

# **Fuel Quality Monitoring(FQM) in EU, US and Japan**

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# Sustainable Automobile Society in Asia

**Fuel Quality  
Requirement**

**Emission  
Regulation**

**Vehicle Technology**

**Air Quality Improvement  
CO2 Reduction**

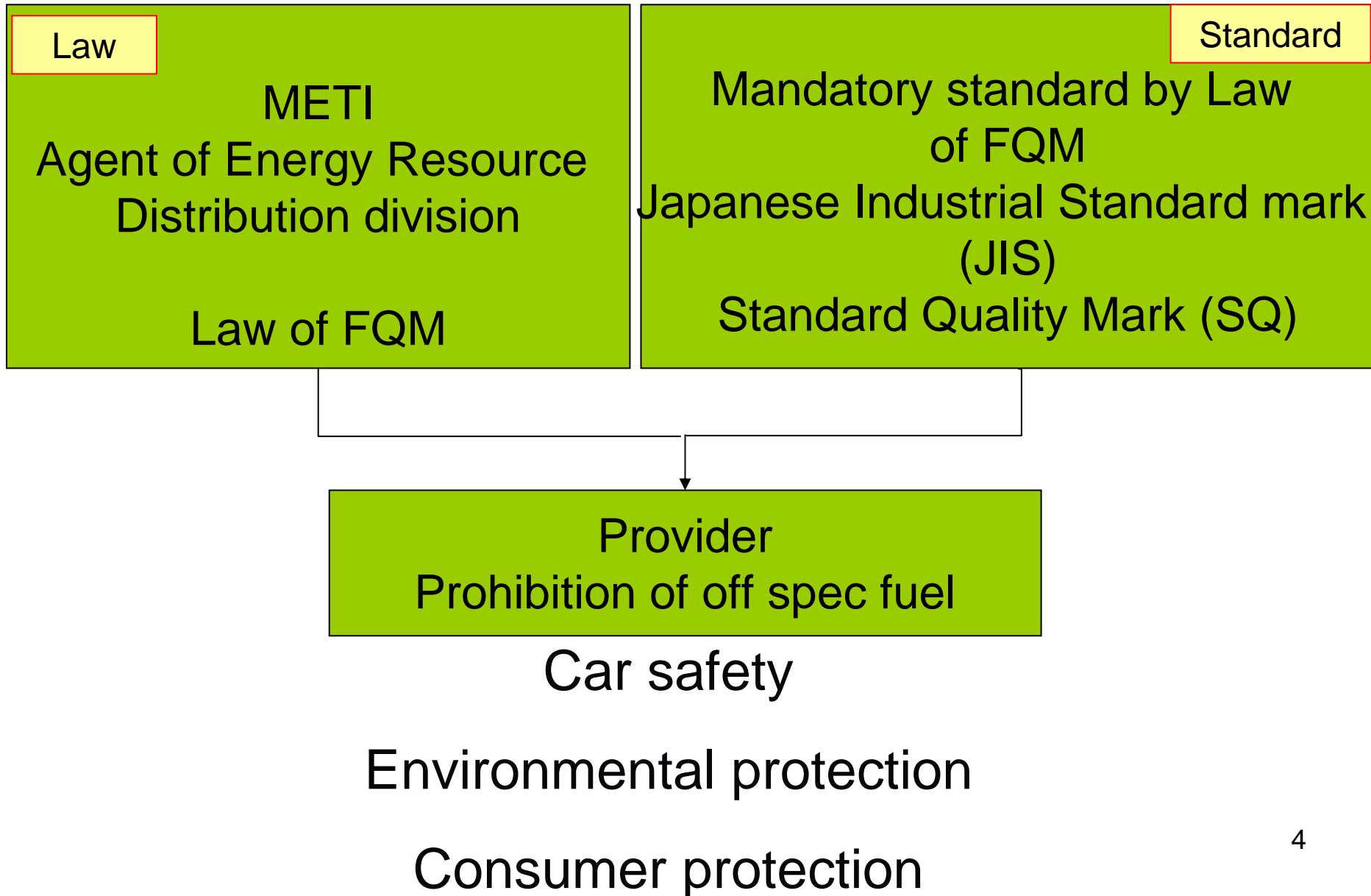
# Import deregulation made stricter control necessary



- Before 1996:
  - Only several companies could supply fuels
    - Refining capability was a requisite to import petroleum products
  - The several companies were controlling supply chains

↓
- Since 1996:
  - Regulations were relaxed: Any company can import
  - Fuels from various sources came into market
  - Stricter control of fuel quality became necessary

# Law and standard in Japan



## Japan

Quality control  
1977 Regulation on inflammable  
oil sales  
JIS standard

Inflammable oil  
Kerosene mixture <4%  
Quality analysis  
Mandatory for provider

Engine performance and fuel quality  
1986 Regulation on inflammable  
oil sales amendment

Inflammable  
Kerosene mixture <4%  
No detection of methyl alcohol  
Gum <5mg/100ml

Trade liberalization and fuel quality  
Mandatory for env'tl, safety, health impact  
Prevention of mixture  
1996 Law of FQM

Inflammable oil No lead detected  
Sulfur <0.01%  
MTBE <7% Benzene <5%  
Orange coloring (differentiate from kerosene)  
Diesel Sulfur <0.2%  
Cetane index >45  
90% distillation temperature <360°C  
Fuel quality analysis  
Management by production,  
importer  
Fuel Quality Certificate  
Inflammable oil, diesel, kerosene

Low sulfur diesel for emission standard  
target for a long term  
1996 Law of FQM  
Emission enforcement of toxic substance  
2000 Law of FQM

Sulfur contents <0.05%  
Benzene < 1%

# Quality standards items for gasoline and diesel oil

## Gasoline

Item	Level
Lead	No detection
Sulphur content	0.001%(10ppm)
MTBE	< 7%
Oxygen content	< 1.3%
Benzene content	< 1%
Kerosene	< 4%
Methanol	No detection
Ethanol	< 3%
Washed gums	< 5mg/100ml
Color	Orange
Octane	Regular > 89
	Premium > 96
Density	< 0.783g /cm <sup>3</sup>
Distill	T10/T50/T90
Copper corrosion	< 1
RVP	44-78 kPa (kgf/cm <sup>2</sup> )
Oxidation stability	> 240min

mandatory

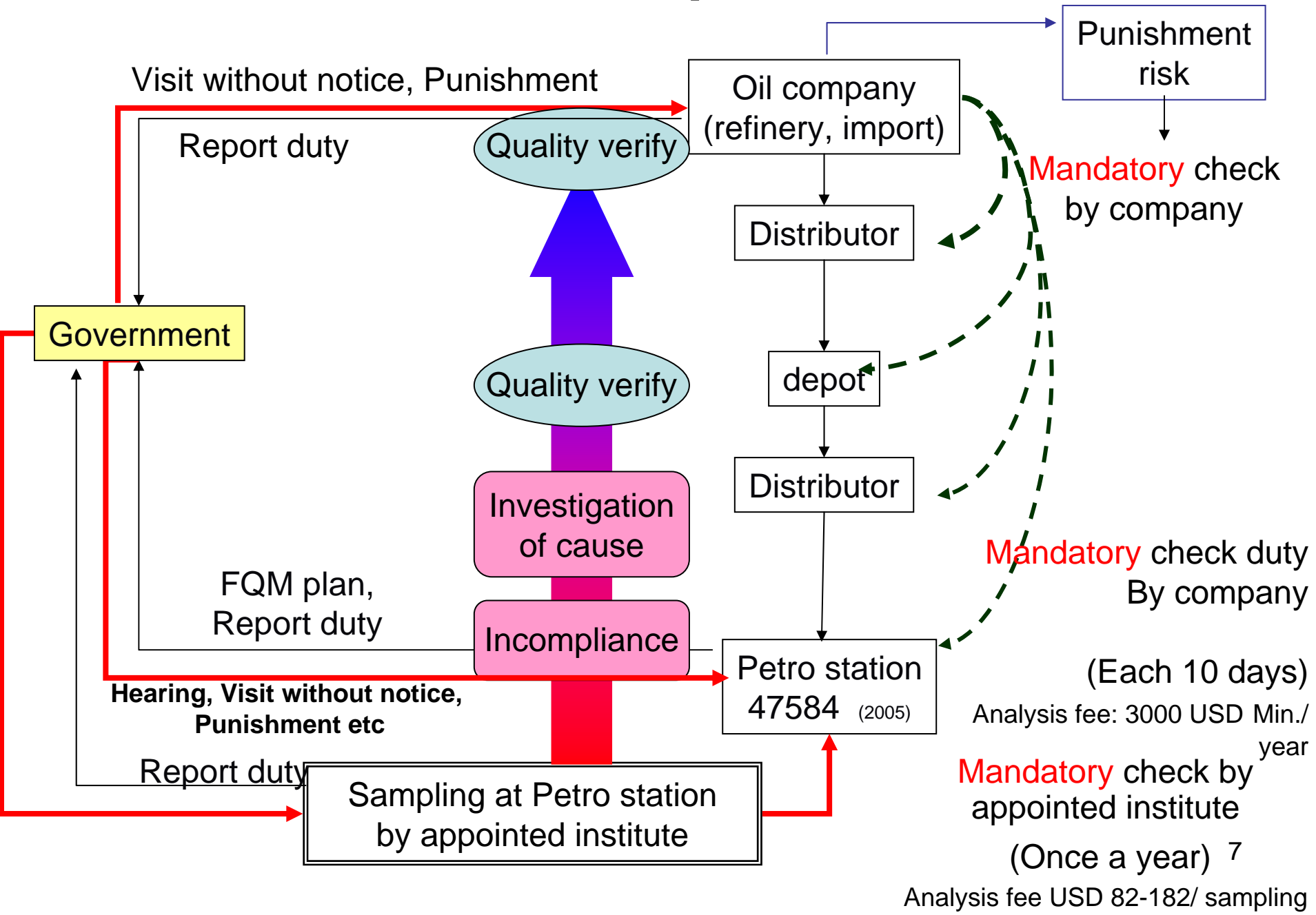
## Diesel

Item	Level
Sulfur content	0.001%(10ppm)
Cetane index	> 45
Distillation T90	< 360 °C
Flash point	> 45°C
Cloud point (CP)	Depends on regions and month
Cold Filter Plugging Point (CFPP)	Depends on regions and month
Carbon residue of 10% bottom	< 0.1%
Kinematic viscosity (30°C)	> 1.7mm <sup>2</sup> /S


New mandatory items since 2003.Aug.

- ✓ Oxygen contents: 1.3wt% (Max.)
  - To meet Japanese emission regulation
  - Equivalent to 7% MTBE
- ✓ Ethanol content: 3vol% (Max.)
  - Car safety
  - Aluminum corrosion and rubber expansion

# FQM in Japan



# FQM regulation and compensation in Japan

Negative impacts of FQM regulation	Compensate measure of negative impacts
Mandatory check by company Each 10 days	FQM plan certification system
Mandatory check by appointed Institute for all petro stations	The cost of mandatory check Is subsidized.
Fine < \1,000,000 or Imprisonment < 1 year Public announcement Shut down business for 6 month	SQ mark at Petro station 

# Consumer Protection : Quality Certificate by Government in Japan



SQ (Standard Quality) Mark  
Guarantees Fuel Quality at Petro Station.  
The SQ Mark Provide the Fuel Quality Information  
for Consumer



# US FQ Regulation

1977 Clean Air Act Amendment  
1970s Regulations vehicle +fuel quality

1970s Regulation on vehicle  
1975 Regulation on fuel market

1980 Standard +market intervention

Oxygen content  
up to 2wt%

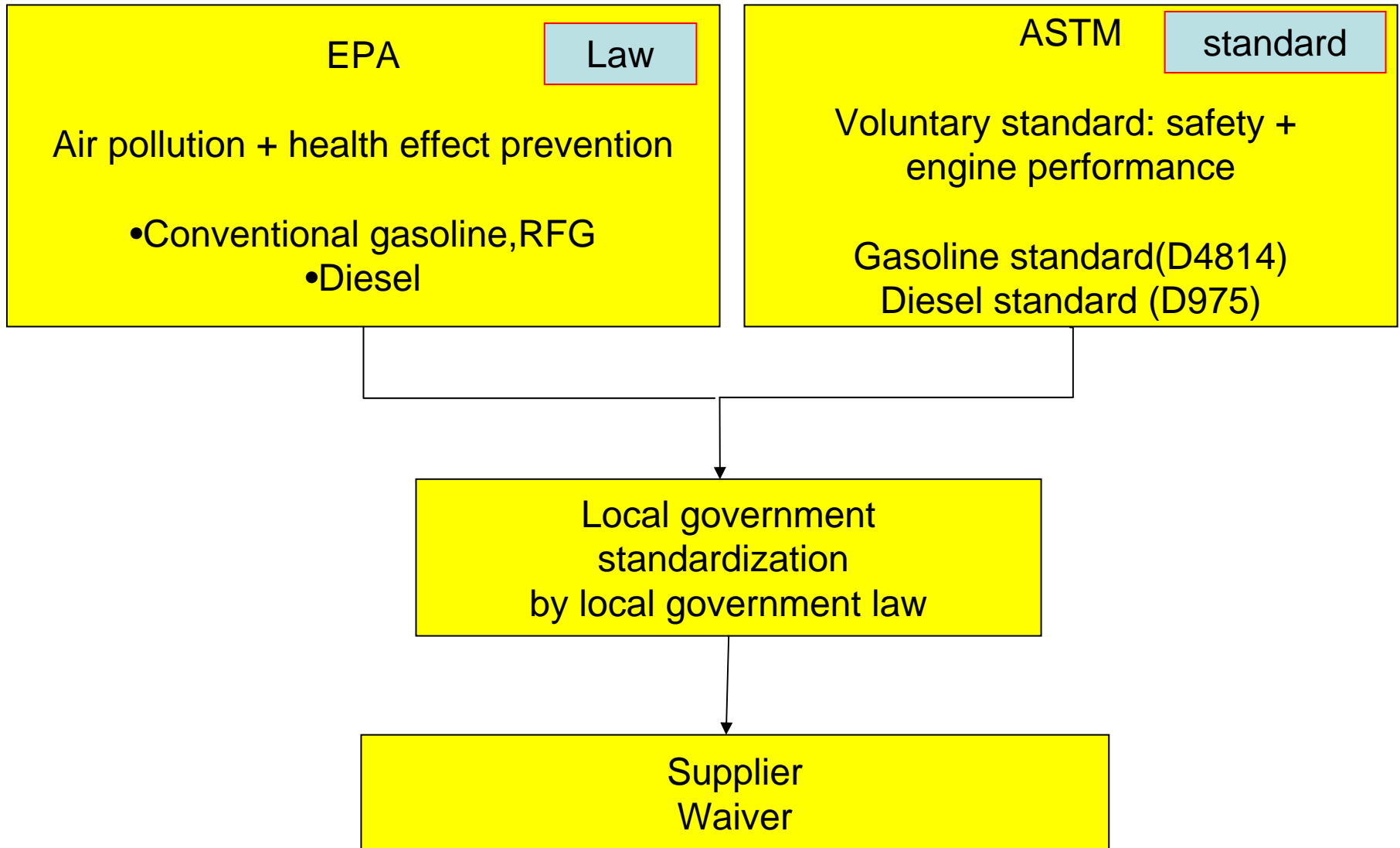
1982 Air pollution problem

permissible limit on lead  
in gasoline

1990 Severe pollution from vehicle,  
Clean Air Act Amendment  
due to loose standard

- ① Diesel oil (cetane <40, lead content >0.05wt%) was not allowed.  
Permissible limit on aromatics
- ② Quality standard for vapor pressure, distillation  
sulfur, aromatic content, olefin, metal content and detergent.  
Prohibition of leaded gasoline.
- ③ Mandatory on RFG in the area where ozone concentration is beyond standard
- ④ Mandatory on oxygen content more than 2%.

# Law and standard in the US

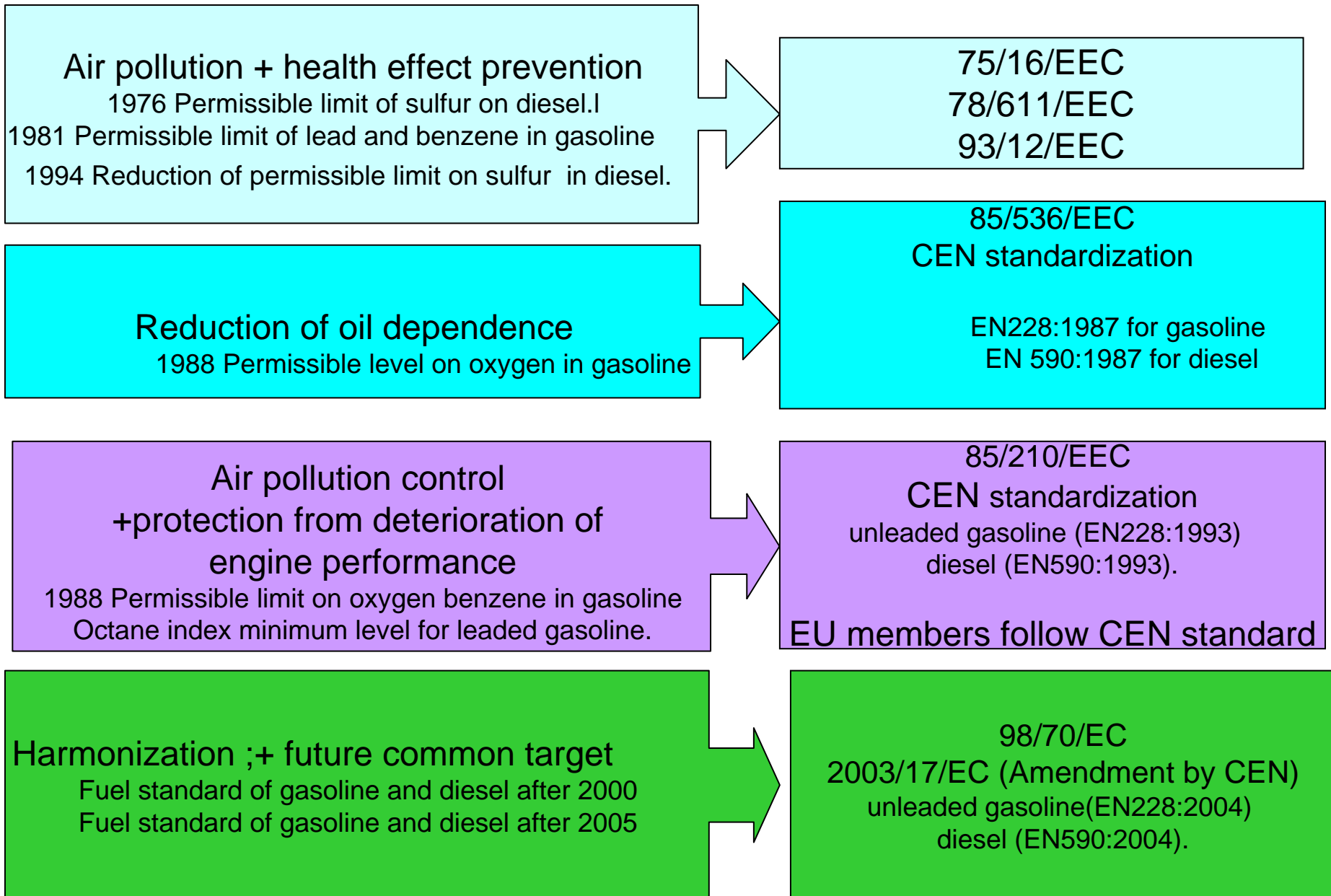




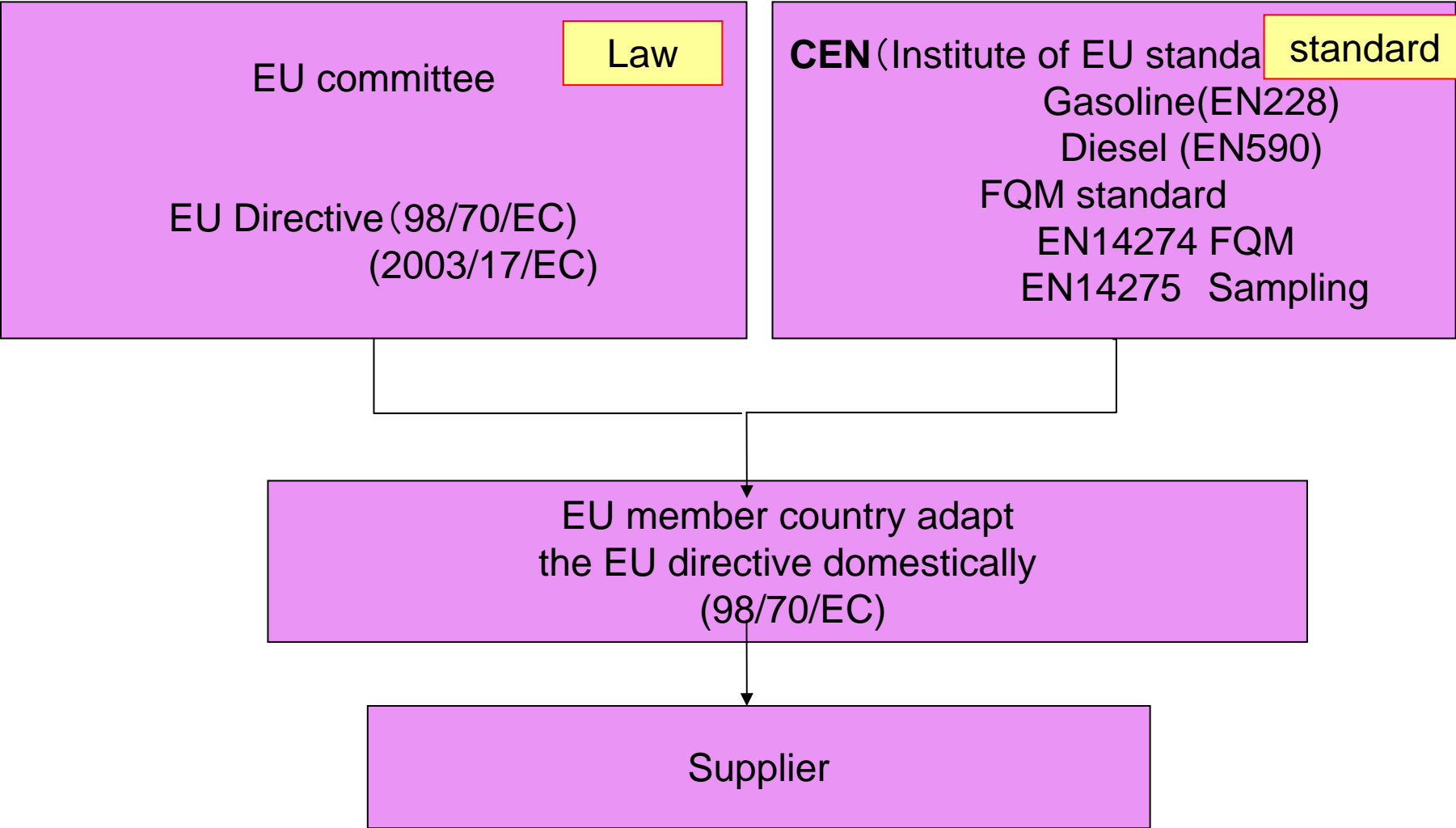
# FQMS measures in US

	Government	Private sector
Various distribution system	Quality check at retail level	Voluntary check before from distribution to retail Sampling check by non-profit organization
High penalty cost	Organize sampling method seminar by EPA Setting tolerance	Participate sampling method seminar Product Transfer Document (PTD)
Strict penalty	Fine max \$27,500/day Imprisonment Shut down business etc.	Submission of sampling result (PTD) or other source of sampling results. Periodical report to EPA

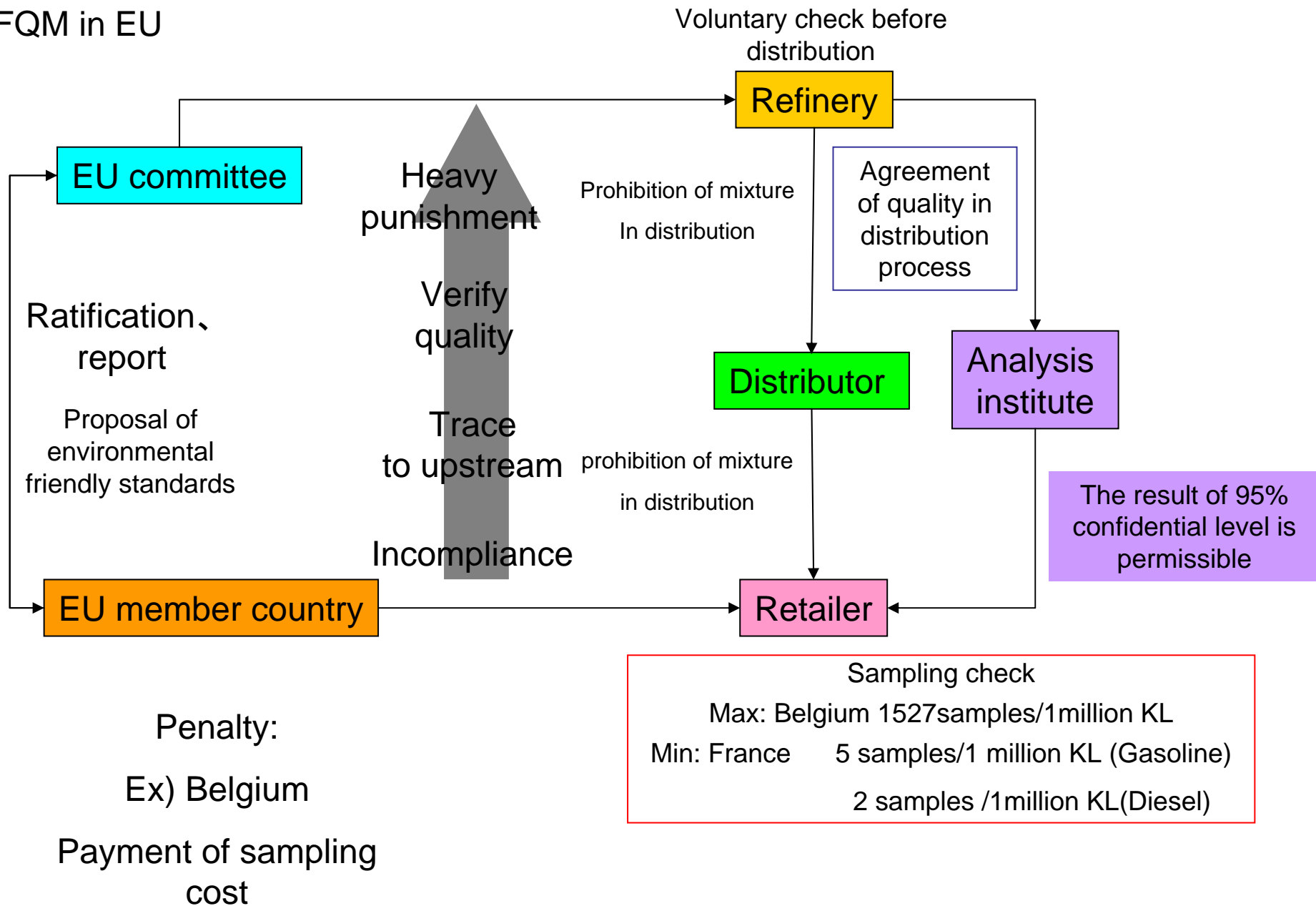
# EU FQ Regulation



# Law and standard in EU



# FQM in EU

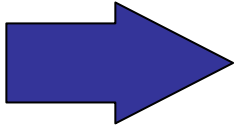


# FQMS measures in EU

	Government	Private sector
Various distribution system	Quality check at retail level	<p>Voluntary check before distribution</p> <p>Sampling check by NGO</p>
High sampling test	<p>The government charge sampling cost if petro station fail the results (Belgium)</p> <p>95% of <b>confidential level</b> is permissible.</p>	<p>Voluntary standard at retail level</p> <p><b>No mixture during distribution</b></p> <p>Certificate of distribution process</p>
Penalty	<p>Public announcement</p> <p>Shut-down</p> <p>Fine and <b>vigilance</b> (Germany)</p>	<p><b>Public announcement by NGO</b></p>

# Fuel Quality Control

How we can complete the FQ regulation and standard?



- Obligation of control/ management by law
- Check and improve by monitoring
- Severe penalty by government
- Information transparency

## US·EU

Responsibility for penalty  
US: Sharing  
from upstream to downstream  
EU: Ownership

Voluntary monitoring at upstream

The monitoring cost covered by  
Company

## Japan

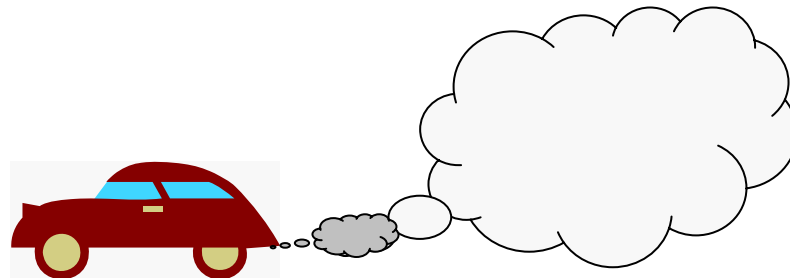
Responsibility for penalty  
Sharing  
from upstream to downstream

Mandatory sample check at  
downstream

The monitoring cost covered by  
government

# Expected Effects of Fuel Quality Improvement

- **Guarantee of Standards for EURO2/EURO4 Compliant Fuels**
- **Appropriate Fuel Quality for Vehicle Technology**
- **Reduction of Air Pollution**
- **Prevention of Health Effects**
- **Promotion of Automobile Industry**



**Blue Sky for all of us**  
**Thank you for your attention!**



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# Toward Harmonization of Fuel Quality and Vehicle Technology

- Availability of Emission Control technology
- Ready for Low Emission Vehicles
- Necessity of a Consistent Schedule in order to Achieve Better Air Quality.



***Need an Incentive for  
Fuel Improvement.***

# Sampling and Analysis to Asian countries

Potential problems on

Adulterations

Penalty

Number  
of sampling

Human resource  
+ analysis facilities

Possibility on

**National standard.**

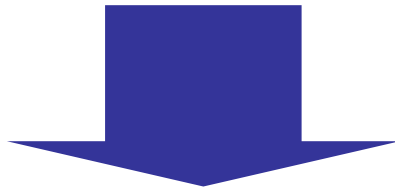
**AAF recommendation.**

- 
- Obligation of control/ management by law
  - Check and improve by FQ monitoring
  - Severe penalty by government
  - Information transparency

# Off spec fuel quality problems in Asia

- Limited Number of Samples
  - Insufficient Analysis Facilities
  - Lack of Skilled Human Resources
- **The FQM exists, but system operation is not enough.**

(FQM : Fuel Quality Monitoring)



**Increase Government Initiative  
for Fuel Quality Improvement**

# **Conclusion: Needs for the Government Initiative for Better Fuel Quality toward EURO2/EURO4**

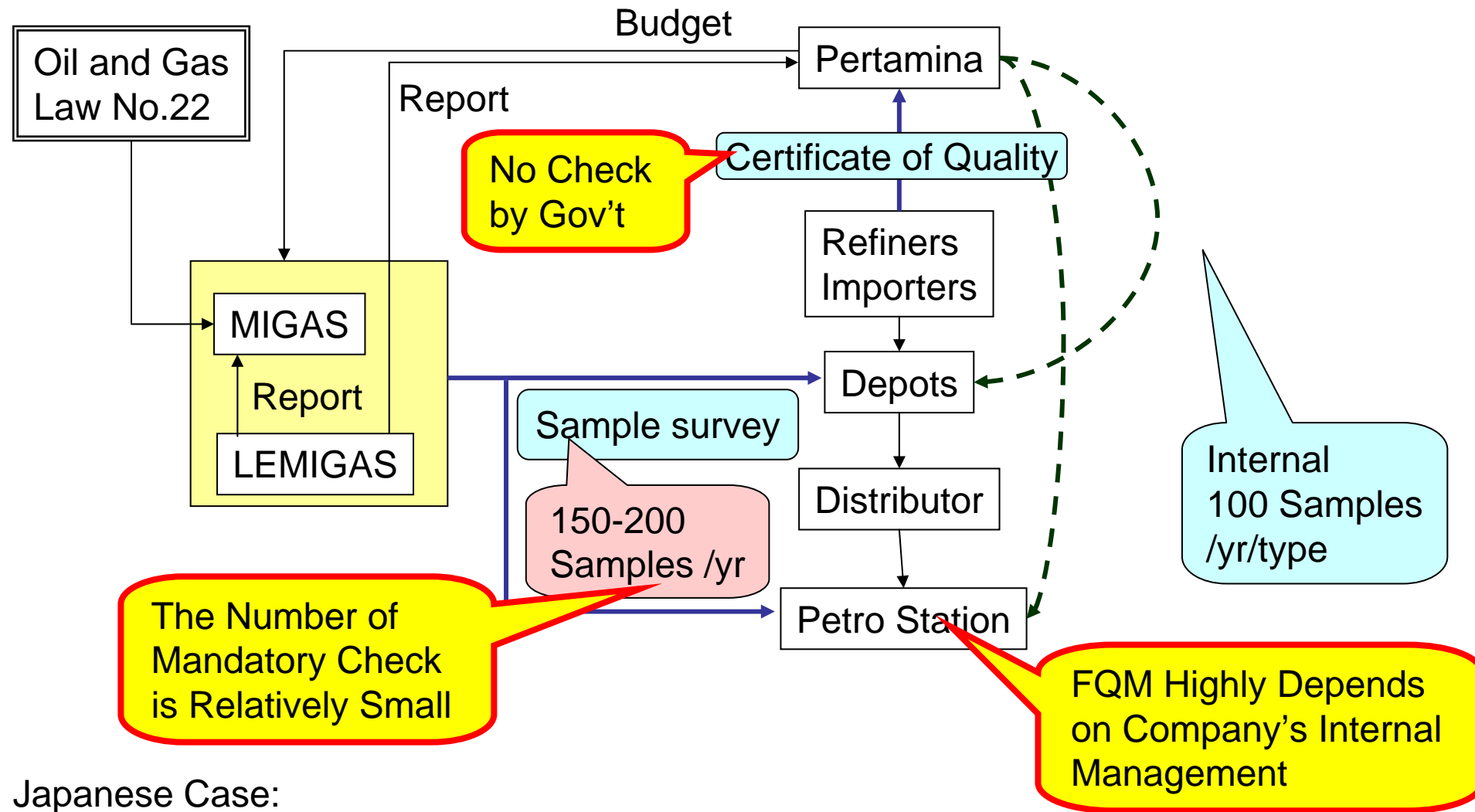
- Needs for the Increase Number of Mandatory Sampling
- Needs in Analytical Capacity Improvement
- Needs in Human Resources Development

**Let's improve fuel quality together.**

**We can make better environment!**

# Current FQM in Asia

(FQM : Fuel Quality Monitoring )



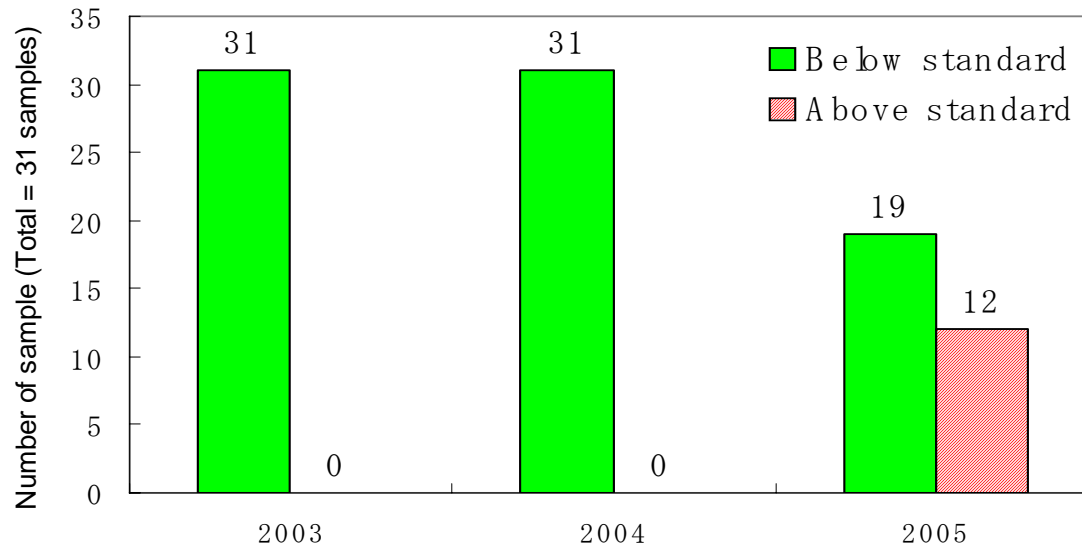
Japanese Case:

Mandatory Check Duty by Company (Each 10 days)

Mandatory Check by Appointed Institute

(Once a year at all Petro Station) The number of petro station (2005) : 47584

# Results of Fuel Monitoring and Lead Phase Out Policy



After 2000, lead phase out policy was introduced by region.

According to MOE/KPBB, 12 out of 31 samples were over the Indonesian standard level.

According to JARI-JAMA-JETRO project, 17 out of 90 samples were over the Indonesian standard level.

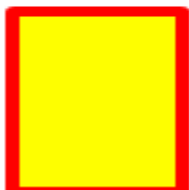
It is urgent matter to guarantee appropriate fuel quality.<sup>26</sup>

# Fuel Quality and Safety Gas Station Campaign in Thailand

1002 petro station participated out of 18902 petro station (5.3%).  
(2008)

370 out of 1002  
gas stations  
(40%) were  
certificated.

124



208

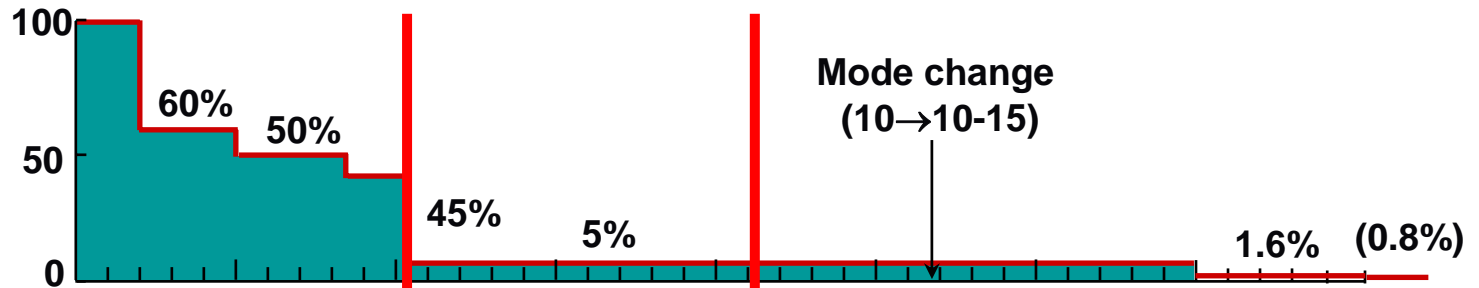


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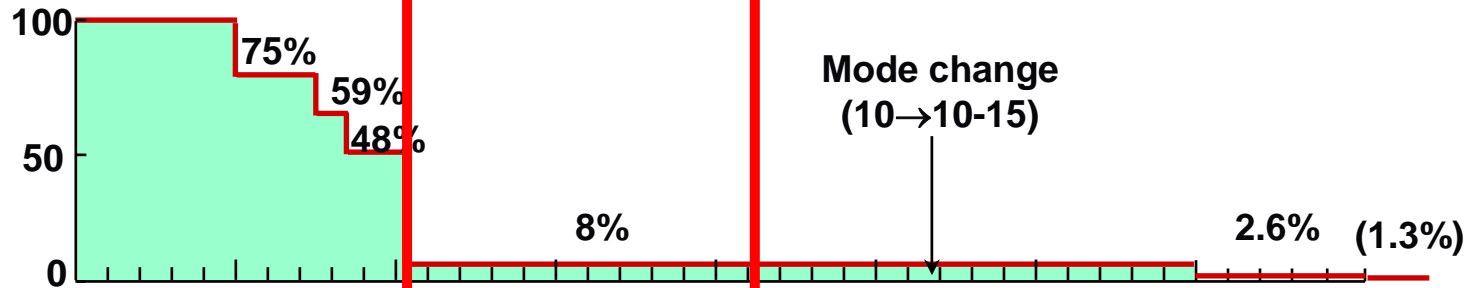


# History of Emission control in Japan (Gasoline Passenger car)

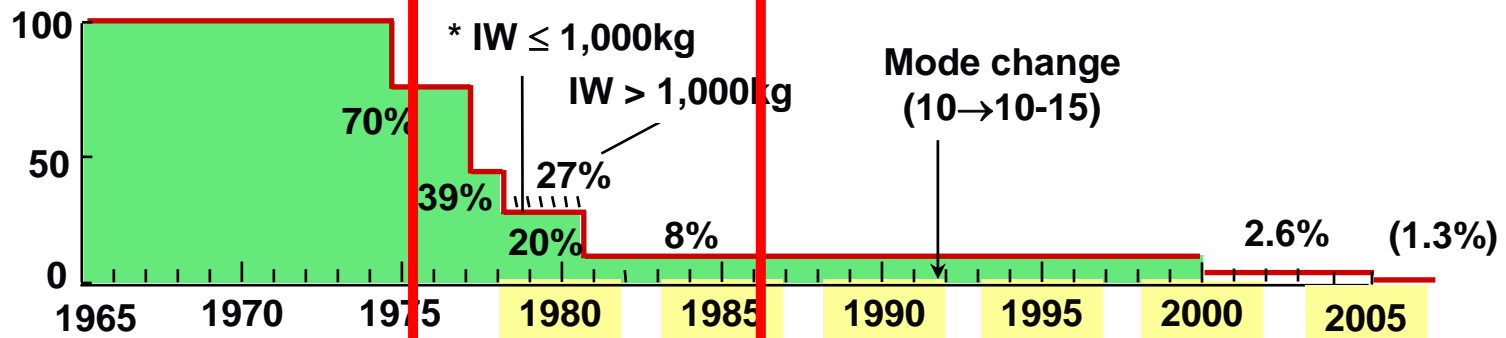
CO



HC

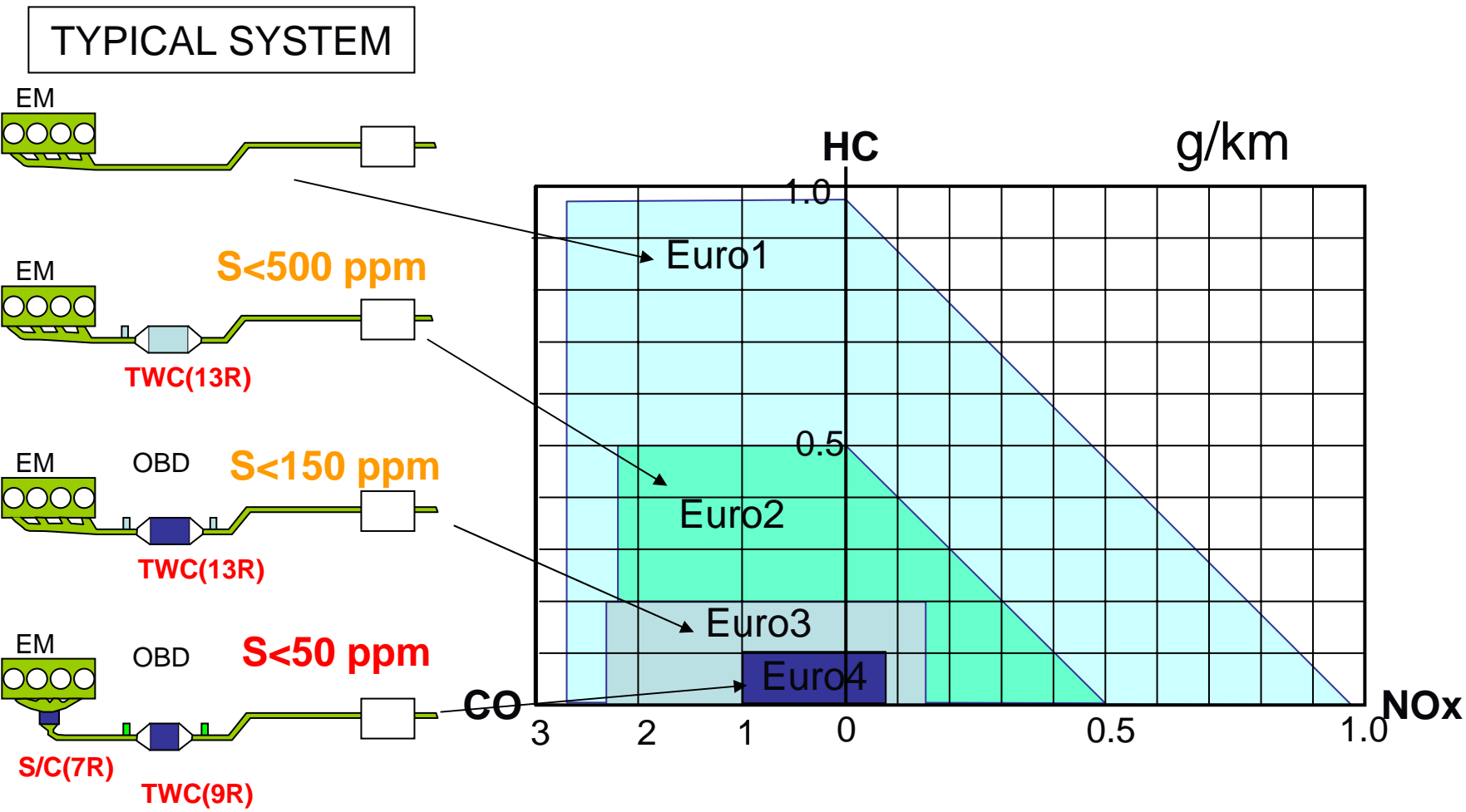


NOx



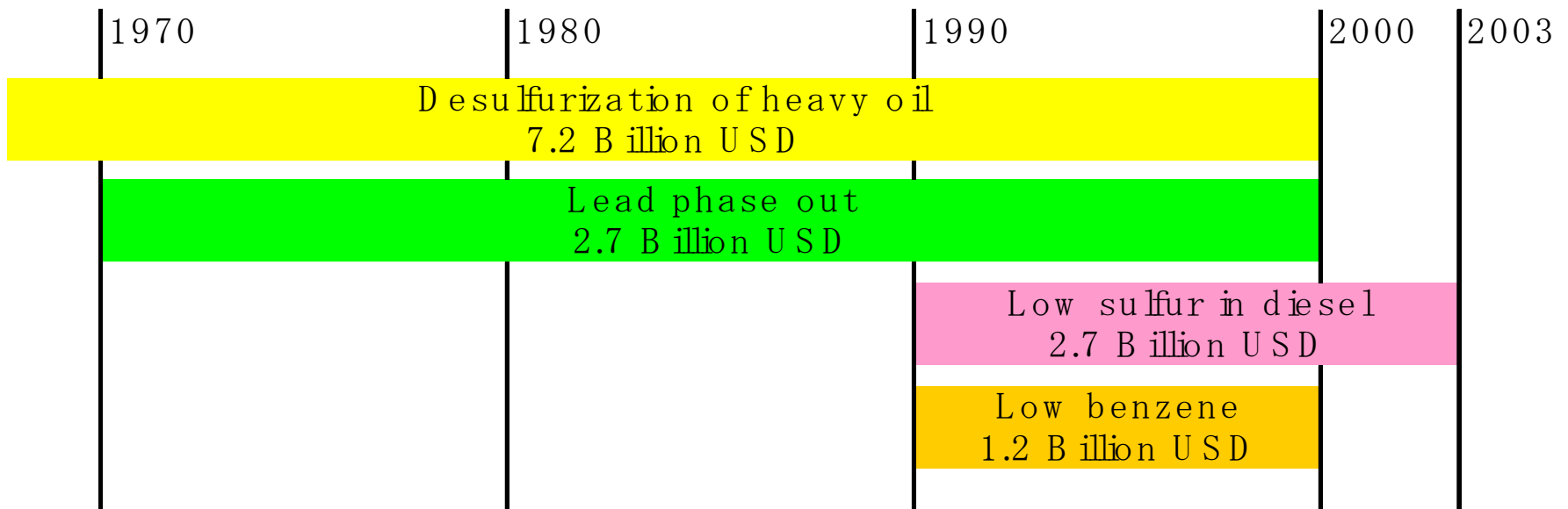
Lead phase out      Regular gasoline      Premium      Benzene contents      1996 5%      2000 1%

# Emission Control Level and counter-measures on Gasoline Passenger Cars



# Efforts from oil industry and government budget

## Total investment from oil industry



Source: [www.cosmo-oil.co.jp/kanky/publish/report/pdf/2001/09\\_p17\\_18.pdf](http://www.cosmo-oil.co.jp/kanky/publish/report/pdf/2001/09_p17_18.pdf)

Converted as 1 USD = 109.65 yen

Infrastructure for low sulfur diesel distribution  
from oil special account : 6.2 million USD(2004)