



# CERTIFICATION AND FINANCING PROPOSAL

## BORDER-WIDE PUBLIC TRANSPORTATION IMPROVEMENT PROGRAM IN MEXICO

*Submitted: May 1, 2014*

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#### INDEX

<b>EXECUTIVE SUMMARY .....</b>	<b>2</b>
<b>1. ELIGIBILITY .....</b>	<b>3</b>
<b>2. CERTIFICATION CRITERIA</b>	
2.1 Technical Criteria	
2.1.1. Project Description .....	3
2.1.2. Technical Feasibility .....	12
2.1.3. Land Acquisition and Right-of-Way Requirements .....	14
2.1.4. Management and Operations .....	14
2.2 Environmental Criteria	
2.2.1. Compliance with Applicable Environmental Laws and Regulations .....	15
2.2.2. Environmental Effects/Impacts .....	16
2.3 Financial Criteria	
<b>3. PUBLIC ACCESS TO INFORMATION</b>	
3.1 Public Consultation .....	24
3.2 Outreach Activities .....	24

## EXECUTIVE SUMMARY

### BORDER-WIDE PUBLIC TRANSPORTATION IMPROVEMENT PROGRAM IN MEXICO

<b>Project:</b>	The proposed project consists of the development of a vehicle purchase program to support the acquisition of low-emission vehicles for public transportation (PT) within the 300-kilometer border region in Mexico (the “Project”).
<b>Project Objective:</b>	The Project will improve PT fleets through a vehicle purchase program (the “Bus Program”) by facilitating the financing of low-emission technology vehicles, contributing to the displacement of greenhouse gases (GHG) and other pollutants in urban areas throughout the northern border region of Mexico.
<b>Expected Project Outcomes:</b>	The Project is expected to generate environmental and human health benefits related to the displacement of an estimated 192 metric tons/year of carbon dioxide (CO <sub>2</sub> ), 30 metric tons/year of nitrogen oxides (NOx) and 1.2 metric tons/year of hydrocarbons (HC). <sup>1</sup>
<b>Sponsor:</b>	Mercader Financial, S.A. de C.V., SOFOM, E.N.R. (Mercader).
<b>Borrower:</b>	Mercader.
<b>Project Cost:</b>	\$150.0 million pesos (US\$11.4 million). <sup>2</sup>
<b>Loan Amount:</b>	\$120.0 million pesos (US\$9.1 million).

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<sup>1</sup> The target emission is calculated considering the displacement of demand on the existing EPA 1998 technology vehicles commonly used for public transportation with 100 low-emission buses offered by the proposed program with anticipated emission improvements based on the EPA 2004 technology standards of the new diesel vehicle option.

<sup>2</sup> Unless otherwise noted, all U.S. dollar figures are quoted at an exchange rate of \$13.16 pesos per dollar, according to Bloomberg.com dated March 14, 2014.

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### BORDER-WIDE PUBLIC TRANSPORTATION IMPROVEMENT PROGRAM IN MEXICO

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#### 1. ELIGIBILITY

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##### **Project Type**

The Project falls in the eligible sector of public transportation (PT).

##### **Project Location**

The Project will be implemented within the 300-kilometer BECC/NADB jurisdiction in Mexico.

##### **Project Sponsor and Legal Authority**

The **private-sector project sponsor** is Mercader Financial, S.A. de C.V., SOFOM, E.N.R. (Mercader or the “Sponsor”), a financial entity created in 1992 with the authorization of the Ministry of Finance and Public Credit (SHCP) to operate as a lender for heavy vehicle sales. Mercader is the financing division of DINA Camiones, S.A. de C.V. (DINA), a Mexican bus manufacturer.

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#### 2. CERTIFICATION CRITERIA

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##### 2.1 TECHNICAL CRITERIA

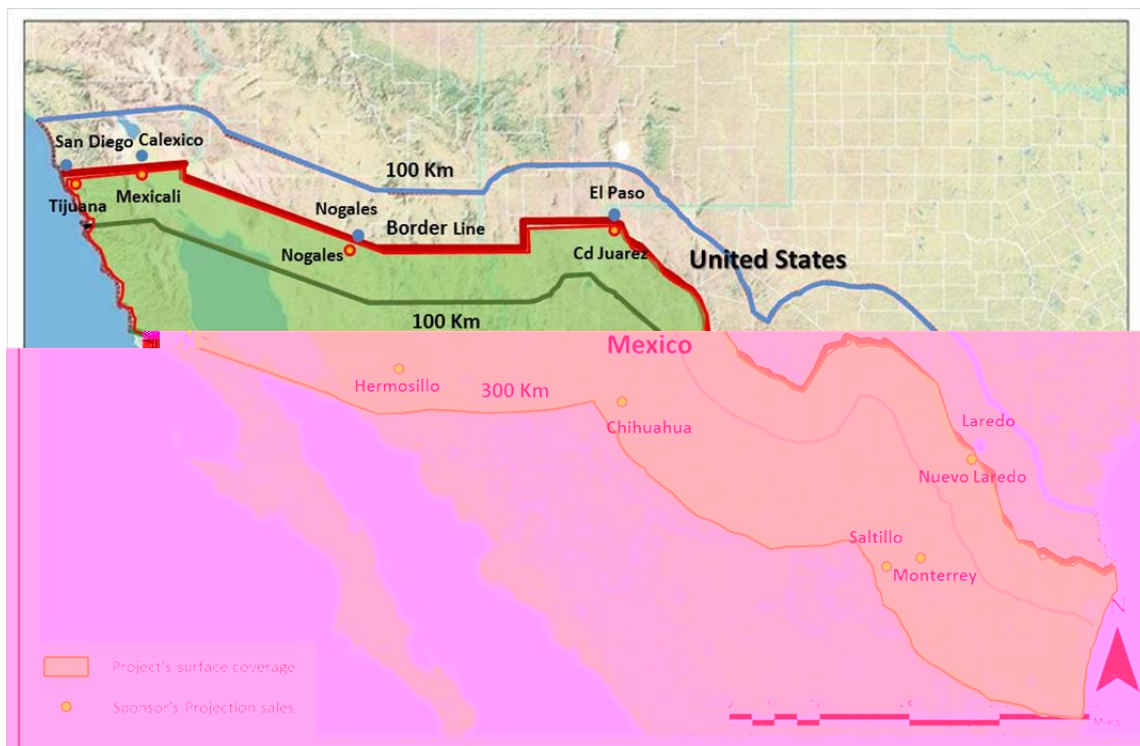
##### 2.1.1. Project Description

##### **Geographic Location**

The Project is intended to improve public transportation systems through the financing of low-emission multi-passenger vehicles or buses in urban areas within the 300-km border region in Mexico. The most likely market for the new buses exists in large cities, such as Mexicali, Tijuana, Hermosillo, Nogales, Chihuahua, Ciudad Juarez, Saltillo, Monterrey, and Nuevo Laredo, where there is a substantial demand for access to PT systems.

Figure 1 shows the BECC/NADB jurisdiction within Mexico, identifying those major urban markets, as noted above.

**Figure 1**  
**PROJECT VICINITY MAP**



### **General Community Profile**

The six northern Mexican Border States represent 17.8% of the country's population and 22.6% of its GDP. Because PT systems are typically established in densely populated urban areas, the Project Sponsor anticipates that the cities identified in Figure 1 will be the primary market for Project implementation; however, the implementation of the Project is not limited only to these locations. Below is a brief summary of the demographics of these major cities.

**Table 1**  
**URBAN AREA DEMOGRAPHICS**

City	Population*	Annual Growth Rate**	Average Household Income* (MX\$)	Main Workforce Activities*
Monterrey	4,106,054	1.99	130,500	Manufacturing, commerce and services
Juarez	1,321,004	0.65	81,500	Manufacturing
Tijuana	1,300,983	1.56	87,500	Manufacturing
Chihuahua	809,232	1.42	146,500	Manufacturing
Hermosillo	715,061	1.60	186,500	Manufacturing and commerce
Nogales	111,295	1.64	112,800	Manufacturing and services
Saltillo	709,671	1.43	156,000	Manufacturing and commerce
Mexicali	689,775	1.38	120,900	Manufacturing
Nuevo Laredo	373,725	1.14	57,800	Manufacturing, commerce and logistics

\*Source: Mexican national statistics institute, *Instituto Nacional de Estadísticas y Geografía* (INEGI), 2010.

\*\*Source: Mexican national population council, *Consejo Nacional de Población* (CONAPO), 2010-2015.

According to the Mexican national statistics institute, *Instituto Nacional de Estadísticas y Geografía* (INEGI), a notable percentage of households within these same urban areas do not own a personal vehicle.<sup>3</sup> Table 2 presents the number of total households and the number of those households without a personal vehicle.

**Table 2**  
**HOUSEHOLDS WITHOUT A VEHICLE IN 2010**

City	Total Households	Total Households Without a Personal Vehicle	% Without a Personal Vehicle
Monterrey	994,274	418,519	42%
Juarez	342,814	123,743	36%
Tijuana	419,357	152,896	36%
Chihuahua	228,580	64,088	28%
Hermosillo	210,275	65,798	31%
Nogales	57,647	1,297	2%
Saltillo	184,417	70,472	38%
Mexicali	258,788	62,661	24%
Nuevo Laredo	94,979	31,944	34%

Source: INEGI, 2010.

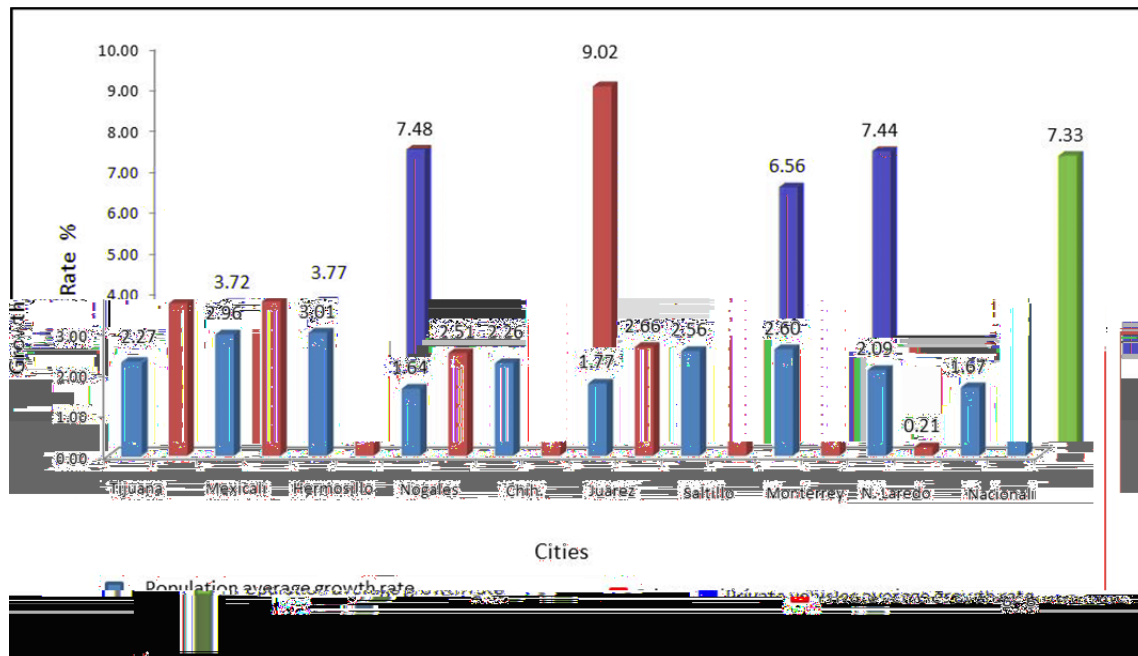
<sup>3</sup> INEGI is the agency responsible for collecting, analyzing, and distributing statistics for vehicle registrations in Mexico. The data does not provide specific information related to registered vehicles, such as use, condition, or emissions.

Since the average number of persons per household in the border region is estimated to be 3.7, it is likely that more than 3.5 million persons lack access to a personal vehicle and, therefore, depend on public transport to support their daily activities: employment, school, and access to health care and other needs.

### **Public Transportation Profile**

INEGI reported that more than 15.6 million vehicles were registered in 2000 in Mexico. By 2010, vehicle inventories had more than doubled to 31.6 million. Nearly 20% of these vehicles were registered in the six northern Border States. In fact, the average growth rate for personal vehicles in many of the main border cities over the last 10 years grew at a significantly faster rate than the population itself. Figure 2 shows a comparison of population and private vehicle registration growth rates for each of the cities mentioned above.

**Figure 2**  
**POPULATION VS PERSONAL VEHICLE REGISTRATION GROWTH RATES**  
 (2000-2012 Average)



Source: INEGI: Registered motor vehicles in circulation.

[http://www.inegi.org.mx/sistemas/olap/Proyectos/bd/continuas/transporte/vehiculos.asp?s=est&c=13158&proy=vmrc\\_vehiculos](http://www.inegi.org.mx/sistemas/olap/Proyectos/bd/continuas/transporte/vehiculos.asp?s=est&c=13158&proy=vmrc_vehiculos)

In its most recent publication, INEGI reported over 35 million vehicles registered nationwide in 2012, an increase of nearly four million in two years. Of this total, approximately 67% of the vehicles registered are for personal use, 28% are heavy trucks for commercial transportation, 1% is for public transportation, and the remaining 4% are motorcycles. Even with the steep growth trend in the number of registered vehicles, based on the statistics described above, less than 63% of households in the border region's major urban areas have access to privately-owned vehicles.

Mexico's National Development Plan 2013-2018 (NDP) recognizes the need to address the existing transportation inefficiencies and to implement infrastructure that facilitates the transportation of people in a rapid, efficient and low-cost manner.<sup>4</sup> The document also encourages improved mobility within cities by promoting urban transportation systems consistent with sustainable urban development and the use of state of the art technologies to optimize service. In addition, each state and many municipalities have programs and strategies to support sustainable urban development, including the expansion and renovation of PT systems.

According to a study published by the Mario Molina Center, Mexico has experienced significant population growth and expansion in urban areas, resulting in increased demand for public and private transportation; therefore, more vehicles are on urban roadways, giving rise to side-effects such as traffic congestion, accidents, pollution and noise.<sup>5</sup> Additionally, the increased use of private vehicles in comparison with buses promotes an inefficient use of the urban surface, with private vehicles parked nearly 95% of the time, while public transportation works throughout the day and uses up to 50 times less road space per passenger carried. This study recommends that public transportation should take precedence over private vehicles and should incorporate clean technologies and clean fuels: ultra-low sulfur diesel (ULSD) or compressed natural gas (CNG).<sup>6</sup>

To further understand PT operating conditions in the border region and identify some benefits of the proposed Bus Program, the existing regulations guiding public transportation are summarized below, along with some of the data gathered in a study conducted by BECC for specific PT system characteristics in several of the urban markets identified for the Project.

BECC's review found that the development and operation of public transportation is regulated by each state or, in some cases, directly by the municipalities. In general, the public regulations control the number of licenses and thus the number of vehicles that can be utilized for public transportation. The majority of the existing regulations also specify the maximum allowable age of the vehicles used to provide public transportation services. Table 3, below, summarizes the primary requirements identified by BECC in the transportation regulations.<sup>7</sup>

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<sup>4</sup> This plan lists the major objectives of public policies and sets specific actions to achieve those objectives, as well as indicators to measure their progress.

<sup>5</sup> The Mario Molina Center for Strategic Studies on Energy and Environment is an independent non-profit association created in 2005 that contributes to decision-making in the public and private sectors in Mexico. The research center is named in honour of Mario José Molina, recipient of the 1995 Nobel Prize in Chemistry for his role in elucidating the threat to the Earth's ozone layer from chlorofluorocarbon gases (CFC), <http://centromariomolina.org/english/>.

<sup>6</sup> Source: Centro Mario Molina, *Hacia Un Modelo de Transporte Sustentable para las Ciudades Mexicanas* (Towards a Sustainable Transport Model for Mexican Cities), [http://centromariomolina.org/el-impacto-del-cambio-climatico-en-la-agricultura/#\\_ftn1](http://centromariomolina.org/el-impacto-del-cambio-climatico-en-la-agricultura/#_ftn1).

<sup>7</sup> A list of reference documents is available upon request.



**Table 3**  
**SUMMARY OF PT SYSTEM REGULATIONS**

State	Legal Authority	Requirements		Emission Requirements
		Fleet Age	Vehicles per License	
Baja California	State (state-wide / inter-municipal) Municipal	Tijuana – 8 yrs Mexicali – Not defined	Defined in license	Tijuana – Not defined Mexicali – Yes
Sonora	State	Not defined	1	Not defined
Chihuahua	State	10	1	Yes
Coahuila	State (state-wide / inter-municipal) Municipal	Not defined	1	Yes
Nuevo León	State	10	Defined in license	Not defined
Tamaulipas	State	8	Sole proprietor: 1 Associations: Defined in license	Not Defined

Public transportation regulations are aimed at properly managing the number of buses in relationship to demand. One of the strategies used in several border cities is to limit the number of service licenses and related number of vehicles. The regulations also serve to prevent inefficiencies related to the useful life of PT vehicles, including increasing emissions which may be related to substandard engine conditions.

In order to comply with these regulations, there is a strong expectation that the new low-emission buses may replace less efficient vehicles rather than expand the existing fleet. Since some states limit the allowable age of the vehicles in use, older vehicles may be discontinued in the PT fleet and will require proper disposal or their components may be recycled and sold as spare parts. Based on the PT system conditions and regulations identified by BECC, as well as national, state and local public policy and transportation strategies, the proposed Project will provide an important financing program to advance the integration of more efficient, low-emission buses into the program

**Table 4**  
**BECC URBAN TRANSPORTATION STUDY FINDINGS AND CONCLUSIONS**

<b>Tijuana, B.C.</b>	
Findings:	<ul style="list-style-type: none"> <li>The average age of the fleet is 13 years, which is the oldest of the cities analyzed.</li> <li>The public transportation fleet has a total of 2,223 vehicles: 1,155 have a capacity of 40 seats and the remaining vehicles have a capacity of 24 seats.</li> <li>Based on the number of vehicles and available seats, the current fleet size appears sufficient to meet demand.</li> <li>A high number of licenses with units varying in vehicle capacity create inefficiencies related to operation and maintenance, as well as more vehicles on the road than necessary.</li> </ul>
Conclusions:	The vehicle fleet should be replaced with cleaner and more efficient units and the vehicle size and technology should be standardized to make the system more efficient.
<b>Mexicali</b>	
Findings:	<ul style="list-style-type: none"> <li>The average age of the fleet is 4 years, which is one of the youngest of the cities analyzed.</li> <li>The fleet has a total number of 427 vehicles: 420 have a capacity of 40 seats and the remaining vehicles have a capacity of 14 seats.</li> <li>Based on the number of vehicles and available seats, the current fleet size appears insufficient to meet demand.</li> </ul>
Conclusions:	The Mexicali transportation system may require additional units to meet current and future demand.
<b>Hermosillo</b>	
Findings:	<ul style="list-style-type: none"> <li>The average age of the fleet is 4 years, which is one of the youngest of the cities analyzed.</li> <li>The fleet has total of 455 vehicles; all of them have a capacity of 40 seats.</li> <li>Based on the number of vehicles and available seats, the current fleet size appears to meet current demand, but is unlikely to meet growing needs.</li> <li>The long distances traveled on a daily basis indicate that the existing vehicles, although new, may require intensive operation and maintenance, which may accelerate the need for vehicle replacement.</li> </ul>
Conclusions:	Hermosillo should renew or supplement its fleet with more efficient vehicles, due to their heavy usage, even though the average fleet age is currently not a matter of concern.
<b>Nogales</b>	
Findings:	<ul style="list-style-type: none"> <li>The average age of the fleet is 15 years, which is the oldest of the cities analyzed.</li> <li>The fleet has a total number of 179 vehicles: 129 have a capacity of 40 seats, 20 have a capacity of 24 seats, and the remaining vehicles have a capacity of 14 seats.</li> <li>Based on the number of vehicles and available seats, the current fleet size appears insufficient to meet demand.</li> </ul>
Conclusions:	The vehicle fleet should be replaced with cleaner and more efficient buses.

<b>Chihuahua</b>	
Findings:	<ul style="list-style-type: none"> <li>• The average age of the fleet is 6 years, the youngest after Mexicali and Hermosillo.</li> <li>• The fleet has a total of 528 vehicles; all of them have a capacity of 40 seats.</li> <li>• Based on the number of vehicles and available seats, the current fleet size appears to be well balanced to meet demand.</li> <li>• The distance travelled per unit is the longest among the analyzed cities; so there is potential for replacement of units in the midterm due to intensive operation.</li> </ul>
Conclusions:	Chihuahua has a good PT system, and the possibility of implementing a program for the replacement of bus engines that use alternative fuels, such as natural gas, should be explored.
<b>Juarez</b>	
Findings:	<ul style="list-style-type: none"> <li>• The average age of the fleet is 12 years, which is one of the oldest of the cities analyzed, just behind Tijuana.</li> <li>• The public transportation fleet is the second biggest of all with a total of 1,016 vehicles, all of which have a capacity of 40 seats.</li> <li>• Daily travel per unit is the second longest, just behind Chihuahua, which is likely influenced by the broad area covered by the city, requiring vehicles to travel long distances to serve a larger area. Inefficient route design may also be a negative influence.</li> </ul>
Conclusions:	The vehicle fleet should be replaced with cleaner and more efficient buses.

All of the cities studied by BECC have recently invested in projects for appropriate PT system improvements, such as fleet renovation and route efficiencies, as well as considered necessary rate adjustments. For example, cities such as Chihuahua, Ciudad Juarez, and Tijuana have worked to develop bus rapid transit (BRT) systems to further address the public transportation demands of their main urban corridors. Other cities in the border region, such as Monterrey, which was not included in BECC's study, have achieved significant progress in public transportation systems. The city has an agency dedicated to managing PT and in recent years has worked towards the implementation of a BRT system and renovation of its fleet.

There is also another type of PT service in the border region. Many companies offer specific bus service to transport personnel to and from manufacturing and other facilities. This service is typically offered to address some deficiencies in the PT system and as a benefit to employees as well as, a more secure means of supporting attendance at work. Buses are routed to pick up employees near their homes and thus make several stops on the way to the company's facilities. These additional vehicles are not included in the PT fleets described above and can only be used by company personnel. This service requires a specific license that does not permit public use of the buses, and which are also subject to emission requirements.

**Project Scope and Design**

The proposed Project will establish a Bus Program to support the acquisition of low-emission vehicles in the border region of Mexico. The Project Sponsor has a well-established financing program that is designed to extend purchasing credit to reputable PT service providers, associations or individuals.

Clients seeking financing under the Bus Program will have to meet the following conditions:

- Potential borrowers, including private transportation services to manufacturing companies, must have an existing license for the operation of a PT vehicle within the 300-km border region.
- The bus should be used for transportation within cities and urban areas.
- Only the most-state-of-the-art vehicles will be available, including ULSD and/or CNG available fuel sources in the area of the service provider or based on local transportation system policies.
- Purchasers will need to complete available training from the manufacturer, access other technical assistance support provided by the manufacturer and comply with warranty requirements, such as preventive maintenance activities, as determined by the manufacturer.

According to the Project Sponsor, the typical life cycle of a new vehicle is 7 to 8 years. The Project Sponsor will provide a 3-year warranty on the vehicle.

## 2.1.2. Technical Feasibility

### Selected Technology

Development in engine technology has evolved over the last 20 years as a result of increasingly stricter emission regulations. However, improvements in engine technology alone have not been sufficient. Fuel quality and exhaust after-treatment systems have also been required.

The vehicles available for purchase through the Bus Program will be manufactured by DINA Camiones, one of the largest bus and truck manufacturers in Mexico. DINA employs a High Technology Quality system to manufacture vehicles that meet the strict requirements set by the international market and official Mexican Standards, considering such parameters as:

- Vehicles designed as a complete unit with modular structure.
- Cutting-edge designs and technology to increase quality and efficiency.
- Better performance with lower weight (from 1,000 to 2,600 lbs. less than other brands).
- Lower initial investment.
- Lower operating cost.
- Solid infrastructure that allows the development of integrated projects.
- Development of sustainable vehicles with lower fuel consumption and greenhouse gas (GHG) emissions.

Table 5 shows the bus models, along with the corresponding emission standard and engine technology, which will be made available by DINA through the proposed Bus Program.


**Table 5**  
**DINA VEHICLES AVAILABLE FOR PUBLIC TRANSPORTATION**

Commercial name	Type of Fuel	Emission Technology*	Engine Model Family
Picker	Diesel	EPA 2004	Cummins ISB
Linner	Diesel	EPA 2004	Cummins ISB
Linner-8	Diesel	EPA 2004	Cummins ISF
Linner-G	Natural Gas	EPA 2013	Cummins ISL G
Runner 8, 9 & 10	Diesel	EPA 2004	Cummins ISB
BRT Brighter	Diesel	EPA 2004	Cummins ISM
BRT Ridder	Natural Gas	EURO V	Cummins ISL
Ridder-G	Natural Gas	EPA 2013	Cummins ISL

\* See Table 7 for emission factors.

The Cummins engines used by DINA in their vehicles comply with Mexican regulations and require a certification from the Mexican federal environmental protection agency, *Procuraduría Federal de Protección al Ambiente* (PROFEPA), which ensures compliance with current standards. A list of certifications available for the engines is provided in section 2.2.1, below.

With low-emission technology in each model option, PT service providers can consider other vehicle characteristics to determine the most appropriate model to meet demand in their



### 2.1.3. Land Acquisition and Right-of-way Requirements

There are no land acquisition and rights-of-way requirements for the proposed Project. PT service providers requesting financing through the Bus Program will be required to demonstrate the appropriate license to own and operate the PT vehicle.

### 2.1.4. Management and Operations

Mercader provides various financial services in Mexico, including leasing services; loans for the acquisition of fixed assets; and loans for the purchase of passenger or cargo trucks. It serves micro, small, and medium enterprises in transportation, logistics and storage, food, automotive, real estate, and other sectors. The company was founded in 1992 and is based in Mexico City, Mexico. Mercader has extensive experience with the proposed financial structure with other banks, including other development banks, such as NAFIN. Mercader currently manages more than 800 loan accounts nationwide.

As the manufacturer of the buses, DINA has more than 60 years of experience offering solutions for public transportation through custom-made products using the latest technology for heavy vehicles. DINA has a manufacturing capability of 5,000 buses per year and offers guaranties against any defect for manufacturing and operation.

DINA has a technical assistance program accessible with the purchase and delivery of a vehicle, including a 24-hour toll-free number attended by qualified staff. The program offers four key services:

- Training: Vehicle operation and functions are reviewed to support optimal conditions for driver and passengers. Additionally, the mechanical features and basic maintenance activities are reviewed to ensure high performance. Once the training is complete, an evaluation is conducted to document if the training objectives were met.
- Mobile Service Units: Qualified personnel are deployed to diagnose any vehicle failure at the clients' facilities.
- Technical Manuals: Maintenance and vehicle parts manuals, maintenance schedules and logbooks are available on-line.
- Spare Part Supplies: Parts and materials are available nationwide in 13 warehouses and 57 service centers.

The partnership between the financing entity and bus manufacturer establishes a strong foundation for the operation and management of the proposed Project.

## 2.2 ENVIRONMENTAL CRITERIA

### 2.2.1. Compliance with Applicable Environmental Laws and Regulations

Applicable environmental laws and regulations for this project are applied specifically to the emission standards of the new vehicles. The federal government of Mexico has enacted standards for emissions and opacity from vehicles based on fuel source, as follows:

- NOM-044-SEMARNAT-2006, which establishes the maximum allowable pollutant emission levels of HC, NOx, carbon monoxide (CO), particulate matter and opacity for diesel vehicles.
- NOM-045-SEMARNAT-2006, which establishes the maximum allowable level of opacity for diesel vehicles.
- NOM-076-SEMARNAT-2012, which establishes maximum emission limits for unburned hydrocarbons (UHC), NOx and CO and evaporative emission limits for HC for new heavy-duty engines that use gasoline, liquid petroleum gas (LPG), natural gas or other alternative fuels.

The vehicles that will be manufactured and sold through the proposed Bus Program use ULSD or CNG, aligned with the EPA 2004, EPA 2013 or EURO V emission technologies.<sup>10</sup>

#### **Environmental Studies and Compliance Activities**

The engine models for each vehicle are reviewed by PROFEPA for compliance with the applicable standard. Once approved, PROFEPA issues a certification. For the models proposed for the Project, all certifications have been issued.

It is the responsibility of the municipality and the state to establish the necessary regulations to ensure an efficient service and to inspect all vehicles destined for public transportation service. As described above, only some regulatory frameworks enforce emission testing for vehicles. For municipalities with vehicle emission standards, bus owners must comply with emission testing requirements. Based on the results of this test, the municipality has the authority to remove a bus from service if it is highly contaminating or does not meet mechanical or technological requirements.

DINA has performed and submitted a study to justify a Nationally Appropriate Mitigation Action (NAMA) to reduce GHG emissions. In contrast to the Clean Development Mechanism, NAMAs do not need to be project-based and do not necessarily address point sources of emissions or result in the issuance of carbon credits to be bought and sold in the carbon market.<sup>11</sup> A NAMA is simply any action that ultimately contributes to GHG emission reductions while addressing the

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<sup>10</sup> EURO V was adopted by the EU Parliament in 2008. The directive set more stringent voluntary emission limits for extra low-emission vehicles, known as “enhanced environmentally friendly vehicles” or EEVs. (<http://transportpolicy.net/index.php?title=EU: Heavy-duty: Emissions>).

<sup>11</sup> The Clean Development Mechanism (CDM) allows a country with an emission-reduction or emission-limitation commitment to implement an emission-reduction project in developing countries. Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one ton of CO<sub>2</sub>, which can be counted towards meeting Kyoto targets. ([http://unfccc.int/kyoto\\_protocol/mechanisms/clean\\_development\\_mechanism/items/2718.php](http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php)).



development needs of a country. The NAMA study describes the general condition of public transportation systems in Mexico and the advantages of promoting a larger use of vehicles fueled by natural gas.

### **Pending Environmental Tasks and Authorizations**

There are no pending environmental tasks or authorizations.

### **Compliance Documentation**

Certifications issued by PROFEPA to Cummins engines include:<sup>12</sup>

- Certification Number PFPA-S11 DGIFC-VN-439/2011 for Model No. ISM 500 HP, Family 353X Utilized in DINA BRT Brighter.
- Certification Number PFPA-S11 DGIFC-VN-445/2011 for Model No. ISB 280 HP, Family ISB-EX/PX6, Utilized in DINA Runner, Linner, Picker, Outsider.
- Certification Number PFPA-S11 DGIFC-VN-451/2011 for Model No. ISL8.9E5400, Family ISL8.9E5, Utilized in DINA Ridder.

## **2.2.2. Environmental Effects/Impacts**

There are many reasons why residents may be interested in using public transportation, including cost savings related to reduced fuel consumption, parking, and/or maintenance costs; reduced stress; and increased time available for activities while riding a bus (reading, conferencing, etc.). Additional benefits to the system user and to the broader community include but are not limited to:

- A reduction in the number of cars on the road, which helps to alleviate traffic congestion, and thus helps to improve air quality and reduce noise pollution,
- An increase in labor productivity by reducing travel time and out-of-pocket costs of commuters in congested areas, and
- An opportunity to reduce energy consumption, GHG and other pollutants.

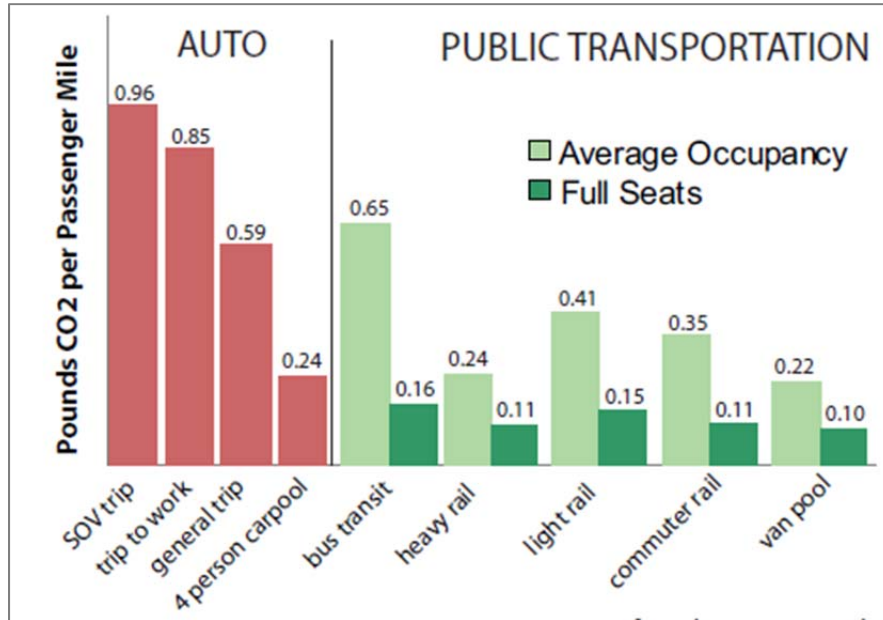
According to the U.S. Department of Transportation, new buses (especially newer diesel vehicles) produce less pollution than cars per passenger mile, 0.16 pounds of CO<sub>2</sub> and 0.96 pounds of CO<sub>2</sub>, respectively, by utilizing advanced technologies and higher standards.<sup>13</sup> Figure 4 shows estimated CO<sub>2</sub> emissions per passenger mile.

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<sup>12</sup> Source: <http://www.dina.com.mx/>.

<sup>13</sup> Source: U.S. Department of Transportation, Public Transportation's Role in Responding to Climate Change, <http://www.fta.dot.gov/documents/PublicTransportationsRoleInRespondingToClimateChange.pdf>.

**Figure 4**  
**ESTIMATED CO<sub>2</sub> EMISSIONS PER PASSENGER MILE**  
**FOR AVERAGE AND FULL OCCUPANCY**



Source: U.S. Department of Transportation.

The Project is expected to improve public transportation systems by promoting access to low-emission buses, offering a comfortable, safe, fast, and accessible transportation option for the existing market, as well as achieving lower emissions related to vehicle operation and reduced urban congestion, which serves a broader environmental and human health benefit.

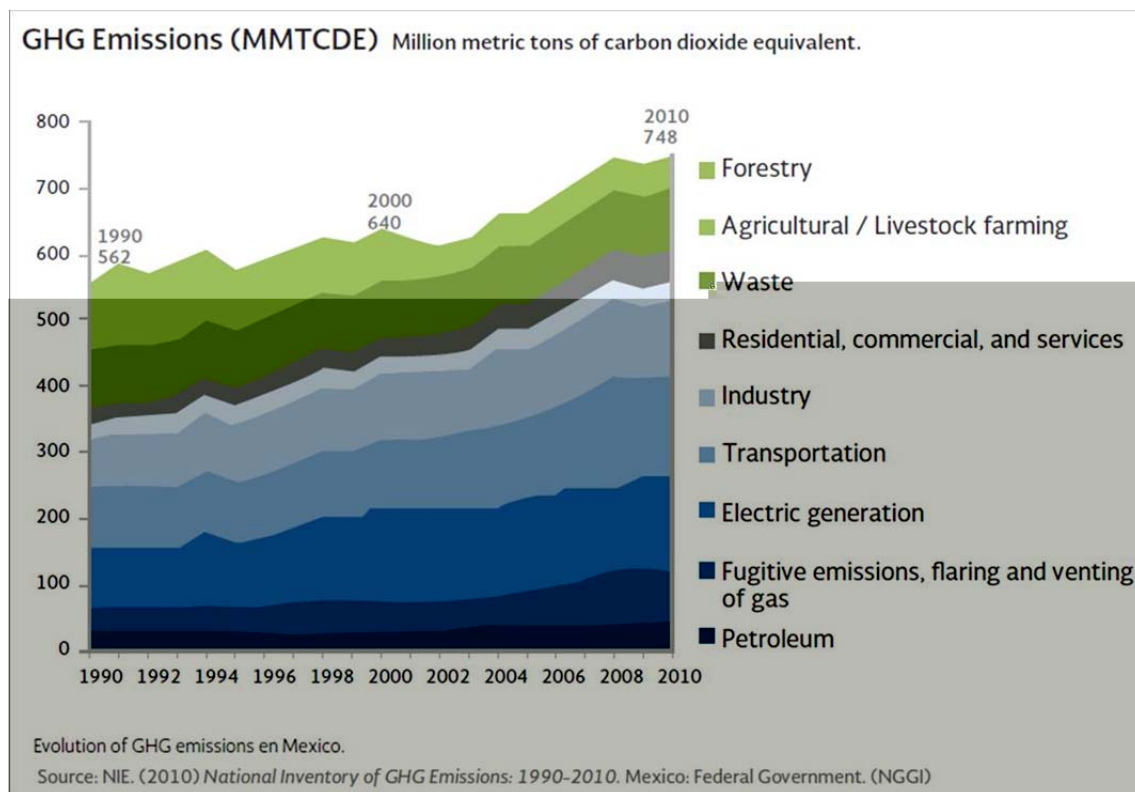
#### **Existing Conditions and Project Impact – Environment**

Mexico's National Climate Change Strategy indicates that GHG emissions increased 13.87% between 1990 and 2000 and 16.9% between 2000 and 2010. Mexico emitted GHG equivalent to 748 million metric tons of CO<sub>2</sub> (MMTCDE),<sup>14</sup> representing a total increase of 33% in 20 years. In the period 2001-2010, GHG emissions registered an average annual growth rate (AAGR) of 2.6%, while the GDP grew at an average annual rate of 1.9%. Figure 5, shows the evolution of GHG emissions in Mexico and their sources. One of the emission sources that has registered the largest increase is transportation, with an AAGR of 4.1% between 1990 and 2010. This increase is mainly due to urbanization in Mexico during this period and the rapid growth of the vehicle fleet (with an AAGR of 6.3% between 2004 and 2009). The transportation sector has been associated with nearly 30% of total CO<sub>2</sub> equivalent emissions in Mexico.<sup>15</sup>

<sup>14</sup> Million metric tons of CO<sub>2</sub> equivalent.

<sup>15</sup> Source: National Climate Change Strategy, 10-20-40 Vision.

**Figure 5**  
**EVOLUTION OF GHG EMISSIONS IN MEXICO**



Source: National Climate Change Strategy, 10-20-40 Vision.

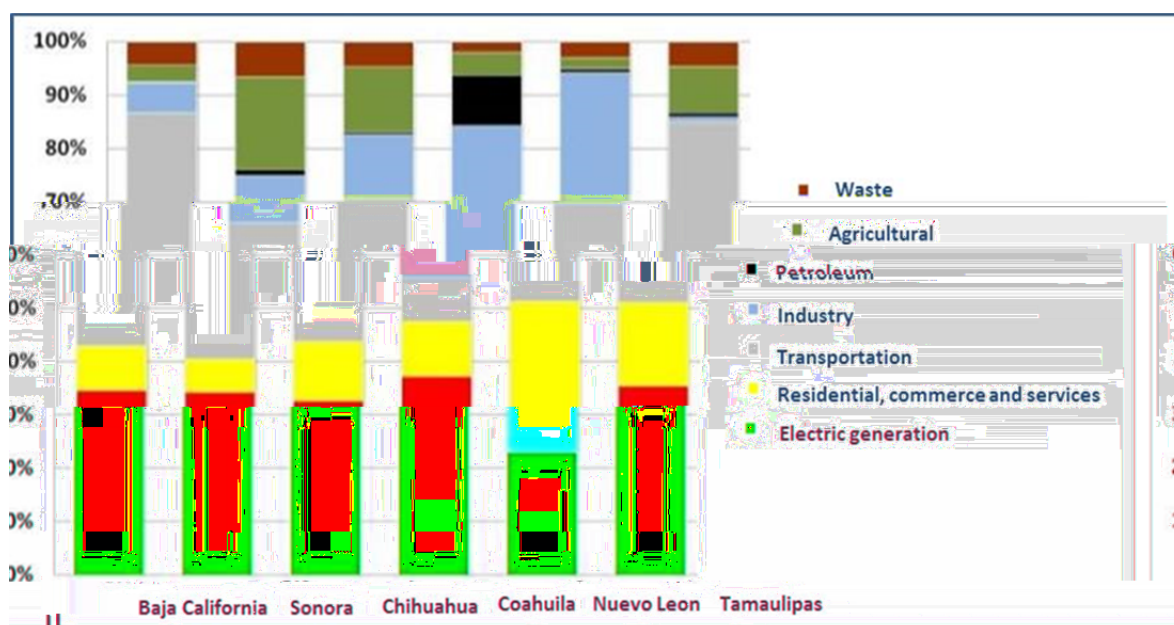
According to Mexico's 2005 National Emissions Inventory (INEM), urban buses nationwide emitted 1.9% of mobile sources of total CO, 16.8% of NO<sub>x</sub>, 16.0% of PM<sub>10</sub> and 2.0% of HC.<sup>16</sup> The emissions of urban buses in the six Mexican border states contributed with 0.1% of mobile sources of CO, 3.5% of NO<sub>x</sub>, 2.6% of PM<sub>10</sub> and 0.2% of HC.

Regarding GHG emissions, in 2005, the six northern border states of Mexico emitted a total of 141.3 MMTCDE or 21.7% of national emissions. Figure 6 shows the main sources of GHG emissions in the six northern border states of Mexico.<sup>17</sup>

<sup>16</sup> Latest version at the time this document was prepared.

<sup>17</sup> Mexico's National Emissions Inventory Subsystem, 2005. <http://sinea.semarnat.gob.mx/sinea.php?>

**Figure 6**  
**EVOLUTION OF GHG EMISSIONS IN MEXICO**



Source: BECC, *Border States Climate Change Action Plans*.

As indicated in the emissions inventory chart, the transportation sector has been a major contributor to GHG in the border region. As part of their climate action planning based on these inventories, the states of Baja California, Sonora, and Coahuila have identified new public policy options and several potential projects to support emission reductions in the transportation and urban development sectors.

As shown in Table 7, below, the use of new diesel vehicles that comply with EPA 2004 standards, will lower NO<sub>x</sub> and HC emissions by approximately 50% and will achieve nearly 24% lower CO<sub>2</sub> emissions. In the case of natural gas-fueled vehicles, the criteria pollutant emissions are nearly eliminated, which provides a benefit to the air quality of the community and reduces risks to human health.

**Table 7**  
**EMISSION FACTORS FOR VEHICLE TECHNOLOGIES**

Technology	Fuel	Criteria Pollutants Emission Factor (g/mile) <sup>A)</sup>				GHG (g/mile) <sup>B)</sup>
		NO <sub>x</sub>	HC	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
EPA 1998	Diesel	14.88	0.61	0.14	0.13	1,617.60
EPA 2004	Diesel	8.84	0.36	0.14	0.13	1,579.20
EPA 2013	Natural Gas	0.80	0.19	0.04	0.04	1,320.00

Sources:

A) California Environmental Protection Agency, Air Resources Board, *Methods to Find the Cost-Effectiveness of Funding Air Quality Projects*

B) Intergovernmental Panel on Climate Change (IPCC)

Although it is unknown how many diesel or CNG vehicles will be sold, it can be expected that more diesel units will be sold due to the availability of the ULSD fuel source in the border region. The emission reduction is calculated considering the displacement of demand on existing vehicles with EPA 1998 technology, commonly used for public transportation in the border area, with 100 low-emission buses based on EPA 2004 technology standards. The anticipated environmental and human health outcomes generated by the Project are related to the displacement of 192 metric tons/year of CO<sub>2</sub>, 30 metric tons/year of NO<sub>x</sub> and 1.2 metric tons/year HC.

In the case of natural gas vehicles, for each unit sold, the emission displacement results will significantly increase for criteria pollutants. The results measurement process will document the actual vehicle types sold through the Bus Program and calculate the displaced emissions based on that condition.

#### Mitigation of Risks

Based on Project implementation, the following potential risks have been identified:

- Additional emissions will be generated by the introduction of a new vehicle.
- The addition of new buses may oversaturate the fleet and affect the efficiencies of the PT system.
- An existing PT vehicle replaced by a new bus will require proper disposal.

Based on information presented in the public transportation profile, the growth rate of personal vehicles exceeds the population growth rate in several urban areas in the border region. The Project will help to address existing demand for mobility, with new buses (especially newer diesel vehicles) that produce less pollution than cars per passenger mile by utilizing advanced technologies and higher standards. Additionally, there is a growing demand for the expansion, improvement or renovation of existing PT systems. Without facilitating access to new vehicles, the demand will be met by the existing fleet or personal vehicles, which emit greater quantities of harmful emissions. The use of new low-emission technology buses will mitigate overuse of aging and less efficient PT vehicles and provide a safe and comfortable option to existing PT users.

Since existing regulations limit the number of licenses and/or the allowable age of vehicles used for PT services, it is likely that new low-emission buses will be purchased to replace less efficient vehicles rather than to expand existing fleets. Older less efficient vehicles that are discontinued in the PT fleet will require proper disposal or components of the vehicles may be recycled and sold as spare parts. The used vehicle, its parts and associated liquid waste is classified as special waste, which is regulated for proper disposal under the General Law for Waste Prevention and Management, and implemented and enforced by the states.

#### Natural Resource Conservation

The Project will be implemented within existing urban areas which have been previously impacted; therefore, it is not expected that the Project will have a negative impact on natural resources.

The higher-efficiency vehicles supported by the Project will use less fuel and oil, decreasing the demand on fossil-fuel resources. Additionally, the improved option for public transportation is expected to increase the general efficiency of urban mobility, resulting in improved air quality and lower GHG emissions.

#### No Action Alternative

The proposed EPA 2004 technology for the Project is the cleanest technology available in Mexico for diesel engines and is cleaner than the technologies being used for current public transportation systems in the border area. The technology commonly used in the border area is EPA 1998 with outdated emission control systems. The Project provides an opportunity to successfully facilitate the use of cleaner technologies for the public transportation sector. A lack of viable financing options for purchasing these vehicles may delay or inhibit the renovation of the current PT fleet and increase demand for less efficient means of transportation.

#### Existing Conditions and Project Impact – Health

Diesel and gasoline motor vehicles are a major contributor to air pollution in large cities. It is estimated that 40% of the urban population is exposed to air pollution.<sup>18</sup> Children, the elderly and the infirm are the most affected by this contamination.<sup>19</sup> Pollution is estimated to cause as many deaths per year as traffic accidents.

The International Agency for Research on Cancer (IARC), which is part of the World Health Organization (WHO), has classified diesel engine exhaust from older technologies as carcinogenic to humans, based on sufficient evidence that exposure to criteria pollutants is associated with an increased risk for lung cancer. According to the American Cancer Society, diesel exhaust is also believed to play a role in other health problems, such as eye irritation, headaches, asthma and other respiratory diseases, heart disease, and possibly immune system problems.<sup>20</sup>

Like all fuel-burning equipment, diesel engines produce NOx and HC, which form ground-level ozone, a major component of smog in cities, and have been linked to respiratory illness and other health problems, including:

- Decreases in lung function, resulting in difficulty breathing and shortness of breath.
- Respiratory symptoms, including bronchitis, aggravated coughing, and chest pain.
- Increased incidence/severity of respiratory problems (asthma).
- Chronic inflammation and irreversible structural changes in the lungs.

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<sup>18</sup> Source: *Instituto Nacional de la Salud Pública* (National Health Institute), 2004.

<sup>19</sup> Source: World Health Organization, 2002.

<sup>20</sup> Source: American Cancer Society <http://www.cancer.org/cancer/cancercauses/othercarcinogens/pollution/diesel-exhaust>.

Additionally, sulfur content in diesel engine emissions is associated with health risks, such as: increased risk for lung and bladder cancer; eye irritation; headaches, asthma and other lung diseases; as well as heart disease, and possibly immune system problems.<sup>21</sup>

Because of increasing environmental impacts and environmental health concerns over the past two decades, tighter emission standards for both diesel and gasoline engines have been implemented in North America, Europe and elsewhere. These standards have also required other changes, such as marked decreases in sulfur content in fuels, changes in engine design to burn diesel fuel more efficiently and reductions in emissions through exhaust control technology.

Due to Mexico's proximity to the United States, its northern border cities have access to ULSD fuel and natural gas.<sup>22</sup> The availability of these fuels, along with the use of new low-emission buses, can help reduce the harmful emissions linked to the health risks described above.

### **Transboundary Effects**

No significant transboundary impacts or negative effects have been identified and none are anticipated as a result of the development of the Project. Emissions from diesel engines are a significant source of air pollutants in the border region. In order to address the threat posed by diesel emissions, the Good Neighbor Environmental Board (GNEB), a U.S. federal advisory panel on U.S.-Mexico border issues, recommended in its 2006 annual report that the U.S. and Mexico work collaboratively to reduce emissions from diesel trucks, buses, municipal and private fleets, and passenger vehicles.<sup>23</sup> The Project supports the achievement of this recommendation and a beneficial environmental effect is anticipated. The Project will also aid in addressing other environmental concerns related to GHG and climate change targeted by regional and international agendas.

### **Other Local Benefits**

The Project is expected to generate permanent and temporary jobs in the border region from manufacturing the motors and operating the buses. Cummins, which designs, manufactures, distributes and services engines and related technologies worldwide, has several plants on the Mexican northern border. According to the Sponsor, it is estimated that production of 100 vehicles for the Project will require approximately 50 permanent positions and approximately 150 temporary positions.

In addition to the economic benefits of employment, the local communities where the vehicles are purchased would benefit from the renewed public transportation fleet. The renewed fleet would facilitate a better quality, safer and more efficient service while also improving the overall image of public transportation in the community.

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<sup>21</sup> Source: Agency for Toxic Substances & Disease Registry, Toxic Substances portal – Sulfur Dioxide, <http://www.atsdr.cdc.gov/phs/phs.asp?id=251&tid=46>.

<sup>22</sup> Source: Mexican Ministry of Energy, *Prospectiva de Petroliferos 2012-2026* (2012-2026 Petroleum Prospects).

<sup>23</sup> Source: Good Neighbor Environmental Board, Ninth Report to the President and Congress of the United States: Air Quality and Transportation & Cultural and Natural Resources, March 2006. Available online at: <http://www.epa.gov/ocem/gneb/gneb9threport/English-GNEB-9th-Report.pdf>.

## 2.3 FINANCIAL CRITERIA

The Project Sponsor has requested a loan for up to \$120 million pesos from the North American Development Bank (NADB) to complete the financing of the Project, with an estimated cost of \$150 million pesos. The proposed payment mechanism is well known and widely used by the Mexican financial sector to structure similar transactions. The source of payment will be the payments generated by the sale of vehicles to purchasers that qualify for a financing program specifically designed to support the acquisition of low-emission units for public transportation within the 300-kilometer region in Mexico.

NADB performed a financial analysis of Mercader, which included the analysis of its historical financial statements and projected cash flows. From a historical standpoint, the company has experienced consistent annual growth in its loan portfolio while maintaining low delinquency levels, which reflects good asset quality and management. The cash flow projections indicate that Mercader will have sufficient funds to cover both the cost of its operations and debt service requirements, including the NADB loan.

In addition, NADB has verified that Mercader has the legal authority to contract this loan and transfer its collection rights derived from vehicle sales to NADB to serve as the source of payment for the proposed loan. NADB also confirmed that the promissory notes signed by Mercader clients could be endorsed to NADB. As a result, Mercader will become jointly and severally liable for the payment obligations contained in the promissory notes through their full endorsement.

Considering the Project's characteristics and based on the financial and risk analyses performed by NADB, the proposed Project is considered to be financially feasible and presents an acceptable level of risk. Therefore, NADB proposes providing a market-rate loan for up to \$120 million pesos to Mercader for the funding of the program described herein.



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### 3. PUBLIC ACCESS TO INFORMATION

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#### 3.1. PUBLIC CONSULTATION

BECC released the Draft Project Certification and Financing Proposal for a 30-day public comment period beginning March 26, 2014 and ending April 25, 2014. The following Project documentation was made available upon request:

- *Hacia un Modelo de Transporte Sustentable para las Ciudades Mexicanas* (Towards a Sustainable Transport Model for Mexican Cities), Centro Mario Molina.
- List of applicable transportation regulations in the Mexican northern border states.
- *Diagnóstico Preliminar sobre Transporte Urbano de Pasajeros y Emisión de Contaminantes al Medio Ambiente en Siete Ciudades de la Región Fronteriza de México* (Preliminary Needs Assessment of Urban Public Transportation and Pollution Emissions in Seven Mexican Border Cities), BECC, May 2012.
- DINA's NAMA to reduce GHG emissions.
- PROFEPA Certification Number PFPA-S11 DGIFC-VN-439/2011 for Model No. ISM 500 HP, Family 353X Utilized in DINA BRT Brighter
- PROFEPA Certification Number PFPA-S11 DGIFC-VN-445/2011 for Model No. ISB 280 HP, Family ISB-EX/PX6, Utilized in DINA Runner, Linner, Picker, Outsider.
- PROFEPA Certification Number PFPA-S11 DGIFC-VN-451/2011 for Model No. ISL8.9E5400, Family ISL8.9E5, Utilized in DINA Ridder.

One comment was received during the public consultation period. The comment from the Arizona Department of Environmental Quality (ADEQ) requested clarification related to the scope of the proposed Project, including the availability of the program for the region in or around the city of Nogales, Sonora; whether the Project would support fleet replacement or fleet expansion; and how either of these scenarios would contribute to a reduction in air pollution or lower environmental health impacts. Although the Project does not target any particular city, in response to the comment, the Certification and Financing Proposal has been modified to include relevant data for the city of Nogales, Sonora. Additionally, BECC consulted directly with the ADEQ sender and provided an explanation about the objectives of the Project and how benefits will be measured, which are already described herein. No further comments have been received.

#### 3.2. OUTREACH ACTIVITIES

BECC conducted a media search to identify public opinion about public transportation conditions or needs.<sup>24</sup> The media articles described some of the current conditions of the public transportation systems of the cities within the Project scope. For example, some articles

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<sup>24</sup> A list of referenced documents is available upon request.

mentioned public support for BRT projects (Tijuana), problems with conflicts between licensees (Hermosillo), the need to modernize public transportation (Tamaulipas), the need to improve regulations to better manage licenses (Saltillo), the installation of transportation councils (Coahuila), etc.

Some of DINA's activities are also covered by the media. Some of the articles found described its recent investments and sales in the region. In addition, all DINA information is available on their webpage: [http://www.dina.com.mx/index\\_eng.html](http://www.dina.com.mx/index_eng.html).

The Project sponsor has demonstrated its willingness to contribute to the improvement of public transport systems and continues to work to satisfy technological requirements of emissions control, which supports the objectives of the Project.