Fuel Policies and Fleet Technology Management: Mexico's Case Study

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Moderator:
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Presenter:
Jorge Macias
General Deputy Director, Environmental Commission for the Central Region of Mexico
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SOME HOUSEKEEPING ITEMS

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SOME HOUSEKEEPING ITEMS (CONTINUED)

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AGENDA

- Overview of the LEDS Global Partnership & Transport Working Group

- Presentation: *Fuel Policies and Fleet Technology Management: Mexico's Case Study*

- Questions and Answers

- Closing Remarks

- Survey
LEDS GLOBAL PARTNERSHIP
Advancing Climate-Resilient Low Emission Development Around the World

Mission
Harness the collective knowledge and resources of governments, donors and international organizations, and practitioners in scaling up and strengthening implementation of climate-resilient low emission development around the world.

Objectives
- Strengthen support for LEDS
- Mobilize capacity and advance peer-to-peer learning and collaboration on LEDS
- Improve coordination of LEDS at the country, regional, and global levels.

Launched in 2011, the LEDS GP now catalyzes action and collaboration across more than 120 countries and international organizations.
LEDS GP ORGANIZATIONAL STRUCTURE

IMPROVED LEDS

REGIONAL PLATFORMS
define priorities, lead peer learning, and support delivery

SECRETARIAT
coordinates implementation

Africa LEDS Partnership
Asia LEDS Partnership
Latin America and Caribbean Platform

STEERING COMMITTEE
sets strategic direction

GLOBAL WORK STREAMS
Provide technical support and training

LEDS Planning
LEDS Analysis Models and Tools
Finance
Sectors
EXAMPLES OF LEDS GP SUPPORT

Peer learning and knowledge sharing

- Global and regional workshops and trainings for more than 800 practitioners on LEDS planning, analysis, finance, and sectoral programs

Technical collaboration

- Transportation and Development Impacts Assessment (DIA) toolkits and country assistance
- National LEDS Finance Strategies with Colombia, Peru, and Chile
- No cost expert assistance available on LEDS analysis, finance, and sector measures to all members
  - e.g. support to Mauritius on solar hot water program, Bhutan on transport options, Indonesia on budget allocation, Cambodia on green fund, and Cote D’Ivoire on bio-energy

Understanding and analysis of LEDS benefits

- Application of DIA visual tool with Ghana, Kenya, and Montenegro
- Broader portfolio of shared LEDS communication resources under development

Learn more at:
www.LEDSGP.org
LEDS Transport Working Group

Leaders
- EMBARQ, the sustainable urban mobility initiative of WRI Ross Center for Sustainable Cities
- United States National Renewable Energy Laboratory (NREL)
- United Nations Environment Programme (UNEP)

Global
- LEDS Transport Toolkit (ledsgp.org/transport)
- Webinars
- Global events and trainings

Regional
- Workshops that serve the specific needs of that region
- Matchmakers for knowledge sharing

Local
- Deep dive, in-country support for governments on specific transport issues and policies
  - Workshops with peer experts
  - Technical assistance
- Remote Expert Assistance on LEDS (REAL)

Countries facing significantly increasing demand for transport services over the coming decades have a unique opportunity to meet this demand and enable economic growth while minimizing greenhouse gas (GHG) emissions. Sustainable transport systems are based on minimizing travel; shifting to more environmentally, as well as socially and economically, sustainable mobility; and improving transport technologies, fuels, and institutions. The Low Emission Development Strategies: Global Partnership (LEDS-CSP) Transport Working Group provides technical assistance, tools, and training on strategies that support low emission development in transport systems.

The Working Group is building a LEDS transport community, supporting champions and innovators, creating networks of experts on low-emission transport, and exploring opportunities for collaboration at local and regional levels. A team of international transport experts from EMBARQ, the sustainable urban mobility initiative of WRI Ross Center for Sustainable Cities, the United States Department of Energy’s National Renewable Energy Laboratory (NREL), and the United Nations Environment Programme (UNEP) is leading these activities.

Avoid-Shift-Improve approach to sustainable transportation system development

This traditional approach to developing transportation systems has focused on expanding infrastructure—building new roads, rails, and expressways to meet growing demand. The approach has led to profiting’s sprawl, traffic congestion, and associated economic impacts, increases in public health and reduced local air quality and increased accidents, as well as reduced costs of global climate change impacts.

Sustainable transport system development is based on an alternative approach—what we call the “avoid-” “shift-” and “improve” strategies. Avoid improves the efficiency of the existing transport system by reducing the number of trips through changes in behavior and transport planning. Shift to more efficient modes and options such as public transport, walking, and biking. Improve the environment and technologies in urban transport by investing in cleaner, more efficient, and lower-emission vehicles and fuels. This approach addresses the long-term cost of problems rather than marginally improving the status quo.
Fuel Policies and Fleet Technology Management: Mexico's Case Study

Presenter:
Jorge Macias
General Deputy Director, Environmental Commission for the Central Region of Mexico
Mexico’s Environmental Roadmap
M. Ph. Jorge Macias
AGENDA

• Introduction

• Mexico during 1980’s: “The most polluted city in the world”

• Action Plan
  • Fuel Quality Standards
  • Inspection & Maintenance Program
  • A day without a car
  • Air quality monitoring

• What remains to be done?

• Conclusions
Context

Mexico City was considered, during the 80’s as, **one of the most polluted cities in the world**. Plenty of factors adversely contributed for this circumstance:

1) **Geographic conditions:**
   - High altitude
   - Poor ventilation conditions
   - High radiation

2) **Accelerated growth**
   - Populated (+20 million)
   - High Motorization Growth
   - High Industrialization

3) **Lack of a regulatory framework**
Air Quality Monitoring

Ciudad de México, Lunes 11 de enero de 2016
09 horas 9 °C

Calidad del aire: **REGULAR**
Contaminante: PM$_{10}$
Índice: 61
Estación: VIF-Villa de las Flores

Recomendaciones aire:
Hoy no circulan: S y 6
Próximo sábado H1: Impar
H2: Todos
Este mes verifican: 

Recomendación UV:
NO NECESITA PROTECCIÓN
Air quality monitoring started with a network of 25 stations.

They can measure SO2, CO, NO2, O3, PM2.5 & PM10.

Nowadays there are 46 stations total.

Data for Action
Public Awareness

The pollution problem was constantly present in social media and it was empirically visible.

This generated a unique opportunity for implementing strong regulations and policies.
Environmental Emergency Program

- Sets in motion temporary restrictive measures for the greatest polluting sectors/sources and also implements policies oriented to inform the general population & reduce personal exposure hazards.
- This program increased the overall monitoring & inspection of sources while increasing the pollution costs.
- It was a very important policy to generate citizenship and public awareness towards the environmental emergency.
What was Mexico’s Roadmap?

Half the pollution levels with 4 X more population & fleet!
The two thermoelectric and the refinery contributed with 68% of the total SO2 emissions.
At the beginning thermoelectric used CNG during winter, however they were completely converted or shut down by 1998 (heavy oil).
In 1991 the Azcapotzalco refinery ceased to operate definitively.
The environmental contingency program imposed specific working condition to the urban industry & that increased the polluting costs.
High pollutant industries decided to move away from Mexico City or to cease their operation.
(1990-95) Fuel Quality Standards (Lead)

- In 1990 Catalytic Converters started being introduced.
- In 1990 the sulfur level in diesel was diminished and distributed and also gasoline without lead started being distributed to strategic fleets.
- 1993 Diesel with low sulfur was generally distributed in Mexico City and in the country in 1997.
- In 2006, NOM 086 is published and establishes the date for introduction of ULSD.

Goal was general distribution of ULSD in 2010, this goal has been revised and changed to 2018!
Linkage with Vehicle Emission Standards.

Bus Technology Meta-analysis

MPH. Jorge Macias Mora, MSc. Hilda Martinez, PhD. Alper Unal
Center for Sustainable Transportation – EMBARQ, Mexico City
Day Without a Car!

According to Molina Center:

• DWC has had an influence on average fleet age. Mexico City fleet is 4 years younger than comparable cities such as Guadalajara & Monterrey.

• Private vehicle fleet would be greater in 70% for VOC, 35% in NOx and 27% in PM$_{10}$.

• Nonetheless, they recognize an effect on total fleet growth. Molina Center states that if the program wouldn’t have existed there would have been 2.9% less vehicles.

• The fleet growth effect was diminished with the introduction of positive incentives in 1996 & 1998.
Vehicles greater than 15 years old contribute with 6X more HC and 10 times more NOx per km.

Source: CTS EMBARQ with SEDEMA data
Inspection & Maintenance

Información SEDEMA DF
*A partir del 2007, entraron vehículos TIER 2.
**Resultados preliminares del Inventario de emisiones de contaminantes criterio de la ZMVM 2010.
Effect of integrated policy I&M + DWC

• During its peak there were 50,000 regular taxi beetles in Mexico City Streets.
• Almost twice as much if you consider non-regulated.
• A strategy for phasing out beetles (which lacked emission control tech) was required.
• A strategy that comprised differential rates along with DWC restrictions and a cease to concessions helped changing Mexico’s City face.
Copenhague

México D.F.
# Highest car ownership

Number of cars per 1,000 population*

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Cars per 1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Luxembourg</td>
<td>647</td>
</tr>
<tr>
<td>2</td>
<td>Iceland</td>
<td>601</td>
</tr>
<tr>
<td>3</td>
<td>New Zealand</td>
<td>592</td>
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<tr>
<td>4</td>
<td>Italy</td>
<td>590</td>
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<td>5</td>
<td>Canada</td>
<td>561</td>
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<td>546</td>
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<td>7</td>
<td>Australia</td>
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<td>9</td>
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<td>Costa Rica</td>
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<tr>
<td>50</td>
<td>Mexico</td>
<td>142</td>
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</tbody>
</table>

*2004 or latest

Source: "Pocket World in Figures", based on data from the International Road Federation
Vehicle Fleet Management Strategy

Entrance
Vehicle Fleet Management Strategy
Vehicle Fleet Management Strategy

Entrance  |  Use  |  Mortality
Vehicle Fleet Management Strategy

Entrance

Use

Mortality

Imported Second Hand Vehicles
Vehicle Fleet Management Strategy

Entrance

- Imported Second Hand Vehicles
- New Vehicles

Use

Mortality

34
Vehicle Fleet Management Strategy

Entrance

Imported Second Hand Vehicles
New Vehicles

Use

National Used-Vehicle Fleet

Mortality
Imported Second Hand Vehicles Characteristics

69% are Vans, Mini vans, Pick up SUVs.

75% > 3.0 L volume motors

Fuente: SEMARNAT
Environmental Costs

- High Emissions:
  Emissions monitored through remote sensing device by Molina Center show to have:

  **101 % more NOx,**
  **99 % more HC,** &
  **61 % more CO**

Compared to vehicles with the same conditions in Mexico City during 2005.

Fuente: Centro Mario Molina
Global Flow Imported Second Hand Vehicles 1997

Gráfica: CTS EMBARQ para FIA Foundation y OECD con datos de IEA
... 10 Years Later

Gráfica: CTS EMBARQ para FIA Foundation y OECD con datos de IEA
Imported Secondhand Vehicles Trend

2.7 millones de vehículos importados/legalizados
1.8 millones de vehículos importados

Decreto de liberalización (oct, 2005)
Primer decreto restrictivo (feb, 2008)
Segundo decreto restrictivo (dic, 2008)

Miles de unidades

Import. totales usados — ventas de autos nuevos — Importaciones por medio de amparos

Vehicle Fleet Management Strategy

Entrance

Imported Second Hand Vehicles

New Vehicles

Ensure the proper entrance conditions:

• Physical & Mechanical

• Emissions

Use

National Used-Vehicle Fleet

Mortality
Vehicle Fleet Management Strategy

**Entrance**

- Imported Second Hand Vehicles
- New Vehicles

Ensure the proper entrance conditions:

- Physical & Mechanical
- Emissions

**Use**

- National Used-Vehicle Fleet

Foster a maintenance culture and a rational vehicle use

- Compulsory Inspection & Maintenance Programs

**Mortality**
Vehicle Fleet Management Strategy

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- New Vehicles

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Foster a maintenance culture and a rational vehicle use:

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- Fuel Taxes
- Fuel Quality Standards

Mortality

Promote Fleet Renewal and Emissions Control Technologies:

- Low Emission Zones
- Parking Policies
- Retirement Systems
Vehicle Fleet Management Strategy

**Entrance**

- Imported Second Hand Vehicles
- New Vehicles

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**Use**

National Used-Vehicle Fleet

Foster a maintenance culture and a rational vehicle use
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Fuel Quality Standards

**Mortality**

Promote Fleet Renewal and Emissions Control Technologies:
- Low Emission Zones
- Parking Policies
- Retirement Systems

Promote Mobility!!!
Concentration vs Personal Exposure
Low Emission Zones
## Main Global Results

Table 2 Selected Air Quality and Emission Benefits of LEZs in European Cities

<table>
<thead>
<tr>
<th>City / Region</th>
<th>Year of LEZ Introduction / Measurement</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>2008 / 2009</td>
<td>-24% diesel PM -8% overall PM&lt;sub&gt;10&lt;/sub&gt;</td>
</tr>
<tr>
<td>Munich</td>
<td>2006-7 / 2008 / 2009-10</td>
<td>-60% transport contribution from 1.1 to 0.5 μg/m³ elemental carbon&lt;sup&gt;19&lt;/sup&gt;</td>
</tr>
<tr>
<td>Netherlands – 9 cities</td>
<td>2007 / 2008</td>
<td>up to 2μg/m³ PM reduction</td>
</tr>
<tr>
<td>London</td>
<td>2008 / 2008-2012</td>
<td>-5.8% PM&lt;sub&gt;10&lt;/sub&gt; -13% average annual PM&lt;sub&gt;10&lt;/sub&gt; concentration&lt;sup&gt;19&lt;/sup&gt;</td>
</tr>
<tr>
<td>Cologne</td>
<td>2008</td>
<td>4μg/m³ PM&lt;sub&gt;10&lt;/sub&gt; reduction -1.2μg/m³ NO&lt;sub&gt;2&lt;/sub&gt; reduction</td>
</tr>
<tr>
<td>Stockholm</td>
<td>1996 / 2000</td>
<td>-60% PM&lt;sub&gt;10&lt;/sub&gt; -20% NO&lt;sub&gt;x&lt;/sub&gt;</td>
</tr>
<tr>
<td>Milan – emission-based congestion charge</td>
<td>2011 / 2012</td>
<td>-19% PM10&lt;sup&gt;20&lt;/sup&gt; -14% NOx -15% CO&lt;sub&gt;2&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

* FUENTE: International Council on Clean Transportation
Berlin LEZ – impact analysis

Vehicle fleet composition

decrease: cat.1 (no sticker) by 70-90 %; Cat 2 (red) by 50-80 %
increase: category 4 (green) by factor 1,5 to 3

decrease: cat.1 (no sticker) by 70-90 %; Cat 2 (red) by 50-80 %
increase: category 4 (green) by factor 1,5 to 3
Berlin LEZ – impact analysis

Trend of total black carbon concentrations from traffic

Traffic related* total carbon concentration in Berlin
adjusted with traffic volume changes

*traffic increment based on the difference between kerbside and urban background sites
data recalibrated Oct 2014
Improve Mobility!
Mobility w/o TDM = Exercise w/o Diet!!!
TIME FOR Q&A

Questions ?
SURVEY

- How did we do?
- Your feedback is important!
YOUR PARTICIPATION IS APPRECIATED

Thank You!

Contact:

transport@ledsgp.org

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