

Proposed Amendments to the Heavy-duty Diesel Vehicle Emission Control System Warranty Regulations

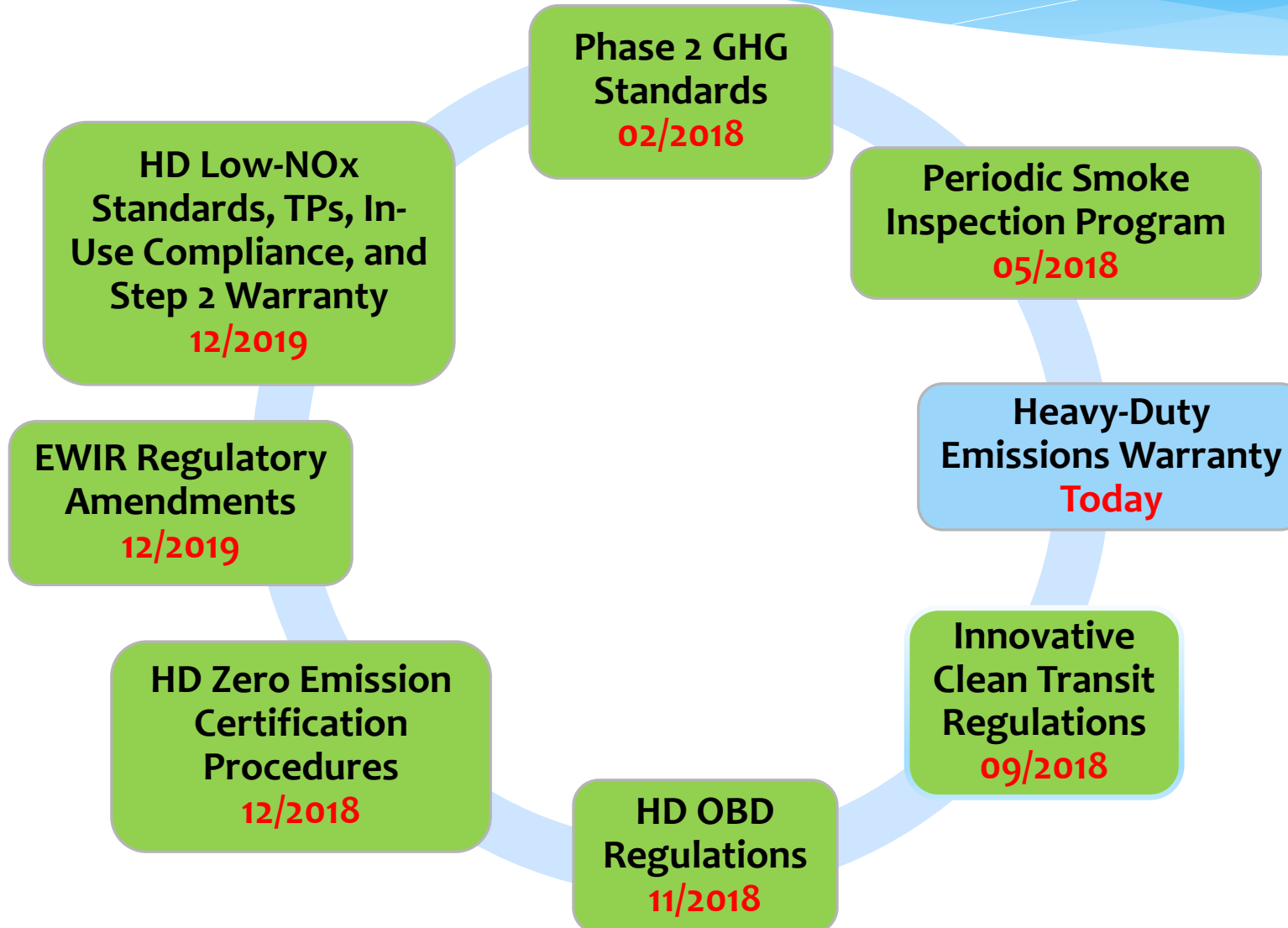
June 28, 2018

Sacramento, California

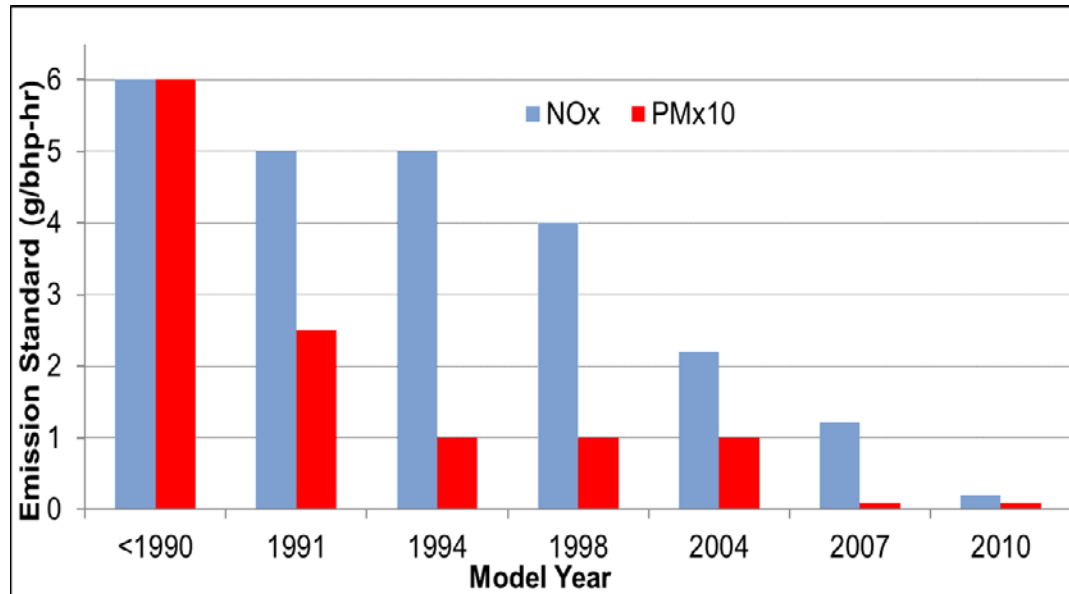
Presentation Outline

- Background
- Current Warranty Requirements
- Proposed Amendments
- Costs and Emission Benefits
- Next Steps
- Staff Recommendation

CARB Heavy-duty Rulemakings



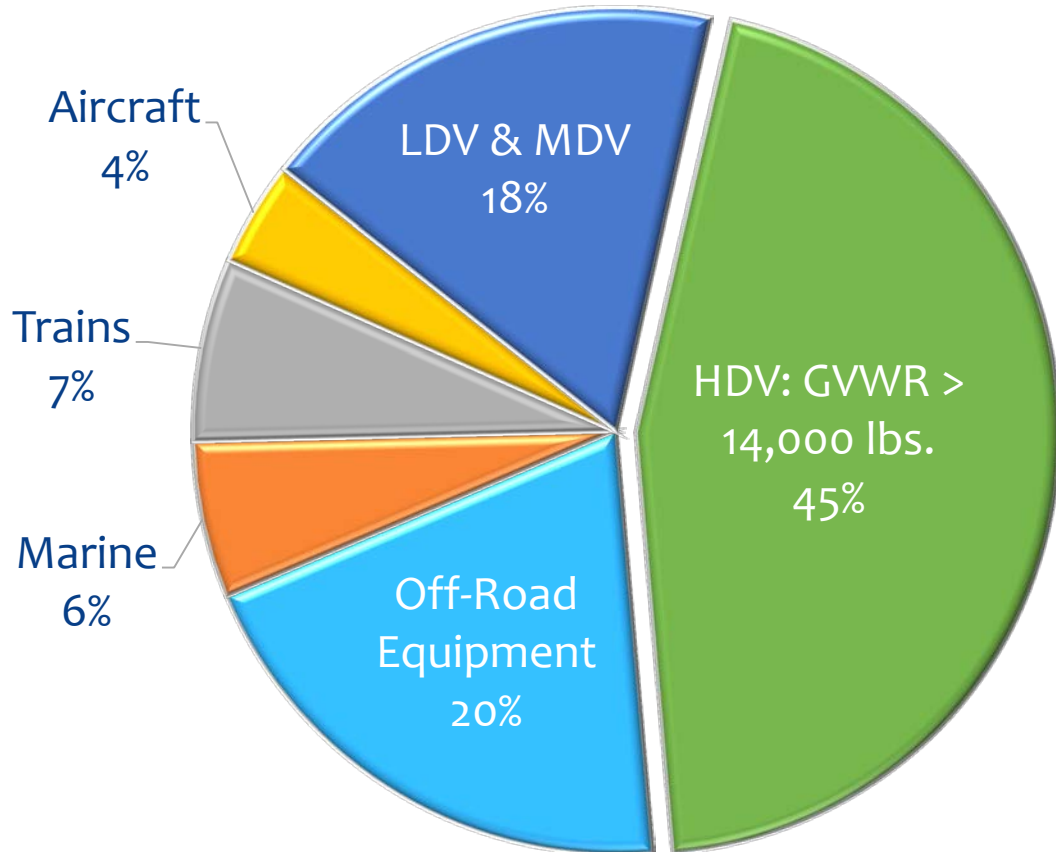
Increasingly Stringent HDV Standards Required Advanced Aftertreatment Devices



- **2007 – 2009**
 - Diesel Oxidation Catalysts and Catalyzed Diesel Particulate Filter (DPF)
 - **2010 and later (Current Standards)**
 - DOC, DPF, Urea-Selective Catalytic Reduction, and Ammonia Slip Catalyst
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- Manufacturers must certify that engines and aftertreatment will meet these standards through **useful life**

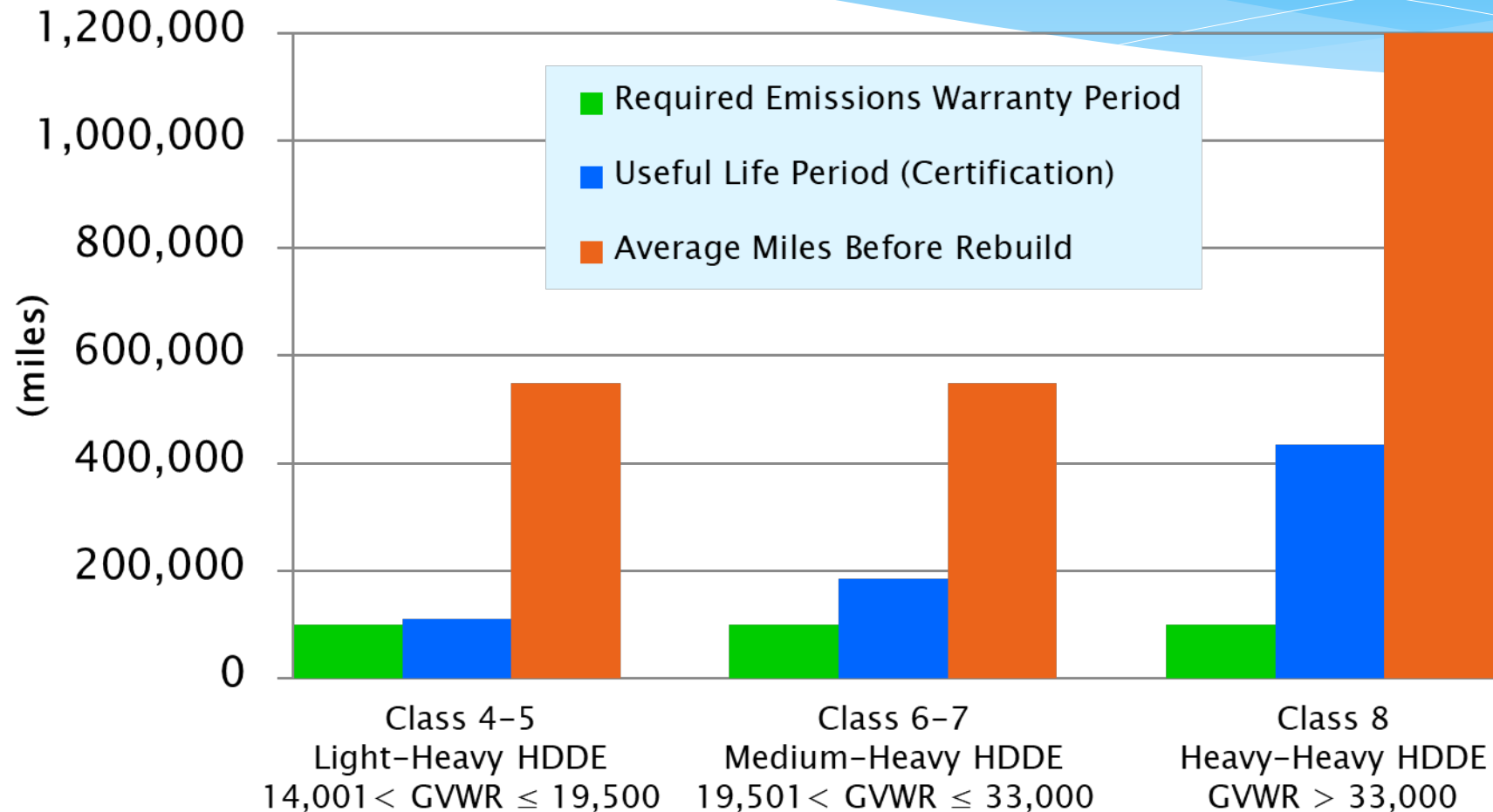
Further Emission Reductions Needed from Heavy-duty Vehicles > 14,000 GVWR

2016 Statewide Mobile Source NOx Emissions



- Heavy-duty vehicles > 14,000 lbs GVWR emit:
 - 45% of total mobile source NOx
 - 19% of mobile source diesel PM 2.5
- Need to further reduce NOx from heavy-duty vehicles by 90%
 - (SIP Commitment)
- Also need to reduce toxic diesel PM

Warranty Coverage vs. Service Life



Evidence of Heavy-duty Durability Issues: High Warranty Claim Rates for Recent Models

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- Claim rates during all current warranty periods for the worst engine families:
 - > **100%** for turbochargers
 - > **40%** for diesel particulate filters, injectors, and exhaust gas recirculation (EGR) coolers
- Average claim rates:
 - > **10%** for EGR valves and coolers, injectors, turbochargers, other sensors, and the Electronic Control Module

Evidence of Heavy-duty Durability Issues: High In-Use Emissions

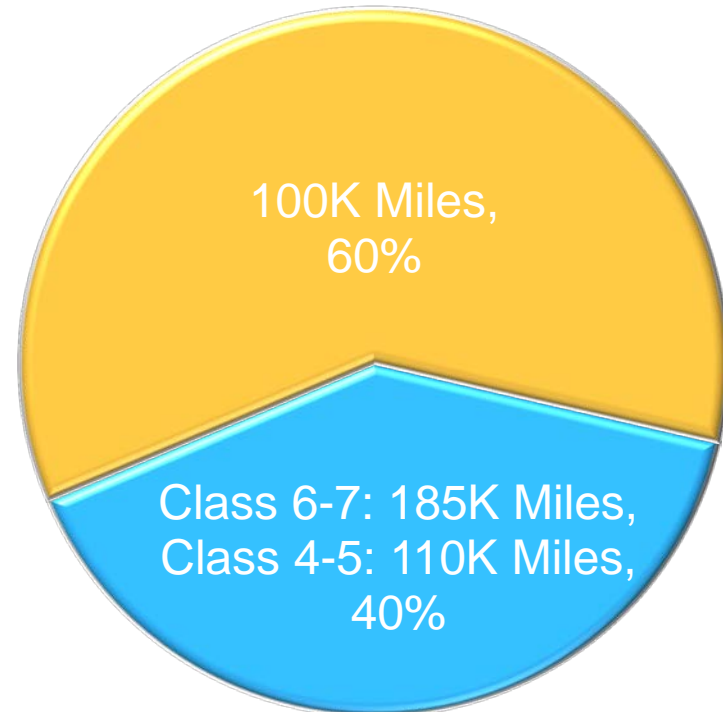
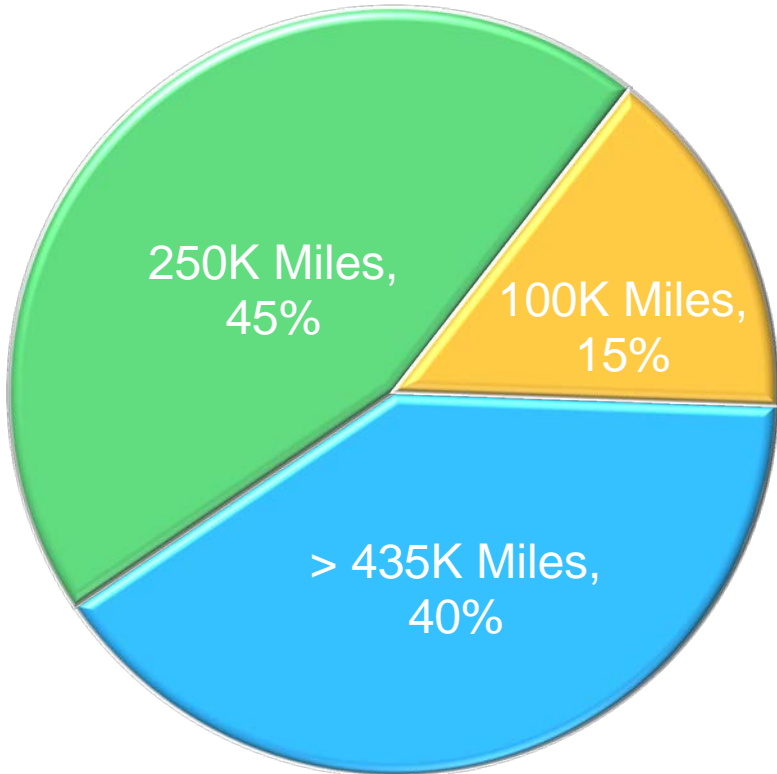
- Heavy-Duty In-Use Compliance Program
 - Two-thirds failed Not-To-Exceed (NTE) testing outside warranty, but within useful life
 - Some as high as 4.5 g/bhp-hr (> 22 times the standard)
- Truck and Bus In-Use Surveillance Program
 - Two-thirds had NO_x emission levels above their emission standards, but within useful life
 - Some levels were > 10 times the NO_x standard

Current Heavy-duty Diesel Emissions Warranty Requirements

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- A period of use of five years, 100,000 miles, or 3,000 hours of operation, whichever first occurs
 - HD Warranty requirements have not been amended in 40 years (adopted in 1978)
- 3,000-hour warranty limit applies only to California-certified heavy-duty diesel vehicles

Most Heavy-duty Vehicle Owners Already Purchase Extended Warranties



Proposed Amendments

- Longer Heavy-Duty Diesel Warranty Periods
- Elimination of the 3,000-Hour Limit
- Updated Maintenance Intervals
- Turbochargers and EGR Systems
- Clarifying Warranty Coverage

Longer Warranty Periods

Gross Vehicle Weight Rating (GVWR)	WARRANTY	WARRANTY
Diesel Class 8 Heavy-Heavy GVWR >33,000 lbs.	100,000 miles 5 years / 3,000 hours	350,000 miles 5 years
Diesel Class 6-7 Medium-Heavy 19,500 < GVWR ≤ 33,000 lbs.	100,000 miles 5 years / 3,000 hours	150,000 miles 5 years
Diesel Class 4-5 Light-Heavy 14,000 lbs. < GVWR ≤ 19,500 lbs.	100,000 miles 5 years / 3,000 hours	110,000 miles 5 years

Longer Warranties Would Reduce Emissions

- Incentivize timely repair of malfunctioning emissions-related components
 - Vehicle owners might not otherwise fix if they had to pay
- Encourage better vehicle maintenance and less tampering
 - To keep from voiding warranty
- May encourage manufacturers to develop more durable components

Elimination of the 3,000-Hour Limit

- Applies only to California-certified diesel vehicles
 - Manufacturers certify federally without the 3,000-hour limit
- Impacts low mileage vocational vehicles
 - 5-year warranty limit ensures warranty lengths for such vehicles are not unreasonably long
 - 3,000 hour limit lasts ~ 1½ to 3 years



Manufacturer vs. Vehicle Owner Responsibilities

- Emissions warranty:
 - Manufacturer corrects defective emissions-related parts
- Maintenance:
 - Vehicle owner keeps emissions control systems functioning properly by cleaning, adjusting, repairing, or replacing parts as scheduled by manufacturer
- Current maintenance intervals could negate the emission benefits of the proposed lengthened warranty periods

Updated Minimum Repair/Replacement Maintenance Intervals

- Proposing updated minimum repair/replacement intervals
- No changes to maintenance intervals for cleaning and adjusting

Special Requirements for Turbochargers and EGR Systems ¹⁷

- If replacement is scheduled during useful life, the manufacturer pays
 - Catalyst beds and DPF elements now
- Significant emissions and cost increases
 - Failed turbochargers and EGR systems can increase emissions by more than 100%
 - EGR system and Turbocharger replacements cost \$4,300 to \$5,100

Variable Turbine Geometry Diesel Turbocharger



EGR System (Valve Plus Cooler)

Clarifying Warranty Coverage

- The definition of a “warranted part”
- Warranty coverage to include any malfunction that causes the HD OBD Malfunction Indicator Light to illuminate
- Manufacturer liability during service inspections
- Continuing warranty coverage following scheduled replacements



Applicability

- New Production HDVs
- 2022 and Subsequent Model Year HDVs
- California Certified and Registered HDVs
- Compression-Ignition Certified HDVs
- Classes 4 - 8 HDVs (> 14,000 GVWR)
- Criteria Pollutant Standards

Cost of the Warranty Amendments

- Manufacturers are expected to raise vehicle prices
 - Somewhat offset for vehicle owners by savings at time of repair
- Average additional capital costs ~\$177 to \$752 per vehicle
 - ~\$15 per month on average when amortized
- Average out-of-pocket expenses avoided ~\$149 to \$437 at time of repair
- Expected increase in vehicle uptime because of more durable parts

Projected Emission Benefits

- Modest gains, but an important first step
- Cost-Effectiveness = \$2.97 to \$7.91 per pound of NOx reduced
 - Compares favorably to other recent rulemakings
- 40 premature mortalities avoided

Statewide Estimated Benefits

Year	NOx Tons/Day
2030	0.75
2040	1.49

First Step Toward More Comprehensive Overhaul of Heavy-duty Standards

- Today's proposal:
 - Modest increases in length of warranty, updated maintenance intervals, other improvements

- Late 2019:
 - Major comprehensive rulemaking planned
 - More stringent NOx standards, new test procedures, and in-use compliance program revisions
 - Further lengthening of useful life and warranty periods – Step 2

Staff Recommendation

- Approve written response to environmental comment
- Approve staff's proposal for adoption:
 - Longer Warranty Periods
 - Elimination of the 3,000-Hour Limit
 - Updated Maintenance Intervals
 - Turbochargers and EGR Systems to Useful Life
 - Clarifications of Warranty Coverage
 - 15-Day Changes

