

# Japan's Effort to Reduce Tailpipe NOx/ PM Emissions

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# Air Quality Standard and How Far We Have Come

**NO<sub>2</sub>**

JAPAN 0.04~0.06 ppm (Daily Average)  
 EU 0.021ppm (Annual Average)  
 US 0.053ppm (Annual Average)



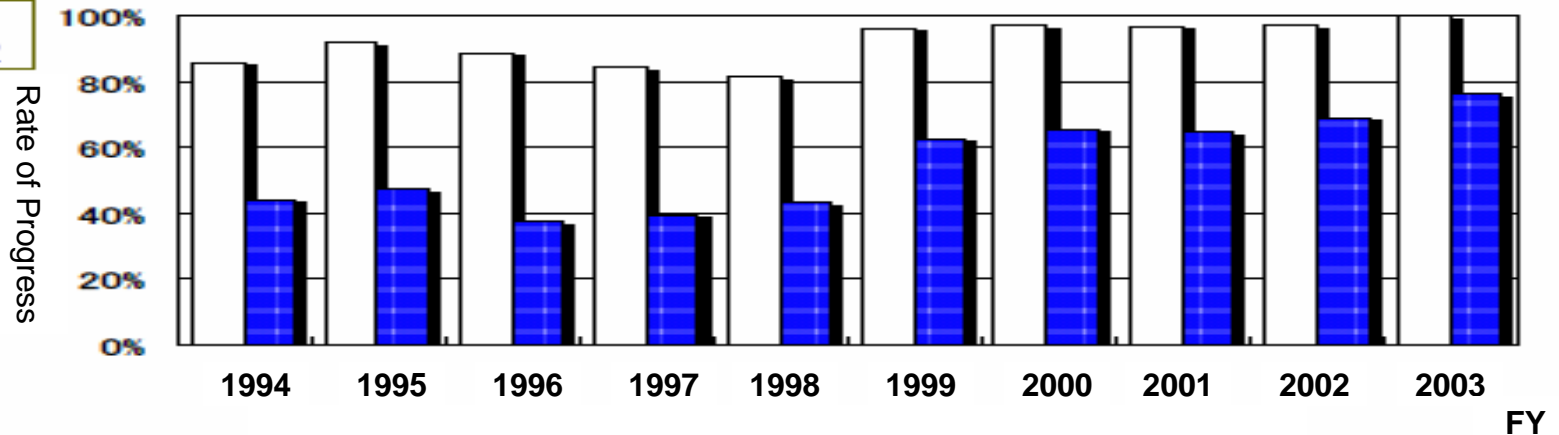
**PM**

JAPAN PM<sub>10</sub> 100 μg/m<sup>3</sup> (Daily Average)  
 EU PM<sub>10</sub> 50 μg/m<sup>3</sup> (Daily Average)  
 US PM<sub>10</sub> 150 μg/m<sup>3</sup> (Daily Average)  
 PM<sub>2.5</sub> 65 μg/m<sup>3</sup> (Daily Average)

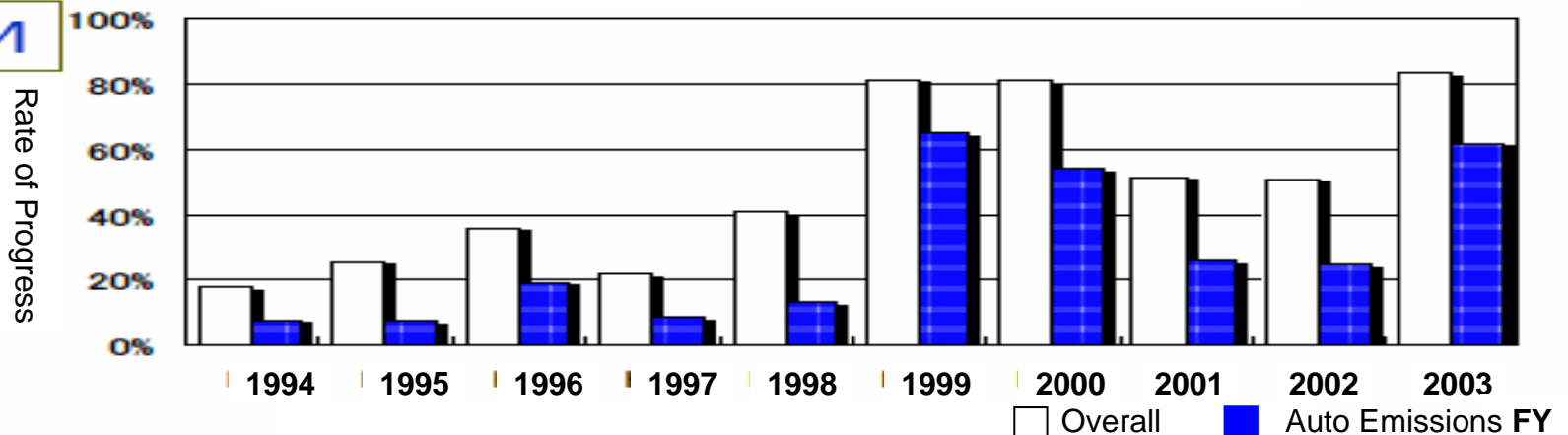


## ~ Monitoring results of metropolitan areas ~

**NO<sub>2</sub>**



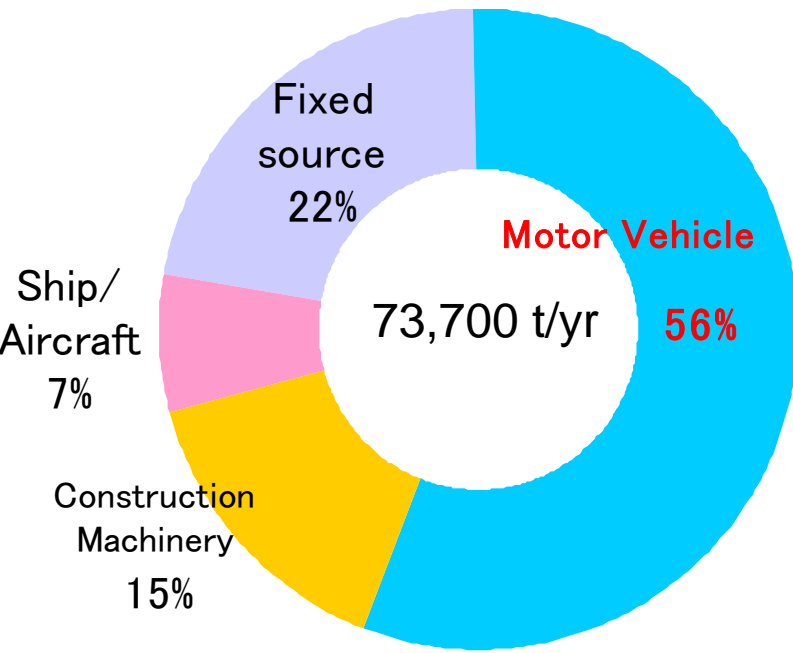
**SPM**



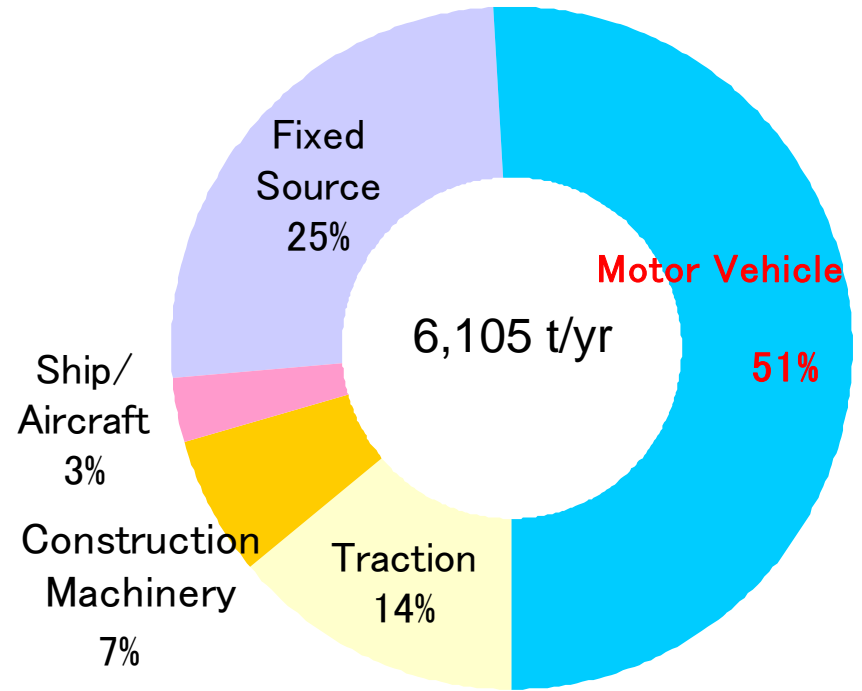
□ Overall    ■ Auto Emissions

# NOx and PM Emissions in Tokyo (2000)

**NOx**

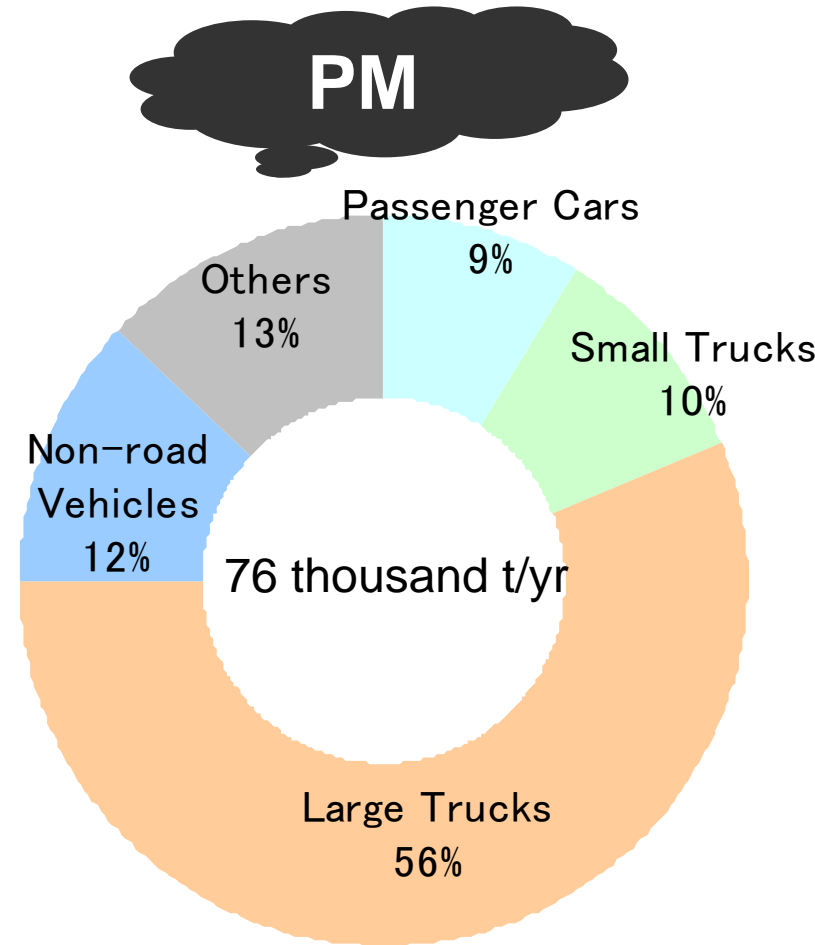
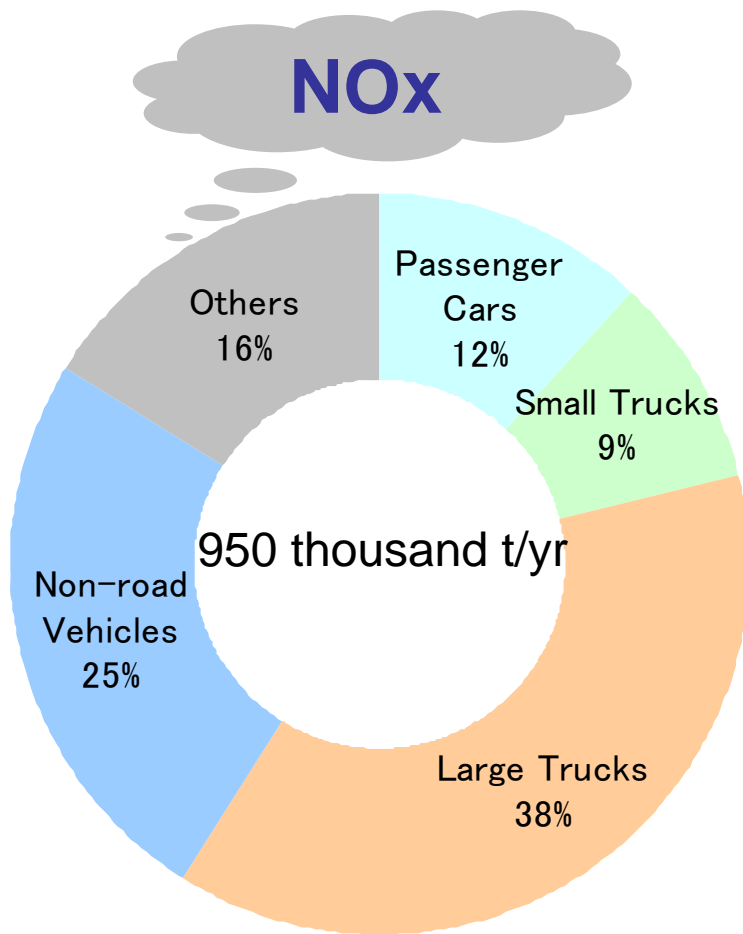


**PM**



Source: Tokyo Metropolitan Government

# NOx and PM Emissions from Motor Vehicles (2000)



Source: Ministry of the Environment

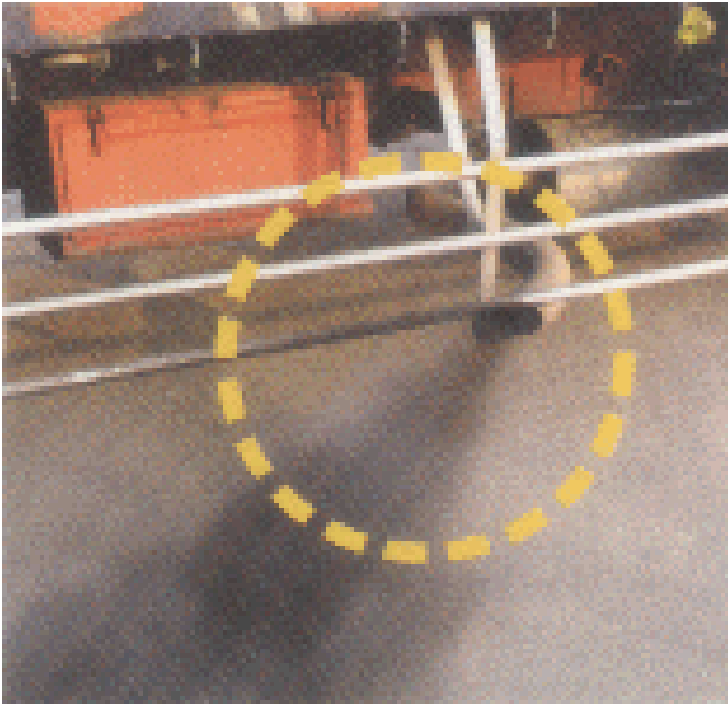
# Why do we have to care about automobile emissions?

- ✓ **NO<sub>x</sub>** reacts with ammonia, moisture, and other compounds to form nitric acid and related particles. Human health concerns include effects on breathing and the respiratory system, damage to lung tissue, and premature death. Small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease such as emphysema and bronchitis, and aggravate existing heart disease.
  
- ✓ **Particle** pollution - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:
  - ✓ increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing, for example;
  - ✓ decreased lung function;
  - ✓ aggravated asthma;
  - ✓ development of chronic bronchitis;
  - ✓ irregular heartbeat;
  - ✓ nonfatal heart attacks; and
  - ✓ premature death in people with heart or lung disease.

People with heart or lung diseases, children and older adults are the most likely to be affected by particle pollution exposure. However, even if you are healthy, you may experience temporary symptoms from exposure to elevated levels of particle pollution.

(EPA HP)

*It is also suspected.....*



Tailpipe emissions

+



Pollens

=

# Pollen allergy



\* According the survey conducted by Asahi Shinbun, **22%** of the population have pollen allergy. No conclusive evidence ties the allergy to NOx/PM pollution yet.

# Control Measures on NO<sub>x</sub> / PM Emissions from Motor Vehicles



## 1. Regulatory measures on motor vehicles

- Measures targeted at new cars, buses and trucks
- Measures targeted at used cars, buses and trucks
- Measures targeted at non-road vehicles

## 2. Subsidies and tax measures to promote cleaner vehicles

## 3. Low sulfur fuel



\* Nissan Diesel low emission truck and bus

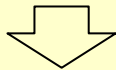
# Emission Controls on Cars and Trucks

- **Enforcing emission controls on both new and used cars and trucks through state inspection**

## New Cars and Trucks

### (Air Pollution Control Act)

Ministry of the Environment (MOE) sets AIR QUALITY STANDARD.



## Road Vehicle Act

Ministry of Land, Infrastructure, and Transport (MLIT) sets the emission standard for new cars and trucks.

- ◆ MLIT enforces the standard through state inspection.
- ◆ MLIT has reinforced the emission standard gradually.
  - 2002~2004 New short-term standard phased in.
  - 2005~ New long-term standard applies.
  - 2009~ Further strengthened standard applies

### New long-term standard

One of the strictest standard in the world (Reduces PM by 96% and NO<sub>x</sub> by 85% from before the introduction of the standard.)

## Used Cars and Trucks

### (Automobile-origin NO<sub>x</sub>/PM Control Law)

Applies only to cars and trucks in metropolitan areas falling short of AIR QUALITY STANDARD.

- ◆ Used cars and trucks not meeting the 97/98 NO<sub>x</sub>/PM standard (in the case of heavy duty vehicles NO<sub>x</sub> 4.5g/kwh, PM 0.25g/kwh) have to retire by 8<sup>th</sup> to 12<sup>th</sup> year from the registration or retrofit with control devices.
- ◆ More than 2 million used trucks and buses have to retire in several years as of October, 2003. (80% of them in 2004 to 2006)
- ◆ The business office using more than 30 trucks shall submit a NO<sub>x</sub>/PM reduction plan to the authority.

### Road Motor Vehicle Act

- ◆ Makes sure that non-compliant vehicles are off the road.

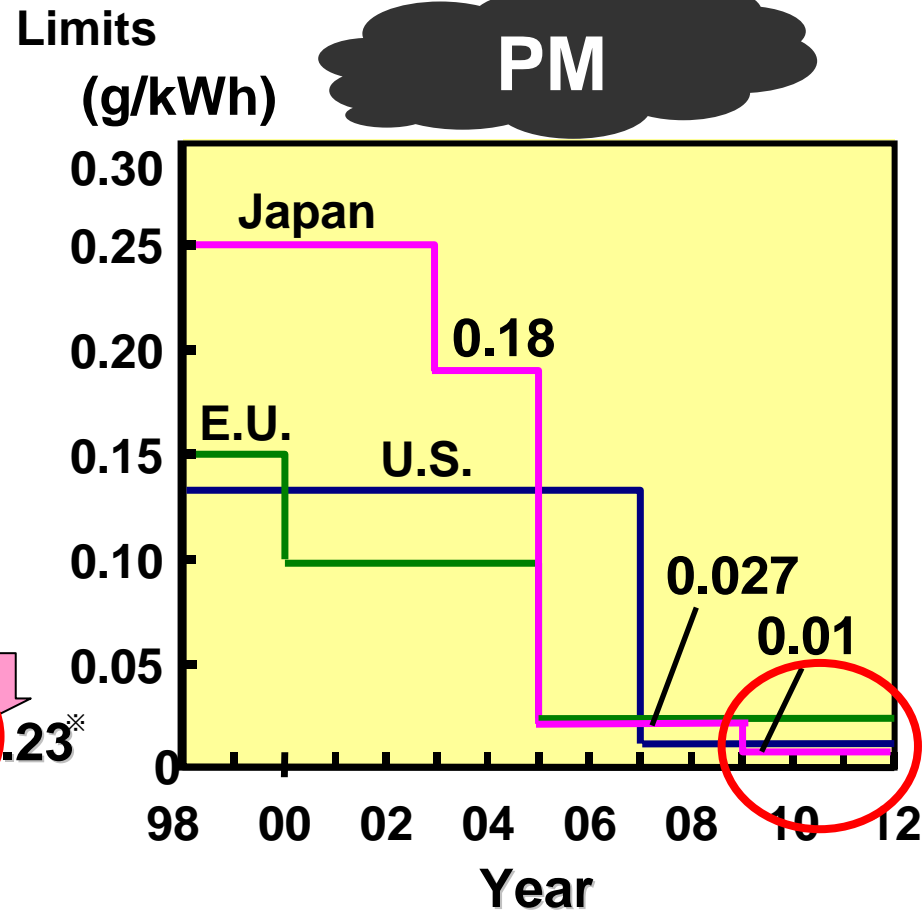
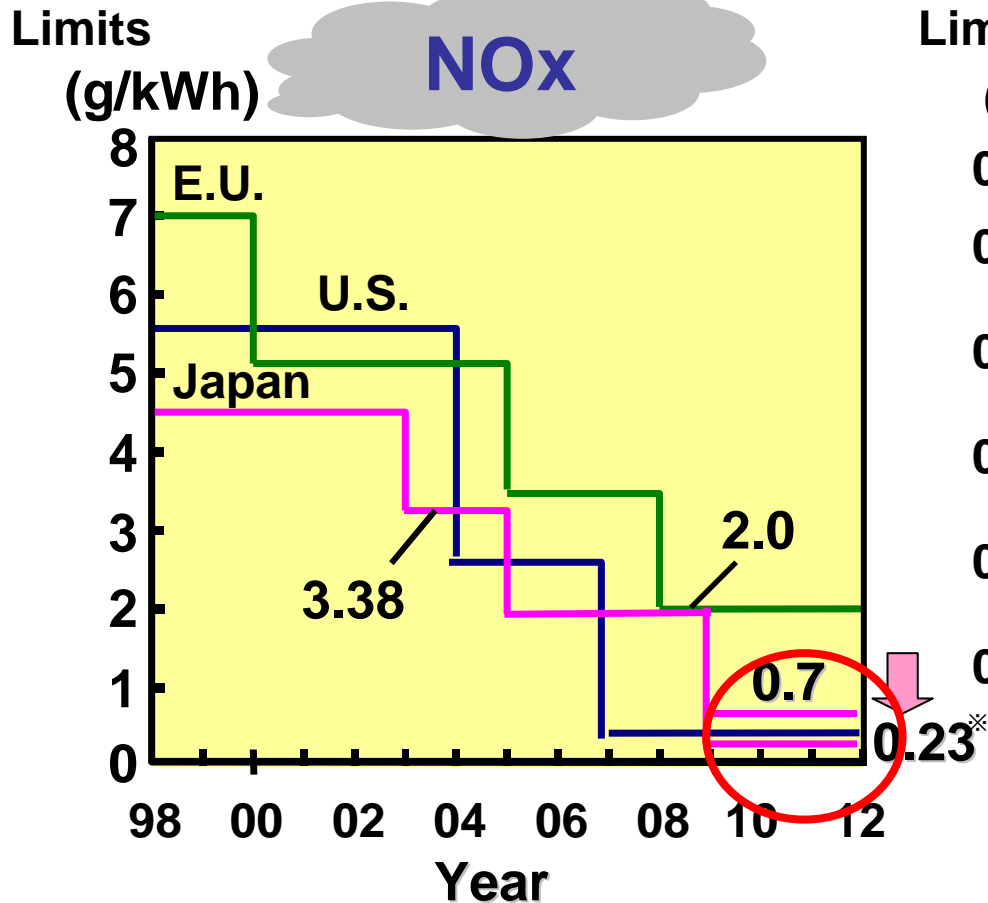
### Local governments in Tokyo Metropolitan area

Trucks which fail to meet 97/98 PM emission standard are barred from running in the Tokyo metropolitan area, with a 7 year grace period.

# Emission Controls in the World: Today and Future

## - Heavy-duty Vehicles (GVW>3.5t) -

*Race to the bottom*

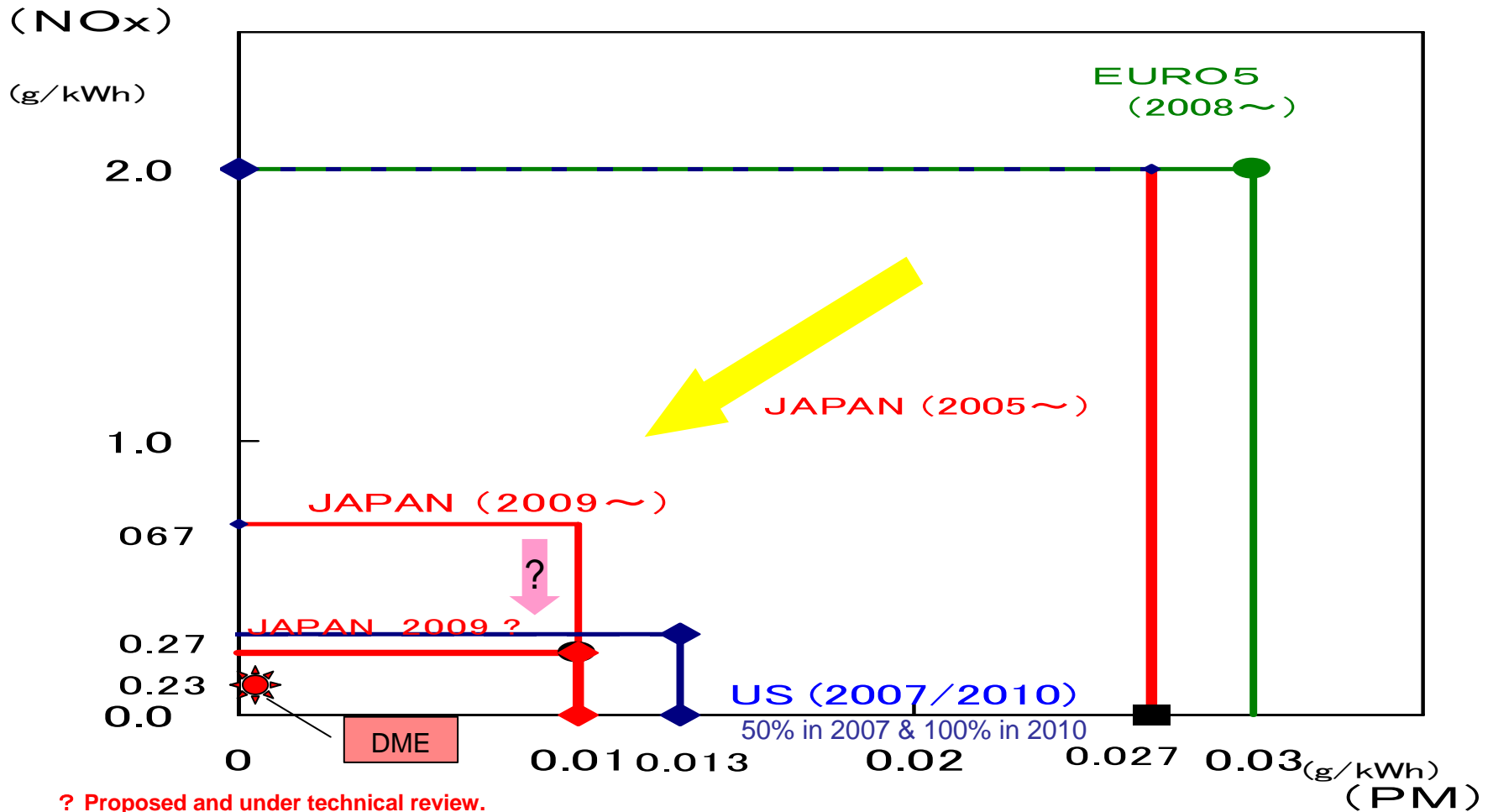


※ Proposed and under technical review.

Source: MLIT

# Emission Controls in the World: Today and Future

## - Heavy-duty Vehicles (GVW>3.5t) -



Source: MLIT

# Non-Road Vehicle Emissions Control Law

(Taking effect this year)

## Three-staged Measures

The government sets the emissions standard for an engine for the use of non-road vehicles.



**Engine Makers**


**Type approval for engines**

**Vehicle Makers**

**Report requirements for the engines mounted on the vehicles**

**Users**

**Requirements to a buy a new vehicle that meets the emission standard**



\* The government estimates that 90 thousand tons of NOx and 2 thousand tons of PM will be reduced.

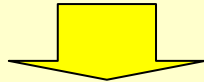
Source: Ministry of the Environment

# Assistance to promote cleaner vehicles

The government targets at 10 million clean vehicles by 2010.

## Tax measures

Sales tax (3~5%)  
Ownership tax (\$70~\$600)



- Cars and trucks meeting the NOx/PM emission standard under Automobile-origin NOx/PM Control Law (Sales tax: ▲1.2%~ ▲2.1%)
- Diesel cars and trucks meeting the latest emission standard (Sales tax : ▲1.0%~ ▲2.0%)
- Cars and trucks going beyond the emissions standard by more than 50% and fuel efficiency standard by more than 5% (Sales tax: \$200~\$300base deduction; Ownership tax: ▲25%~ ▲50%)

\* Clean cars powered by CNG, methanol, fuel cell, electricity, and those with emissions 25% or more lower than the 2000 standard. (Heavy duty vehicles are not eligible for tax breaks yet.)

## Subsidies

- Subsidies for the price difference between clean energy cars/ buses/ trucks and regular ones of equivalent size
- Subsidies for retrofit DPFs



## Government purchase

- All of the official cars of the national government are low emission cars.

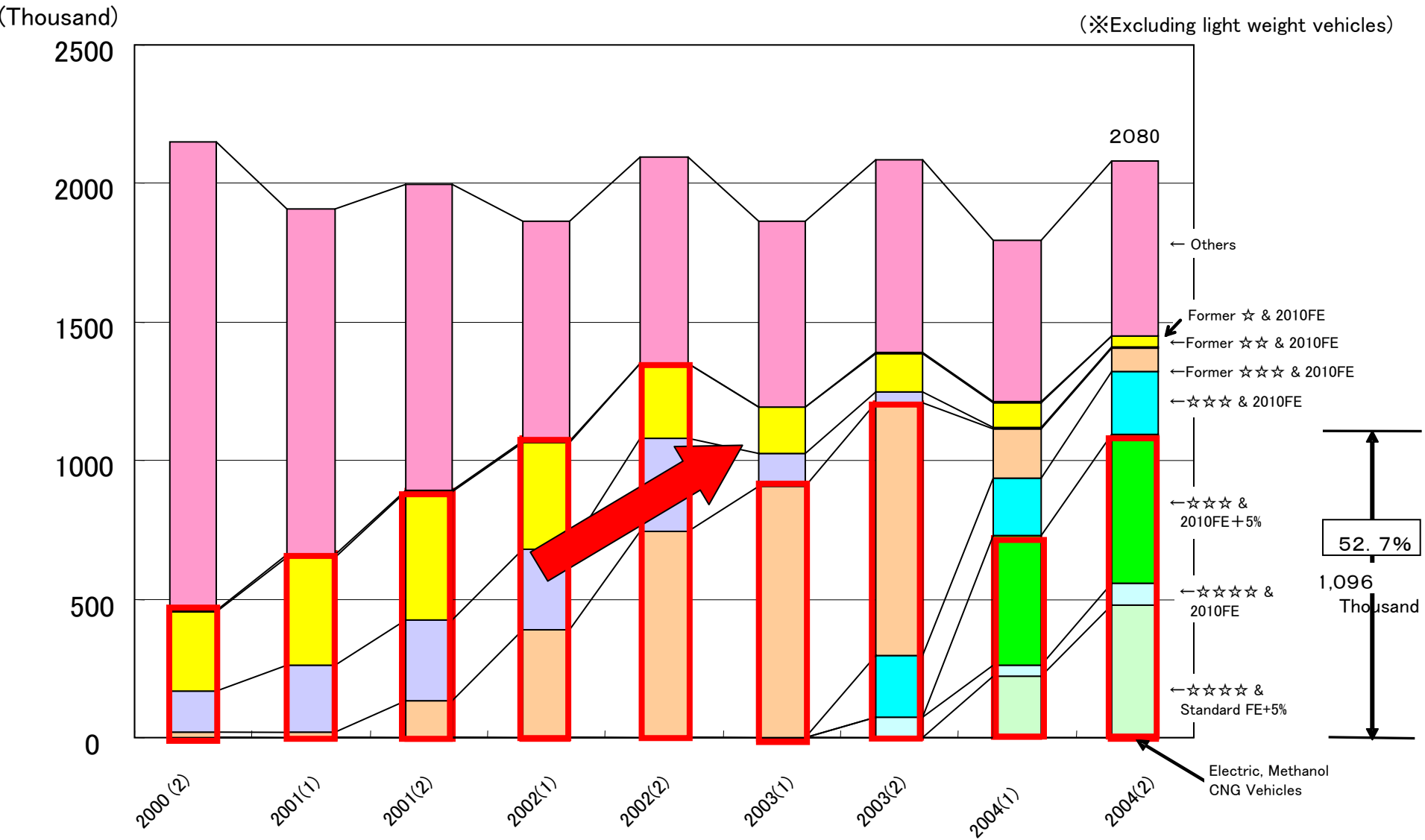
Stickers to let people know the car gets the tax break.



And a campaign to boot...



# The Number of Registered Low Emission Cars



- ✓ # of ☆ denotes the level of exhaust emissions. The more stars mean the lower emissions. Currently cars with 50% to 70% lower than the standard emissions are given tax breaks.
- ✓ 2010FE stands for 2010 Fuel Economy Standard

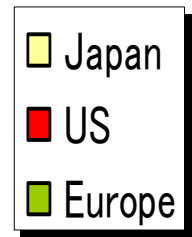
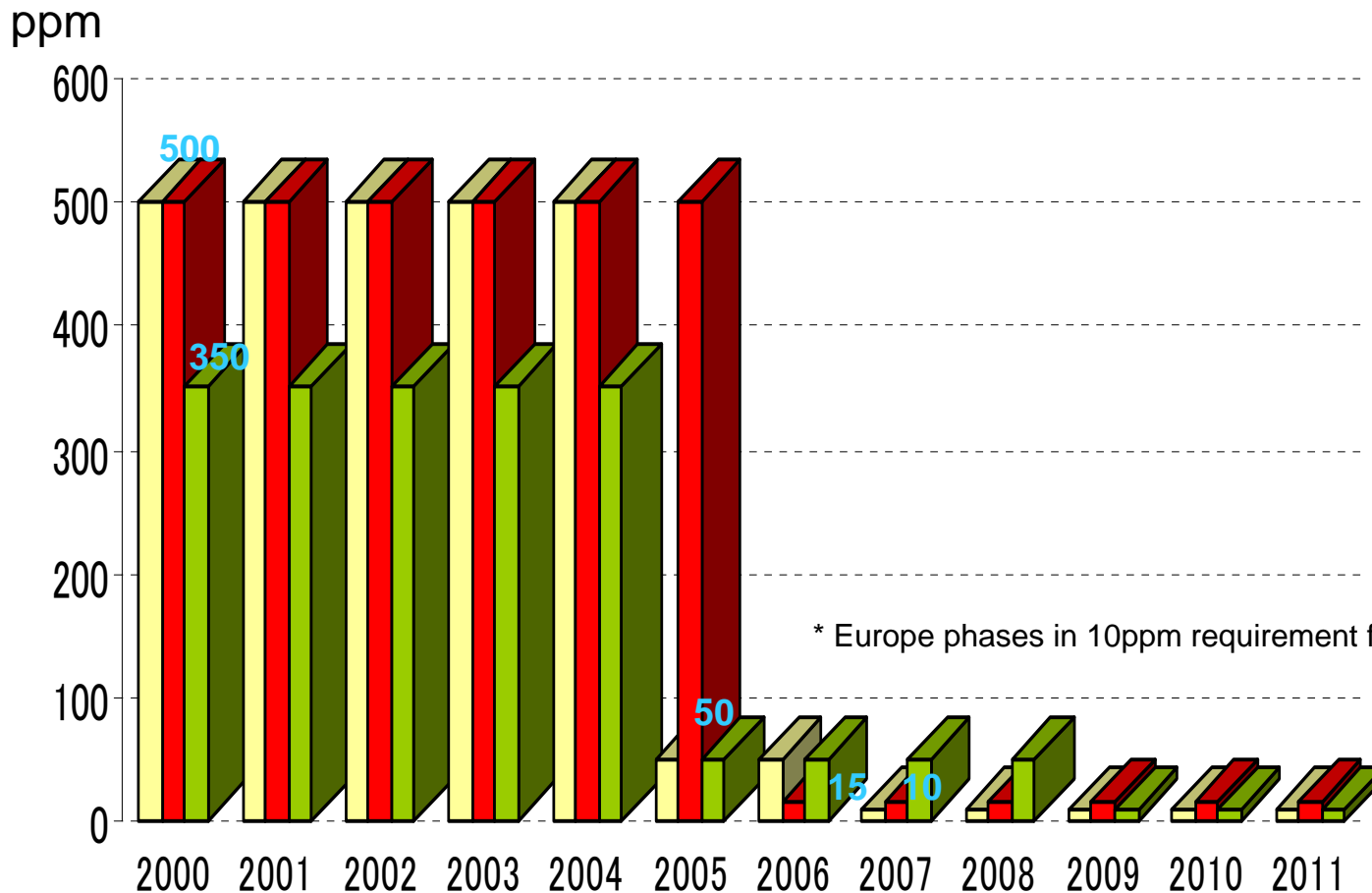
(Source: MLIT)

Vehicles under  
 Green Automobile Tax

# Low Sulfur Diesel

Japan's petroleum suppliers started supplying 10ppm sulfur diesel in 2005

## Government Regulations

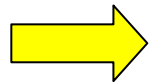


# Conclusions

● Four factors affect the level of emissions:

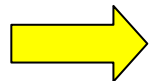
① Demand \* ② Modal Share \* ③ Emission per vehicle\* ④ Fuel

- Progress in measures targeting the emission source: emission standard & low sulfur fuel



Beef up compliance measures. Future actions to progressively strengthen measures for existing vehicles.

- Clean vehicles --- More to be seen on the road



Economic incentives for clean vehicles.  
Alternative fuels should be exempt from tax.

\* 9.7 million clean vehicles (19% of the registered motor vehicles\*) (March, 2005)

\* Excluding light motor vehicles, two wheelers and special vehicles.

- From the engine improvement to demand control



Old trucks to be barred from the metropolitan areas.

Thank you !

