

Overview of Clean Air Transport Issues in Latin America

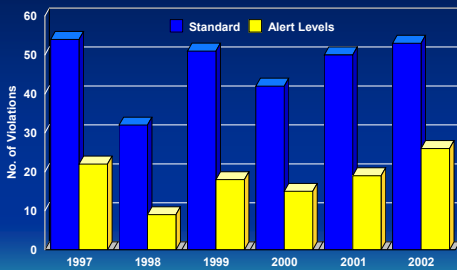


Sustainable Transport in Latin America
From Theory to Practice

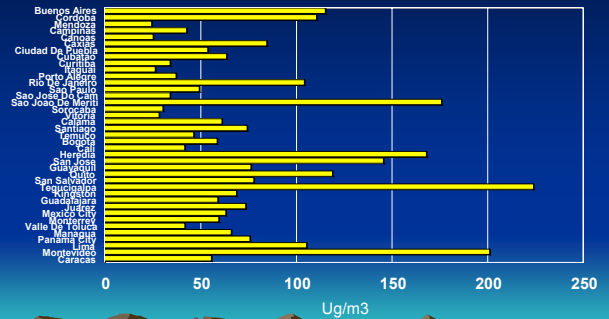
Outline

- The Current Air Pollution Problem in Latin America is Very Serious
- Future High Growth Could Further Exacerbate the Problem
- Future Worsening of Air Pollution Problems in the Region Is Not Inevitable
- Good Examples of Effective Strategies Exist in the Region But Need To Spread

Ozone-Number of Standards Violations and Alert Levels in Ibirapuera

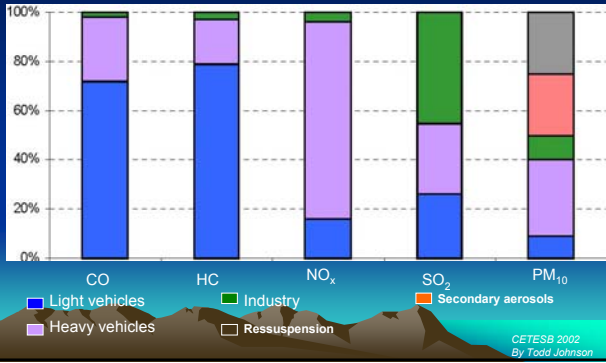


PM10 Levels in Latin American Cities

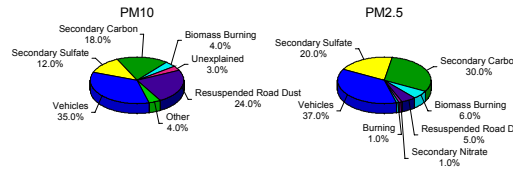


Source: Luis A. Cifuentes
P. Universidad Catolica de Chile

Contribution to different pollutants by sector— São Paulo 2002

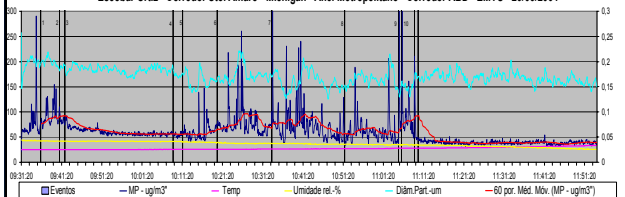


Receptor Modeling Results



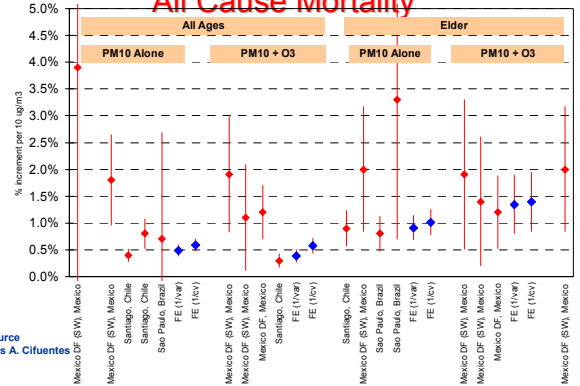
• PM averages in diesel corridors are 50 to 100% higher than in normal streets, even those very congested; "one vehicle" PM peaks hit 200 $\mu\text{g}/\text{m}^3$ easily .

Escobar Ortiz - Corredor Sto. Amaro - Michigan - Anel Metropolitano - Corredor ABD - EMTU - 29/06/2004

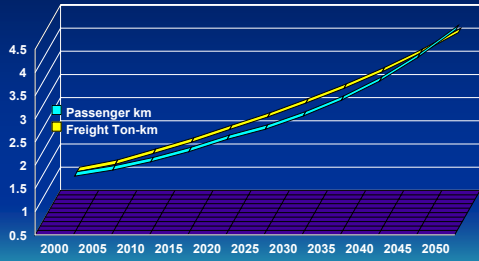


Source: Gabriel Branco

Meta-analysis of the effects of PM10 All Cause Mortality

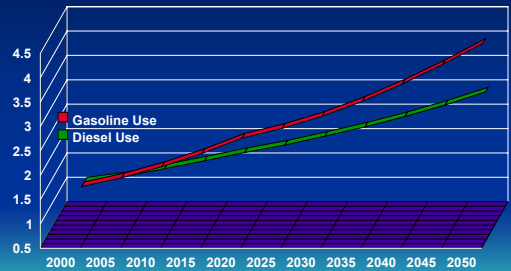


Forecasted Trends For Latin America (Normalized to 2000)



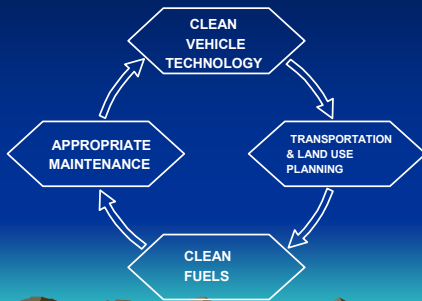
Source: WBCSD Base Case

Forecasted Trends For Latin America (Normalized to 2000)

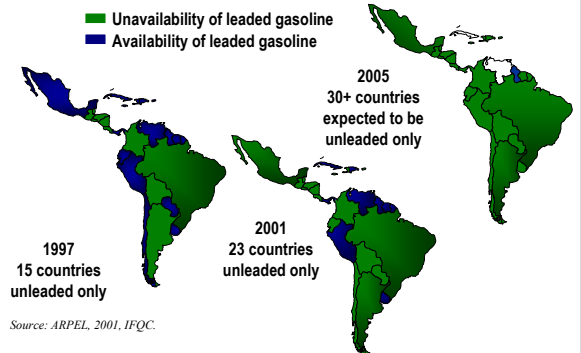


Source: WBCSD Base Case

ELEMENTS OF A COMPREHENSIVE VEHICLE POLLUTION CONTROL STRATEGY

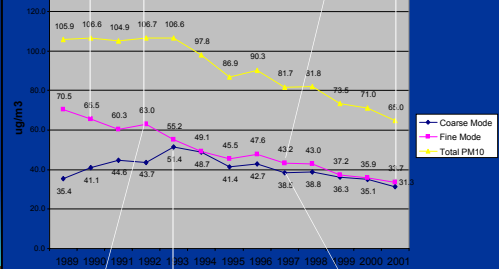


Lead Phase-Out Progression



Santiago: Fine and Coarse PM trends 1989-2001

Total PM10, fine and coarse modes trends, Santiago Monitoring Network (1989-2001)



PM10 tradable permits for industries
PM10 emissions standards

Street paving programs

Street cleaning programs

Source: Gianni Lopez

18 High Impact (2001-2005) Technical Measures For Santiago

- Renovation of buses:**
 - Reduction of 75% PM10 and 40% NOx with the Urban transport plan
 - Retirement of 2,700 pre-EPA buses
 - Incorporation of low emission's buses and post treatment systems starting year 2004
 - Renovation of trucks:**
 - EURO III and EPA98 Standards
 - Incorporation of post combustion treatment systems.
 - New standards for light vehicles:**
 - Tier1 and EURO III Standards
 - Dust Control:**
 - Street dust control
 - Street pavement programs
 - Fuel Improvement:**
 - Diesel Quality from 300 to 50 ppm by 2004
 - Gasoline Quality improvement by 2003
 - Gasoline Quality improvement by 2005
 - Progressive regulations on firewood burning
 - New industry standards:**
 - CO emission standards
 - SOx emission standards
 - Reduction program of SOx in major industrial processes
 - Integrated System of Compensations and Tradable Emission Permits**
 - Emission shares of NOx in the industry
 - Emission shares of PM10 in industrial processes
 - A 150% emissions compensation for all new activities (industry and transport)
- Source: Gianni Lopez

Actions effectiveness- tons/year

Medida	NOx	SO2	MP10	PoVo
Compensación emisiones MP en industria			447	
Criterio de paralización FF	309	578	122	
Cupos de emisión MP en procesos			375	
Norma de emisión CO en industria	244		8	
Norma de emisión de SOx en industria	63	4.406		
Norma Tier1 VL y VC	1.425		53	
Buses EURO III diesel	1.788		37	
Buses híbridos				
Convertidor CC buses diesel nuevos				
Retrofitting CC buses EPA94 existentes		-1	103	
Retrofitting CC buses EPA91 existentes		-1	68	
Retrofitting CC buses no licitados			117	
Norma EURO III camiones	6.618		659	
Retrofitting CC camiones			433	
Prohibición de calefacción con leña	72		586	
Mejora calidad del diesel 1200-300 ppm		1.109	618	
Mejora calidad del diesel 300- 50 ppm		392	101	
Mejora calidad de la gasolina, año 2003	2.203			
Mejora calidad de la gasolina, año 2005	1.950			
Aspirado de calles				4.804
Pavimentado de calles				4.635
Total Medidas	14.672	6.483	3.727	9.439

Source: Gianni Lopez

Cost/ Benefits - Action Plan 2001-2005 for Santiago

	Emission reduction (ton/year)	Cost	Benefits
Actions	• 2.755 PM • 14.732 NOx	127 US\$ mill/year	260 US\$ mill/year

Source: Gianni Lopez

Figure 1-1: Light Duty Vehicle Emissions Standards in Brazil

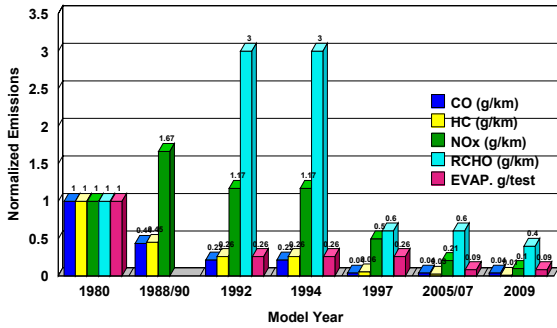
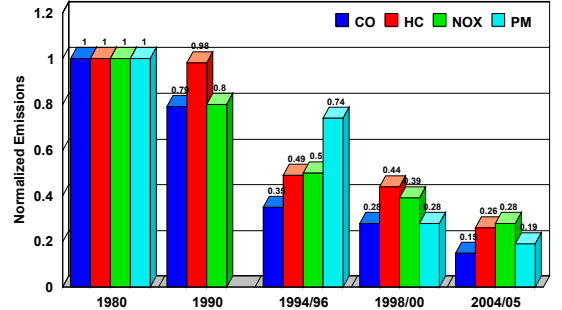
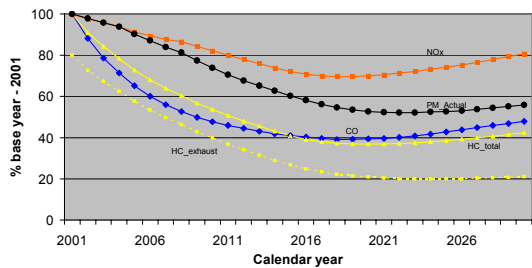


Figure 1-2: Heavy Duty Engine Emissions Standards in Brazil

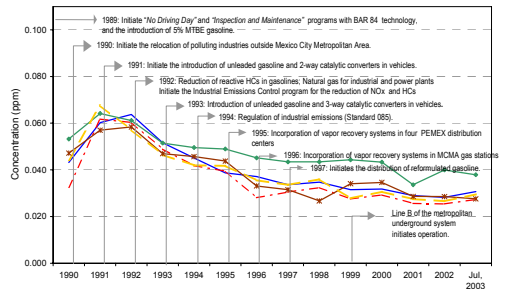


Total Vehicle Emissions CONAMA



Source: Gabriel Branco

Trends of Ozone in MCMA



Lessons From Mexico City I/M Program

- Test and Repair
 - Very convenient for vehicle owners
 - Very Difficult to Control
 - Often Degenerates into a visibly flawed program with no Public Support
- Test Only-Centralized
 - Good Technical and Administrative Control
 - Design program for profitability
 - Legal framework to favor sanctions
 - Minimize impact of technician on Results

Source: John Rogers

Lessons From Mexico Gasoline Testing Protocols

- Easy to generate False Pass on Static (Idle) Tests
- Dynamometers and NOx testing are essential to minimize False Passes
- Short, loaded-mode, constant-speed test (ASM) easy to operate at reasonable investment and cost
- Dynamic tests technically better but more difficult for low-skill technicians

Source: John Rogers

Lessons From Mexico Harness Public Opinion

- Program success depends on public support
- Program benefits must be seen to outweigh social costs
- Must be seen to be effective, totally objective, transparent and focused on the gross polluters
- Well enforced, supervised and audited
- False Passes critically damage public opinion
- Design the Program to minimize False Passes from Day One

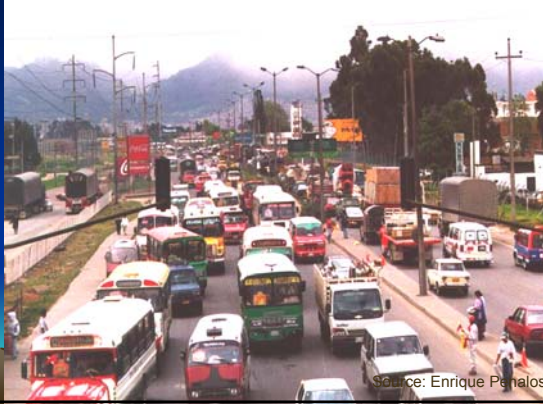
Source: John Rogers

6/4/2005

Elements of A Successful I/M Program



THE OLD SYSTEM



Source: Enrique Penalosa

TRANSMILENIO



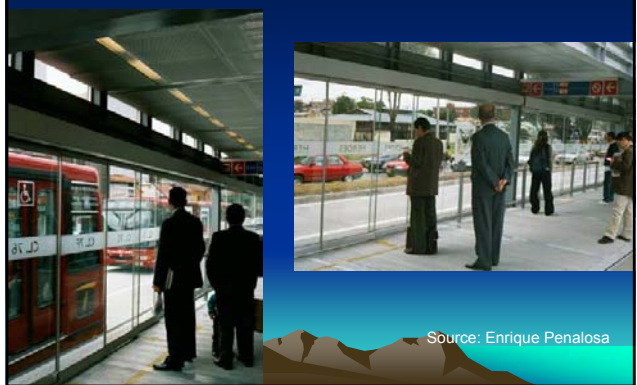
Source: Enrique Penalosa

TRANSMILENIO



Source: Enrique Penalosa

TransMilenio Stations



Source: Enrique Penalosa



Conclusions

- The Current Air Pollution Problem in Latin America is Very Serious
- Future High Growth Could Further Exacerbate the Problem
- Future Worsening of Air Pollution Problems in the Region Is Not Inevitable
- Good Examples of Effective Strategies Exist in the Region But Need To Spread
 - Tighter New Vehicle Standards
 - Clean Fuels (No Lead, low sulfur, other)
 - I/M
 - BRT