Phase 1 and 2 Greenhouse Gas (GHG) Standards and the Tractor-Trailer GHG Regulation

Presentation for Chinese Ministry of Ecology and Environment (MEE)

November 28, 2018
Presentation Outline

- California’s GHG Reduction Goals
- CARB’s Tractor-Trailer GHG Regulation
- Phase 1 and 2 GHG Standards
  - California Differences
- Trailers
- Gliders
- Contacts
California’s GHG Reduction Goals

- Reducing GHG emissions to 1990 levels by 2020 (AB 32)
- Reducing GHG emissions to 40% below 1990 levels by 2030 (SB 32)
- Reducing GHG emissions to 80% below 1990 levels by 2050 (Governors’ Executive Order S-3-05)
Medium- and Heavy-Duty Vehicles are a Significant Source of GHG Emissions

- Medium- and heavy-duty trucks (8,501+ lbs GVWR) account for 1/5 of transportation sector GHG emissions
- Fastest growing transportation sector in the U.S. and globally

Source: U.S. Energy Information Administration
Annual Energy Outlook 2014
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California’s First GHG Regulation for HD Vehicles: CARB’s Tractor-Trailer GHG Rule

• Adopted in 2008; Effective January 1, 2010
• Fleet Rule: Applies to owners and operators
• Also impacts California-based shippers and brokers
• Reduces GHG emissions from long-haul tractor-trailers by improving
  □ Tractor aerodynamics
  □ 53’+ box-type trailer aerodynamics (skirts, etc.)
  □ Tire rolling resistance
• Based on elements of U.S. EPA SmartWay Program
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GHG Rule Structure (8,501+ lbs GVWR)
- Covers engines and three vehicle categories
- Phase 2 introduces trailer requirements

- Combination Tractors
- Vocational Vehicles
- Pickup Trucks and Vans
- Trailers Pulled by Combination Tractors

NEW in Phase 2!
### Adoption of Federal and California HD GHG Standards

<table>
<thead>
<tr>
<th>U.S. GHG Standards</th>
<th>California GHG Standards</th>
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<tbody>
<tr>
<td>2011 – adopted the first national GHG standards for medium- and heavy-duty engine</td>
<td>2013 – harmonized with federal Phase 1 program</td>
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<td>and trucks (Phase 1)</td>
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<td>2016 - adopted the second phase of GHG standards (Phase 2)</td>
<td>Feb. 2018 – Proposed Phase 2 approved for adoption by Board</td>
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<td>Rulemaking will be final in early 2019</td>
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- Phase 1 will reduce heavy-duty truck CO$_2$ in California by ~12% in 2030.
- Phase 2 program is expected to lower CO$_2$ emissions beyond Phase 1 levels by an additional ~13% in 2030. By 2050, those reductions will grow to ~24%.
California Phase 2: Harmonized with the National Program

• Largely harmonized with U.S. EPA’s Phase 2 GHG standards
  • Same structure and stringency levels
  • Same timing (except CA trailer standards take effect in model year 2020)
  • Would allow CARB to certify engines/vehicles and enforce Phase 2 in California

• Some distinctions to credit, labeling, and reporting provisions

• Concurrently, amended TTGHG Rule to allow trailer fleet owners to comply using Phase 2 certified trailers/technology
Phase in of GHG Standards

Phase 1
- Model Year 2014 (2015 in CA)
- Model Year 2017

Phase 2
- Model Year 2018 trailers (2020 in CA)
- Model Year 2021
- Model Year 2024
- Model Year 2027
  More stringent GHG emission standards for medium- and heavy-duty trucks
Compliance with GHG Standards

- Demonstrate tractors and vocational vehicles compliance using GHG Emissions Model (GEM)
- Pickups trucks and vans compliance based on dynamometer testing
- Trailers compliance equation approach, based on GEM model

<table>
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<tr>
<th>Phase 1 Technologies</th>
<th>Phase 2 Technologies</th>
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<tbody>
<tr>
<td>Engine improvements</td>
<td>Phase 1 technologies</td>
</tr>
<tr>
<td>Low rolling resistance tires</td>
<td>Engine, transmission, and driveline improvements</td>
</tr>
<tr>
<td>Mass reduction</td>
<td>Electrified accessories</td>
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<tr>
<td>Improved aerodynamics</td>
<td>Lower tire rolling resistance</td>
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<tr>
<td>Reduced idling</td>
<td>Automatic tire inflation and tire pressure monitoring systems</td>
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GHG Credit Programs, Multipliers to Encourage Use of Zero Emission Vehicles

- Averaging, Banking, and Trading

<table>
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<tr>
<th>Optional Credits</th>
<th>Early Credits</th>
<th>Advanced Technology Credits</th>
<th>Innovative Technology / Off-Cycle Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>1.5x multiplier</td>
<td>1.5x multiplier</td>
<td>No multiplier</td>
</tr>
<tr>
<td>Phase 2</td>
<td>3.5x (Plug-in Hybrid Electric Vehicles) 4.5x (All-Electric Vehicles) 5.5x (Fuel Cell Vehicles)</td>
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Federal Phase 2 includes trailer standards starting with 2018 MY

- Truck Trailer Manufacturers Association challenged the standards in court, saying U.S. EPA lacks authority over trailers

- U.S. Court of Appeals actions stayed the trailer requirements

- Federal Bill proposed July 2018 would eliminate federal funding to enforce U.S. EPA Phase 2 trailer standards (HR 6147)
California Phase 2 Requirements and TTGHG Regulation Amendments

• Adopt California Phase 2 trailer standards equivalent to the U.S. EPA Phase 2 trailer standards (implementation begins with 2020 MY)

• Modify California TTGHG regulation to give trailer fleet owners two new compliance options:
  • Phase 2 certified trailer, or
  • Trailer retrofitted with Phase 2 compliant aero and tires
CARB’s Next Steps Regarding Trailers

- Implement California Phase 2 trailer certification starting with 2020 MY, for trailers sold in California
- Implement modified TTGHG rule
  - CARB to review and approve Phase 2 aerodynamic performance and LRR tire test data not being processed by U.S. EPA due to stay
- Provide flexibility to manufacturers left in limbo while U.S. EPA not implementing trailer requirements
- If U.S. EPA rescinds trailer requirements, propose further modifications to TTGHG to Board in ~2019/2020:
  - Would impact owners of trailers that travel in California (regardless of State of origin)
  - Expand TTGHG applicability (e.g., long and short box-vans, non-box trailers)
  - Increase stringency in-line with Phase 2 trailer requirements
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California Phase 2 Includes Glider Restrictions

- Gliders are new chassis/cabs with refurbished engine, transmission and rear axle
  - Most gliders powered by pre-2002 engines with no exhaust aftertreatment

- Phase 2 standards close glider loophole
  - Glider vehicles must comply with GHG standards
  - Glider engines must comply with GHG and criteria pollutant standards for model year corresponding to the vehicle’s date of manufacture
  - Effective January 1, 2018, with some transitional flexibilities
    - limits to 300 gliders/year

U.S. EPA found:
Glider NOx:
4 to 40 times higher
Glider PM:
50 to 450 times higher
U.S. EPA / NHTSA Revisiting Glider Requirements

- Federal Phase 2 contains restrictions on dirty gliders (limits to 300 gliders/year)
  - Glider industry petitioned U.S. EPA for reconsideration in July 2017
  - U.S. EPA released proposal (NPRM) on gliders in November 2017
    - Would repeal the current U.S. EPA Phase 2 glider requirements
    - U.S. EPA now says glider vehicles and engines are not “new” so they lack authority
  - U.S. EPA issued a “Conditional No Action Assurance” memo on July 6, 2018 that would result in non-enforcement of the 300 dirty glider/year cap.
    - Environmental organizations, CARB, California, 16 other states and the District of Columbia, filed motions requesting that the U.S. Court of Appeals for the D.C. Circuit vacate or stay U.S. EPA’s action and review U.S. EPA’s action in issuing that action.
    - Acting U.S. EPA Administrator withdrew the non-enforcement order July 26, 2018
  - U.S. EPA’s Science Advisory Board currently investigating the scientific/technical basis of the NPRM
CARB’s Next Steps Regarding Gliders

- Adopted the final Federal Phase 2 glider kit requirements with one change:
  - Modify the 300 gliders/year exemption to allow only \textit{2010 and newer model year} engines in gliders

- CARB's Options to Address U.S. EPA Repeal of Glider Requirements:
  - Challenge U.S. EPA’s action, as appropriate
  - Increase truck and bus enforcement to find noncompliant gliders
    - AB 2564 would establish minimum fine of $25,000
  - Work with states to opt-in to California’s truck and bus rule
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Further Information

CARB Website
https://ww2.arb.ca.gov/

California Phase 1 and 2 GHG Standards
https://ww2.arb.ca.gov/our-work/programs/ghg-std-md-hd-eng-veh

Heavy-Duty Tractor-Trailer GHG Regulation
https://www.arb.ca.gov/cc/hdghg/hdghg.htm