Light-Duty Vehicle
Greenhouse Gas Standards

Center for Automotive Research Management Briefing Seminar

August 4, 2015
U.S. GHG/Fuel Economy standards provide significant benefits to climate, oil, consumers.
What does the future hold ... Empty Shelf or Smorgasbord?

“Yet maintaining the current pace of emissions reductions will be challenging because automakers have exhausted available technologies to reduce emissions, leaving “nothing sitting on the shelf””  Alliance of Automobile Manufacturers, Automotive News, March 26, 2015

OR

“We’ve got a whole smorgasbord or buffet of technology that can be implemented”  
Mark Reuss, GM President of North America, Automotive News, February 5, 2011
Auto industry ranks 3rd largest sector for global R&D investment

**Auto R&D Budget**
>$100 Billion/year
(>$270 Million/day)

*Source: Booz & Co.*
BCG report: Fuel economy standards are spurring auto innovation

“Regulatory and marketplace demands with respect to fuel efficiency, connectivity, and safety ... may well herald a new golden age of automotive innovation.”

“Consumers cite innovation – generally in key areas such as connectivity, safety, and fuel economy – as an important consideration in their purchase decision.”
Thompson Reuters lists Fuel Economy among the 5 “hottest areas” of automotive innovation

“Technology is most certainly playing a key role in developing next generation automobiles that will be more fuel efficient, safer, and fun to drive.”
Powertrain suppliers have a key role – and opportunity – to lead innovation

Half of the 2015 PACE awards (7 of 14) went to supplier innovations to improve fuel economy

"A new level of efficiency is being achieved with basic science -- new materials and electronics"
J. Ferron, Director of Judging, PACE Awards

Half of the Global Automotive Innovation Challenge awards (6 of 12) were also related to fuel economy technologies
GHG Compliance ... Good News So Far

Automakers beat standards first two years; widespread use of credit flexibilities

![GHG Compliance Chart]

- **11 g/mile** (Lower than Standard) for Model Year 2012
- **12 g/mile** (Lower than Standard) for Model Year 2013

**Greenhouse Gas Emission Standards for Light-Duty Vehicles**

**Manufacturer Performance Report for the 2013 Model Year**
Vehicles are meeting future standards with a variety of powertrains – mostly gasoline

More than 1.3 million MY 2015 vehicles are already meeting future standards for MY 2020 or beyond
Many of today’s top-selling vehicles* can already meet future standards

<table>
<thead>
<tr>
<th>Year</th>
<th>Ford F-150</th>
<th>Ram 1500</th>
<th>Chevy Silverado</th>
<th>Subaru Outback</th>
<th>Nissan Rouge</th>
<th>Honda CR-V</th>
<th>Jeep Renegade</th>
<th>Mazda 6</th>
<th>Honda Civic HF</th>
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<th>Ford Focus SFE</th>
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25 TRUCK configurations meet 2020 or later
26 SUV configurations meet 2020 or later
63 CAR configurations meet 2020 or later

*At least one variant of vehicle model
Vehicles are meeting future standards with a variety of technologies

<table>
<thead>
<tr>
<th>Engine</th>
<th>Trucks</th>
<th>SUVs</th>
<th>Cars</th>
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<tbody>
<tr>
<td>Diesel</td>
<td>Ford F-150</td>
<td>Ram 1500</td>
<td>Chevy Silverado</td>
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<td>Turbocharging</td>
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<td>High Compression Atkinson</td>
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<td>GDI</td>
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<td>Cylinder Deactivation</td>
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<td>Stop-start</td>
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<tr>
<td>Transmission</td>
<td>8+ Speed Transmissions</td>
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<td>CVT</td>
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<td>X</td>
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<tr>
<td>Road Loads</td>
<td>Mass Reduction*</td>
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<td>Tires**</td>
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<tr>
<td>Aero**</td>
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*compared to MY2008 curb weight
** Top 25% of class + other active/passive features
Manufacturers are aggressively adopting technology
NAS Report on Fuel Economy Technologies

- Comprehensive study – good early input to MTE process

- Affirmed that 2025 standards can be met through advanced gasoline vehicle technologies

- Many recommendations in line with our research plan already underway, others help prioritize
MYTHS

Standards ignore consumer choice

- Footprint-based standards designed to preserve consumer choice

Low gasoline prices threaten compliance

- Industry is complying as sales are booming
- If fleet mix changes, standards adjust

Low HEV/EV/PHEV sales mean 2025 standards can’t be met

- EPA standards are performance-based – no technology mandate
- EPA projected – and NAS reaffirmed – compliance largely from gasoline vehicles
Midterm Evaluation – Overview

• Technical review of longer term standards for 2022-2025

• In coordination with NHTSA and CARB

• EPA’s decision could go one of 3 ways:
  - Standards remain same; more stringent; less stringent
Midterm Evaluation – Technology Assessment

- Advanced technology assessment
- Mass reduction feasibility/cost study
- Cost teardowns
- Modeling tools
- Collaboration: NHTSA, CARB, DOE, Canada
Midterm Evaluation – Powertrain Benchmarking

- Testing 23 vehicles/engines across a wide range of powertrains and segments
  - Cars, SUVs, pickups
  - Naturally aspirated and boosted engines
  - Gasoline and diesel
  - I4 and V6 engines
  - 6 and 8+ speed AT/DCT transmissions and CVTs
Midterm Evaluation – Market Research

• Vehicle sales
• Fleet mix changes (cars v. trucks)
• Technology penetration in fleet
• Consumer satisfaction surveys
• Automotive reviews
Automotive Reviewers Like Fuel Economy Technologies

- EPA study finds 4 out of 5 mentions of FE technologies in auto reviews have positive or neutral ratings

- Most positives (80-100%): active aero, mass reduction, cylinder deactivation, LEDs, GDI, turbocharging

- Most negatives (~30%): CVTs and stop-start

- But no universal issues with technologies -- some manufactures implementing better than others
## Midterm Evaluation Timeline

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<thead>
<tr>
<th>Year</th>
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<tr>
<td>2012</td>
<td>Final Rule 2017 - 2025 Standards</td>
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<tr>
<td>2013</td>
<td>Draft Technical Assessment Report (TAR) for public comment</td>
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<tr>
<td>2016</td>
<td>Proposed Determination/NPRM for public comment</td>
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<td>2017</td>
<td>Final Determination/FRM</td>
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Going forward

- Extensive stakeholder outreach
- Data-driven
- Transparent: we’ll share results of technical work along the way

www.epa.gov/otaq/climate/mte.htm