California Air Resources Board

Proposed Heavy-Duty Vehicle (HDV) Warranty Period Amendments

Public Workshop

at

South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA, 91765

January 12, 2018

Webcast Information

- During the workshop, please submit any questions and comments to the following email address:

hdwarrantyworkshop@arb.ca.gov

(all one word, lowercase, no spaces, no numerals)

Outline

- On-Road Heavy-Duty Rulemaking Schedule
- Need for Longer Warranty
- Need to Amend Current Maintenance Interval Provisions That Effectively Truncate Warranty Period
- Proposed Amendments
- Emission Benefits and Cost
- Proposal's Impacts on Vehicle Buyers and Parts Manufacturers
- Warranty Survey Overview and Q/A

CARB On-Road Heavy-Duty Rulemakings

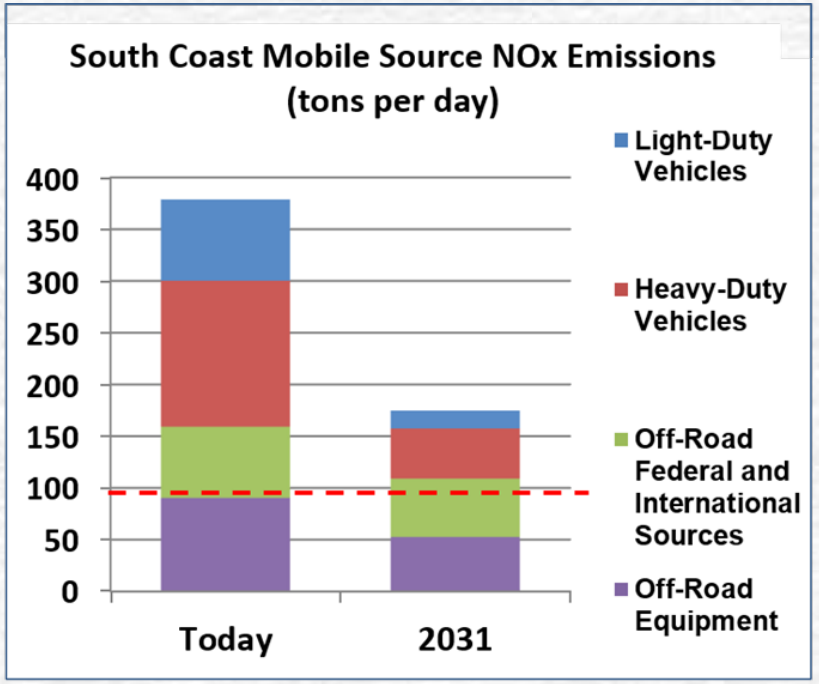
Rulemaking	Scheduled Hearing Date
California Phase 2 GHG Standards	February 2018
Revisions to Periodic Smoke Inspection Program	May 2018
Revisions to the HD Warranty Regulations	May 2018
Revisions to Innovative Clean Transit Regs	June 2018
Heavy-Duty Vehicle Zero Emission Certification Procedures	June 2018

CARB On-Road Heavy-Duty Rulemakings (Continued)

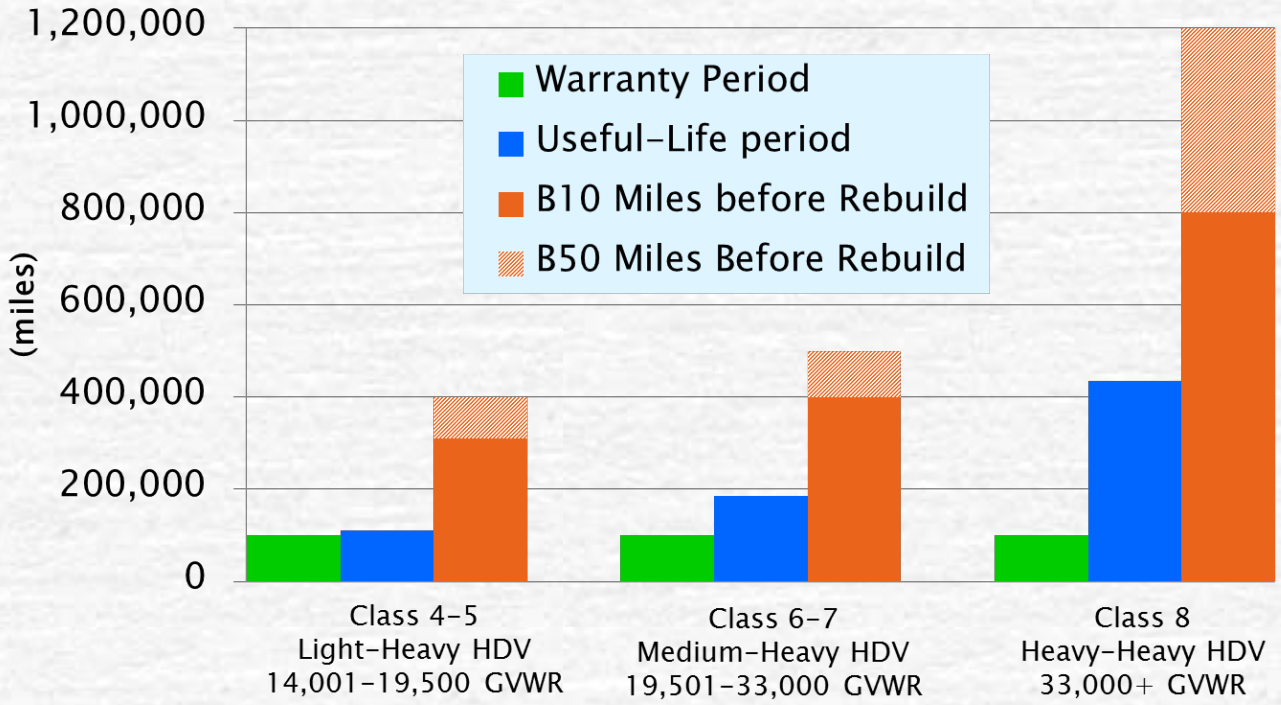
Rulemaking	Scheduled Hearing Date
Revisions to Advanced Clean Local Truck Regs	November 2018
Revisions to Heavy-Duty OBD Regs	Late-Fall 2018
Revisions to Warranty Information and Reporting Regs	December 2019
Revisions to the - NOx Standard and Test Procedures, - In-Use Compliance Program, and - Durability/Useful Life Requirements	Late 2019
Heavy-Duty Inspection and Maintenance	2020

South Coast - Emissions Inventory

- NOx benefits in 2031 from current program
  - Mobile source emissions reduced over 50 percent
  - Heavy-duty vehicle emissions reduced by nearly 70 percent
- Heavy-duty trucks and federal sources remain largest contributors
- Heavy-duty trucks emit 33% of statewide NOx
- Need to further reduce heavy-duty NOx by 90 percent
- Also need to reduce toxic diesel PM



Warranty vs. Real-World Longevity



- The real-world operational longevity of HDVs is far greater than the currently required warranty and useful-life periods based on industry established B10 and B50 statistics.

Benefits of Longer Warranty

- More timely repair of malfunctioning emission-related components that HDV owners would not otherwise fix if they had to pay out-of-pocket
- Better maintenance and less tampering
- More HDVs remaining at, or below, applicable emission standards longer in-use
- Longer warranty period for HDVs may encourage manufacturers to develop more durable components
- Lower NOx emissions – 0.84 tons per day reduction Statewide in 2030

Early Adoption is Important

- Heavy-duty vehicles are already “required” to remain durable throughout the engine’s useful life, but this is not happening
- Longer warranty periods will protect truck owners from “unfair” repair costs when faced with expected stricter PSIP and HD I/M requirements
- Lengthening warranty now does not impede future standards, but is needed to ensure that current standards are being met throughout useful-life
- Long-term emission reductions will be greater the sooner warranty is lengthened

Current Maintenance Interval Provisions Effectively Truncate Warranty Period

- Existing maintenance interval provisions would allow manufacturers to schedule replacements during the proposed lengthened warranty period at the vehicle owner's cost
- 13 CCR 2036 (d)(3) truncates the warranty period at the first replacement interval, thus potentially rendering lengthened warranty periods ineffective
- Vehicle owners would have little incentive to perform repairs in a timely manner should they still have to pay "out of pocket" (e.g., to replace a turbocharger that is leaking oil, but has not yet lost boost capability)

Summary of Proposed Warranty Amendments

- Lengthen required emissions warranty mileage period for heavy-duty diesel vehicles
- Prohibit manufacturers from requiring turbocharger or EGR system replacement during useful life at owner's expense
- Update minimum replacement maintenance intervals
- Link HD OBD to the definition of a Warranted Part

Lengthened Emissions Warranty

DIESEL VEHICLE/ ENGINE CATEGORY	CURRENT WARRANTY	PROPOSED WARRANTY
Class 8 Heavy-Heavy GVWR > 33,000 lbs.	100,000 miles 5 years 3,000 hours	350,000 miles 5 years
Class 6-7 Medium-Heavy 19,500 lbs. < GVWR ≤ 33,000 lbs.	100,000 miles 5 years 3,000 hours	150,000 miles 5 years
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

Turbochargers and EGR

- Similar to existing prohibitions for catalytic converters and DPF elements, manufacturers would not be allowed to schedule these parts for replacement during useful life unless the manufacturer pays for their replacements
- Special treatment is needed for turbochargers and EGR systems due to potential for inducing catastrophic emission failures and the high costs of replacement:
  - Failing Turbochargers and EGR systems can increase NOx emissions to more than 100% over applicable standards
  - Costs of Turbocharger and EGR cooler replacements exceed the costs of Catalyst and DPF replacements

Revised Maintenance Intervals

- Extend minimum repair/replacement intervals to shortest interval already needed by any manufacturer
  - For example, for Heavy HDV DEF filter, the shortest repair/replacement interval specified by any manufacturer in owners' manuals is 100,000 miles. So the proposed new minimum repair/replacement interval is 100,000 miles.
- Set minimum repair/replacement intervals at applicable useful life for parts without indicated intervals in owners' manuals
- See separate handout for proposed revised maintenance intervals

On-Board Diagnostics (OBD)

- System using engine's computer for monitoring performance of emissions-related parts
- Uses various sensors to judge performance of emission controls
- Activates Malfunction Indicator Light (MIL) on vehicle's instrument panel when an emissions-related malfunction is detected
- Identifies/stores malfunction-related "fault codes"
- OBD benefits include:
  - Helping to keep emissions low by identifying emission controls in need of repair
  - Providing for effective/inexpensive emission inspections
  - Eliminating unnecessary repairs

HD OBD and Warranty

- HD OBD was adopted in 2005 for vehicles > 14,000 lbs. GVWR
  - Fully implemented with 2013 model year
- HDVs with OBD are monitoring emissions-related parts and activating the MIL if emission increases or monitor failures are detected
- Defective parts under warranty need to be repaired
- Staff proposes to clarify that “warranted parts” include “any part that can affect emissions,” including any defect “which would cause the vehicle's OBD MIL to illuminate”
  - OBD MIL already linked to warranty for light-duty vehicles

Applicability

- New Model-Year HDVs
  - — Warranty periods for in-use HDVs will not be modified
- 2022 and Subsequent Model Year HDVs
- California Certified and Registered HDVs
  - — Does not include federally certified vehicles operating in California
- Compression-Ignition Certified HDVs
  - — Does not include Otto-cycle, hybrid, or electric vehicles
- Classes 4 - 8 HDVs (> 14,000 GVWR)
- Criteria Pollutant Standards Only
  - — Warranty periods for GHG Standards will not be modified

Clarifications

- Modify the definition of a warranted part in 13 CCR 2035 (c)(2)(A) to include “any part that can affect emissions,” as is already the case for light-duty vehicles, and is currently implied for HDVs by the definition of an “Emissions-related part” in 13 CCR 1900 (b)(3)
- Clarify 13 CCR 2040 to be consistent with the requirement in 13 CCR 2036 (d)(2) that requires manufacturers to pay to replace defective components discovered during inspections

Projected NOx Emission Benefits

- Baseline:
  - 40% of all Class 4-8 vehicles warranted to useful-life
  - 45% of all Class 8 vehicles now warranted to 250,000 miles
- Emission benefits:
  - Emission benefits estimated based on EMFAC2017
  - Lengthening warranty incentivizes repairs because the vehicle owner is more likely to do repairs if manufacturer pays
  - Proposed warranties would reduce frequency of mal-maintenance and malfunction of HD fleet, resulting in lower emissions

Projected NOx Emission Benefits (continued)

California NOx Emission Benefits (tons per day)	
Calendar Year	**2022 Implementation**
2022	0.02
2030	0.84
2031	0.93
2040	1.54

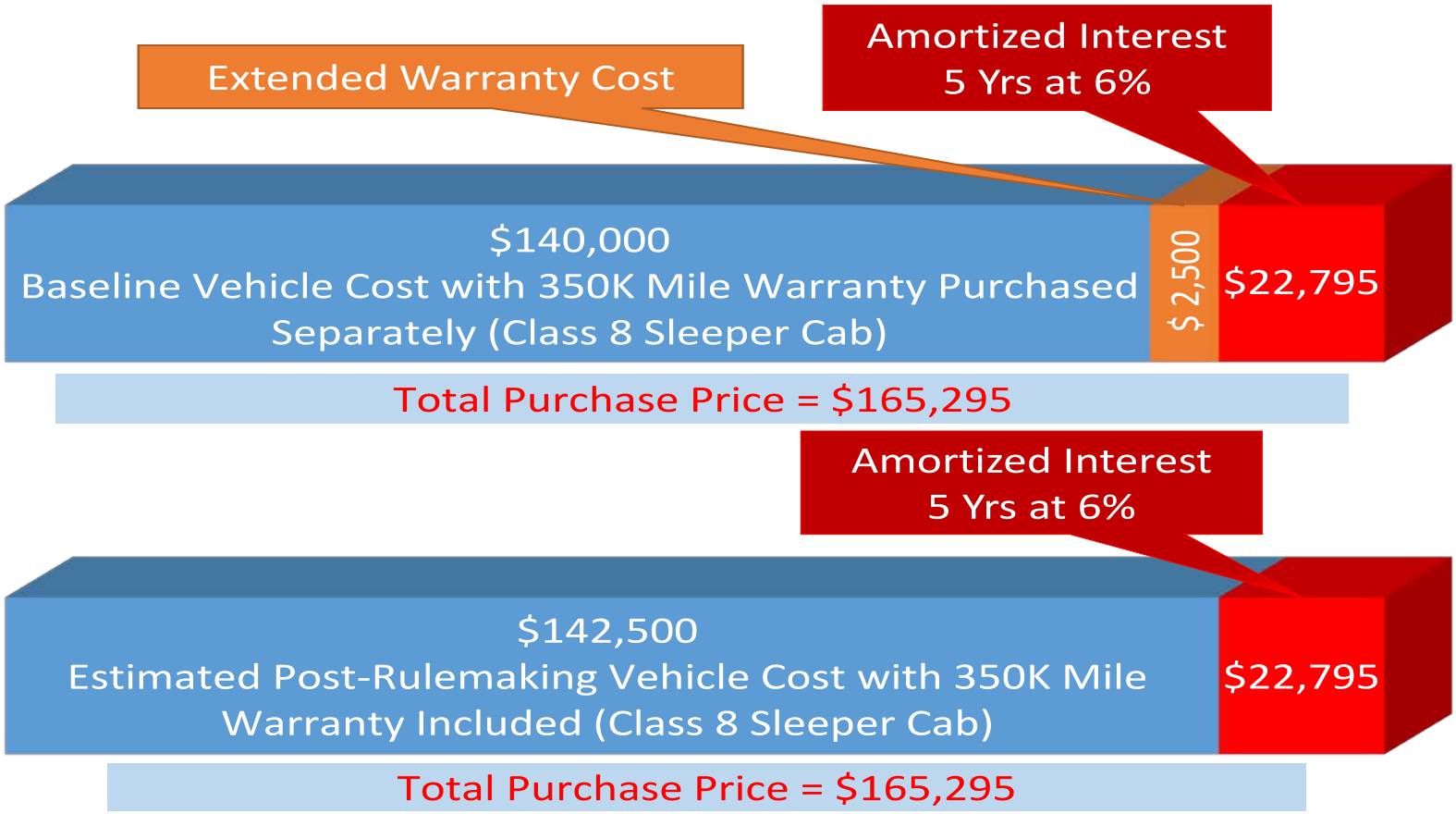
Economic Analysis

- Data sources:
  - Emissions warranty claims data
  - Repair costs from service providers
  - Fleet owners survey (CSUS/ISR)
  - Engine and vehicle manufacturer cost estimates
  - Third party warranty providers
- Assumptions:
  - Baseline capital costs are the sum of vehicle purchase price and the price of separately purchased extended warranties
  - 40% of Class 8 vehicles currently have warranties to 500K miles
  - Additional 45% of Class 8 vehicles have warranties out to 250K
  - Vehicle owners purchase capital using a 5-year loan at 6% APR

Cost & Savings Estimates

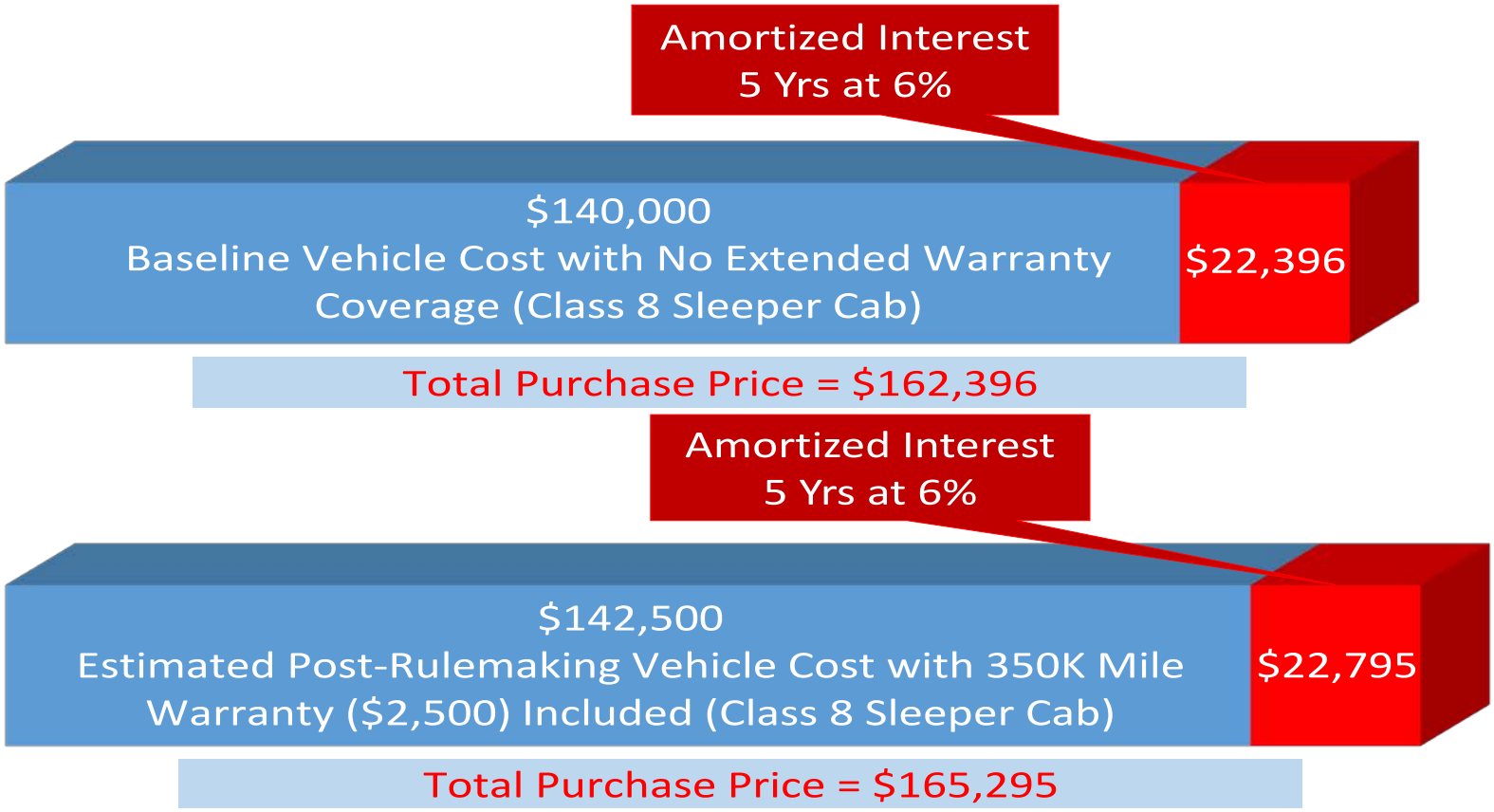
- Average additional capital cost of ~$100 to $500 per vehicle above the current baseline
- Average savings of ~$50 to $400 in repair costs per vehicle as a result of the proposed lengthened warranty periods
- For a Class 8 HDV, additional warranty would add ~$10 per month when amortized (less than $50 per month for worst-case)

Cost Analysis Example 1
HDV Already Covered by Extended Warranty



Cost Analysis Example 2

HDV Has No Extended Warranty Coverage



INCREASED UPFRONT COST TO BUYER: $2,899 or $48/Month

BUYER WILL SAVE ON REPAIR COSTS AS TRUCK AGES AND WARRANTED PARTS FAIL

Impact of Proposal on Low-Mileage Vehicle Buyers

- Manufacturers may not raise vehicle purchase price for low-mileage vehicles because they will face no new costs for repairs on such vehicles
- Would it be helpful to separate out vocational vehicles?

Impact of Proposal on Component Manufacturers

- Will need to take into account longer warranties when setting up contracts with engine and vehicle manufacturers
  - Make clear who is responsible for warranty repairs
  - Ensure adequate data is shared
- May be asked by engine and vehicle manufacturers to make more durable parts

CARB Warranty Survey

- The Sacramento Institute for Social Research (ISR) was contracted to conduct a survey of HDV owners and operators
- The purpose of the survey was to better understand the cost structure and administration of base, corporate, and extended warranties currently being offered for HDVs
- 539 HDV owner/operators and 92 dealer/repair facility representatives participated in the survey

Key Survey Findings

- The majority of vehicle owner/operators believe a 500,000 mile warranty should be standard
- 40% of new engines sold had warranties that extended to 417,000 miles on average
- Owner/operators indicated that the average cost of repairs over 508,000 miles was $2,131 per vehicle
- 54% of vehicle owners experienced extended downtime due to repairs; 62% said those repairs were not covered under warranty
- There was a significant number of days (>3,600) of lost revenue (>$1.6 million) due to downtime

Board Hearing Information

Date: May 24-25, 2018

Time: TBD

Location: Sacramento City Hall
915 “I” Street
Sacramento, CA 95814

California Air Resources Board

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Backup Slides

Baseline Cost Calculation Examples

- Case 1:
  - A new HDV Class 8 Sleeper sells for $140,000
  - The owner purchases an extended warranty for $2,500 to cover repairs through 350,000 miles
  - Total baseline capital cost = Purchase price + cost of extended warranty = $142,500
  - Staff's proposed mandatory 350,000 mile warranty would add no additional cost
    - Purchase price increases, but owner no longer has to pay for the extended warranty

Baseline Cost Calculation Examples (Continued)

- Case 2:
  - A new HDV Class 8 Sleeper sells for $140,000
  - Owner does not purchase an extended warranty
  - Total baseline capital cost = $140,000
  - Staff's proposed mandatory 350,000 mile warranty would add $2,500 additional cost

HD Parts Linked to Emissions Increases

- Emission-related parts fail after the current warranty periods, and these failures cause emission increases
- Summary table showing the average costs for parts, and the impact on emissions due to a faulty part
  - Sales-weighted percentage emissions increase compared to the baseline values for an undamaged, fully operational engine
  - Component price + labor cost for repair work
- Able to identify parts that are both relatively high in price, and cause severe increases in emissions when faulty

Components	Average Cost Class 8	Emissions Increase	
		NOx	PM
Catalytic Converter (SCR system)	$5,371	304%	-
Diesel Particulate Filter	$2,600	83%	4,766%
EGR Valve EGR Cooler	$1,300 $3,100	102%	-
Electronic Controls (NOx Sensor)	$670	114%	-
Fuel Injection System	$1,900	99%	-
Turbocharger systems	$5,100	147%	-

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Warranty Claim Rate Averages

ALL HEAVY-DUTY DIESEL VEHICLES WITH GVWR > 14,000 POUNDS
(2012 Model Year Over a Five Year Period)

Component	Total Claims	Average Claim Rate (based on total certification 2012 sales data)
Diesel Particulate Filter	493	2.62%
Diesel Particulate Filter Doser	864	4.59%
Diesel Oxidation Catalyst	190	1.01%
EGR Valve	1,868	9.92%
EGR Cooler	2,212	11.74%
Injector	2,802	14.88%
NOx Sensor	1,102	5.85%
Selective Catalyst Reduction	1,603	8.51%
Turbocharger	2,061	10.94%
Other Sensors	3,618	19.21%
Exhaust Manifold	681	3.62%
Fuel System	548	2.91%
Engine Control Module	2,084	11.07%

Penalties for Buying Out of State

- California Health & Safety Code 43150-43156
  - A person shall not offer for sale, introduce into commerce, import, deliver, purchase, rent, lease, acquire, or receive a new motor vehicle, new motor vehicle engine, or motor vehicle with a new motor vehicle engine for use, registration, or resale in this state unless the motor vehicle engine or motor vehicle has been certified pursuant to this chapter.
  - A person who violates any provision of this article shall be subject to a civil penalty not to exceed thirty-seven thousand five hundred dollars ($37,500) for each such action.
  - For purposes of this article, it is conclusively presumed that the equitable or legal title to any motor vehicle with an odometer reading of 7,500 miles or more, has been transferred to an ultimate purchaser.