



Air Quality Opportunities

Mexico experiences serious air pollution problems, particularly in its urban centers. Mexico's four most populous states—Mexico City, Mexico State, Jalisco and Nuevo Leon—are home to approximately 40% of the nation's motor vehicles, industry, and GDP. Not surprisingly, these four jurisdictions also account for the majority of the nation's fixed and mobile source pollution.¹

Of Mexico's nearly 100 million people, approximately 20% live in the Mexico City metropolitan area (MCMA). Another combined 7% live in the Guadalajara and Monterrey areas. Mexico City, Guadalajara, Monterrey, Toluca, Mexicali and Ciudad Juarez, in that order, have the nation's worst air quality, and as such, the greatest need for mitigating technologies.

The Mexican government's principal strategies to reduce air pollution are to promote fuel switching, renew the public and private vehicular park, and promote and impose stricter emissions standards for fixed and mobile sources. In the case of fixed sources, efforts have been focused on promoting fuel switching from high to low sulphur fuel oil ("gasoleo") and to natural gas, as well as acquiring cleaner boilers, emissions control systems, and end-of-stack solutions. In the case of mobile sources, the trend has been toward employing more highly oxygenated, unleaded gasoline, liquid petroleum gas, and compressed natural gas, as well as retrofitting, replacing and upgrading catalytic converters. All of these strategies have resulted in a significant increase in investments in clean technologies.

Air Quality Improvement Programs—"PROAIRE"

To implement Mexico's air pollution reduction strategies discussed above, since the mid-1990s government and other public and private stakeholders have formulated Air Quality Improvement Programs in Mexico's largest urban centres, called "PROAIRES". Spearheaded by INE (National Ecology Institute)—and in coordination with the state and municipal authorities, academic institutions, NGOs and the private sector—seven cities have created PROAIRE programs. By 2005, INE projects that an additional seven PROAIRES will be established.

¹ Mexico City generates 23.6% of the nation's atmospheric emissions, Guadalajara, 3.5%, Monterrey, 3% and other centers, 70%.



Region/City	Year PROAIRE Created	Population (millions)
MCMA	1996 ²	17.79
GMA	1997	3.49
MMA	1997	3.31
TMA	1997	1.28
Ciudad Juarez	1998	1.22
Mexicali	2000	.76
Tijuana/Rosarito	2000	1.28
Puebla	2002	1.35
Minatitlan/Coatzacoahuila	2002	.42
El Bajío corredor (Querétaro-Guanajuato)	2003	1.74
Tula Industrial Corridor	2003	.24
La Laguna (Torreón, Coahuila)	2004	.53
Cuernavaca	2004	.34
Ciudad Madero/Tampico/Altamira	2005	.60
Acapulco	2005	.72

Source: Gestión de la Calidad del Aire en Mexico, INE 2000.

Preparing each PROAIRE (excluding implementation measures and the acquisition of monitoring equipment) requires an investment of roughly US\$1 million and the participation of private sector consultants and research institutions. INE and the SEMARNAT are working to develop international support to fund the creation of new PROAIRES. To date, monies have been made available from the US Environmental Protection Agency (EPA) and the Western Governor's Association, and investigation has been provided by the Massachusetts Institute of Technology (MIT), among other international collaborators. Canadian NGOs, governmental institutions, and private sector groups are encouraged to discuss with INE the possibility of providing similar support, which may be tied to the acquisition of Canadian expertise.

Mexico City

The Mexico City Metropolitan Area (MCMA) offers the greatest potential for both fixed and mobile source mitigating technologies.

The MCMA is home to approximately to 3.2 million motor vehicles, about 25%-30% of which were made before 1980. Each year approximately 200,000 new cars and trucks are put on the road in the region. These vehicles are responsible for roughly 80% of Mexico City's air pollution. In terms of daily trips, private cars transport 22.4% of passengers, taxis and microbuses 59.9%, buses 4.4%, and the metro, 12.6%. The trend throughout the 1990s and into the present decade has been an increase in the use of private cars and a decrease in the use of buses and the metro.

² The MCMA PROAIRE 2002-2010 was released in 2002.



Reducing emissions caused by public transportation is a central tenant of the MCMA PROAIRE. Efforts have been focused more on modernizing the vehicular park, building new urban freeways and roads, and fuel conversion. Building new and expanding existing infrastructure to encourage alternative forms of public transportation—such as the subway—has lagged behind growth, however. This week's approved referendum to invest approximately US\$900 million in building a second level to Mexico City's two most-trafficked urban freeways—the *Viaducto* and the *Periferico*—further supports this trend.

The MCMA's 2002-2010 PROAIRE (the first PROAIRE covered 1995-2000) includes many new, ambitious programs aimed at improving the air quality of the region, as well as the continuation of many programs under the previous program that went unimplemented.

World Bank Urban Transportation Fund

To aid Mexico City in meeting its PROAIRE goals, Claudia Sheinbaum, Secretary of the Environment for the Federal District, has announced that the World Bank has provided a US\$12.2 million line of credit to fund urban transport studies and related activities in the MCMA. Interested environmental consultants should contact Sheinbaum's office for further details on the approved program. The bid process is expected to begin in April 2003 and will involve:

1. Urban transportation studies
2. Clean burning technology testing and evaluation, including: fuel cells, natural gas, diesel and electric hybrid powered vehicles

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The table below summarizes the best opportunities for Canadian suppliers of environmental equipment and services under the Mexico City PROAIRE Program.

Project Profile/Mitigating Measure	Niche Market	Forecasted Investment (MMD) ³		Time-Line																				
		Public	Private																					
Natural Resource Conservation																								
<ul style="list-style-type: none"> Formulating the ecological order of the region to permit its sustainable development and avoid those productive activities harming the environment. 	Consulting	3.5		2001-04																				
<ul style="list-style-type: none"> Formulating improvements to Mexico City's land use law. 	Legal services	.6		2002-04																				
<ul style="list-style-type: none"> Containing urban sprawl. Monitoring urban sprawl via remote perception and GIS technology. 	GIS	2.0																						
Fixed Source Pollution Control & Industrial Applications																								
<ul style="list-style-type: none"> Imposing stricter requirements and inspection efforts with respect to emissions control in MCMA industrial facilities, with a focus on the furniture, paints, chemicals and solvents sectors. 	Fixed source pollution mitigating technologies																							
<ul style="list-style-type: none"> Promoting and facilitating the acquisition of clean technologies to reduce PM10, HC and NOX emissions. <table border="1" data-bbox="289 846 972 1068"> <thead> <tr> <th>Emission</th> <th>Cost/ton</th> <th>Target reduction (tons)</th> <th>Total Investment (USD million)</th> </tr> </thead> <tbody> <tr> <td>NOX</td> <td>1,755</td> <td>1,532</td> <td>2.7</td> </tr> <tr> <td>PM10</td> <td>293</td> <td>95</td> <td>.03</td> </tr> <tr> <td>HC</td> <td>2,000</td> <td>5,953</td> <td>11.9</td> </tr> <tr> <td>TOTAL</td> <td></td> <td></td> <td>14.63</td> </tr> </tbody> </table>	Emission	Cost/ton	Target reduction (tons)	Total Investment (USD million)	NOX	1,755	1,532	2.7	PM10	293	95	.03	HC	2,000	5,953	11.9	TOTAL			14.63	Clean Technology acquisition		14.66	
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<ul style="list-style-type: none"> Converting to natural gas up to 300 existing industrial facilities. <ul style="list-style-type: none"> Many large facilities have already converted. In 2003, the local distribution network infrastructure will enable SMEs to convert. Government will attempt to impose new regulations prohibiting the use of liquid fuels in new facilities. 	SME Natural gas conversion			2003-2010																				

³ All dollar figures tabled herein assume a Mexican peso-US dollar exchange rate of 10-1. The source of these estimates is the MCMA 2002-2010 PROAIRE and in some cases additional data taken from an interview with Dr. Alfonso Garcia Gutierrez, Director of Air Quality, INE. Additionally, these estimates only include investments in the MCMA; similar types of investments may be undertaken in other cities.

<ul style="list-style-type: none"> • Biggest challenge is Mexico's inability to increase domestic natural gas production. 				
<ul style="list-style-type: none"> • Federally regulated industries (6,740 in all) are now obligated to contract satellite geo-positioning services so that the SEMARNAT is aware of the location of these industries. • Estimated per-unit cost is US\$1,000. 	GIS		6.74	
<ul style="list-style-type: none"> • Promoting through tax incentives and credits the creation of clean, high-tech industrial parks in the MCMA to replace old, polluting industrial facilities. 	Industry Consulting & Equipment Supply			2002-2010
<ul style="list-style-type: none"> • Promoting the used of closed circuit dry cleaning and laundering technology. • Cost of US\$25,000 per unit; 388 establishments. • Studies and financing options will be the first phases. 	Closed circuit laundering and dry-cleaning systems		9.7	2002-2010
<ul style="list-style-type: none"> • Promoting and developing eco-efficiency training programs. 	Training			2002-2010
Mobile Source Pollution Control				
<ul style="list-style-type: none"> • Imposing stricter vehicle emissions control requirements (NOM-ECOL-041). • Opportunity to install new catalytic converters in up to 500,000 vehicles. • Constant market, as vehicular park with catalytic converters (first introduced in 1990) continues to age. • The new standard for the (MCMA only) will test dilution factor and require an earth to fuel factor of 1.18. Those vehicles failing, regardless of age, will be prevented from circulating one day per week and on those days with pollution levels above 220 MECA (down from 240 under the previous standard). 	Catalytic converter retrofits; vehicle emissions testing equipment		163	July 2002
<ul style="list-style-type: none"> • Imposing stricter new vehicle emissions requirements. • Manufacturers of autos sold in the MCMA will be required to produce cars with lesser emissions (NOM-ECOL-042). • AS of 2006, all new vehicles sold in the MCMA must comply with EPA Tier II emissions standards and have installed On-Board Diagnostics. • The new measure will require PEMEX to gasoline with only 50ppm of sulphur. 	OEM suppliers of Emission reduction technologies	3,000 ⁴	340 ⁵	2002-2006
<ul style="list-style-type: none"> • Improving the emissions testing center program ("<i>Verificentros</i>"). 	Emissions	1.8	.7	2002

⁴ Cost to PEMEX for sulfur reduction component.

⁵ Private sector investment for acquisition of 1.7 million new vehicles purchased from 2006-2010 with the new technology.

<ul style="list-style-type: none"> • Measure will go hand and hand with the new emissions control measure, as the testing centers will be required to ensure the vehicular park is complying with the new standards. • Currently 130 emissions testing centers operating in MCMA. 	testing equipment (software, metering, auditing)			
<ul style="list-style-type: none"> • Introducing fuel cell vehicles under a pilot program (see report below). 	New fuel cell buses	10		2002
<ul style="list-style-type: none"> • Converting minibuses and <i>combis</i> (small Volkswagen buses) to natural gas. 	Natural gas conversion kits	400		2002-2007
<ul style="list-style-type: none"> • Converting taxis to natural gas. 	Natural gas conversion kits	250		2002-2007
<ul style="list-style-type: none"> • Currently three natural gas stations in Mexico. • New rule in place to allow gas stations to sell natural gas will increase willingness to convert fleets. 	Natural gas stations			
<ul style="list-style-type: none"> • Four phase diesel emissions reduction plan: <ul style="list-style-type: none"> ○ Stricter new diesel vehicle emissions standards. ○ Sulphur reduction in diesel fuel sold at the pump (PEMEX) ○ Update diesel emissions testing program on federal level to put on par with US and Canadian programs. ○ Diesel retrofits. 	Diesel emissions control	1,500	166	2002-2006
<ul style="list-style-type: none"> • Ethanol for MTB substitution in public transportation. • Still in testing phase but thought to be a viable project. 	Alternative energies in public transportation			
<ul style="list-style-type: none"> • Urban trucking program. 	Urban transport studies	1		2002-2006
Institutional Strengthening				
<ul style="list-style-type: none"> • Modernizing the automated atmospheric emissions monitoring system. 	Emissions monitoring equipment	2		2002
<ul style="list-style-type: none"> • Ongoing Investigation under the 2002-2010 PROAIRE. 	Consulting & Investigation	5		2002-2010
Reduction of Greenhouse Gases				
<ul style="list-style-type: none"> • Creating of National Climate Change Commission. • Promoting international cooperation. • Promoting use of clean energy and non-end-of-stack solutions and fuel 	Investigation and International			2002-2006

<p>conservation.</p> <ul style="list-style-type: none"> • Promoting co-benefits and co-controls. 	Cooperation			
<ul style="list-style-type: none"> • Promote use of solar energy in homes, service companies and industry. 	Solar energy technology			2002-2010
<ul style="list-style-type: none"> • Integral Environmental Program of the Delegación Tlalpan of Mexico City. <ul style="list-style-type: none"> ○ Subprograms involving the conservation of energy and water in the residential sector, cleaner and more efficient production in industrial and hospital facilities. ○ Carbon sequestration and forest restoration. 	Environmental Consulting/Energy Efficiency			2002-2010

Mexico City

Mexico State Natural Gas Public transportation Fleet Conversion Opportunity

The State of Mexico Secretary of the Environment has approved a Compressed Natural Gas (CNG) conversion program for public transportation vehicles. The program is a priority in the state of Mexico as it borders Mexico City and jointly faces severe air pollution problems.

The major obstacle to the project is that there are only two natural gas filling stations in the state of Mexico. Current Mexican standards prohibit the sale of gasoline and CNG in the same facility, although both the Mexico City and State of Mexico authorities are considering lifting the prohibition.

This program will open opportunities for companies selling services and equipment for CNG stations and conversion kits. Companies interested in this program should contact the office of the Secretary for the Environment, State of Mexico or Mr. Rojas, who is coordinating the project in the Secretary of Transport, State of Mexico.

The first phase of the program calls for the conversion of an initial 50,000 vehicles from 2003 – 2005. The local government has signed an agreement with Gaz de France for a pilot project for the conversion of 5,000 units. It is expected that after the pilot phase there will be opportunities for additional suppliers.

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Industrial Opportunities

Grupo SIMEC

Dust collection and handling. CSG produces approximately 30 metric tons per day of dust and is looking for alternative forms of collection and treatment. The company spends over US\$300,000 per year on dust treatment (excluding collection).

- CSG is considering investing in expanding its existing collector or purchasing a new one and transferring the existing one to the Mexicali plant.
- Although CSG operates its own dust confinement facility in Los Altos (same town proposed for the commercial hazardous waste confinement facility), because of the high handling costs and limited capacity, CSG wishes to purchase technology aimed at reducing dust coming out of the ovens, thereby decreasing pollution and increasing efficiency.
- Recycling of dust is also another alternative to confinement that CSG is currently considering. Dust includes sodium, led and iron, all of which can be extracted, recycled and reused.

CEMEX

- Dioxins and furans laboratory testing
- Dust collectors, dust collector bags, and dust inhibitors (increase humidity, thereby decreasing emissions)
- VHA accessories,
- Biogas filters and electro-filters

Girsa

Girsa uses boilers in its plants, and in some cases, the boilers employ a gas combustion recuperation system, which acts as a carbon sink. Girsa is currently analyzing the possibility of purchasing other alternative recuperation systems technology, and would be interested in learning more about Canadian technology in this area. With this technology, Girsa hopes to benefit from carbon trading under the Kyoto Protocol.

Peñoles

Peñoles, a major producer of greenhouse gases, wishes to employ mitigating technologies to reduce carbon emissions and eventually participate in carbon trading programs under the Kyoto Protocol.