

# Potential solution to reduce PM pollution in a big city

## ***Soot-free Tehran***

International workshop on solutions for eliminating Diesel and gasoline emitted soot from urban air  
7th SEP 2016  
Sharif University of Technology, Tehran, Iran



**Hidezo Umiyama - Isuzu Motors Germany GmbH**

# Agenda

- **Isuzu Motors Limited , Isuzu Motors Germany**
- **What is PM2.5 ?**
- **Is DPF effective solution to reduce PM2.5 ?**
- **Key points for „DPF into market“**
- **Market experiences of Isuzu DPF technology**
- **Case study in a big city**
- **Summary**

# Isuzu Motors Limited



**Date of Establishment**  
9th APR, 1937

**Sales**  
Consolidated 1,927 bn yen  
FY2015-2016

**Employee**  
Consolidated 32,418  
As of MAR 2016

- Light- to heavy-duty trucks



- Pickup trucks



- Buses

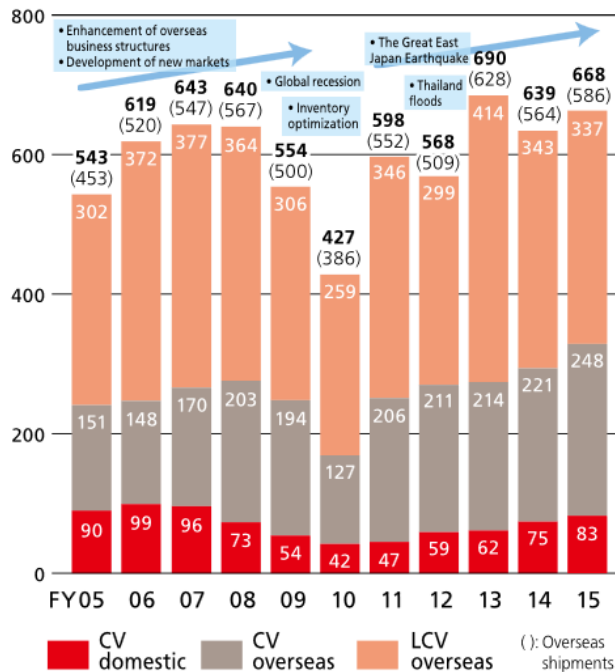


- Industrial diesel engines



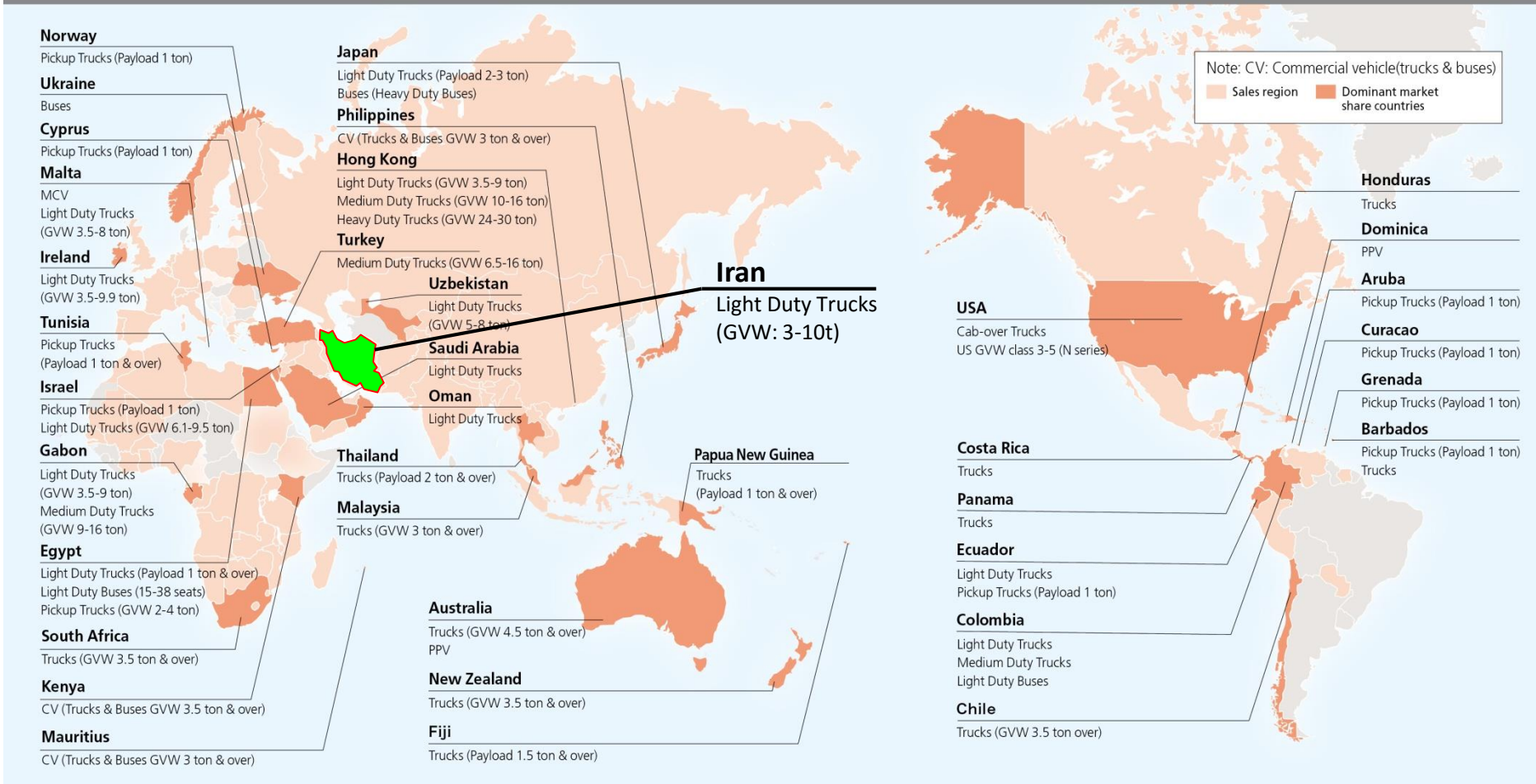
## Global CV / LCV Shipments (K-units) .....

Finished vehicles, KD sets, and others



# Isuzu Motors Limited

No. 1 Market Share in 2015 (Based on sales figures compiled by Isuzu) Source: Isuzu Motors



# Isuzu Motors Germany GmbH



## Location

Ginsheim-Gustavsburg, Germany

## Business units

Development

Aftersales

Training Center

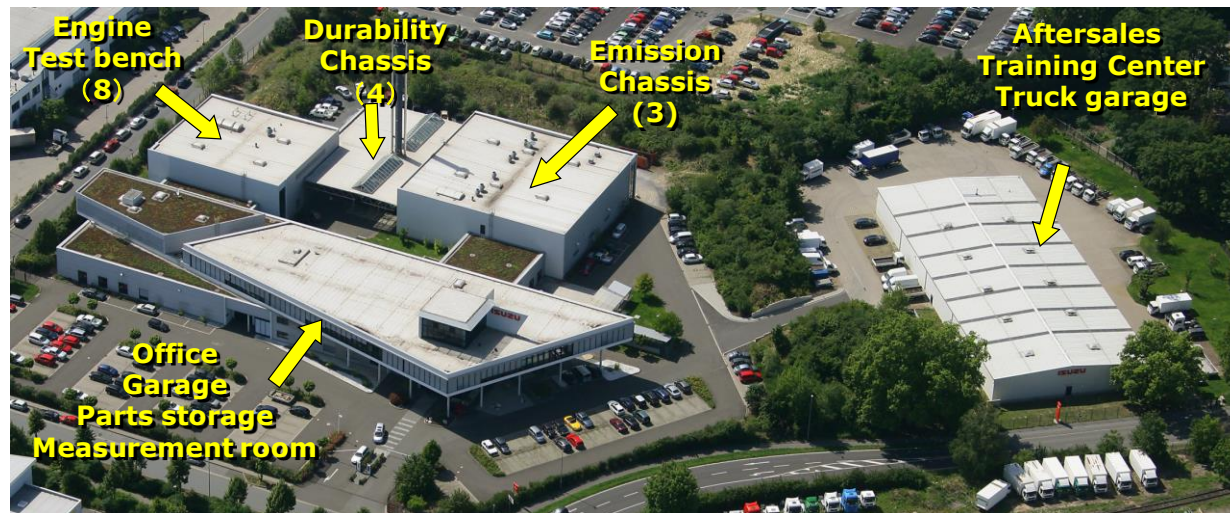
## Employee

135

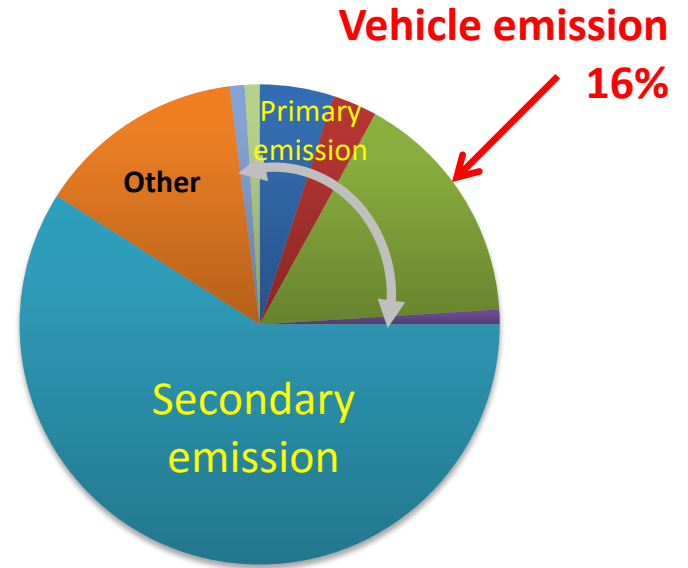
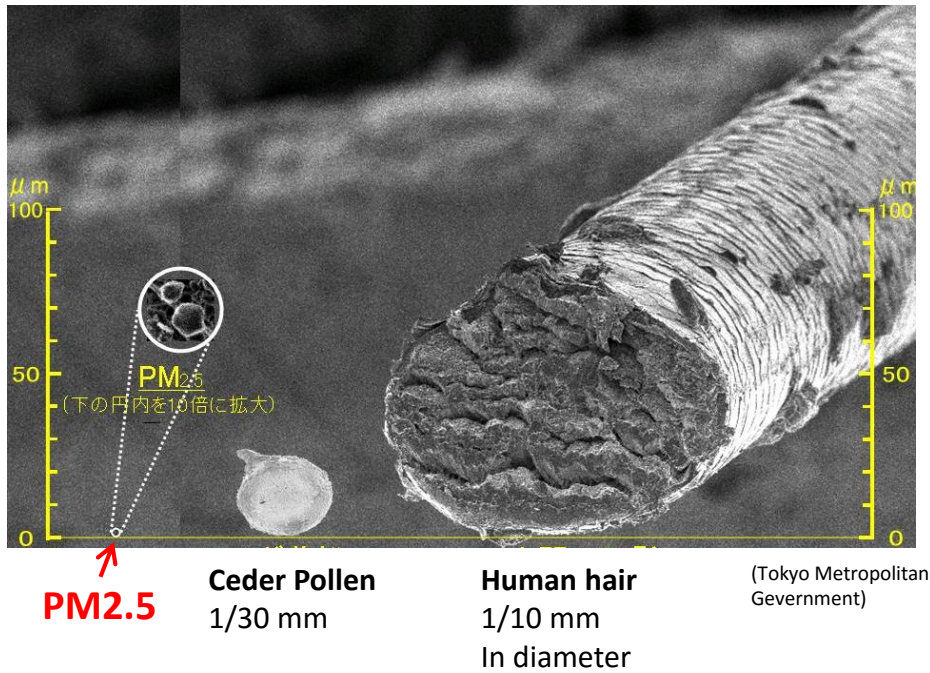
As of MAR 2016

## Development functions

- Engine calibration(LCV&CV)
- Various road tests
- Advanced development
- Type approval tests (Euro regulation)
- Benchmark activities
- Design & project management



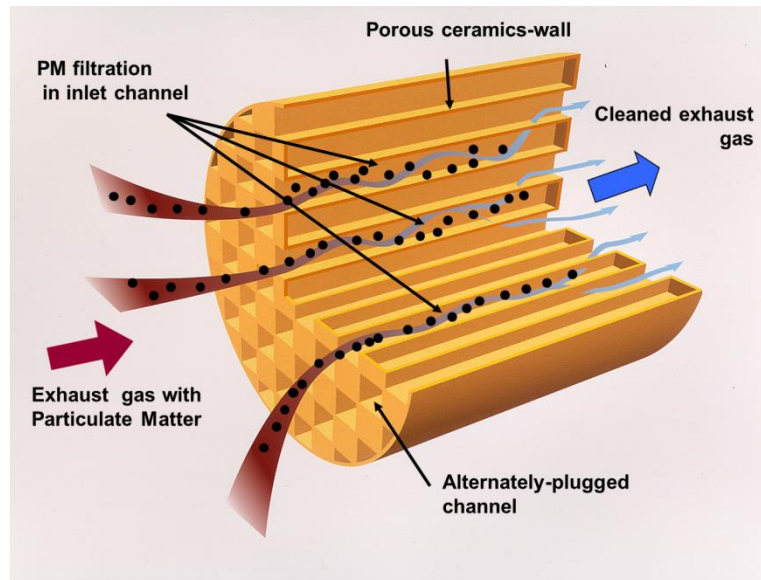
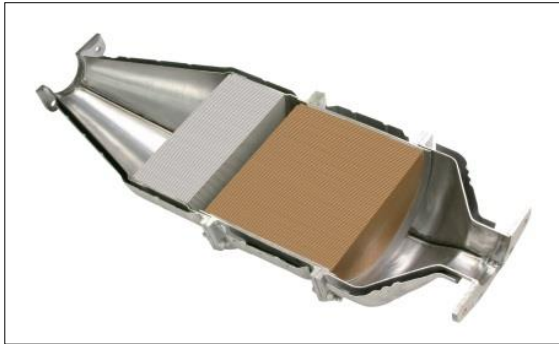
# What is PM2.5?



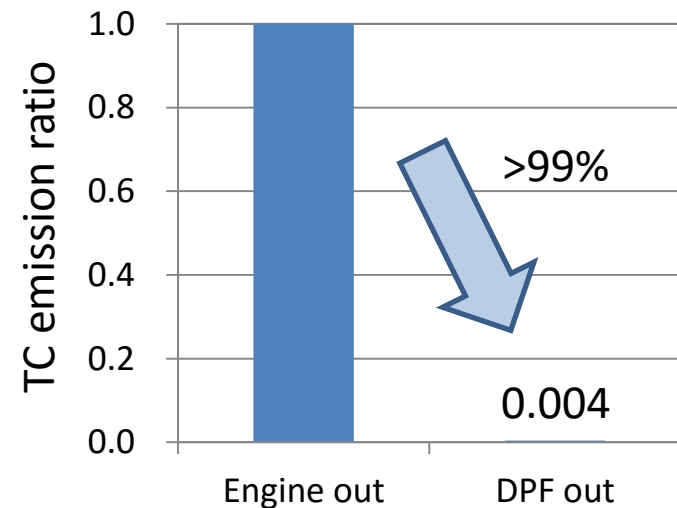
**Apportionment of  
emission sources in  
2007-2008**

**(Nakajima et al, 2009)**

# Is DPF an effective solution?



 NGK INSULATORS, LTD.



Source:  
Isuzu Advanced Engineering Center  
Test cycle:JE05

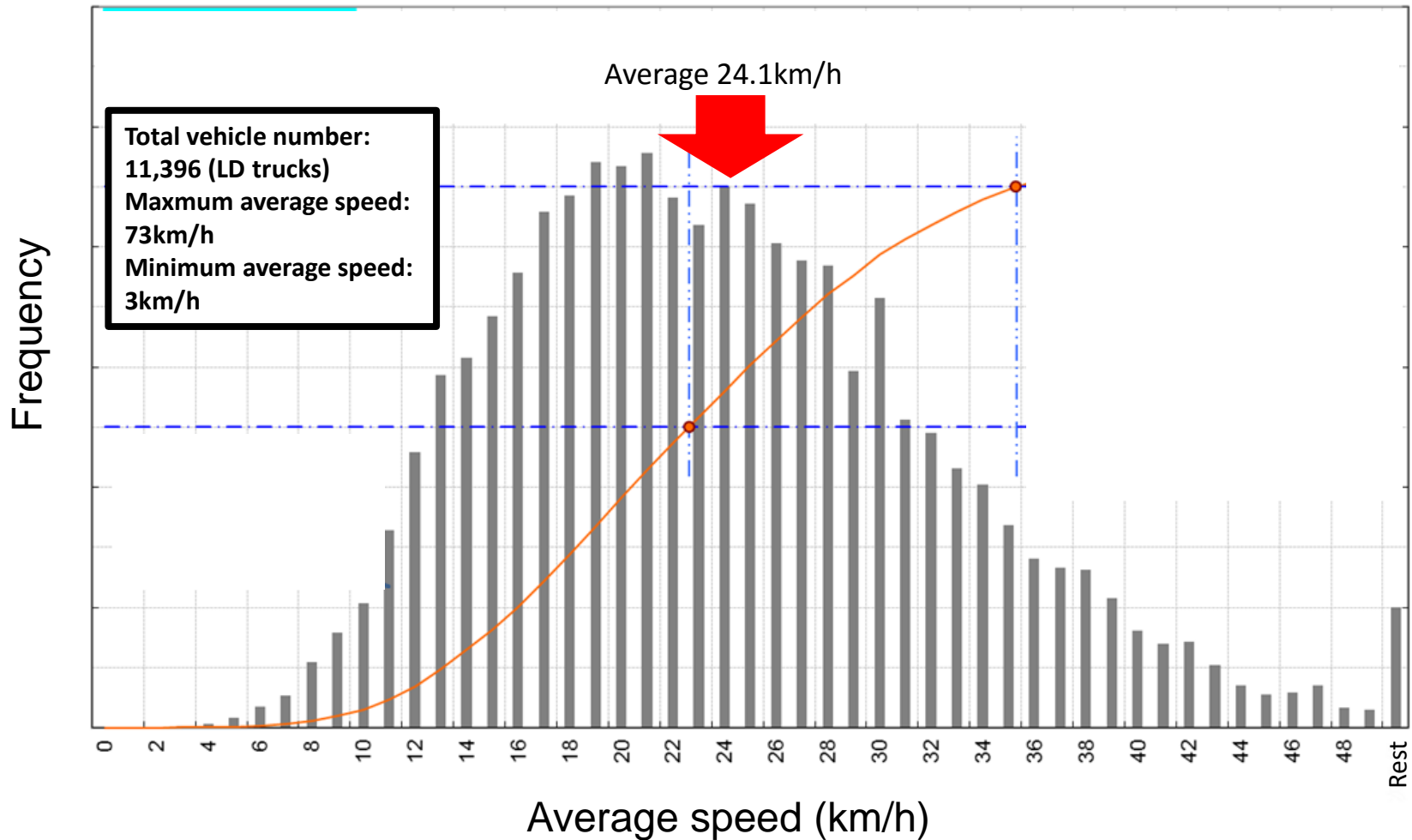
## Yes, However ....

# **Key points for „DPF into market“**

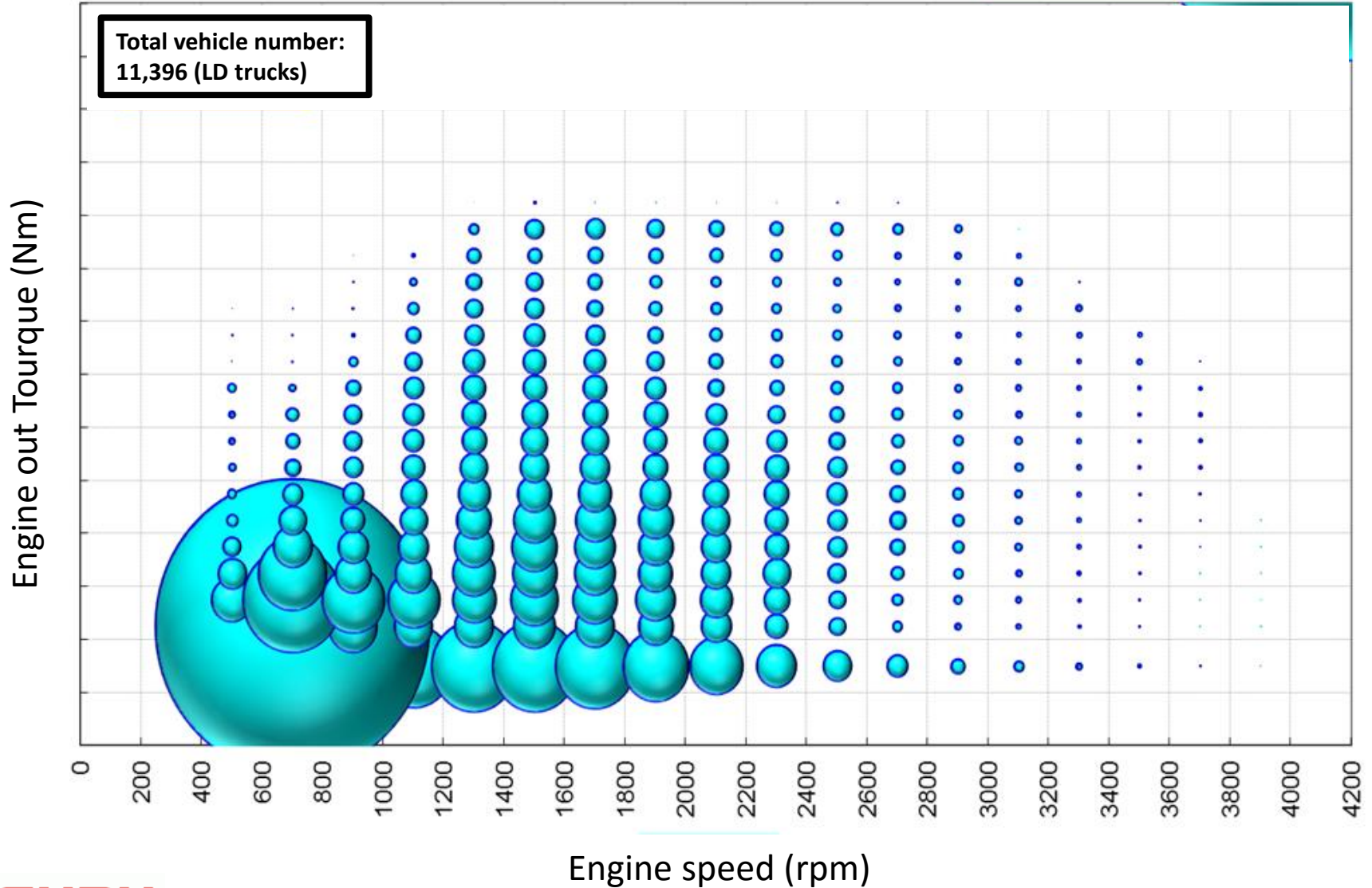
- ✓ **Fuel quality**
  - **Low sulphur fuel is mandatory**
- ✓ **Low ash engine oil**
- ✓ **Low speed, low load operation**  
**and frequent engine stop**
- ✓ **DPF system information to market**



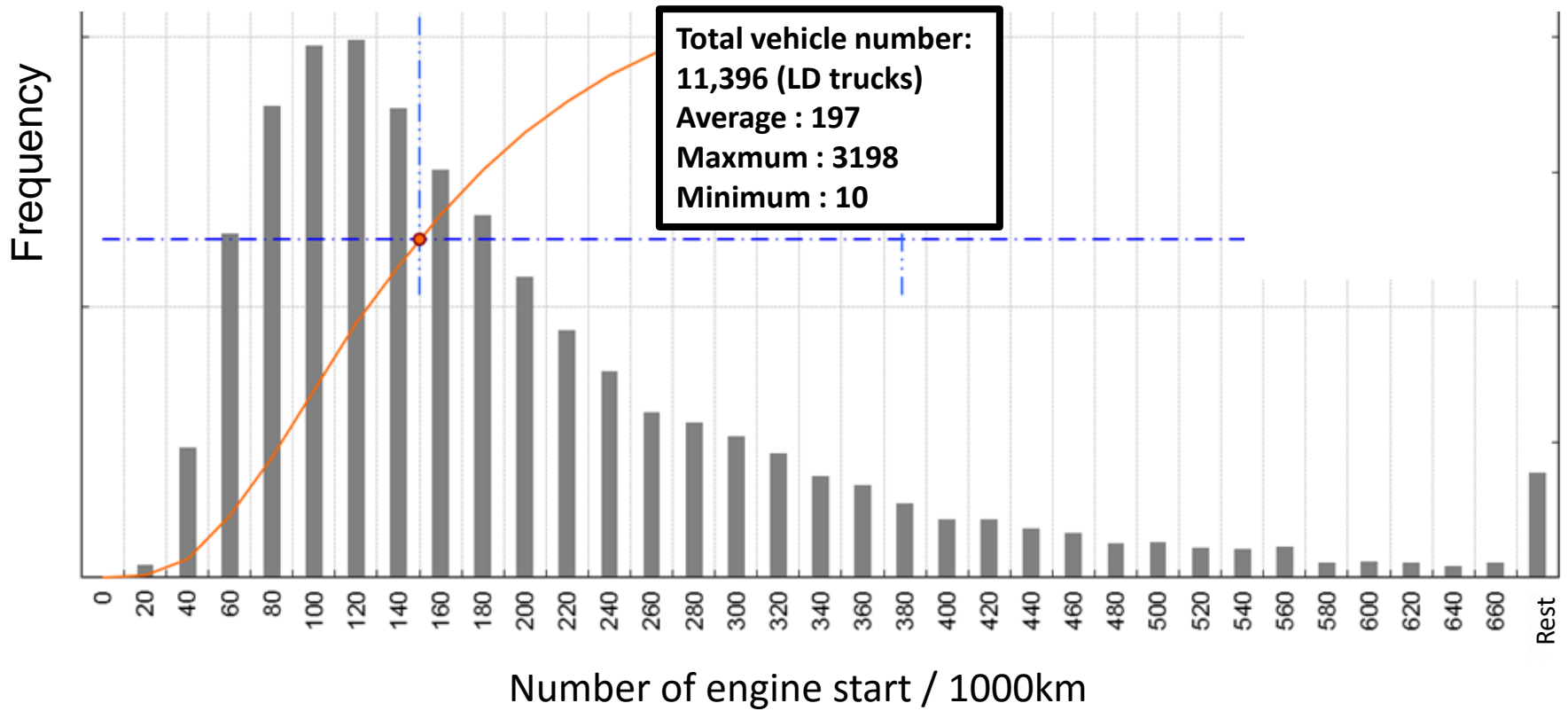
# Driving profile



# Driving profile



# Driving profile

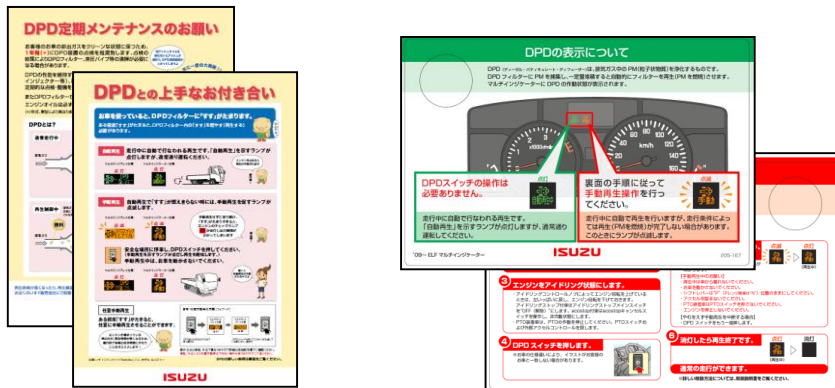


# Further cares for market

## Provided VIDEO about DPF



## Provided information on HP and brief instruction in vehicle



## Further trainings for mechanics



# Market experiences of Isuzu DPF technology



Since MY2005



Since MY2006



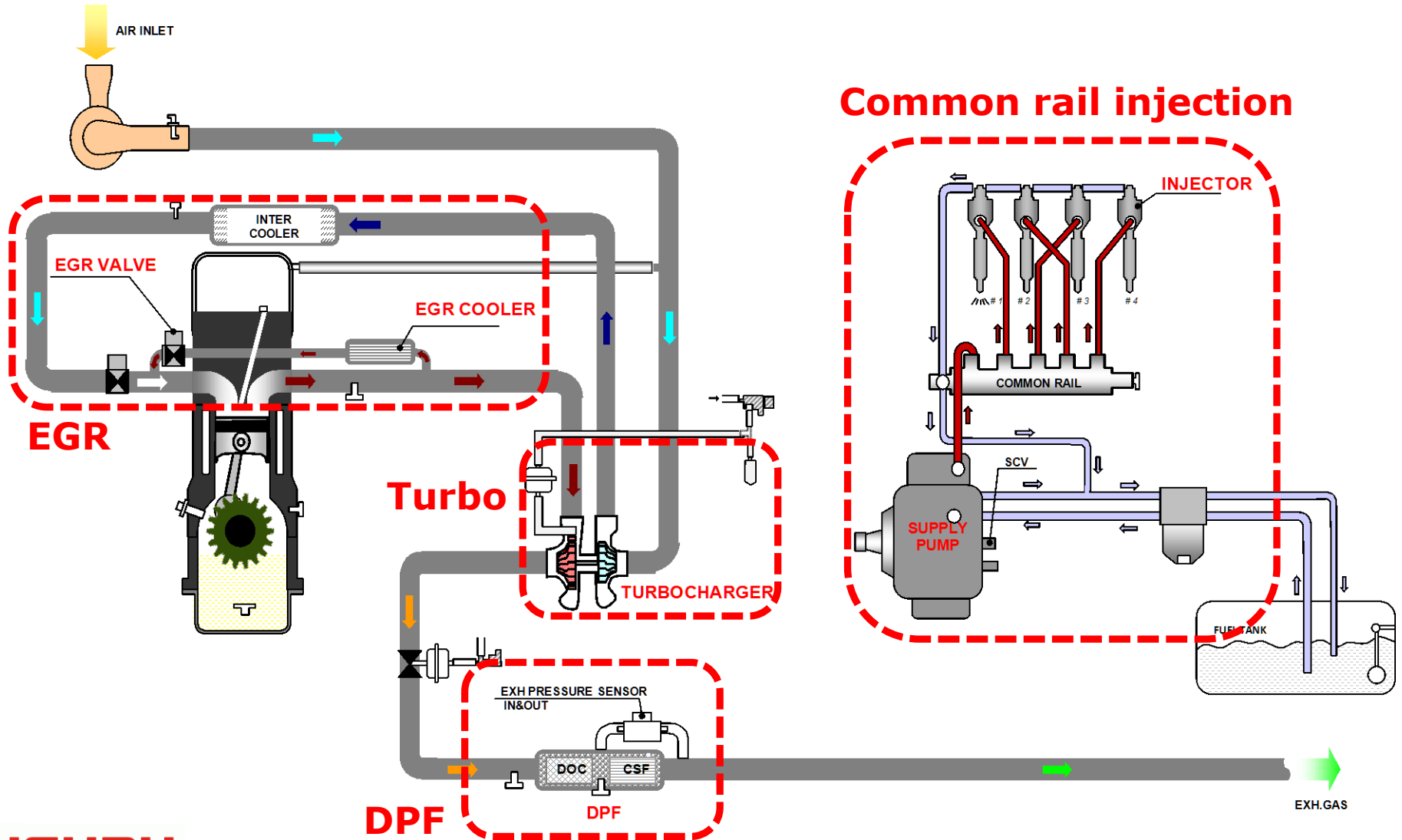
Since MY2007



**More than 10 years market experiences**



# Potential system for proposed IranIVa



# Case study for a big city



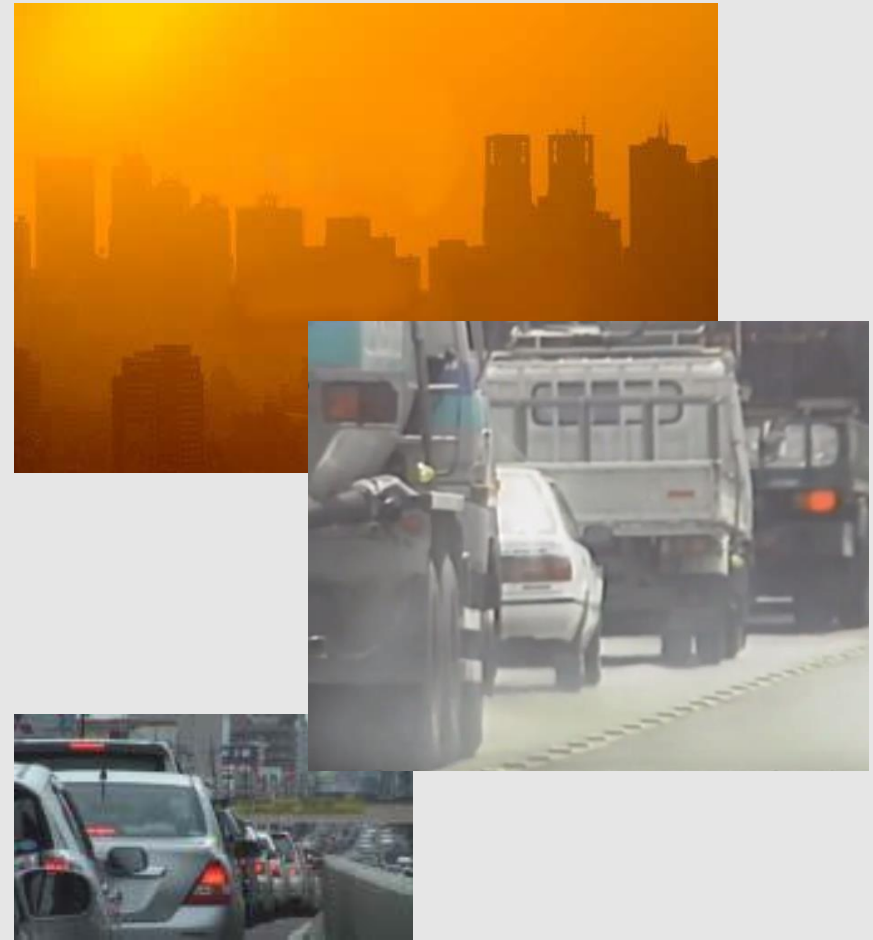
	<b>Tokyo</b>	<b>Tokyo</b>	<b>Tehran</b>
	Whole area	Urban, 23wards	Urban
<b>Area (sq. km)</b>	<b>2,188</b>	<b>626</b>	<b>730</b>
<b>Population (Mil. persons)</b>	<b>13.6</b>	<b>9.35</b>	<b>8.85</b>
<b>Density (persons / sq. km)</b>	<b>6,225</b>	<b>15,048</b>	<b>12,119</b>

Source:  
Tokyo Metropolitan Government. Retrieved January 17, 2015  
Statistical Center of Iran. Retrieved 23 January 2015

# Once upon a time in Tokyo



1960s-1970s



1980s-1990s



# History of major regulations

**Isuzu First DPF application launched**



AUG'99

Governor of Tokyo in a memorable press conference

Source: Tokyo Metropolitan Government

**New Vehicle\***

Japan New Short Term Standard

Japan New Long Term Standard

Japan Post New Long Term Standard

OCT'03

**Existing Vehicle\***

*Regional regulation*

Diesel vehicles that do not meet Particulate emission standards, have been banned

*Regional regulation is updated with tighter limit*

OCT'03

APR'06

**Diesel Fuel**

**50ppm sulphur Diesel into a market**  
(21months advanced from national regulation)

**10ppm sulphur Diesel into a market**  
(2 years advanced From national regulation)

APR'03

JAN'05

1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Year



\*) Payload 2ton category 17

# Action package by Tokyo city

**Development cooperation for retrofit DPF**

**Obligation to use low emission vehicle on larger fleet users**

**Deployment of diesel quality investigators**

**Monitoring of emissions in various places**

**Hotline for report from Tokyo residents**



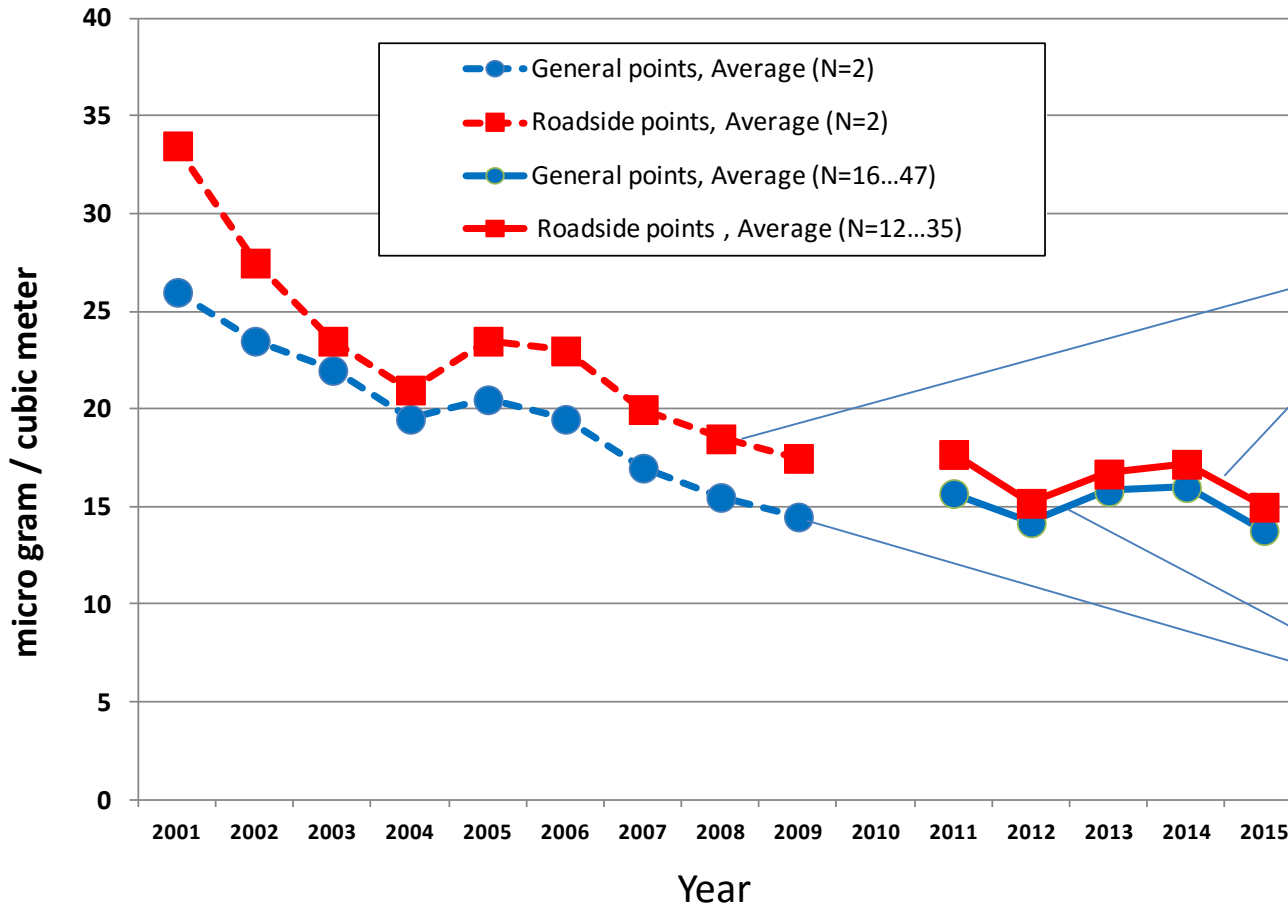
**Road inspection to crack down on an illegal vehicle**



**Monitoring by fixed & mobile camera to crack down on an illegal vehicle**



# PM<sub>2.5</sub> in Tokyo



Roadside measurement point



General measurement point



Data source: Tokyo metropolitan Government  
 Picture source: Ministry of Land, Infrastructure, Transport and Tourism, Shinagawa city, Tokyo

## ***View from Tokyo***



**Source: Tokyo Metropolitan Government**

# Summary

- **DPF is one of effective solution to reduce particulate emission if requirements are fulfilled**
- **Isuzu has long experience at various markets concerning the DPF technology**
- **Potential system is available for proposed IranIVa emission standard**
- **Experiences in Tokyo Metropolitan Government would be a good example for further challenges in Tehran**



**Thank you for your attention**