



# **International Fuel Efficiency Policies for Cars and Heavy Duty Vehicles**

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**INTERNATIONAL ENERGY AGENCY**

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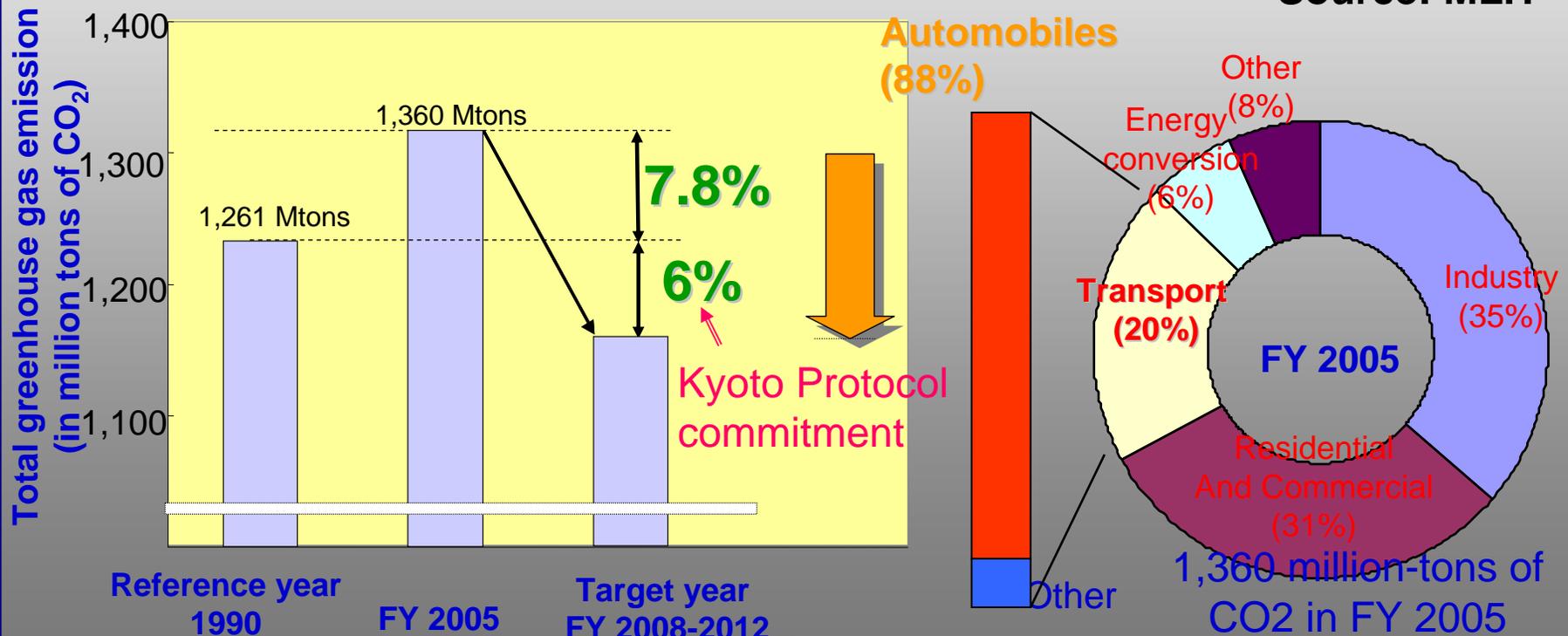
- **Standard for Cars in Japan**
- **Standard for HDVs**
  - **International situations**
  - **Japanese standards, etc.**



# Greenhouse Gas Emission in Japan

- 1,360 Million-tons of GHG Emitted in FY2005, up 7.8% Over 1990.  
→ To achieve the committed 6% GHG reduction, we must reduce about 14% of GHG between 2005 and 2008-2012.
- About 20% of CO<sub>2</sub> were emitted from Automobiles.

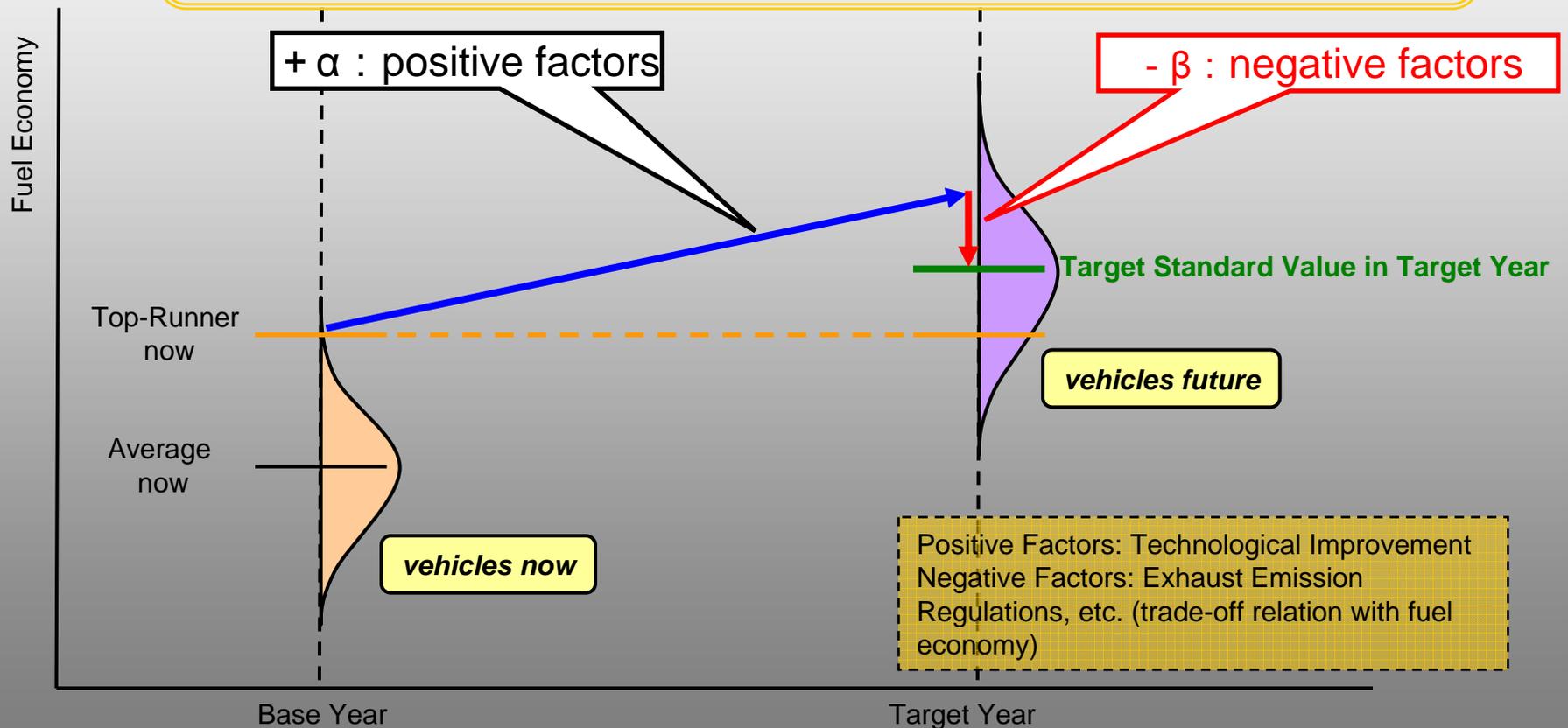
Source: MLIT





# Top Runner Program

Based on the fuel economy of the most fuel efficient vehicle which is on sale



Source: MLIT



# Fuel Efficiency Targets for Passenger Vehicles

Set in 1999

Target Year: 2010 (for Gasoline Vehicles)  
2005 (for Diesel Vehicles)

## *Present Target Standard Values for Passenger Vehicles*

Class by weight (kg)	-702	703-827	828-1015	1016-1265	1266-1515	1516-1765	1766-2015	2016-2265	2266-
Gasoline (km/L)	21.2	18.8	17.9	16.0	13.0	10.5	8.9	7.8	6.4
Diesel (km/L)	18.9		16.2	13.2	11.9	10.8	9.8	8.7	

Source: MLIT

\* Fuel economy values on this table are measured by 10-15 mode.



# Fuel Efficiency Targets for Passenger Vehicles (On Average)

*Present Target Standard Values for Passenger Vehicles  
(Expected Improvement Rate)*

	Base Year (1995) Fuel Economy (On Average)	Target Year Fuel Economy (On Average)	Expected Improvement Rate
Gasoline Passenger Vehicle	12.3 km/L	15.1 km/L (Target Year 2010)	22.8 %
Diesel Passenger Vehicle	10.1 km/L	11.6 km/L (Target Year 2005)	14.9 %

Source: MLIT

\* Fuel economy values on this table are measured by 10-15 mode.



# Fuel Efficiency Sticker Scheme

- (1) To stimulate consumers interest in fuel economy performances and to encourage the use of fuel efficient vehicles (Implemented in April 2004).
- (2) Fuel economy performance is ranked in four levels - the target level, the level exceeding the target level by 5%, 10% and 20%.
- (3) These stickers are attached to rear windows of vehicles according to the level.

(Examples of Fuel Economy Stickers)

Source: MLIT



FY 2010 Fuel Economy Target  
Compliance



FY 2010 Fuel Economy  
Target +20% Compliance

# Automobile Green Taxation



**Term**  
Apr. 2006 - Mar. 2008



75% Low-Emission Vehicle of 2005 Emission Regulation

Fuel economy target +10% compliance



(Automobile tax)  
25% reduction

(Automobile acquisition tax)  
¥7,500 (≒ £ 50 ) reduction

Fuel economy target +20% compliance



(Automobile tax)  
50% reduction

(Automobile acquisition tax)  
¥15,000 (≒ £ 100 ) reduction

The 1.8% - 2.7% reduction of Automobile acquisition tax can be applied to Other Environment Friendly Vehicles.

- > Hybrid vehicles : 1.8-2.0% reduction
- > CNG vehicles and Electric vehicles : 2.7% reduction

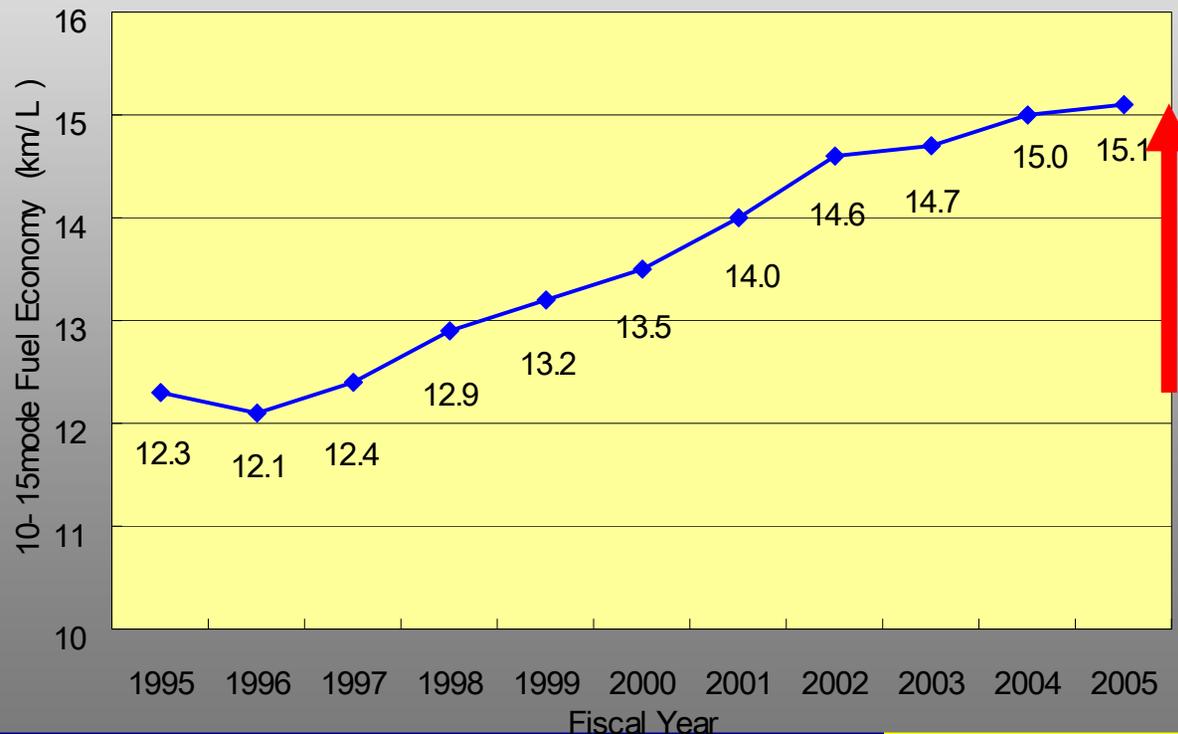
**Source: MLIT**



# Fuel Efficiency Improvement Trend

Manufacturers' strong efforts with political support including tax incentives have made remarkable outcomes after Target Standard Values by Top-Runner Program were set in 1999.

- The average fuel economy has improved about 23% from 1995 to 2005.
- About 80% of new passenger vehicles achieve the Target Standard Values in 2005.



**23% Improvement**

Average Fuel Economy for Passenger Vehicles has been remarkably improved!!

Source: MLIT



# The New Fuel Efficiency Targets

## *New Target Standard Values for Light-Duty Vehicles (In 2007)*

	Base Year (2004) Fuel Economy (On Average)	Target Year (2015) Fuel Economy (On Average)	Expected Improvement Rate
Passenger Vehicle	13.6 km/L	16.8 km/L	23.5 %
Light-Duty Bus	8.3 km/L	8.9 km/L	7.2 %
Light-Duty Truck	13.5 km/L	15.2 km/L	12.6 %

\* Target standard values are divided into some categories by vehicle weight.  
(ex. 16 categories for Passenger Vehicles.)

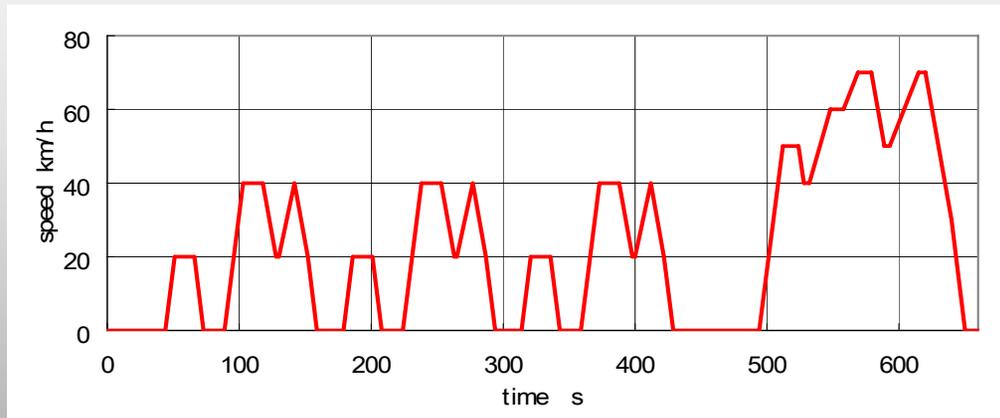
\* Fuel economy values on this table are measured by JC08 mode.

Source: MLIT



# New Fuel Efficiency Measurement Method

Fuel Efficiency measurement method will be changed to more realistic driving cycle as well as Exhaust Gas Emission measurement method.

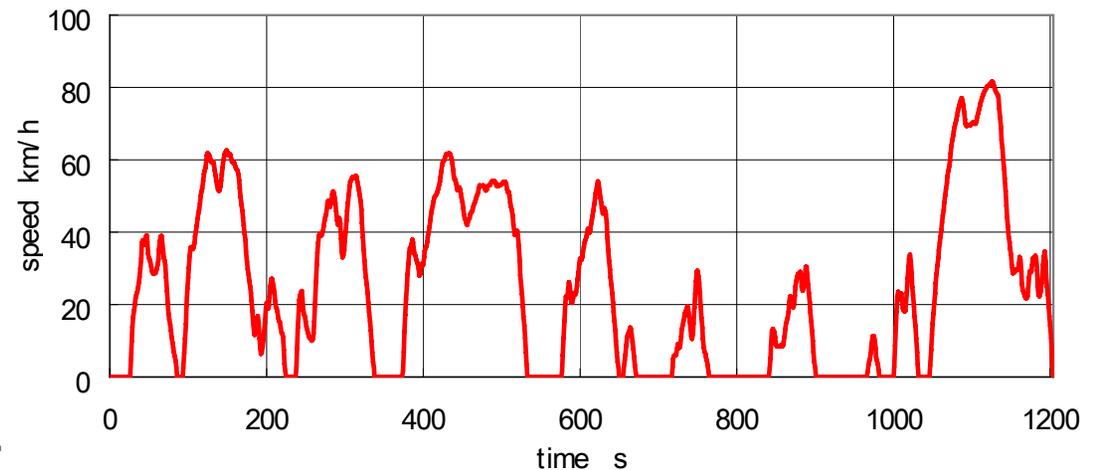


**10-15 mode**  
(present driving cycle)  
**hot start**

Source: MLIT

**JC08 mode**  
(new driving cycle)  
**hot start and cold start**

\*categories of inertial weight are as same as ECE regulation.





# Heavy Duty Vehicles

## - Background information

- **Heavy-duty vehicles are responsible for 30% of world-wide fuel use**
- **Conventional wisdom**
  - **Commercial operators are more conscious of fuel costs than private drivers, obviating the need for policy intervention.**
- **Market alone seems to be not sufficient to bring all cost-effective efficiency technologies into the market**
  - **Manufacturer risk**
  - **Fluctuating fuel prices**
  - **Lack of information on individual models**



# **Fuel Efficiency of Heavy Duty Vehicle –Background 2**

- **Japan began regulating fuel efficiency of heavy duty vehicles in 2006**
- **USEPA announced draft fuel efficiency test protocol for HDVs**
- **The European Commission is currently surveying potential measures and instruments, using an open-ended approach**
- **NDRC and CATARC of China shows their interest in the possibility of introducing fuel efficiency standards for HDV**
- **PCRA started activities regarding introducing fuel efficiency standards including the one for HDV**



# **Fuel Efficiency of Heavy Duty Vehicle - Background 3**

- **CEOs of major truck manufacturers have agreed to set up special working group to enhance their efforts to establish a harmonized method to evaluate the fuel consumption performance**
- **UN/ECE developed a globally harmonized test procedure for emission from HDV (mainly for pollutant emissions but could be used for CO<sub>2</sub>)**



# Heavy Duty Vehicles

## - The IEA Workshop

- The IEA held a workshop last June
- The objectives were to
  - Bring together policy makers, technical experts, manufacturers and other stakeholders in Heavy Duty Vehicle transportation
  - Exchange the latest information on policies to improve HDV fuel efficiency
  - Share experience with fuel efficiency standards for HDVs, including in relation to effectiveness and test procedures



# Heavy Duty Vehicles

## - Result of the workshop

- **Participants' views**
  - Potential HDV fuel efficiency improvements were not necessarily being delivered as quickly or as broadly as the conventional wisdom would suggest.
- **The challenges identified**
  - Improved testing cycles
  - Cost-effective way to promote R&D and deployment of new technologies (pay back period of more than 4-6 years)
  - Addressing lighter van (under 3.5 ton) fuel efficiency



## Establishing Fuel Efficiency Standards for HDV in Japan

### <Background>

Heavy-duty Vehicles emit nearly 25% of CO<sub>2</sub> in the transport sector in Japan. Fuel economy Improvement is significantly needed for HD vehicles.



An appropriate method has been developed to quantitatively evaluate fuel economy for heavy-duty vehicles.



The world's first Fuel Economy Target Standard Values for Heavy-Duty Vehicles (GVW>3.5 tons), based on "Top-Runner Program", promulgated in 2006.

Automakers are required to improve HD vehicle fuel economy, taking into account one or two model changes by FY2015

Source: MLIT



## Japanese Fuel Efficiency Targets for Heavy-Duty Vehicles

	Target year	Base year (2002) Fuel Economy	Target standard value (average)
Trucks	2015	6.32 km/L (415 g-CO <sub>2</sub> /km)	7.09 km/L (370 g-CO <sub>2</sub> /km) <b>(12.2% improvement)</b>
Buses	2015	5.62 km/L (466 g-CO <sub>2</sub> /km)	6.30 km/L (416 g-CO <sub>2</sub> /km) <b>(12.1% improvement)</b>

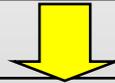
\*Target standard values are set by categories of GVW.

Source: MLIT



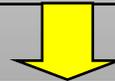
# Fuel Efficiency Test Procedure

Character of Heavy-Duty Vehicle  
Wide variety of types



Challenges for Fuel Economy Test

- testing facility
- testing time
- evaluation of factors affecting fuel economy



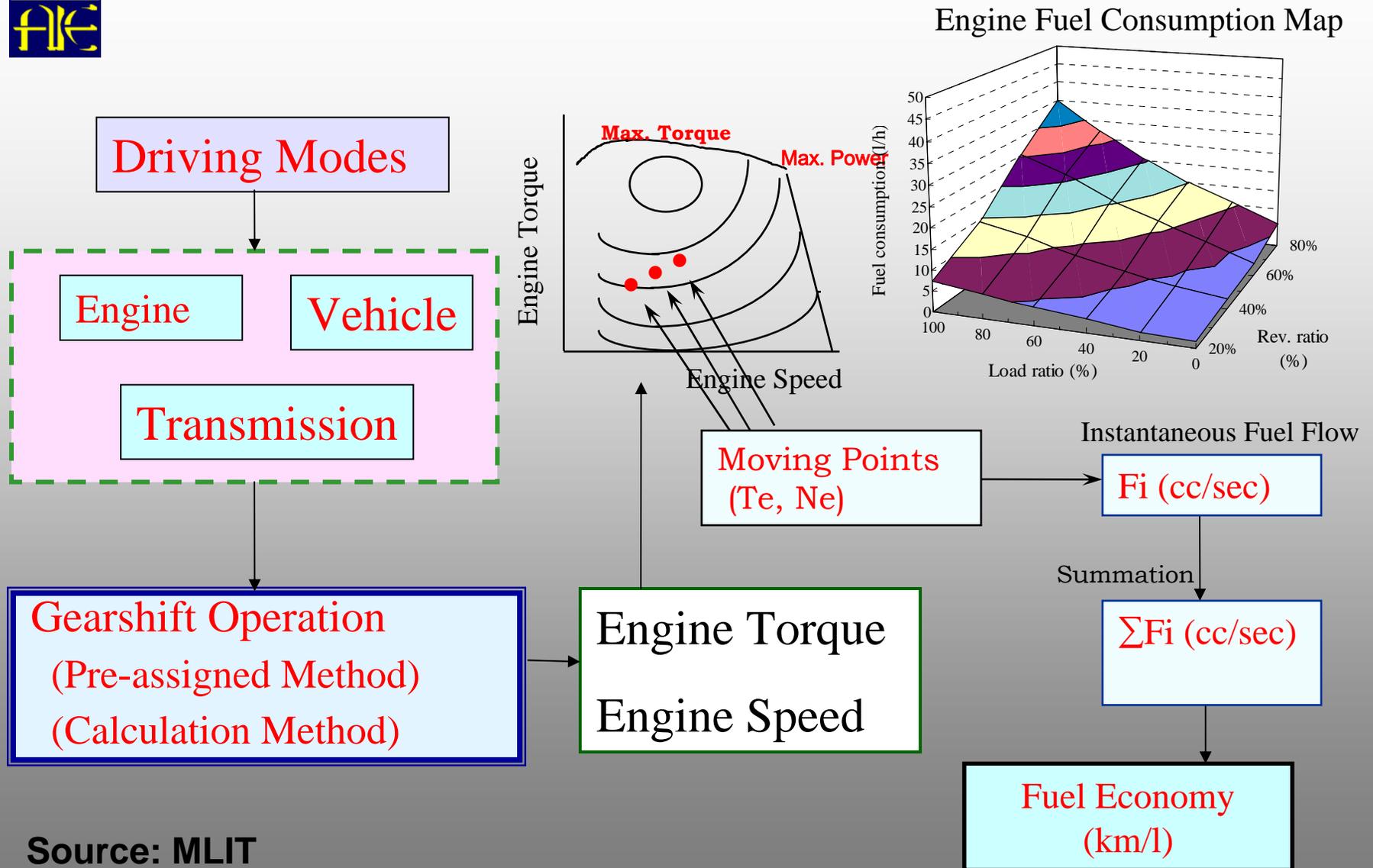
Solution: Simulation method

A computer program that converts a vehicle-based driving cycle into an engine-based operation cycle using vehicle specification data, and thereby calculates fuel economy using the data from engine-based tests.

Source: MLIT



# Concept of Simulation Method

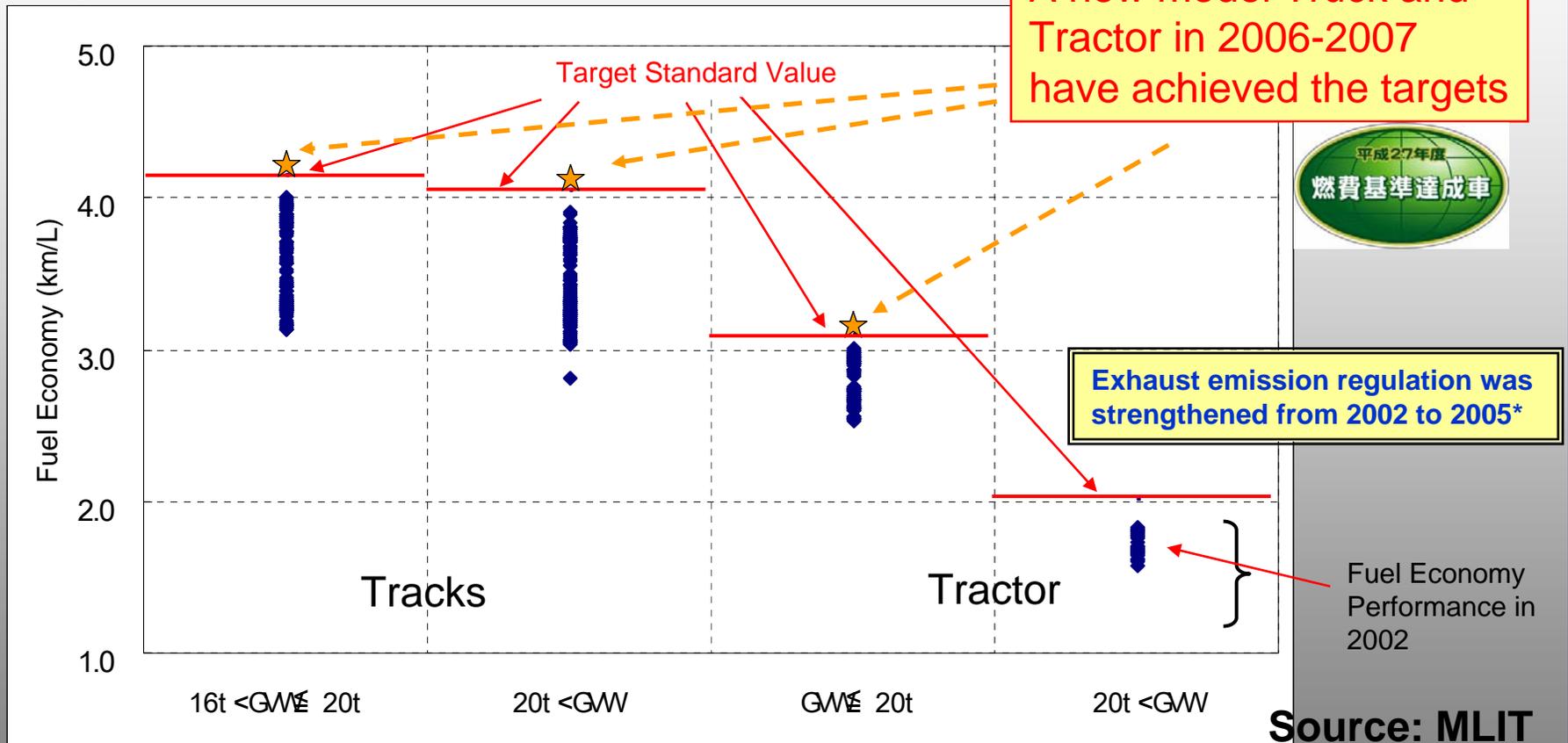


Source: MLIT



# Latest Outcomes of Target Standard Values for Heavy-Duty Vehicle (Trucks)

## Target Standard Values for Truck and Tractor

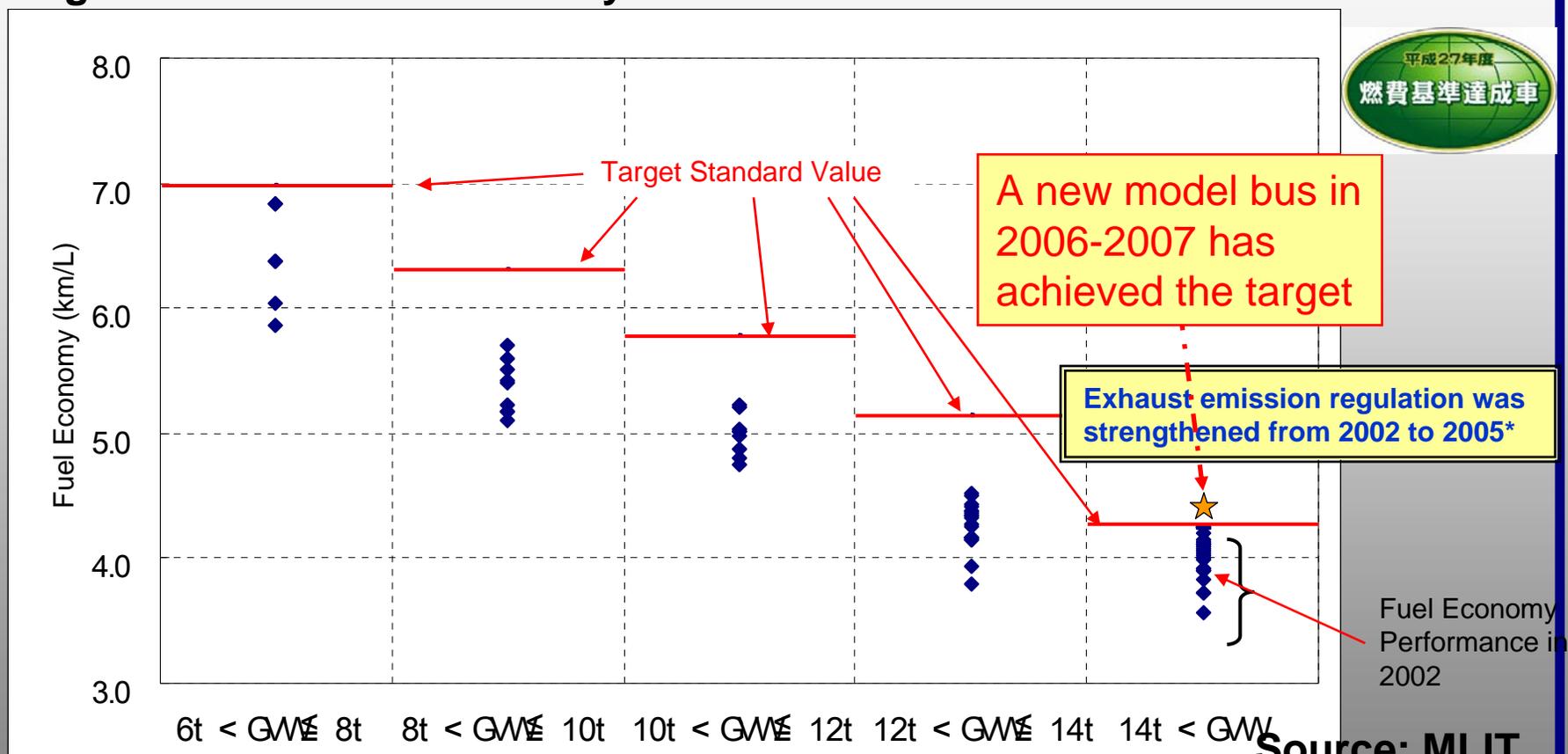


\* The Truck or Tractor in 2006 should meet 85% more stringent PM regulation and 40% more stringent NOx regulation, which generally lowers fuel efficiency.



# Latest Outcomes of Target Standard Values for Heavy-Duty Vehicle (Buses)

## Target Standard Values for City Bus



\* The Bus in 2006 should meet 85% more stringent PM regulation and 40% more stringent NOx regulation, which generally lowers fuel efficiency.



## **SmartWay Fuel Efficiency Test Protocol**

- **Draft announced in November 2007**
- **The fuel consumption measured on either a test track or on a chassis dynamometer**
- **Separate drive cycles for highway line haul, delivery vehicle, transit bus and so on.**
- **Load by accessories including air conditioning and lighting are accounted for**



# Harmonization for Vehicle Regulations

United Nations (UN)

Economic Commission for Europe (ECE)

World Forum for Harmonization for Vehicle Regulations (WP29)

Working Party on Pollution and Energy (GRPE)

**<Global Technical Regulations>**  
**World-wide Heavy-Duty Certification procedure (WHDC)**

Worldwide harmonized Heavy-Duty Vehicle test procedure will be developed

- > Same Exhaust Emission test procedure will be applied worldwide
- > Same Fuel Economy test procedure will be applied as well ?



## **Summary (Japanese standard for cars)**

- 1. Japan has been promoting countermeasures against global warming under “Plan to Achieve Kyoto Protocol Commitment”, and the regulation for fuel economy is one of the main measures.**
- 2. Combination of Top-Runner Standards for fuel economy and Green Taxation System has made remarkable effect on improvement of fuel economy.**
- 3. The New Fuel Economy Standard was set in July 2007, taking Japan’s severe circumstances of CO2 emission into consideration.**



## **Summary (Heavy Duty Vehicles)**

- 1. Heavy-duty vehicles are responsible for 30% of world-wide fuel use**
- 2. With appropriate government intervention, potential HDV fuel efficiency improvements could be delivered more quickly and broadly**
- 3. Fuel efficiency standards for heavy duty vehicles were set in JAPAN for the first time in the world in 2006**
- 4. USEPA announced fuel efficiency test protocol for HDV to quantify the benefit of various HDV designs and technologies**
- 5. All concerned parties are encouraged to review the impact of these initiatives to determine if a similar approach would bring benefits in other regions, and worldwide approach could be explored**



**Thank you for your attention!**