



STRATEGY AND RECOMMENDATIONS FOR U.S.-MEXICO BORDER DIESEL EMISSIONS REDUCTIONS

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1. INTRODUCTION

Purpose, Scope, and Summary of Key Results

This document provides recommendations about priority diesel emissions reduction projects for the U.S.-Mexico border region and approaches for coordinating and communicating a border diesel strategy. The recommendations are informed by findings about diesel emission sources and trends, the motivations of potential stakeholders, funding sources, and lessons learned from previous projects. The document sets the stage for selecting pilot projects to pursue and develop in the near-term. Key recommendations are:

- Promote ongoing efforts to encourage private sector funding of drayage truck retrofits in Mexico, building on lessons learned from existing grant-funded pilot projects.
- Promote public vehicle fleet retrofits and conversion to alternative fuels in the U.S. and Mexico, including possible pilot projects in Mexico.
- Promote increased participation in SmartWay for U.S. long-haul fleets in the border region; in the Mexico border region, promote SmartWay-type activities for long-haul fleets, including demonstrating feasibility through pilot projects.
- Demonstrate the feasibility of truck idle reduction through electrification facilities at border crossings and at truck stops along major transportation corridors in Mexico; promote current truck stop electrification efforts in the U.S. border region.
- Improve and expand inspection and maintenance of diesel vehicles in Mexican border cities, including through pilot projects.
- Promote biodiesel sourcing, availability, and use in the border region, including through pilot projects in Mexico.
- Demonstrate the feasibility of engine retrofits, fuel conversion, and replacement in the Mexican agricultural and construction sectors through pilot projects.

These and other projects are further described below, along with the findings and strategic considerations that suggest them as priorities.

Methodology and Organization

Following this introductory section of the report, Section 2 briefly describes the context for diesel emissions reduction projects on the border. It outlines key sources and trends in diesel emissions as well as key findings about stakeholders, resources, and funding. Based on this background, the section concludes by identifying four criteria for selecting priority diesel emissions reduction projects. The section draws heavily on an analysis funded by EPA that investigated sources of diesel emissions on the border and related transportation patterns and dynamics.¹ It also summarizes information and ideas from a series of discussions with stakeholders (see Appendix A for the list of stakeholder contacts). These stakeholder

¹ Industrial Economics, Inc. and Ross & Associates. "Analysis of Diesel Emissions in the U.S. Mexico Border Region." March 9, 2007.

conversations covered information about groups involved in border diesel emissions reduction activities, descriptions of past and current projects, and sources of funding for diesel emissions reduction projects. This information is summarized in Appendices B, C, and D, respectively.

Section 3 describes seven recommended types of diesel emissions reduction activities for the border as well as a set of other lower priority efforts that could be undertaken as opportunities arise. Each description includes a summary of benefits, costs, and other pertinent information. Section 4 provides recommendations about the best way to coordinate and communicate diesel emissions efforts along the border and outlines best practices for undertaking individual projects.

2. DIESEL EMISSIONS SOURCES, STAKEHOLDERS, AND RESOURCES

High priority diesel emissions reduction projects should target the main sources of diesel emissions in the border region. To be successful, they also need to be able to attract project proponents and funding and garner support from interested stakeholders. This section briefly describes key findings about diesel emissions sources, stakeholders, and resources and uses them to develop criteria for making recommendations about which diesel emissions reduction projects are a high priority.

Analysis of Diesel Emissions Sources and Related Transportation Dynamics

Information on the sources and location of diesel emissions was developed as part of this project and presented in the document “Analysis of Diesel Emissions in the U.S.-Mexico Border Region.” Diesel emissions inventories described in the report show that on-road heavy-duty diesel vehicles are the single largest source of diesel emissions in the border region. This includes both freight and non-freight heavy-duty vehicles, such as public buses, school buses, and garbage trucks. These vehicles contribute to emissions at many points in the transportation system (e.g., roads, seaports, border crossings, etc.). In Mexico, diesel emissions from non-road diesel engines for agriculture and construction are also leading sources of diesel emissions. Other transportation sources of diesel emissions in the border region, such as marine and rail engines, are less significant. However, intermodal transportation is a growing trend, which may lead to a higher share of diesel emissions from marine and rail sources in the future.

Geographically, the main air pollution concerns in the border region are around major border cities and border crossings and along major border transportation corridors where emissions sources are concentrated. Border crossings between major cities are high profile hot spots for diesel emissions from idling trucks, although existing research is somewhat ambiguous as to the overall contribution of these border crossings to border air quality problems.

In the future, the geography of emissions will be affected by changes in transportation dynamics and may be significantly affected by near-term developments, such as opening the border to international truck traffic beyond the current limited commercial zone, as agreed in NAFTA. Longer-term potential developments may also alter transportation dynamics and the geography

of diesel emissions. These potential developments include construction of a new major port in Ensenada, major new infrastructure to connect other Mexican ports to the border, and the proposed “NAFTA Superhighway.”

Analysis of Stakeholders and Resources

Discussions with stakeholders (see Appendix A) revealed a number of themes about motivations and barriers for diesel emissions reduction projects, as well as information on funding and other resources that could be used to undertake future projects. Stakeholders contacted included a range of federal, State, and local governments, NGOs, border institutions, and private sector firms and associations from both the U.S. and Mexico.

For U.S. federal, State, and local stakeholders, an important motivation for diesel emissions reduction projects is achieving attainment with national ambient air quality standards (and maintaining attainment status where it already exists). U.S. stakeholders also frequently mentioned their interest in Mexico implementing its plans to switch to low sulfur diesel (ULSD) in the border region and beyond. The availability of ULSD in Mexico would allow modern U.S. trucks to operate in Mexico without damaging on-board emissions reduction technologies and compromising emissions warranties. Mexican trucks using ULSD would create lower emissions when operating in the U.S. once the border is open. Stakeholders recognized, however, that implementation of Mexico’s ULSD policies is largely up to the government and Pemex, Mexico’s national oil company; the ability to accelerate implementation through individual border projects is limited.

In Mexico, the air quality regulatory system is less stringent, and compliance plays less of a role in driving diesel emissions reduction efforts than in the U.S. Stakeholders said that the primary motivation for reducing diesel emissions in Mexico is achieving the health benefits of improved air quality. There are border cities that are clear leaders in air quality efforts. Primary among these is Ciudad Juarez, but Tijuana and Mexicali are also undertaking diesel emission reduction efforts. In addition, these and other Mexican border municipalities are currently developing updated emissions inventories as a step toward developing future emissions reduction policies and programs.

Most (but not all) stakeholders said that funding is the most important factor for getting diesel emissions reduction projects started. There are many possible sources of funding for future diesel emissions reduction projects, although many target certain types of projects (e.g. reducing emissions from school buses) or a particular geographic area (e.g., non-attainment areas in Texas). See Appendix D for a description of funding sources and their areas of focus. In the near-term, funding for a multi-faceted diesel emissions reduction effort will be piecemeal. The largest single sources of funding for future diesel projects are the Carl Moyer funds in California and the Texas Emissions Reduction Plan (TERP) funds, although both have limitations on where and how they can be used. The connection of some diesel reduction opportunities to the reduction of greenhouse gasses suggests potential new funding opportunities. There is growing attention to climate change strategies along the border, both from Mexico, which has signed the Kyoto Protocol and is building experience with projects

funded by the Clean Development Mechanism, and from U.S. border States that are developing climate plans.

Stakeholders also outlined some of the challenges and opportunities involved in achieving diesel emissions reductions through privately funded projects. A key challenge is the fact that many Mexican drayage fleet owners (as well as companies with public fleet concessions) are small and poorly funded. Public grant funding rather than private investment will likely be required to cover emissions reduction expenses for these smaller owners; however, such grant-funding may be difficult to sustain over time. At the same time, there are opportunities for encouraging private investment in diesel emissions reductions from some of the large companies with facilities in Mexico that ship goods across the border using both drayage and long-haul fleets. Stakeholders noted that some of these firms are motivated to promote a “green” image, and they may be willing to invest their own money in vehicle upgrades.

Strategic Criteria for Project Selection

Information on diesel emissions sources, transportation dynamics, stakeholders, and resources suggest four criteria for identifying recommended diesel emissions reduction activities on the border, as detailed below.

Activities should target priority emission sources and locations. This criterion suggests a priority focus on freight and non-freight on-road trucks, especially older drayage trucks and public fleets with the highest emissions. In the longer term (e.g., when the border is open) the focus should also include older long-haul fleets, which will likely start traveling greater distances. In Mexico, this criterion would also include non-road diesel engine emissions from mechanized agricultural and construction equipment. In terms of location, this criterion would suggest a focus on areas where diesel emissions are concentrated, including:

- Major border corridors (I-35, I-10/I-8, I-19, and I-5),
- Major border crossings, and
- Sister cities of: Tijuana-San Diego; Mexicali-Calexico, Nogales-Nogales, El Paso-Juarez, and Laredo-Nuevo Laredo.

In the near-term, this criterion of targeting priority emissions sources and locations would suggest helping to fund updates or development of Mexican emissions inventories as an interim step toward identifying priorities.

Target activities can attract a strong project proponent. Recognizing that a strong proponent (or proponents) will be necessary to implement any project, this criterion focuses on projects that appeal to the motivations of key stakeholders. For the U.S., this would principally mean projects in non-attainment and near non-attainment areas. For Mexico, this means focusing on projects with significant health benefits, especially in cities with a strong track record of diesel projects such as Ciudad Juarez and possibly Tijuana and Mexicali.

Activities should be able to be scaled up for broader application along the border and ultimately be financially self-sustaining over the long term. This criterion focuses on ensuring that projects can be scaled up to longer-term, broader efforts with self-sustaining incentives once public

funding and pressure are no longer applied. It also means selecting activities that will remain viable and relevant in the face of foreseeable future developments, such as the opening of the border. For the private sector, this criterion suggests focusing on proponents with strong economic motivations for a project, such as large multinational companies operating in Mexico that are motivated to improve or maintain a “green” image.

Activities should be able to attract funding. This criterion addresses how attractive an activity is to a potential funder. For public funds, attractive projects will be those that demonstrate activities that can be scaled up and sustained by other sources of funding. For private funds, the most attractive activities will be those with a positive return on investment or other significant competitive or public relations benefits.

Together, these four criteria can be applied to a “master list” of potential border diesel activities as shown in Table 1. The list is based on research into current and past pilot projects in the border region (see Appendix C), projects already being implemented outside of the border region in Mexico and the U.S., and studies and recommendations from other analyses of diesel emissions reduction opportunities. The list is not comprehensive, but it covers most of the feasible activities related to reducing diesel emissions from heavy-duty trucks, locomotives, ships, and other non-road diesel engines.

The table indicates the extent to which each diesel emissions reduction activity meets the four criteria described above. Each activity is rated as high, medium, or low according to each criterion. The highest scoring activities (which are shaded in the table) are developed into recommendations in Section 3, which also briefly describes lower-scoring activities for reference.²

Table 1: Assessment of a “Master List” of Diesel Emissions Reduction Activities

Diesel Emissions Reduction Activities	Strategic Criteria for Project Selection			
	Targets a Priority Emission Source	Potential for a Strong Project Proponent	Scalability and Long-term Viability	Potential for Funding
On-Road Vehicles				
Truck engine retrofits (e.g., oxidation catalysts, particulate filters)	High	Medium (private fleets) High (public fleets)	Low (grants) Medium (loans)	High
Fleet scrapping and modernization through purchasing incentives	High	Low	Low	Medium
SmartWay-type alterations other than retrofits (e.g., wide-based tires, improved aerodynamics, etc.)	Medium	Medium	High	High
Improved inspection and maintenance (in Mexico)	Medium	High	Medium	Medium

² High priority projects are those receiving a score of 8 or higher in the criteria ranking where high=3, medium=2, and low=1.

Diesel Emissions Reduction Activities	Strategic Criteria for Project Selection			
	Targets a Priority Emission Source	Potential for a Strong Project Proponent	Scalability and Long-term Viability	Potential for Funding
Truck anti-idling/electrification (e.g., truck stop electrification)	Medium	High	High	Medium
Non-Road Vehicles				
Non-road engine retrofits, replacement, and/or fuel conversion (e.g., agricultural and construction equipment)	High	Medium	Low (grants) Medium (loans)	Medium
Marine engine retrofits, emissions controls, and/or fuel conversion	Low	Medium	Medium	Low
Locomotive engine retrofits, emissions controls, and/or fuel conversion	Low	Medium	Medium	Medium
Locomotive anti-idling at transfer facilities	Low	Medium	Medium	Medium
Fuels				
Accelerated ultra low sulfur diesel (USLD) introduction	Medium	Low	High	Low
Biodiesel sourcing, availability, and use	High	High	Medium	Medium
Fleet conversion to renewable or alternative fuels (e.g., compressed natural gas)	High	High	High	High
Transportation Dynamics and Infrastructure				
Streamlined border crossing to reduce congestion (e.g., participation in FAST program)	Medium	Low	High	Low
Mode switching (e.g., trucks to trains)	Medium	Low	Medium	Low
More efficient goods movement (e.g., better scheduling, ensuring trucks aren't returning empty, etc.)	Medium	Low	Medium	Low

Note: Shaded activities are the highest scoring efforts developed into recommendations in the next section.

3. DIESEL EMISSIONS REDUCTION PRIORITIES

This section describes seven recommended diesel emission reduction activities for the border as well as other lower priority activities for reference. Recommended activities are those that generally scored high across all four of the criteria, as explained in the previous section. That is, the activities targeted priority emission areas, could motivate key stakeholders, could be scaled up and viable over time, and could garner funding. Recommendations include activities to promote ongoing efforts, as well as recommendations for new pilot projects. Most of the recommended pilot projects are in Mexico, where there has been less programmatic attention and funding for diesel emissions reduction efforts. Each project description includes benefits, costs, potential funding sources, and key stakeholders.

Recommended Activities

1. Promote ongoing efforts to encourage private sector funding of drayage truck retrofits in Mexico, building on lessons learned from existing grant-funded pilot projects

There are a number of examples of existing or planned grant-funded truck engine retrofit projects along the border, including some in Mexico. Recently, staff from the U.S. EPA SmartWay program and their counterparts in Mexico have been investigating ways to transition from grant-funded retrofits to fleet retrofits privately financed by trucking companies, shippers (particularly maquiladoras), or both. This recommendation focuses on promoting this ongoing work by identifying partners, conducting outreach, and generating incentives for participation.

Retrofit projects typically involve adding oxidation catalysts or particulate filters to existing diesel engines. In a project to retrofit public buses in Mexico City, for example, oxidation catalysts achieved a 20-30% reduction in PM_{2.5} and a 20-33% reduction in NO_x. Particulate filters (in conjunction with the use of ULSD) achieved a 90-98% reduction in PM_{2.5} and a 10% reduction in NO_x.³

Costs of retrofits vary depending on the specifics of a project, with diesel oxidation catalysts costing a few thousand dollars and particulate filters costing around \$6,000 per vehicle.⁴ Unlike some options that address fuel efficiency along with emissions, there are no direct economic benefits for truck companies or owners to do retrofits. A number of other incentives have been suggested to encourage privately financed retrofits, including favorable financing through the North American Development Bank (NADB), streamlined border crossings (e.g., by linking

³ U.S. EPA. "Mexico City Diesel Retrofit Project." Available at: http://www.epa.gov/otaq/retrofit/mexico_city.htm, last visited 12/26/06.

⁴ The EPA SmartWay program estimates the cost of diesel oxidation catalysts as \$1,200 per vehicle. See U.S. EPA. "SmartWay Innovative Financing for the Trucking Industry." Available at: <http://www.epa.gov/smartway/documents/420f06016.pdf>, last visited 2/24/07. In the San Diego-Tijuana retrofit project, one report said the costs of the catalysts came to around \$3,500 per vehicle. See, Mike Lee. "Emissions Program Shifts to High Gear." SignOnSanDiego.com. March 23, 2006. Available at: http://www.westcoastcollaborative.org/files/news/SanDiego032306_bigriq.pdf, last visited 6/12/07.

retrofits with the Free and Secure Trade, or FAST, program), projecting a favorable “green” image, and compliance with possible future vehicle emissions policies in the U.S.

Efforts to promote retrofits should utilize the experience developed from previous projects and the institutions established through past projects, such as the Center for Sustainable Transportation. Key stakeholders in Mexico are federal, State, and municipal governments, private commercial trucking companies, and major shippers and/or shipping associations. Key stakeholders in the U.S. are State and federal regulators and California’s local air quality management districts.

2. Promote public vehicle fleet retrofits and conversion to renewable or alternative fuels in the U.S. and Mexico, including possible pilot projects in Mexico

In the United States, there are a number of examples of federal, State, and local efforts to retrofit public fleets or convert them to renewable or alternative fuels. These include projects through EPA’s Clean School Bus program and fuel conversion projects in Las Cruces and Laredo. These efforts in the U.S. can be promoted through identification of partners, outreach, and assessment of project benefits. In Mexico, promoting public fleet retrofits or conversion could include pilot projects modeled on the Mexico City public transit retrofit project (see Appendix C). Projects in Mexico should also consider near-term funding for emissions inventory development as an interim step.

The technology for public fleet retrofits is the same as discussed in Recommendation 1 for private fleets, typically involving the addition of diesel oxidation catalysts and/or particulate filters. Fleet conversion from diesel to renewable or alternative fuels, such as compressed natural gas (CNG), is another way to lower emissions from existing vehicles. Fuel conversion is a common practice in the U.S., particularly for public fleets. In one study, conversion of buses from diesel to CNG reduced particulate matter (PM) by 97% and NO_x by 58%.⁵ However, there is some evidence that conversion can increase emissions of smaller particle sizes even as it reduces emissions of larger particles. CNG buses can cost \$25,000 to \$50,000 more than conventional diesel, though these costs can be offset by lower fuel costs.

Municipalities, in particular, are more likely to be more interested in projects that focus on publicly funded fleets (e.g., mass transit) than those that focus on private freight fleets. There are, however, some challenges with publicly funded fleets in Mexico. In particular, most of these fleets are privately owned and operating under contracts to provide services on behalf of municipal governments. Although contracts could include provisions to ensure lower emissions, some stakeholders noted that there are political and social sensitivities around increasing costs for public transit. Potential additional funding sources for public fleet retrofits or fleet conversion to alternative fuels in Mexico include EPA grant programs, such as diesel collaborative grants and Border 2012 grants. Some types of fuel conversion projects may also be able to leverage climate-related funds.

⁵ DOE EERE. “Natural Gas Buses: Separating Myth from Fact.” Clean Cities Alternative Fuel Information Series (May 2000). Available at: <http://www.eere.energy.gov/afdc/pdfs/MythsFact.pdf>, last visited 2/24/07.

3. Promote increased participation in SmartWay for U.S. long-haul fleets in the border region; in the Mexico border region, promote SmartWay-type activities for long-haul fleets, including demonstrating feasibility through pilot projects

Although much of the focus of border diesel emissions reductions is on short-haul drayage fleets, the border area is also the origin and destination for long-haul fleets traveling to and from the interior of Mexico and the U.S. Long-haul transportation in the region is likely to increase significantly when the border is open to cross-border movement of trucks beyond the current limited commercial zone.

The SmartWay program has identified a number of techniques to increase fuel economy and reduce emissions from long-haul trucks that also save money, such as use of wide-based tires and improved aerodynamics. For example, EPA estimates that improving aerodynamics by 15% can cut annual fuel use by 2,000 gallons.⁶ Up-front costs vary by the type of alteration, with an aerodynamics upgrade costing around \$2,400 and a wheel upgrade costing around \$5,600 per vehicle.⁷ However, over time, the costs of alterations can be offset by fuel savings. In the U.S., the up-front costs are typically borne by fleet owners, although favorable loan programs are available. Such loan programs may also work in Mexico, although grants could be considered as well.

Participation in the SmartWay program should be encouraged for U.S. companies that have a significant trucking presence in the border region. The SmartWay techniques should also be promoted in Mexico, including through pilot projects focused on long-haul fleets based in the border area. Particular targets of opportunity are around border crossings that process a high percentage of long-haul freight, such as Laredo-Nuevo Laredo and Ambos Nogales. Key stakeholders include shippers and commercial trucking companies, as well as State and federal regulators in both countries.

4. Demonstrate the feasibility of truck idle reduction through electrification facilities at border crossings and at truck stops along major transportation corridors in Mexico; promote current truck stop electrification efforts in the U.S. border region

Anti-idling programs for trucks typically focus on providing alternative sources of power (e.g., electrification) at truck stops and other locations where trucks sit at idle. For long-haul vehicles, EPA estimates that truck stops with anti-idling features can, on average, reduce 0.009 tons per year of PM per truck and 0.35 tons per year of NO_x per truck.⁸ Anti-idling also saves fuel: EPA estimates that reducing unnecessary truck idling can save 1,900 gallons annually per truck.⁹

⁶ More data on fuel use reductions from Smart Way alternatives can be found at: U.S. EPA "Overview of Carrier Strategies." Available at: http://www.epa.gov/smartway/documents/carrier_strategies.pdf, last visited 2/2/407.

⁷ U.S. EPA. "SmartWay Innovation Financing for the Trucking Industry," Available at: <http://www.epa.gov/smartway/documents/420f06016.pdf>, last visited 2/24/07.

⁸ Paul Bubbosh. "Alternatives to Truck Engine Idling Workshop: Environmental Objectives." June 22, 2005. Available at: http://www.ctre.iastate.edu/pubs/truck_idling/bubbosh.pdf, last visited 2/24/07.

⁹ U.S. EPA. "Overview of Carrier Strategies." Available at: http://www.epa.gov/smartway/documents/carrier_strategies.pdf, last visited 2/2/407. EPA studies estimate that trucks often idle 8 hours per day, 300 days per year, using 0.8 gallons of fuel for each hour of idling (U.S. EPA. "A Glance at Clean Freight Strategies: Idle Reduction." Available at: <http://www.epa.gov/smartway/documents/apu.pdf>, last visited 2/24/07).

EPA's per-vehicle estimates of emissions reductions and fuel use are for long-haul trucks, not drayage vehicles. However, information suggests that drayage vehicles spend a considerable amount of time idling. An EPA-funded study of two border crossings between El Paso and Juarez found that trucks—many of them drayage vehicles—spent 63% and 72% of their crossing time idling at standstill or “creep idling” at less than five miles an hour. The study estimated total annual idling emissions at these two border crossings to be 23.8 tons of NO_x and 0.3 tons of particulate matter.¹⁰

A variety of anti-idling options exist, both technologies that can be installed on a truck and supporting technologies that can be installed at truck stops or other facilities. The cost of these technologies varies widely. For example, auxiliary power units for trucks cost from \$5,000 to \$7,000 per vehicle, while the cost of creating electrified parking spaces at truck stops can range up to \$18,000 per parking space.¹¹ For facilities where idling infrastructure exists, costs to truckers themselves can be very low.

For trucks stops, key opportunities are along major transportation corridors in the U.S. (I-35, I-10/I-8, I-19, I-5) and their corresponding corridors in Mexico, especially near the major border crossings and PROAIRE cities. Efforts in the U.S. would focus on non-attainment and near non-attainment areas along major transportation corridors in the border region or those that are significantly affected by border transportation. Key stakeholders would be transportation agencies, commercial freight companies, and local, State, and federal regulators.

For border crossings, anti-idling efforts would focus on “staging areas” where trucks wait to go through crossing stations. Such efforts, however, may require a substantial change in infrastructure and border crossing logistics. Any projects that concern border crossing infrastructure would also need to engage the U.S. Department of Homeland Security (DHS) and other stakeholders not usually focused on environmental activities. Anecdotal information suggests that DHS's motivation to partner on diesel emission reduction projects is limited.

Funding sources for truck stop or border crossing anti-idling includes diesel collaborative grants and related sources. Efforts could also potentially seek climate-related funds, such as funds from offset programs in the U.S. and the Clean Development Mechanism in Mexico. For example, a carbon offset program (Climate Trust) recently contributed to anti-idling facilities on the I-5 corridor in the U.S.

5. Improve and expand inspection and maintenance of diesel vehicles in Mexican border cities, including through pilot projects

Inspection and maintenance programs focus on reducing emissions from cars already on the road, including high emitters. While such programs are well-developed on the U.S. side of the

¹⁰ Josias Zietsman, Juan C. Villa, Timothy L. Forrest, John M. Storey. “Mexican Truck Idling Emissions at the El Paso-Ciudad Juarez Border Location.” Texas Transportation Institute, College Station Texas. November 2005. Available at: <http://swutc.tamu.edu/publications/technicalreports/473700-00033-1.pdf>, last visited 6/11/07.

¹¹ Paul Bubbosh. “Alternatives to Truck Engine Idling Workshop: Environmental Objectives.” June 22, 2005. Available at: http://www.ctre.iastate.edu/pubs/truck_idling/bubbosh.pdf, last visited 2/24/07.

border, Juarez is the only city along the Mexican side of the border with an inspection and maintenance program. This program includes both passenger vehicles and trucks (including diesel trucks). Projects could focus on expanding Juarez's program or creating similar programs in other Mexican border cities, such as Tijuana and Mexicali, which have been contemplating implementing inspection and maintenance programs. Estimates of specific quantities of potential emissions reductions from inspection and maintenance programs could not be found for this project.

Key stakeholders in Mexico would be municipal governments responsible for implementing programs as well as State and federal agencies. Costs for improved inspection and maintenance would be borne by both the public sector and private vehicle owners. Costs for municipalities include inspection equipment and program operations. Costs to drivers include maintenance and licensing or certification fees, which may create a disincentive to comply. Further research is needed to investigate the specific amount of funds needed for inspection and maintenance programs. To cover public costs, there have been examples of in-kind donation of equipment of inspection equipment. Border 2012 grants may be another source of funding. To be viable, these programs may need to address both diesel and non-diesel vehicles and the importation of used vehicles.

6. Promote biodiesel sourcing, availability, and use in the border region, including through pilot projects in Mexico

In the U.S., use of biodiesel has become increasingly common as a strategy to reduce emissions of PM and CO₂, particularly in public vehicle fleets. According to one stakeholder, some U.S. border cities are interested in using biodiesel in public fleets in the future. Projects to source used fry oil for biodiesel are already under way in some Mexican border cities.

Biodiesel can be used in existing diesel engines at varying blends. A 20% blend (B20), which can be used in unmodified diesel engines, is estimated to reduce PM emissions by about 10%. A 100% blend (B100), which may require engine modifications, can reduce PM emissions by 40%. Biodiesel also offers co-benefits by reducing lifecycle CO₂ emissions. Biodiesel can potentially increase NO_x emissions (e.g., B20 can increase NO_x by 2%), and some "NO_x sensitive" areas treat it with caution. NO_x emissions can, however, be controlled with additives.¹²

Pilot projects could focus on either the supply side (e.g., sourcing biodiesel feedstocks in Mexico) or on the demand side (e.g., promoting biodiesel availability and use). Because biodiesel introduction is easier for fleets with dedicated fueling facilities, key demand-side targets of opportunity are border city public fleets and agricultural equipment (tractors, pumps, and other farm equipment) where dedicated fuel facilities exist.

¹² See, for example, West Coast Collaborative. "Fields to Fuel San Joaquin Valley Biodiesel Project: Cleaner Air, Local Jobs & Greater Energy Security." Information available at: <http://www.epa.gov/region9/waste/biodiesel/resources/SanJoaquin.pdf>, last visited 2/24/07.

Key stakeholders would be private companies or others producing biodiesel feedstocks, demand-side stakeholders (e.g., municipal government, agricultural association, etc.), and local, State, and federal regulators. An existing biodiesel production facility at Monterrey Tech in Mexico could serve as an example for similar efforts in Mexico. Potential sources of funding for production are private investment and possibly funding from NADB or the World Bank. The effort could also potentially seek climate-related funds.

7. Demonstrate the feasibility of engine retrofits, replacement, and/or fuel conversion in the Mexican agricultural and construction sectors through pilot projects

Although more localized than emissions from on-road vehicles, agricultural and construction engines are a significant source of diesel emissions, particularly in northern Mexico. Initial pilot projects could focus on applying some of the same types of retrofit and fuel switching projects undertaken in the U.S. to Mexico. These include projects focused on fixed engines (e.g., irrigation pumps) and mobile sources (e.g., tractors and construction vehicles).

The West Coast Collaborative (WCC) has funded projects that address stationary and non-road mobile sources of diesel emissions in the agricultural and construction sectors. One WCC project funded an effort that retrofitted and repaired six inefficient agricultural pumps, which reduced emissions by an estimated 1.08 tons of PM and 20 tons of NO_x; the project also saved 13,000 gallons of diesel fuel.^{13 14} A second WCC-funded project focused on non-road construction engines. It added emission control devices to five pieces of heavy construction equipment and reduced PM emissions by 85% and NO_x emissions by 25%.¹⁵

The cost of reducing diesel emissions from non-road engines can vary widely. For example, the two WCC-funded projects mentioned above cost a total of \$75,000 and \$985,000 to address emissions from agricultural pumps and non-road construction engines, respectively.

One stakeholder in Mexico noted that Mexico's Secretaria de Agricultura, Ganadería, Desarrollo Rural, Pesca, y Alimentación (SAGARPA) operates the Programa de Desarrollo Rural de la Alianza Contigo, which provides financial and technical support for agricultural mechanization.¹⁶ He suggested that this program could be adapted to promote cleaner engines. The same stakeholder noted that construction companies likely have the resources for private investment in retrofits, meaning that projects would not need to be fully funded by government grants. NADB might be a source of favorable loans for projects along the border, and grant funding could come from Border 2012 grants and possibly diesel reduction collaboratives.

¹³ West Coast Collaborative. "Diesel Agricultural Pump Replacement Project." Information available at: <http://www.westcoastdiesel.org/grants/ca-diesel-ag-pump.htm>, last visited 2/24/07.

¹⁴ Irrigation pump engines annually emit an estimated 480 tons of PM and 10,000 tons of NO_x. California ARB. "Control measures for in-use Stationary Diesel Agricultural Engines." Available at: <http://www.arb.ca.gov/diesel/ag/documents/factsheet012005.pdf>, last visited 2/24/07.

¹⁵ West Coast Collaborative. "Construction Equipment Retrofit Demonstration Project" Information available at: <http://www.westcoastdiesel.org/grants/ca-const-equip-retrofit.htm>, last visited 2/24/07.

¹⁶ For more information on SAGARPA and the "Alianza Contigo" program, see: <http://www.sagarpa.gob.mx/sdr/progs2003/alianza2003.htm> and <http://www.ers.usda.gov/Briefing/Mexico/Policy.htm>.

Other Diesel Emissions Reduction Projects

Although not high priorities according to the project criteria, there are a number of other diesel emissions reduction activities that could be undertaken in the border region as opportunities arise. These activities are briefly described below.

Fleet Scrapping and Modernization through Purchasing Incentives

Fleet scrapping and modernization programs replace older vehicles with new vehicles that have more efficient modern engines and emissions control equipment. EPA estimates that upgrading trucks from pre-1987 to post-1999 models can reduce PM by 90% and NO_x by 50%.¹⁷

The costs of purchasing new trucks can be prohibitive compared to retrofits or fuel conversion. New truck purchasing is particularly difficult for smaller, poorly-funded trucking operations. Diesel reduction programs could focus on rebates for scrapped vehicles or favorable loan terms for the purchase of new cleaner-running vehicles. Mexico's Programa de Modernización del Autotransporte Federal, for example, encourages fleet owners to modernize their fleets by offering rebates for scrapping older trucks and offering favorable financing for new trucks.¹⁸ In addition, the SmartWay program has discussed favorable financing approaches with NADB. Like retrofits, key targets of opportunity are public and private sector fleets and both freight (e.g., drayage) and non-freight vehicles (e.g. public transit, school buses, etc.).

Marine Engine Retrofits, Emissions Controls, and/or Conversion to Renewable or Alternative Fuels

There are a variety of strategies available to reduce emissions from marine engines, offering a range of emissions reduction benefits. Strategies include in-engine modifications, water-based controls (i.e., using water into the combustion process to reduce NO_x formation), after-treatment on-board controls, shore-side controls, and fuel switching.¹⁹ These alternatives have widely ranging costs from \$100,000 to \$4 million per vessel, depending on the technology used. Funding is typically from private investment, possibly with favorable loan terms. Diesel collaborative grants have been awarded for various projects as well. In California, funding through the Carl Moyer program may be appropriate.

There are presently few border zone ports; as a result, marine-related emissions of diesel are not currently a high percentage of overall emissions within the border region. However, given changes in transportation dynamics and the pressure on current West Coast ports, addressing marine emissions of diesel may become more important to the border region in the future.

¹⁷ U.S. EPA. "A Glance at Clean Freight Strategies: Gateway Cities Diesel Fleet Scrappage Program for Drayage." Available at: <http://www.epa.gov/smartway/documents/420f06004.pdf>, last visited 2/2/407.

¹⁸ For more information, see <http://www.nafin.com/portalf/?action=content§ionID=2&catID=73&subcatID=628> and <http://cs.sct.gob.mx/fileadmin/Boletines/04/abr/04abr027.doc>.

¹⁹ Anthony Fournier. "Controlling Air Emissions from Marine Vessels." (February 2006). Available at: <http://www.westcoastdiesel.org/files/sector-marine/Fournier%20Marine%20Emissions%20Problems%20and%20Opportunities.pdf>, last visited 2/24/07.

Locomotive Engine Retrofits, Emissions Controls, and/or Conversion to Renewable or Alternative Fuels

As with marine engines, there are a number of different approaches for addressing emissions from locomotives, each offering different benefits and costs. For example, a current \$140,000 West Coast Collaborative-funded effort to capture emissions from stationary locomotives is estimated to reduce 2.2 tons per year of PM and 102.5 tons per year of NO_x.²⁰ Another effort to convert a switch yard locomotive from diesel to liquefied natural gas is estimated to reduce 0.43 tons per year of PM and 17.2 tons per year of NO_x (the specific costs of this component of the project were not available). Complementary activities could include retrofits of non-road rail yard support equipment, such as machinery for loading trains.

Although there are rail switchyards in the border region, inventories do not suggest that they are significant sources of diesel emissions. However, they may become more significant in the future if current increasing trends in intermodal transportation continue.

Outside of the border region, locomotive engine retrofits have been partially funded by the diesel collaboratives, and Carl Moyer funds may be available in California. Other sources of grants and favorable loans are likely available.

Locomotive Anti-Idling at Transfer Facilities

Similar to truck anti-idling efforts, anti-idling opportunities are available for locomotives. Benefits and costs of such projects depend on their scale. A \$150,000 project to install anti-idling technologies for 10 switcher locomotives in California was estimated to reduce 0.04 tons per year of PM and 1.5 tons per year of NO_x.²¹ A Chicago anti-idling project estimated reductions of 0.07 tons per year of PM and 2.4 tons per year of NO_x per engine.²² The cost was \$35,500 per locomotive.

Locomotive anti-idling projects have been funded, in part, with West Coast Collaborative funds, along with private investment. As noted above, however, emissions from rail are not a significant current contributor to diesel emissions in the border region.

Accelerated Ultra Low Sulfur Diesel (ULSD) Introduction

ULSD has been introduced in the U.S. and is being introduced into the Mexican border region. There are no studies that specifically address air quality benefits of using ULSD in the border region. However, introduction of low-sulfur gasoline and diesel (along with associated engine technologies) nationwide in Mexico has been estimated to reduce PM_{2.5} and NO_x emissions 40

²⁰ West Coast Collaborative. "Advanced Locomotive Emission Control System." Information available at: <http://www.westcoastdiesel.org/grants/ca-loco-hood.htm>, last visited 2/24/07.

²¹ West Coast Collaborative. "San Joaquin Valley Locomotive Idle Reduction Project Fact Sheet." Information available at: <http://www.westcoastcollaborative.org/files/grants/San%20Joaquin%20Idle%20Reduction%20Fact%20Sheet.pdf>, last visited 2/24/07.

²² U.S. EPA. "Case study: Chicago Locomotive Idle Reduction Project," EPA420-R-04-003, March 2004. Available at: <http://www.epa.gov/otaq/smartway/documents/420r04003.pdf>, last visited 2/24/07.

to 50 percent by 2020.²³ Cost-benefit analyses by EPA and others demonstrate that the human health and environmental benefits of ULSD introduction far outweigh the costs.²⁴

Opportunities to promote the availability of ULSD in the border region through specific projects are limited. The supply of ULSD in Mexico is determined by Pemex, the national oil company, and Mexico's federal government; both have committed to introducing it to the entire country, beginning with the border region. Domestic Mexican production of ULSD is projected to require substantial investment by Pemex (estimated at \$4.7 billion²⁵). Projects that retrofit trucks with diesel particulate filters, which require the use of ULSD, can play a small part in raising awareness about ULSD availability.

Streamlined Border Crossings

Participation in streamlined border crossing programs (such as FAST) can reduce congestion and truck idling at border crossings, resulting in reduced fuel use and emissions. Existing analyses of emissions from idling trucks at border crossings are not definitive about the nature of the problem, but congested border crossings represent a highly visible and concentrated opportunity to address emissions from idling trucks. This is an area where commercial motivation for streamlined crossings can help promote the environmental benefits of lower emissions. There have been discussions between EPA's SmartWay program and U.S. and Mexican border and customs agencies about linking SmartWay participation with eligibility to join the FAST program.

Streamlined crossing programs can involve substantial costs for participants. For private fleet owners, start-up costs to participate in FAST can run around \$25,000, including the cost of background checks, security fences, security cameras at lots, and other measures.²⁶ However, these costs are weighed against the efficiency benefits of quicker border crossings and fuel savings. The bulk of funding for such projects will likely come as private investment by fleet owners. Key targets of opportunity are major crossings with already established FAST programs.

Mode Switching

Moving cargo from trucks to trains can reduce emissions by switching freight between modes of transportation. This opportunity exists because of the highly developed rail infrastructure along the border. EPA estimates that for distances greater than 500 miles, switching from trucks to trains can cut fuel use by 65%.²⁷ Mode switching coupled with fuel switching (e.g., from diesel to liquefied natural gas) can reduce emissions for transport over shorter distances as well.

²³ SEMARNAT, Instituto Nacional de Ecología, and PEMEX. "Estudio de Evaluación Socioeconómica del Proyecto Integral de Calidad de Combustibles." June 26, 2006. Mexico City, MX.

²⁴ See, for example, Katherine O. Blumberg, Michael P. Walsh, and Charlotte Pera. "Low-Sulfur Gasoline & Diesel: The Key to Lower Vehicle Emissions." International Council on Clean Transportation (ICCT). May 2003. Available at: http://www.theicct.org/documents/Low-Sulfur_ICCT_2003.pdf, last visited 2/24/07.

²⁵ SEMARNAT, Instituto Nacional de Ecología, and PEMEX. "Estudio de Evaluación Socioeconómica del Proyecto Integral de Calidad de Combustibles." June 26, 2006. Mexico City, MX

²⁶ Personal communication with Dave Fege, February 12, 2007.

²⁷ U.S. EPA. "Overview of Carrier Strategies." Available at: http://www.epa.gov/smartway/documents/carrier_strategies.pdf, last visited 2/2/07.

Mode switching using existing facilities can be cost-effective, and market forces are already shifting some freight from trucks to trains. The costs of mode switching can be substantial, however, if new infrastructure is involved. For example, the cost of a short distance project to allow freight to be shipped by trains instead of trucks at the Ports of Los Angeles and Long Beach (including fuel switching on an existing locomotive from diesel to LNG) was estimated at \$2.2 million.²⁸ Diesel collaboratives have assisted with mode switching projects, coupling funds with private investment.

More Efficient Goods Movement

A variety of strategies for moving goods, such as improved scheduling to reduce idling time at transfer stations and reduction in empty truck return trips can increase the efficiency of freight transport with the attendant benefit of reducing fuel use and emissions per unit of good shipped. For example, EPA estimates that eliminating 15% of empty freight miles could save \$3,000 in fuel annually for a typical long-haul truck. EPA does not report emissions reductions for reducing freight miles, but it is understood that lower fuel use would translate into lower emissions.

Costs of improving the efficiency of freight transport likely vary substantially for different project types. The costs are, however, offset by reduced fuel use and cost-savings from more efficient use of freight capacity.

Key targets of opportunity are major marine, locomotive, and commercial transfer facilities in or near the border region. The private sector has been working to improve the efficiency of goods movement at these types of facilities for some time, driven by the incentive of lowering cost. Given this motivation, it is not clear that public funds should play a role in increasing efficiency, even with attendant benefits in air quality. SmartWay has, however, encouraged shippers to reduce emissions by improving pickup and delivery scheduling and reducing shipping via partially loaded trucks by using enhanced communications or logistics software.²⁹

4. RECOMMENDED APPROACHES FOR PROJECT COMMUNICATION, COORDINATION, AND PILOT PROJECT IMPLEMENTATION

To complement recommendations about desirable and feasible diesel emissions reduction projects, this section recommends ways to collaborate, communicate, and implement a border diesel emissions reduction strategy.

²⁸ See, for example, the LNG Short Line Locomotive Project, intended to reduce truck use at the Ports of Long Beach and Los Angeles by using short line trains to transport cargo to distribution centers near the ports; the project is estimated to reduce PM emissions by 3 tons annually and NO_x emissions by 57 tons. West Coast Collaborative. "Clean Air Partners Transportation System Liquefied Natural Gas Short Line Locomotive Project." Information available at: <http://www.westcoastcollaborative.org/grants/ca-clean-air-transport.htm>, last visited 2/24/07.

²⁹ U.S. EPA. "Overview of Shipper Strategies." Available at http://www.epa.gov/smartway/documents/shipper_strategies.pdf, last visited 6/12/07.

Recommended Approaches for Project Communication and Coordination

A very common theme across discussions with stakeholders was the need for collaborative approaches to diesel emissions reduction projects. Border emissions reduction efforts have a distinct advantage in that key coordinating mechanisms already exist. The West Coast Collaborative (I-5 corridor) and the Blue Skyways Collaborative (I-35 corridor) are established forums for coordinating, and in some cases funding, diesel projects. Both collaboratives have an international component reaching from Mexico in the south to Canada in the north. These collaboratives bring together private sector stakeholders, NGOs, and many levels of government.

Another vital collaborative mechanism along the border is Border 2012, which all stakeholders interviewed regard as the key collaborative institution on the border because it convenes public and private stakeholders from Mexico and the U.S. Border 2012 has a topical group focused on air (the Air Policy Forum), as well as regional workgroups focused on a variety of projects and regional task forces focused on specific regional air issues.

Although the mechanisms for coordinating on air quality and other environmental issues are strong, there are some ties that could be strengthened in the border region around diesel emissions reduction efforts specifically. One such area is with groups that have a more traditional transportation and border security focus. There are few opportunities for environmental and security stakeholders to interact with each other, and any effort to reduce border crossing emissions through changes in infrastructure or procedures will need to involve both groups. Another area is coordination with the emerging focus on climate; there are numerous State efforts underway, and Mexico is pursuing projects as a signatory to the Kyoto protocol. Enhancing the connection between diesel emissions reduction stakeholders and those involved in reducing greenhouse gasses could reveal new funding and project coordination possibilities.

These findings lead to the following four recommendations that supplement those described above:

8. Build on existing collaborative institutions to establish an ongoing mechanism for identifying, discussing, and implementing border diesel emissions reduction projects

This mechanism would regularly bring together interested participants in the West Coast Collaborative, the Blue Skyways Collaborative, the Border 2012 Air Policy Forum (APF), the Border 2012 regional air task forces, and other interested stakeholders to discuss and plan diesel emissions reduction efforts on the border. Regular meetings of the APF are one natural place for these discussions. Diesel emissions stakeholders could also convene periodic stand-alone border diesel forums.

9. Increase discussion between air quality and border security stakeholders on border diesel emissions reduction solutions at border crossings

Efforts to reduce emissions at border crossings necessarily involve policy and infrastructure issues for security and customs agencies on both sides of the border. However, security and customs stakeholders are not involved in discussion and planning for border diesel emissions reduction projects. EPA and SEMARNAT should increase representation and participation in forums dealing with traditional transportation and border security issues, such as the U.S.-Mexico Joint Working Committee on Transportation Planning.

10. Strengthen relationships between border diesel emissions reduction efforts and climate-focused activities

The co-benefits of diesel emissions reductions and CO₂ emissions reductions closely link diesel projects with climate strategies. Stakeholders interested in diesel emissions reductions should strengthen their relationships with climate stakeholders and funding sources, including the Clean Development Mechanism activity in Mexico.

11. Communicate a border diesel strategy to a broad set of border diesel emissions stakeholders

Communicating the recommendations in this report can help promote coordinated effort, identify potential project proponents, and encourage funding of diesel emission reduction activities. Members of the Border 2012 Air Policy Forum, the West Coast Collaborative, and the Blue Skyways Collaborative are clear audiences. Other organizations with an interest in diesel emissions and broader air quality strategies may be interested as well, including the Centro Mario Molina, the Clean Air Institute (funded by the World Bank's Clean Air Initiative for Latin America), the Partnership for Clean Fuels and Vehicles, those involved with Mexico's Clean Development Mechanism, and others. Funding organizations could be encouraged to use the strategy to inform grant program solicitations for border projects.

Recommended Approaches for Implementing Pilot Projects

In the course of this work, a number of people involved in implementing pilot projects suggested some key lessons derived from their experiences. These lessons include, for example, the importance of convening high profile stakeholders at the beginning of a project, engaging with research and academic organizations as project proponents along the Border, and preventing government turnover from stalling a project. These findings lead to the following recommendations for convening stakeholders and conducting pilot projects:

12. Coordinate Mexican pilot projects through an on-the-ground institution with relevant experience and stakeholder networks

Organizations such as the Center for Sustainable Transportation in Mexico City or the Border Environmental Cooperation Commission bring important experience and stakeholder networks to a project. Mexican academic and research institutions can also be effective partners for

project ideas, promotion and implementation, particularly for activities related to project assessment and evaluation.

13. Include capacity building and outreach components for all pilot projects

Training and communication should be incorporated into all pilot efforts to promote both the long-term effectiveness of pilot projects and the implementation of similar projects in other locations. Training includes both technical personnel (e.g., mechanics) and regulatory agencies.

14. Follow pilot project “best practices” identified through past diesel emission pilot project implementation

As described by stakeholders, these best practices include:

- Time Mexico-based projects to coincide with the first year to year-and-a-half of a new political term to mitigate the impact of a 3-year cycle of government turnover;
- Establish a high-level stakeholder group with a common base of knowledge that can help resolve inevitable problems and lend significance and credibility to the effort;
- Work with project managers that have strong connections to government;
- Have a high-visibility kick-off to promote the project and gain public buy-in;
- Establish a technical panel that can mobilize to solve technical issues as they come up;
- Test and evaluate emissions reduction efforts through real-time monitoring and related technologies (note that this can add substantially to cost);
- Provide adequate funding for equipment and expertise; and
- Enhance project success by paying attention to fundamentals, such as ensuring proper maintenance of vehicles before they are retrofitted.

5. CONCLUSION

There are a number of projects that could be effectively pursued to reduce diesel emissions in the border region. This report has recommended a set of seven high-priority activities that target priority emissions sources and can motivate key project partners, be scaled up and remain viable over time, and attract funding. The report also recommends strategies for coordinating border diesel emissions reduction efforts over the longer-term. Going forward, the key need is to identify project proponents and funding to implement pilot efforts. These pilot efforts can then lay the foundation for broader implementation of diesel emission reduction activities in the region.

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APPENDIX A. PROJECT CONTACTS

Over the course of three months, Ross and Associates conducted open-ended conversations with twenty-two border diesel emissions stakeholders, including seven members of an EPA project steering committee. Individuals contacted came from U.S. and Mexican federal, State, and local governments, private companies, associations and collaborations, NGOs, and academia. Together they offered a range of experience with diesel projects including participation in pilot projects, program and regulatory responsibilities, funding, and more. Table A-1 lists the people contacted, along with their contact information (EPA Steering Committee members are denoted with an asterisk).

Table A-1: Contact List

Name ³⁰	Organization	Phone	Email
Diana Borja	Texas Commission on Environmental Quality	512.239.3603	dborja@tceq.state.tx.us
Paul Bubbosh	EPA Office of Transportation and Air Quality	202.343.9322	bubbosh.paul@epa.gov
Mariana Chew	Sierra Club	915.203.7920	Mariana.Chew@sierraclub.org
Dave Fege*	US EPA Region 9 (San Diego Border Liaison Office)	619.235.4769	fege.dave@epa.gov
Barry Feldman*	US EPA Region 6	214.665.7439	feldman.barry@epa.gov
Juan Jose Garcias Islas	Cummins Filtration	444.870.4751	juan.j.garcia@cummins.com
Orlando Gonzalez*	US EPA Office of International Affairs	202. 564.6446	gonzalez.orlando@epa.gov
John Guy	EPA Office of Transportation and Air Quality	202.343.9276	guy.john@epa.gov
Rich Kassel	Natural Resources Defense Council	212.727.4454	rkassel@nrdc.org
Adreana Lobo	Centro de Transporte Sustentable	(52) 553.096.5742	director@cts-ceiba.org
Bill Luthans*	US EPA Region 6	214.665.8154	Luthans.William@epa.gov
Rod Mercado	p3m Consulting	915.351.3800	p3m@sbcglobal.net
Arturo Nunez Serrano	North American Development Bank	210.231.8000	anunez@nadb.org
Ross Pumfrey	Texas Commission on Environmental Quality	512.239.6132	rpumfrey@tceq.state.tx.us
Alberto Ramirez	Border Environmental Cooperation Commission	877.277.1703	aramirez@cocef.org

³⁰ Others contacted that provided names of further contacts included Oliver Bernstein (Sierra Club, TX), Robert Reider (San Diego Air Quality Management District), Louis Hill (River of Trade Corridor Commission), Howard Duchan (US Department of Homeland Security), and Maria Elena Giner (Border Environmental Cooperation Commission).

Name³⁰	Organization	Phone	Email
Kristin Riha*	US EPA Region 9 and West Coast Collaborative	415.947.4140	riha.kristin@epa.gov
Carlos Rincon*	US EPA Region 6 (El Paso Border Liaison Office)	915.533.7273	rincon.carlos@epa.gov
Sergio Sanchez	Clean Air Institute	202.785.4222	ssanchez@cleanairinstitute.org
Sue Stendebach*	US EPA Office of Air and Radiation	202.564.8309	stendebach.sue@epa.gov
Gerardo Tarin	SEMARNAT (located in Ciudad Juarez)	915.533.7272	contaminantes@chihuahua.semarnat.gob.mx
Rick van Schoik	Southwest Consortium for Environmental Research and Policy	619.594.0568	scerp@mail.sdsu.edu
Domingo Vigil	San Diego Air Pollution Control Administration	858.586.2644	Domingo.Vigil@sdcounty.ca.gov
Enrique Villegas Ibarra	State of Baja	(52)664.624.2095	evillegas@baja.gob.mx

APPENDIX B. LIST OF SELECTED BORDER DIESEL EMISSIONS REDUCTION STAKEHOLDERS AND POTENTIAL PROJECT PARTNERS

Based on conversations with project contacts and associated research, this section describes organizations that are stakeholders and potential partners in future emissions reduction projects along the U.S.-Mexico border. It is not an exhaustive list, but it includes many of the key organizations interested and active in diesel emissions reduction efforts. Organizations are categorized by type (e.g., U.S. and Mexico federal government) and listed alphabetically within each category

For each organization there is a brief description of its role and responsibilities followed by a description of its connection to diesel-related work in the border region. Where known, the possible role of the entity in future diesel emissions reduction projects on the border is identified. Organizations contacted directly for this report are identified with an asterisk (*)

U.S. and Mexico Federal Government

- Comision Nacional para el Ahorro de Energia (CONAE): CONAE is Mexico's national energy department with a strong interest in renewable and clean energy options. More information is needed to identify CONAE's interest and potential involvement in border diesel emissions reduction projects.
- Instituto Nacional de Ecologia (INE): INE is a component agency of SEMARNAT, Mexico's federal environmental agency, and the lead agency in applied environmental research in Mexico. More information is needed to identify INE's interest and potential involvement in border diesel emissions reduction projects.
- *Secretaria del Medio Ambiente y Recursos Naturales (SEMARNAT): SEMARNAT is the lead federal environmental agency in Mexico. SEMARNAT was a key leader in the Mexico City public transit bus retrofit program. SEMARNAT will be a critical partner in border diesel projects, especially during the early stages of project formulation and development.
- *U.S. Department of Homeland Security: The U.S. Department of Homeland Security is in charge of the U.S. side of all U.S.-Mexico border crossings. Initial contact with the department suggested that it would need more information on actual diesel emissions reduction projects before determining how to be involved.
- *U.S. Environmental Protection Agency (EPA): EPA is the United States' lead federal agency for environmental protection. It has funded numerous diesel emissions reduction pilot programs through its National Clean Diesel Campaign and has been an active partner in many of the current diesel emissions reduction border projects. EPA's Office of International Affairs, Office of Air and Radiation, Office of Transportation and Air Quality and border programs in Regions 6 and 9 have all been significant players in past and current diesel emissions reduction work in the border region and would likely play a significant role in future projects.

U.S. and Mexico State Government

- Arizona and New Mexico Climate Change Advisory Groups: The Arizona Climate Change Advisory Group created a Climate Change Action Plan in August 2006, which includes transportation and land use sector policy recommendations to reduce vehicle idling, set standards for alternative fuels, and provide incentives for accelerated replacement or retirement of high-emitting diesel engines. New Mexico has a similar climate change group with a similar plan and recommendations completed in December 2006. More information is needed to identify interest and potential involvement of these groups in border diesel emissions reduction projects.
- Arizona Department of Environmental Quality (ADEQ): ADEQ is the lead Arizona State agency for environmental programs. More information is needed to identify ADEQ's interest and potential involvement in border diesel emissions reduction projects, although the agency would be a likely partner in future projects focused on the Arizona border region, especially in non-attainment and near non-attainment areas.
- California Air Resources Board (ARB): ARB is the lead California agency for setting environmental standards and implementing a wide range of air quality programs and projects. As one facet of its work, ARB is responsible for setting and enforcing State diesel emissions standards. Currently ARB is involved in research and implementation of numerous diesel emissions reduction projects in and around the border region. It would be a likely partner in future projects focused on the California border region, especially in non-attainment and near non-attainment areas.
- New Mexico Environment Department (NMED). NMED is the lead New Mexico agency for environmental programs. NMED has a specific Border & Environmental Reviews office. More information is needed to identify NMED's interest and potential involvement in border diesel emissions reduction projects, although the agency could be a likely partner in future projects focused on the New Mexico border region, especially for areas that are currently in non-attainment with particulate standards.
- North Central Texas Council of Governments: The North Central Texas Council of Governments is partnering with EPA to support the SmartWay initiative in the Dallas-Fort Worth area and may be interested in border-related areas in Texas. More information is needed to identify the Council's interest and potential involvement in border diesel emissions reduction projects.
- *State of Baja California: The State of Baja has an environmental department in charge of all State environmental programs. The representative contacted for this project said that air quality is an important issue in Baja's border region, but diesel emission reduction projects are not the highest priority air-related projects. The State places more emphasis currently on paving roads and improving public transit. However, the State environmental agency would be willing to partner on diesel emissions reduction projects, especially in the agricultural and construction sectors. While the State could not offer funding, it could offer valuable local contacts and "on-the-ground" knowledge.
- States of Sonora, Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas. Like the State of Baja, these other Mexican border States have environmental programs and work with federal and municipal counterparts to implement programs. More information is needed on the specific interests of, and potential roles for, these Mexican border States in diesel emissions reduction activities.

- *Texas Commission on Environmental Quality (TCEQ): TCEQ is the lead environmental agency for the State of Texas, responsible for setting and enforcing air quality rules and policy. TCEQ runs the Emissions Reduction Incentive Grant (ERIG) Program under the Texas Emissions Reduction Plan (TERP), which provides funds for reducing diesel emissions. TCEQ would be a likely partner in future projects focused on the Texas border region, especially as they impact non-attainment or near non-attainment areas.

U.S. and Mexico County and Municipal Government

- *Ciudad Juarez: Ciudad Juarez is a leader among Mexican cities along the border regarding air quality projects because of its shared airshed with El Paso in the U.S. and El Paso's desire to gain and maintain attainment status. This city would be a likely starting point for more extensive and/or involved pilot projects in Mexican border cities. According to the local SEMARNAT representative in Ciudad Juarez, a particular priority would be improved inspection and maintenance programs in the city.
- El Paso City-County Health and Environmental District Air Quality Program: El Paso was suggested by stakeholders as one of the more active local governments on the U.S. side of the border. Because El Paso has been in non-attainment for a number of criteria pollutants and shares an airshed with the Mexican City of Juarez, it has engaged in much cross-border work to improve the area's air quality, including participating in the Joint Advisory Committee for the Improvement of Air Quality (see below). The City of El Paso would be a likely participant in diesel emissions pilot projects in the El Paso-Juarez area.
- *San Diego Air Quality Management District (AQMD): The San Diego AQMD is a key partner in the San Diego-Tijuana truck retrofit pilot and has expressed interest in expanding the project and/or helping to implement additional projects. The agency is currently working with Imperial AQMD to begin a similar project for Imperial-Mexicali. These AQMDs could be participants in pilot projects in southern California and adjacent border areas in Mexico.

U.S.-Mexico Border and Trade-Related Institutions

- *Border 2012: Border 2012 is a 10-year, bi-national planning effort implemented under the La Paz agreement. Many of the stakeholders consulted for this project participate regularly in Border 2012 activities. Under the EPA and SEMARNAT National Coordinators, there are four regional workgroups, three border-wide workgroups, an Air Policy Forum, and numerous task forces that focus on specific border issues and help to implement site-specific projects. Reducing air pollution and improving environmental health are two of the goals of the Border 2012. Border 2012 was identified by many stakeholders as a key agency for organizing interested parties and a key partner for future diesel emissions reduction projects in the border region.
- *Border Environment Cooperation Commission (BECC): BECC is a bi-national organization created by the governments of the United States and Mexico under side agreements to the North American Free Trade Agreement (NAFTA). The purpose of the BECC is to help conserve, protect and enhance the environment in the U.S.-Mexico border region through the development and certification of environmental infrastructure projects. BECC works in conjunction with the North American Development Bank (NADB) to certify projects for funding. BECC also provides grant management and

technical assistance and supervises project development for Border 2012 grantees through an agreement with EPA. BECC could be a key partner in helping to manage and implement future border diesel emissions reduction projects.

- Commission for Environmental Cooperation (CEC): The CEC is an international organization created by Canada, Mexico and the United States under the North American Agreement on Environmental Cooperation (NAAEC), which complements the environmental provisions of NAFTA. The CEC was established to address regional environmental concerns, help prevent potential trade and environmental conflicts, and to promote the effective enforcement of environmental law. The CEC studies and programs are a source for information on diesel emissions and their impacts in the border region.
- Consejo Consultivo para el Desarrollo Sustentable. Known as “Consejos,” it is an advisory board of leading Mexican citizens and environmental stakeholders in Mexico. Consejos is the counterpart of the U.S. Good Neighbor Environmental Board (see below), advising on environmental policy in the border region and the rest of Mexico. More information is needed to identify Consejos’ interest and potential involvement in border diesel emissions reduction projects.
- Good Neighbor Environmental Board (GNEB): GNEB is a U.S. federal advisory committee composed of senior government and non-governmental leaders. It recently recommended a focused effort on reducing diesel emissions on the U.S.-Mexico border. GNEB could provide high-level policy support and momentum for a border diesel strategy and related projects.
- *Joint Advisory Committee for the Improvement of Air Quality (JAC): JAC is a bi-national committee overseeing the improvement of air quality in the Paso del Norte Air Basin (El Paso-Ciudad Juarez). Some of the stakeholders consulted for this project are regular participants in the JAC. The JAC is a Border 2012 task force and could be a key partner for motivating, coordinating, and implementing diesel emissions reduction projects in the El Paso-Ciudad Juarez area.
- U.S.-Mexico Joint Working Committee on Transportation Planning (JWC): JWC is a binational group established at the time of NAFTA. It facilitates communication concerning transportation planning between U.S.-Mexico border States, cooperative land transportation planning, and efficient, safe, and economical cross-border transportation movements. Membership includes the U.S. Federal Highway Administration and the Mexican Secretariat of Communication and Transportation as well as the U.S. Department of State, the Mexican Secretariat of Foreign Relations, the four U.S. border State Departments of Transportation, and the six Mexican border States. The General Services Administration and Customs and Border Protection of the Department of Homeland Security also participate in JWC meetings. The JWC could be a forum for discussing environmental aspects of border transportation planning, such as anti-idling at border crossings.

U.S. and Mexico NGOs, Collaborative Institutions, and Research Organizations

- *Blue Skyways Collaborative: Supported by Central States Air Resources Agencies and the EPA, Blue Skyways focuses on reducing air emissions through voluntary efforts in ten States of the central U.S.—including the border States of Texas and New Mexico—and the related border areas of Mexico and Canada. Blue Skyways is organized around

six working group subcommittees on on-road, non-road, energy, fuels, air/water/rail, and outreach. Blue Skyways could be a key partner for border diesel projects and funding along the I-35 corridor.

- Business Alliance for Secure Commerce (BASC): BASC is an international, non-profit organization working to promote secure international trade and has a North Mexico/ East Monterrey Chapter. BASC may provide a good forum for convening private sector stakeholders; more information is needed to identify the organization's interest and potential involvement in border diesel emissions reduction projects.
- *Centro de Transporte Sustentable (CTS): CTS is an independent NGO formed to implement the Mexico City public transit retrofit program. It has a strong interest in being involved in similar projects in the future, including projects in the border region. Key strengths of this organization are managing project implementation and facilitating stakeholder interactions. It could be a key partner for managing day-to-day pilot project activities.
- Centro Mario Molina: The Mario Molina Center is an independent organization created in 2004 that focuses on strategic studies of energy and the environment. The Center aims to find innovative solutions to environmental problems in Mexico. Nobel Prize winner Dr. Mario Molina, the head of the Center, has been a key voice and project proponent for diesel emissions reduction efforts in Mexico and served on the Steering Committee for the Mexico City public transit retrofit project. A number of stakeholders identified Centro Mario Molina as a key partner for providing project vision and voice and for gaining project credibility and buy-in from stakeholders on diesel emissions reduction projects.
- *Clean Air Initiative in Latin America Cities (CAI-LAC): CAI-LAC is a joint partnership established in 1998 between the World Bank and numerous Latin American cities and interested organizations to improve air quality in Latin American cities. Formerly run by the World Bank, it is now an independent non-profit organization called the Clean Air Institute. The program has recently expanded its initial focus on the seven major cities in Latin American to include smaller cities, including some Mexican border cities. Reducing diesel emissions is a priority for the program. The Clean Air Institute provides a convening mechanism and technical assistance for starting air quality projects, and it assists with development of local air quality action plans. Although the institute does not currently fund projects, it can assist with identifying possible funding. For border diesel projects, the Clean Air Institute could play a role in helping to attract key stakeholders and funding as well as providing technical resources.
- Environmental Defense: Environmental Defense is a comprehensive environmental advocacy organization with a history of involvement in border and clean air issues. More information is needed to identify the organization's interest and potential involvement in border diesel emissions reduction projects.
- Monterrey Tech: Monterrey Tech is a leading research university in Mexico that has a biodiesel production facility on campus for campus fleets. Although not officially in the border region, it could serve as a resource and model for other border biodiesel projects. More information is needed to identify Monterrey Tech's interest and potential involvement in border diesel emissions reduction projects.
- *Natural Resources Defense Council (NRDC): NRDC is a non-profit environmental NGO. It was a partner in the Mexico City public transit retrofit project and continues to be involved in developing and promoting Mexico's overall diesel strategy, including

ULSD introduction and new diesel engine standards. NRDC is also involved in on-the-ground projects regarding diesel emissions reduction. NRDC could be a potential partner in both launching and implementing border diesel emissions reduction projects.

- Partnership for Clean Fuels and Vehicles: The Partnership for Clean Fuels and Vehicles is an international organization that convenes governments, including the U.S., to work on reducing air pollution from vehicles in developing countries by promoting clean fuels and engine technologies. It is an institution through which EPA conducts much of its international transportation work. More information is needed to identify the Partnership's interest and potential involvement in border diesel emissions reduction projects.
- *Sierra Club: The Sierra Club is a U.S. non-profit environmental advocacy group. As part of its work, the organization addresses environmental justice issues in the U.S.-Mexico border region and runs a clean car campaign. The Sierra Club's current efforts regarding diesel emissions reduction along the border focus on introducing biodiesel in Ciudad Juarez. In particular, the Sierra Club is working to identify sources of biodiesel (e.g., waste oil) and promote its use. The Sierra Club could be a potential partner for projects focused on renewable fuels.
- *Southwest Consortium for Environmental Research and Policy (SCERP): SCERP is a research organization focused on strategy and the "big picture" of emissions reduction and air quality (among other issues) on the border. It has conducted studies on approaches for reducing border diesel emissions. SCERP is currently focusing on climate change, among other topics, and could be a partner for border projects that reduce greenhouse gasses as well as traditional criteria pollutants.
- Texas Transportation Institute (TTI): TTI is an applied research institute through Texas A&M University focusing on transportation in Texas. TTI has conducted some of the key analytical work on border transportation and air emissions and could be a resource for the technical and evaluation components of border diesel emissions reduction projects.
- *West Coast Collaborative (WCC): The WCC is a public-private partnership working to reduce diesel emissions along the West Coast of North America, including the border areas of Canada and Mexico. It was established under EPA's National Clean Diesel campaign and runs a grant program for diesel emissions reduction projects, including funding of the San Diego-Tijuana retrofit project. The WCC organizes its work by sector, including transportation-related workgroups for trucking, rail, marine, and agriculture. One of WCC's goals in its 2007 Workplan is to increase collaboration with Mexico and work in the border region. There are many opportunities to partner with the WCC for future projects and funding.
- World Resources Institute (WRI): WRI is an international environmental think tank that has a Climate, Energy, and Transport division that helped fund the Mexico City retrofit project. More information is needed to identify WRI's interest and potential involvement in border diesel emissions reduction projects.

Private Sector Companies and Associations

- Camera Nacional de la Industria de Transformacion (CANACINTRA): CANACINTRA is a Mexican industry association promoting innovative technologies. CANACINTRA has an automotive sector and is involved with SmartWay in Mexico. More information is needed

to identify interest and potential involvement in border diesel emissions reduction projects.

- *Cummins Filtration: Cummins Filtration provided the technology and conducted the training for the Mexico City public transit retrofit project. Cummins is currently focusing on promoting truck retrofits for big companies with facilities on the border, such as Coca-Cola and H-E-B Grocery, and has discussed public and private sector retrofits with some Mexican border State and municipal governments. Cummins could be a potential private sector partner for border retrofit projects.
- IdleAire: IdleAire produces and markets anti-idling technology at truck stops. Currently, there are four IdleAire-equipped truck stops Arizona, eleven in California, four in New Mexico, and sixteen in Texas. IdleAire could be a potential partner and stakeholder in future anti-idling projects in the border region.
- National Association of Fleet Administrators, Inc. (NAFA): NAFA is a non-profit, professional society providing services for fleet managers in the United States and Canada. NAFA provides a potential forum for engaging the private sector in border diesel projects, but more information is needed to identify interest and potential involvement in border diesel emissions reduction projects.
- National Association of Maquiladoras. The National Association of Maquiladoras and other maquiladora associations in the border region represent groups of maquiladoras responsible for shipping goods. The National Association of Maquiladoras is involved in bringing SmartWay to Mexico and is in discussions about requiring the companies that ship goods from partner maquiladoras to be SmartWay partners. Maquiladora associations are a possible means for engaging the Mexican private sector, although more information is needed to identify potential involvement in border diesel emissions reduction projects.
- *North American Development Bank (NADB): NADB provides financial analysis, grants, and loans for public and private sector projects certified by the BECC. In 2001 the board authorized loan financing for air projects. Most of the air projects currently funded are street paving projects to reduce particulates. In a conversation about this project, NADB expressed interest in discussing financing for projects related to engine retrofits, renewable energy production, and commercial availability of ULSD.
- Petroleos Mexicanos (Pemex): Pemex is the national oil company of Mexico and is responsible for ULSD introduction to the country, including current imports to the border region and future refining and distribution. Pemex would be a necessary partner in any projects dealing with ULSD or other petroleum-based fuels.
- River of Trade Corridor Coalition (RTCC): RTCC works to increase public awareness and understanding of the Trans-Texas Corridor. RTCC has both public and private sector members, and may be a means for engaging the private sector. More information is needed to identify potential involvement in border diesel emissions reduction projects.

APPENDIX C. SELECTED PAST AND CURRENT DIESEL EMISSIONS REDUCTION PROJECTS IN THE BORDER REGION

Name	Purpose/Accomplishments	Selected Partners	Funding	Status	Lessons for Future Border Projects
On-Road					
Ambos Nogales School Bus Retrofit (Rio Rico, Arizona)	This project resulted in retrofits of 35 out of 47 diesel school buses in the Rio Rico School District with diesel oxidation catalysts or particulate traps. Expected emissions reductions are 20-30% PM reduction from diesel oxidation catalysts and 90% PM and 5-10% NO _x reduction from particulate traps.	City of Rio Rico, AZ; Rio Rico School District	Total costs is \$100k	Completed	A similar program could be implemented in other border cities, either under the Clean School Buses program or independently.
City of El Paso Sun Metro Fleet Conversion to CNG	The purpose of the project was to convert 25 city buses to Compressed Natural Gas.	City of El Paso	Texas Emissions Reduction (TERP) funds of \$1.5 million	Ongoing	A similar project could be implemented with fleets in other cities in the border region.
City of Laredo Fleet Conversion to CNG	The purpose of the project is to convert city fleets to Compressed Natural Gas.	City of Laredo	Unknown	Ongoing	A similar project could be implemented with fleets in other cities in the border region.
IdleAire Truck Stop Anti-idling Facilities	IdleAire installs technology at truck stops to allow truckers to turn off engines. There are currently 4 IdleAire equipped truck stops in Arizona, 11 in California, 4 in New Mexico, and 16 in Texas. This includes 5 facilities at the border crossing cities of El Paso (3) and Laredo (2). The recent Cal-Ark Idle-Aire facility in Laredo is the first private sector anti-idling facility on the border.	Varies, depending on the project	Varies, depending on the project	IdleAire started in 2000; numerous projects are completed, ongoing, or planned	Continued implementation in the border region along major transportation corridors and at border crossings.
Las Cruces Fleet Conversion to LNG	The purpose of the project is to convert city fleets to Liquefied Natural Gas.	City of Las Cruces	Unknown	Ongoing	A similar project could be implemented with fleets in other cities in the border region.

Name	Purpose/Accomplishments	Selected Partners	Funding	Status	Lessons for Future Border Projects
Mexico City Public Transit Retrofit	Although not in the border region, this project can serve as an example for border region efforts. It resulted in retrofits of 20 diesel buses from the Mexico City public transit fleet with particulate filters and diesel oxidation catalysts. Retrofitted buses were monitored while in use with a Ride-Along Vehicle Emissions Measurement system. The project included training mechanics and bus operators.	Centro de Transporte Sustentable; EPA; SEMARNAT; World Resources Institute; PEMEX	Supported by \$511,000 in grants from EPA and the World Resources Institute	Final reports issued January 2006	A similar project could be implemented with public transit fleets in cities in the border region.
North Central Texas Pollution Reduction Technology Testing	The North Central Texas Council of Governments (NCTCOG) is working with transport companies to test new pollution reduction technologies on 30 to 50 trucks. An auxiliary power unit will allow trucks to turn off their engines rather than leave them idling while at a rest stop.	The North Central Texas Council of Governments (NCTCOG); EPA	\$300,000 from EPA's SmartWay program	Ongoing	Implementation of successful technologies on a broader number of trucks that cross the border and/or travel within the border region.
San Diego/Tijuana Border Clean Diesel Demonstration Project	The purpose of the project was to investigate costs and effectiveness of diesel retrofit technologies on heavy-duty diesel vehicles in the San Diego-Tijuana border region. The first phase targeted retrofitting 40 diesel trucks that crossed the border.	San Diego County Air Pollution Control District; EPA Region 9; SEMARNAT; State of Baja Department of Ecology	\$150k in EPA funds via West Coast Diesel Collaborative	Began 2004, ongoing	Could be implemented in other border region sister cities with major border crossings such as Imperial-Mexicali and El Paso-Juarez.
SmartWay Transport Partnership	EPA is working with SEMARNAT to introduce the SmartWay program to Mexico, with an initial focus on the border region. SmartWay Upgrade Kits can reduce fuel consumption and air emissions.	EPA; SEMARNAT; TTI; Numerous truck, ship, and rail carriers, freight shippers, logistics companies and affiliates	Varies by project	Ongoing	Program could be implemented in the Mexican border region and expanded in the U.S. border region.

Name	Purpose/Accomplishments	Selected Partners	Funding	Status	Lessons for Future Border Projects
West Coast Collaborative (WCC) I-5 Truck Idle Reduction Initiative	The I-5 Truck Idle Reduction Initiative is a joint effort of the WCC, EPA's SmartWay Transport Partnership, The Climate Trust, and the West Coast Governors' Global Warming Initiative. Its purpose is to reduce idling along the I-5 corridor. Projects include truck stop electrification and installation of SmartWay upgrade kits in California, Oregon, and Washington.	EPA; South Coast Air Quality Management District; The Climate Trust; The West Coast Governors' Global Warming Initiative	\$400,000 from EPA's SmartWay Transport Partnership (leveraging over \$6 million in matching funds)	Began 2004, ongoing	Expansion of the Initiative and/or its program components to all major transportation corridors in the border region.
Non-Road					
Railroad Commission Forklift Initiative	This project, which was operated by the Railroad Commission of Texas and funded by the Texas Emissions Reduction Program (TERP), provided funds to replace older internal combustion forklifts with propane powered forklifts that met or exceeded EPA emissions standards. In the border region, only projects in El Paso, TX were eligible.	Railroad Commission of Texas, Texas Emissions Reduction Program (TERP)	TERP funds for individual replacement projects averaged around \$8,500 per forklift. The program has replaced over 80 forklifts in El Paso County	Projects funded in 2004 to 2006; current status of program is not known.	With adequate funding, similar projects could be undertaken elsewhere.
San Pedro Bay Ports Plan	Although not in the border region, this joint action plan is a resource for port-related diesel emissions reduction efforts. It outlines actions leading to reduced emissions from all port-related activities at the Ports of Los Angeles and Long Beach in the next five years. Total estimated reductions are a 50% reduction in PM and a 45% reduction in NO _x .	Port of Long Beach; Port of Los Angeles; EPA; CARB; South Coast AQMD	Estimated \$194M - \$2.6B	Ongoing, full implementation by 2011	Similar strategies could be implemented in other border region ports or cargo transfer facilities.

Name	Purpose/Accomplishments	Selected Partners	Funding	Status	Lessons for Future Border Projects
WCC Liquefied Natural Gas Short Line Locomotive Project	Although not in the border region, this project serves as an example of locomotive projects that could be undertaken in the border region. The project will reduce diesel emissions from both trucks and locomotives and reduce truck traffic congestion between the Ports of Los Angeles and Long Beach by retrofitting an existing locomotive to operate primarily on cleaner-burning liquefied natural gas (LNG) and using this locomotive to offset diesel truck traffic as part of a larger clean transportation system. The overall project is expected to reduce annual emissions of NO _x by approximately 17 tons and PM by 860 pounds.	EPA; South Coast Air Quality Management District	EPA is providing a \$100,000 grant to the South Coast Air Quality Management District, with over \$2.1 million in matching funds	Began 2005, ongoing	A similar project could be implemented on locomotives traveling within the border region.

APPENDIX D. SELECTED POTENTIAL FUNDING SOURCES FOR DIESEL EMISSIONS REDUCTION PROJECTS

Program	Description and Requirements
Federal	
National Clean Diesel Campaign (U.S. EPA)	EPA created the National Clean Diesel Campaign to aggressively reduce the pollution emitted from diesel engines across the country through the implementation of varied control strategies and the involvement of national, State, and local partners. Within the program are a number of sub-programs with their own grant resources, including Clean School Bus USA, Clean Ports, Clean Construction, and Smartway Transport Partnership. Each of these programs provides technical and financial assistance to stakeholders interested in reducing their fleets' emissions.
Clean School Bus USA (U.S. EPA)	<p>By 2010, Clean School Bus USA aims to retrofit or replace the 400,000 diesel school buses in the United States and promote idle reduction policies in 14,000 school districts. The program works with communities to reduce school bus idling, retrofit current school bus fleets with new technologies, introduce cleaner fuels, and replace the oldest buses with new vehicles that meet stringent pollution control standards. In 2006, EPA announced the award of \$7.5 million to 37 school districts under this program. School districts, State and local government programs, federally recognized Indian tribes, and non-profit organizations are eligible.</p> <p>The West Coast Collaborative and Blue Skyways have released new RFPs under this program in 2007 or are planning to do so.</p>
SmartWay Transport Partnership (U.S. EPA)	The SmartWay Transport Partnership focuses on reducing diesel emissions from existing freight fleets through commercial and financial incentives for partner companies and organizations to adopt emissions reduction and fuel saving technologies. The Partnership has developed innovative financing programs for adoption of new technologies. SmartWay also provides some grant funding for research and development of emissions reduction and fuel saving technologies.
Clean Air Tribal Program (U.S. EPA)	Funding is available for federally recognized Tribes and tribal consortia. Funded activities vary by year.
CMAQ Congestion Mitigation and Air Quality Improvement Program (U.S. DOT)	The CMAQ program provides funds to State departments of transportation, metropolitan planning organizations (MPOs), and transit agencies to invest in projects that reduce criteria air pollutants from transportation-related sources. Funding is available for non-attainment areas and former non-attainment areas. The most recent legislation authorizing CMAQ requires States and MPOs to give priority in distributing CMAQ funds to diesel engine retrofits, and other cost-effective emission reduction and congestion mitigation activities that provide air quality benefits.
Private Activity Bonds (U.S. DOT)	Private activity bonds allow investors to issue tax-exempt bonds for projects that improve public infrastructure. Recently they were expanded to privately developed and operated highway and freight transfer facilities, including international bridges or tunnels. These bonds are intended to increase private sector investment in U.S. transportation infrastructure. The law limits the total amount of such bonds to \$15 billion and directs the Secretary of Transportation to allocate this amount among qualified facilities.

Program	Description and Requirements
Regional	
Region 6 Blue Skyways Collaborative	In July 2007, Blue Skyways issued a request for proposals for a total of \$1.36 million in funding for school bus diesel emissions reductions under the EPA Clean School Bus program. In 2006, Blue Skyways also solicited grants under the EPA Clean School Bus program. No grants were awarded in the border region at that time.
U.S.-Mexico Border Air Quality Grant Competition (EPA Region 6)	EPA Region 6 recently issued a grant solicitation to conduct research, investigations, experiments, demonstrations, surveys, and studies relating to the causes, effects (including health and welfare effects), extent, prevention, and control of air pollution in the U.S.-Mexico Border area.
Border 2012 Grants (EPA Region 6)	EPA provides some grants specifically for Border 2012 projects. The most recent grant solicitation, administered by Region 6, was for New Mexico-Texas-Chihuahua and Texas-Coahuila-Nuevo Leon-Tamaulipas Border 2012 Regional Workgroup projects. Eligible projects must address the objectives of the Border 2012 Program.
West Coast Collaborative Grants	In addition to convening stakeholders, the West Coast Collaborative provides funding for diesel emissions reduction projects. These projects must take place in EPA Regions 9 or 10 and fall under one of six categories: trucking, marine vessels and ports, construction and distributed generation, locomotives and rail, agriculture, or cleaner fuels. Target projects are those that demonstrate new, innovative, or experimental applications, technologies, methods, or approaches to reducing diesel emissions. In 2006, the West Coast Collaborative had \$3 million available to fund projects.
State	
Carl Moyer Program (California)	<p>The Carl Moyer program is administered by the California Air Resources Board (CARB) in partnership with local air quality districts throughout the State of California. It provides grants to reduce emissions by repowering or retrofitting existing engines and vehicles or purchasing new low-emission engines or vehicles. Qualifying projects include on-road heavy-duty trucks and buses, off-road heavy-duty equipment, marine vessels, locomotives, forklifts, airport ground support equipment, agricultural sources, heavy-duty vehicle idling emission reduction projects, and transport refrigeration units. The program is expected to provide funds of up to \$140 million annually through 2015.</p> <p>Both public and private entities located in California are eligible for funding. Carl Moyer funds may only be used to generate surplus emission reductions—to reduce emissions beyond what is required by standards or regulations. They cannot be used to comply with any applicable emission standards or regulations.</p>
Regional Transportation Council Clean Fleet Vehicle Projects (North Central Texas Council of Governments)	This program funds clean vehicle projects to help reduce NO _x emissions from local government fleet vehicles. Eligible project types include new purchases, replacements, retrofits, repowers, and conversions of heavy-duty and light-duty vehicles. Adoption of the RTC/Clean Fleet Vehicle Model Ordinance is required for funding consideration.

Program	Description and Requirements
State Infrastructure Banks (SIBs) (various States)	A SIB is a revolving fund mechanism for financing a wide variety of highway and transit projects through loans and credit enhancement. SIBs are designed to complement traditional Federal-aid highway and transit grants by providing States increased flexibility for financing infrastructure investments. The maximum loan term is 35 years, and interest rates are set by the State. Loan recipients must be eligible for federal funds under Title 23 of the United States Code. Only certain types of funds can be placed into a SIB (national highway system, interstate maintenance, equity bonus, surface transportation, and bridge).
Texas Emissions Reduction Program, Emissions Reduction Incentive Grants (Texas)	<p>The program provides grants to eligible projects in nonattainment areas and affected counties. No border counties are currently eligible for TERP-ERIG funds, however, El Paso was eligible in the past and received TERP-ERIG funding for 85 projects.³¹</p> <p>The TERP-ERIG grants offset the incremental costs associated with reducing emissions of NO_x from high-emitting internal combustion engines. Any person (i.e., individual, corporation, organization, governmental agency, business or any other legal entity) who operates or plans to operate on-road heavy-duty vehicles, non-road equipment, or stationary engines primarily in one or more of the nonattainment areas or other eligible counties of the State is potentially eligible for a grant. For infrastructure projects, persons owning or operating the infrastructure in an eligible county may also be eligible for funding. The program sets a maximum cost/ton threshold of \$13,000.</p>
International	
Clean Development Mechanism under the Kyoto Protocol	The Clean Development Mechanism (CDM) is an arrangement under the Kyoto protocol allowing industrialized countries with a greenhouse gas reduction commitment to meet those commitments by investing in emissions reduction projects in developing countries. Mexico is a signatory to the Kyoto protocol, and has developed agreements for a number of CDM projects. Specific requirements for funding vary with the project.
Inter-American Development Bank Programs on Environment and Natural Disasters and Transportation	The Inter-American Development bank funds projects in many sectors in Mexico, including environment and natural disasters and transportation. Recent funding in the environment sector has not focused on air quality. In the transportation sector, recent projects on road modernization and maintenance may have air quality benefits.
North American Development Bank	NADB provides public and private sector funding and loans for projects in the border region in target sectors. Only loans, not grants, are available for air quality projects. Projects must be certified by the BECC in order to be considered for funding.
U.S. Agency for International Development	To promote environmental business and energy conservation businesses, USAID is working with Mexico on economically viable renewable systems and energy-efficient, non-polluting production technologies.

³¹ For the current list of eligible counties for TERP-ERIG funding, see: http://www.tceq.state.tx.us/implementation/air/terp/erig_apps.html#projects (last visited 6/14/07). For a list of TERP projects funded to date (including those in El Paso), see: <http://www.tceq.state.tx.us/implementation/air/terp/erig.html#reports> (last visited 6/14/07).

Program	Description and Requirements
The William and Flora Hewlett Foundation: Environment Program	The environment program at the William and Flora Hewlett Foundation funds projects in three areas: 1) energy (including renewable energy), 2) protecting western lands, and 3) support for non-governmental organizations that are working on behalf of communities whose environmental concerns have often been underrepresented. Although none of these areas is specifically focused on diesel emission reduction, certain types of projects (e.g., renewable fuels) may fall into these project areas. The foundation also has a Latin America in the Environment program focused on introducing ultra-clean fuels, reducing emissions from cars and trucks through regulation, promoting cleaner technologies for heavy-duty vehicles, and promoting economically viable public transportation options.
World Bank: Global Environment Fund	The Global Environment Facility (GEF), established in 1991, helps developing countries fund projects and programs that protect the global environment. One of the program areas is climate change, under which GEF has a program on sustainable transportation. This program focuses on funding bus rapid transit, light rail transit, and related planning in developing countries. Ciudad Juarez has reportedly been selected for one of the sustainable transportation projects.