Fuel Economy Regulation in Japan
(New standard for light duty, passenger vehicle, 2030FY)

METI, Japan
2019
Fuel Economy Regulation in Japan: CAFE, Top Runner Approach

- Japan has a fuel economy regulation based on “Act on the Rational Use of Energy”. : Top runner approach, CAFE regulation

Source: Joint council’s material by METI and MLIT
Current Fuel Economy Standard

- Current Standard of 16.8 km/L (JC08) is updated to 20.3 km/L in 2020FY.
- Japan’s fuel economy has improved steadily and it has already achieved 2020 target.

Source: Based on MLIT’s data
Joint council’s material by METI and MLIT
※Trend is based on only gasoline cars

2030 Fuel Economy Standard (WLTP)
Scope, Test Mode, Target Year of the New Standard (finalized in June, 2019)

Target Year

- 2015FY ⇒ 2020FY ⇒ 2030FY

(considering model change and expected innovation)

Scope (Light Duty, Passenger)

- 2020FY: Gasoline, Diesel, LP ⇒ 2030 FY: Gasoline, Diesel, LP, EV, PHV

Test Mode

- JC 08 ⇒ 2030FY WLTC (Exclude ExtraHigh phase)

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger cars</td>
<td>3.5 t</td>
</tr>
<tr>
<td>&gt; 3.5 t</td>
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<td>3.5 t</td>
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<td>&gt; 3.5 t</td>
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</tr>
<tr>
<td>Cargo cars</td>
<td>3.5 t</td>
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<tr>
<td>&gt; 3.5 t</td>
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</tbody>
</table>
New standard for light duty, passenger vehicle, 2030FY

Standard in FY 2030: 25.4km/L
(Result of average CAFE in FY2016: 19.2km/L ⇒ 2030: 25.4km/L (+32%))

$Y = -2.47E-06 X^2 - 0.000852 X + 30.65$

○ ~ 2,759kg :
○ 2,759kg ~ : 9.5
Evaluation of Energy Efficiency

- “Act on the Rational Use of Energy” defines the fuel economy by km/L.
- For the new standard, Well-to-Wheel approach is adopted. It counts energy consumed for serving fuels or electrical powers to vehicles.
- However, to secure the continuity from present fuel economy standard, fuel economy of EV/PHV/LP is set to Well-to-Wheel value divided by upstream energy consumption of gasoline.

\[
\Rightarrow \frac{6750}{EC} = \frac{8700 \times 0.714}{0.920}
\]

\[
\Rightarrow \frac{FEd}{1.1} = \frac{0.930}{0.920}
\]

\[
\Rightarrow \frac{FE_{LPG}}{0.74} = \frac{0.983}{0.920}
\]

※ Using national target of power generation Mix as of 2030 (Renewable 22-24% Nuclear 22-20%).
**Setting Fuel Economy Standard**

1. **Choose top runner vehicles (hereinafter “TR”).**
   Select top runner candidates from each powertrain and vehicle weight (per 200 kg). Calculate their fuel economy, and decide the top runner vehicles of each powertrain per weight.

2. **Assess technologies affecting fuel economy.**
   - a) Assess technologies improving fuel economy and expected penetration rate.
   - b) Assess elements which might worsen fuel economy such as expected introduction of new gas emission regulation.

3. **Determine relationship between weight and TR fuel economy for each powertrain and draw approximate line for each powertrain.**

4. **Draw regulation line by aggregating 3 lines with assumptions of penetration rate of each powertrain for each weight.**
**Target Diffusion of Next-Generation Vehicles and the Current Situation of Japan**


<table>
<thead>
<tr>
<th>Powertrain Type</th>
<th>FY 2018 (Result)</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Vehicle</td>
<td>61.7% (2.69 mil. units)</td>
<td>30~50%</td>
</tr>
<tr>
<td><strong>Next-Generation Vehicle</strong></td>
<td><strong>38.3% (1.67 mil. units)</strong></td>
<td><strong>50~70%</strong></td>
</tr>
<tr>
<td>Hybrid Vehicle</td>
<td>33.2% (1.45 mil. units)</td>
<td>30~40%※</td>
</tr>
<tr>
<td>Battery Electric Vehicle</td>
<td>0.53% (0.023 mil. units)</td>
<td>20~30%※</td>
</tr>
<tr>
<td>Plug-in Hybrid Vehicle</td>
<td>0.48% (0.021 mil. units)</td>
<td></td>
</tr>
<tr>
<td>Fuel Cell Electric Vehicle</td>
<td>0.01% (600 units)</td>
<td>3%※</td>
</tr>
<tr>
<td>Clean Diesel Vehicle</td>
<td>4.1% (0.177 mil. units)</td>
<td>5~10%※</td>
</tr>
</tbody>
</table>


④Draw regulation line by aggregating ③ lines with an assumption of penetration rate of each powertrain for each weight.
(EV/PHV penetration is assumed to be 20% based on the following policy target)
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Circle 2,759kg~: 9.5
Comparison with Tank-to-Wheel Regulation

- It is important to note that Well-to-Wheel standard includes emission/energy consumption of Well-to-Tank.
On Going Discussion

- Policy for promoting EV/PHV. (e.g. “Council for Promoting Electrified Vehicles” has been launched with more than 90 companies/organizations)

- Flexibility such as off-cycle Credit

- Midterm Review

- FCV
“Energy Efficiency

6. …the G20 Energy Ministers note the energy efficiency analysis such as Global Energy Efficiency Benchmark work undertaken by the IEA, which includes Well to Wheel analysis. They will further explore the potential and impact of energy efficiency, in such area as heating and cooling, buildings through international cooperation and sharing best practices. The G20 Energy Ministers encourage policy actions to significantly scale up investments and financing in energy efficiency across all sectors to help to achieve the energy transitions.”

*emphasize added
Thank You !