LEDS GLOBAL PARTNERSHIP

Advancing climate-resilient low emission development around the world

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

January 12, 2016

Moderator:

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Presenter:

Jorge Macias

General Deputy Director, Environmental Commission for the Central Region of Mexico

UNEP

Partnership for Clean Fuels and Vehicles

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ledsgp.org/transport

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

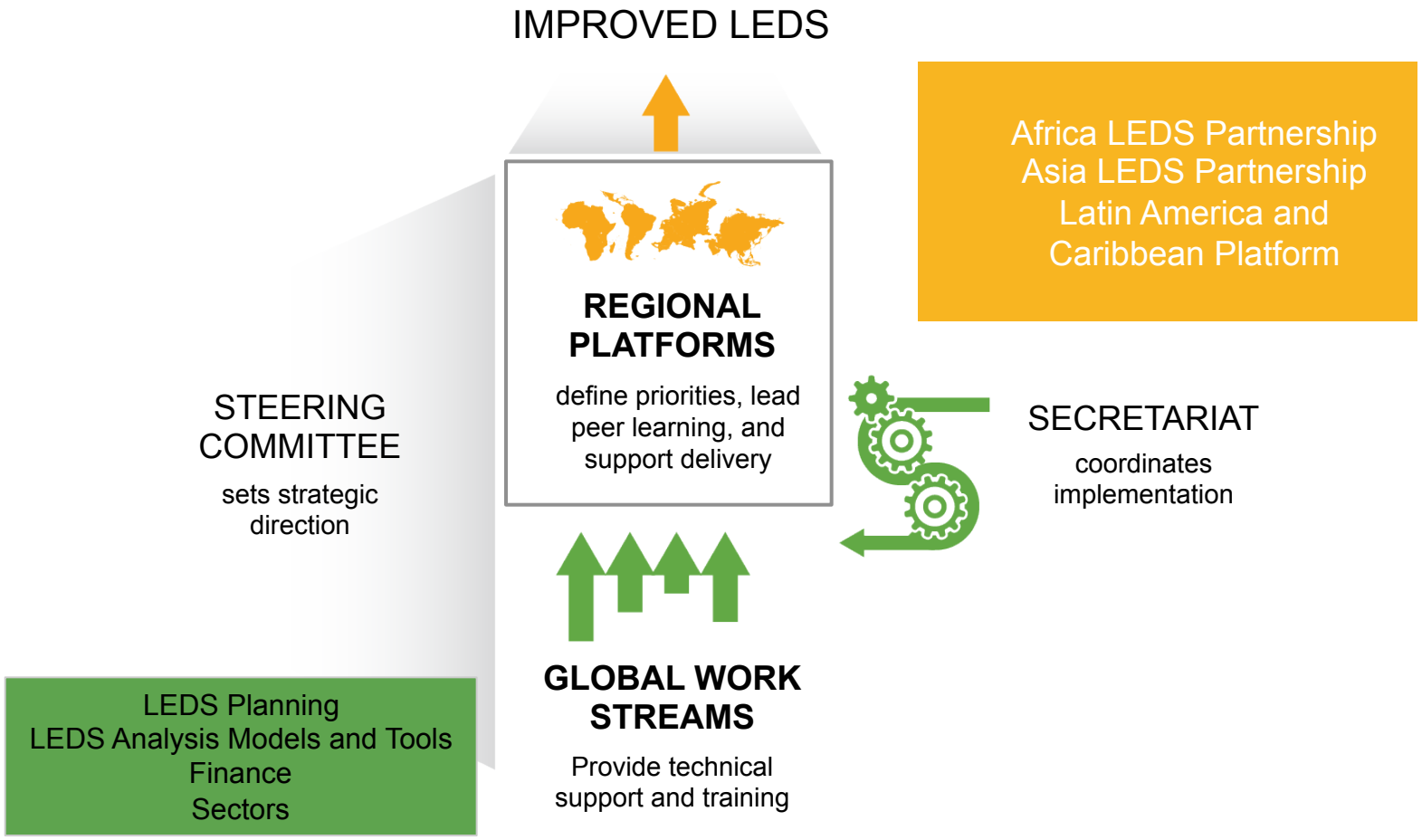
Harness the collective knowledge and resources of governments, donors and international organizations, and practitioners in scaling up and strengthening implementation of climate-resilient low emission development around the world.

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



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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 serves 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)

LEDS GLOBAL PARTNERSHIP
Advancing climate-resilient low emission development around the world

WORKING GROUP

TRANSPORT
WORKING GROUP

Supporting sustainable transport systems of tomorrow

Countries facing significantly increasing demand for transport services over the coming decades have a unique opportunity to meet this demand and enable economic growth 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 GP) 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) are leading these activities.

Avoid-Shift-Improve
approach to sustainable transportation system development

The traditional approach to developing transportation systems has focused on expanding infrastructure—building new roads, rails, and vehicles to meet growing demand. This approach has led to proliferating sprawl, traffic congestion and associated economic impacts, costs to public health from reduced local air quality and increased accidents, and direct and indirect costs of global climate change impacts.

Sustainable transport system development is based on an Avoid-Shift-Improve (ASI) approach—which moves the focus to the policies and behaviors behind the demand for transport. LEDS prioritizes solutions that seek to "avoid" or reduce trips through the integration of land use and transport planning; that "shift" to more efficient and less carbon intensive modes such as public transport, walking and bicycling; and that "improve" the environmental efficiency from each kilometer traveled by enhancing vehicle and fuel technology. This approach addresses the long-term root of problems rather than marginally improving the status quo.

AVOID — Avoid and reduce need to travel
SHIFT — Shift to more environmentally friendly travel modes
IMPROVE — Enhance conventional technologies, infrastructure & policies

The Avoid-Shift-Improve (ASI) framework supports the holistic design of sustainable low-emission development strategies for transportation systems.

LEDS GLOBAL PARTNERSHIP

Advancing climate-resilient low emission development around the world

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

Presenter:

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General Deputy Director, Environmental Commission for the Central Region of Mexico

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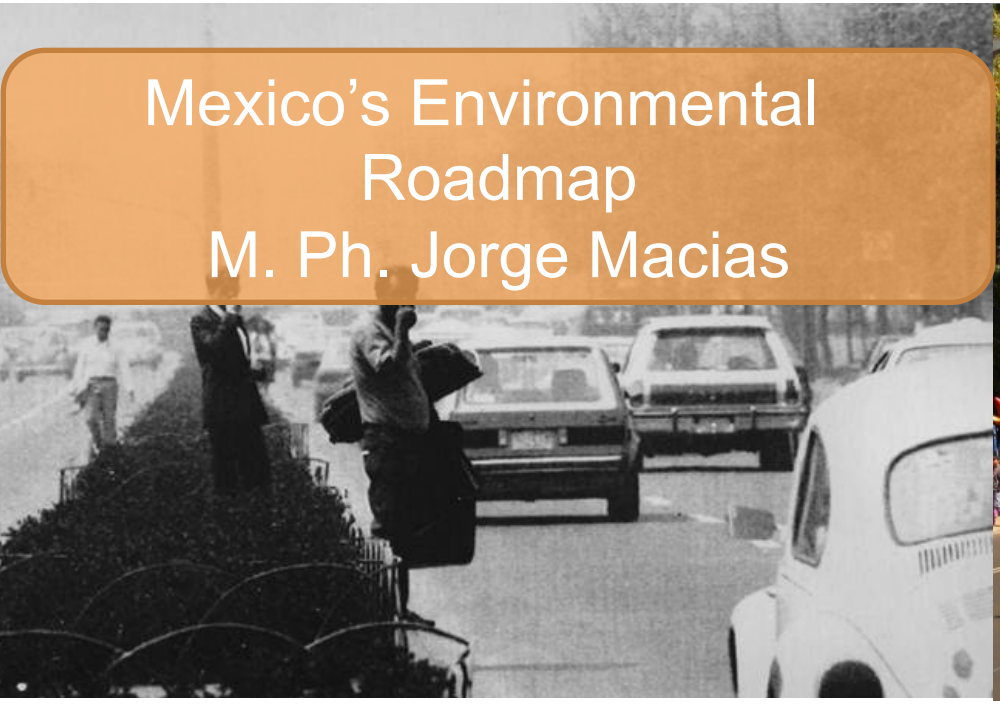
Mexico's Environmental Roadmap

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:

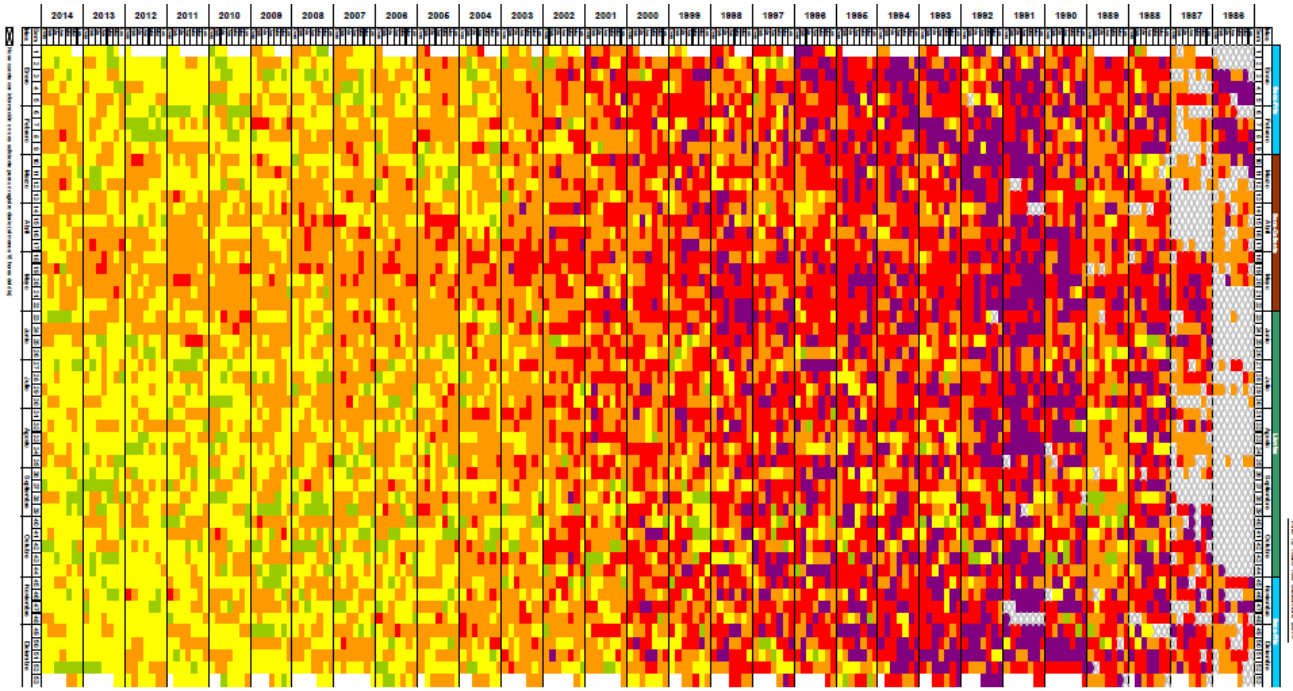
- High altitude
- Poor ventilation conditions
- High radiation

2) Accelerated growth

- Populated (+20 million)
- High Motorization Growth
- High Industrialization

3) Lack of a regulatory framework

Air Quality Monitoring



Calidad del aire	IMECA	Concentración (ppm)
Buena	0 a 50	[0.000, 0.055]
Regular	51 a 100	(0.055, 0.110]
Mala	101 a 150	(0.110, 0.165]
Muy Mala	151 a 200	(0.165, 0.220]
Extremadamente Mala	201 o más	0.221 o más

- 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.

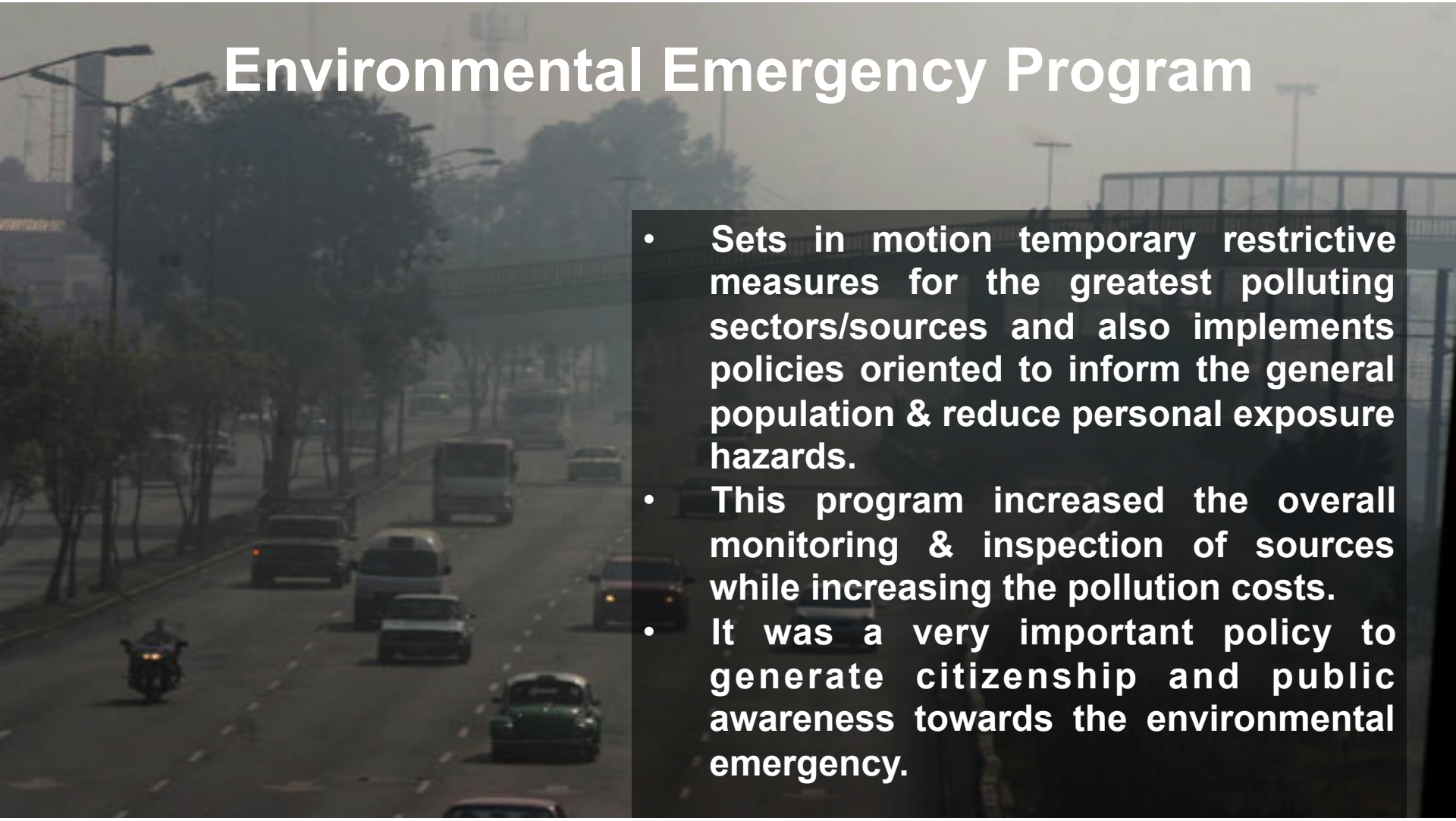
Data for Action

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.

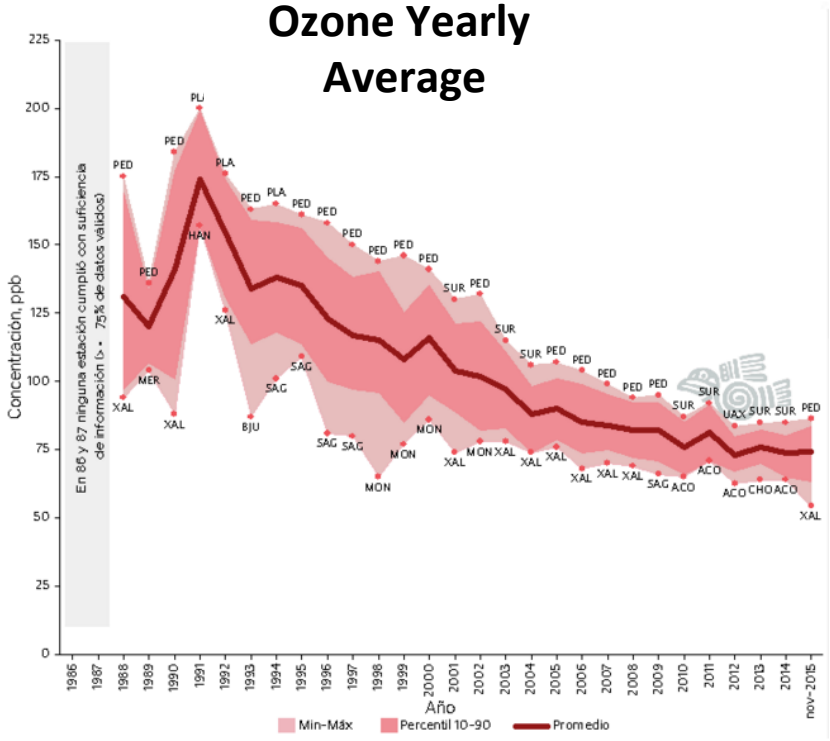
Environmental Emergency Program



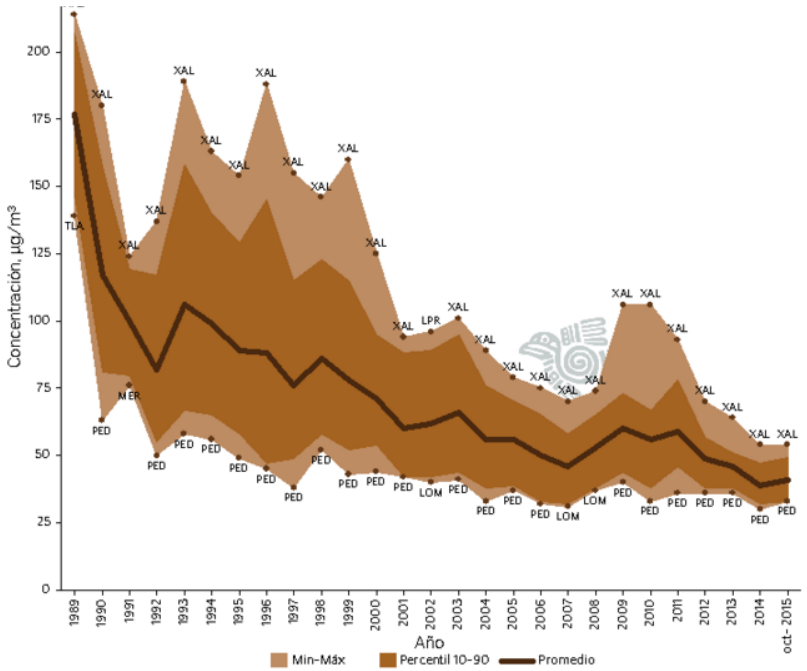
- Sets in motion temporary restrictive measures for the greatest polluting sectors/sources and also implements policies oriented to inform the general population & reduce personal exposure hazards.
- This program increased the overall monitoring & inspection of sources while increasing the pollution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

What was Mexico's Roadmap?

Ozone Yearly Average



PM10 Yearly Average

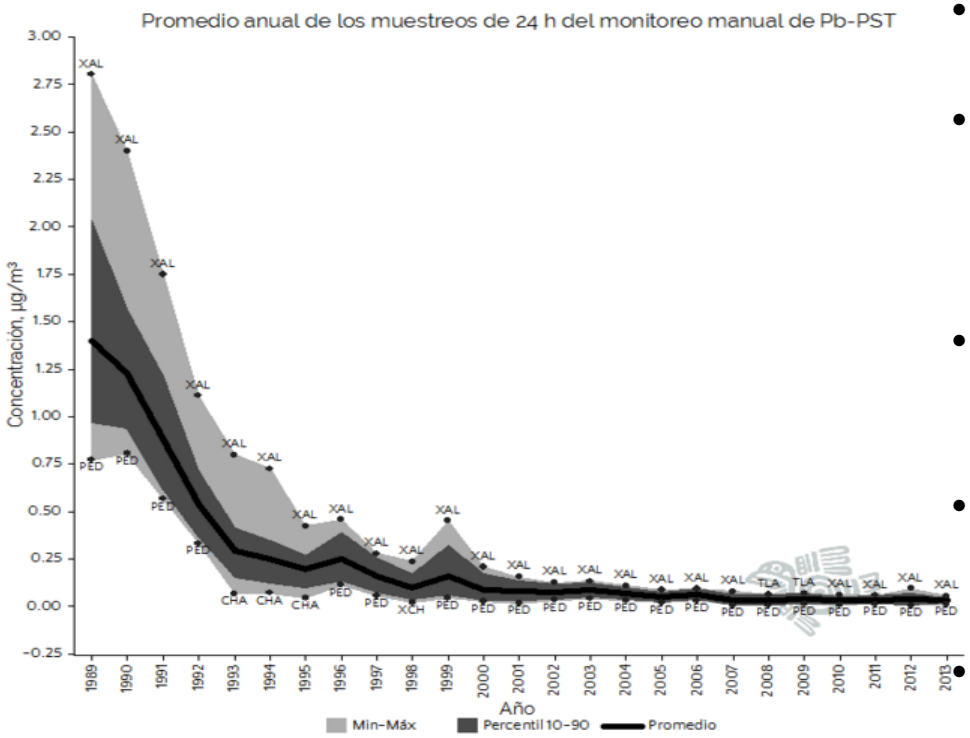


Half the pollution levels with 4 X more population & fleet!

1985 – 2000 Urban Industry Regulation

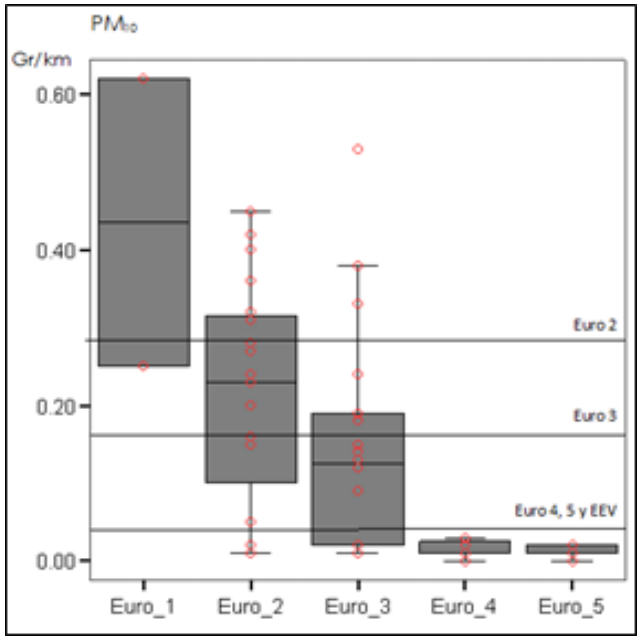
- The two thermoelectric and the refinery contributed with 68% of the total SO2 emissions.
- At the beginning thermoelectric used CNG during winter, however they were completely converted or shut down by 1998 (heavy oil).
- In 1991 the Azcapotzalco refinery ceased to operate definitively
- The environmental 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.

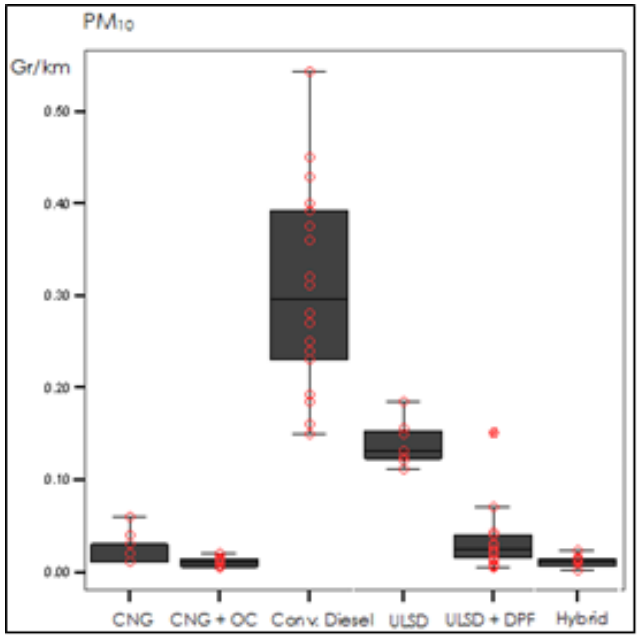
(1990- 95) Fuel Quality Standards (Lead)



- 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 stablishes 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 Martínez, 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.

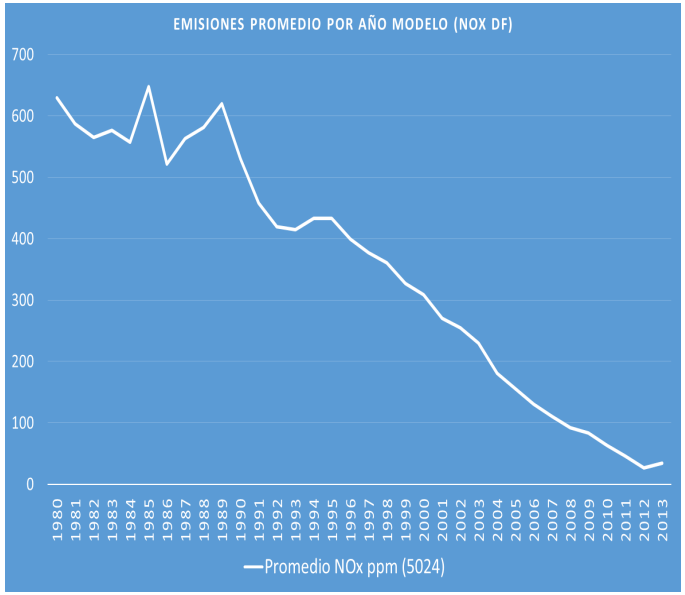
- Private vehicle fleet would be greater in 70% for VOC, 35% in NOx and 27% in PM_{10}.

- 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.

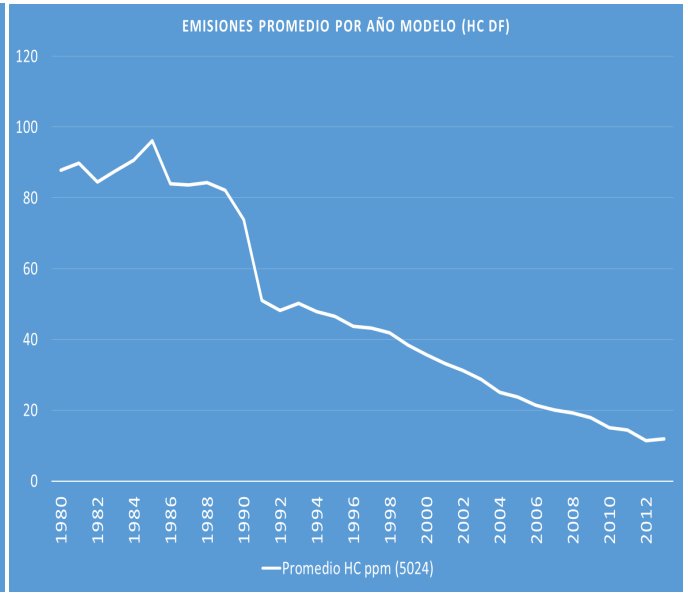
- The fleet growth effect was diminished with the introduction of positive incentives in 1996 & 1998

Vehicles greater than 15 years old contribute with 6X more HC and 10 times more NOx per km.

HC

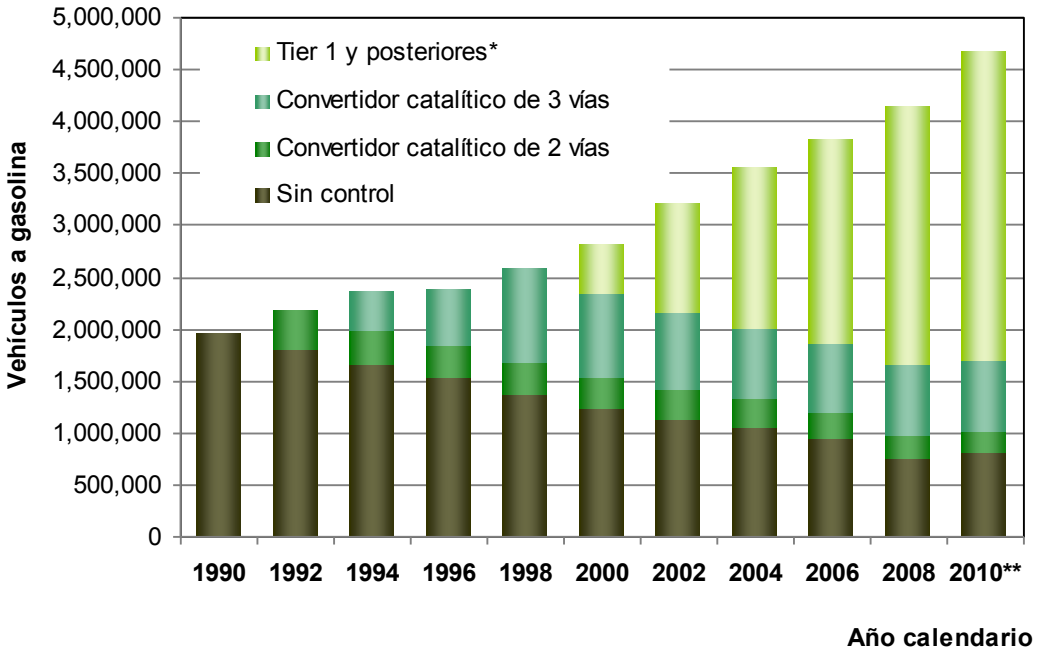


NOx



Source: CTS EMBARQ with SEDEMA data

Inspection & Maintenance

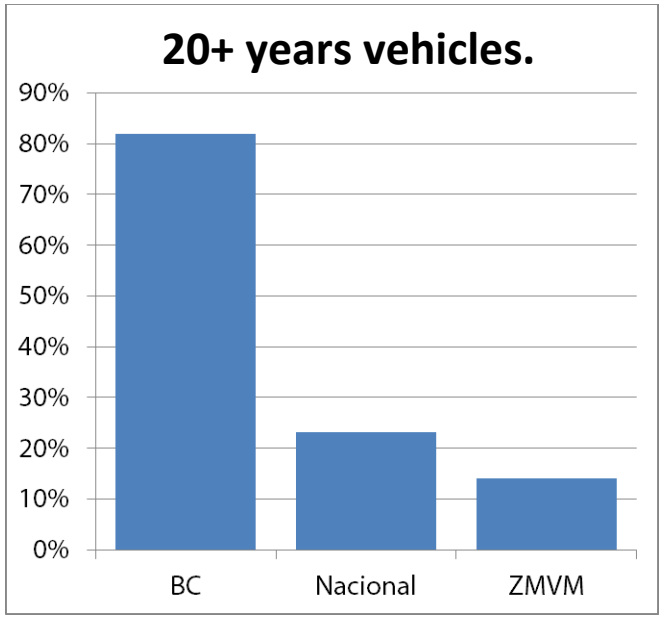


Información SEDEMA DF

***A partir del 2007, entraron vehículos TIER 2.**

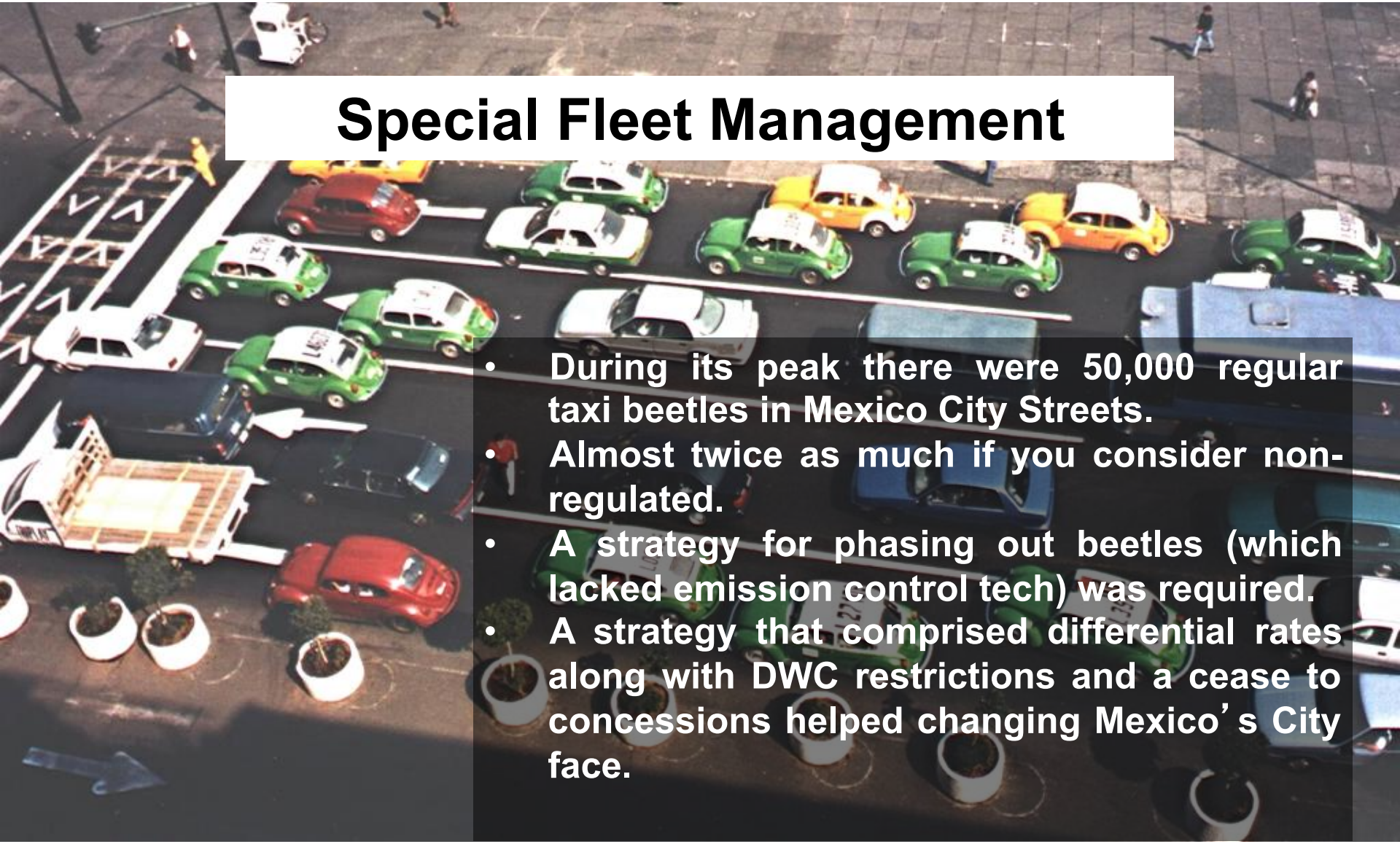
****Resultados preliminares del Inventario de emisiones de contaminantes criterio de la ZMVM 2010.**

Effect of integrated policy I&M + DWC



FUENTE: SEMARNAT, 2009. "Guía de Cumplimiento de la Norma Oficial Mexicana NOM-041-SEMARNAT-2006", Inventario de Emisiones de Contaminantes Criterio de la ZMVM-2008, Secretaría de Protección al Ambiente de BC.

Special Fleet Management



- 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.


Amsterdam


México D.F.


Copenhague


México D.F.

Economist.com rankings

Highest car ownership

Number of cars per 1,000 population*

1	Luxembourg	647	26	Ireland	382
2	Iceland	601	27	Greece	368
3	New Zealand	592	28	Denmark	360
4	Italy	590	29	Czech Republic	358
5	Canada	561	30	Estonia	349
6	Germany	546		Kuwait	349
7	Australia	524	32	Barbados	343
8	Malta	523	33	Qatar	335
9	Switzerland	516	34	Bahrain	325
10	Austria	503	35	Netherlands Antilles	321
11	France	495	36	Bulgaria	314
12	Portugal	471	37	Croatia	302
13	Belgium	468	38	Latvia	297
14	United States	465	39	Poland	294
15	Sweden	457	40	Hungary	274
16	Slovenia	456	41	Israel	234
17	Britain	451	42	Malaysia	225
18	Finland	446	43	Slovakia	222
19	Spain	445	44	South Korea	218
20	Japan	441	45	Serbia	181
21	Netherlands	429	46	Belarus	174
22	Norway	422	47	Suriname	171
23	Cyprus	406	48	Romania	149
24	Brunei	397	49	Costa Rica	146
25	Lithuania	383	50	Mexico	142

*2004 or latest

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

Vehicle Fleet Management Strategy

Vehicle Fleet Management Strategy

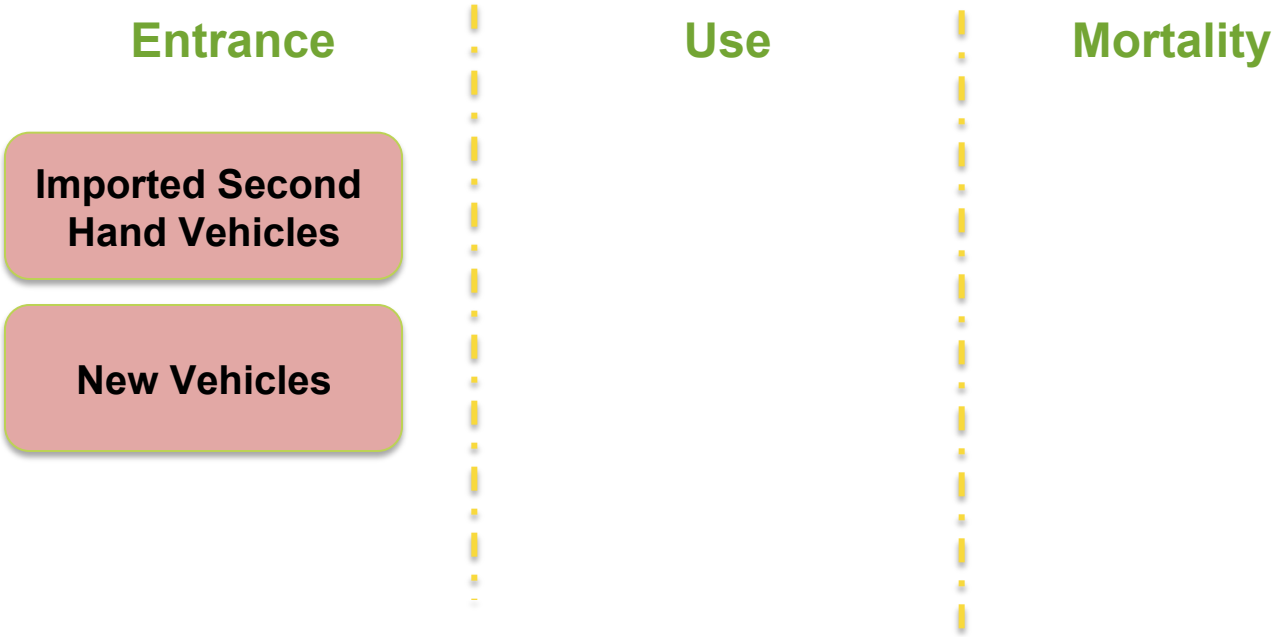
Vehicle Fleet Management Strategy

Entrance | **Use** | **Mortality**

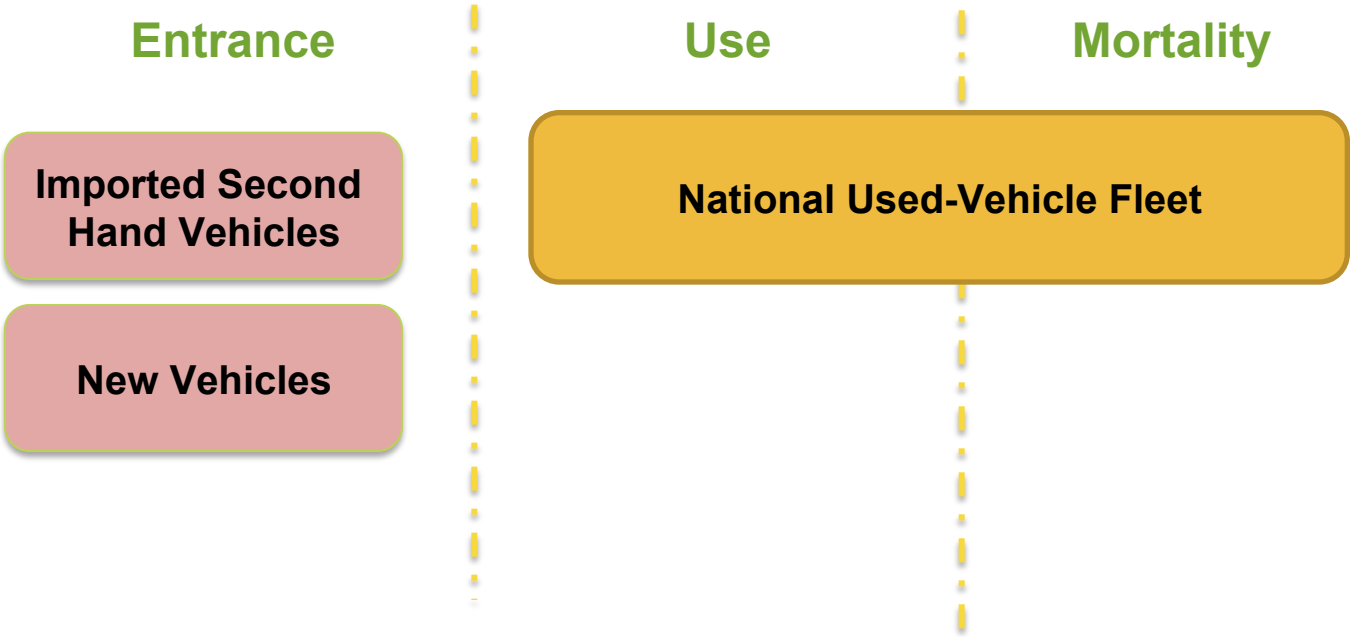
Vehicle Fleet Management Strategy

Entrance	Use	Mortality
Imported Second Hand Vehicles		

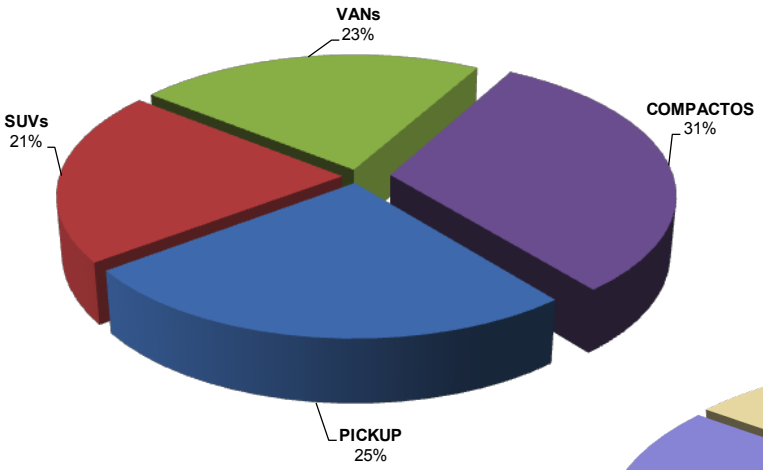
Vehicle Fleet Management Strategy



Vehicle Fleet Management Strategy

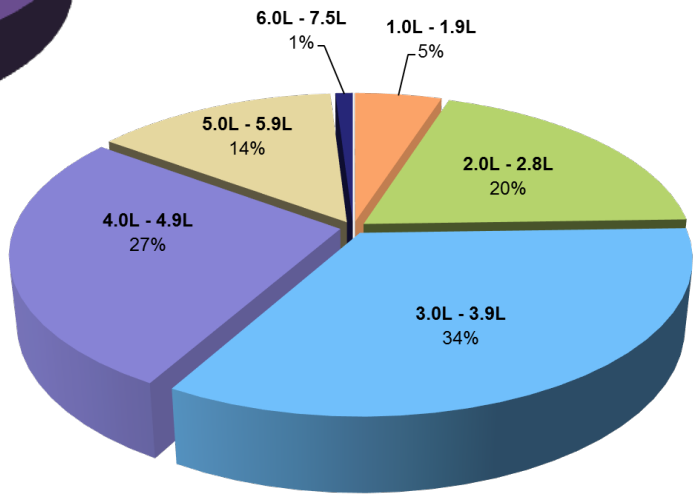


Imported Second Hand Vehicles Characteristics



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

75% > 3.0 L volume motors



Fuente: SEMARNAT

Environmental Costs

- High Emissions:

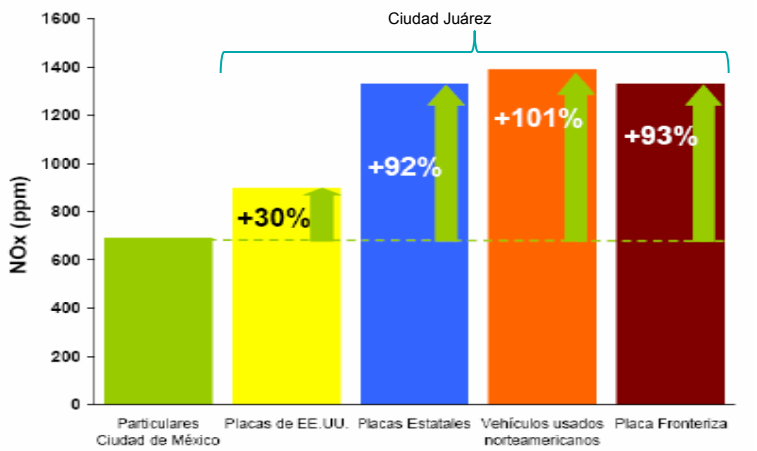
  Emissions monitored through remote sensing device by Molina Center show to have:

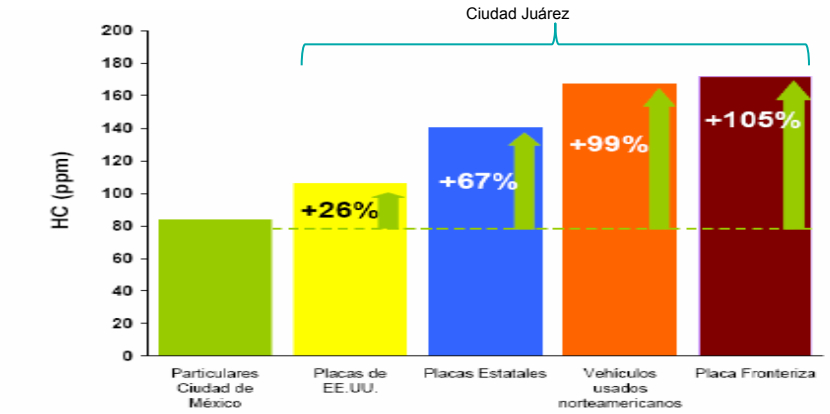
  101 % more NOx,

  99 % more HC, &

  61 % more CO

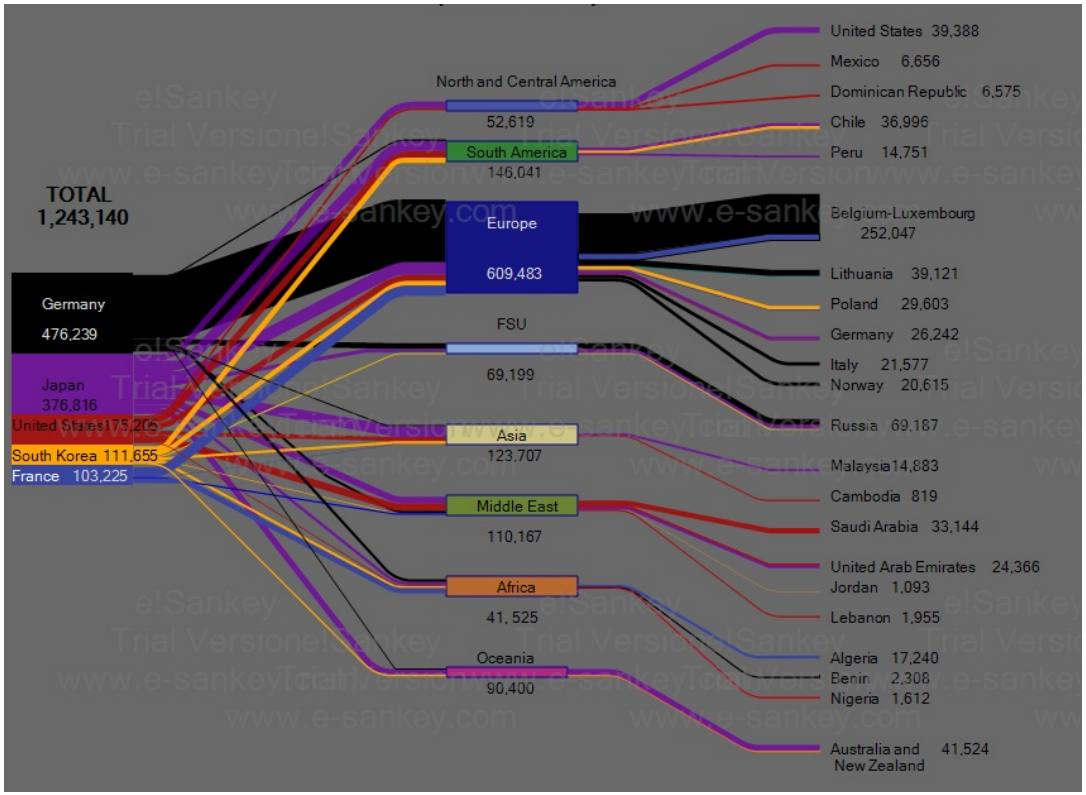
  Compared to vehicles with the same conditions in Mexico City during 2005.





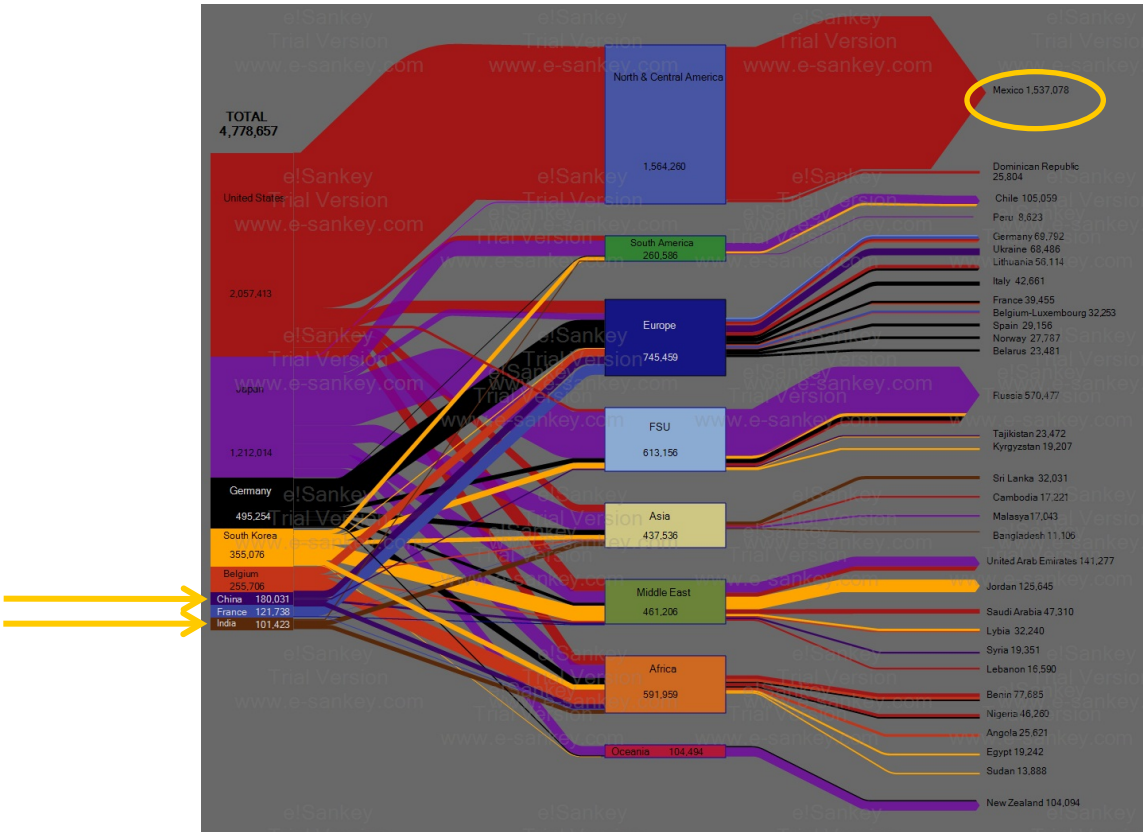
Fuente: Centro Mario Molina

Global Flow Imported Second Hand Vehicles 1997



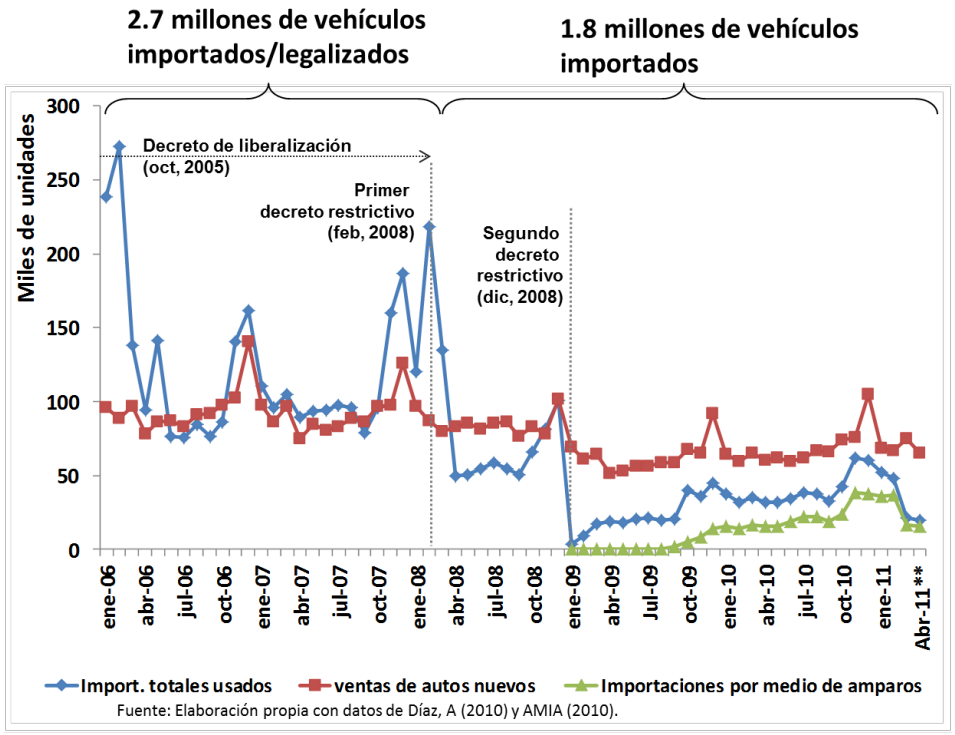
Gráfica: CTS EMBARQ para FIA Foundation y OECD con datos de IEA

… 10 Years Later



Gráfica: CTS EMBARQ para FIA Foundation y OECD con datos de IEA

Imported Secondhand Vehicles Trend



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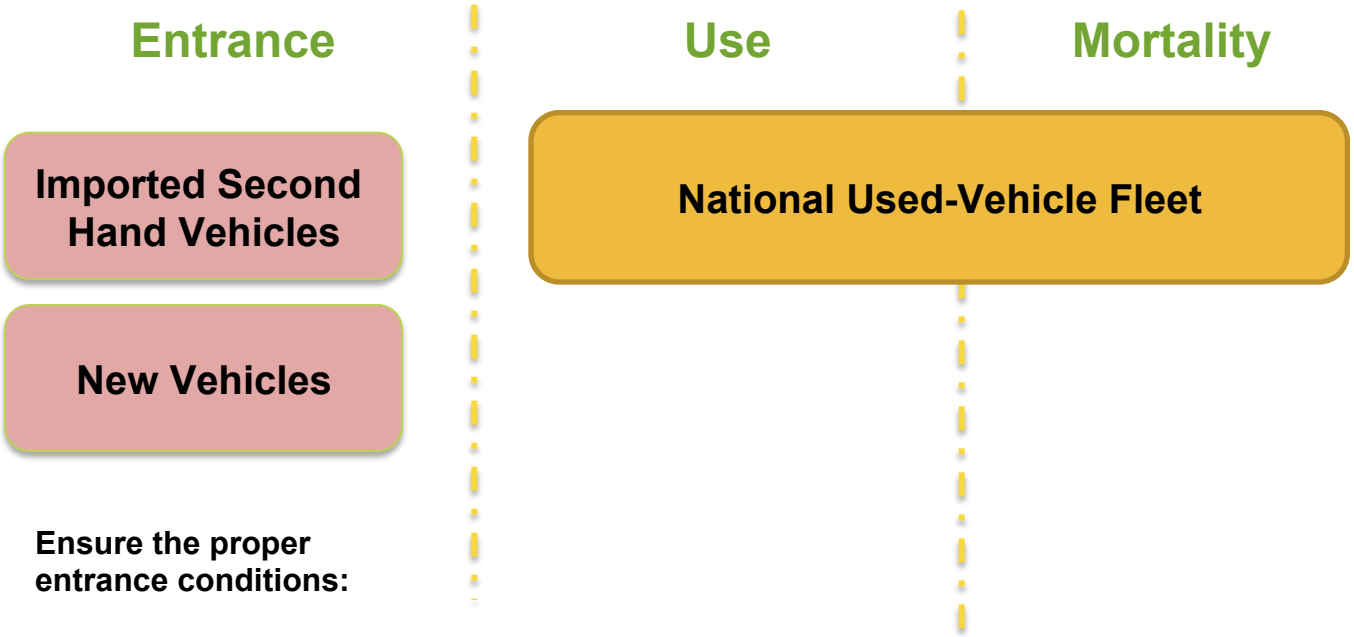
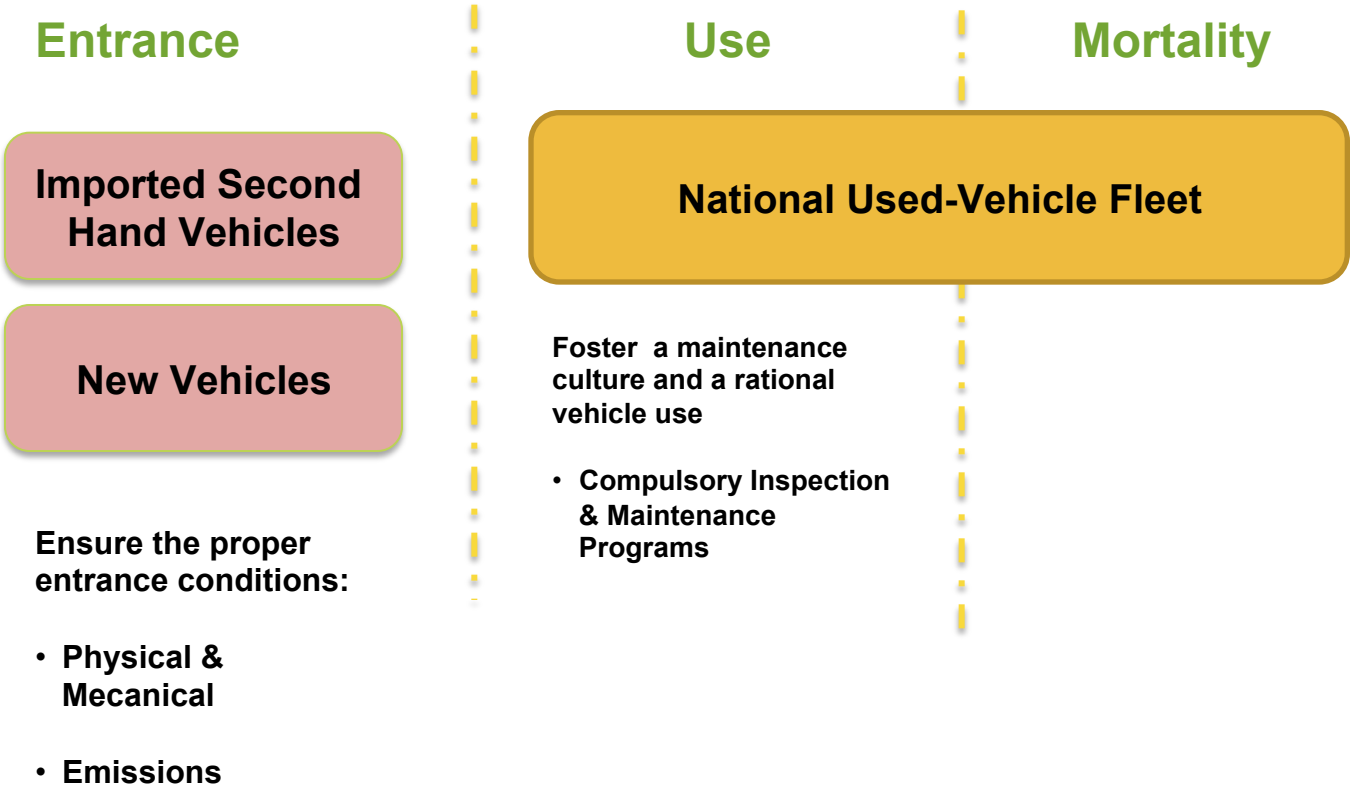
Vehicle Fleet Management Strategy



Ensure the proper entrance conditions:

- **Physical & Mecanical**
- **Emissions**

Vehicle Fleet Management Strategy



Vehicle Fleet Management Strategy

Entrance

Imported Second Hand Vehicles

New Vehicles

Ensure the proper entrance conditions:

- **Physical & Mecanical**
- **Emissions**

Use

National Used-Vehicle Fleet

Foster a maintenance culture and a rational vehicle use

- **Compulsory Inspection & Maintenance Programs**
- **Fuel Taxes**

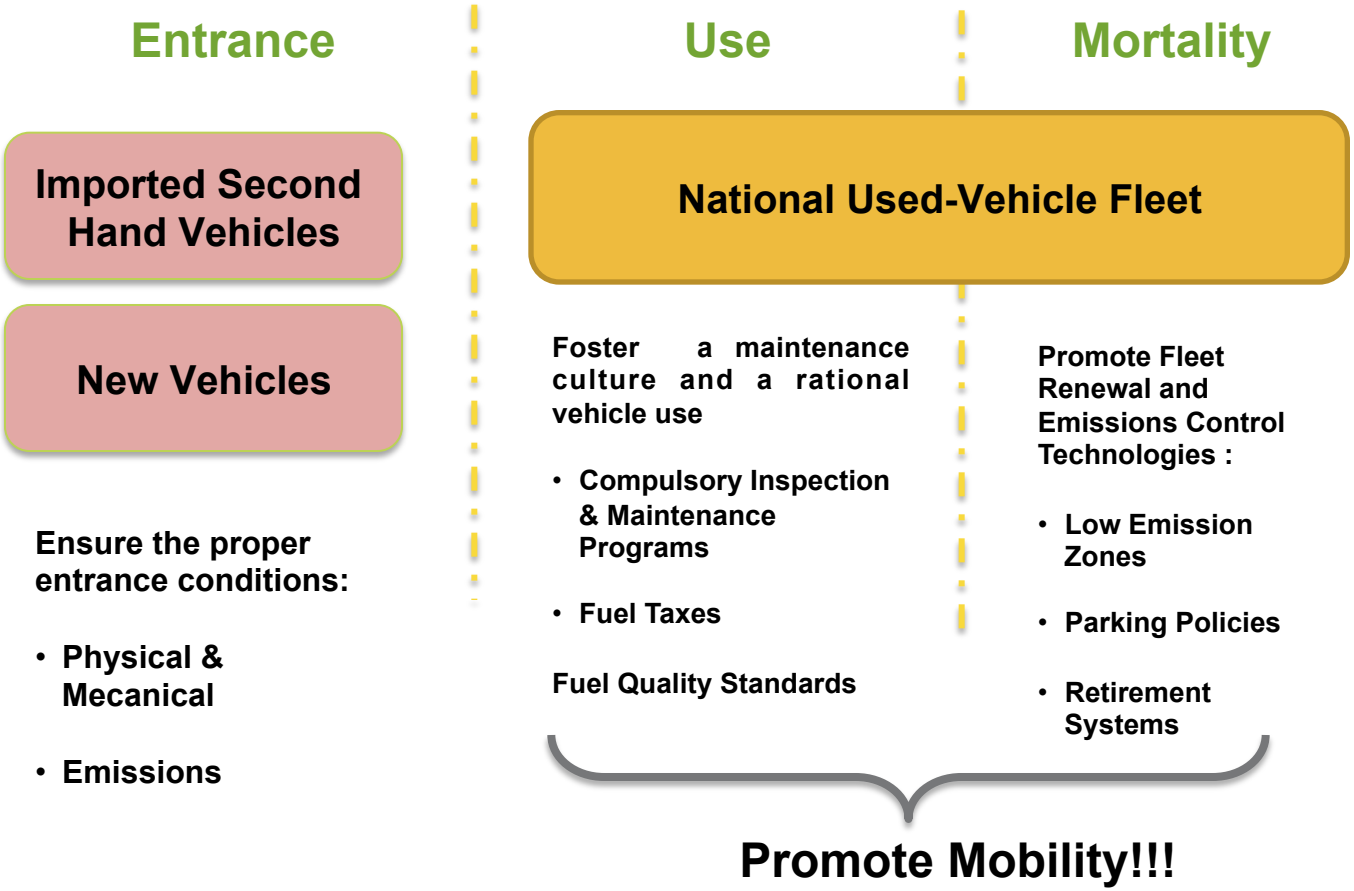
Fuel Quality Standards

Mortality

Promote Fleet Renewal and Emissions Control Technologies :

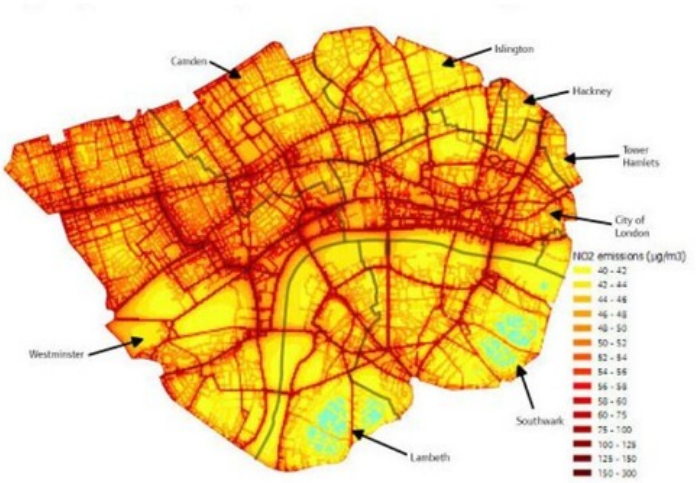
- **Low Emission Zones**
- **Parking Policies**
- **Retirement Systems**

Vehicle Fleet Management Strategy



Concentration vs Personal Exposure

Low Emission Zones



Main Global Results

Table 2 Selected Air Quality and Emission Benefits of LEZs in European Cities[17]

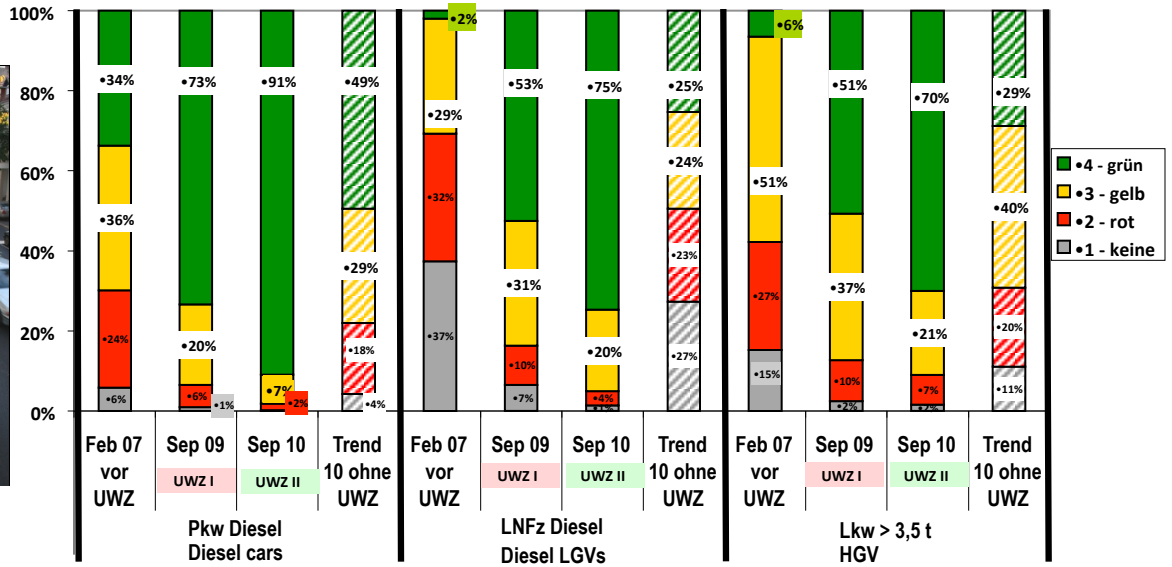
City / Region	Year of LEZ Introduction / Measurement	Indicator
Berlin	**2008** / 2009	-24% diesel PM -8% overall PM_{10}
Munich	2006-7 / **2008** / 2009-10	-60% transport contribution from 1.1 to 0.5 $\mu g/m^3$ elemental carbon[18]
Netherlands – 9 cities	**2007** / 2008	up to 2$\mu g/m^3$ PM reduction
London	**2008** / 2008-2012	-5.8% PM_{10} -13% average annual PM_{10} concentration[19]
Cologne	**2008**	4$\mu g/m^3$ PM_{10} reduction 1.2$\mu g/m^3$ NO_2 reduction
Stockholm	**1996** / 2000	-60% PM_{10} -20% NO_x
Milan – emission-based congestion charge	**2011** / 2012	-19% PM10[20] -14% NOx -15% CO_2

- FUENTE: International Council on Clean Transportation

Berlin LEZ – impact analysis

☞vehicle fleet composition

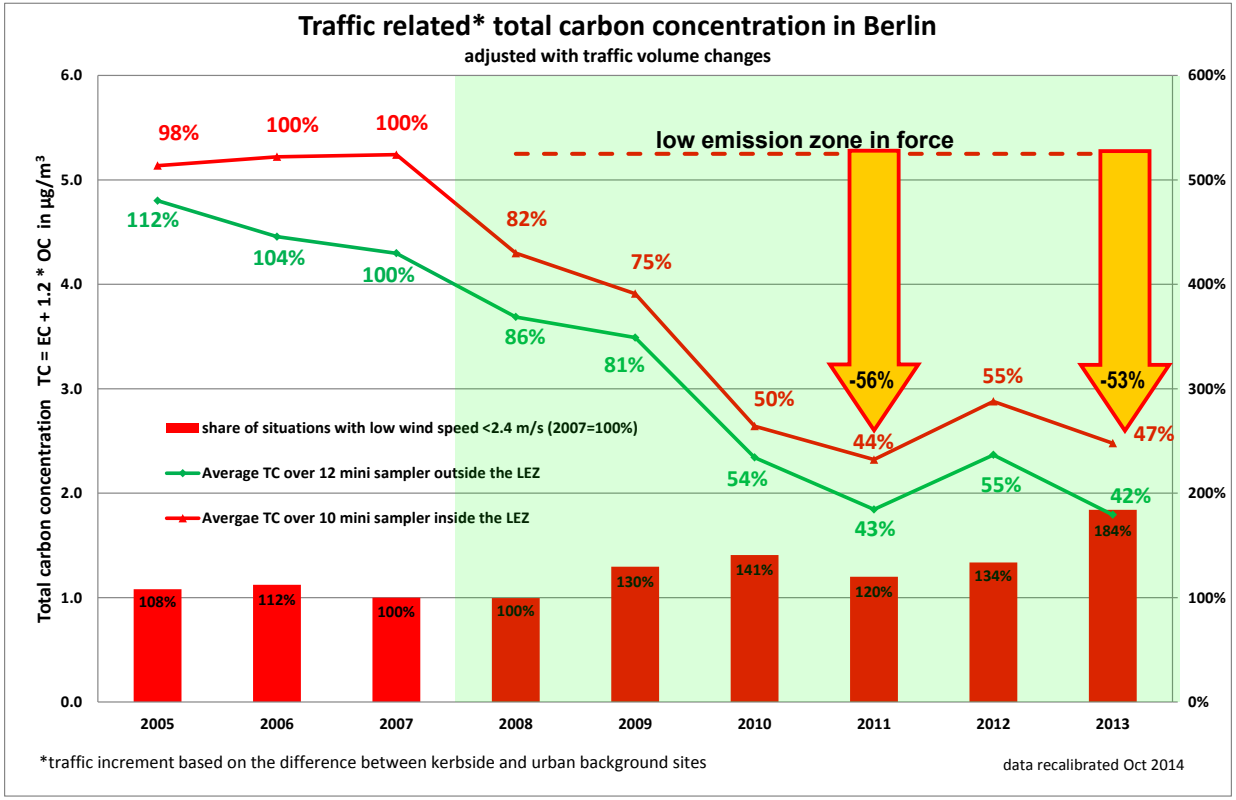
change of the vehicle fleet composition on the road (from number plate recognition Frankfurter Allee)



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



Ixtapaluca, EDOMEX

Imagen: Al Gore, Nuestra Elección

ctsEMBARQ México


Improve Mobility!
WORLD RESOURCES INSTITUTE

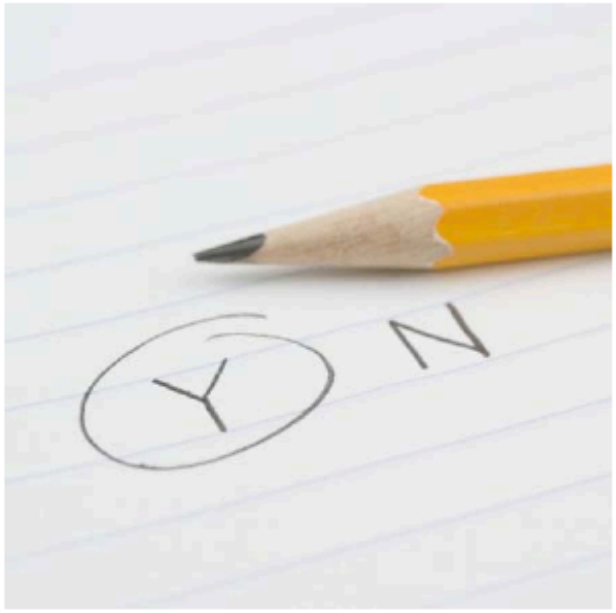
Mobility w/o TDM = Exercise w/o Diet!!!

TIME FOR Q&A

Questions ?

SURVEY

- How did we do?
- Your feedback is important!



YOUR PARTICIPATION IS APPRECIATED

Thank You!

Contact:

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An audio recording of this webinar will be available at:

ledsgp.org/transport