CERTIFICATION AND FINANCING PROPOSAL

BORDER-WIDE NATURAL-GAS VEHICLE PROGRAM FOR PUBLIC TRANSPORTATION IN MEXICO

Published: March 13, 2020

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EXECUTIVE SUMMARY

BORDER-WIDE NATURAL-GAS VEHICLE PROGRAM FOR PUBLIC TRANSPORTATION IN MEXICO

Project: The proposed project consists of establishing a program to lease or finance up to 223 natural gas-fueled vehicles for public and private personnel transportation services within the 300-kilometer border region in Mexico (the "Project" or "Bus Program"), which will offer vehicles in two phases.[1] The first phase covers a five-year lease agreement with the State Government of Nuevo Leon for 63 vehicles that comply with Mexican Standard NOM-076-SEMARNAT-2012 (equivalent to EURO V emission standards) and will be used for public transportation in the metropolitan area of Monterrey.[2] The remaining vehicles will be required to go beyond the current Mexican standard and will have to comply with EURO VI emission standards or those established by the U.S. Environmental Protection Agency (EPA) in 2016.[3]

Objective: The Project will improve public and private transportation fleets by facilitating the financing of compressed natural gas (CNG)-fueled vehicles, which will help displace criteria pollutants and greenhouse gases (GHG) in urban areas throughout the northern border region of Mexico.

Expected Outcomes: The Project is expected to generate environmental and human health benefits related to air quality improvements by offering CNG vehicles that comply with or exceed the emission requirements established in NOM-076-SEMARNAT-2012. Project outcomes will be based on the emissions generated by the vehicles offered through the Bus Program compared to Mexican Standard NOM-044-SEMARNAT-2017 for diesel vehicles (equivalent to EPA 2004 emissions factor), which represents the average level of emissions currently generated by bus fleets in major cities throughout the Mexican border region.[4] In this context,

[1] Source: Information provided by Project sponsor. Private personnel transportation services refer to bus services contracted by some companies to transport their employees to and from their facilities.
[2] NOM-076-SEMARNAT-2012 establishes maximum emission limits for hydrocarbons (HC), nitrogen oxides (NOx) and carbon monoxide (CO), as well as evaporative emission limits for HC from new heavy-duty engines that use gasoline, liquid petroleum gas, natural gas or other alternative fuels. EURO V emission standards were 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).
[3] Currently, there is no specific Mexican standard equivalent to EURO VI or EPA 2016 emission standards.
[4] NOM-044-SEMARNAT-2017 establishes the maximum allowable emission levels of HC, NOx, CO, particulate matter (PM) and opacity for diesel vehicles. Standard 1A under this regulation is equivalent to EPA 2004 emission limits.

the emission factors for EPA 2004 are being used as the current baseline.[5] The following table shows the expected emission factors for estimating environmental benefits from the Project.

Technology	Criteria Pollutant Emission Factors (g/mile)		GHG (g/mile)
	NOx	$PM_{2.5}$	CO_2
Baseline			
EPA 2004	8.84	0.13	1,579.20
Phase 1			
NOM-076-SEMARNAT-2012 (equivalent to EURO V)	5.79	0.07	1,232.00
Phase 2			
EURO VI	1.33	0.03	1,232.00
EPA 2016	0.8	0.04	1,320.00

* Source: Intergovernmental Panel on Climate Change (IPCC).

The use of 223 natural gas vehicles, including 63 that comply with NOM-076-SEMARNAT-2012 (EURO V) and 160 that comply with EURO VI emission limits, is expected to lower nitrogen oxides (NOx) emissions by approximately 71% or 63 metric tons/year; carbon dioxide (CO_2) emissions by 22% or 3,497 metric tons/year; and particulate matter with a diameter of 2.5 micrometers or less ($PM_{2.5}$) by 68% or 0.9 metric tons/year.[6]

Population benefitted: 76,700 passengers of 223 public transportation vehicles.[7]

Sponsor: Value Arrendadora, S.A. de C.V. SOFOM E.R. (Value).

Borrower: Value Arrendadora, S.A. de C.V. SOFOM E.R.

[5] Due to local requirements regarding the age of public transportation vehicles, most buses in major cities in the border region comply with standard 1A under NOM-044-SEMARNAT-2017 (equivalent to EPA 2004 limits). Smaller cities tend to have older fleets that comply, at best, with EPA 1998 emission standards. As a conservative measure, the baseline for estimating the environmental benefits of this Project is assumed to be standard 1A under NOM-044-SEMARNAT-2017 (EPA 2004).

[6] The reduction in emissions is calculated based on the difference in emissions from the new buses being financed vs. the emissions generated by the current baseline buses (equivalent to EPA 2004). The buses are estimated to travel a distance of 219 km (136 miles)/day, based on a study by the Border Environment Cooperation Commission (BECC), *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 Passengers and Pollution Emissions in Seven Mexican Border Cities], May 2012 (the "BECC Public Transportation Study").

[7] Source: BECC Public Transportation Study, which indicates that an average of 344 passengers are transported per vehicle per day.

Project Cost: $613.3 million pesos (US$32.4 million).[8]

NADB Loan Amount: Up to $521.3 million pesos (US$27.55 million).

[8] Unless otherwise noted, all U.S. dollar figures are quoted at an exchange rate of $18.9026 pesos to the dollar, according to Bloomberg.com on January 7, 2020.

CERTIFICATION AND FINANCING PROPOSAL

BORDER-WIDE NATURAL-GAS VEHICLE PROGRAM FOR PUBLIC TRANSPORTATION IN MEXICO

1. PROJECT OBJECTIVE AND EXPECTED OUTCOMES

The proposed project consists of establishing a program to lease or finance up to 223 natural gas-fueled vehicles for public and private personnel transportation services within the 300-kilometer border region in Mexico (the "Project" or "Bus Program"), which will offer vehicles in two phases.[9] The first phase covers a five-year lease agreement with the State Government of Nuevo Leon for 63 vehicles that comply with Mexican Official Standard NOM-076-SEMARNAT-2012 emission standards (equivalent to EURO V emission requirements) and will be used for public transportation in the metropolitan area of Monterrey.[10] The 160 remaining vehicles will be required to go beyond the current Mexican standard and will have to comply with EURO VI emission standards or those established by the U.S. Environmental Protection Agency (EPA) in 2016.[11]

The Project will improve public and private transportation fleets by facilitating the financing of compressed natural gas (CNG) vehicles, which will help displace criteria pollutants and greenhouse gases (GHG) in urban areas throughout the northern border region of Mexico. The Project is expected to generate environmental and human health benefits related to air quality improvements by offering CNG vehicles that comply with or exceed the emission requirements established in NOM-076-SEMARNAT-2012. Compared to older diesel technologies commonly used by current public transportation fleets in major cities in the border region in Mexico,[12] the proposed use of the 223 new natural gas vehicles, including 63 that comply with NOM-076-SEMARNAT-2012 (EURO V) and 160 that comply with EURO VI emission limits, is expected to lower nitrogen oxides (NOx) emissions by approximately 71% or 63 metric tons/year; carbon dioxide

[9] Source: Information provided by Project sponsor. Private personnel transportation services refer to bus services contracted by some companies to transport their employees to and from their facilities.
[10] Mexican Official Standard NOM-076-SEMARNAT-2012 establishes maximum emission limits for hydrocarbons (HC), nitrogen oxides (NOx) and carbon monoxide (CO), as well as evaporative emission limits for HC from new heavy-duty engines that use gasoline, liquid petroleum gas, natural gas or other alternative fuels. Its emission limits are equivalent to EURO V. EURO V emission standards were 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).
[11] Currently, there is no specific Mexican standard equivalent to EURO VI or EPA 2016 emission standards.
[12] Due to local requirements regarding the age of public transportation vehicles, most buses in major cities in the border region comply with standard 1A under NOM-044-SEMARNAT-2017 for diesel vehicles (equivalent to EPA 2004 limits). Consequently, the baseline for estimating the environmental benefits of this Project is assumed to be standard 1A under NOM-044-SEMARNAT-2017 (EPA 2004).

(CO_2) emissions by 22% or 3,497 metric tons/year; and particulate matter with a diameter of 2.5 micrometers or less ($PM_{2.5}$) by 68% or 0.9 metric tons/year.[13]

2. ELIGIBILITY

2.1. Project Type

The Project falls within the eligible category of public transportation.

2.2. Project Location

The Project will be implemented within the northern border region of Mexico, which encompasses the states of Baja California, Sonora, Chihuahua, Coahuila, Nuevo Leon and Tamaulipas. Figure 1 illustrates the geographical location of the 300-kilometer jurisdiction of NADB in Mexico.

Figure 1
PROJECT LOCATION MAP

[13] The reduction in emissions is calculated based on the difference in emissions from the new buses being financed vs. the emissions generated by the current baseline buses (equivalent to EPA 2004). The buses are estimated to travel a distance of 219 km (136 miles)/day, based on a study by the Border Environment Cooperation Commission (BECC), *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 Passengers and Pollution Emissions in Seven Mexican Border Cities], May 2012 (the "BECC Public Transportation Study").

2.3. Project Sponsor and Legal Authority

The private-sector project sponsor is Value Arrendadora, S.A. de C.V. SOFOM E.R. (Value or the "Sponsor"), a Mexican multipurpose financial institution known as a "SOFOM" created in 1991 with the authorization of the Ministry of Finance and Public Credit (SHCP) to operate as a lender, lessor or factoring agent for movable or immovable property. Its legal representative is Victor Manuel González González.

3. CERTIFICATION CRITERIA

3.1. Technical Criteria

3.1.1. General Community Profile

In 2015, The six northern border states represent 17.8% of the population of Mexico and 22.6% of its gross domestic product (GDP).[14] Because public transportation 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. In fact, the first 63 buses are already slated for the Monterrey metropolitan area. However, Project implementation is not limited to those locations. Table 1 provides a brief summary of the demographics of those major cities.

Table 1
URBAN AREA DEMOGRAPHICS OF MAJOR MEXICAN BORDER MUNICIPALITIES

City	Population (2015)*	Annual Growth Rate*	Average Household Income** (MXN)	Main Workforce Activities**
Mexicali, B.C.	988,417	1.38 %	120,900	Manufacturing
Tijuana, B.C.	1,641,570	1.56 %	87,500	Manufacturing
Juarez, CHIH	1,391,180	0.65 %	81,500	Manufacturing
Chihuahua, CHIH	878,062	1.42 %	146,500	Manufacturing
Saltillo, COAH	807,537	1.43 %	156,000	Manufacturing and commerce
Monterrey metropolitan area, N.L.	4,689,601	1.99 %	130,500	Manufacturing, commerce and services
Hermosillo, SON	884,273	1.60 %	186,500	Manufacturing and commerce
Nuevo Laredo, TAM	399,431	1.14 %	57,800	Manufacturing, commerce and logistics

* Source: Mexican national institute of statistics, INEGI, Intercensal Survey, 2015.
** Source: INEGI, Economic Census, 2014.

[14] Source: Mexican national institute of statistics, *Instituto Nacional de Estadística y Geografía* (INEGI), Intercensal Survey, 2015 and Economic Census, 2014.

Public Transportation Profile

Table 2 shows the percentage of households within those urban areas that do not own a private vehicle. Since the average number of persons per household in the border region is estimated at 3.7, approximately 3.6 million people depend on public transport to support their daily activities: employment, school, access to health care, and other needs.

Table 2
HOUSEHOLDS WITHOUT A VEHICLE IN 2010

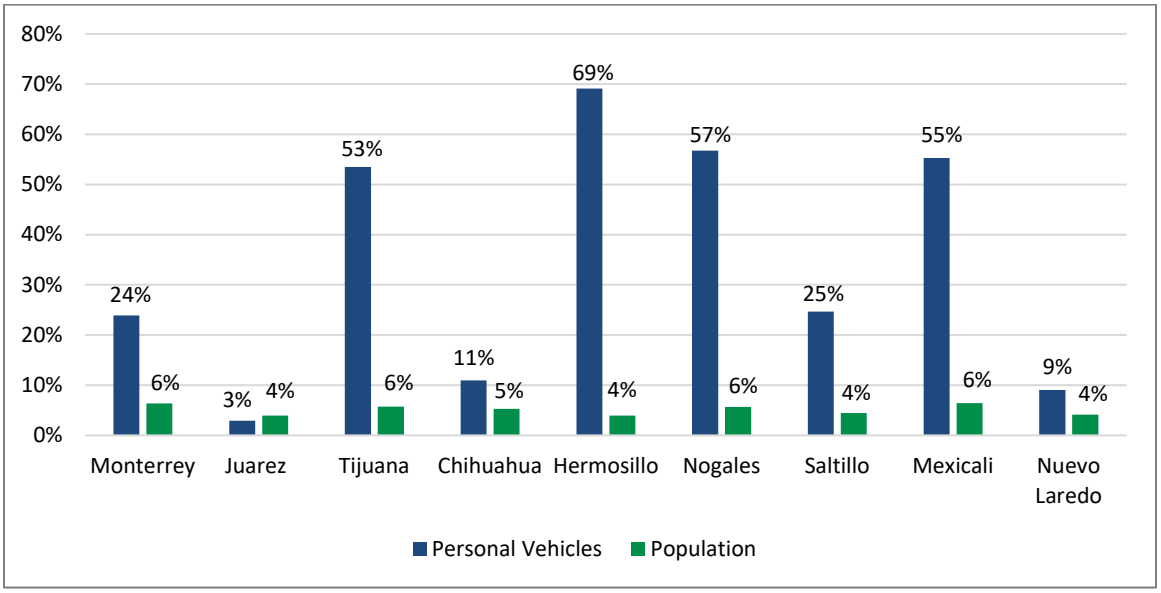
City	Total Households	Households with No Personal Vehicle	
		Total No.	%
Monterrey metropolitan area	994,274	418,519	42
Tijuana	419,357	152,896	36
Juarez	342,814	123,743	36
Mexicali	258,788	62,661	24
Hermosillo	210,275	65,798	31
Chihuahua	228,580	64,088	28
Saltillo	184,417	70,472	38
Nuevo Laredo	94,979	31,944	34

Source: INEGI, https://www.inegi.org.mx/sistemas/olap/Proyectos/bd/censos/comparativo/VOVCV.asp?s=est&c=17164&proy=sh_vocv

The Project is expected to improve public transportation systems in the border region by providing access to new vehicles that offer a comfortable, safe and rapid transportation option for the existing market, as well as encourage more people to use public transportation instead of other less efficient means of transportation, such as taxis or private vehicles.

Despite the large number of people who rely on public transportation, there has been a sharp increase in privately-owned vehicles in Mexico and the border region in recent years. INEGI reported that there were more than 39.9 million registered vehicles in Mexico in 2015. By 2018, vehicle inventories had grown to 47.8 million, an increase of nearly eight million in three years. Of the vehicles registered, 67.6% are for personal use, 23% are heavy trucks for commercial transportation, 0.9% is for public transportation and the remaining 8.5% are motorcycles. Nearly 20% of those 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 presents a comparison of population growth versus private vehicle registration rates for each of the aforementioned cities.

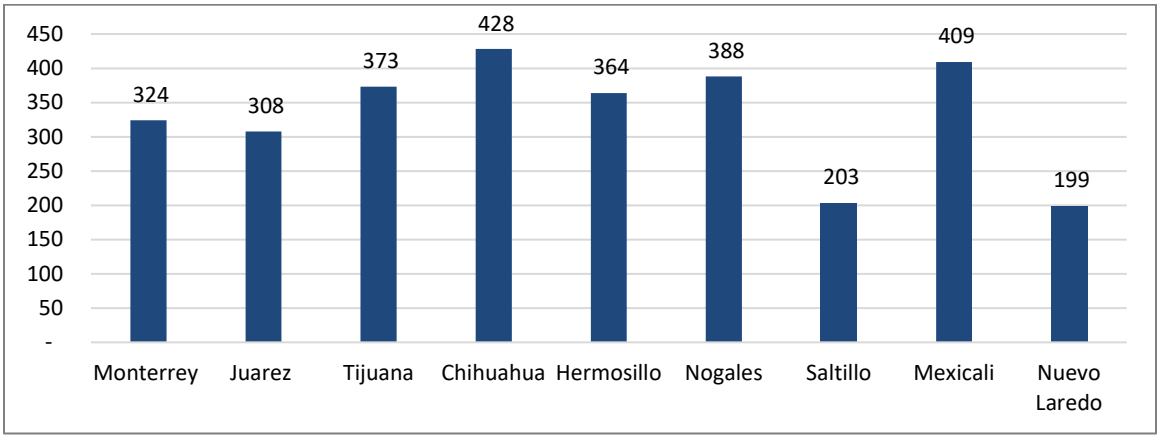
Figure 2
POPULATION VS VEHICLE REGISTRATION GROWTH RATES
(2015-2018 Average)



Sources: INEGI, registered motor vehicles in circulation 2015-2018, https://www.inegi.org.mx/sistemas/olap/Proyectos/bd/continuas/transporte/vehiculos.asp?s=est; INEGI, Intercensal Survey 2015. https://www.inegi.org.mx/programas/intercensal/2015/default.html#Tabulados; National Population Council (CONAPO), population grow projections through 2018, https://www.gob.mx/conapo/documentos/proyecciones-de-la-poblacion-de-los-municipios-de-mexico-2015-2030.

According to INEGI, in 2018 there was an average of 270 personal vehicles registered per 1,000 inhabitants in Mexico. In the northern border region, the average was 333 personal vehicles per 1,000 inhabitants, 33% higher than the national average. Only the cities of Nuevo Laredo and Saltillo had fewer personal vehicles registered than the national average, with 199 and 203, respectively, as shown in Figure 3.

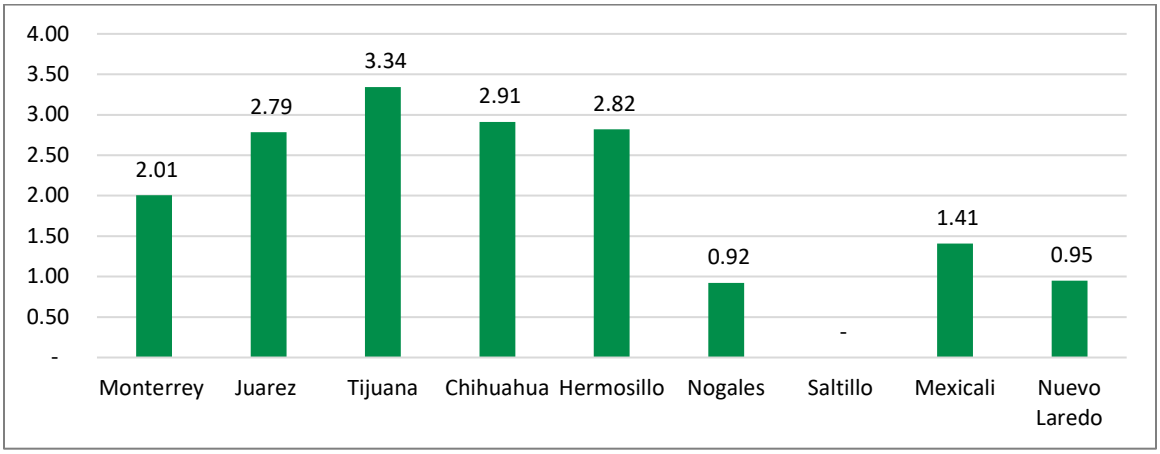
Figure 3
PERSONAL VEHICLES PER 1000 PERSONS IN MEXICO (2018)



Sources: INEGI, registered motor vehicles in circulation 2015-2018, ttps://www.inegi.org.mx/sistemas/olap/Proyectos/bd/continuas/transporte/vehiculos.asp?s=est; INEGI, intercensal survey 2015, https://www.inegi.org.mx/programas/intercensal/2015/default.html#Tabulados; CONAPO, population grow projection to 2018, https://www.gob.mx/conapo/documentos/proyecciones-de-la-poblacion-de-los-municipios-de-mexico-2015-2030.

On the other hand, the number of public buses registered per 1,000 persons in the border region is lower than the national average by as much as 75%. This situation offers an opportunity to increase the use of public transportation systems. By providing better quality vehicles, it is anticipated that some people will shift their mode of transportation from private cars to buses, reducing current reliance on personal vehicles and increasing the benefits of the Project. Figure 4 shows the number of public buses registered per 1,000 persons in the major border cities in Mexico.

Figure 4
PUBLIC BUSES PER 1,000 PERSONS (2018)



Sources: INEGI, registered motor vehicles in circulation 2015-2018, https://www.inegi.org.mx/sistemas/olap/Proyectos/bd/continuas/transporte/vehiculos.asp?s=est; INEGI, Intercensal Survey 2015. https://www.inegi.org.mx/programas/intercensal/2015/default.html#Tabulados; CONAPO, population grow projections through 2018, https://www.gob.mx/conapo/documentos/proyecciones-de-la-poblacion-de-los-municipios-de-mexico-2015-2030.

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.[15] More vehicles on urban roadways give rise to side-effects, such as traffic congestion, accidents, pollution and noise. Additionally, the increased use of personal vehicles over buses promotes an inefficient use of urban space, as personal vehicles are parked nearly 95% of the time, while public transportation operates 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 personal vehicles and should incorporate clean technologies and clean fuels such as natural gas.[16]

The development and operation of public transportation systems is regulated by each state or, in some cases, directly by the municipalities. In general, public regulations control the number of concessions (company permits) and thus the number of vehicles that can be used for public transportation. Most of the regulations also specify the maximum allowable age of the vehicles used to provide public transportation services. Table 3, below, summarizes the primary requirements established in the transportation regulations for each Mexican border state.[17]

Table 3
SUMMARY OF PUBLIC TRANSPORTATION SYSTEM REGULATIONS

State	Legal Authority	Requirements		Emission Inspection Program
		Maximum Vehicle Age	Vehicles per Concession	
Baja California	State (state-wide / inter-municipal) Municipal	Tijuana – 8 years Mexicali – Not defined	Defined in concession	Tijuana – Not defined Mexicali – Yes
Chihuahua	State	10 years	1	Yes
Coahuila	State (state-wide / inter-municipal) Municipal	10 years	1	Yes
Nuevo Leon	State	10 years	Defined in concession	Not defined
Sonora	State	10 years	1	Not defined
Tamaulipas	State	8 years	Sole proprietor: 1 Associations: Defined in concession	Not defined

[15] The Mario Molina Center for Strategic Studies on Energy and Environment is an independent, non-profit association created in 2004 that contributes to decision-making in the public and private sectors in Mexico. The research center is named in honor 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/

[16] Source: Centro Mario Molina, *Hacia un Modelo de Transporte Sustentable para las Ciudades Mexicanas* (Moving toward a Sustainable Transport Model for Mexican Cities), http://centromariomolina.org/el-impacto-del-cambio-climatico-en-la-agricultura/#_ftn1

[17] Sources: Border Environmental Cooperation Commission (BECC), *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), May 2012, which included the cities of Tijuana, Mexicali, Hermosillo, Chihuahua and Juarez.

Public transportation regulations are aimed at properly managing the number of buses in relationship to demand, thus avoiding the uncontrolled growth of public transportation fleets. They also serve to prevent inefficiencies related to the useful life of the buses, including increased emissions resulting from substandard engine conditions.

The buses that will be offered through the Project are expected to be used to replace less efficient vehicles or to expand existing fleets. Since some states limit the allowable age of vehicles in circulation, older buses will require proper disposal. Their components may be recycled and sold as spare parts, or they may be used to replace even older buses in smaller cities.

Additionally, many manufacturing companies in the larger cities provide private bus service to transport personnel to and from their facilities. This service is typically offered as an employee benefit to address deficiencies in the public transportation system, as well as a means of supporting work attendance. Buses are routed to pick up employees near their homes and can only be used by company personnel.

Based on current conditions and regulations, as well as national, state and local public policies and transportation strategies, the proposed Project will provide an important leasing and financing program to promote the use of more efficient buses in public and private personnel transportation systems in order to meet existing and future demand.

3.1.2. Project Scope

The proposed Project consists of establishing a program to lease or finance natural gas-fueled vehicles for public and private transportation services within the 300-kilometer border region in Mexico. Through this Project, up to 223 buses are expected to be put into circulation in two phases. In the first phase, 63 EURO V vehicles will be leased in the Monterrey metropolitan area for the expansion of new urban routes, including some that may feed into the mass transportation system of the city. The remaining vehicles will have to comply with EURO VI or EPA 2016 emission standards.

The Project Sponsor will evaluate potential clients for compatibility with the Bus Program using the following criteria.

- Potential clients, including private transportation services for personnel, must have an existing concession to provide public or private transportation services within the 300-km border region.
- The bus should be used for transportation within cities and urban areas.
- Clients will have to perform maintenance activities to comply with manufacturer warranty requirements.

The Sponsor will collect and submit information to NADB related to each vehicle, including such data as the type of vehicle leased/financed and the location where it will be used.

3.1.3 Technical Feasibility

Any bus leased or financed through the Project will necessarily comply with Mexican regulations for natural gas vehicle emissions, provide an environmental benefit in comparison to the established baseline and must be supplied by a reputable bus manufacturer.

The first phase covers 63 vehicles manufactured by Zhongtong Bus Holding Co., Ltd, a Chinese company based in the Province of Shandong, China. Table 4 summarizes the specifications of these CNG vehicles.

Table 4
VEHICLE CHARACTERISTICS

Bus brand/model	Zhongtong / Golden Star 4000 
Engine brand	Weichai
Fuel	Compressed natural gas
Number of passengers	75
Emission technology	EURO V
Total length	413.4 in / 10,500 mm
Total width	98.4 in / 2,500 mm
Type of entry	Low-entry bus with step-free access for wheelchairs, walkers, strollers.
Other*	Steel handrail, destination LED sign on the front and right side, anti-skid floor, automatic extinguisher in engine compartment, warning signs to get off the bus, WIFI, air conditioning systems, and CCTV cameras.

* Additional accessories may be added to the units per client request.

Emissions from Golden Star 4000 buses comply with Mexican regulations and must be certified by the Mexican environmental enforcement agency (PROFEPA), which ensures compliance with Mexican Standard NOM-076-SEMARNAT-2012. The Sponsor obtained Certification No. PFPA-SII-DGATI-VN-0883/2019.

The second phase of the Project will encompass 160 new vehicles that must have EURO VI or EPA 2016 emission technology, as well as the accessories and general equipment noted above.

3.1.4. Land Acquisition and Right-of-Way Requirements

There are no land acquisition and right-of-way requirements for the proposed Project.

Public transportation service providers seeking to lease buses through the Project will be required to demonstrate the appropriate concession to operate the vehicles.

3.1.5. Project Milestones

PROFEPA Certification No. PFPA-SII-DGATI-VN-0883/2019 was obtained as required under NOM-076-SEMARNAT-2012 for the first 63 buses leased for use in in metropolitan area of Monterrey, Nuevo Leon. There are no other pending milestones to be completed to initiate the implementation of this Project.

The remaining 160 vehicles must comply with EURO VI or EPA 2016 emission technology. The corresponding PROFEPA certification must also be obtained as required by NOM-076-SEMARNAT-2012.

3.1.6. Management and Operation

Value provides various financial services in Mexico, including pure leasing, financial leasing and credit. It serves micro-, small-, and medium-sized enterprises, mainly in the state of Nuevo Leon and Mexico City, and has a presence in other states, such as Chihuahua and Jalisco. Value mainly operates in the commercial, construction, transportation and manufacturing sectors.[18]

Value initially plans to acquire 63 CNG buses manufactured by Zhongtong Bus Holding Co., Ltd., a Chinese company based in the Province of Shandong, China. One of the largest bus manufacturers in China, Zhongtong employs more than 4,000 people worldwide. In October 2019, it began construction of a bus manufacturing plant in El Carmen, Nuevo Leon, which will have an expected production capacity of 4,800 buses per year.

The bus engine is manufactured by Weichai Westport, Inc. Founded in 1946, Weichai is an international group that has six business segments: powertrain, commercial vehicles, construction machinery, intelligent logistics, luxury yachts, and finance & after-services. The subsidiaries of Weichai Group are spread throughout Europe, North America, Asia and other regions, and its products are exported to more than 110 countries and regions.

Value leasing agreements establish that its clients (the lessees) are responsible for performing the preventive and corrective maintenance required by the manufacturer under the terms of the warranty, as well as obtaining insurance coverage. Operation and maintenance of the 63 CNG buses leased for the metropolitan area of Monterrey will be carried out by the Government of Nuevo Leon, through its Agency for Streamlining and Modernizing Public Transportation Systems.

[18] Source: Value website, https://www.value.com.mx/arrendadora/nuestros-vehiculos.

3.2. Environmental Criteria

3.2.1. Environmental and Health Effects/Impacts

A. Existing Conditions

Many public transportation options in border communities are inefficient, uncomfortable and unsafe, and they do not provide a comprehensive solution for urban mobility, generating a vicious cycle of increased usage of personal vehicles and less demand for public transportation. Dependence on personal vehicles and the low penetration of efficient public transportation systems lead to air pollution, noise, traffic congestion and loss of productivity, thus reducing the overall quality of life of residents.

The Institute for Health Metrics and Evaluation (IHME) estimated that air pollution from particulate matter caused close to 20,500 deaths in Mexico in 2010 and contributed to the equivalent of 461,454 person-years of life lost due to disabilities.[19] Likewise, the World Health Organization (WHO) estimated that air pollution in Mexico during 2012 caused 467 deaths from lower respiratory tract infections, 742 from chronic obstructive pulmonary diseases (COPD), 1,336 from lung cancer, 9,983 from ischemic heart disease and 4,269 from stroke.[20]

In the Monterrey metropolitan area, the Mexican National Institute of Ecology and Climate Change (INECC) estimated 263 cases of preventable premature death in adults over 30 years of age during 2010 because of airborne $PM_{2.5}$ concentrations in excess of the limits established by Mexican Standard NOM-025-SSA1-1993.[21] In monetary terms, non-compliance with this standard represented $5 billion pesos (in 2010), which does not include the morbidity costs associated with the care and treatment of acute and chronic diseases, nor the loss of productivity due to respiratory ailments caused by air pollution.

In 2017, Mexico emitted a total of 733.8 million metric tons of carbon dioxide equivalent (CO_2e), and transportation accounted for approximately 23.2% of those emissions (170.3 million metric tons).[22] According to the 2016 Mexican National Emissions Inventory (INEM), urban buses nationwide emitted 12.3% of NOx, 9.4% of sulfur dioxide (SO_2), 16.6% of PM_{10} and 3.0% of HC from all mobile sources. Emissions from urban buses in the northern border states accounted for 10.2% of NOx, 8.4% of SO_2, 13.2% of PM_{10} and 1.7% of HC from mobile sources.

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[19] Source: Mexican national ecology and climate change institute, *Instituto Nacional de Ecología y Cambio Climático* (INECC) of the Mexican Ministry of Environment and Natural Resources (SEMARNAT), 2013 National Air Quality Report, Mexico, https://www.gob.mx/cms/uploads/attachment/file/191427/2014_Informa_de_Calidad_del_Aire.pdf.
[20] Source: World Health Organization (WHO), Ambient Air Pollution: A Global Assessment of Exposure and Burden of Disease, 2016 (p.68), http://www.who.int/phe/publications/air-pollution-global-assessment/en/.
[21] NOM-025-SSA1-1993 establishes the criteria for evaluating air quality and the permissible limits for concentrations of particulate matter, total suspended particles (TSP), PM_{10} and $PM_{2.5}$.
[22] Source: INECC, *Inventario Nacional de Emisiones de Gases y Compuestos de Efecto Invernadero* [National Inventory of Greenhouse Gas and Compound Emissions], https://datos.gob.mx/busca/dataset/inventario-nacional-de-emisiones-de-gases-y-compuestos-de-efecto-invernadero-inegycei.

To support its international commitments to combat climate change under the United Nations Framework Convention on Climate Change (UNFCCC), Mexico has developed strategies to reduce GHG and to transition to a low-carbon economy.[23] Mexico prepared its Intended Nationally Determined Contribution (INDC) based on its legal climate change framework, which includes the General Law of Climate Change and the National Climate Change Strategy, Vision 10-20-40. Its INDC target is consistent with the goal of reducing GHG emissions by 50%, compared to 2000 levels, by 2050. According to the scenarios set by Mexico in its INDC, the main source of CO_2e emissions in 2020 is transportation, accounting for 214 million tons per year, followed by power generation with 143 million tons per year. Mexico is committed to reducing total CO_2e emissions by 211 million metric tons (22% lower than business-as-usual levels) by 2030 through unconditional measures.[24] The reduction of emissions from transportation is estimated at 18% (equivalent to 48 million metric tons of CO_2e). The use of natural gas technologies for public and private personnel transportation systems supports these efforts.

B. Project Impacts

The Project is expected to improve public transportation systems by promoting access to natural gas-fueled buses that offer a comfortable, safe, fast and accessible transportation option for the existing market, while at the same time reducing emissions related to vehicle operation and urban congestion, which serves a broader environmental and human health benefit.

Due to local requirements regarding the age of public transportation vehicles, most buses in major cities in the border region comply with standard 1A under NOM-044-SEMARNAT-2017 for diesel vehicles (equivalent to EPA 2004 emission limits). Smaller cities tend to have older fleets that comply, at best, with EPA 1998 standards. Therefore, as a conservative measure, the baseline for estimating the environmental benefits of this Project is assumed to be standard 1A under NOM-044-SEMARNAT-2017 (EPA 2004). The Project will introduce new natural gas-powered buses that comply with NOM-076-SEMARNAT-2012 for the first phase.[25] Vehicles under the second phase of the Project must go beyond the current Mexican standard and comply with EURO VI or EPA 2016 emission standards. Table 5 presents the emission factors for criteria pollutants and GHG under these standards, as well as the current baseline.

[23] Source: SEMARNAT, National Climate Change Strategy, Vision 10-20-40, 2013.
[24] INDC includes a set of mitigation measures that Mexico will implement with its own resources (unconditional measures) and/or through international cooperation (conditional measures). https://www.gob.mx/inecc/acciones-y-programas/contribuciones-previstas-y-determinadas-a-nivel-nacional-indc-para-mitigacion-80048.
[25] The emission factor for HC under this Mexican standard is higher than the assumed baseline level. Most CNG engines available on the market, including Weichai engines, produce less HC emissions than the baseline level. NADB will review any future proposals under Phase 2 of the Bus Program to ensure that the vehicles meet or exceed NOM-076-SEMARNAT-2012 standards, as well as the current baseline level.

Table 5
EMISSION FACTORS

Technology	Criteria Pollutant Emission Factor (g/mile)		Greenhouse Gases* (g/mile)
	NOx	$PM_{2.5}$	CO_2
Baseline			
EPA 2004	8.84	0.13	1,579.20
Phase 1			
NOM-076-SEMARNAT-2012 (equivalent to EURO V)	5.79	0.07	1,232.00
Phase 2			
EURO VI	1.33	0.03	1,232.00
EPA 2016	0.8	0.04	1,320.00

* Source: Intergovernmental Panel on Climate Change (IPCC).

Based on the above factors, the use of 223 new CNG vehicles, including 63 that comply with NOM-076-SEMARNAT-2012 (EURO V) and 160 that comply with EURO VI emission limits is expected to lower NOx emissions by approximately 71% or an estimated 63 metric tons/year; CO_2 by 22% or an estimated 3,497 metric tons/year; and $PM_{2.5}$ by 68% or an estimated 0.9 metric tons/year.[26] Table 6 shows the estimated emissions avoided by the new vehicles.

Table 6
ESTIMATED EMISSIONS AVOIDED

Program Phase	No. of Vehicles	Emission Technology	Emissions Avoided (ton/year)		
			NOx	$PM_{2.5}$	CO_2
First	63 CNG buses	NOM-076-SEMARNAT-2012 (EURO V)	8.7	0.17	988
Second	160 CNG buses	EURO VI	54.3	0.72	2,509

At this time, there is no way of knowing the exact mix of vehicles with EURO VI or EPA 2016 emission technology that will be offered in the second phase of the Bus Program. Once the information becomes available, the environmental benefits will be estimated using the applicable emission factors in Table 5.

It should be noted that some units may be used to expand public transportation fleets, either through new routes or by increased frequency of operation on existing routes. The expansion of the public transportation fleet can have significant environmental benefits, as improved service helps promote a modal shift from other less efficient means of transportation, which would help alleviate traffic congestion and improve air quality. For example, the carbon footprint of a person

[26] The reduction in emissions is calculated based on the difference in emissions from the new buses being financed vs. the emissions generated by the current baseline buses (equivalent to EPA 2004). The buses are estimated to travel a distance of 219 km (136 miles)/day, based on the BECC Public Transportation Study, May 2012.

traveling by bus will on average be 58% lower than that of person traveling in a personal vehicle. Table 7 presents the CO_2 emissions per passenger based on vehicle type.

Table 7
CO_2 EMISSIONS PER PASSENGER

Vehicle Type	No. of Seats	Average Occupancy (passenger/mile)	Total CO_2 Emissions (grams/mile)	CO_2 emissions per Passenger (grams/passenger)	
				Full Occupancy	Average Occupancy
Bus	40	12.0[a]	1,232.0[c]	31.0	103.0
Private car	5	1.4[b]	368.4[d]	73.7	263.1

a. Source: Border Environment Cooperation Commission, 2012.
b. Source: The International Council on Clean Transportation, 2015.
c. Source: Intergovernmental Panel on Climate Change (IPCC).
d. Source: USEPA. Average Annual Emissions and Fuel Consumption or Gasoline-Fueled Passenger Cars and Light Trucks, 2008

Overall, the local communities where the vehicles are used would benefit from an improved public transportation fleet, which would facilitate a better quality of life through safer and more efficient service, while also improving the overall image of public transportation in the community.

Vehicle scrapping program

With the implementation of the Project, improved fleets and service will help meet the demand for public transportation in large urban areas. Older vehicles retired from service in those cities may be used in other communities with less stringent regulations or will require proper disposal through a vehicle scrapping program. Vehicle scrapping programs for buses falls under the jurisdiction of the state government and depends on many factors beyond the scope of NADB.

The success of a vehicle scrapping program depends on several factors, not just the legal and regulatory elements, but also the institutional capacity of the agencies in charge of regulating the sector, enforcement of the standards and, primarily, an appropriate economic balance of the principles on which the program is built. A scrapping program must be implemented by the agency responsible for the public transportation sector at the local level. The agency must be robust and have adequate capacity to enforce compliance with established standards and regulations, as well as to manage and control all public transportation programs properly. The vehicle scrapping program should be only one part of the management plan, which should include minimum service standards, route planning, service fees and payment methods, as well as guidelines and terms applicable to concessions or authorized operators.

NADB is currently conducting an impact assessment of the two public transportation projects previously financed. This study will examine the benefits, advantages and disadvantages of replacing older buses with cleaner buses, as well as expanding existing fleets. It includes an analysis of various communities to determine the overall impact of increasing the use of public transportation and of replacing and scrapping units. It will also look at vehicle life cycles and current scrapping programs/practices, as well as provide recommendations based on the study

findings. With this study, NADB hopes to be able to estimate better the impacts of efforts in the public transportation sector, as well as provide further insight regarding the need for and scope of scrapping programs. Based on its findings, NADB may also be able to better support state and local agencies in developing scrapping programs or policies to improve public transportation systems. This study is expected to be completed by the end of 2020.

C. Transboundary Impacts

No significant transboundary impacts have been identified, and none are anticipated as a result of the development of the Project.

3.2.2. Compliance with Applicable Environmental Laws and Regulations

A. Environmental Clearance

The Mexican federal government enacted NOM-076-SEMARNAT-2012 for new heavy-duty engines that use gasoline, liquid petroleum gas (LPG), natural gas or other alternative fuels. The new buses that will operate as part of the proposed Project use natural gas and comply with the emission levels established in this standard.

According to the provisions of NOM-076-SEMARNAT-2012, an emissions certificate issued by PROFEPA is required to ensure compliance with the applicable emissions limits. Certificate No. PFPA-SII-DGATI-VN-0883/2019 was issued by PROFEPA for the first 63 buses. NADB will verify that the required certificate is issued for the remaining 160 buses.

B. Mitigation Measures

Due to the nature of the Project, an environmental impact assessment (MIA) is not required and, therefore, no mitigation measures are identified.

C. Pending Environmental Tasks and Authorizations

There are no pending environmental authorizations.

3.3 Financial Criteria

The total cost of the Project is estimated at $613.3 million pesos (US$32.4 million), which includes the acquisition of the 223 vehicles and NADB loan closing costs.[27] The Project Sponsor has requested a loan for up to $521.3 million pesos (US$27.55 million) from NADB, which represents approximately 85% of the total cost.

[27] Unless otherwise noted, all U.S. dollar figures are quoted at an exchange rate of $18.9026 pesos to the dollar, according to Bloomberg.com on January 7, 2020.

The proposed payment mechanism is a well-known structure that is widely used in the Mexican financial sector for similar transactions. The source of payment will be all the revenue generated by the Sponsor. Based on the financial analysis performed by NADB, the Sponsor will have sufficient funds to cover both the costs of its ongoing operations and debt service requirements, including the NADB loan. Historically, Value has registered consistent annual growth in its leasing portfolio, while maintaining low delinquency levels, which reflects good asset quality and management.

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 $521.3 million pesos to Value Arrendadora, S.A. de C.V. SOFOM ER to finance the Bus Program described herein, subject to its Board approval.

4. PUBLIC ACCESS TO INFORMATION

4.1. Public Consultation

NADB published the draft certification and financing proposal for a 30-day public comment period beginning on March 13, 2020.

4.2. Outreach Activities

NADB conducted a media search to identify public opinion about public transportation conditions and needs in the northern border region of Mexico.

- *La Jornada, Baja California* (July 19, 2019) – "*Monitorean velocidad, número de pasajeros y ubicación de camiones en Mexicali"* [Tracking the speed, number of passengers and location of buses in Mexicali), https://jornadabc.mx/mexicali/19-07-2019/monitorean-velocidad-numero-de-pasajeros-y-ubicacion-de-camiones-en-mexicali

- *Proyecto Puente, periodismo diferente* (November 26, 2019) – "*Vigilan camiones urbanos desde nuevo centro integral de monitoreo en Hermosillo"* [Tracking city buses from the new comprehensive monitoring center in Hermosillo], https://proyectopuente.com.mx/2019/11/26/vigilan-camiones-urbanos-desde-nuevo-centro-integral-de-monitoreo-en-hermosillo/

- *El Heraldo de Chihuahua* (April 4, 2019) – "*Salen a cazar camiones chatarra en zona centro"* [On the hunt for junk buses downtown], https://www.elheraldodechihuahua.com.mx/local/salen-a-cazar-camiones-chatarra-en-la-zona-centro-3276593.html

- *El Diario de Coahuila* (February 9, 2019) – "*Modernizará Saltillo el transporte público"* [Saltillo to modernize public transportation], https://www.eldiariodecoahuila.com.mx/locales/2019/2/9/modernizara-saltillo-el-transporte-publico-791512.html

- *El Porvenir* (May 28, 2019) – "*Tienen regios un servicio de transporte caro y deficiente*" [Monterrey residents have expensive and poor transportation service], http://elporvenir.mx/?content=noticia&id=150817

- *El Mañana* (November 9, 2019) – "*Estado, incapaz de controlar transporte"* [State government incapable of controlling transportation], https://elmanana.com.mx/estado-incapaz-de-controlar-transporte/

- *El Economista* (October 25, 2019) – "*Armadora de autobuses ecológicos se instalará en Nuevo León con inversión de 6,230 millones de pesos"* [Green bus factory to be built in Nuevo Leon with an investment of $6.230 billion pesos], https://www.eleconomista.com.mx/estados/Amadora-de-autobuses-ecologicos-se-instalara-en-Nuevo-Leon-con-inversion-de-6209-millones-de-pesos-20191025-0058.html

- *El Norte* (January 17, 2020) – "*Deberán camiones usar gas natural"* [Buses should use natural gas], https://www.elnorte.com/aplicacioneslibre/preacceso/articulo/default.aspx?__rval=1&urlredirect=https://www.elnorte.com/deberan-camiones-usar-gas-natural/ar1854907?referer=--7d616165662f3a3a6262623b727a7a7279703b767a783a--

- *Milenio* (March 8, 2020) – "*Para finales de mes llegarán 63 camiones de las rutas exprés"* [63 buses for express routes to arrive by the end of the month], https://www.milenio.com/politica/finales-mes-llegaran-63-camiones-rutas-expres

- *El Norte* (March 8, 2020) – "*Alistan 63 nuevas unidades de la Ruta Exprés"* [Preparing to get 63 new buses for Express Route] https://www.elnorte.com/alistan-63-nuevas-unidades-de-la-ruta-expres/ar1891914

In summary, these publications highlighted some of the current conditions of the public transportation systems in cities within the Project scope, especially their need to expand, control and upgrade local systems. One article describes the construction of the new Zhongtong-Golden Star 4000 assembly plant.

The Project Sponsor has demonstrated its willingness to contribute to the improvement of public transportation systems and continues to work to satisfy its clients' needs, which supports the objectives of the Project.