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January 31, 2011

Filed Electronically

Air Docket, Environmental Protection Agency
EPA Docket Center, Mailcode 6102T
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Attention Docket ID No. EPA-HQ-OAR-2010-0162

Document Management Facility
M-30, U.S. Department of Transportation
West Building, Ground Floor, Rm 12-140
1200 New Jersey Avenue, SE
Washington DC 20590
Attention Docket ID No. NHTSA-2010-0079

Subject: Notice of Proposed Rulemakings for Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles 75 Fed. Reg. 74,152 (November 30, 2010)

Dear Sir/Madame:

Allison Transmission, Inc. ("Allison") is pleased to comment on the Environmental Protection Agency's ("EPA's") and National Highway Traffic Safety Administration's ("NHTSA") notice of proposed rulemaking on Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles[1] ("Proposed Rules") to establish greenhouse gas ("GHG") emission standards and fuel efficiency ("FE") standards for on-road heavy-duty vehicles, including combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles. While Allison has certain criticisms of the regulatory approaches taken in the Proposed Rules, Allison looks forward to continuing to work with EPA and NHTSA as they jointly develop standards for medium- and heavy-duty vehicles ("MD/HD vehicles") for model years ("MYs") 2014-2018 and engage in any future "follow on" rulemakings.

As detailed below in the submitted comments, Allison's overarching concern with respect to the Proposed Rules is that:

[1] 75 Fed. Reg. 74,152 (November 30, 2010).

- The GHG performance and FE of many diverse MD/HD vehicles must be accurately measured and based on the real world commercial operation of such vehicles.

- EPA and NHTSA need to employ complete metrics that account for the work performed by MD/HD vehicles. This requires accounting for the average speed of vehicles and its effect on FE and GHG emissions.

- EPA and NHTSA should make available and allow sufficient time for public comment on the computer modeling and associated inputs that is used for compliance.

- Any regulatory program that is finalized should not act to disadvantage emerging technologies, like hybrids, that may be more expansively integrated into fleets in coming years.

While the Proposed Rules attempt to address such issues, they fall short in many important respects. Therefore, Allison believes that it would be prudent for EPA and NHTSA to take additional time with respect to the finalization of the Proposed Rules in order to obtain additional information and to further review available technologies.

In general, EPA should more closely examine how MD/HD vehicles are used in the marketplace and conduct further assessments of the cost and market impacts of providing incentives and disincentives to the use of various technologies. In this regard, both agencies have sufficient statutory flexibility to pursue such a course. EPA and NHTSA are not constrained by law or judicial deadline to adhere to the announced – and overly ambitious – deadline for this rulemaking.

To be clear, that the purpose of any delay in this rulemaking would not be to simply delay for delay's sake, but rather, to "get it right the first time." With additional time, EPA and NHTSA could correct certain aspects of the Proposed Rules as well as refine its computer modeling of vehicle performance. EPA and NHTSA must recognize that this rulemaking will inevitably establish precedent and shape market expectations for follow-on rules affecting MD/HD vehicles into the next decade. Additional time can help to ensure that this unprecedented regulatory effort – to establish the first ever GHG and FE regulation of Class 2b to Class 8 vehicles – is accomplished correctly and with full consideration of available alternatives.

With regard to specific criticisms, our detailed comments highlight numerous concerns. In specific, the Proposed Rules:

- Employ and incorrect and incomplete metric that does not measure the real world performance and utilization of MD/HD vehicles.

- Fail to incorporate average vehicle speed in the proposed metric and testing protocols even though average speed is directly related to the productivity of a MD/HD vehicle and resulting FE and GHG emissions.

- Utilize computer modeling which is incomplete and still under development even though vehicle simulation plays a central role in the FE and GHG regulation of MD/HD vehicles.

- Do not employ compliance "drive cycles" that accurately represent the real world operation of many MD/HD vehicles, including both Class 7 and 8 line-haul trucks and vocational vehicles.

- Do not contain or contain inadequate procedures to ensure vehicle compliance with the drive cycles that are utilized.

- Do not accurately classify some vehicles within the regulatory categories that are proposed.

- Contain substantial uncertainties with regard to hybrid vehicle testing and characterization of hybrid vehicles and hybrid vehicle systems.

Additional time and effort could resolve many of these issues. We would encourage EPA and NHTSA to not only closely examine the comments submitted below but to conduct their own analysis of these issues with adequate outside expert review. We believe that any additional time that is spent now will be time well spent.

Sincerely,

Eric C. Scroggins
Vice President, General Counsel & Secretary

Allison Transmission

Comments of Allison Transmission, Inc.

Proposed Rules for Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles

January 31, 2011

I. Introduction

Allison is the world's largest supplier of commercial-duty automatic transmissions and hybrid propulsion systems. Allison's products are specified by over 300 of the world's leading heavy-duty vehicle manufacturers and used in many diverse market sectors, including on-highway, off-highway, and military. Allison has a broad global presence, including over 1,500 dealer and distributor locations in the United States, and 15,000 fleets and customer accounts. Therefore, Allison and the marketplace for its products will be affected by the Proposed Rules, which seek to achieve long-term reductions in the emission of GHG emissions as well as reduce the use of transportation fuel in the United States.

While Allison recognizes that the timing of the Proposed Rules is part of a broader policy decision within the Administration, many separate areas of this rulemaking need to be revised or improved before final rules would be appropriate. As detailed below, EPA and NHTSA need to adopt a metric which more completely characterizes FE and GHG performance, substantially improve and finalize the computer modeling utilized for compliance, incorporate different drive cycles and drive cycle weighting, revise regulations related to the testing of vehicles and ensure that the Propose Rules do not act to inhibit advanced transmission technology, including that utilized in hybrid systems.

II. EPA and NHTSA Should Adopt Complete Metrics That Measure the Work Performed by MD/HD Vehicles

EPA and NHTSA are proposing to establish standards for combination tractors, vocational vehicles, and heavy-duty pickup trucks and vans. As detailed below in section IV., Allison does not generally object to this segmentation of the MD/HD marketplace.[1] However,

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[1] We would note that despite the title of the proposed rules, EPA and NHTSA have utilized the term "heavy-duty" to refer to both MD and HD vehicles. 75 Fed. Reg. at 74,156. Otherwise, the agencies have utilized different categories of Light Heavy-duty (LHD), Medium Heavy-duty (MHD) and Heavy Heavy-duty (HHD) for vocational vehicles. *Id.* at 74, 200. These comments will simply refer to MD/HD vehicles for the sake of simplicity; Allison does not take a position with respect to the proposed nomenclature for different vehicle categories. In addition, all comments referring to either MD and/or HD vehicles refer only to combination tractors and

(continued...)

with respect to combination tractors and vocational vehicles, Allison would submit that there are metrics available to measure GHG emissions and the FE[2] of MD/HD vehicles which are superior to the incomplete metric that EPA and NHTSA are proposing to adopt for MY 2014-2018 vehicles.

As outlined in Attachment 1, it is essential that any metric promulgated by EPA and NHTSA under their respective statutory authorities accurately measure the actual productivity of MD/HD vehicles. This can only be accomplished if the final regulatory metric includes consideration of the time that a commercial vehicle spends completing any set amount of transport work, which EPA and NHTSA incompletely describe in ton-miles (devoid of time). EPA and NHTSA recognize in the preamble that MD/HD sector is "extremely diverse in several respects, including the types of manufacturing companies involved, the range of sizes of trucks and engines they produce, the types of work the trucks are designed to perform, and the regulatory history of different subcategories of vehicles and engines."[3] MD/HD vehicles undoubtedly present a different challenge for GHG/FE regulation than light-duty vehicles. Metrics utilized in the final rule for Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards[4] ("LDV Rule") are properly considered as inappropriate for combination tractors and vocational vehicles, as opposed to heavy-duty pickup trucks and vans, which are used in a manner similar to that of LDVs. EPA and NHTSA, however, do not fully account for the full extent of such differences in the utilization of combination tractors and vocational vehicles. EPA and NHTSA's analysis is incomplete in this area, resulting in the proposal of a metric which does not properly account for the utilization of MD/HD vehicles in the industrial and commercial marketplace.

A. Any Metrics Must Recognize Commercial Operation of MD/HD Vehicles

Combination tractors and vocational vehicles are not generally owned or operated for personal use. Instead, private businesses and governmental agencies own and operate such

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(continued…)

vocational vehicles as defined in the proposed rule. Allison is not providing comments with respect to any aspect of the proposed rules for heavy-duty pickup trucks and vans.

[2] We would note that the proposed rules refer to a "fuel efficiency' standards rather than "fuel economy" standards. These comments utilize the acronym "FE". In all cases where FE is used, reference is being made specifically to a fuel efficiency metric and to the requirement contained in 49 U.S.C. 32902(k)(2) that NHTSA develop a "commercial medium-duty and heavy-duty on-highway vehicle and work truck *fuel efficiency improvement program* designed to achieve maximum feasible improvement." (Emphasis added). We would also note that NTSA has interpreted its statutory authority in this manner. *See* 75 Fed. Reg. at 74,158, note 17.

[3] 75 Fed. Reg. at 74,156.

[4] 75 Fed. Reg. 25, 324 (May 7, 2010).

vehicles on a near-exclusive basis. In these circumstances, the time it takes to complete a task is highly valued. Moreover, as demonstrated within Attachment 1, accounting for time in the metric more directly represents the GHG emissions and FE associated with the operation of such vehicles. While Allison recognizes that the timeframe of this rulemaking makes it difficult for EPA and NHTSA to fully explore new concepts (and hence creates a "natural" reliance on existing certification systems for engines and a limited computer modeling of non-engine factors affecting FE and GHG emissions), the art of the possible should not prevail over the need to accurately assess vehicle emissions and efficiency. Especially with respect to a regulatory program which is in its initial stages, EPA and NHTSA should strive to "get it right the first time."

The proposed metric is considered by EPA and NHTSA to better represent the work performed by MD/HD vehicles than metrics based on pure calculation of miles per gallon (fuel economy) and/or GHGs emitted. On this point, Allison agrees with each agency. However, the further assessment that the proposed metric best represents FE and the emission of GHGs in the MD/HD sector among available alternatives is not accurate. As indicated below, Allison believes that other metrics provide a much more complete measure of the actual work performed by commercial vehicles, and hence, a better measurement of a vehicle's FE and GHG emissions.

B. NHTSA Has Independent Statutory Obligation Apart from NAS Report

Pursuant to Section 107-108 of the Energy Independence and Security Act[5] ("EISA"), NHTSA was required to contract with the National Academy of Sciences ("NAS") to develop a report evaluating medium-duty and heavy-duty truck fuel economy standards. Based on this report, the Energy Independence and Security Act of 2007 ("EISA") section 102(b) required the Secretary of Transportation in consultation with the Department of Energy ("DOE") and EPA to determine the appropriate *test procedure*s and methodologies for measuring "the fuel *efficiency* of [medium- and heavy-duty on-highway] vehicles and work trucks." (Emphasis added). Therefore, EISA clearly directed NHTSA to focus on a *different* metric from that utilized in the LDV program (i.e., a corporate average fuel economy metric) and to develop regulations based on the new authority explicitly granted to NHTSA for the first time through enactment of EISA.

The NAS Report utilized in this proposed rule[6] ("NAS Report") recommended adoption of a load-specific fuel consumption ("LSFC") standard expressed in gallons/100 ton-miles. While EPA and NHTSA did conduct further analysis, the NAS Report clearly provides the basis for both EPA and NHTSA's proposed combination truck and vocational vehicle

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[5] Pub. L. 110-140 (December 19, 2007).

[6] *Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles*, National Academy of Science, Committee to Assess Fuel Economy Technologies for Medium- and Heavy-Duty Vehicles (2010).

standards. As further detailed in comments provided as Attachment 2, the NAS report, however, is deficient in several respects. While the report accurately notes that average speed (and correspondingly, time of transporting a given ton-miles) is an important consideration in determining the fuel efficiency of a commercial vehicle, the NAS failed to incorporate this factor into the LSFC.

The NAS report additionally does not fully satisfy NHTSA's obligations under EISA to develop "fuel efficiency" standards for different classes of vehicles. While EISA certainly directs NHTSA to examine the fuel efficiency of medium- and heavy-duty vehicles and work trucks following publication of the NAS report, NHTSA rulemaking authority as contained in EISA section 102(b)[7] is not constrained to the NAS recommendations. There is no explicit statutory language directing NHTSA to "base" its standards on the NAS report, or even to directly consider the NAS recommendations in setting the required standards. Instead, EISA directs NHTSA to promulgate a "fuel efficiency improvement program" based on several factors, including factors explicitly outside the scope of the NAS review as established in EISA section 108 (e.g., "compliance and enforcement protocols"). In enacting EISA, Congress clearly set out factors that NHTSA must independently analyze and evaluate in developing the fuel efficiency program that is required for medium- and heavy-duty on-road vehicles and work trucks.

NHTSA has apparently attempted to fulfill its independent statutory obligations in this matter by issuing a new report, but this report is insufficient to provide a suitable informational basis for the proposed rule. In October 2010, NHTSA published a report, *Factors and Considerations for Establishing a Fuel Efficiency Regulatory Program for Commercial Medium- and Heavy-Duty Vehicles*.[8] This report largely tracks and directly quotes from the NAS report and contains relatively little independent analysis. Moreover, NHTSA admits that the agency's effort was driven by a non-statutory deadline and that much more study needs to be done with regard to a fuel efficiency program. Specifically, the report states:

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[7] This section amended 49 U.S.C. § 32902 adding a new subsection (k). NHTSA rulemaking authority for this proposed rule is found at 49 U.S.C. § 32902(k)(2).

[8] Department of Transportation, National Highway Traffic Safety Administration, DOT HS 811, October 2010.

> The agencies are able to meet the President's ambitious time table for regulation in part because of our relatively simplified approach, which is different than the more holistic and complicated approach envisioned by NAS, but which should contribute to significant improvements in fuel efficiency while minimizing the impact on the segments of the medium- and heavy-duty truck industry that are more complicated to regulate given their diversity. . . *NHTSA emphasizes that it recognizes that much more study needs to be done given the lack of information regarding the impacts of fuel efficiency regulations on the MD/HD fleet.* NHTSA intends to continue its study going forward, to ensure that subsequent phases of the HD National Program are well-informed, and to help ensure that the best information is available both to the government and to the public as the National Program continues.[9]

In sum, NHTSA must conduct further analysis to support the proposal of a fuel efficiency metric. NHTSA cannot simply rely on the NAS Report as the basis for its proposed metric and the agency's independent examination of these issues, by its own admission, suffers from a "lack of information" and is therefore insufficient to support the proposed rule.

C. The NAS Report Recognized Relationship Between Average Speed, Fuel Efficiency and Emissions But Proposed Incomplete Metric

The NAS Report fully recognized the relationship between average speed and efficiency in fuel use when it stated that "[v]ehicles in the real world do not operate at a steady speed. For a given segment of activity, or for a cycle, it is therefore important to use the metric of <u>average speed</u> in discussing fuel use."[10] The NAS report also indicated that "[t]he fuel efficiency of a truck is not readily characterized by a single number, but rather by a curve against average speed."[11] The LSFC—and the metric proposed by EPA and NHTSA for combination tractors and vocational vehicles -- only takes into account payload and fuel economy (i.e., through use of a gallons/1000 ton-miles form). Thus, it is missing a vital component of measuring true GHG emissions and FE, average speed.

Failure to take into account average speed will have significant adverse effects on any program intended to improve the FE of MD/HD vehicles, particularly for vocational vehicles which often operate in urban conditions of "stop and go" traffic. In this regard, NAS recognized that the majority of wasted energy in transient operation resulted from use of service brakes and the associated need for propulsion energy during subsequent acceleration events. Powertrains that maximize propulsion energy and/or recapture energy

[9] *Id.* at 110 (emphasis added).

[10] NAS Report at 34 (emphasis added).

[11] *Id.* at 36.

lost during braking would have significant advantages in terms of fuel efficiency (i.e., powershifting transmissions or hybrid systems that utilizing regenerative braking and electrical storage systems to minimize energy losses). Yet a gallons/ton-miles form would not recognize any of this inherent and demonstrable efficiency. EPA and NHTSA should instead utilize a complete metric based on:

$$\frac{\text{Gallons}}{\text{1000 ton miles}} \quad \text{x} \quad \frac{\text{Average Vehicle Speed (Reference)}}{\text{Average Vehicle Speed (Actual)}}$$

This metric would utilize current EPA vehicle certification technology and utilize drive cycles that are appropriate to the particular vehicle types and classes being tested. In the equation presented above, average vehicle speed (reference) refers to the average speed prescribed by the appropriate vehicle drive cycle for the vehicle tested while average vehicle speed (actual) refers to the average speed actually achieved by the vehicle on the drive cycle. In effect then, the actual performance of any vehicle relative to the drive cycle serves as a necessary correction to the measurement of gallons consumed in order to move weight a certain distance – it provides a better measurement of the actual "work" done by the vehicle.

D. A Metric That Incorporates Vehicle Speed More Accurately Measures Fuel Efficiency and GHG Emissions

The metric, proposed above in Section I.B, also provides for a better measurement of a vehicle's fuel efficiency and greenhouse gas emissions. Vehicles that are able to accomplish more work during a given time period produce greater overall vehicle fuel efficiency. Vehicles that are able to avoid power losses and accelerate more effectively in urban traffic over the course of a day can make more stops, deliver more goods and complete more tasks required of them. Relatively small time savings, when replicated repeatedly over the course of a day or week, greatly enhance the productivity of a vehicle. Therefore, the work needed to be performed by a vehicle can be accomplished with relatively less running time (in the case of a single vehicle) and the work needed to be accomplished by a fleet can be accomplished with relatively fewer vehicles.[12]

[12] As an example, assume that Fleet A and Fleet B operate similar trucks with similar payloads and operating hours per day. But due to vehicle technology, including the use of advanced transmissions, Fleet A's trucks average 50 MPH, while Fleet B's trucks average only 40 MPH. The net result of such a different over the course of a year is highly significant. In the above example, Fleet B would need 10 trucks to transport the same ton-miles per year as 8 trucks at Fleet A.

EPA and NHTSA have recognized that personal vehicles, regulated pursuant to the 2009 LDV Rule and MD/HD vehicles, addressed by this proposed rule, are utilized differently and are affected by different external factors. But EPA and NHTSA have not fully incorporated this differential in the utilization of different vehicle classes into the proposed metric. The use of commercial vehicles addressed by this proposal is largely driven by the demands of the U.S. economy; it is the responsibility of the transportation industry to provide the required ton-miles of freight transport in any given year. This contrasts starkly with personal vehicle use that is affected by multiple non-economic factors, including recreational use, and other personal driving.

Within the LDV Rule, EPA and NHTSA accounted for changes in fuel cost per mile, personal income, vehicle prices, vehicles per capita, and other factors in deriving an estimate of the "rebound effect." EPA and NHTSA stated that "[the fuel economy rebound effect for light-duty vehicles has been the subject of a large number of studies since the early 1980s. Although they have reported a wide range of estimates of its exact magnitude, these studies generally conclude that a significant rebound effect occurs when vehicle fuel efficiency improves."[13] In other words, when the costs of driving decrease, individual vehicle use can increase.

In this proposed rule, EPA and NHTSA have recognized that the commercial and business purpose of MD/HD vehicles will predominate with regard to considerations of vehicle use. For example, driver pay is estimated to constitute 44% of the operating cost per mile of trucks.[14] There is minimal, if any, personal or recreational use of most commercial vehicles. EPA and NHTSA have also properly recognized that there may be short-term and longer-term factors that could affect truck usage and vehicle miles traveled ("VMT").[15] But the agencies have not fully incorporated these factors into their regulatory approach for the MD/HD vehicle sector. Overall, there needs to be a greater recognition in this proposed rule that commercial vehicle use is driven by profit motive, and that broader economic factors are paramount in creating the demand for commercial vehicle VMT.

Simply put, the relative state of the national economy and individual commercial decision-making by businesses will dictate MD/HD vehicle use. EPA and NHTSA have recognized this difference in their qualitative assessment and comments with respect to the

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[13] *Final Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards*, Joint Technical Support Document, at 4-16 (April 2010).

[14] *Draft Regulatory Impact Analysis for Proposed Rulemaking to Establish Greenhouse Gas Emission Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles*, Office of Transportation and Air Quality, U.S. Environmental Protection Agency and National Highway Traffic Safety Administration, U.S. Department of Transportation, at 9-4 (October 2010).

[15] The Draft Regulatory Impact Analysis for this rulemaking notes that reductions in fuel costs "could ripple through the economy which could in turn increase overall demand for goods and services shipped by trucks, and therefore increase truck VMT." *Id.* at 9-5.

"rebound effect" for commercial vehicles.[16] What EPA and NHTSA have not done, however, is to take the next logical step in this observation. That is, EPA and NHTSA should recognize that if vehicles can accomplish the work dictated by the economy in less time, utilizing fewer vehicles, this will result in an overall increase in fuel efficiency within the MD/HD sector. Allison's proposed metric acknowledges this fact and would account for these efficiency and emission benefits. The simple ratio of fuel consumed to 1000 ton-miles, as proposed by EPA and NHTSA, will not address such benefits.

Moreover, improving fuel efficiency within the MD/HD sector via utilizing fewer vehicles to accomplish the work required of the trucking industry will directly reduce overall GHG emissions. EPA has long recognized and taken steps to reduce the time that MD/HD vehicles idle through SmartWay program grants and planning. If more trucks are required to do the economy-prescribed transport task, there will be more overall truck idling time, which will consume more fuel, less efficiently, even when accounting for possibly higher rates of fuel consumption at higher speed. In addition, more trucks in traffic will add to congestion, creating additional idling time for automobiles, too. Since GHG emissions are overwhelmingly based on fuel combustion[17], using fuel more efficiently to complete the required work of MD/HD vehicles directionally reduces GHG emissions. In addition, the manufacture and maintenance of fewer vehicles reduces net GHG emissions from the MD/HD sector.

E. Allison Proposed Alternative Complete Metric Provides Incentives for More Efficient Technologies, Including Hybrids

As explained above, the alternative metric proposed by Allison incorporates concepts outlined in the NAS Report on vehicle average speed, while refining the NAS proposed metric to reflect how vehicles are actually used in the commercial sector. Thus the alternative metric provides a better (i.e., more complete) measurement of the actual productivity of the vehicles. In addition, however, utilizing such a metric in this rulemaking would incentivize the adoption of more efficient technologies, including hybrid drive systems. While EPA provides an alternative for the crediting of individual hybrid systems through A vs. B testing[18], the metric

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[16] EPA and NHTSA are using rebound effects of 5%, 10%, and 15% for vehicles covered by this proposed rulemaking, but have not tied these estimates directly to any specific study, but rather indicated that these estimates reflect the "potential impact of the rebound effect in our analysis." *Id.* at 9-4.

[17] *See* Draft Regulatory Impact Analysis cited above at 5-12. Carbon Dioxide ("CO_2") emissions from fuel combustion predominated MD/HD emissions. CO_2 emissions in the base case are estimated at 58,232,974 metric tons in 2030 as compared with 353,576 metric tons of hydrochlorofluorocarbon ("HFC") emissions from air conditioning. CO_2 emissions then represent an even higher percentage of all emissions as compared to LDVs, representing over 98% of GHG emissions.

[18] 75 Fed. Reg. at 74,256.

should directly recognize that hybrid vehicle operation is more fuel efficient due to how hybrid vehicles operate and how vehicle efficiencies are achieved, especially with regard to transient operation. This is not to advocate a theoretical measurement of hybrid efficiencies, but rather, to advocate a methodology for more direct measurement or, in the alternative, for robust modeling of hybrid systems. EPA should additionally make other changes to its proposed approach to crediting hybrid vehicles, as provided in the discussion in Section XI below.

F. Lower Average Vehicle Speeds Will Not Produce Vehicle Efficiency Gains

It has been observed that lower vehicle speeds can increase the fuel economy of individual trucks. At least in some instances, moving freight at lower speeds could consume less fuel due to lower wind resistance on a vehicle and the possible ability to operate at lower engine revolutions per minute ("rpm"). But this observation is of limited utility with regard to the promulgation of standards which would regulate the MD/HD sector. Commercial vehicles have inherent incentives to deliver goods more efficiently. In the commercial sector, time undoubtedly is money and the cost of operating a vehicle is only partially reflected in the fuel consumed. External factors – e.g., hourly wages paid, customer needs for prompt delivery – play an intrinsic and undeniable role in vehicle utilization. In other words, theory cannot replace hard commercial facts.

In seeking to design appropriate metrics to measure and improve the FE and lower GHG emissions from MD/HD vehicles, both EPA and NHTSA thus need to more fully consider vehicle operational realities in the commercial sector. Assuredly, the focus of this rulemaking is broad-based with respect to addressing climate change and reducing the consumption of transportation fuels. EPA's statutory focus must necessarily reside with respect to the emission of GHGs from MD/HD vehicle sector. NHTSA, operating within its own statutory framework, is required to focus on "maximum feasible improvement" for a fuel efficiency improvement program.[19] Overall policy direction has been framed with respect to preservation of our environment and decreased utilization of petroleum.[20]

Using fewer vehicles to perform the work dictated by the U.S. economy is consistent with such aims. That is, a metric incorporating average vehicle speed, thereby truly reflecting how the commercial sector measures work performed, serves the complementary goals that EPA and NHTSA seek in this rulemaking – less GHGs and improved FE.

G. Other Alternatives to Proposed Metric Are Possible

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[19] 49 U.S.C. § 32902(k)(2).

[20] *Improving Energy Security, American Competitiveness and Job Creation, and Environmental Protection through Transformation of Our Nation's Fleet of Cars and Trucks*, Memorandum of President Barack Obama, issued May 21, 2010, 75 Fed. Reg. 29,399 (May 26, 2010).

As noted, EPA and NHTSA are *not* required to propose or promulgate a metric based on the NAS Report recommendation for a measure of load specific fuel consumption ("LSFC"). This being said, under the accelerated rulemaking schedule that the agencies are following, it may be difficult to re-propose a different metric and adhere to the July 2011 deadline for a final rulemaking package. In the event that EPA and NHTSA decide to adhere firmly to the announced deadline, an alternative approach to the Allison proposed metric would be to include a "correction factor" to the proposed metric.

The correction factor would be applied when HD engines are tested on a given duty cycle representing the classes and duty cycle of particular vocations. That is, EPA and NHTSA would utilize the proposed metric, but then adjust the certification of vehicles based on measured or modeled performance relative to drive cycles based on real-world driving conditions. The resulting compliance values would essentially be corrected based on the actual distance a vehicle travels when trying to meet the "vehicle speed vs. time" trace for the specified duty cycle.

In this regard, the proposed gallons/1000 ton miles standard is not a "self-correcting" metric. If a vehicle is tested on an appropriate drive cycle and covers less distance on the drive cycle, it is true the denominator of the gallons/1000 ton miles metric will be smaller and thus produce a higher (i.e., worse) FE or GHG "rating." However, in this case, the numerator of the FE ratio will also decrease, which would improve the FE ratio. EPA and NHTSA should recognize this effect and not simply assume that the proposed metric automatically accounts for the different operation of different vehicles being tested (or simulated) on a drive cycle utilized for compliance.

As a simple example, suppose the goal of a drive cycle used for compliance is to compare the FE of two trucks at a steady cruising speed for one hour. It would be contrary to the purpose of the drive cycle to operate one truck at 65 mph and the other at 50 mph and then directly compare the FE of the two trucks, as measured in gal/1000 ton-mile. Yet such a result might be possible if the slower truck is allowed to "pass" a drive cycle test (on the theoretical basis that because the slower truck goes a lesser distance over the 1 hour test period, the resulting performance of the truck is "corrected" by the FE ratio in gal/1000 ton-mile). In short, it is logically inconsistent and not reflective of real world conditions to directly compare the FE of vehicles when they are operated at different average speeds and when their performance varies widely from that prescribed by a drive cycle.. Such an approach also would be misleading to ultimate purchasers of the vehicle who might rely on the vehicle's performance on a drive cycle as being indicative of real-world performance.

Drive cycles are designed to simulate real world traffic conditions. Therefore, the inability of any vehicle to follow the "trace" of a drive cycle is not simply a failure without consequence. It means that the vehicle in the real world will not be able to keep up with traffic, will take more time to complete the work required of it and will consume more fuel to complete the work required of it (or, in the aggregate, a fleet will require more vehicles to fulfill its business obligations). Therefore, a correction factor is necessary to account for this failure, either in the form of a correction based on average speed as incorporated within the

Allison-proposed metric, or with respect to a correction based on the distance a vehicle travels on the duty cycle versus the distance that would be covered by a vehicle which was following the trace.

Altogether, Allison recognizes and appreciates that EPA and NHTSA are operating under tight timeframes in this rulemaking proceeding and that there are also constraints related to testing facilities and funding which might be needed in order to develop a more robust GHG/FE metric that would directly incorporate average speed or support a different approach to compliance than the approach in the proposed rules.[21] Applying an adjustment factor would address these practical limitations, yet allow each agency to implement a more direct complete measure of each vehicle's FE and GHG emissions.

Given EPA and NHTSA intention for follow-on rulemakings,[22] it is also incumbent upon both agencies to continue their evaluation of appropriate metrics for fairly comparing the relative GHG emissions and FE of different MD/HD vehicles. EPA and NHTSA should therefore recognize the limited focus of the NAS report, carefully evaluate alternatives to the proposed metric and work cooperatively with affected industries on a going-forward basis. An adjustment factor could serve as a bridge to the broader evaluation of appropriate FE and GHG metrics in follow-on rulemakings.

III. The Greenhouse Gas Emission Model ("GEM") is Deficient for Purposes of Calculating GHG and FE Standards.

At the time that these comments are filed,[23] the GEM modeling to support this rulemaking effort is limited to several discrete factors including aerodynamics, rolling resistance, and weight. As EPA and NHTSA well know, aerodynamic factors can have a relatively small impact at low urban speeds and "stop and go" traffic. EPA and NHTSA have also not fully addressed some significant factors in the GEM, like non-hybrid transmissions, which can have a far greater impact on FE and GHG emissions than discrete aerodynamic technology. Thus, it is impossible to state EPA and NHTSA have addressed the "largest" emission factors affecting the FE and GHG emissions of MD/HD vehicles in the GEM.

At minimum, both EPA and NHTSA should make available additional information on the GEM when any updates are completed and afford an opportunity for public notice and comment on all but the most minor, administrative items contained in the model. Such an approach is not only required by the Clean Air Act (CAA), but is also supported by several policy statements

[21] EPA and NHTSA noted the lack of chassis-test facilities as a factor in developing the proposed rules and for not proposing alternative standards. 75 Fed. Reg. at 74,162.

[22] 75 Fed. Reg. at 74,172.

[23] While Allison has made every effort to keep itself appraised of relevant EPA analysis and documentation provided in the docket for this rulemaking, from a practical standpoint, comments must be assembled many days prior to their submittal by the January 31, 2011 deadline.

concerning the transparency of the rulemaking process.[24] More importantly, in order to serve as a basis for this proposed rule, the GEM must be improved to reflect a more accurate estimation of FE and GHG performance. The current GEM is overly simplified and provides an insufficient basis and support for the resulting regulatory standards.

A. The GEM Is Incomplete And Does Not Currently Reflect Real World Vehicle Operations.

The GEM incorporates a 55 miles per hour ("mph") steady state cycle that does not reflect real world vehicle operations. In specific, the GEM drive cycle allows 1.6 minutes in order for a heavy-duty vehicle to reach 55 mph and 3.3 minutes for a heavy-duty vehicle to reach 65 mph. Actual capabilities of such vehicles far exceed these extended acceleration curves and such lengthy accelerations of the sort modeled in the GEM are clearly not utilized or reasonable in the real world. As indicated below, actual tests performed as part of the Oak Ridge National Laboratory Class-8 Heavy Truck Duty Cycle Project Final Report demonstrate that HD vehicles can (and do) accelerate to 55 mph in far less time than the times utilized in the GEM.[25]

The comparison between the GEM and actual testing of vehicles is stark. While the Oak Ridge testing did not accelerate to 65 mph, falling just short of that speed, MD/HD vehicles can accelerate much faster than the GEM "presumes" and variation in speed is evident when HD vehicles operate in urban environments and elsewhere.. EPA's modeling of excessively long and smooth acceleration – combined with overweighting of steady-state operation – creates a gap between modeled and real world performance. If the goal of this combined rulemaking is to achieve gains in FE and improvement in GHG in the real world, NHTSA and EPA should revisit this critical issue and strive to utilize more realistic modeling of MD/HD vehicle operation in its regulatory program.

[24] *Transparency in EPA's Operations*, Memo to EPA Employees, Administrator Lisa P. Jackson, (April 23, 2009).

[25] *Class 8 Heavy Truck Duty Cycle Project Final Report*, Oak Ridge National Laboratory, ORNL/TM-2008/122 (December 2008)..

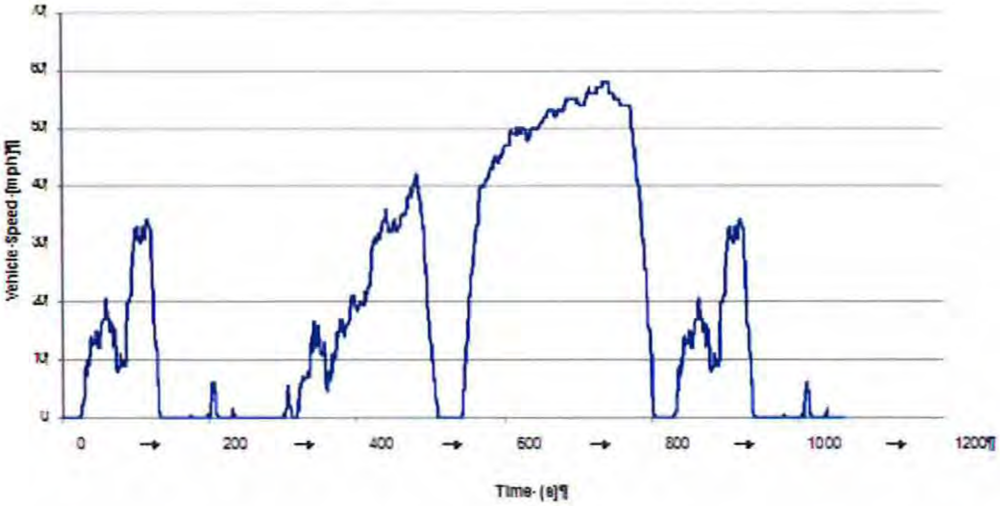

Fig. 52. Heavy Duty Urban Dynamometer Driving Schedule (EPA's UDDS Cycle D)

As the above figure[26] from the Oak Ridge report attests, real world driving conditions of MD/HD vehicles can be characterized by fairly rapid accelerations and decelerations. In the Drive Cycle above[27], the HD vehicle reaches speeds of 40 mph in a very short period of time; and appears to reach 50 mph in far less than 1.6 minutes. In this regard, there would also not be any technical reason why a MD/HD vehicle equipped with an advanced transmission would not be able to replicate a reasonably smooth acceleration from the 40 mph or 50 mph level to the GEM "steady state" speeds of 55 or 65 mph.

Represented immediately below is the HD Drive Cycle that we currently understand is included within the GEM. Following the GEM Drive Cycle is another Drive Cycle from the Oak Ridge report representing Heavy-Heavy Duty Truck Cruise Mode. The difference between the GEM Drive Cycle and the Oak Ridge Drive Cycle above and immediately below the GEM Drive Cycle is obvious. In either comparison, the GEM Drive Cycle is overly simplified and does not represent anything close to real world transient or "steady state" operation of vehicles.

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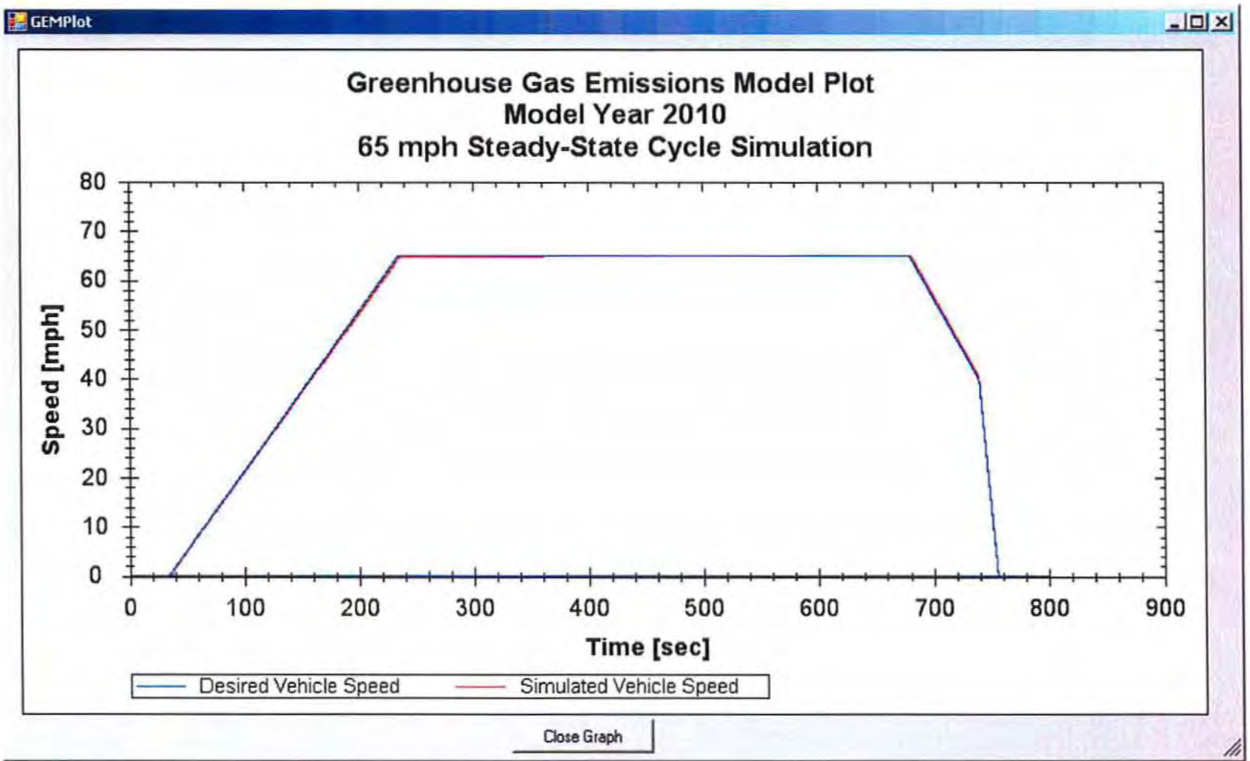
[26] Id. at 4.

[27] Id.


GEMPlot
Greenhouse Gas Emissions Model Plot
Model Year 2010
65 mph Steady-State Cycle Simulation
Speed [mph]
Time [sec]
Desired Vehicle Speed
Simulated Vehicle Speed
Close Graph

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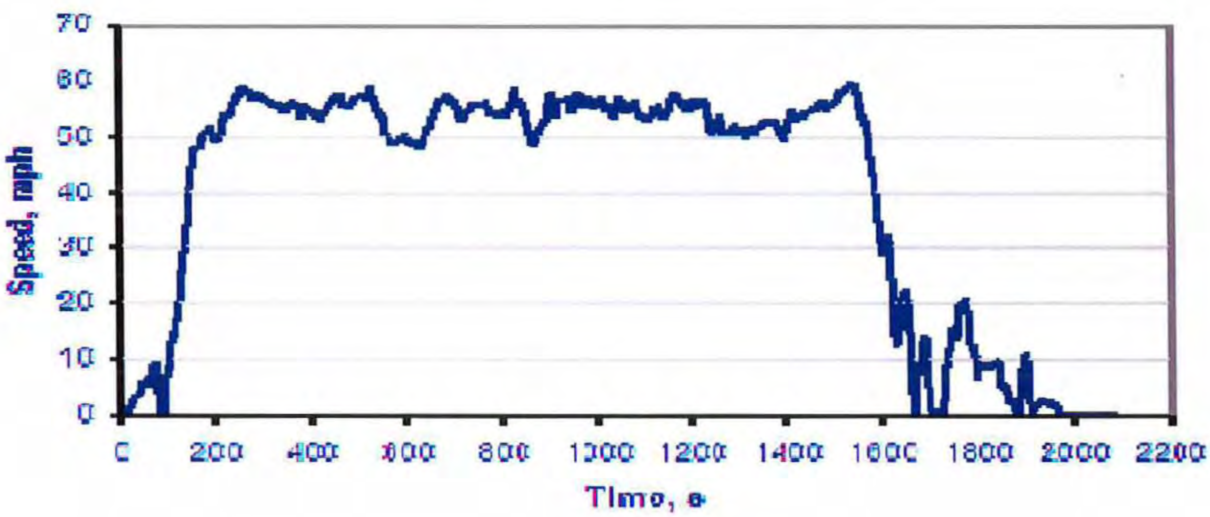
Speed, mph

It is also evident that the GEM Drive Cycle would rarely, if ever, be experienced in real world traffic and highway conditions. It could not be expected – and it contradicts common, everyday experience – that MD/HD vehicles seeking to merge into traffic on interstate highways would take 3.3 minutes to have their vehicle match the speed of other vehicles already on the highway. Moreover, as shown above, "steady state" operation is itself subject to at least some variation in speed. Heavy-duty vehicles traveling on interstate highways are subject to various elements impact that their ability to keep speed constant. Long grades, headwinds, heavy traffic and other conditions impede the ability of HD vehicles to travel at 55 mph or 65 mph for extended periods of time.

Instead, vehicles operating in the real world experience driving conditions far closer to the Oak Ridge Drive Cycles than the Drive Cycle utilized by the GEM. And it is clear that many vehicles are actually able to meet such Drive Cycles. In specific, the Oak Ridge report not only presented various different drive cycles, but actual testing of vehicles on the Drive Cycles contained in the report was conducted. As noted in the report with reference to the chart below: "Fig. 53 presents the actual implementation of the EPA Heavy Duty UDDS (run 5270-2 is shown). The implemented duty cycle was very close to the theoretical duty cycle shown in Fig. 52, in both shape and scale (i.e., *the speeds and times were almost a perfect match*)."[28]. (Emphasis added).

[28] Id. at 58.

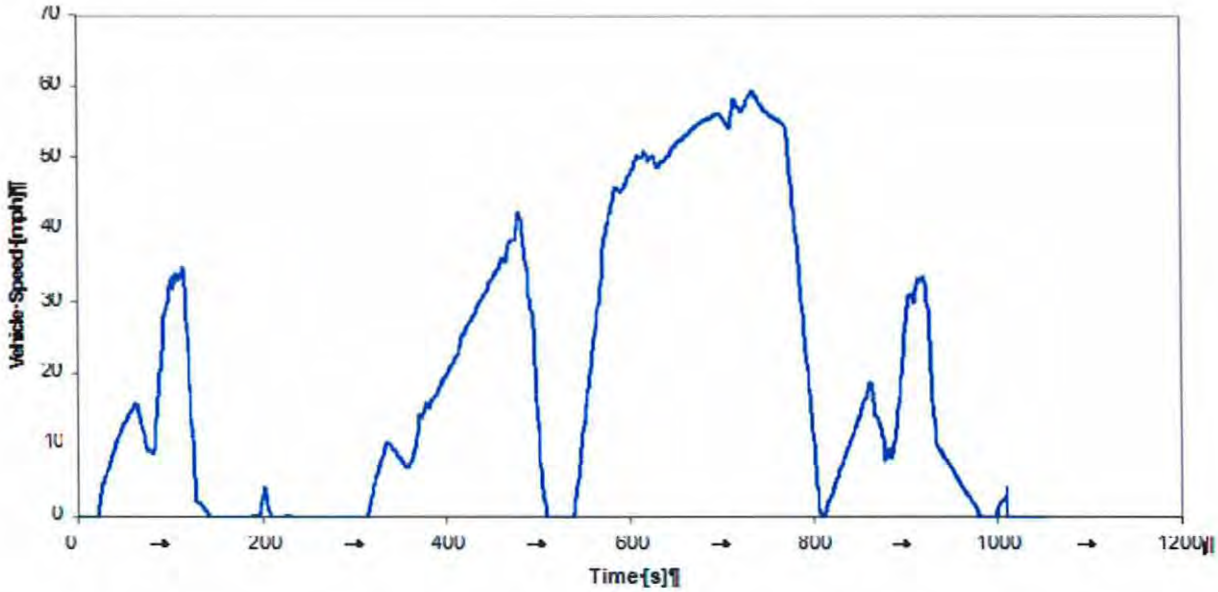

Fig. 53. Implemented Heavy Duty Urban Dynamometer Driving Schedule (UDDS) (Run 5270-2)

Since the GEM effectively provides the compliance mechanism for original equipment manufacturers ("OEMs"), the model is intrinsic to both EPA and NHTSA's exertion of statutory authority. With regard to NHTSA, EISA requires the adoption of "appropriate test methods" that are "appropriate, cost-effective, and technologically feasible for commercial medium- and heavy-duty on-highway vehicles and work trucks."[29] With respect to EPA, the Agency relies on authority contained in CAA section 202(a)(1) for this rulemaking, and cites several statutory factors that are required for its analysis including the "feasibility and practicability of potential standards."[30]

It is clearly both cost-effective and technologically feasible for all vehicle classes affected by this rulemaking to accelerate to 55 mph and 65 mph in timeframes far shorter than provided

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[29] 49 U.S.C. § 32902(k)(2).

[30] 75 Fed. Reg. at 74,170.

for in the GEM. Moreover, both agencies must recognize the complexities that are involved in the simulation of acceleration in MD/HD vehicles. Shift time, clutch profile, controller, shift schedule and lockup (LU) schedule are important factors in acceleration as well as transients, turbo lag and lug-up curve. In order to optimize the resulting FE and GHG of MD/HD vehicles, the drive cycles modeled in the GEM must be based on more appropriate real-world scenarios. EPA and NHTSA should therefore revise related GEM simulation parameters in order to better replicate actual FE and GHG performance.

B. Duty Cycle Mode Weightings in GEM Simulation Conflict with Real World Data and Overestimate High-Speed Operation of Vocational Vehicles and Combination Tractors

Allison's own analysis of this issue starkly departs from the weighting of different operating modes used in the GEM and supporting this proposed rule. As indicated by the chart contained below, for both combination tractor categories and vocational vehicles, the percentage of distance traveled that MD/HD vehicles spend in transient operation versus steady state operation at 55 mph and 65 mph is widely different from the percentages that EPA and NHTSA are proposing to incorporate in the GEM. Instead, Allison's analysis much more closely conforms to analysis of vehicle operating modes that EPA performed in 2008.

Data supporting the chart and the analysis are included as Attachment 4 of these comments. This data, representing several different types of vocational vehicles, sleeper cabs, day cabs, and buses indicates that much lower percentages of steady-state on-highway high speed operation of vehicles should be incorporated into the duty cycle weightings that EPA and NHTSA have proposed. This analysis was performed in an analogous manner to the analysis that EPA and NHTSA performed.

In the information provided in Attachment 4, weightings are calculated based on the percentage of time and distance experienced by the vehicles during monitored operation. As the summary chart demonstrates, transient operation of vocational vehicles and day cabs is much higher than EPA and NHTSA have proposed. For vocational vehicles, a minimal amount of time is spent at speeds exceeding 60 mph (consistent with EPA's 2008 analysis indicating 0.0% time and distance operation at speeds exceeding 60 mph). For day cabs, a similar finding can be made – Allison's data indicates that day cabs travel at speeds in excess of 60 mph only for 13.8%

of the total distance traveled (compared with EPA's 2007 estimate of 32.9%[31] and the proposed rule's incorporation of 64% of the distance traveled at over 60 mph).

We would therefore request that EPA and NHTSA closely examine the submitted data and reconsider and recalculate the percentages of high speed steady-state operation proposed in the rulemaking for inclusion into MD/HD vehicle modeling. We believe this "real world" data provides a strong indication that the proposed estimates, which form the basis of compliance with the GEM, are unsupported and arbitrary.

	VOCATIONAL VEHICLES					DAY CABS					SLEEPER CABS				
Duty Cycle	2007 EPA		2010 EPA	Allison Data		2007 EPA		2010 EPA	Allison Data		2007 EPA		2010 EPA	Allison Data	
	% Time	% Distance	% Distance	% Time	% Distance	% Time	% Distance	% Distance	% Time	% Distance	% Time	% Distance	% Distance	% Time	% Distance
Transient (<50 MPH)	87.5%	66.6%	42%	86.8%	80.4%	41.7%	19.6%	19%	64.7%	44.8%	55.2%	8.9%	5%	14.9%	6.7%
50 MPH - 60 MPH	12.5%	33.4%	21%	8.0%	13.9%	35.6%	47.5%	17%	26.5%	41.5%	10.1%	4.2%	9%	16.5%	15.6%
>60 MPH	0.0%	0.0%	37%	5.2%	5.7%	22.7%	32.9%	64%	8.8%	13.8%	34.7%	86.9%	86%	68.6%	77.7%

2008 EPA Cycle Analyzed	Refuse Hauler	rev. 12_28_05 SW_hwy_line_haul_cycle_Phase_II_test_with_ARB_cycle_BAS1.xls	NESCAUM_Dynamometer_drive_cycle_w_grade_Feb29_08

Duty Cycle Mode Weightings[32]

C. EPA and NHTSA Did Not Provide Timely Notice of GEM Updates

The GEM provides an intrinsic part of this proposed rule. While EPA and NHTSA may seek to improve the operation of the model and improve the regulatory program in this proposed rule, the Agencies cannot rely on a model which is subject to change and thereby not subject to

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[31] Supporting data for SmartWay Fuel Efficiency Test Protocol for Medium and Heavy Duty Vehicles, Transportation and Regional Programs Division, Office of Transportation and Air Quality, EPA420-P-07-003 (November 2007).

[32] "2007 EPA" data from SmartWay Fuel Efficiency Test Protocol cited *supra*. "2010 EPA" data from Draft RIA. "Allison Data" from independent analysis; *see* Attachment 4.

full public notice and comment. EPA and NHTSA should therefore provide an additional period of notice and comment for this proposed rule based on changes to the GEM model made between November 30, 2010 and January 31, 2011, as well as any significant changes made to the model thereafter.

At minimum, EPA and NHTSA must make a complete GEM model available to the public and allow a sufficient amount of time for comment on the model and its utilization within the proposed rule. The GEM model is an integral part of both the compliance mechanism in this proposed rule as well as the EPA and NHTSA assessment of the stringency of the proposed regulations and, by extension, the compliance of the proposed rule with the statutory authorities sought to be implemented by both Agencies. Given its central relevance to the proposed rule, EPA and NHTSA must allow public comment on the completed model as well as its utilization in deriving the proposed rules.

D. Tires Should Reflect Real World Vehicle Utilization

EPA and NHTSA have proposed that vehicle compliance for Class 7 and 8 combination tractors measure the performance of specified tractor systems, including aerodynamics and tire rolling resistance.[33] For vocational vehicles, EPA and NHTSA are proposing vehicle standards focused solely on improvements to vehicle tires.[34] Thus, relatively large emphasis is placed in the proposed rules on tire rolling resistance and the ability of a vehicle to improve GHG and FE performance through the use of newer technology tires.

Given this emphasis, EPA and NHTSA should attempt to incorporate real world data and experience with respect to the matter of tire selection for individual vehicles. As each agency recognizes, there are a multiplicity of different vehicle uses in the MD/HD category. Certain vehicles may perform emergency services, other vehicles may be required to regularly transport heavy loads or incorporate some off-road travel into their pattern of ordinary use. In such situations, tire selection can be a critical component of vehicle function and safety. One possible point of reference for modeling tire rolling resistance for various vehicles is therefore the normal original equipment manufacturer ("OEM") tire offerings for various vehicles. While EPA and NHTSA certainly may seek to improve GHG and FE through incorporation of improved tire technology, both agencies should also recognize that there are limitations with

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[33] 75 Fed. Reg. at 74,180.

[34] Id. at 74,198.

respect to at least some vehicles in the degree to which such technology may reasonably and rationally be incorporated into the end vehicle.

IV. Neither the Clean Air Act or the Energy Independence and Security Act Dictate that EPA and NHTSA Adopt the NAS Recommended Metric or Promulgate Final Standards within the Announced Timeframe.

A. EPA Clean Air Act Authority

EPA relies upon and directly cites the CAA as the source of its authority to set GHG standards for MD and HD vehicles. As previously cited by the Agency with respect to its use of the same authority in the LDV rule, EPA considers that CAA section 202 provides the Agency with broad authority to set standards.[35] EPA considers that it is authorized to set standards whether vehicles and engines are designed as complete systems or incorporate devices to prevent or control pollution. In other mobile source rulemakings, EPA has also relied on its stated ability to allow standards to take effect in such time periods as to permit the development of requisite technology, giving appropriate consideration to the cost of compliance within such period.

Since EPA indicates that it is acting within this same authority in this proposed rule, the Agency certainly may consider the NAS Report in evaluating options for the control of GHGs from MD/HD vehicles. However, EPA is under no mandate to directly consider the NAS Report, nor does the Agency owe NAS any statutory deference. Technical comments and evaluations from other parties, if supported, must be given equal weight. The CAA does not provide – as it does with respect to other standard setting provisions[36] – that EPA either directly consider or respond to NAS' recommendations.

In addition, EPA is not under a statutory duty or judicial order requiring the Agency to promulgate MD/HD standards by any particular date. Instead, the planned deadline for a final regulation is the result of policy decisions. EPA is also not required by law to conform its CAA rulemaking to any other statutory authority; the CAA does not cross-reference other statutory authority (e.g., EPCA) or require a direct consultation of the EPA Administrator with

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[35] Id. at 74,170.

[36] *See*, for example, CAA section 109(d)(2) where consultation with an independent scientific review committee is explicitly required as part of the process for establishing or considering revisions to existing national ambient air quality standards.

other members of the Executive branch (e.g., Department of Transportation). EPA then has significant flexibility with regard to the timing of this rulemaking, including the timeframe for initial application of standards.[37] In addition, EPA must fully consider information submitted to the Agency as part of the public notice and comment procedures required under both the CAA and the Administrative Procedures Act. In making these observations, Allison is neither suggesting that EPA not consider the NAS report, nor carefully consider its analysis. In fact, EPA should further review and give weight to the NAS observations concerning the effect of transmission technology on fuel economy and emissions.[38] As reflected in Attachment 1 and below in Section VII, the NAS recognized that transmissions can have a significant effect on fuel consumption and vehicle emissions. Concomitantly, the NAS also recognized the importance of average vehicle speed in measuring fuel efficiency, stating that "[t]he fuel efficiency of a truck is not readily characterized by a single number, but rather by a curve against average speed. . . . If varying operating weight is also considered a factor, fuel efficiency information forms a surface of values against the axes of average speed and operating weight."[39]

B. EPCA/EISA Authority

Undoubtedly NHTSA must take into account the analysis and findings of the NAS report it commissioned pursuant to the enactment of EISA. EISA explicitly added requirements for both an NAS study of vehicle fuel economy standards and a report assessing technologies and costs, the practical integration of technology into MD/HD fleets and other matters.[40] The NAS report, however, cannot be the sole basis for the promulgation of standards. Instead, in setting standards NHTSA must consider the "maximum feasible improvement" for a fuel efficiency improvement program and must adopt and implement several measures, including

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[37] We would note that under the announced timeframe, EPA would promulgate standards that would take effect for Model Year 2014. Considering requirements of the Congressional Review Act, this would mean that compliance with new standards would need to occur approximately 27-28 months from the publication of final regulations in the Federal Register. This short compliance window stands in contrast to past Agency practice whereby EPA typically allowed several model years before standards in this vehicle segment would take effect.

[38] *See* Section I.D., *infra*.

[39] NAS Report at 36.

[40] EISA sections 107-108.

appropriate test methods and measurement metrics.[41] NHTSA then has statutory flexibility to not propose or adopt the LSFC standard. Moreover, NHTSA is required under the Administrative Procedures Act to consider comments submitted for the record in this rulemaking proceeding.[42]

C. **Coordination of CAA/EPCA/EISA authority**.

In *Massachusetts v. EPA*[43], the Supreme Court indicated that it saw "no reason" why EPA and NHTSA could not coordinate the use of their respective statutory authorities to avoid conflict in regulation. EPA and NHTSA therefore proceeded to work together on both the LDV rule and this rulemaking.

The ability of the agencies to coordinate their standards so as to avoid inefficiencies and regulatory overlap is not at issue in the instant rulemaking. Instead, the issue is with respect to the degree to which EPA and NHTSA owe deference to the NAS report conclusions and proposed metric, either singly or as part of a coordinated rulemaking effort. In this regard, both EPA and NHTSA must give proper evaluation of the extent to which they have carefully considered and carried out their statutory duties under the CAA and EISA/EPCA. NHTSA must consider and EPA may consider the NAS report, but the bottom line of fulfilling their statutory duties is to promulgate standards in accordance with the full range of directives that Congress established in their enabling statutes.

In this regard, it is somewhat anomalous that EPA has deferred or given considerable weight to one element of NHTSA statutory authority by adopting the NAS metric – while not similarly recognizing the statutory restraint placed on NHTSA to not implement new standards with at least 4 years of lead time. As a result, NHTSA appears to be placed in the awkward position of proposing "voluntary" standards within MY 2014-2015 instead of EPA acting to "harmonize" the exercise of its CAA authority with a direct restraint placed on NHTSA by law.

In sum, EPA, and to a different degree NHTSA, is not required to adopt (or solely consider) the NAS recommended metric but must exercise independent judgment consistent with the statutory authority of each agency. Both agencies have discretion, in exercising their statutory authority, to make necessary adjustments and alterations to the metric recommended by

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[41] 49 U.S.C. § 32902(k)(2).

[42] 5 U.S.C. § 553.

[43] 549 U.S. 497 (2007).

the NAS report. Neither agency can delegate its responsibilities in this matter to the NAS, but rather, must exercise independent judgment in accordance with relevant CAA and EPCA authority. Thus either or both agencies could adopt the vehicle average speed corrected metric outlined above or otherwise "correct" certification data to reflect the actual and real world performance of a vehicle in complying with an appropriate drive cycle.

D. Timing of Rulemaking Effort

In a similar fashion, both EPA and NHTSA have substantial degree of discretion with respect to the timing of any regulatory effort concerning MD/HD vehicles. Under the announced timeframe, a final rulemaking is to be completed in approximately 6 months. Yet the CAA does not require this action; the CAA in fact contains no specific date by which this MD/HD rule must either be proposed or finalized. While NHTSA is subject to certain timelines pursuant to EPCA,[44] such requirements also do not dictate that NHTSA finalize its part of this rulemaking package by July of 2011. In fact, the Supreme Court recognized that NHTSA has a singular duty, apart from EPA, to coordinate its vehicle rulemakings with standards of other federal agencies, including EPA.[45]

Both agencies should then balance any need to promulgate GHG/FE standards against the factors provided for in their authorizing statutes and the agencies' general duty to fully review relevant technical information. As the first regulation of its type for MD/HD vehicles (and indeed the first regulation for MD/HD vehicles ever promulgated by NHTSA), both agencies should also pay close attention to the comments received during the public notice and comment process. In short, both agencies should avoid any "rush to judgment" in this matter and get it right the first time. EPA and NHTSA are proposing to regulate a large segment of the nation's transportation system and one tied directly to the nation's

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[44] 49 U.S.C. § 32902(k)(3).

[45] In discussing the argument that EPA and NHTSA statutory authorities conflict in this area, the Supreme Court stated that "EPA has been charged with protecting the public's 'health' and 'welfare,' 42 U.S.C. § 7521(a)(1), a statutory obligation wholly independent of DOT's mandate to promote energy efficiency." *See* Energy Policy and Conservation Act, § 2(5), 89 Stat. 874, 42 U.S.C. § 6201(5). The two obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency. *Massachusetts v. EPA*, 549 U.S. 497, 532.

economic viability. Sufficient time and care must be taken to ensure that the final regulations promulgated are supportable on a technical, legal and policy basis.

We recognize – as cited in the proposed rule – that direction to complete this rulemaking has been issued by the President.[46] We also acknowledge and share the goal of reducing GHG emissions and improving the FE of MD/HD vehicles. But as is the case with complex rulemakings of this type, we believe the public interest can better be served by taking sufficient time to complete EPA and NHTSA's ongoing work on the GEM model, to more carefully review and validate the NAS report analysis, to examine the comments submitted to date to the Agency and to undertake further agency analysis.

Both EPA and NHTSA have certainly gained more knowledge in the time period following the May 21, 2010 announcement of the "aim" of completing a final rule by the end of July 2011. However, part of the direction for this rulemaking was also to "take into account the market structure of the trucking industry and the unique demands of heavy-duty vehicle applications."[47] As cited throughout these comments, but especially with regard to the submitted comments on the incomplete metric, the incomplete GEM model and the overweighting of high speed steady-state MD/HD vehicle operations, more work needs to be done on the proposed rules and their supporting technical analysis. We believe it would be consistent with the Presidential Memorandum to take additional time to recognize and fully account for the unique demands and realistic operation of the MD/HD on-road vehicle fleet.

V. Most Vehicle Categories Are Appropriate, but EPA Should Revisit Some Categories

Allison has reviewed the nine subcategories that were created for Class 7 and 8 combination tractors.[48] EPA has properly recognized that there are differences in the type and configuration of vehicles within Class 7 and 8 and the vehicle attributes selected for categorization appear to be broadly appropriate. Roof height and cab configuration generally correspond to the use of such vehicles. As cited elsewhere in our comments, however, EPA and NHTSA assumptions regarding the use of Class 7 and 8 vehicles are not as well-grounded.

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[46] Presidential Memorandum Regarding Fuel Efficiency Standards, cited *supra* note 20.

[47] Id. at Section 1(b).

[48] 75 Fed. Reg. at 74,199.

A. Some Combination Tractor Vehicles Should Be Considered Vocational Vehicles

From Allison's analysis of technical data supporting this rulemaking, it appears that several vehicles have been included within the Class 7 and 8 combination tractor subcategories which more appropriately belong in the vocational vehicle category. These vehicles are: Aircraft refueler; Aircraft service; Construction dry bulk, Construction Equipment Hauler, Construction tanker, Fire aerial; Hauler slag; Hauler logs; Hauler wood chips; Hauler mining; Hauler bottom dump; Oil Field draw works; Oil Field pumping; Oil Field service; Oil Field tubing; Refuse liquid waste, Equipment Hauler,; and Dock Spotter vehicles. Allison's long experience in supplying various vehicle markets indicates that these vehicles are more appropriately considered to be vocational vehicles within the meaning of this proposed rule due to their configuration and utilization. This view is supported by the data contained within Attachment 4.These vehicles largely operate in a "transient mode "(i.e., a mode characterized by the operation of vehicles during multiple periods of acceleration and deceleration, short periods of variable speed, and different levels of speed during a Drive Cycle – as opposed to long periods of "steady state" operation at one continuous speed).It would therefore be inappropriate to classify such vehicles as combination tractors and model the operation of the vehicles usingDirve Cycles with high to very high percentages of steady-state operation at speeds exceeding 55 mph.

B. EPA and NHTSA Should Consider Separate Bus Category

In addition to the categories proposed, EPA and NHTSA should consider the establishment of a separate category for buses. Such vehicles constitute a major subsector of Class 2-8 vehicles. According to available information, school buses alone constitute 30,710 units out of a total 125,110 units for Classes 5-7.[49] Other transit buses, shuttle buses, and motor coaches may add up to an additional 10,000 units per year to this total.

In particular, EPA and NHTSA should consider different drive cycle testing for buses to reflect their different operational profiles. While buses, like any category of vehicles subject to this rulemaking vary within the category, it would appear facially implausible to project that school buses spend either 86% or 58% of their operational time at speeds over 55 mph as presumed within the drive cycles utilized in Class 7-8 tractor cabs and Class 2-8 vocational vehicles. Instead, given the relative large and distinct vehicle group presented by buses, different drive cycles reflecting operation in urban environments, transient operations associated with multiple stops and starts and normal routes driven by such vehicles should be considered.

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[49] *ACT N.A. Commercial Vehicles Outlook*, Americas Commercial Transport Research Co., Inc. at B-1 (January 10, 2011).

VI. EPA and NHTSA Proposals on Class 7/8 Tractor Cabs and Compliance/Drive Cycles for Such Vehicles Are Deficient

In the preamble, EPA has stated several factors that Allison agrees with in respect to vehicle drive cycles. EPA indicates correctly that the choice of a drive cycle has significant consequences for the technology that will be employed to meet regulatory standards.[50] EPA has also stated that the "drive cycle should focus on promoting technology that produces benefits during the primary operation modes of the application."[51] Despite these observations, however, the Agency has proposed that all engines in the combination tractor category meet a steady-state SET test cycle. EPA proposes to base the drive cycle for combination tractor compliance testing on the California ARB Heavy Heavy-duty Truck Mode 5 Cycle and utilize three of the cycles on the basis of information in EPA's MOVES model.[52]

While EPA's proposed approach is fairly direct and straightforward, it is also wrong with regard to its primary assumptions. First, the approach does not account for variation of speeds in cruise conditions caused by numerous external factors (e.g., grades, wind, traffic conditions, etc.). Instead, incorporation of the High Speed Cruise and Low Speed Cruise utilizes constant speed cycles of 65 miles per hour (mph) and 55 mph which are overestimated.[53] Second, acceleration rates employed are too low. EPA should instead consider the following additional data and information with regard to establishing applicable drive cycles for combination tractor compliance:

(1) Attachment 3 to these comments. This attachment outlines why requiring *adherence* to duty cycles in testing – or incorporation of a suitable adjustment factor to the testing results – is necessary to better reflect the true fuel efficiency and emission performance of vehicles.

(2) Appendix 1 to Attachment 2 of these comments. This attachment addresses assumptions made within the NAS Report and contained within this proposed rule as to the operation of long-haul vehicles and the amount of steady-state operation of Class 7-8 vehicles.

A. EPA Should Utilize Test Protocols As Outlined in 2007 Working Draft.

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[50] 75 Fed. Reg. at 74,185.

[51] 75 Fed. Reg. at 74,186.

[52] *Id.*

[53] Draft RIA at 3-24.

In November 2007, EPA published the Working Draft of the SmartWay Fuel Efficiency Test Protocol for Medium and Heavy Duty Vehicles.[54] The purpose and scope of that document was to "provide a standardized, objective, consistent test procedure to measure the fuel consumption of heavy duty vehicles used in on-road operation."[55] Within the report, in the discussion of drive cycle selection criteria, it was noted and observed that the duty cycles of heavy-duty vehicles "vary greatly by application."[56] The report included a highway line haul duty cycle, a regional haul cycle, a local pick up and delivery cycle, a neighborhood refuse truck, a utility service truck, transit bus cycles, and an intermodal drayage truck cycle. Unique drive cycles were provided for each different vehicle type, including two different candidate drive cycles for transit buses, the Manhattan bus cycle and the Orange County bus cycle.

While Allison appreciates the rationale that EPA and NHTSA offer for not pursuing dynamometer testing of vehicles, it is also clear that the rulemaking structure proposed by each Agency could incorporate additional drive cycles and vehicle subcategorization beyond that proposed. Indeed, the issue of dynamometer testing is not intrinsic to the selection of drive cycles; instead, EPA and NHTSA have the ability to model compliance with drive cycles and propose this alternative as part of the utilization of the GEM. Within the preamble to the proposed rule, neither agency has offered an argument why additional drive cycles could not be utilized. EPA and NHTSA should therefore reevaluate the drive cycles utilized in this proposed rule taking into account the 2007 draft report. The test protocols outlined by EPA in 2007 are also supported by additional work performed by the Oak Ridge National Laboratory in 2008.[57] This report specifically noted that line-haul vehicle operation varies from the high levels of cruise estimated for purposes of the proposed rule. In specific, the report noted that:

> Heavy truck-based long-haul operations (i.e., operations in areas beyond 300-to-500 miles of a garaging area) have typically been stereo-typed as long-periods of driving many miles with few stops. However, when considering refueling, topography, congestion, size/weight/safety inspections, anti-idling laws and hours-of-service, there is considerably more

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[54] Transportation and Regional Programs Division, Office of Transportation and Air Quality, EPA420-P-07-003 (November 2007).

[55] *Id.* at 6.

[56] *Id.* at 22.

[57] *Class-8 Heavy Truck Duty Cycle Project Final Report*, Vehicle Systems Program, Oak Ridge National Laboratory, ORNL/TM-2008/122 (December 2008).

stop-and-go behavior than is popularly believed. In long-haul operations, the drivers usually do not return to their home terminal each evening and they maintain a daily logbook of operation statistics.[58]

Within this report, an EPA modified cruise module was also cited. As demonstrated in the graphic provided below, we would note the variance between the drive cycle contemplated by this effort and the drive cycle(s) proposed to be incorporated within this proposed rule. In effect, more transient operation is forecast for HD vehicles even in cruise operation than proposed to be incorporated within the compliance mechanism for this rule.

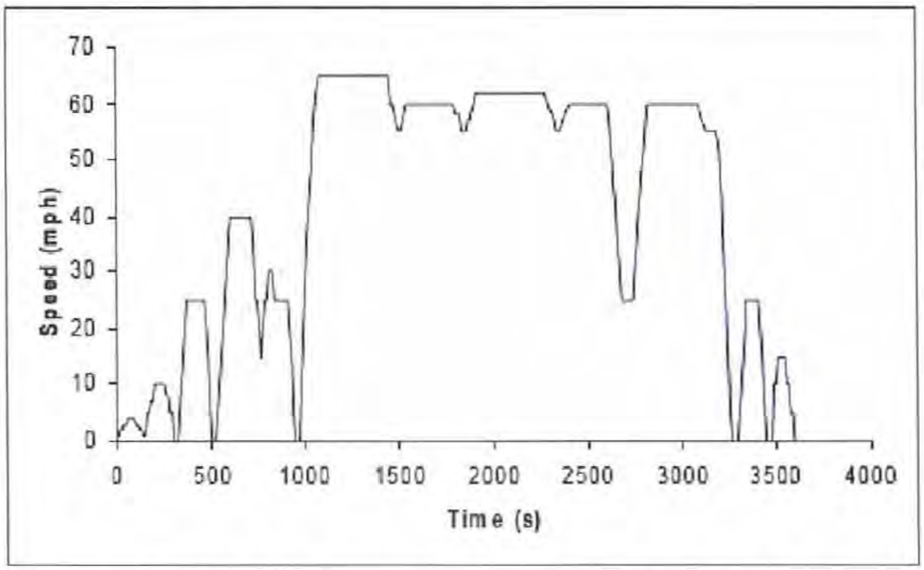

Fig. 4. Modified HHDDT Cruise Module for Highway Line Haul Operations[59]

Altogether, the weighting of drive cycles proposed does *not* reflect real-world conditions. In the proposed rule, EPA and NHTSA estimate that sleeper cabs operate 86% of the time at 65 mph and that day cabs operate 64% of the time at 65 mph. EPA and NHTSA should revisit these estimates and reconsider recent work conducted by both the SmartWay program and Oak Ridge National Laboratory.

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[58] *Id.* at 4-5.

[59] *Id.* at 7.

VII. EPA and NHTSA Should Improve Vocational Vehicle Test Protocols, Drive Cycles and Vehicle Categorization.

EPA and NHTSA are proposing to utilize drive cycle weighting for vocational vehicles based on 37% of 65 mph cruise, 21% of 55 mph cruise and 42% transient operation.[60] While this weighting reflects a substantial difference from the combination tractor weighting being proposed, the operating assumption is that real-world operation of these vehicles occurs nearly 60% at highway speeds. Given the vast differential of vehicles in this category, including very slow-moving vehicles like garbage trucks, vehicles with heavy transient utilization (urban and school buses, larger pick-up and delivery vehicles, urban transit and school buses), EPA's continued and over applied focus on steady-state operation is misplaced.

As indicated above, EPA's previous assessment of vocational vehicles for the SmartWay program indicated many distinct use patterns. This work is not reflected within the proposed rule. Instead, EPA and NHTSA have chosen to propose three different vehicle categories for vocational vehicles: Light Heavy-Duty Class 2b-5, Medium Heavy-Duty Class 6-7, and Heavy Heavy-Duty Class 8 driving.

The preamble to the proposed rule offers little rationale for this oversimplification of a diverse vehicle sector. As indicated by our comments with respect to buses, Allison believes that more distinct vehicle categories may be possible without creating an excessive administrative burden. While the proposed rule indicates that these vehicle categories "use the groupings EPA currently uses for other heavy-duty engine standards"[61] and that the categories are "consistent with the nomenclature used in the diesel engine classification,"[62] the Agency offers no additional rationale beyond a reference to the fact that aerodynamic streamlining may not yield benefits in this sector. In contrast to the three categories for regulation for the vocational vehicle sector, EPA and NHTSA are proposing a total of nine different categories for regulation with respect to Class 7 and 8 tractor cabs.

As reflected by the chart below, supported by data contained in Attachment 4, vocational vehicles are primarily characterized by transient operation. Vehicles such as transit buses, shuttle buses, coaches and school buses operate overwhelmingly in transient modes with some vehicles approaching 100% transient operation. The proposed rules,

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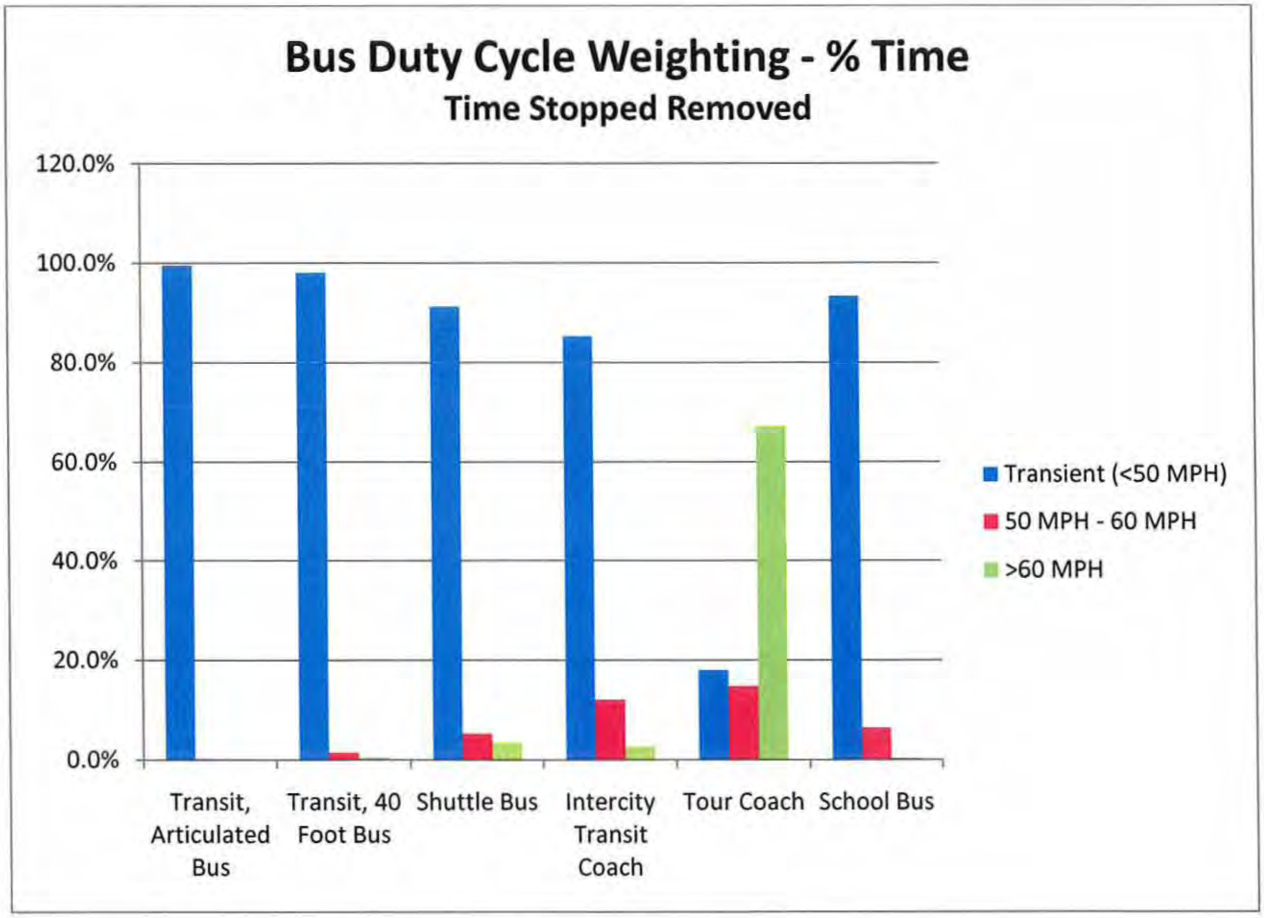
60 Draft RIA at 3-25.

61 75 Fed. Reg. at 74,166.

62 75 Fed. Reg. at 74,199.

however, would impose artificial and unrealistic assessments of such vehicles based on vast overweighting of on-highway, high speed operation.



VIII. Advanced Technology Transmissions Can Provide Substantial GHG Emission and FE Benefits

A. NAS Report Confirmed Value of Advanced Transmissions

In the discussion of regulatory rationale that is provided in the preamble, EPA and NHTSA broadly indicate that the GHG and FE effect of different transmissions are essentially the same. EPA references a TIAX report that estimates that such effects range from 0 to 8 percent of vehicle emissions.

EPA and NHTSA must not rely on such sweeping and largely unsupported estimates in the characterization of the emission and FE effects of various transmission technologies. For example, as recognized by the NAS, there are large differences between the operational and emission effects of automatic transmissions ("ATs") automated manual transmissions ("AMTs") and manual transmissions. As indicated by NAS:

> ATs share the driver skill, productivity, and safety advantages of AMTs. They also offer the ability to complete upshifts under full engine power, something that cannot be done with manual or automated manual transmissions. This can be a significant productivity (trip time) factor in applications with frequent large changes in vehicle speed, such as urban or suburban driving. With an MT or AMT, the engine fueling is shut off during each upshift. This interrupts power generation during the shift, which typically takes about 1 second in lower gears and up to 2 seconds in higher gears. However, after the shift is completed, the engine still requires some time (typically 2 to 3 seconds) to return to full power once the shift is completed. In the future, if the development of heavy-duty dual-clutch transmissions progresses as it has for light-duty vehicles, a dual-clutch transmission will remove the problem of interrupting the power during shifting. There can be a fuel consumption advantage as well as a productivity advantage in performing full-power upshifts, because the engine can continue to operate at an efficient point during and after shifts . . . . Under acceleration the AT has an advantage over the other types due to power shifting. Shifts are completed without changing the fueling command, so boost pressure is maintained and engine operation is more efficient . . . Under deceleration the AT has a slight advantage over other types because there is no need to blip the engine fueling for downshifts. This blip is necessary with both manual and automated manual transmissions to get the engine speed to match the speed of the transmission gears. . . Overall, the selection of transmission type has only a relatively small impact on vehicle fuel consumption. The exception is in urban and suburban operation, where the AT may offer a modest reduction in fuel consumption, combined with significantly greater productivity (average trip speed). The higher productivity is a result of avoiding power interruptions during acceleration.[63]

[63] NAS Report at 66.

In addition, as referenced in Attachments 3 and 5, transient operating conditions accentuate the technical advantages of automated systems, including hybrids. While EPA seeks to model such effects for hybrid vehicles in the GEM, it cannot otherwise ignore fuel savings associated with non-hybrid ATs which represent the vast majority of fleet now and for the foreseeable future.

B. "Transmission-Neutral" Policy Is Justified

Despite the advantages of advanced transmissions, including ATs, adopting a "transmission neutral" policy can be justified in the context of this rulemaking. As EPA and NHTSA indicated within the Proposed Rules, a transmission neutral policy can serve to let the current marketplace operate and let customers select the transmission and gearing that best meets their individual or fleet needs.[64] While advanced transmissions and ATs offer certain FE and GHG advantages (as outlined throughout the comments that are being submitted by Allison for the Proposed Rules) it is far more preferable to not quantify this effect than to incompletely quantify the effect, or to quantify the effect erroneously.

Instead, Allison can support a system of MD/HD regulation that lets the current marketplace – a marketplace that is traditionally sensitive to obtaining the best possible vehicle acquisition and operating costs – select the transmission technology which best suits a buyer's needs and expectations of performance. Especially if accurate information regarding the real world FE of various transmission types is available, the natural economic incentives of the commercial MD/HD truck market will tend to select the most efficient option. Customers will naturally tend to select the engine/transmission/vehicle pairings that will cost them the least amount of money in the long-run when other issues (e.g.,unique vehicle demands, ease of servicing) are also adequately addressed.

IX. ATs Can Offer FE and GHG Benefits Apart From The Effect of 'Well-Trained' Driver

Within the rationale underlying this proposed rule, EPA and NHTSA mistakenly equate both ATs and AMTs with the effect of a "well-trained driver."[65] This statement, however, is without factual support or data as is the assertion that a well-trained driver might perform better

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[64] EPA and NHTSA specifically noted that there is "truck companies provide software tools to specify the proper drivetrain matched to the buyer's specific circumstances. These dealer tools allow a significant amount of customization for drive cycle and payload to provide the best specification for the customer." 75 Fed. Reg. at 74, 205.

[65] 75 Fed. Reg. at 74,217.

than a vehicle with an AT because he or she can see road ahead.[66] Overall, it is not apparent on what basis this statement is made. The NAS report did not make this finding. Instead, the NAS report provided supporting statements and information indicating that ATs can have a positive impact on vehicle emissions and FE.

Instead of persisting in this unsupported comparison, EPA and NHTSA should recognize that ATs can reduce or take away the influence of ill-trained drivers, while making additional positive impacts on a vehicle's FE and GHG emissions. ATs effectively reduce and/or eliminate driver input into the selection of proper gears. Any comparison of transmission technologies to the GHG and FE effect of bad drivers is attempting to compare measurable factors with disparate and largely unknowable quantities. [67] As cited above,[68] significant differences do arise with regard to different transmission types. The NAS report recognized such differences; at minimum, EPA and NHTSA should further investigate the gains that can be made through wider utilization of advanced transmission technologies in the vocational vehicle sector.

X. ATs Offer Clear Measure of Performance Improvement

EPA and NHTSA have requested comment with regard to a "clear measure of performance improvement" associated with ATs.[69] We believe that such a clear measure exists with respect to the information provided in Section I of these comments and Attachments 1 and 3. In sum, ATs offer the ability to achieve FE gains and improved GHG performance in transient operating conditions due to the ability of the transmission type to more quickly and efficiently accelerate. In the prevailing driving conditions for many vehicle types, including both Class 7 and 8 tractor cabs and Class 2-8 vocational vehicles, this inherent ability of ATs to increase the average speed of MD/HD vehicles results in FE improvement and GHG emission benefits by enabling completion of the required transport work by fewer commercial vehicles. Since work is externally defined in the national

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[66] *Id.*

[67] It might further be noted that both EPA and NHTSA lack statutory authority to directly address any effect of under-trained drivers on FE and GHG. While none is asserted within the proposed rule, this fact further underlies arguments for the agencies to focus on measurable differences within their respective statutory authority.

[68] Section VII.

[69] 75 Fed. Reg. at 74,217.

economy, ATs offer the ability to utilize fewer vehicles to perform the same amount of work as other vehicles equipped with manual and AMTs.

XI. Testing Compliance

In whatever drive cycles EPA and NHTSA may ultimately require for certification and compliance of MD and HD engines and vehicles, substantial testing will need to be undertaken under controlled conditions. In such testing, various engine/vehicle configurations may be assessed with respect to an ability of the equipment to follow a duty cycle (e.g., follow the "trace" of acceleration and deceleration events that are incorporated into the cycle).

In the Light-Duty Vehicle ("LDV") sector, the ability to follow a "trace" is generally not an issue. The power-to-weight ratios of passenger cars often far exceed the levels needed to comply with particular drive cycles. For example, a 2-ton passenger car with a 250 horsepower ("hp") engine, would have a power-to-weight ratio of 125 hp/ton. In the MD/HD sector, however, such ratios are simply unachievable given the far higher vehicle weights and the normal commercial loads transported by the vehicles. For example, a tour coach may weigh 25 tons and utilize a 400 hp engine, producing a power-to-weight ratio of 16 hp/ton. A day cab line haul truck could weigh from 11 to 35 tons (depending on loading) and use a 425 hp engine, producing power-to-weight ratios of 39 hp/ton and 12 hp/ton respectively. For a 33 ton cement mixer using a 350 hp engine, the power-to-weight ratio would decline to 11 hp/ton. In short, the typical passenger car has a power/weight ratio which is at least an order of magnitude higher than a commercial truck.

In testing MD/HD vehicles as against a drive cycle then, meeting the trace is not a foregone conclusion. The slower acceleration of vehicles and the lag times between "stops" and "starts" are inherently greater than in the LDV. The additional time it takes to shift gears for manual and AMT transmissions and recover lost speed on acceleration events is also considerable when compared to an AT. ATs are the most often specified and purchased transmission type in vocational vehicles in the U.S. As outlined in Attachment 3, the ability of some vehicles to reliably follow a trace is then, at best, questionable. EPA should not simply ignore this factor, but instead account for the real-world operation of vehicles relative to drive cycles by either adopting a metric which applies a vehicle speed factor, or otherwise account for or "correct" test results to apply a penalty for vehicles which cannot meet the trace.

Such correction is needed to preserve the integrity of the engine/vehicle testing and compliance system. Duty cycles are drawn from vehicle testing information and generally strive to replicate real-world operation of vehicles. It thus seems incoherent to focus drive cycles on replication of real-world traffic conditions while ignoring the ability of vehicles to either meet or not meet such cycles. Second, as noted above, Allison would encourage continuing development and testing of drive cycles; especially drive cycles which are focused on the transient conditions in which many vehicles of all classes operate on a daily basis. While perfection is unachievable and the variety of different vehicle types in the MD/HD sector greatly complicates the agencies' tasks, continual improvement of the methodology and testing protocols is possible.

EPA's proposed emission testing regulations, however, allow vehicles that cannot maintain compliance with the duty cycle trace to "pass" the test and be certified as compliant. *See* proposed 40 CFR § 1066.330(e)(4)(iii)). This essentially promotes two results. First, this provision does not provide impartial treatment between those engines and vehicles that can pass the test and those that are unable to pass a test draw from "real world" vehicle operation. Where there is no penalty for not following the trace, there is no incentive to design and build equipment which may be able to follow acceleration and deceleration events. Second, allowing an exception ignores the fact that inability to follow the trace means the vehicle cannot keep up with traffic in real world, thereby distorting EPA emission/fuel economy analysis. In the real world, vehicles that cannot follow the trace will fall behind other vehicles in traffic, requiring additional fuel and time to reach its destination. Simply ignoring this likely result does nothing to serve the GHG emission and FE goals of the rulemaking.

By comparison, for many years it has been the standard EPA practice during certification testing for LDVs to assure that vehicles must precisely follow a carefully-prescribed "speed vs. time" drive cycle. This is based upon the sound principle that the energy put into a vehicle (energy derived ultimately from the fuel) is highly dependent upon the vehicle's acceleration and speeds during the cycle. Such an important, long-standing principle and testing protocol should not be abandoned simply because there is a broad range of variation in a commercial vehicle's ability to faithfully meet the prescribed drive cycle. Instead, EPA should take the required time to develop appropriate drive cycles that replicate the real world conditions experienced by Class 2b to Class 8 vehicles. To account for variability in individual vehicle performance, EPA has discretion to certify engines or vehicles that cannot meet the prescribed drive cycle,[70] but to instead correct GHG and FE results on the basis of differences experienced by vehicles able to comply with a required drive cycle and vehicles that cannot follow the prescribed trace of a drive cycle.

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[70] EPA has indicated it has considerable discretion under CAA section 202(a)(1) with regard to considering "different standards for appropriate groupings of vehicles" or "to consider and weigh various factors along with technical feasibility, such as the cost of compliance . . . lead time necessary for compliance . . . safety . . . and other impacts on consumers, and energy impacts associated with the use of technology . . ." 75 Fed. Reg. at 74,140.

XII. Hybrid Testing and Regulation Needs to be Improved

A. EPA and NHTSA Should Not Discourage Hybrid Technology Adoption

The Proposed Rules specify "A to B" testing for hybrids; EPA is to certify vehicles on the basis of chassis testing where essentially identical hybrid and non-hybrid vehicles are run on the same testing cycles. Engine dynamometer evaluation is to occur through the use of the Heavy-duty Federal Test Procedure cycle. While this approach has some connection to the overall approach to the proposed rule, the crediting of hybrid vehicles stands in stark contrast to the approach taken to non-hybrid vehicles, in which compliance is based on existing engine certification protocols and limited inputs into the GEM. The testing burdens placed on hybrids appear in relation to non-hybrid vehicles to be excessive and may create substantial additional hurdles to the adoption of hybrids in the MD/HD vehicle segment beyond the considerable economic hurdles these vehicles currently face.

Hybrid purchasers are generally "first adopters" who are willing to assume overcosts versus conventional technology. For wider adoption of the technology in the MD/HD sector, however, overcosts need to be minimized and the prospects for eventual technology "pay back" enhanced. Given this situation, EPA should seek to minimize the regulatory burden on hybrid technology and recognize that direct head-to-head competition between hybrid and non-hybrid technology in the commercial vehicle sector now decidedly favors non-hybrid alternatives.

The economics of hybrids within the commercial marketplace versus the LDV market are entirely different and EPA and NHTSA should not seek to draw broad conclusions based on that experience. Hybrid adopters in the MD/HD vehicle classes are forced by the commercial nature of their vehicles – and by the existence of external competition in the marketplace – to weigh overcosts differently from individuals assessing what family vehicle to purchase. Therefore, EPA and NHTSA should examine whether modeling could be an acceptable substitute for hybrid crediting, at least in the limited timeframe of the proposed rule.

Altogether, EPA and NHTSA should more directly recognize the obvious conclusion from the current operation of hybrids in many different vehicle types: there are significant to substantial FE and GHG emission benefits associated with the technology. EPA's and NHTSA's rulemaking efforts should not impose greater barriers to the adoption of hybrids than to the integration of other conventional technology that is projected to occur as a result of a final FE/GHG rule.

B. Questions Remain Regarding EPA/NHTSA Hybrid Proposals

There are several areas in which EPA and NHTSA proposed rules and underlying support documents regarding hybrid vehicles are unclear. Given the vital nature of this technology and the improvements to GHG emissions and FE that could be obtained by greater integration of hybrids into the MD/HD fleet, Allison believes that EPA and NHTSA should take additional time to clarify its regulatory intent and the precise nature of its proposed rules in this area. Specifically, we would pose the following questions:

(i) EPA and NHTSA have not precisely specified what the agencies will consider to be a "complete hybrid system." For example, the Draft RIA appears to indicate that pre-transmission systems constitute such a "complete hybrid system."[71] yet there is not an accepted industry view of this term or what does and does not constitute a complete system. Transmissions are integral to many hybrids and hybrid vehicle systems and cannot be arbitrarily excluded.

(ii) EPA and NHTSA propose different testing systems for hybrid vehicles: testing of a complete vehicle and "powertrain test cell" testing without adequate explanation or justification for this proposal.[72] On what informational basis is this proposal made and would the use of such differential testing protocols be decided by EPA, NHTSA or those manufacturers seeking to test hybrid systems?

(iii) It is unclear as to how the proposed testing protocols for hybrids will account for expected aging of the systems and how such expected aging would affect the end crediting of the hybrid system.

(iv) EPA and NHTSA must give greater consideration to the baseline configuration of hybrids in "A to B" testing. Within both the preamble and the draft RIA, it is not clear as to whether the agencies will require that the baseline vehicle be of the same model year and configuration as normally specified by vehicle purchasers and supplied by equipment manufacturers.

(v) The "value" of hybrids relative to conventional vehicles can only be assessed with respect to a real world non-hybrid vehicle of substantially similar type. Given that the transmission/rear axle combination determines the engine torque/speed map for a brake power cycle, EPA should specify how "pre transmission" drivetrain components will be taken into account in the intended testing protocol.

(vi) It is unclear as to whether hybrid manufacturers are to submit A vs. B test cycles for each vehicle or a family of hybrid vehicles, or whether some other methodology is intended in the proposed rules.

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[71] Draft RIA at 3-31.

[72] Id.

(vii) It is unclear how accessory/hotel loads will be specified or considered in the A vs. B testing.

(viii) It is unclear whether the test methods are focused specifically on sandwich hybrid and engine power take-off hybrid configurations and/or whether the test methods would be limited to such configurations.

(ix) Engine certifications have traditionally involved criteria pollutant standards. Since the proposed rules address FE and GHG standards, in the case of A vs. B hybrid testing, will criteria pollutants be considered with respect to the certification of a hybrid system or considered separately with respect to engine certification?

(x) It is unclear how EPA and NHTSA contemplate that hybrid vehicles will be certified and by whom. The proposed regulations generally provide that engine manufacturers must comply with Subpart A regulations[73] Subpart G regulations, however, refer not only to engine and vehicle manufacturers but "all other persons."[74] Given the non-engine components that are necessary for the testing, EPA needs to clarify whether a certification can be required from or held by an engine manufacturer, an OEM or a hybrid component manufacturer.

C. Other Hybrid Issues

Otherwise, EPA states that "typical operation" of non-PTO hybrid is similar to conventional vehicles. However the Agency provides no empirical support for this assertion. Drive cycles for both PTO and non-PTO assisted hybrids also overweight steady state operations (58% of vocational vehicle operation is assumed to be 55 mph and above; 81% for day cab tractors and 95% for sleeper cabs). EPA regulations also appear to require that vehicle manufacturers submit testing data for crediting of hybrid vehiclesFinally, Allison would also request that EPA and NHTSA quantify the available testing capability for hybrid testing and any longer-term plans that EPA and NHTSA may have in this area. It appears that lack and the expense of dynamometers create a "choke point" for greater penetration of hybrid technology. The marketplace would benefit from some iteration within the context of this rulemaking, of EPA's longer-range thinking regarding the ability of the marketplace to support hybrids and the infrastructure necessary to accommodate the testing and the certification of such vehicle systems.

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[73] *See* 40 CFR 1036.2.

[74] *See* 40 CFR 1037.601(a)

XIII. EPA and NHTSA Should Consider Additional Research on Regulatory Alternatives, Including Testing Protocols And Compliance Mechanisms

EPA and NHTSA considered, but did not propose, chassis-based vehicle tests for Class 7 and 8 vehicles similar to the dynamometer tests that are done for LDVs utilizing a Federal Test Procedure. The agencies, however, stated they did not pursue this path for several reasons including significant technical hurdles, costs and limitations on appropriate HD test sites.[75] In addition, the agencies cited the 9 subcategories of combination tractors used in the regulatory framework as a substantial hurdle for using dynamometer testing in this regulatory sector. With regard to vocational vehicles, as noted above, EPA and NHTSA relied on existing regulatory categories for such vehicles despite the obvious differentials in the normal use and operation of different types of vehicles. Altogether, the proposed rulemaking suffers from a lack of empirical evidence and testing to support the regulatory alternatives that are offered.

While Allison appreciates the constraints attendant to this rulemaking, EPA and NHTSA should reevaluate whether the lack of available information is of such extent that the better course of action is to defer finalization of any rulemaking until additional information can be assembled. For example, it is notable that in presenting arguments against the use of dynamometer testing, the large number of possible axle types, axle ratios, engines, transmissions and tire sizes are mentioned. EPA and NHTSA then indicate that even utilizing representative groupings, this would raise the potential for many different combinations to need testing. While there is validity to this argument – EPA and NHTSA do not utilize a similar lens to scrutinize the testing protocols that the agencies are actually proposing. That is, in the proposed testing and compliance system, the agencies simply ignore such differences, relying on engine-only testing and computer modeling. Thus a classic "chicken and egg" situation unfolds – dynamometer testing is considered out of reach because to do so would involve assessing real world truck configurations and their effect on GHGs and FEs – yet without such information it is not possible to know the benefits and drawbacks of such a testing and compliance system versus the benefits and drawbacks of the regulatory system that is being proposed.

In seeking comments, the agencies indicate that a dynamometer testing approach may be more appropriate in the future if testing facilities become available and if agencies are able to address the complexity of tractor configurations. We would suggest, however, that the complexity of tractor configurations and their effect on GHGs and FE can only be assessed if additional testing is done. This information would be of value no matter what regulatory

[75] 75 Fed. Reg. at 74,188.

alternative is pursued; Allison would not suggest that the EPA and NHTSA must necessarily utilize dynamometer testing for compliance, but that having additional information produced from such testing would be of benefit to any regulatory alternative undertaken. At minimum, such information could serve to validate modeling information utilized in the proposed rule.

The NAS Report, moreover, asserts that additional research should be undertaken before any regulatory program is attempted. A conclusion of the NAS Report that was overlooked with respect to this rulemaking is that additional information is needed before regulation of the entire MD/HD sector should be undertaken. In specific, the report stated that:

> The committee recommends that NHTSA conduct a pilot program to "test drive" the certification process and validate the regulatory instrument proof of concept. There are two broad purposes for such a pilot program. In the first element, the agency would gain experience with certification testing, data gathering, compiling, and reporting. *There needs to be a concerted effort to determine the accuracy and repeatability of all test methods and simulation strategies that will be used with any proposed regulatory standards and a willingness to fix issues that are found.* There are numerous technical challenges related to implementation of this program (e.g., reliable and accurate methods to determine tire rolling resistance and vehicle aerodynamic drag coefficients, incorporation of simulation modeling with hardware, integrating a hybrid drive train within the standard test cell, characterizing subcomponents for use in simulation modeling). *This trial period will serve as a means for developing and refining the regulatory processes before the official start date of the program.*
>
> A second element would include gathering data on fuel economy from several representative fleets of commercial trucks (e.g., long-haul, delivery vans, specialty vehicles, and large pickups). *These data would continue to be collected once the program was established in order to provide a real world check on the effectiveness of the regulatory design on the fuel economy of trucking fleets in various parts of the marketplace and in various regions of the country.* As this program will place an additional administrative burden on NHTSA and private operators, the committee

> recommends that Congress consider an annual funding allocation for this program.[76]

That is, a program to further explore this issue would need to be based on the very testing being assessed. Various research testing programs would be needed to assess what tractor configurations produced meaningful differentials in emission and FE results and what vocational vehicle segments would be appropriate. A research program could be used not only to explore new concepts, but to "ground in truth" the actual impacts of the regulations that EPA is seeking to finalize.

XIV. Innovative Technology Credit Program

EPA and NHTSA have proposed to provide innovative technology credits based on a program included within the LDV final rule. Allison is supportive of this concept as described in the preamble.[77] Suitable credits could help to further the development and introduction of new technology into the marketplace.

As EPA and NHTSA have recognized, however, it is important that real world testing of the new technology be accomplished before crediting is allowed. The agencies have further indicated that to address complex interactions between MD/HD vehicles and the potential to reduce fuel consumption "may require a more sophisticated approach to vehicle testing than we are proposing for the largest heavy-duty vehicles."[78] It would also appear that with respect to testing protocols, innovative technologies would not face the barriers mentioned with respect to utilizing engine-only and computer modeling. That is, dynamometer tests could be employed and similar "A to B" testing for hybrids could help to accurately establish the actual emission/FE benefits. Although it appears from the discussion that this is the case, Allison would request that in the agencies response to comments it be confirmed that test procedures and duty cycles in the innovative technologies program are not constrained to use the duty cycles that are in the main regulation.

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[76] Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, Committee to Assess Fuel Economy Technologies for Medium- and Heavy-Duty Vehicles, National Research Council, The National Academies Press at 188. (Emphasis added).

[77] 75 Fed. Reg. at 74,257.

[78] *Id.* at 74,172.

It is also important that in any A to B testing protocol, the configuration utilized to represent the vehicle which forms the basis of the comparison (i.e., the "A" vehicle) must include vehicle systems of the current model year. This is vital to ensure that the correct level of technology advancement is considered in the comparison testing that is performed with respect to the new technology vehicle (i.e., the "B" vehicle). The A vehicle system would consist of all vehicle components that impact fuel efficiency and emissions. These components would include hardware, computers, software, and calibrations as offered in the OEM databook. Such an approach would be consistent with the overall goal of the innovative technology credit program – to provide incentives for the development and adoption of technology that provides benefits over and beyond that currently employed in the vehicle fleet. By maintaining stringent standards for the A vehicle, EPA and NHTSA can eliminate any potential for "gaming" the system and developing GHG and FE estimates that will not be realized when and if the new technology is deployed.

Finally, Allison is supportive of requirements that data submissions for the innovative technology program be subject to a public evaluation process where there is an opportunity for comment. EPA and NHTSA have correctly recognized that transparency is an important element in the process of assessing and evaluating the effect of new technologies. A public review and comment process will not only likely serve to strengthen the applications that EPA may receive for credits, but also increase public confidence in any resulting credits granted to innovative technologies and systems.

XV. Conclusion

Allison appreciates the ability to work with EPA and NHTSA on a going-forward basis in this regulatory effort. Allison is supportive of reasonable regulation in this area based on adequate consideration of different MD/HD vehicle types, accurate information concerning vehicle utilization (including derivation of drive cycles based on such utilization) and thorough assessment of the available technologies to improve the FE performance and reduce GHG emissions on a cost-effective basis. Any regulations in this area should also consider the full range of alternatives that may be available to EPA and NHTSA to fulfill their statutory duties under the CAA and EISA and utilize both metrics and compliance protocols based on the "real world" operation of MD/HD commercial vehicles. In order to accomplish this goal, EPA and NHTSA should adopt a metric which directly incorporates average speed or otherwise provides a correction to the proposed metric which is based upon average speeds (i.e., actual vs. prescribed).

Unfortunately, the proposed rule falls short in several areas including the proposed metric to be used in this rulemaking and the amount of technical information that both agencies reviewed or had access to prior to this proposal. It would therefore appear that the more prudent course for EPA and NHTSA to pursue in this matter would be for each agency to utilize the statutory flexibility afforded by the CAA and EISA, to obtain additional technical information and analysis of the FE and GHG performance of MD/HD vehicles and to further review available technologies (as well as the cost and market impacts of requiring and/or providing incentives and disincentives to the use of such technology) through imposition of a FE/GHG standards. Only with an adequate substantive basis can each agency succeed in promulgating a national program which addresses FE and GHGs from the MD/HD sector in a reasonable manner. Given that this rulemaking represents the first attempt to regulate FE and GHG emissions in the important economic sector represented by MD/HD vehicles, EPA and NHTSA should take the time necessary to promulgate regulations that address both near-term and long-term issues attendant to a new regulatory program.