Mexico City vehicle emissions experiences: measurements

and programs to curb real world emissions

FIA FOUNDATION icct C40 CITIES TRANSPORT & ENVIRONMENT GLOBAL NCAP

true THE REAL URBAN EMISSIONS INITIATIVE

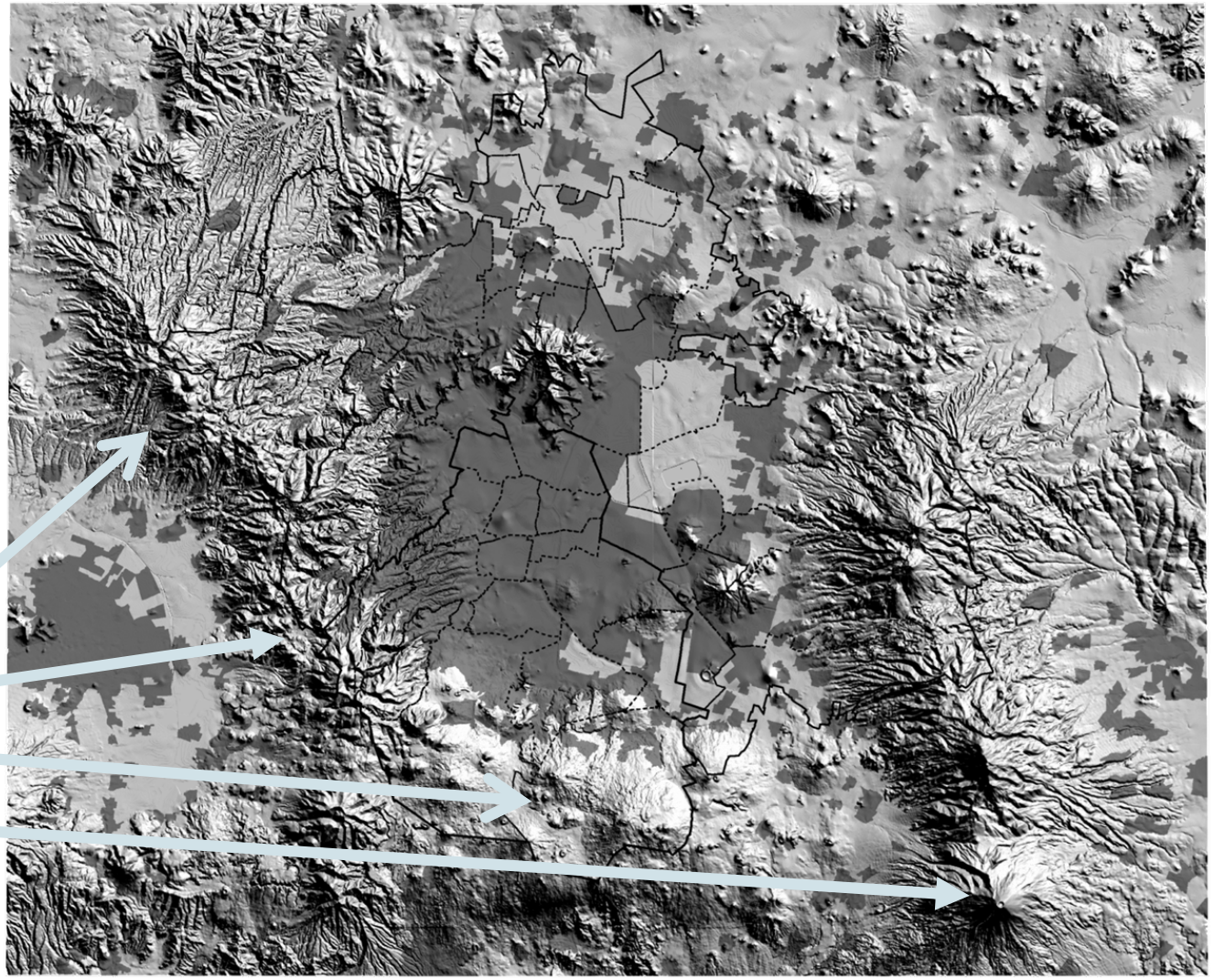
CDMX CIUDAD DE MÉXICO

Mexico City Metropolitan Area

2,200 and 2,800
meters above sea level

High solar radiation

Surrounded by mountain
Above 5,000 m



Altitude

reduced

Efficiency of combustion processes

High level concentration ozone and secondary pollutants

Mexico City Metropolitan Area

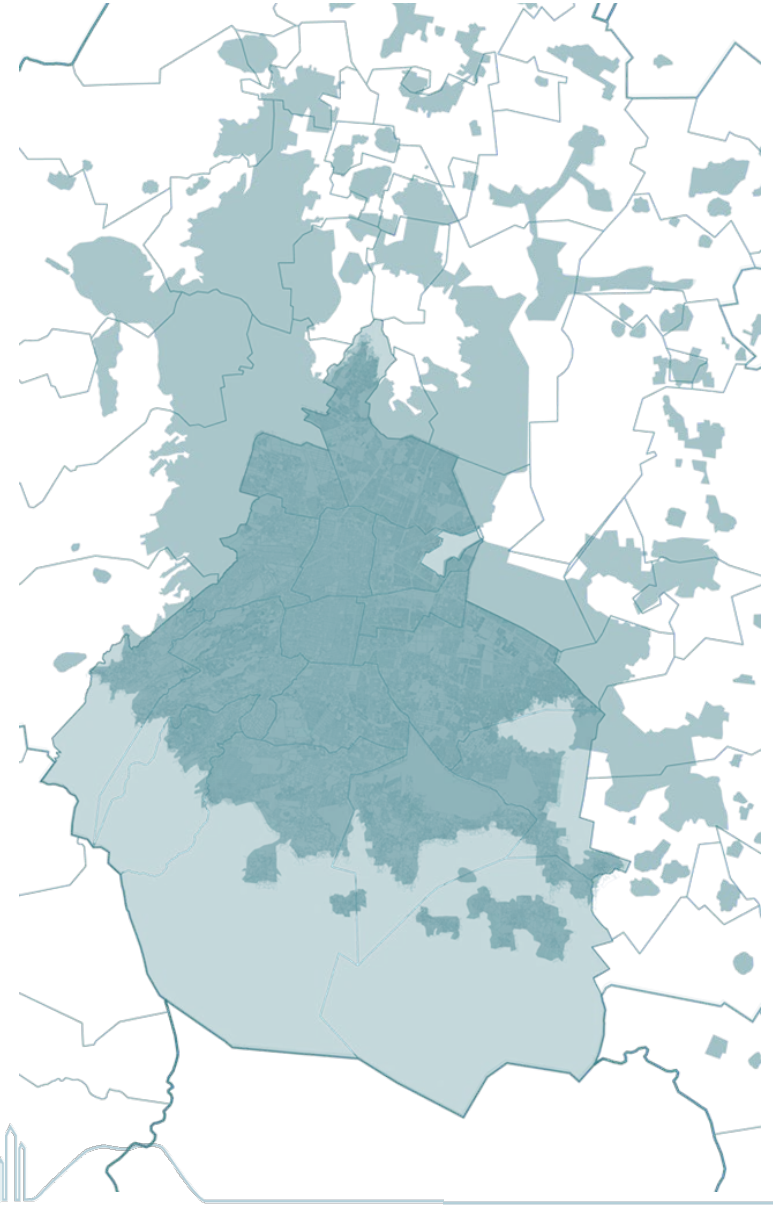
21 Million inhabitants in the Mexico's Valley Metropolitan Zone

9 Million inhabitants in Mexico City

1,935
Industries

5.8 mill.
Homes

2,410
Business and services



CO_2

56.2 MILL

Annual

ENERGETIC CONSUMERISM

543 PJ

Annual

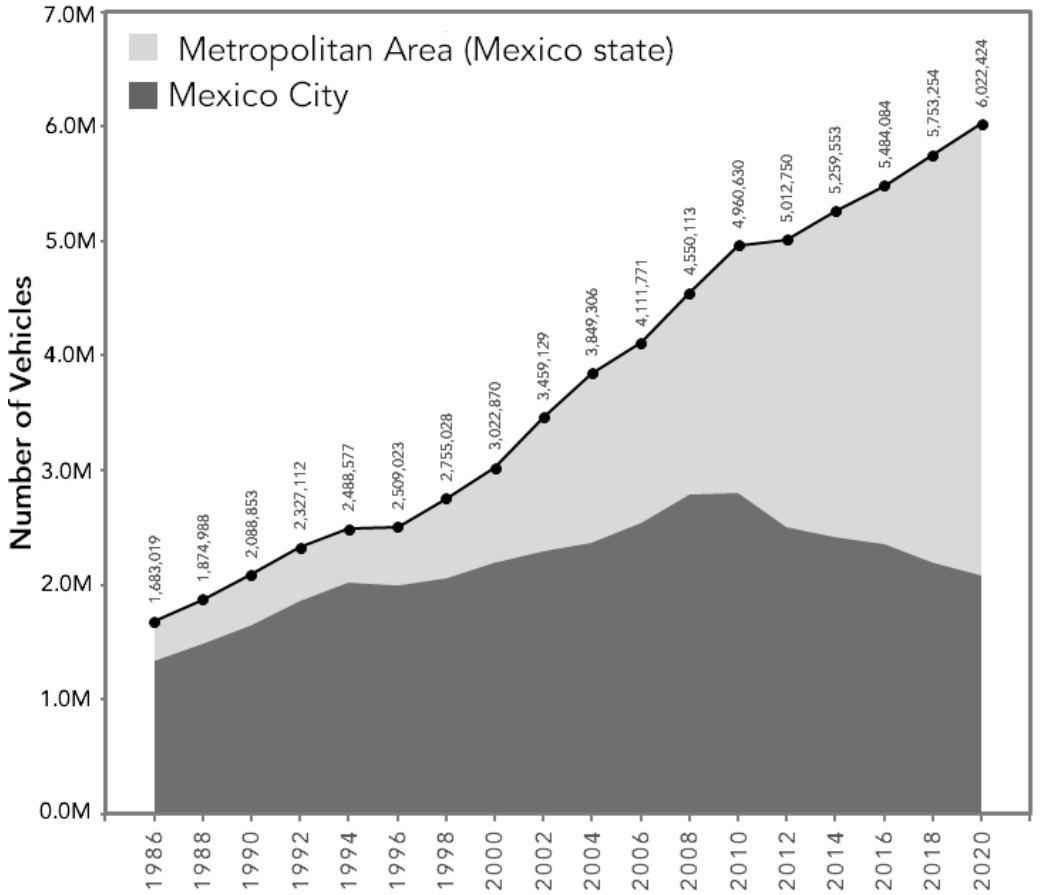
SEDEMA, 2016. Mexico City´s Emissions Inventory 2014

true
THE REAL URBAN EMISSIONS INITIATIVE

CDMX
CIUDAD DE MÉXICO

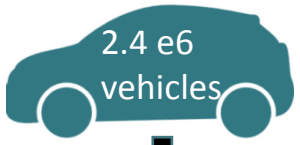
The transportation fleet's composition

Mexico City Metropolitan Area



Projection vehicles

CDMX



State of Mexico

80% Private

7% Public

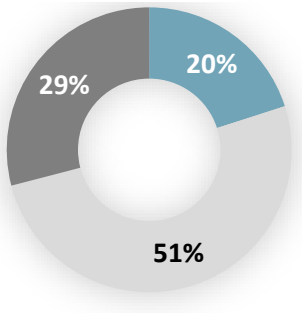
13% Freight

SEDEMA, 2016. Mexico City´s Emissions Inventory 2014

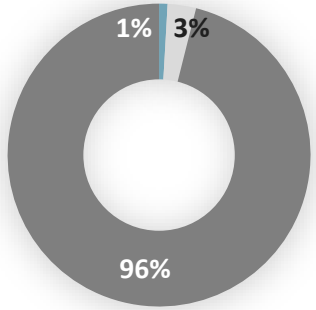
Main pollution sources

Emissions

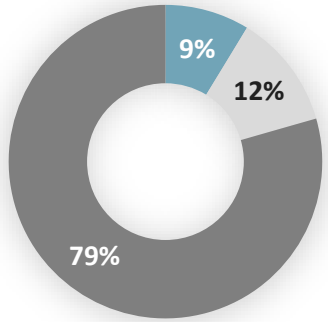
$PM_{2.5}$



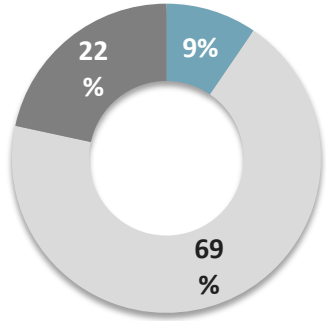
CO



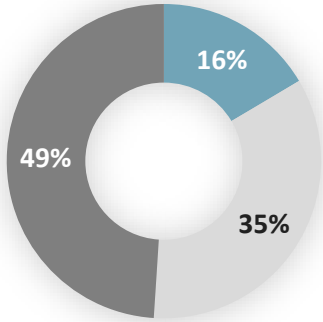
NOx



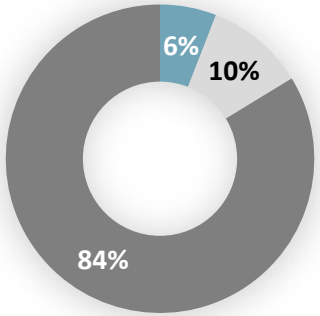
VOC



CO_2 eq



Black Carbon

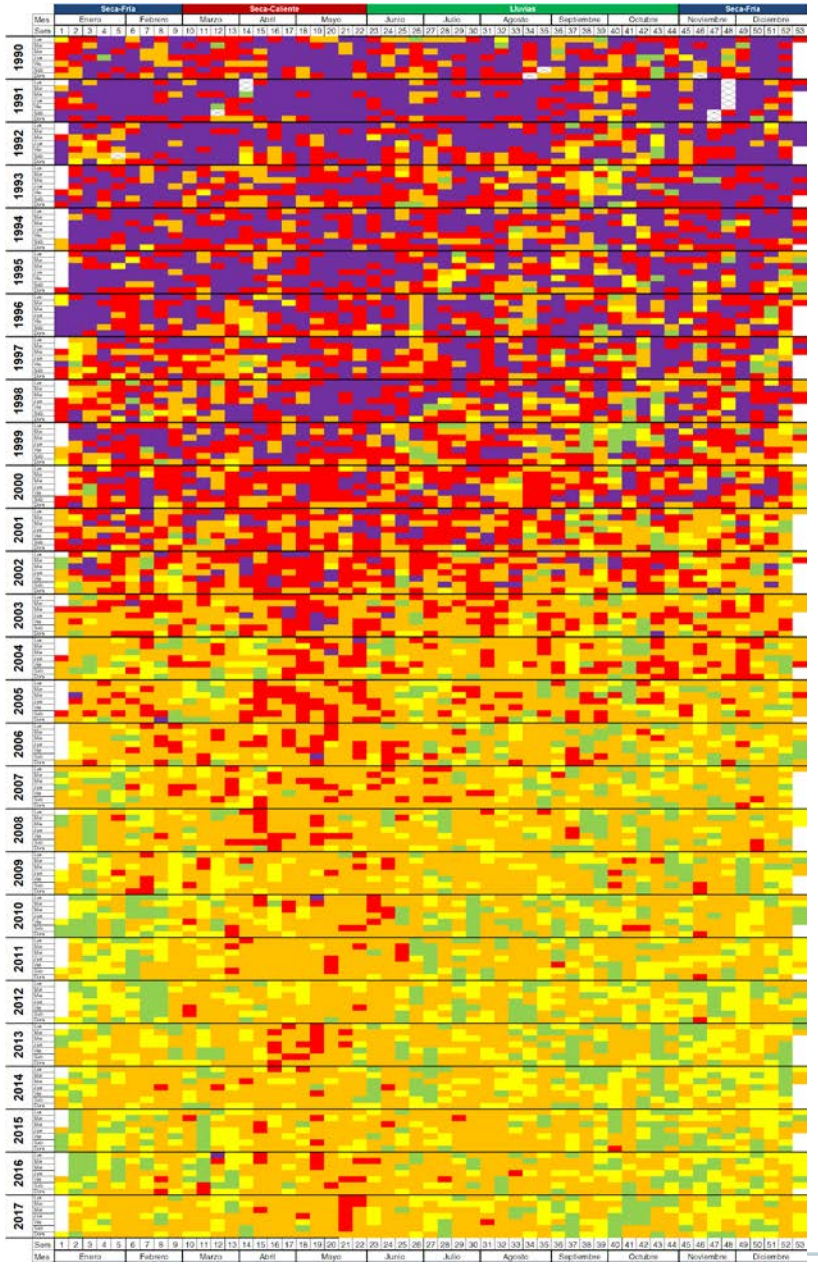


Mobile sources | Fixed Sources | Area Sources

SEDEMA, 2016. Mexico City´s Emissions Inventory 2014

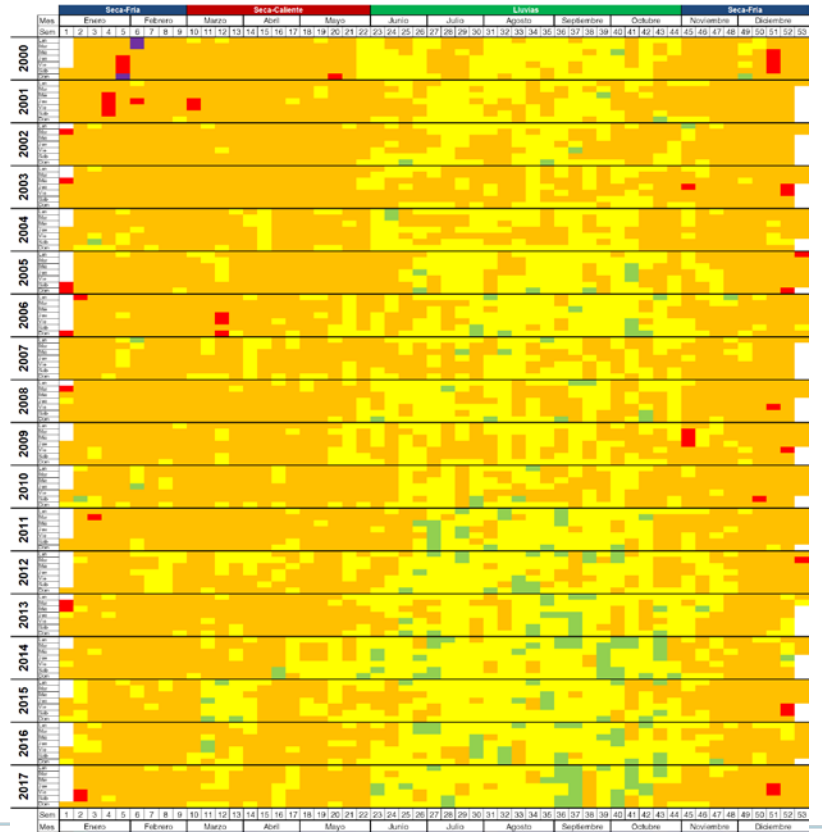
Mexico City Air Quality Over the years/trends

Ozone (O_3)



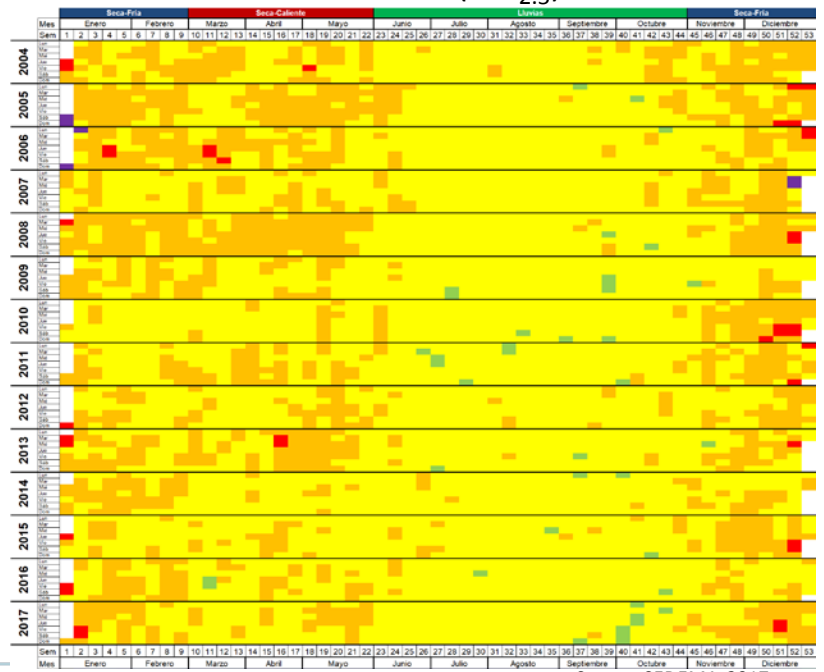
Has Mexico City air quality improved over the years

Particles (PM_{10})



Very unhealty	250
Unhelaty for sensitive groups	200
Unhealty	150
Moderate	100
Good	50
	0

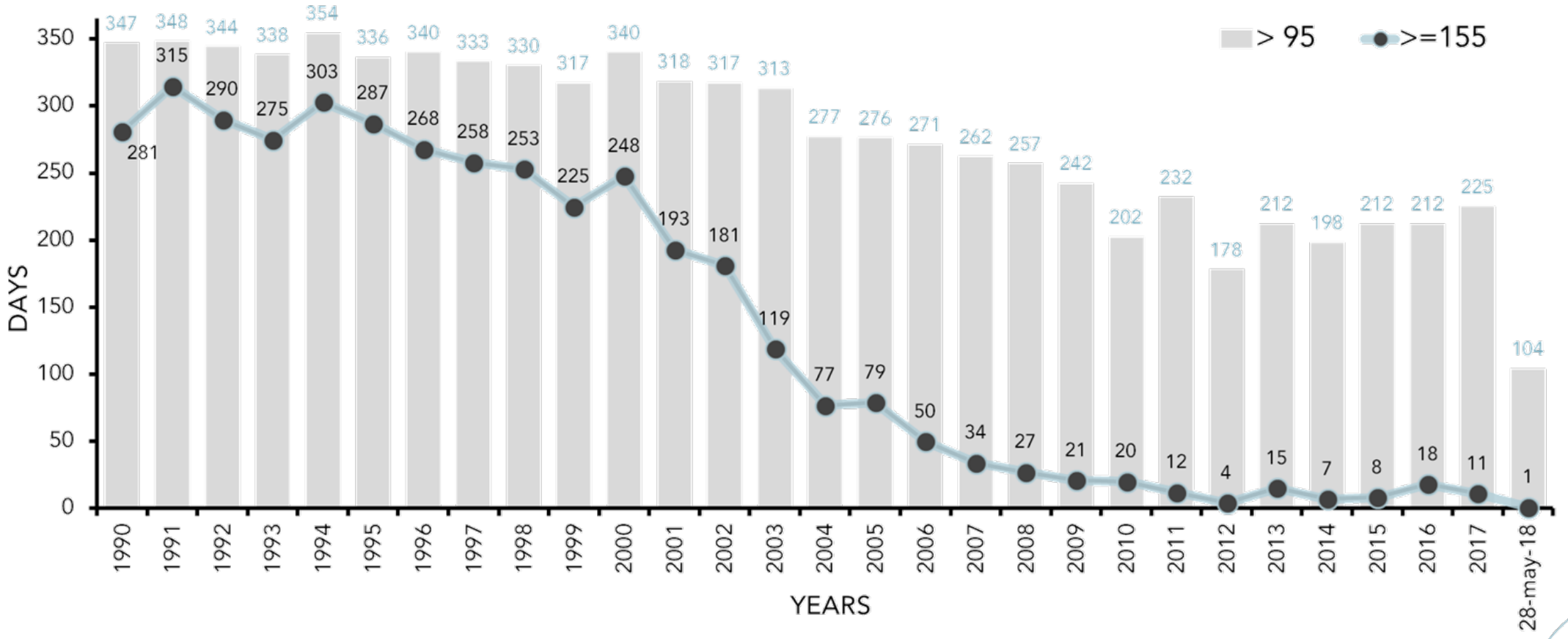
Particles ($PM_{2.5}$)



Source: SEDEMA, 2017.

Ozone trend (peaks)

Number of days exceedance air quality standard 95 ppb
Number of days with concentrations equal or higher than 155 ppb



Source: SEDEMA, 2018

Policies implemented by Mexico City to reduce emissions from mobile sources

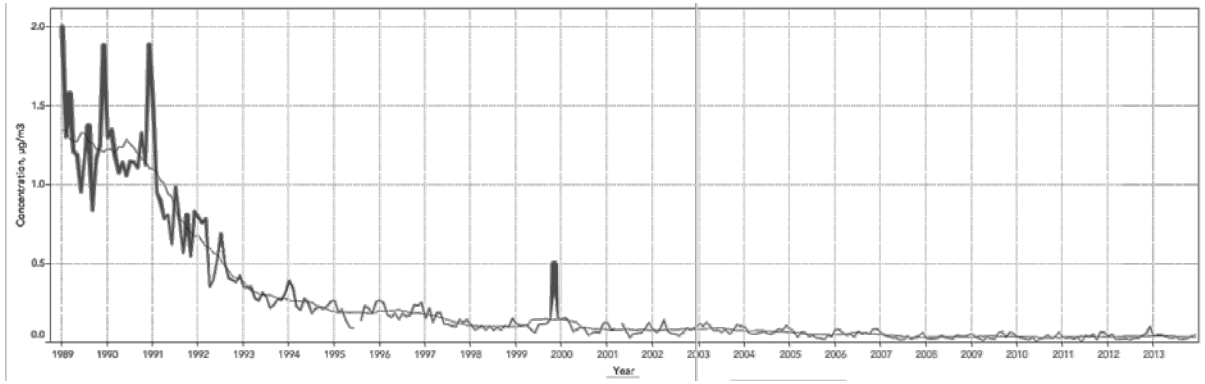
1986-1990

- Gasoline formulation: Pb out, MTBE in
- "No Driving Day" started
- Vehicle Verification program (PVVO) (static mode BAR 84 technology)

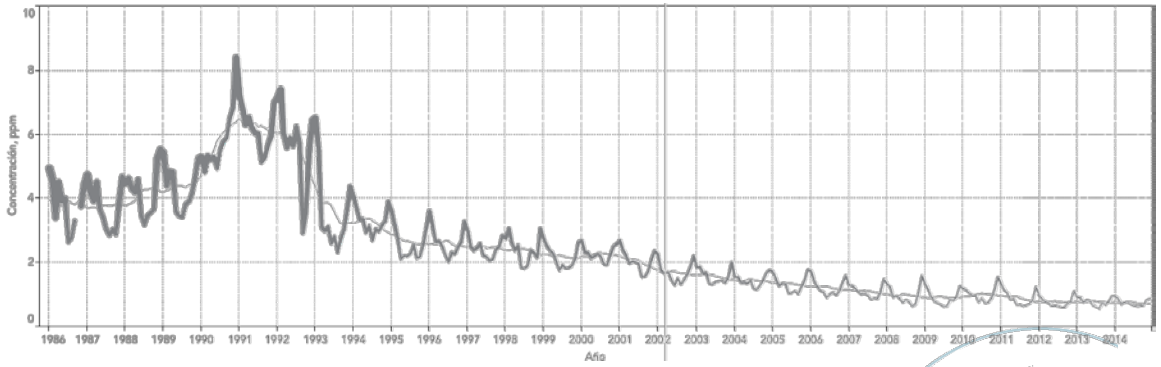
1991-2000

- Introduction of unleaded gasoline
- 2-way catalytic converters in vehicles.
- Reduction of reactive HCs in gasoline.
- 3-way catalytic converters in vehicles.
- Distribution of reformulated gasoline.
- Updated "No Driving Day"
- Starts the GNC to cargo transport and passengers transport.
- Starts the PIREC program to change converters.

Pb trend



CO trend



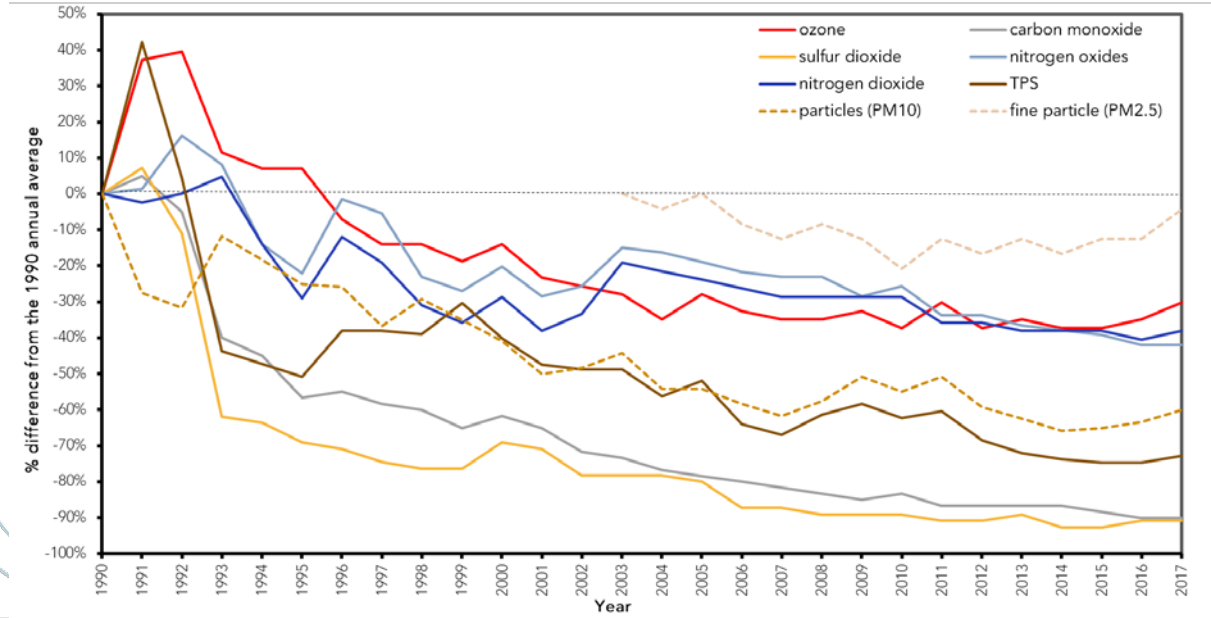
Policies implemented by Mexico City to reduce emissions from mobile sources

2001-2010

- Starts renewal of public transport vehicle fleet
- Set strict limits on vehicle emissions
- Metrobus Line-1 and 2
- Passenger buses EURO IV and TIER 2.
- Refurbishment Program for taxis and minibuses.
- Standard with new limits on vehicle emissions and Diesel vehicles
- Update “No Driving Day” on Saturdays.
- Start Sub urban Train.
- Reduction of sulfur in gasoline 30 ppm.
- ECOBICI program.

2011-2018

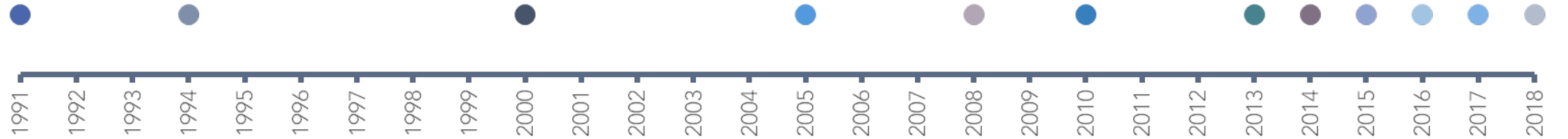
- Metrobus Line-3, 4, 5, 6 and 7
- Subway Line 12
- Update Vehicle Verification program, grants hologram per model year
- “No Driving Day”, Includes restrictions on Saturdays.
- **Remote sensor campaigns.**
- School Transportation Program (PROTE).
- Electric and hybrid taxis.
- Vehicle verification with OBDII, holograms based on technology and emission limits.
- Euro VI metrobus units.
- Increase and renewal of public fleet.
- Performance ECOBICI



How are cities measuring and utilizing real world emissions data?

History of remote sensing field campaigns

First



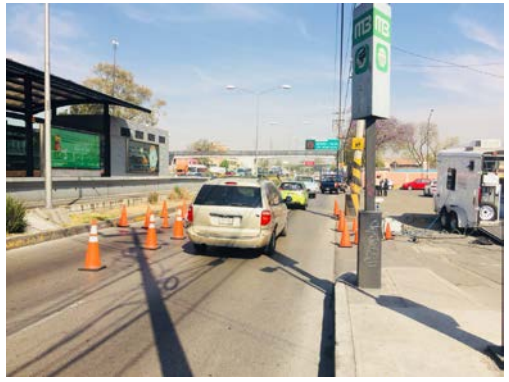
IMP field campaign to characterize emissions from mobile sources.

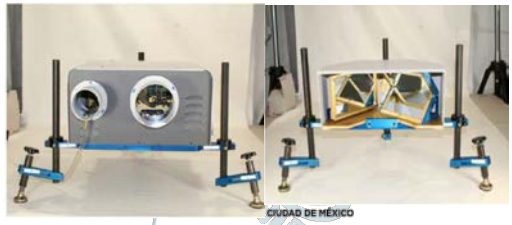
Mexico City Field campaign Evaluate tail pipe emission testing program

Mexico City field campaign: Follow up 2000 campaing.

Fleet characterization

Fleet characterization and high emitters





How are cities measuring and utilizing real world emissions data?

Year	Objective	Measurements	Validated measurement*	%validated data	Number days field campaign	Month	sanctioned
2013	Fleet characterization	79,201	49,448	62%	27	April-June	N/A
2014		38,267	19,553	51%	15	March-May	N/A
2015		84,710	42,669	50%	26	February-May	N/A
2016-1		79,812	33,193	42%	26	February, April and May	N/A
2016-2	Compliance with the standard NOM-167	93,555	39,440	42%	31	July-November	**731**
2017-1		42,588	32,091	75%	16	January- April	**343**
2017-2		17,908	8,610	48%	5	November - December	**205**
2018-1		73,793	47,351	64%	21	January-June	**759**

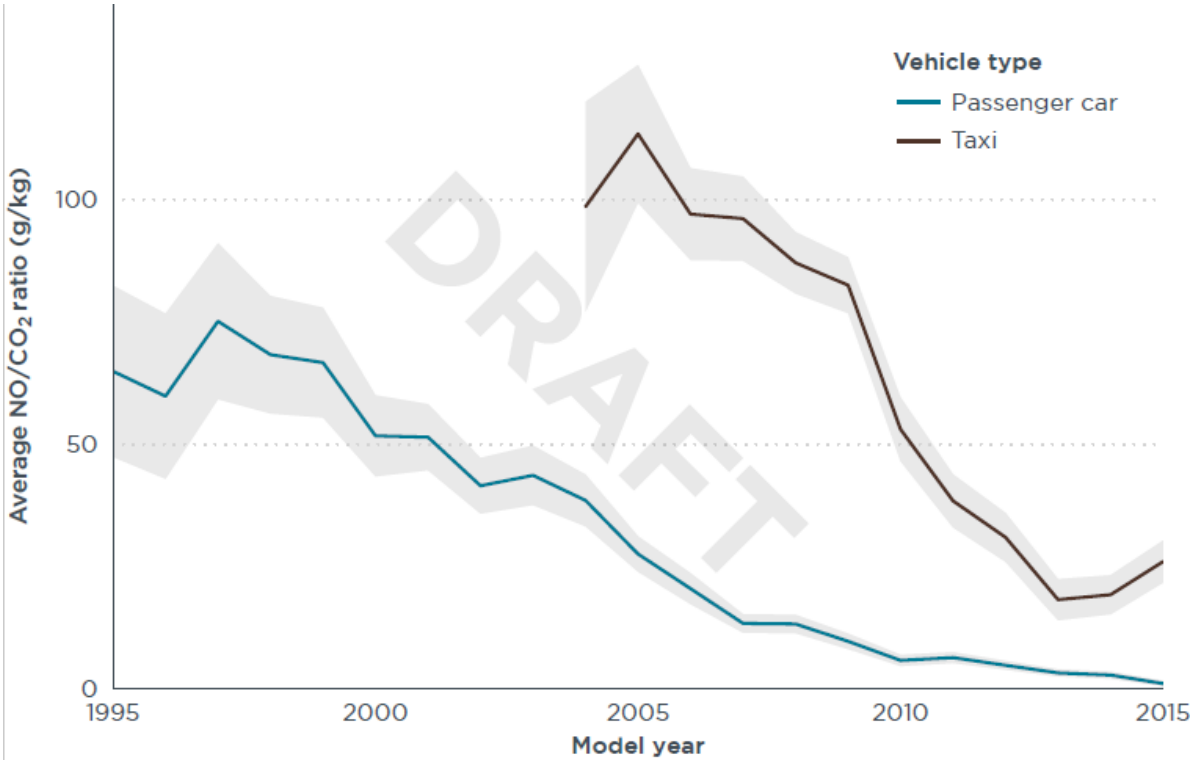
Enforcement tools: vehicular emissions

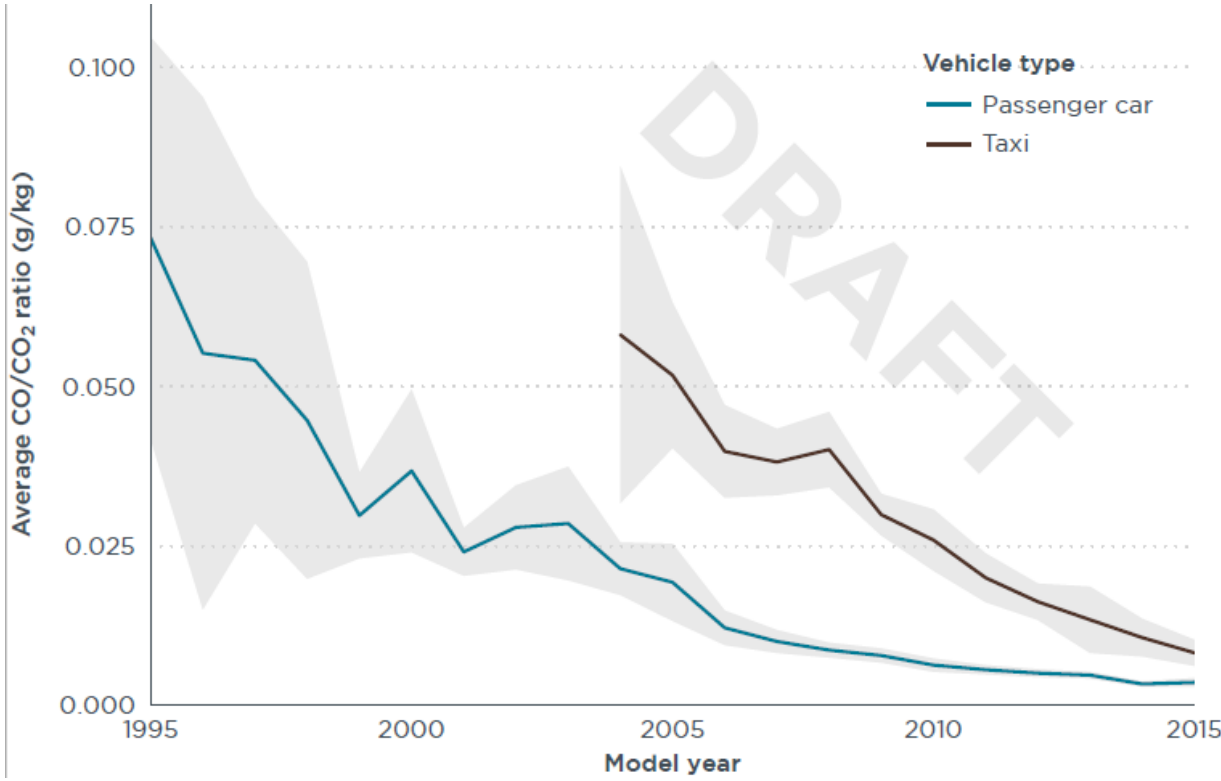
- CIVAR: Mexico City Remote Inspection and Surveillance Center

- Eco-patrols

How are cities measuring and utilizing real world emissions data?

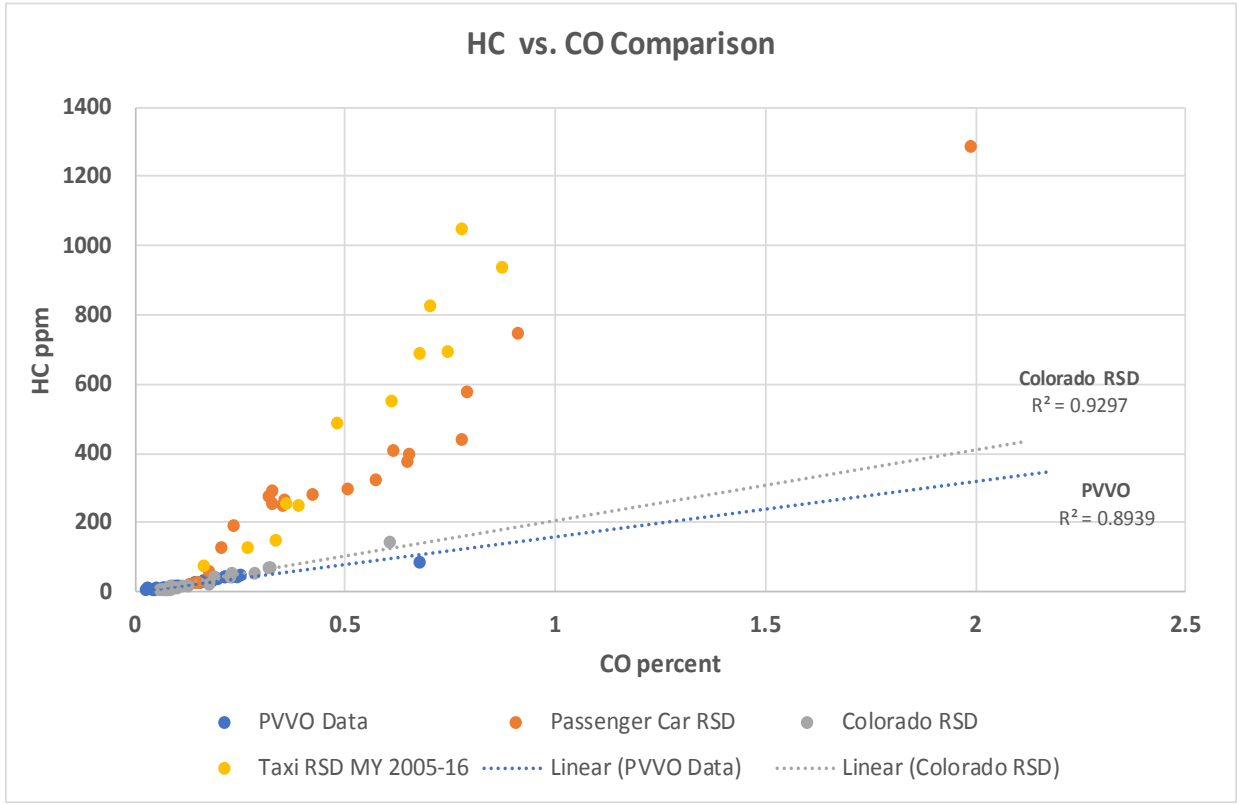
Preliminary analysis by ICCT-Europe (UweTietge and Yoann)



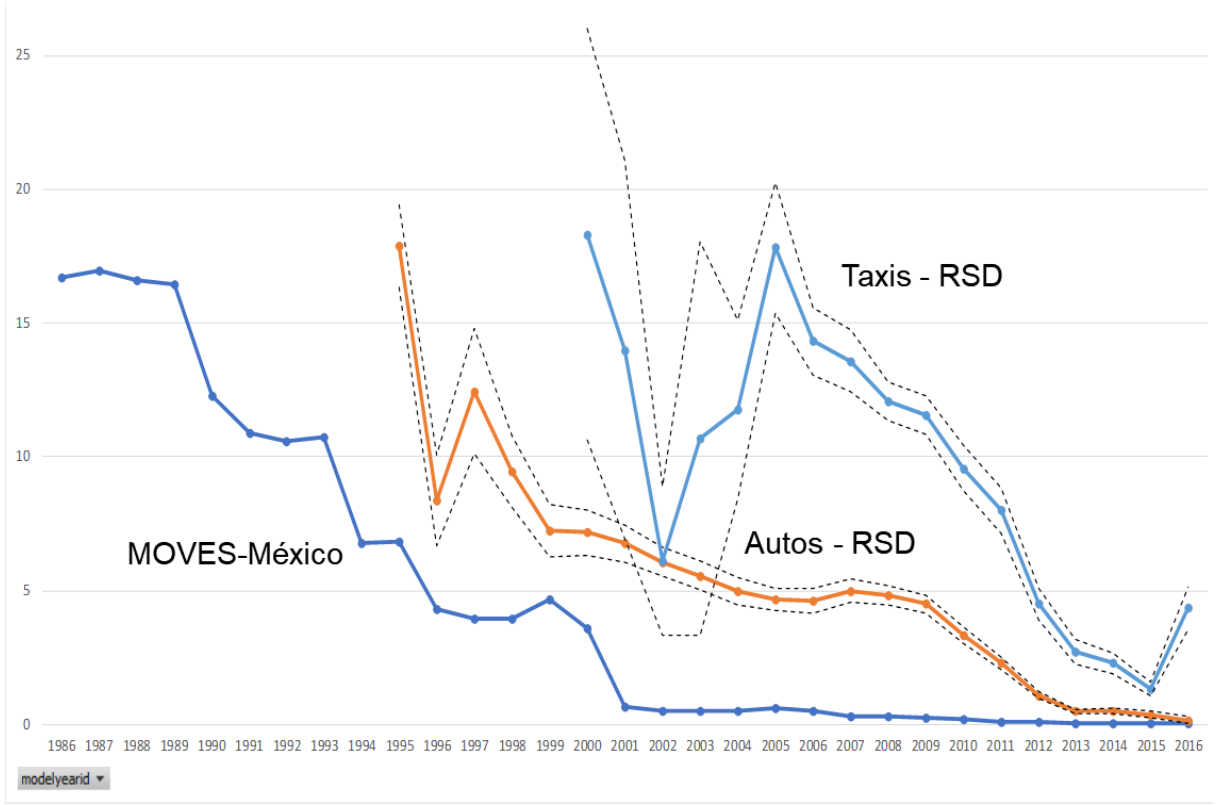


Evaporative emissions

HC vs CO comparison (RSD – PVVO)



Emission factors (g HCT / kg) of MOVES-Mexico vs. Remote sensor data



Enforcement tools:

Vehicle Inspection and Mantainance Program in Mexico City

New Vehicular Program of Inspection and Maintenance , which includes recommendations by OECD [1] , will start on 01 July, 2018.

Neither physical- mechanical or particulate numbers will be considered in certificates. Certificates (00, 0,

- Vehicle physical-mechanic inspection
  - Alignment
  - Suspension Benches
  - Brake tester
  - Clearance detector

- Measurement of ultra-fine particles in the vehicular inspection .
- Improvement of the emissions :
  - Cost down Dynamometers

[1] OCDE. “Estrategias para Mitigar la Contaminación del Aire en la Ciudad de México” publicado en Junio de 2017
https://www.itf-oecd.org/strategies-mitigating-air-pollution-mexico-city

Remote sensing potential

- Compliance and enforcement
- To evaluate our own Inspection and Maintenance (I&M) program
- Evaluate megalopolis fleet (I&M harmonization)
- To evaluate, design our AQ and CC policies
- To support other measures such as evaporative controls
- Collaborate with TRUE

Thank you

mjaimes@sedema.cdmx.gob.mx

sedema.cdmx.gob.mx
aire.cdmx.gob.mx