

# Overview of FY2020 Fuel Efficiency Standards for Passenger Vehicles

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January, 2012

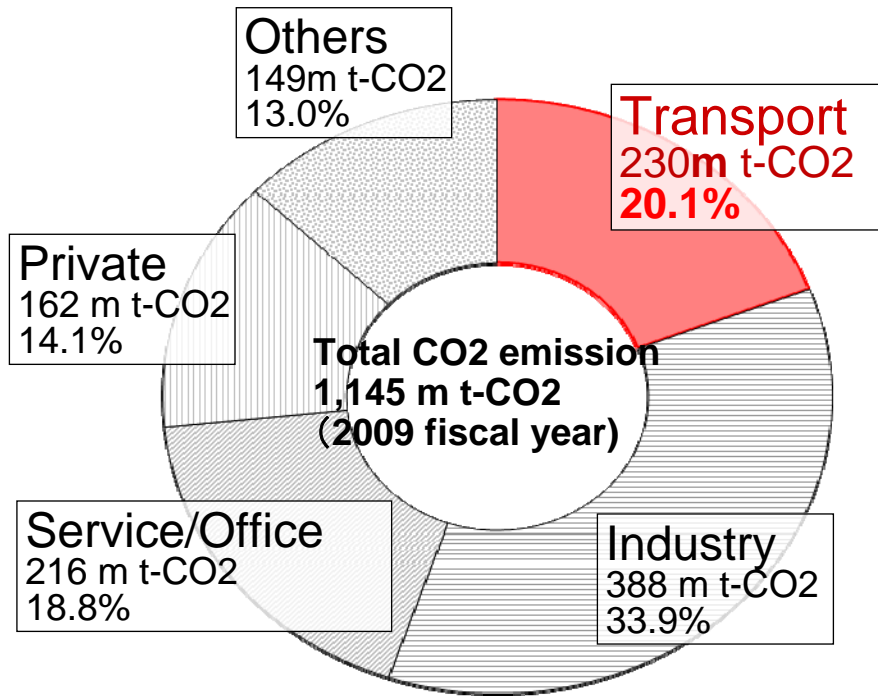
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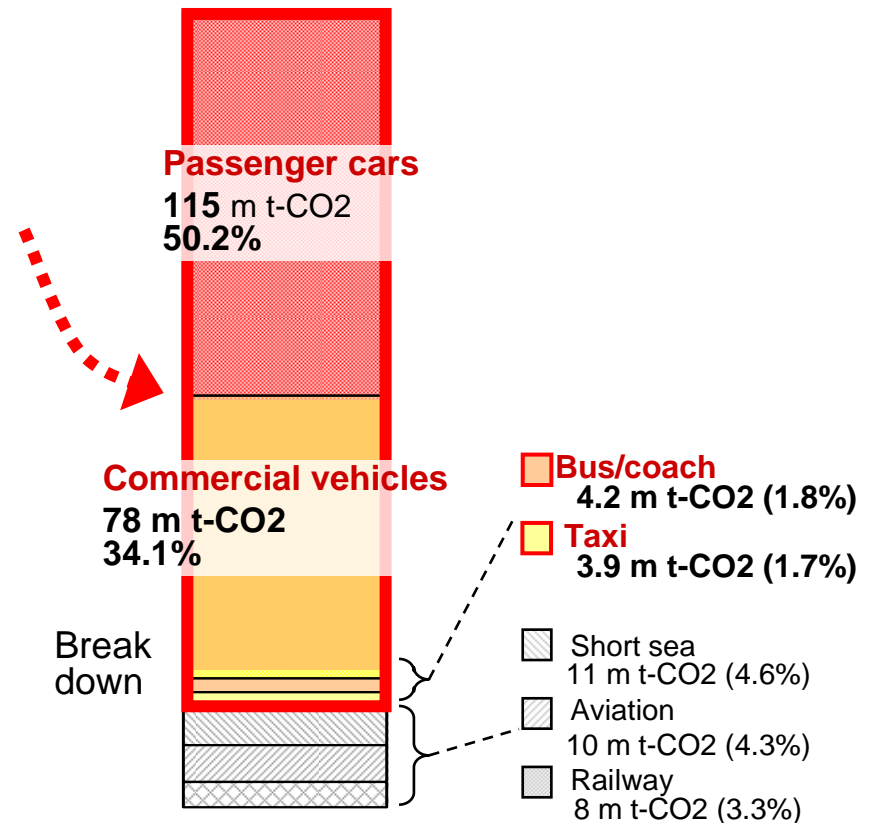
# I. BACKGROUND

CO2 Emission from transport sector is 20% of total emission in Japan.  
Road transport emits 84% of transport emission.

CO2 Emission in Japan



Breakdown in Transport sector



\* Emission from electric generation and thermal generation are distributed to final demand sectors according to amount of consumption of each sector.

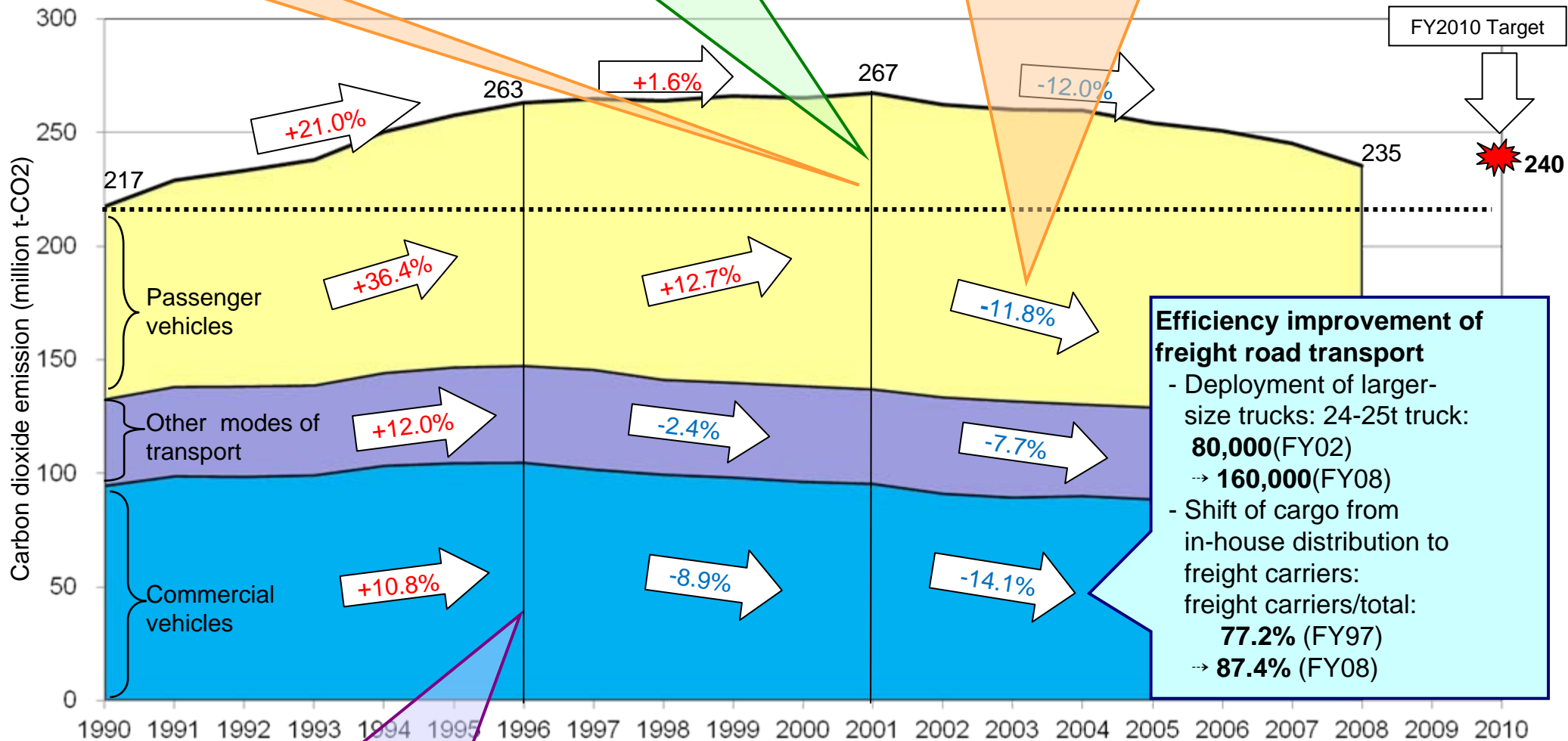
\* Developed by MLIT referring to "Japanese GHG Inventory report"

Emissions from passenger transport on road peaked in FY2001.

Since FY2001, emissions from the transportation sector have been on a downward trend.

### Improvement of mileage of passenger vehicles

- Fuel Efficiency regulation
- Green Tax (Since FY2001)
- 18.2mil./57.7mil. registered vehicles are GREEN



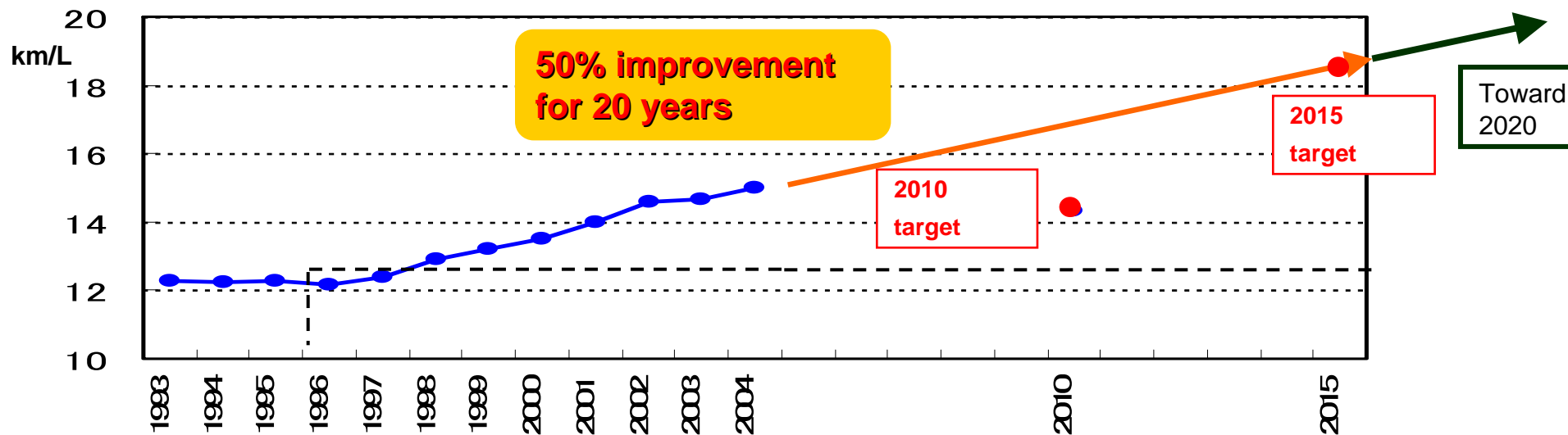
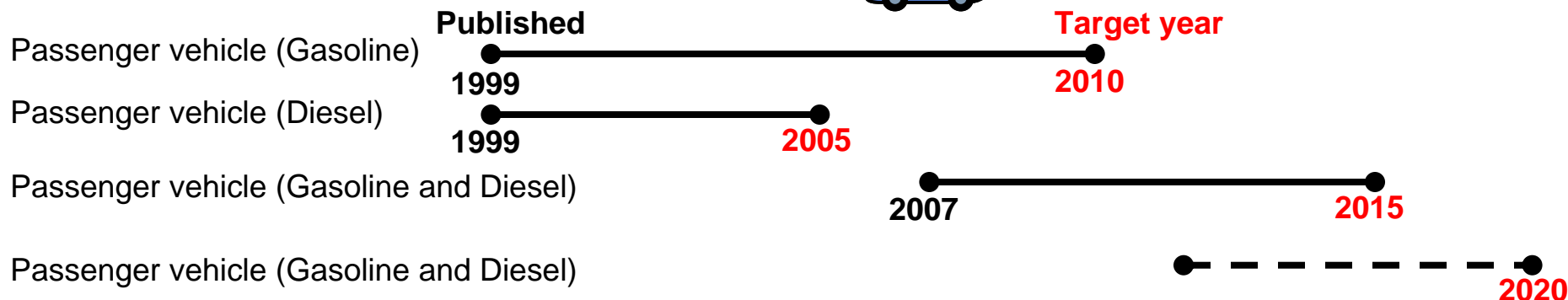
### Efficiency improvement of freight road transport

- Deployment of larger-size trucks: 24-25t truck: **80,000**(FY02) → **160,000**(FY08)
- Shift of cargo from in-house distribution to freight carriers: freight carriers/total: **77.2%** (FY97) → **87.4%** (FY08)

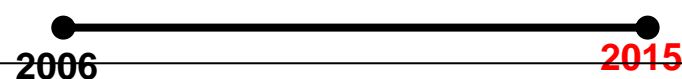
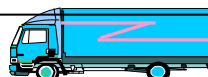
Emissions from freight transport on road peaked out in FY1996

Japan has long history to execute FE regulation.  
Through this regulation, Japan's average FE of automobile has been improving steadily.

## < History of Top runner fuel efficiency regulation >



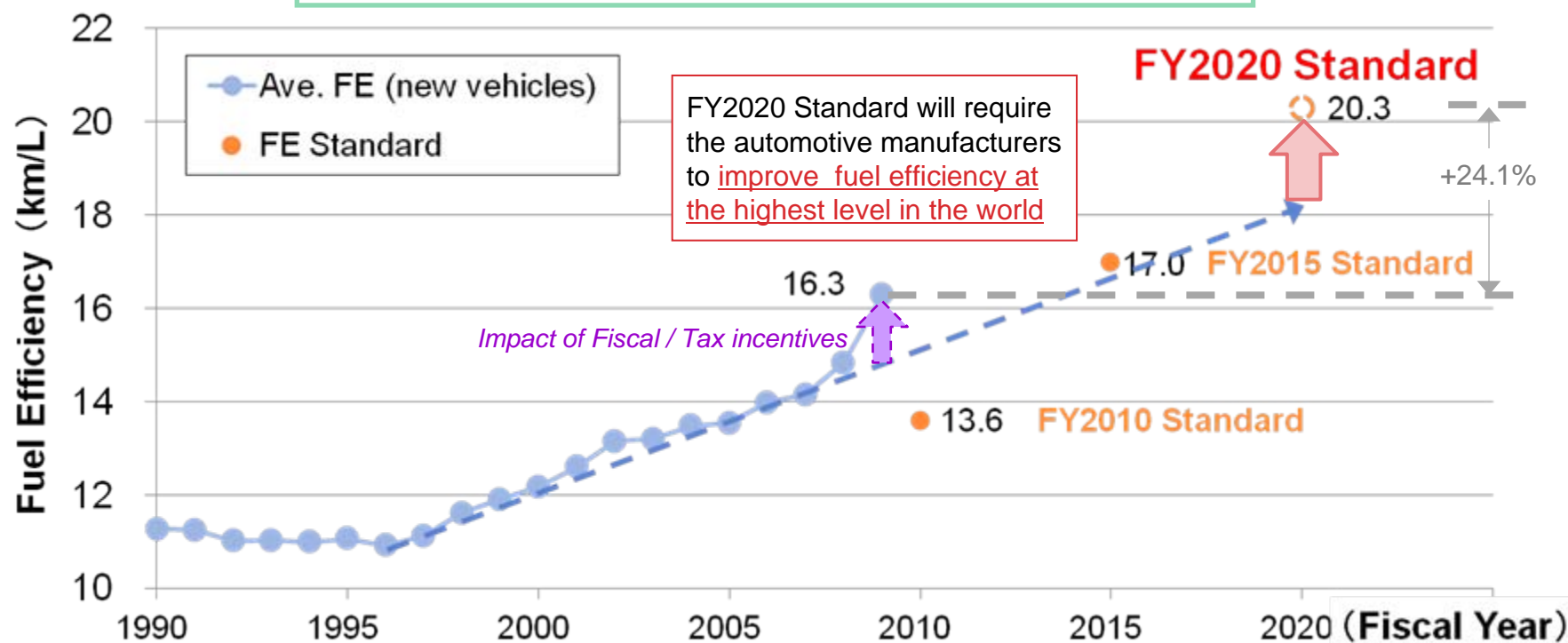
FE regulation for HDV



## **II. FY2020 FE STANDARDS**

- Japan regulates the fuel efficiency standard based on the Energy Conservation Law.
- On Oct. 20, 2011, the Joint committee under MLIT and METI concluded the new standard toward FY2020 for Passenger Vehicles.
- Introducing this new standard, average FE in 2020 will be 20.3km/L, which corresponds to 24.1% improvement, comparing to the actual data in FY2009.

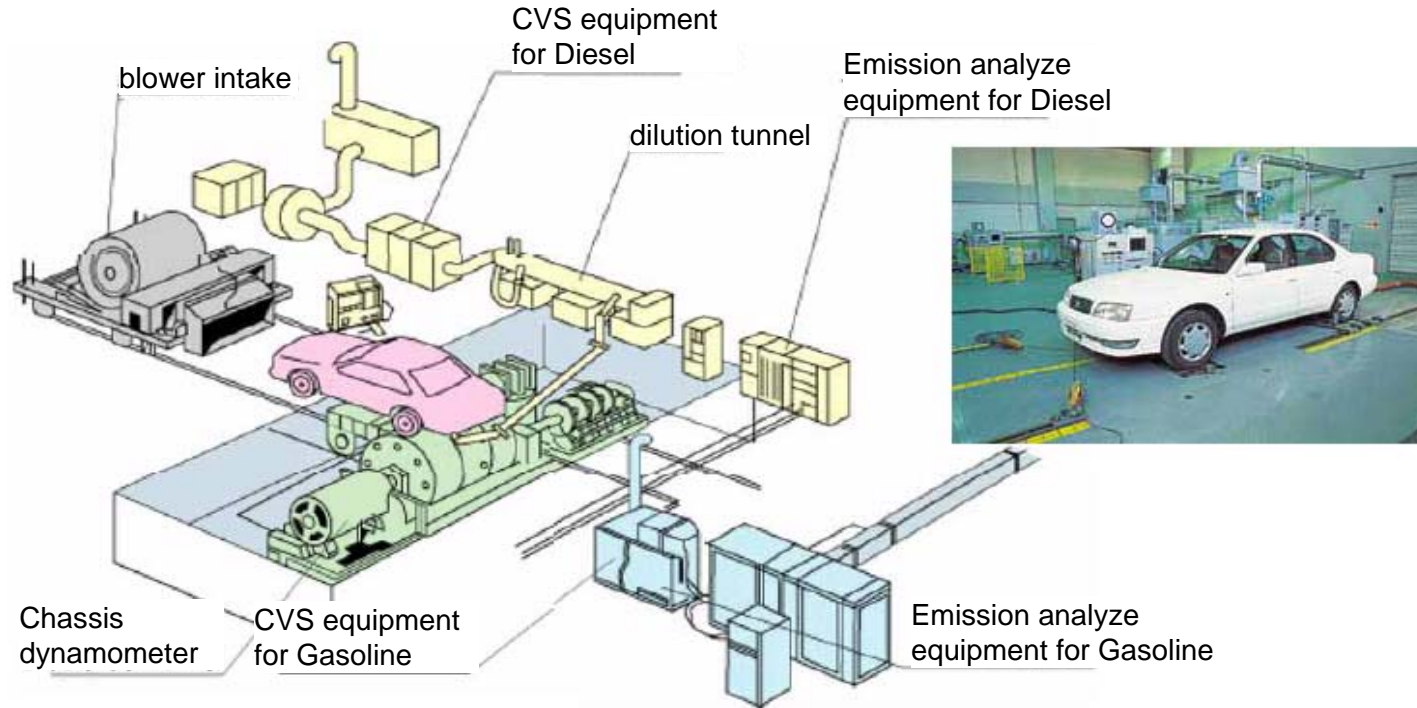
Fuel Efficiency improvements in Passenger vehicles



\* These fuel efficiency values are based on JC08 mode. 10-15 mode values are converted to the JC08 mode value.

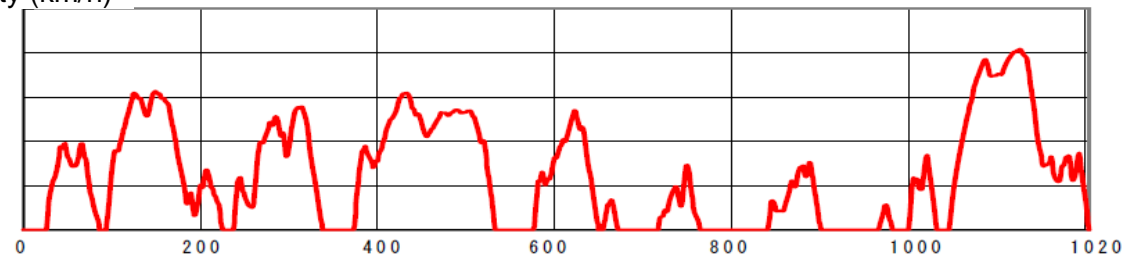
# Driving Mode

- Japan adapts original driving mode to react actual traffic situation in our country.
- “JC08 mode” are used for PV in FY2020 standard
- When the WLTP is established, the FY2020 standard will be reconsidered in the committee.



$$\text{JC08 mode} = \frac{1}{\frac{0.25}{\text{Cold start FE}} + \frac{0.75}{\text{Hot start FE}}}$$

Velocity (km/h)

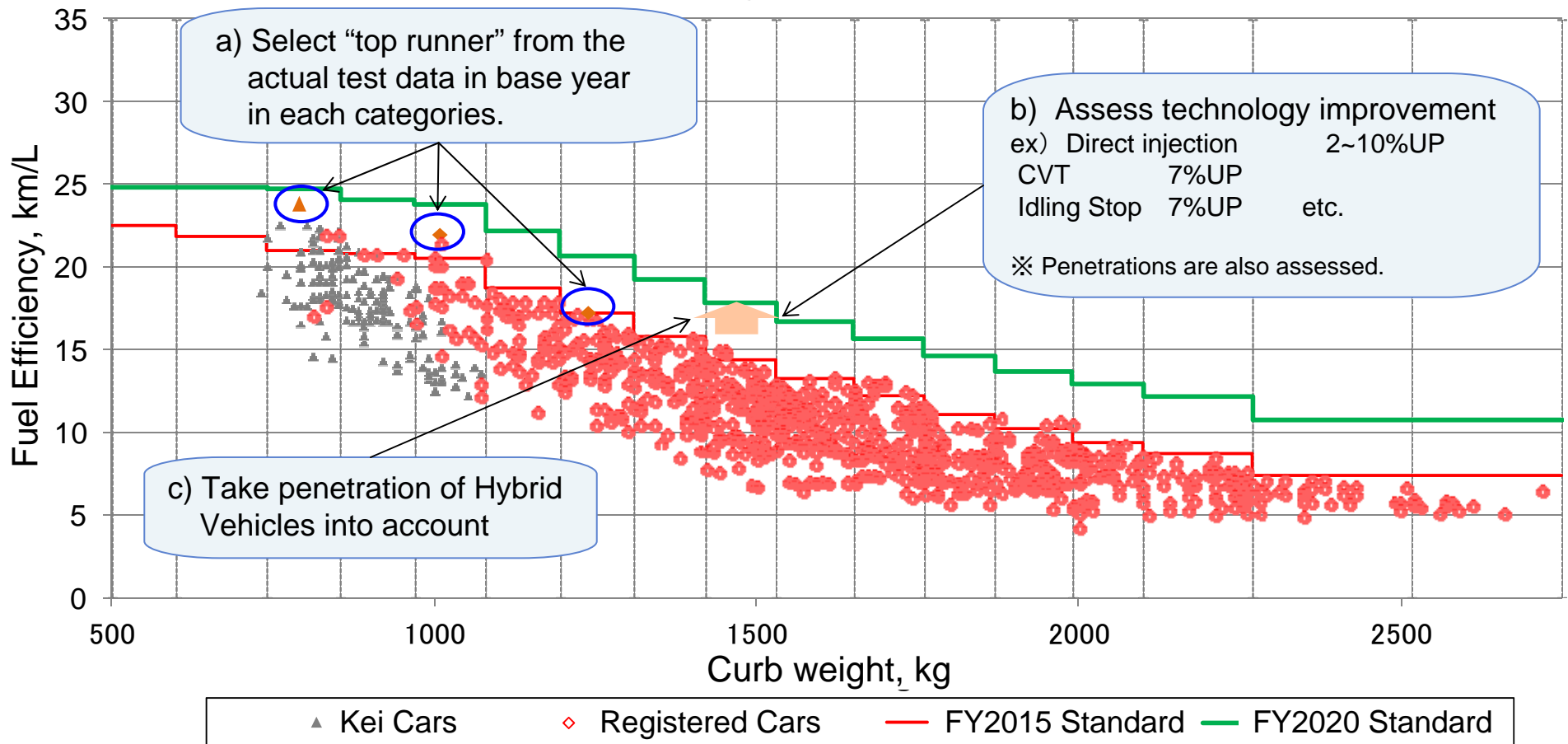


JC08 Mode



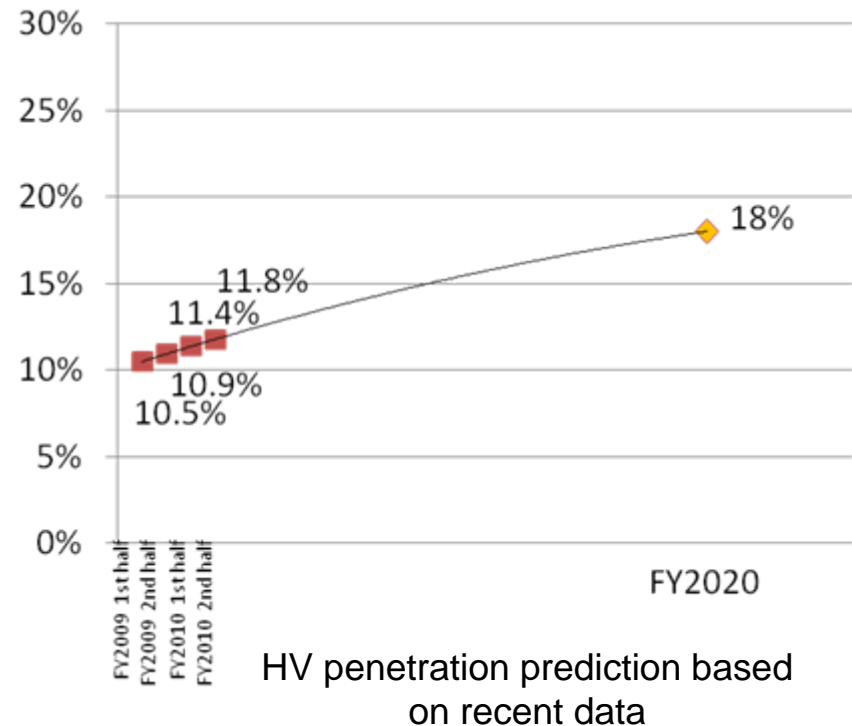
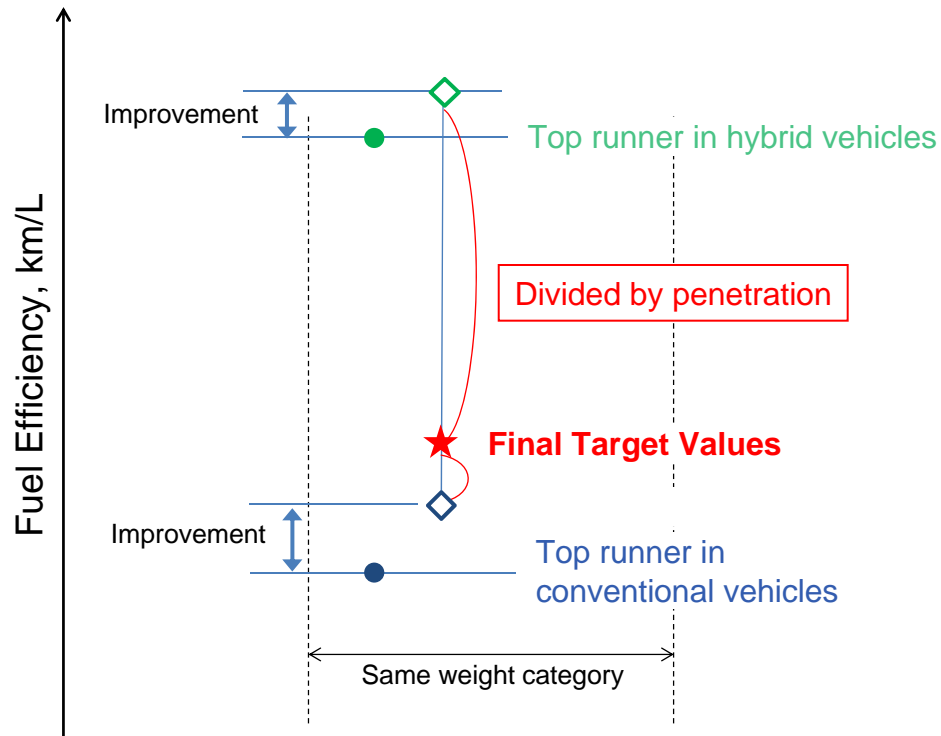
- Based on the Energy Conservation Law, Automotive manufacturers and importers must improve their automobiles' fuel efficiency.
- MLIT and METI make the fuel efficiency standards.
- In making the standard, MLIT and METI take it into account :
  - Fuel efficiency of Top runner, b) technology assessment (improvement, penetration), etc.

**Fuel efficiency map in Gasoline Passenger Vehicles (JC08 Mode) (Exclude Hybrid Vehicles)**

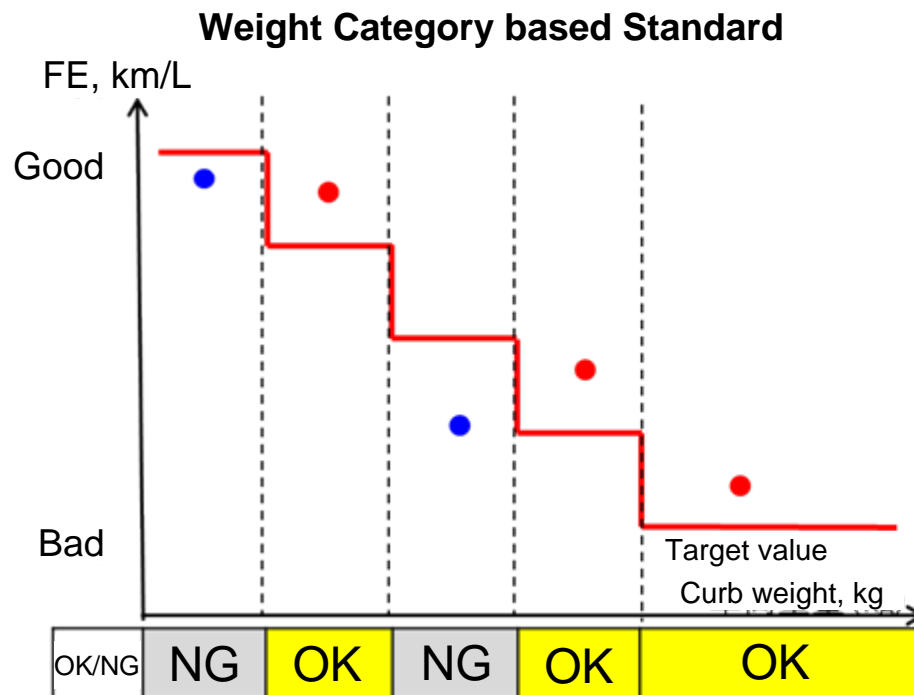


# Hybrid Vehicles

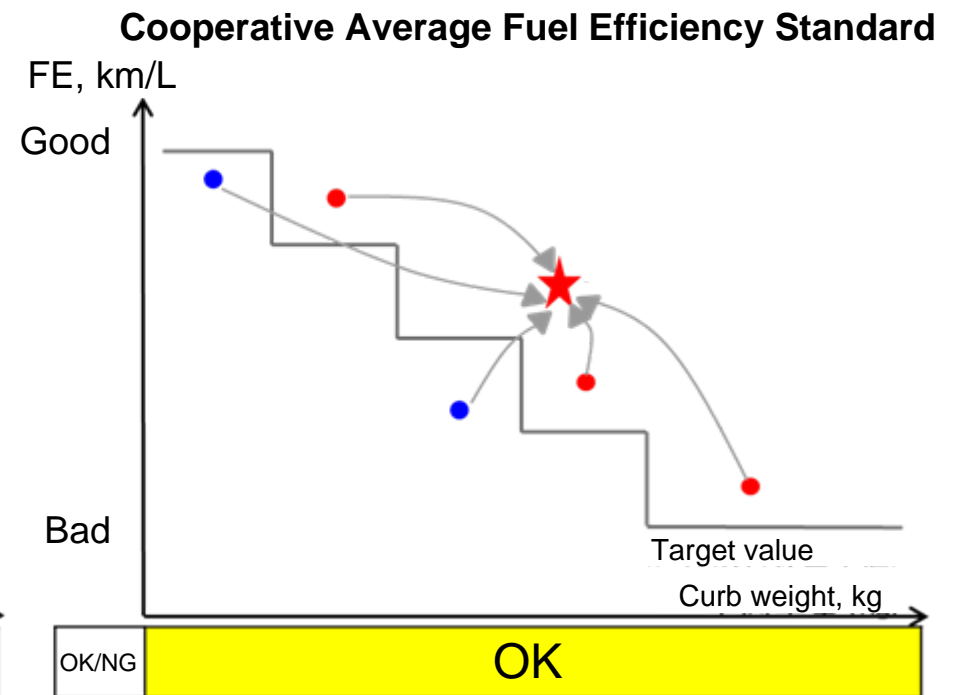
- Conventional vehicles won't be achieved the target, if we select hybrid vehicles as top runner and make fuel efficiency target.
- We made FY2020 standard as follows:
  1. Select top runner both in conventional vehicles and hybrid vehicles.
  2. Assess each fuel efficiency improvement
  3. Divided by hybrid vehicles penetration in FY2020
- We predicted HV penetration by 18%, based on recent data and prediction data by commercial companies.
- Manufacturers won't be required to meet 18% HV penetration in FY2020, and they have flexibilities to accomplish the target.



- Recently, technologies for improving fuel efficiency have been diversified, and those developing costs are increasing. In this context, it is difficult for manufacturers to achieve fuel efficiency target in all weight categories in weight category based standard, because manufacturers cannot focus and have to diversify their developing resources.
- We introduce CAFE standard in FY2020 standard, like US and EU.
- We expect that each manufacturer focuses on developing their home ground techniques in each manufacturer, and technologies will be more sophisticated and diversified, in CAFE standard.



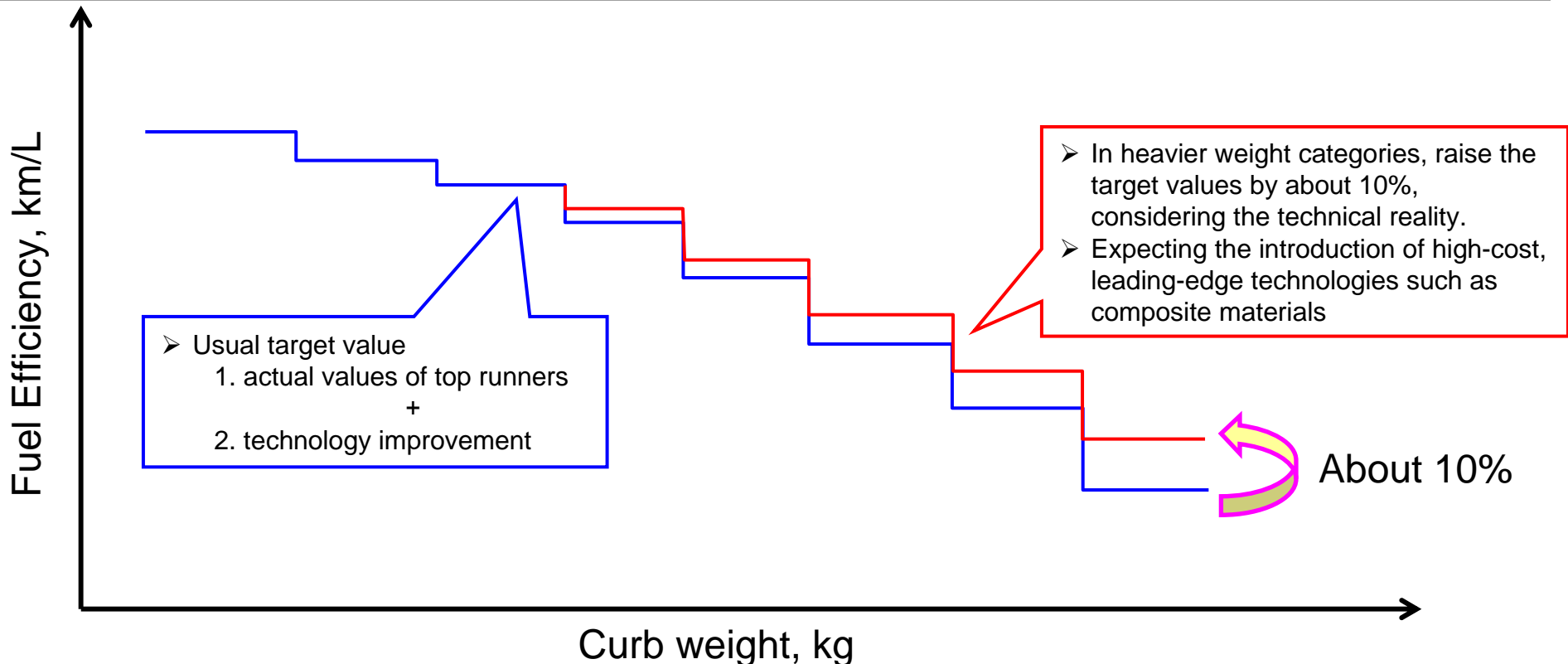
→ **Not accomplished** because there are some weight categories which cannot be accomplished



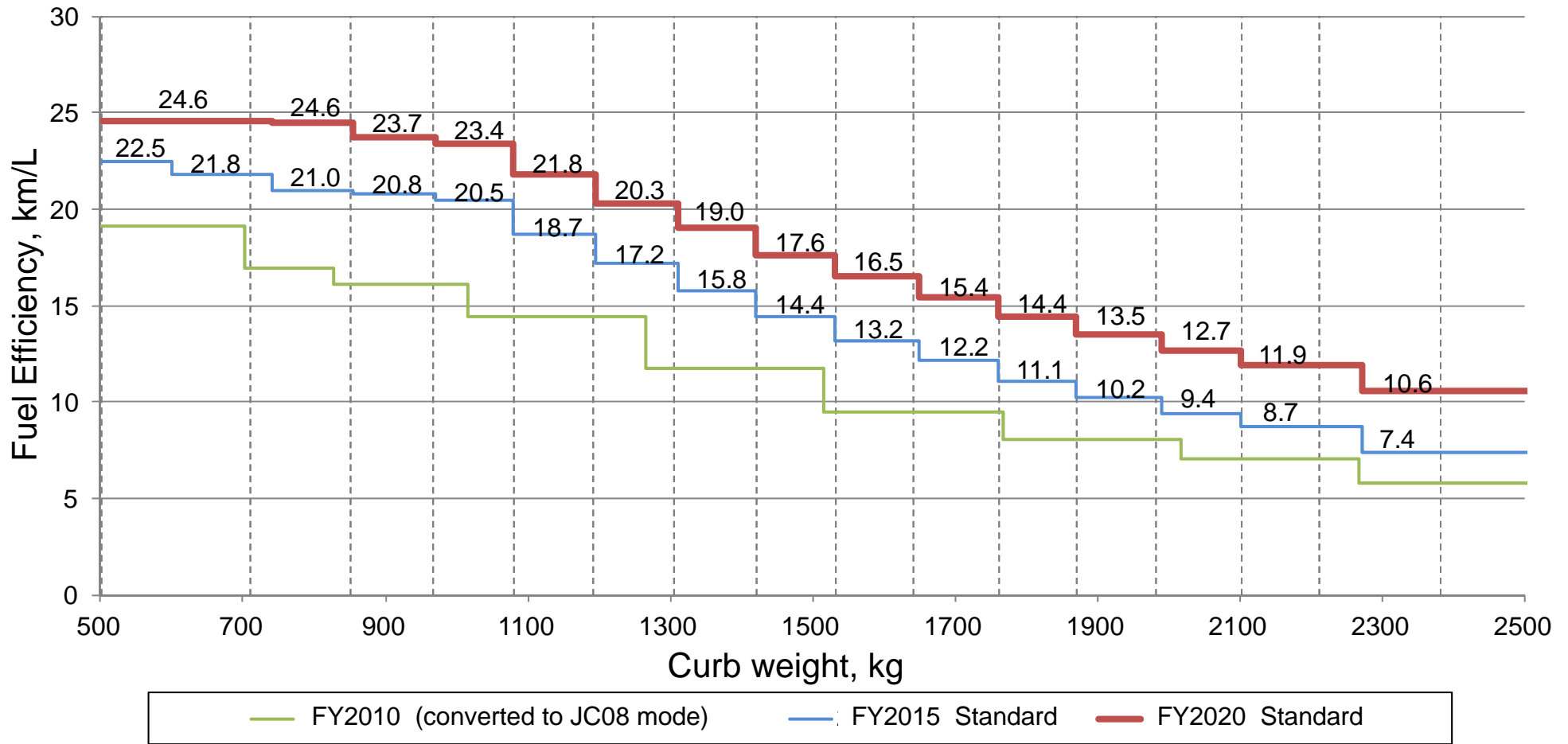
→ **Accomplished** in CAFE standard

# Encouragement to improve FE in heavier vehicles

- In the stair-shaped and weight-based standard, target value is coming down with increased weight. Therefore, there are some cases near the border areas that manufacturers increase the curb weight by adding the accessories to meet the standard in lower target values.
- To cope with these issues, in FY2020 standard, Japan increase target values in heavier vehicles by less than 10% from usual target values, which is decided considering the technical reality.
  - ex. Introduction of composite materials to the body



# Target Values






$$\text{CAFE value} = \frac{\sum \text{Sales volume in Each weight category}}{\sum \frac{\text{Sales volume in Each weight category}}{\text{Average FE in Each weight category}}}$$

≧

$$\text{CAFE standard} = \frac{\sum \text{Sales volume in Each weight category}}{\sum \frac{\text{Sales volume in Each weight category}}{\text{Target Values in Each weight category}}}$$

- The number of EV and PHEV models is too small, and we don't have enough information to make appropriate target values. So, we exclude EV and PHEV from the target scope of the new standard.
- Manufacturers can add EV and PHV by converting its electric efficiency to fuel efficiency, in case they meet the minimum requisite.

		Mitsubishi i-MiEV	Nissan Leaf	Toyota Prius Plug-in Hybrid
				
Max Speed		130km/h	140km/h	100km/h*
Motor	Max Power	47kW	80kW	60kW
	Rated Power	25kW	80kW	18kW
Cruising distance		160km (10-15 mode)	200km (JC08 mode)	23.4km (JC08 mode)*
Electric efficiency		8.00km/kWh (10-15 mode)	8.06 km/kWh (JC08 mode)	6.57 km/kWh (JC08 mode)
Electric energy (3.6 MJ/kWh), Gasoline energy (32.9 MJ/L) Converted FE = Electric efficiency ÷ 3.6 MJ/kWh × 32.9 MJ/L				
<b>Converted FE</b>		<b>73.1 km/L</b>	<b>73.7 km/L</b>	<b>39.2 km/L (combined)</b>

Source : Manufacturer's HP \* Electric drive distance

**Requisite condition:**

$$\text{CAFE value} \geq \text{CAFE standard} \times 0.9$$

← *To improve conventional vehicles' fuel efficiency in the same manner*

*Thank you for your attention*

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