The 2012-2025 Light-Duty Vehicle Standards and the Mid Term Evaluation

Edward Nam
Director, Air Quality Modeling Center
EPA, Office of Transportation and Air Quality

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Greenhouse Gas Standards

- **Cars:**
  - 5.0% average rate of improvement for 2017-2025

- **Trucks:**
  - 3.5% average rate of improvement for 2017-2021
  - 5.0% average rate of improvement for 2022-2025

- **Projected 2025 fleet performance of 163 g/mile CO₂, equivalent to 54.5 MPG** (if from fuel economy improvements)
  - 2025 Car target = 143 g/mi CO₂
  - 2025 Truck target = 203 g/mi CO₂

- **Real-World GHG is 223 g/mi (equiv to ~40mpg)**
  - Excluding A/C improvements, and include real-world factors such as road grade, tire pressure, wind, road surface, fuel, temperature, etc
Standards are Based on Vehicles’ Footprints

- Each manufacturer has a unique car fleet standard and unique truck fleet standard, each derived from the footprint curves, based on the sales-weighted distribution of vehicles it produced
- Footprint curves assign a specific CO\textsubscript{2} or MPG target for each vehicle based on its footprint (roughly the area between the tires)
- No vehicle need meet its target. Compliance applies to fleet’s average performance

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Example Models</th>
<th>Example Model Footprint (sq. ft.)</th>
<th>EPA CO\textsubscript{2} Emissions Target (g/mi)*</th>
<th>NHTSA Fuel Economy Target (mpg)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example Passenger Cars</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compact car</td>
<td>Honda Fit</td>
<td>40</td>
<td>131</td>
<td>61.1</td>
</tr>
<tr>
<td>Mid-size car</td>
<td>Ford Fusion</td>
<td>46</td>
<td>147</td>
<td>54.9</td>
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<tr>
<td>Full-size car</td>
<td>Chrysler 300</td>
<td>53</td>
<td>170</td>
<td>48.0</td>
</tr>
<tr>
<td>Example Light-duty Trucks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small SUV</td>
<td>4WD Ford Escape</td>
<td>43</td>
<td>170</td>
<td>47.5</td>
</tr>
<tr>
<td>Midsize crossover</td>
<td>Nissan Murano</td>
<td>49</td>
<td>188</td>
<td>43.4</td>
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<tr>
<td>Minivan</td>
<td>Toyota Sienna</td>
<td>56</td>
<td>209</td>
<td>39.2</td>
</tr>
<tr>
<td>Large pickup truck</td>
<td>Chevy Silverado (extended cab, 6.5 foot box)</td>
<td>67</td>
<td>252</td>
<td>33.0</td>
</tr>
</tbody>
</table>

* In real-world, typically CO\textsubscript{2} is 25% higher and fuel economy is 20% lower than the values here
Projected Benefit of Light-duty Rules on Light-duty Vehicle Oil Consumption

- LDV BAU pre-rules
- + 2012-2016 LDV rule
- + 2017-2025 LDV rule

Oil consumption (MBPD)

- Business As Usual (pre-rules)
- LD GHG (2012-2016)
- LD GHG (2017-2025)
Combined Benefits of Rules

Current Imports

OPEC: 4.3 MBPD
Persian Gulf: 2.3 MBPD

- 2025: 2.1 MBPD
- 2030: 3.2 MBPD
- 2040: 4.8 MBPD

6 billion metric tons of GHG over lifetime of 2012-2025 vehicles
Costs and Benefits for Consumers

• **Cost for Technologies**
  - Projected to add ~ $1,800 to Manufacturer cost
  - Costs on top of 2012-2016

• **Savings for Consumers**
  - Significant savings to consumers at the pump:
    • Lifetime fuel savings of $5,700 to $7,400
    • Net lifetime savings of $3,400 to $5,000
    • Assuming $3.87 gas price in 2025, so savings even higher if gas prices rise
  - Payback of less than 3.5 years for a MY2025 vehicle
  - Consumers buying new vehicle on loan will save $12 per month, or $140 per year, over loan period (since monthly fuel savings more than offset higher loan payment due to increased vehicle cost)
Vehicle Technologies

- A wide range of technologies is available for automakers to meet the new standards
  - Advanced gasoline engines and transmissions, vehicle mass reduction, improved aerodynamics, lower rolling resistance tires, diesel engines, more efficient accessories, improvements in air conditioning systems

- Automakers expected to increase electric technologies, such as start-stop systems, mild and strong hybrids, plug-in hybrids, and all electric vehicles

- However, we project that automakers could meet the standards largely through advancements in internal combustion engines
  - The agencies project that automakers could only need to produce about 1-3% of the 2025 new vehicle fleet as EVs/PHEVs to meet the 2025 standards
EPA Technology Projections

Turbocharging

- 18 Bar BMEP or less
- 24 Bar BMEP
- 27 Bar BMEP

Yearly Projections:
- MY 2011: Low Bar BMEP
- MY 2016: Moderate Bar BMEP
- MY 2021: Increasing Tendency
- MY 2025+: Significant Growth
What Industry Leaders are Saying

• “Absolutely, ...fuel efficiency is the number one reason to buy....This is fantastic, this is why we feel so good that we have worked together to have regulations in line with what our customers really do want.”
  - Alan Mulally, CEO of Ford
    September 18, 2012

• “This standard is 14 years out. If you start giving up on projects that are 14 years out, we might as well choose another occupation.”
  - Sergio Marchionne, CEO of Fiat-Chrysler
    February 4, 2012
What are Recent Trends Showing?

- **Adjusted fuel economy, weight & horsepower**

Reference EPA report:
Trends by Vehicle Class
Historical Fleet Penetration Rate of Technologies

- Fuel Injection: 100%
- Multi-Valve: 50%
- Variable Valve Timing: 25%
- Lockup: 75%
- Front Wheel Drive: 25%

Years after First Use

Production Share
Technology Adoption Rates by Manufacturer

- Industry averages do not tell the whole story
- Any single manufacturer may adopt technologies at a different time and at a different rate
Technology Changes from 2008 to 2013

- MY 2008
- MY 2013

- VVT
- Multi-Valve
- GDI
- Turbo
- CD
- Hybrid
- Diesel
- 6 speed
- 7+ speed
- CVT
Vehicle Models Meeting Fuel Economy Thresholds in MY 2008 and MY 2013

My 2013 Vehicle Production Share that Meet Future CO2 Targets*

- By projected sales
- By technology type
- With projected A/C credits

*manufacturer fleets are subject to the standards, not individual vehicles
• EPA, NHTSA, and CARB committed to a midterm evaluation of the standards for MYs 2022-2025 vehicles

• Timing:
  – Agencies will issue draft Technical Assessment Report by November 2017
  – EPA final determination of whether standards should be revised by April 2018 (after public comment)
Mid Term Evaluation

MY 2017

Standards final unless changed by rulemaking

MY 2017-2021 Final

MY 2022-2025 Augural

Joint Technical Assessment Report
(draft no later than November 15, 2017)
EPA will Consider a Range of Factors

- The feasibility and practicability of the standards
- The availability and effectiveness of technology, and the appropriate lead time for introduction of technology
- Development of powertrain improvements to gasoline and diesel powered vehicles.
- Availability and implementation of methods to reduce weight, including any impacts on safety.
- Actual and projected availability of public and private charging infrastructure for electric vehicles, and fueling infrastructure for alternative fueled vehicles.
- The impact of the standards on reduction of emissions, oil conservation, energy security, and fuel savings by consumers
- The impact of the standards on the automobile industry
- Impacts on employment, including the auto sector.
- Costs, availability, and consumer acceptance of technologies to ensure compliance with the standards, such as vehicle batteries and power electronics, mass reduction, and anticipated trends in these costs.
- Payback periods for any incremental vehicle costs associated with meeting the standards.
- Costs for gasoline, diesel fuel, and alternative fuels.
- Total light-duty vehicle sales and projected fleet mix.
- Market penetration across the fleet of fuel efficient technologies.
- Any other factors that may be deemed relevant to the review.
CO2 Target Curves for Passenger Car
CO2 Target Curves for Light Trucks