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# Comments on the Economic Analysis of the California Air Resource Board's Proposed In-use On-road Diesel-Fueled Fleet Rule

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## **Introduction**

These comments address three areas of concern in the California Air Resources Board's economic analysis. The first two are specific to the how the economic analysis has been conducted up to this point. The last addresses a critical omission in the CARB's assessment of the economic consequences of its rulemaking.

The first issue covers two conceptual errors in calculating the expected benefits from reducing emissions. First, he proposed methodology double counts benefits that have already been created by existing regulations. Correcting this error reduces expected benefits by as much as half. And second, the analysis ignores the adverse mortality and morbidity impacts that the regulation will create in neighboring states. Finally, the benefits should be estimated for each alternative proposal because the incremental gains of one approach may not outweigh the added costs.

The second issue addresses how the additional costs are likely to impact the state's economy. The current analysis presents a static view that does not capture how the vehicle market is likely to shift in response to the change in demand in supply and demand for used vehicles or how the concentration of increased costs are likely to increase freight rates and other transportation prices across the entire marketplace, leading to windfall profits for out-of-state firms while squeezing in-state businesses. Further, the Staff report does not provide a sufficient breakout to inform the Board about differential impacts to various firms. For example, the impacts on small in-state construction or freight-hauling fleets cannot be identified.

Finally, but most importantly, the CARB has not considered that in the process of creating significant benefits for the state's residents, those who will bear the burden of this cost have not been appropriately compensated. Unlike previous mobile source air quality regulations, this measure will render obsolete and force premature retirement of existing equipment. Most of that equipment was acquired in good faith as complying with CARB's and the U.S. Environmental Protection Agency's regulations. CARB estimates that the benefits amount to as much as \$69 billion over the 2010-2025 period while imposing costs of \$5.6 billion over the same period. If CARB truly believes that the state's citizens place this value on these regulations, it should be willing to tie the imposition of this regulation to funding for implementation through a series of bond measures. The CARB should expand eligibility for Carl Moyer Funds to cover all affected vehicles under the proposed regulation, and funded amounts should be increased to cover relevant costs. The rationale for this is explained further in these comments.

## **Correcting the Air Quality Benefit Calculation to Account for Incremental Acceleration of Emission Reductions**

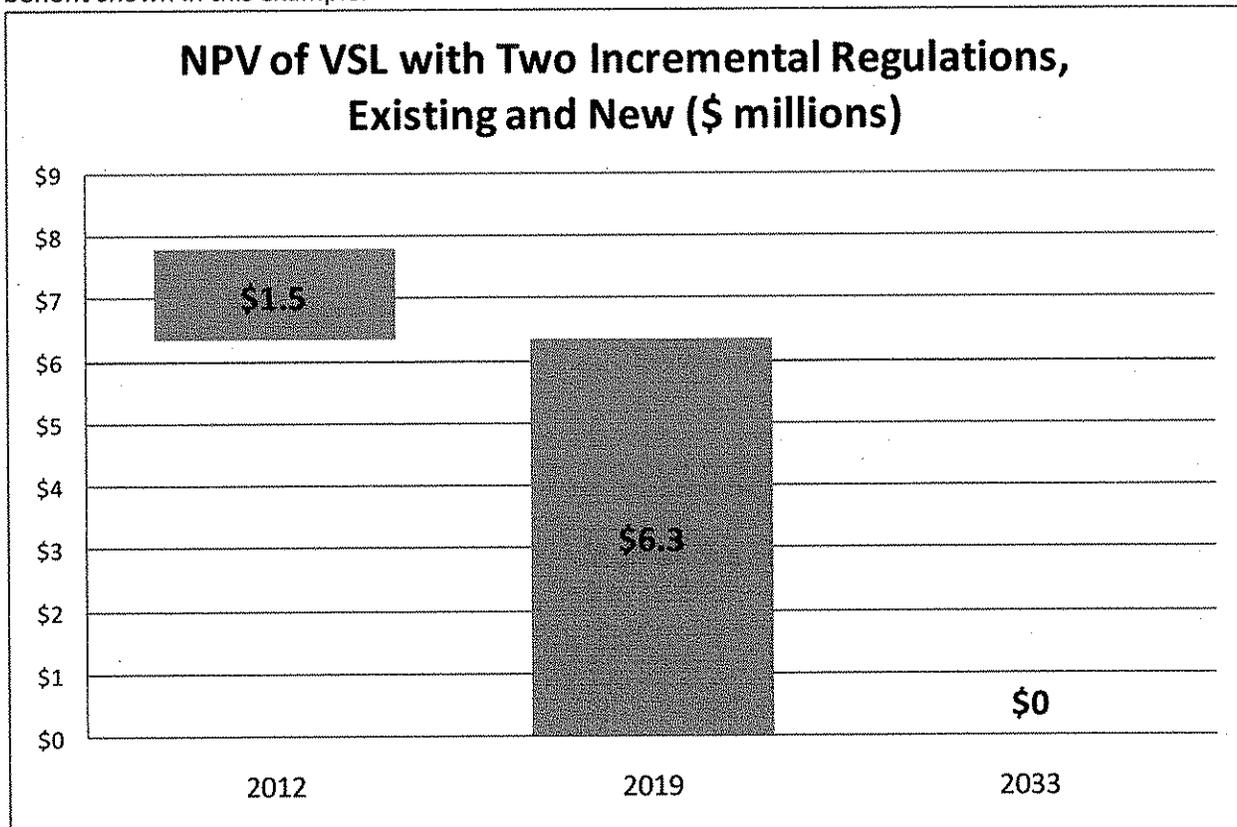
The proposed on-road diesel rule is accelerating the benefits of emission reductions that would have occurred by 2030 under the current regulations. Thus the issue is how to calculate the benefit of that acceleration, not how to calculate an incremental gain beyond the current target baseline which is the effect of a typical regulation. The year-by-year calculation of the benefits done by the ARB makes an important assumption that is incorrect: that the mortality rate for one year is independent of that for subsequent years. This implies that the population of individuals who die later in the 2010-2030 time period due to the acceleration in emission reductions would *not* be the same population who would have benefited from the reductions over the same period under the existing regulations. In other words, the ARB's calculation assumes that a different population is benefiting under the new regulations from those that benefit under existing regulations. This is an important error.

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The fact is that the benefits from the proposed regulations already include the benefit from extending life expectancy under the initial existing regulation. The proposed regulations make an incremental extension, not a new extension. Counting that benefit again would be double counting. The assumption implicit in the value of statistical life (VSL) calculation applied to the mortality rates does not account for differential changes in life expectancy—only that it is improved. Research on VSL has not yet shown a strong relationship with differences in extended life expectancy (see the National Research Council report<sup>1</sup>), so the realized benefit will largely just be an accelerated realization of that benefit.

The CARB's current methodology incorrectly assumes that an individual who is saved from premature death with the new regulation, for example in 2012, would have lived to the fullest extent of their life expectancy, i.e., an additional 14 years or so. In reality, we would expect that the same individuals who benefited from the reduction in emissions in 2012 would be much the same as those who benefit in say 2019 under the existing regulations. So the mortality rate for 2019 is actually dependent on the mortality rate in 2012, and when the 2012 rate is changed, it changes the rate in 2019. So in fact the life expectancy is not extended 14 years, but rather 7 years in this example.

The figure below illustrates the correct method for estimating these benefits using this example. It shows the correct method of computing the net present value of the value of a statistical life with two incremental regulations—the current diesel regulations and the proposed ones. Assuming the an average VSL of \$8.5 million, the present value of improving life expectancy with the existing regulations by 14 years in 2019 is \$6.3 million at a 3 percent discount rate. The new regulation moves forward that benefit by 7 years—it does not create a *new* benefit because the targeted emission level would have been achieved without the regulation, just at a later date in 2019. The value of accelerating this benefit is \$1.5 million. This latter value is the benefit of the new regulation, not the sum of the benefit in 2019 *and* in 2012 of \$7.8 million. Unfortunately, the CARB's current method double counts the \$6.3 million benefit shown in this example.



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We should expect that the same population is benefitting from the accelerated reductions, just at an earlier time. There is no evidence that a new population is benefitting. The new regulations are simply extending the expected remaining life of the target population. The net benefits of the new regulations therefore should be the net benefits of the difference in achieving the regulations the average number of years earlier that the reductions are achieved.

The correct method for calculating the benefits is a two-step process.<sup>a</sup> The first is to calculate how much achieving targeted reductions are accelerated for each year. Then the present value of benefits under the existing regulations are adjusted to bring them closer in each year by the amount of acceleration. Finally, the net benefits of reductions from the proposed regulations below what would have been achieved in 2030 under existing regulations are added to the accelerated benefits. Based on the data for the SCAQMD provided by the Staff, this method reduces the benefits by 52 to 58 percent at a 3 percent discount rate, and delivers benefits of 96 to 111 percent at a 7 percent discount rate. **Based on these adjustments, the health benefits should be adjusted to \$36 to \$40 billion when using a 3 percent discount rate, and to \$46 to \$53 billion based on a 7 percent discount rate.**<sup>2</sup>

These results are consistent with economic theory, confirmed by the difference when we vary the discount rate. We expect that a higher discount rate implies more impatience. We see that accelerating the benefits has more value with a higher discount rate, exactly what we would expect. In contrast, the ARB approach implies that we become *more* patient at the discount rate rises, which is contradicted by the economic theory upon which the entire economic analysis is based.

While this error may not make a significant difference in considering of whether to adopt a plan, it can make a difference in *which* plan should be adopted. **The Staff should be estimating the net benefits for each proposal, including those from stakeholders.** The incremental benefits of each plan should then be compared to the incremental costs.

### Estimated Benefits Do Not Account for Out of State Impacts

According to the CARB's TSD, out of state fleets are expected to reduce their costs by routing their older, dirtier trucks to other states.<sup>3</sup> These fleets represent 57 percent of the HHDD miles travelled in state.<sup>4</sup> In addition, the TSD assumes that many of the now-obsolete older trucks that had been sold in-state will now be sold in the out-of-state used vehicle markets.

The overall impact implied by the underlying economic analysis is that more older, dirtier trucks will be operating in neighboring states. Yet, the analysis does not include the air quality, and resulting health, impacts on those communities. Others states have their own air quality difficulties. For example, the PM10 index of Phoenix currently exceeds that of Los Angeles, and the ozone index is more than 90 percent of that for Los Angeles.<sup>5</sup> Regardless, the studies upon which the ARB relies on to measure the health effects of PM have not found a lower bound on those impacts.<sup>6</sup> **For this reason, the CARB must expect that mortality and morbidity rates will *increase* in other states directly as the result of adopting this regulation.**

If the CARB is going to consider any measure of health benefits, it must include the negative effects in neighboring states. Many of the current residents of those states will become residents of California in the future, and vice versa. To do otherwise, leaves California to be considered an "island" unto itself, which is not consistent with the federal Interstate Commerce Clause.

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<sup>a</sup> We shared with the CARB Staff a spreadsheet derived from the Staff's estimate of benefits for the SCAQMD that illustrates the correct methodology.

The only way to estimate this cost is to calculate the emission increases and associated mortality and morbidity changes in neighboring states. The Staff has not conducted this needed study, so we are not able to estimate the net economic cost.

### **The Economic Analysis May Not Capture the Full Market Effects of the Proposed Regulation**

The economic analysis attached to the Technical Support Document provides substantial information on the expected overall costs of the program, but it does not yet provide some information that would be useful to the Board in deciding how to proceed on this rulemaking.<sup>7</sup>

- **Lack of analysis of vehicle market impacts:** Based on experience with the recent off-road rule, the new regulation is likely to change the quantity and prices of used vehicles. For example, CIAQC members have seen a dramatic drop in the price offered for older equipment that will be rendered obsolete with the adoption of the off road rule. Also, the demand for newer-model used trucks will go up in the agricultural, construction and other sectors based on the age distribution data shown in the emissions inventory.<sup>8</sup> These industries will be forced to buy newer vehicles than they have in the past, both as a direct result of the regulations and an indirect effect from a reduction in the supply of compliant used vehicles from other sectors that are upstream in the vehicle usage cycle.
- **Lack of industry-specific analysis:** The analysis shows differential impacts by fleet size and some industries on Table 11 at page J-21. The analysis also shows an estimated cost by industry in 2013 at Table 13 on page J-25. Unfortunately, the analysis does not show the total cost by fleet type AND industry. Combining this breakdown would provide information on the expected costs across the characteristics of the industries. These are obscured in the current presentation.
- **Inconsistent findings within the TSD:** The cost per truck can be computed a cost from Table 11, and that is shown below. Of equal importance is the cost per vehicle-mile travelled (VMT). The cost per VMT would represent the higher costs of service, particularly for freight and other transportation services. This revision to Table 11 reveals two results that run counter to assertions in the economic appendix:
  - Table 2 shows that smaller fleets (less than 3 vehicles) tend to have older vehicles. Table 4 shows that compliance costs increase with the average age of the fleet. This implies that the costs for small fleets are greater than for large fleets. Yet Table 11 shows that the costs are lower for smaller fleets of similar trucks than larger fleets. How are these differences reconciled?
  - The report states at page J-19, "Out of state vehicles will be minimally impacted as the majority of out-of-state fleets are comprised of newer vehicles and are ahead of the proposed requirements." Yet the costs for in-state HHD and out of state HHD are roughly the same in this table. How are these two findings reconciled?

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From Table 11 - Total Statewide Compliance Costs (2008\$)				
Fleet Type	NPV Cost	Vehicles	Cost/Veh.	Total Cost/Veh
Instate MHD Fleets - Small	\$399	77,739	\$5,133	\$6,201
Instate MHD Fleets - >3 Vehicles	\$565	88,522	\$6,383	\$7,451
Instate MHD - Low Mileage	\$122	32,264	\$3,781	\$4,850
MHD CAIRP & Out-of-State	\$46	8,896	\$5,171	\$6,239
Instate HHD Fleets - Small	\$432	37,097	\$11,645	\$12,714
Instate HHD Fleets - >3 Vehicles	\$740	46,754	\$15,828	\$16,896
HHD - Low Mileage*	\$142	25,841	\$5,495	\$6,564
CA-IRP - Small	\$156	25,126	\$6,209	\$7,277
CA-IRP - >3 Vehicles	\$343	32,273	\$10,628	\$11,696
Neighboring States - Small	\$48	7,773	\$6,175	\$7,244
Neighboring States - >3 Vehicles	\$339	31,928	\$10,618	\$11,686
Non-Neighboring	\$471	225,328	\$2,090	\$3,159
Non-Neighboring - <1000 Miles	\$0	225,329	\$0	\$1,068
Agricultural MHD Fleets - Mid Miles	\$30	1,946	\$15,416	\$16,485
Agricultural MHD Fleets - High Miles	\$30	1,750	\$17,143	\$18,211
Agricultural MHD Fleets - Exempt	\$0	5,742	\$0	\$1,068
Agricultural HHD Fleets - Mid Miles	\$30	1,442	\$20,804	\$21,873
Agricultural HHD Fleets - High Miles	\$108	4,099	\$26,348	\$27,416
Agricultural HHD Fleets - Exempt	\$0	6,459	\$0	\$1,068
Port Trucks	\$106	21,650	\$4,896	\$5,964
HHD Buses	\$252	7,211	\$34,947	\$36,015
MHD Buses	\$26	2,763	\$9,410	\$10,478
School Buses	\$69	16,469	\$4,190	\$5,258
Two Engine Cranes	\$0	2,113	\$0	\$1,068
Utility Fleets	\$4	4,154	\$963	\$2,031
Reporting Costs	\$77	940,668	\$82	
Operating Costs	\$928	940,668	\$987	
<b>Total</b>	<b>\$5,463</b>	<b>940,668</b>		<b>\$5,808</b>
<b>Total w/o Out of State &lt;1000 mi</b>	<b>\$5,463</b>	<b>715,339</b>		<b>\$7,637</b>

- Inaccurate assumptions about cost impact absorption:*** The manner in which the E-DRAM model is adjusted to reflect the regulations inappropriate models a much more efficient response than will actually occur. It simply treats these costs as a higher uniform tax rather than as a structural change that changes the distribution of the cost structure in each industry. It does not make the differential increases within an industry so that the supply curve for services and commodities becomes steeper. Rather it implies a uniform cost increase regardless of the characteristics of the firm and its fleet. This is contrary to the findings in the rest of the report.
- Lack of analysis on freight rates:*** On a related point, the ARB should assess the market effects on freight rates in California if in-state freight haulers have higher costs than out of state firms. We should expect that the increases for higher cost firms will drive up the ability of all firms to

charge higher rates regardless of whether the costs have increased for those lower cost firms. (See for example how LADWP was able to charge higher rates to PG&E, SCE, SDG&E and other California utilities during the 2000-01 electricity crisis because merchant generators raised their prices.) If all firms are able to charge higher prices, then the economic impact will be multiplied across the services for all firms in that sector.

For example, CalTrans estimates that HHDD trucks travel about 10 billion miles annually, most of which for hauling freight. Spreading the costs per truck for in-state HDD trucks shown in Table 1.1 over a 200,000 mile lifetime adds about 6.5 cents per mile. This will translate into a \$650 million per year increase in freight costs. Of this, according to the inventory report, 59 percent or \$380 million will go to out-of-state firms, most of which will not incur significant costs according to the prose in the TSD. This amount is an unmitigated cost to California because it is just like buying foreign oil—it is a financial flow out of state.

- **Lack of cumulative impact analysis:** Finally, the CARB now has sufficient data and analyses to run an analysis on the cumulative impacts of the off road and on road rules on specific industries such as construction and agriculture. The CARB reports filed in the in-use off-road diesel vehicle rulemaking in April 2007 has the comparable data to merge into this analysis.

### **CARB Should Endorse Simultaneously a Linked Funding Program to Mitigate the Cost to Firms Implementing the New Regulations**

The CARB analysis has estimated that the state's residents will receive benefits of \$48 to \$69 billion. These benefits are to be delivered at a net cost of about \$6 billion according to the Staff's analysis. While this argues for imposing these new rules, it misses a fundamental equity issue about *who* should be paying for these costs?<sup>b</sup>

Most of the on-road diesel vehicles now meet at least Tier 1 emission standards. The owners of those vehicles bought them in good faith that the new trucks were meeting the environmental objectives of the CARB and the U.S. EPA. These firms also have based their investment plans on the implementation schedule for future regulations on new equipment. So these firms hold property that they have been told up to this point comply with the state's regulations on air quality.

The proposed in-use rules are intended to accelerate the retirement of this existing equipment beyond the rate dictated by financial and economic conditions. This will result in premature retirement that has adverse financial impacts on these firms. In other words, the CARB is proposing to reduce and even eliminate the economic value of this property of these firms. This is *not* a prospective, speculative value—this equipment is currently being used and would be used in the same manner going forward under *existing* regulations. Forcing the retirement of *existing* equipment—mandatory scrappage—is a new phase of regulation by CARB, particularly when involving private industries.<sup>c</sup>

Given that CARB is asking these industries to give up a portion of their existing economic assets to benefit the state's residents, the appropriate policy response is compensate those industries for the loss in that value. While the principles of benefit-cost analysis applied here can be used to justify adopting

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<sup>b</sup> This issue applies equally to the recently adopted in-use off-road diesel vehicle rule.

<sup>c</sup> CARB has adopted regulations on in-use transit and solid waste fleets that serve public agencies. Those agencies are able to pass through costs by fiat and associated economic regulation. In other words, the economic risk and taking is mitigated through economic regulation. Any private shareholders are thus protected from adverse consequences. This option is largely not available to the private firms affected by this new rule.

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public policies without compensating those who lose economically,<sup>d</sup> this does *not* imply that these policies *should* be adopted without compensating those losers. This is especially true when the losers can be so clearly identified as they can be in this case.<sup>e</sup> If this was the case, one could use this argument to justify criminal endeavors that create new jobs both during the theft and in replacing the goods, but that would be illogical and illegal. The estimated benefit-cost ratio is so large that the proposed regulations will still deliver large net benefits after compensating the affected firms according to the CARB's analysis. Diverting some of these benefits from the winners to the losers is good, sound public policy.

In adopting these regulations, the CARB should tie their implementation to the passage of a series of supporting bond measures. The bonds can be spent along the successful model of the Carl Moyer Program. One relatively simple adjustment would be to expand eligibility for Moyer funds to all diesel fueled vehicles affected by the on-road and off-road in-use rules. Because the benefits accrue over multiple years, the costs should be spread to future state residents and the compensation should not come directly out of the state budget. If the state electorate is unwilling to fund these bonds, that provides the CARB with information that perhaps the state's voters do not place the same value on these reductions as implied by the Staff analysis. And if the bonds are not approved, the regulations should be rescinded.

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<sup>d</sup> Economists call this the "Kaldor-Hicks principle."

<sup>e</sup> In this case, economists would say that the preferable "Pareto optimality" is achievable and should be pursued by the CARB.

<sup>1</sup> Bailar, John C., Richard T. Burnett, Lauraine G. Chestnut, W. Michael Foster, A. Myrick Freeman, Montserrat Fuentes, Daniel S. Greenbaum, Alan Krupnick, Nino Künzli, Kent E. Pinkerton, Armistead G. Russell, Helen Suh, and Evelyn O. Talbott. "Estimating Mortality Risk Reduction and Economic Benefits from Controlling Ozone Air Pollution." Washington, D.C.: Committee on Estimating Mortality Risk Reduction Benefits from Decreasing Tropospheric Ozone Exposure, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council, 2008, pp. 150-152.

<sup>2</sup> California Air Resources Board. "Technical Support Document: Proposed Regulation for in-Use on-Road Diesel Vehicles. Appendix D: Health Impacts from on-Road Diesel Vehicles." Sacramento, California: Mobile Source Control Division, Heavy-Duty Diesel In-Use Strategies Branch, 2008, p. D-8.

<sup>3</sup> California Air Resources Board. "Technical Support Document: Proposed Regulation for in-Use on-Road Diesel Vehicles. Appendix J: Cost and Economic Analysis Methodology." Sacramento, California: Mobile Source Control Division, Heavy-Duty Diesel In-Use Strategies Branch, 2008, p. J-12.

<sup>4</sup> *Ibid.*

<sup>5</sup> U.S. Environmental Protection Agency. 2008. Airtrends Factbook.  
<http://www.epa.gov/airtrends/pdfs/msafactbook2007.xls>. (accessed December 8, 2008).

<sup>6</sup> McCann, Richard J. "Review of the Health Benefit Estimates from Emission Reductions in the Construction Fleet." Davis, California: Prepared by M.Cubed on behalf of the Construction Industry Air Quality Coalition, 2007.

<sup>7</sup> California Air Resources Board. "Technical Support Document: Proposed Regulation for in-Use on-Road Diesel Vehicles. Appendix J: Cost and Economic Analysis Methodology." Sacramento, California: Mobile Source Control Division, Heavy-Duty Diesel In-Use Strategies Branch, 2008.

<sup>8</sup> California Air Resources Board. "Technical Support Document: Proposed Regulation for in-Use on-Road Diesel Vehicles. Appendix G: Emissions Inventory Methodology and Results." Sacramento, California: Mobile Source Control Division, Heavy-Duty Diesel In-Use Strategies Branch, 2008.

