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December 19, 2018

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James Tamm
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Attention: NHTSA Docket ID Nos. NHTSA-2018-0067 and NHTSA-2017-0069
        U.S. EPA Docket ID No. EPA–HQ–OAR–2018–0283
        Freedom of Information Act (FOIA) Request Nos. ES18-003395, EPA-HQ-
        2018-011521; FOIA Appeal

Re: Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026
       Passenger Cars and Light Trucks

Dear Mr. Lieske and Mr. Tamm:

The California Air Resources Board (CARB) is writing to identify substantial procedural
deficiencies regarding information used to support proposed federal relaxations in the
existing passenger car and light-duty truck greenhouse gas (GHG) emissions and
corporate average fuel economy (CAFE) standards in the Safer Affordable Fuel-Efficient
(SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks.[1]
This letter follows our substantive comments on the proposed rules, filed in October, [2]
and our information request letter (submitted in part under the Freedom of Information

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[1] 83 Fed.Reg. 42,986 (August 24, 2018).
[2] Please also see our detailed comments on the SAFE Vehicles Rule, Docket No. EPA-HQ-OAR-2018-
0283-5054 (CARB Detailed Comments), and our comments filed on the Draft Environmental Impact
Statement (DEIS) for the proposal, Docket No. NHTSA-2017-0069-0625 ("DEIS Comments").

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Act (FOIA)) of September 11, 2018.[3] The information we requested has not been fully provided, even though the National Highway Transportation Safety Administration (NHTSA) and the U.S. Environmental Protection Agency (U.S. EPA), collectively referred to here as the Agencies, assert their proposals are based on this information. Moreover, the Agencies may be considering relying upon inaccurate information provided by some commenters. This letter highlights these deficiencies, and includes an appeal of several of NHTSA's initial FOIA determinations.[4]

The proposed SAFE Vehicles Rule is confounding, substantively and procedurally. As explained in our previously submitted comments (and the comments of many others), the proposal cannot be justified based on the information made available by the Agencies and, in fact, appears to be unjustifiable.[5] Further, the opportunity to evaluate the proposal remains unreasonable and inadequate. We reiterate that additional information and additional opportunity for public comment are necessary to consider this proposal.

As an initial matter, U.S. EPA's and NHTSA's responses to our request for additional information were received just three days before the end of the comment period, which was brought to a close quickly despite requests to extend the comment period from many diverse parties. This late response compounds the failure to provide a reasonable opportunity to comment on the proposal itself with a failure to provide a reasonable opportunity to consider and comment on the Agencies' response. The Agencies' decision to revise the preliminary regulatory impact analysis supporting the proposal during the same period worsened the information gap.

We note that the Agencies would further exacerbate their failures to provide adequate information and comment opportunities if, in the final rule or supporting documents (including, but not limited to, NHTSA's final environmental impact statement), they rely on new or supplemental information or analysis not fully disclosed with an opportunity for public comment. In this regard, we note that the comments of the Auto Alliance ask the Agencies to consider an alternative analysis of the proposal that was prepared by its consultants, NERA Economic Consulting and Trinity Consultants (collectively "NERA-Trinity"). As discussed below, the information provided about this alternative analysis is woefully inadequate to permit review by CARB or the public and, accordingly, the Agencies may not rely on it without first providing public notice of their intent to do so, substantial additional information so that the public may understand it, and an

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[3] California Air Resources Board, *Request for Extension Of Comment Period and Additional Public Hearings Regarding Joint Proposed Rule to Roll Back Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards for Model Years 2021-2026 Light-Duty Vehicles*, September 11, 2018, Docket No. EPA-HQ-OAR-2018-0283-0883.

[4] We have copied appropriate FOIA staff, as well as agency officials.

[5] We further note that, after the close of the comment period, additional analyses have been published, including in peer-reviewed journals, highlighting deficiencies in the Agencies' rushed analysis. *See, e.g.,* Bento, et al., *Flawed analyses of U.S. auto fuel economy standards* (December 7, 2018) Science, v. 362, iss. 6419, p. 1119.

opportunity to comment. This would, of course, be true of any alternative analytical paths the Agencies might use to justify or support any final rule.

Below, we summarize the information that the Agencies still have not made available about their own analyses, the information that would prevent meaningful consideration of the NERA-Trinity alternative analysis, and the patent deficiencies in the NERA-Trinity analysis that can be discerned from the limited information provided. Please place this letter in the dockets for both rules, correct the inadequate disclosures and comment periods, and ensure appropriate steps are taken by your FOIA officers.

I. NHTSA and U.S. EPA Continue to Fail to Provide Requested, Relevant Information Necessary to Meaningful Public Comment; CARB Appeals Certain FOIA Responses

The Agencies' responses to CARB's request for additional information concerning the proposed rollback were inadequate under the laws that govern these rulemakings and under FOIA. U.S. EPA flatly declined to share information requested, or even to make a timely FOIA determination. NHTSA shared a limited amount of information, while withholding materials critical to the public's evaluation of the proposed rules. Neither response was proper and both are contrary to law. In this portion of the letter, we discuss these deficiencies with regard to each of CARB's relevant data requests.[6] We look forward to a prompt written response to our appeal, as well as to additional disclosures and further opportunities to comment.

1.   CARB's Request: Information about the models and data used to estimate battery costs for electrified vehicles. [This request comprised three categories of information, identified below.] This information is required to replicate and evaluate whether the modeling underlying the proposal is appropriate, considering the various vehicle and technology types.

>   CARB's Request
>   a.   The proposal and the Preliminary Regulatory Impact Analysis (PRIA),
>   NHTSA-2018-0067-1972, reference the Argonne National Laboratories'
>   (ANL) website for the BatPaC model for estimating battery costs for
>   vehicles, and state that the agencies used "an up-to-date version" of the
>   model, but do not identify the version. (See, e.g., 83 Fed.Reg. 42,985,
>   43,002 (August 24, 2018).) U.S. EPA and NHTSA have posted to the
>   dockets for this action a document describing how BatPaC was developed,
>   but this document appears to be from 2012. It does not state which

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[6] Requests are numbered as they are in CARB's September 11, 2018 letter. We omit further discussion of CARB data requests 6, 7, 10, and 11. Although this information should have been made available in the docket initially, and was provided far too late to CARB, CARB is not appealing NHTSA's responses at this time (though CARB reserves the right to file an additional appeal).

version of BatPaC NHTSA and U.S. EPA used to estimate battery costs.
See "Modeling the Performance and Cost of Lithium-Ion Batteries for
Electric-Drive Vehicles, Argonne National Laboratory, ANL-12/55," NHTSA
Docket ID #: NHTSA-2018-0067-1692; EPA Docket ID#: EPA-HQ-OAR-
2018-0283-0764.

NHTSA's Response: *The BatPaC version 3.0 model was used to estimate battery
costs. NHTSA does not maintain the BatPaC model. The model is maintained by the
U.S. Department of Energy's Argonne National Laboratories (ANL). To obtain a copy
of the BatPaC version 3.0 model, please contact ANL directly.*

CARB's Rebuttal: CARB appeals this response, pursuant to FOIA (5 U.S.C. § 552)
and Department of Transportation FOIA regulations (*see, e.g.*, 49 C.F.R. § 7.32(d)).
As NHTSA is aware, FOIA requires it make its records "promptly available" to any
person. (5 U.S.C. § 552(a)(3)). NHTSA recognizes its statutory duty (*see* 49 C.F.R. §
7.23(b)) and has a standard policy to make records available to the "greatest extent
possible" (49 C.F.R. § 7.23(a)). NHTSA should provide the full model used to
evaluate battery costs. NHTSA has not cited any relevant FOIA exemption to justify
withholding the model as NHTSA used it. Indeed, NHTSA concedes it used a
particular version of the BatPaC model, and that version must be in NHTSA's
possession. Explicitly providing the model version that the agencies used enables
review to determine whether the agencies modified it in any way.

Contrary to NHTSA's assertion it used the latest version of BatPaC, ANL released a
revision, version 3.1, in October 2017, as noted in our previous comments.[7] Since
releasing that version, ANL has not made the prior version 3.0 available on its
website.

It is unreasonable to fail to make available the modeling tools used in support of the
proposal, and to compel the public without notice or instruction to seek information
from third parties. In doing so, U.S. EPA and NHTSA fail to make clear what they are
relying in support of their proposal.

CARB's Request:
b. U.S. EPA and NHTSA should make available the information specifying
the full battery sizes, in kilowatt-hours (kWh), battery pack configuration,
and costs used for each vehicle iteration in the CAFE model. See PRIA,

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[7] See CARB, Analysis in Support of Comments of the California Air Resources Board on the Safer
Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light
Trucks (CARB Detailed Comments), October 26, 2018, Docket Nos. NHTSA-2018-0067-11873, EPA-HQ-
OAR-2018-0283-5054, p. 140.

Electrification Technologies, Technology Overview, section 6.3.8.1, p. 357. The PRIA states that NHTSA posted ANL vehicle files that have battery pack sizes and costs for each vehicle, but there is no additional information about battery pack configuration (e.g., the number of cells, and the electrical topology of how those cells are arranged in the battery pack), nor do they directly reference where the files are posted. NHTSA and U.S. EPA have not posted the BatPaC model file(s) that were used. ANL cost and battery size data referenced in the PRIA, p. 358, footnote 325, but the footnote refers to a docket identification number that is not available. Previously, in support of the draft Technical Assessment Report and Proposed Determination on the Appropriateness of the Model Year 2022-2025 Light-duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation (Proposed Determination), EPA-420-R-16-020, November 2016, U.S. EPA posted the BatPaC files that it used.

NHTSA's Response: *The full battery sizes in kWh and costs are available in files in the docket for each "tech class." Information for peak battery power, battery total energy in kWh, and battery pack direct manufacturing cost can be found in columns AN-AR for each of the files listed below. Please note that there are no battery pack configurations.* [Specific links offered are omitted from this CARB letter for brevity.]

CARB's Rebuttal: CARB appeals this response, pursuant to FOIA (5 U.S.C. § 552) and Department of Transportation FOIA regulations (*see, e.g.*, 49 C.F.R. § 7.32(d)). All information responsive to this request has not been provided, and no relevant exemption has been cited. In this request, CARB requested information "required to replicate and evaluate whether the modeling underlying the proposal is appropriate" but NHTSA did not provide all relevant records. After reviewing the files provided, NHTSA appears to provide only a small part of the Agencies' analysis. CARB was therefore unable to use BatPaC v3.0 to replicate the federal agencies' results.

This information is important because the precise modeling files used go to critical questions in this rulemaking. We requested the model inputs and results and the battery pack configurations (number of cells, cells in parallel, nominal pack voltages, etc.) for each unique battery pack because they are essential to understanding how the Agencies used the model to reach their conclusions.

Specifically:

(1)   Very few of the inputs that are needed to run the BatPaC model were disclosed. We discuss below the inputs that the Agencies provided in support of the SAFE Vehicles Rule, and contrast them with the degree of information

provided in previous analyses by the Agencies. The information provided in this proceeding is not sufficient even to ascertain whether the inputs that were used are reasonable.

(2)   There is no electrical configuration information about the battery packs for any technology combination. The electrical configuration encompasses several physical parameters about a battery pack that are essential to understanding if the battery packs are being modeled appropriately and reflective of reality. Examples of electrical configuration information include, but are not limited to, the following:

- Total number of cells in the battery pack
- Total number of battery cells in wired in series
- Total number of cells in wired in parallel'
- Nominal voltage of each cell
- Energy capacity, in kilowatt-hours (kWh), of each cell
- Number of cells in each module
- Number of modules in each battery pack
- Energy capacity, in kWh, of each module
- Battery pack nominal voltage
- Battery pack energy capacity, in amp-hours (Ah)
- Number of finished battery packs in a single vehicle, because BatPaC allows for multiple packs per vehicle

Without the above information, we cannot determine whether the Agencies' modeling was reasonable or if it contained mistakes, because electrical configurations drive cell design in the BatPaC model. The one example in the Preliminary Regulatory Impact Analysis (PRIA) indicated that the analysis may have used configurations with low nominal pack voltages. These voltages may have been unreasonably low, leading to unreasonable results.

Both these pieces of information were reasonably included in CARB's initial request and should have been provided as part of the rulemaking record available for public comment and as part of the response to our FOIA request. Without this information, CARB was unable to meaningfully comment on the modeling of electric vehicle battery packs and their costs for the SAFE Vehicles Rule. The files cited by NHTSA provide only one input for the BatPaC model, and only two pieces of output information from the BatPaC modeling runs. In its analyses reflected in the midterm evaluation and Proposed Determination, U.S. EPA provided the BatPaC modeling and battery size files. Those disclosures enabled meaningful comment and participation in the midterm evaluation process.

These failures and omissions are illustrated by the two figures below. Figure 1 is a screenshot of one of the ANL files that NHTSA pointed to, specifically 'ANL_CompactNonPerfo_07202017.xlsb', that were provided in the public record for the SAFE Vehicles Rule. All other ANL files that NHTSA pointed to are structured the same, but for different vehicle classes. Each row in the file represents a different technology combination and the resulting Autonomie and BatPaC output data. The arrows point to the only three BatPaC related pieces of information that are provided in the files. All other information listed in the other columns for the files do not connect to information needed to understand input or output information for either the BatPaC model, or other critical information about the modeled battery packs for the modeled vehicles.

Figure 1

Figure 2, below, is a screenshot of one of the files, 'Battery_Sizer_PD_NMC_0WR.xlsx', that U.S. EPA provided as part of the Mid-Term Evaluation process that led to the 2017 Final Determination and is representative of what the Agencies released as part of that earlier process regarding these same standards. The file contains both the iterative battery solver used to find an optimized battery size for different electrified vehicle technology combinations for a given chemistry and targeted mass reduction, and the BatPaC model used to model battery

costs for those optimized battery packs from the battery sizer. Each column of data represents a single optimized battery solution and the resulting data associated with that solution. The arrows point to the same three pieces of information that would be used to populate the three columns in the file referenced for Figure 1.

Figure 2

Figure 3, on the next page, is the same screenshot as in Figure 2, above, but the information that has not been made available for the SAFE Vehicles Rule has been covered up. The file has several other tabs of battery model information where the entire worksheet would have to be covered to align with what was provided for the SAFE Vehicles Rule.

Figure 3
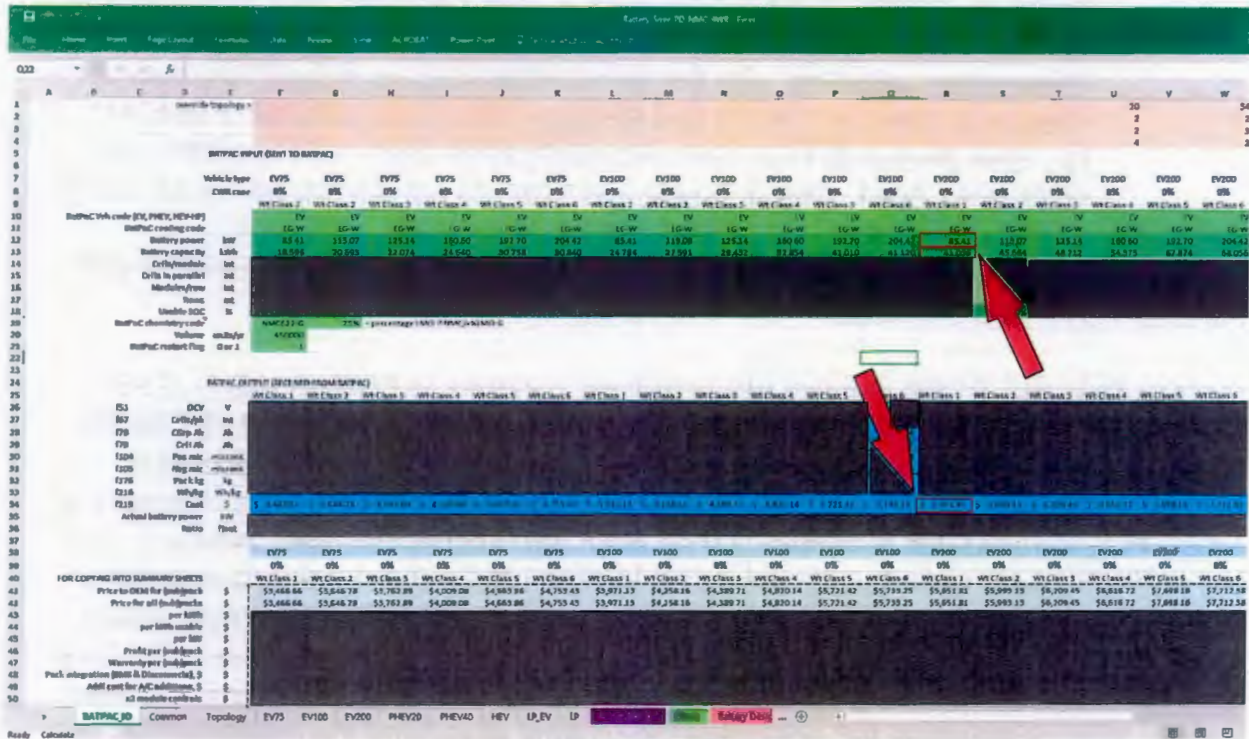
As can be seen in the difference between the three figures, the data supplied by the Agencies for the SAFE Vehicles Rule does not provide the level of detail required to comment on the appropriateness of the battery cost modeling. The data previously provided as shown in Figure 2, and the set of files it represents, contain much more detail of the inputs to, and outputs from, the BatPaC model that are critical to the modeling of the battery packs for evaluating the compliance costs of vehicle regulations.

Because the information is complex, we continue to evaluate it in the event additional conclusions may be drawn relevant to the proposed rule. We reiterate our objection that this information should have been made available to all interested persons in a timely manner and with adequate time for review.

CARB's Request:
c. The proposal and PRIA provide conflicting information about which battery chemistries the agencies considered. For instance, the proposal and PRIA refer to NMC441-Gr chemistry for both plug-in hybrid-electric vehicles and battery-electric vehicles, but the ANL summary refers to NMC333. See, e.g., PRIA, pp. 372, Table 6-27, 373 ["We selected NMC441 as choice of

chemistry for PHEVs and BEVs. NMC441 more suitable for high energy batteries capable of discharge rates."]. The Excel file titled "ANL-Summary of Main Component Performance Assumptions NPRM" has a tab labeled 'Description – BatPac' with the same table listed as in the PRIA, except the chemistry listed for PHEVs and BEVs is NMC333-G instead of NMC441-Gr. See Docket ID Nos. EPA-HQ-OAR-2018-0283-0054 and NHTSA-2018-0067-0003. The proposal and PRIA do not directly reference this file.

NHTSA's Response: *NHTSA and EPA used the battery chemistries associated with the BatPaC version 3.0 model.*

CARB's Rebuttal: CARB appeals this response, pursuant to FOIA (5 U.S.C. § 552) and Department of Transportation FOIA regulations (*see, e.g.*, 49 C.F.R. § 7.32(d)) because it does not appear to reflect the record, and so indicates that records in NHTSA's possession were responsive but have not been provided. The chemistry of NMC441 is not available in version 3.0 (or even the recently-released version 3.1) of the BatPaC model, even though the SAFE Vehicles Rule and supporting regulatory impact analysis refer to this chemistry. The Agencies have either incorrectly stated which version of BatPaC was used, identified the incorrect chemistry when disclosing what was used for modeling batteries for some of the vehicle technologies, modified BatPaC without providing the requested documents describing the modifications, or used inputs without identifying them – despite repeated requests for this information.

Additionally, the files that NHTSA cites in its response are Autonomie model outputs. They contain only battery pack energy capacities, battery pack power capability, and battery pack cost for a reference year. As U.S. EPA and NHTSA stated, they did not disclose any information about the battery pack configurations or provide other BatPaC input information. This precludes meaningful analysis and comment, as U.S. EPA's interagency review made clear.[8]. Several pieces of information would be needed to analyze how BatPaC was used and if the results were appropriate and reflective of reality. Some of that information would include, but is not limited to, the following:

- Basic battery pack information for each unique battery pack
  - Total number of cells in the battery pack
  - Total number of battery cells in wired in series
  - Total number of cells in wired in parallel
  - Number of cells in each module
  - Number of modules in each battery pack

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[8] *See* CARB Detailed Comments, pp. 139-140, *citing* EO 12866 Review: NHTSA responses to interagency comments sent to OMB, Docket ID: EPA-HQ-OAR-2018-0283-0453.

- o Battery pack nominal voltage
- o Battery pack mass, in kilo-grams (kg)
- Cell specifications
  - o Electrode thicknesses and any applied limits
  - o Resultant cell capacity, in kWh
  - o Nominal cell voltage
  - o Mass of constituent materials used in each unique cell, particularly for the cell's anode and cathode
  - o Cell mass, in grams (g)
- Material cost inputs, yields, and assembly costs
  - o Cost of cell constituent materials, like $/kg of nickel or cobalt
  - o % yield of each manufactured cell component
  - o Unit cell hardware costs, like the positive and negative battery terminals
  - o Electrode processing costs
- Manufacturing volume, in number of battery packs per year

Batteries are large cost drivers for electrification technologies, and the public cannot meaningfully comment on the battery sizing and cost development methodologies without the requested information.[9] Effectively, it is impossible to replicate what the Agencies did with BatPaC. NHTSA and U.S. EPA must provide sufficient responsive records to satisfy CARB's request. The Agencies have not offered any relevant FOIA exemptions to support their non-response. The appeals officers at the Agencies should direct a full search for records and promptly supply them to CARB.

2.   CARB's Request: The PRIA references Polk registration data, including survival rates aggregated by model year, calendar year, and body style. These data are needed to verify the coefficients of the new model predictions for vehicle retirement (scrappage), but have not been made available. See, e.g., PRIA at pp. 1008, 1014, 1023, fig. 8-23, 1025, fig. 8-24, and 1027, fig. 8-25.

NHTSA's Response: *The Polk registration data is proprietary information and is being withheld in its entirety from disclosure because it is related to trade secrets and commercial or financial information pursuant to FOIA Exemption 4. 49 U.S.C. § 552(b)(4). To purchase the series of National Vehicle Population Profile (NVPP) datasets, please contact IHS Markit (formerly R.L. Polk & Company) directly.*

CARB's Rebuttal: CARB appeals this response, pursuant to FOIA (5 U.S.C. § 552) and Department of Transportation FOIA regulations (*see, e.g.*, 49 C.F.R. § 7.32(d)).

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[9] See CARB Detailed Comments, pp. 139-140, fn. 261.

The FOIA response appears to have erred in two related regards. First, FOIA itself directs "partial disclosure of information" where possible, and specifies that agencies must take "reasonable steps necessary to segregate and release nonexempt information." (5 U.S.C. 552(a)(8)(A)(ii).) NHTSA does not appear to have made any attempt to segregate and produce responsive information. Nor does it appear to have followed its FOIA regulations in making this trade secret determination. Those regulations require NHTSA to notify the submitter of the data "expeditiously" and ask for any written objections to release. Notably, "[t]he burden is on the submitter to identify with specificity all information for which exempt treatment is sought and to persuade the agency that the information should not be disclosed." (49 C.F.R. 7.29(a).) NHTSA has not demonstrated that *all* relevant information is trade secret under FOIA in the first instance, that the submitter (here, likely, IHS Markit) objects to their release, or even that NHTSA has sought IHS Markit's views.[10]

Moreover, CARB specifically requested "aggregated" data. Such aggregated data protects individual manufacturers' information and so obviates trade secret concerns. We note that such data, as a critical basis for a rulemaking, would be improper to withhold from public review. Indeed, IHS Markit does allow for publication of aggregate data, provided that publication rights have been purchased. Given the Agencies' choices to purchase and rely on this information, the Agencies should have purchased those rights or should do so now.

NHTSA and U.S. EPA should provide the data aggregated to the same degree as used for developing (or "estimating" as it is also described) the CAFE Model so that CARB and the public have a reasonable opportunity to evaluate and comment on the Model's scrappage coefficients. The burden is on the Agencies, not the public, to provide the necessary factual information upon which the Agencies' proposal is based so that the public can meaningfully participate in the rulemaking. The failure to provide this data and information, which are critical components of the Agencies' analysis and are necessary in order to analyze the Agencies' modeling, deprives the public of their right to participate in the rulemaking.[11]

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[10] To the degree 49 C.F.R. Part 512's trade secret rules for NHTSA apply (which NHTSA has not asserted), it is unclear whether any final determinations have been made under those provisions

[11] *See Allina Health Services v. Sebelius*, 746 F.3d 1102, 1110 (D.C. Cir. 2014) ("Still, we have held for many years that an agency's failure to disclose *critical* material, on which it relies, deprives commenters of a right under § 553 [of the Administrative Procedure Act] to participate in rulemaking." (internal quotations omitted)); *Air Transport Ass'n of Am. v. FAA*, 169 F.3d 1, 7 (1999) ("[W]e have cautioned that the most critical factual material that is used to support the agency's position on review must have been made public *in the proceeding* and exposed to refutation."); *Ass'n of Data Processing Service Orgs., Inc. v. Bd. of Governors of Fed. Reserve System*, 745 F.2d 677, 684 (D.C. Cir. 1984) ("[A]t least the most critical factual material that is used to support the agency's position on review must have been made public in the proceeding and exposed to refutation.").

3.   CARB's Request: New vehicle sales and price data referenced in the proposal. This includes:

    a. Data provided by the National Automobile Dealers Association (NADA) and others. See 83 Fed. Reg. at 43,095; PRIA, pp. 1017-1018.
    b. Data describing historical transaction prices, and quarterly new vehicle sales data used to develop the dynamic new sales model. See PRIA, pp. 954-961.
    c. Economic data used to develop the autoregressive distributed-lag (ARDL) model that predicts new vehicle sales and is used in the CAFE model. See 83 Fed. Reg. at 43,074.

CARB's Rebuttal to 3.a. – 3.c.: NHTSA's response is omitted for brevity in this letter, but is under CARB review. This data is necessary to evaluate the proposal's predictions for fleet population, sales, and fatalities. We continue to object that the Agencies have not fully explained how they manipulated and used the NADA data.[12] Because the information is complex, we continue to evaluate it in the event additional conclusions may be drawn relevant to the proposed rule.

Data were provided to CARB only four days prior to the close of the comment period, which did not allow for sufficient time for review and analysis. Separately, NHTSA also provided identical data to Professors James Stock and Kenneth Gillingham, who found numerous errors in the estimation of the new sales model as discussed in their comment letter.[13] Moreover, though NHTSA provided this data to CARB and Professors Stock and Gillingham, NHTSA did not make this data public for all stakeholders to review. The failure to provide this data and information – critical components of the Agencies' modeling and necessary in order to analyze and refute the Agencies' modeling – to the public generally and meaningfully during the proceeding (not four days before the close of the comment period) deprives the public of their right to participate in the rulemaking.[14]

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[12] See Stock, J., Gillingham, K., and Davis, W., Comments on Notice of Proposed Rulemaking for [the SAFE Vehicles Rule], EPA-HQ-OAR-2018-0283-6220, pp. 5-6.

[13] See EPA Docket ID: EPA-HQ-OAR-2018-0283-6220.

[14] See Allina Health Services v. Sebelius, 746 F.3d 1102, 1110 (D.C. Cir. 2014) ("Still, we have held for many years that an agency's failure to disclose critical material, on which it relies, deprives commenters of a right under § 553 [of the Administrative Procedure Act] to participate in rulemaking." (internal quotations omitted)); Air Transport Ass'n of Am. v. FAA, 169 F.3d 1, 7 (1999) ("[W]e have cautioned that the most critical factual material that is used to support the agency's position on review must have been made public in the proceeding and exposed to refutation."); Ass'n of Data Processing Service Orgs., Inc. v. Bd. of Governors of Fed. Reserve System, 745 F.2d 677, 684 (D.C. Cir. 1984) ("[A]t least the most critical factual material that is used to support the agency's position on review must have been made public in the proceeding and exposed to refutation.").

4.   CARB's Request: Report of analysis of the standard errors and significance of the ARDL [autoregressive distributed lag] sales model coefficients, F-statistic and R^2 of the overall model, and variable stationarity and co-integration indicators. This information is needed to verify the statistical significance and errors of the coefficients used in the Volpe model. The coefficients for the ADRL sales model listed on p. 957, Table 8-1 of the PRIA, are not consistent with those implemented in the model. See CAFE Model Documentation, PRIA, p. 78, Table 17, available at: https://www.nhtsa.gov/corporate-average-fuel-economy/compliance-and-effects-modeling-system ["2018 NPRM for Model Years 2021-2026 Passenger Cars and Light Trucks," Model Documentation].

NHTSA's Response: *NHTSA has identified an error in Table 8-1. The agency published a revised PRIA correcting the error in Table 8-1, which is reproduced below and available on page 949 of the revised PRIA at https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld cafe co2 nhtsa 2127-al76 epa pria 181016.pdf.*

Table 8-1 - Coefficient estimates for sales model

Coefficients	Estimate	Std.Error	Significance
Intercept	0.509100	0.3221	
LD.Sales, lag1	0.611700	0.0627	0
LD.Sales, lag2	0.204800	0.05755	0
GDP.Growth.Rate	0.148800	0.01738	0
Delta.Transaction.Price	-0.0001172	0.00002794	0
Labor.Force.Participation	0.000246	0.0001001	0.05
Labor.Force.Participation, lag1	-0.000229	0.00009896	0.05
F-statistic	363.2		
Adjusted R-squared	0.9184		

CARB's Rebuttal: CARB appeals this response, pursuant to FOIA (5 U.S.C. § 552) and Department of Transportation FOIA regulations (*see, e.g.*, 49 C.F.R. § 7.32(d)). All information requested has not been provided, and NHTSA has offered no valid exemption to justify withholding records. Although NHTSA provided a revised Table 8-1, the requested variable stationarity and co-integration indicators were not provided. Using the corrected coefficients, the outputs from CARB's run of the CAFE model do not match the output values published in PRIA Table-8-2.[15] CARB continues to request these records both pursuant to its FOIA request and pursuant to the Agencies' responsibilities to disclose the bases for their proposed actions and to allow comment on those bases.

5.   CARB's Request: The coefficients for the dynamic fleet share equation described in the CAFE Model Documentation on p. 79. These are not listed

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[15] See CARB Detailed Comments, pp. 218-219, Table VI-4 showing discrepancy between CARB and Agency outputs.

anywhere. Additionally, according to the PRIA on p. 955, the model was based on EIA's National Energy Modeling System (NEMS), but no reference is provided for the NEMS model. This information is necessary to evaluate the equation used in the model.

NHTSA's Response: *Records for the dynamic fleet share equation is provided in the Energy Information Administration's 2016 National Energy Modeling System (NEMS) documentation beginning on page 48 and can be found at https://www.eia.gov/outlooks/aeo/nems/documentation/transportation/pdf/m070(2016).pdf.*

A copy of the Fortran code for the NEMS implementation is detailed below. The NEMS implementation in the CAFE model is available in the public source code and described in the CAFE Model Documentation on page 78 at ftp://ftp.nhtsa.dot.gov/CAFE/2021-2026_CAFE_NPRM/CAFE_Model/CAFE_Model/CAFE_Model_Documentation_NPRM_2018.pdf. [NHTSA's image of relevant code is omitted from this CARB letter for brevity.]

CARB Rebuttal: CARB appeals this response, pursuant to FOIA (5 U.S.C. § 552) and Department of Transportation FOIA regulations (*see, e.g.*, 49 C.F.R. § 7.32(d)). All information requested has not been provided, and NHTSA has offered no valid exemption to justify withholding records.

It is unreasonable and improper to direct the public to extrinsic sources of information, when the Agencies themselves have the information and provide no reason it should not be disclosed. It is also unreasonable and improper for the Agencies to vaguely reference, as they do in the Vehicles Rule and the PRIA, the "NEMS model" without citing the version used, when there are many versions of this model available. The public should not be required to guess which version the Agencies used. The exact model used for this rulemaking should be provided and accurately cited. This is especially pertinent where the Agencies do not consistently use the most recent version of available models, such as with the BatPaC model. The Agencies' errors remain where the instructions and information have not been made publicly available.

Further, the information supplied by NHTSA referencing the CAFE Model Documentation does not include the dynamic fleet share coefficient values. Footnote 52 in the CAFE Model Documentation states: "Refer to Section A.3.10 of Appendix A for more information regarding the input parameters used for the Dynamic Fleet Share model." However, Section A.3.10 refers to ZEV Credit Values:

A.3.10 ZEV Credit Values

The ZEV Credit Values worksheet contains parameters allowing the modeling system to target the ZEV requirements of CA+S177 states during compliance simulation. Presently, usage of ZEV credits within the CAFE Model should be considered as experimental.

Table 39. ZEV Credit Values Worksheet

Category	Model Characteristic	Units	Definition/Notes
ZEV Credit Values	ZEV Requirement (%)	percentage	Minimum percentage of zero emission vehicle (ZEV) credits that a manufacturer must generate in order to meet the ZEV requirement in each specified model year.
	Max Credits from PHEV (%)	percentage	Maximum percentage of ZEV credits that a manufacturer may generate from PHEVs in order to meet the ZEV requirement in each specified model year.

Presumably, the correct reference is Section A.3.11, but, while this table does describe the coefficients, the values themselves are not present. Without these coefficient values, it is not possible to understand the extent to which the different variables (fuel price, fuel economy, curb weight, horsepower) affect the model's estimate of production volumes and fleet shares in future model years, and whether those effects are reasonable predictions. In turn, without a proper understanding of the fleet share model, it is not possible to evaluate whether this model's interaction with the other components of the CAFE Model is sound and reasonable.

A.3.11 DFS Model Values

The DFS Model Values worksheet contains fine tuning parameters for utilizing the Dynamic Fleet Share and Sales Response model (DFS/SR) within the CAFE modeling system. When enabled, the DFS/SR model adjusts the production volumes and fleet shares in future model years as a response to increasing fuel economies and costs of vehicle models.

Table 40. DFS Model Values Worksheet

Category	Model Characteristic	Units	Definition/Notes
DFS Model Values	*Seed Values (per Model Year)*	*various*	Fleet-specific seed values for the Dynamic Fleet Share and Sales Response model, specified for LDV and LDT1/2 fleets and for model years 2014 and 2015.
	Share of Total Fleet	percentage	Observed share of either LDV or LDT1/2 fleets versus the total light duty fleet, during a specific model year.
	Fuel Economy	mpg	Average fuel economy for a specific fleet, during a specific model year.
	Horsepower	hp	Average horsepower for a specific fleet, during a specific model year.
	Curb Weight	lbs.	Average curb weight for a specific fleet, during a specific model year.
	Coefficients	number	Fleet-specific coefficients for the Dynamic Fleet Share and Sales Response model, specified for LDV and LDT1/2 fleets.
	Constant	number	Specifies the NEMS "constant" coefficient.
	Rho	number	Specifies the NEMS "rho" coefficient.
	FP	number	Specifies the NEMS "fuel price" coefficient.
	HP	number	Specifies the NEMS "horsepower" coefficient.
	CW	number	Specifies the NEMS "curb weight" coefficient.
	MPG	number	Specifies the NEMS "mpg" coefficient.
	Dummy	number	Specifies the NEMS "dummy" coefficient.

Finally, the CAFE Model documentation lacks any justification or elaboration on how the NEMS coefficients were "applied at a different level" and why it is appropriate to repurpose coefficients developed for vehicle categories for body styles instead.[16] CARB continues to maintain that the information provided, both in the rulemaking record and in response to its FOIA request, was entirely insufficient.

8. CARB's Request: The agencies' detailed explanation and derivation of their point estimates for the increase in fatalities per hundred pounds of mass reduction over a constant footprint based on historical crash data, for model years 2004-2011 and calendar years 2006-2012. Previously, these details were provided in a separate report such as the "2016 Puckett and Kindelberger report." No such report is available this time. The PRIA only provides a summary table of the results of this analysis, yet states an "updated analysis" exists. See PRIA, p. 1357, section 11.4.

NHTSA's Response: *The "updated analysis" referenced in the PRIA at p. 1357, refers to information available in the PRIA in Section 11.4, pps 1345-51. NHTSA intends to publish a technical summary of the logistic regression analysis and its results in the near future. In addition, NHTSA intends to publish a report similar to the "2016 Puckett and Kindelberger report" that will describe the methodological process by which the results were derived. Accordingly, I am withholding these records as*

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[16] See CARB Detailed Comments, pp. 222-223.

exempt from the statutory disclosure requirement that contains information related to pre-decisional agency deliberation, opinions or recommendations pursuant to FOIA Exemption 5. 5 U.S.C. § 552(b)(5).

CARB's Rebuttal: CARB appeals this response, pursuant to FOIA (5 U.S.C. § 552) and Department of Transportation FOIA regulations (*see, e.g.*, 49 C.F.R. § 7.32(d)). CARB also objects that the Agencies continue to withhold information necessary for meaningful public comment on its proposed action.

First, even if technical summaries and methodological reports are still being drafted, NHTSA's response ignores that NHTSA already made the relevant decisions here—to propose the SAFE Vehicles Rule, relying on certain data and analysis. NHTSA cannot, therefore, assert that the data and analysis it relied on for the proposal are protected from disclosure as pre-decisional. Rather, it must make those available for public review. This includes information and analysis on how the point estimates for the increase in fatalities from mass reduction were derived. This information is needed in order to justify the Agencies' point estimates – even more critically here, where all of these point estimates are not statistically significant at the 95 percent confidence level (and three are not even statistically significant at an 85 percent confidence level, and no explanation is provided why these estimates as reasonable in light of such statistical uncertainty). Without the detailed regression analysis, the use of these point estimates is not justifiable and the Agencies' analysis in the proposed rule remains opaque and improperly insulated from meaningful public review and critique, contrary to law.

9. CARB's Request: Data used by the agencies to derive the new statistical model that predicts fatality rates by vehicle age. See PRIA Table 11-21, p. 1397. The coefficients of the model are provided, but without the data it is not possible to evaluate whether the coefficients were properly derived. Additionally, the coefficients provided in the PRIA are different (significant digits and sign changes) than those identified in the actual model source code (which are also commented out such that they are non-functional[17]), and are different from the model year based coefficients used in the input files. This renders unclear what coefficients the analysis in the NPRM is based upon.

NHTSA's Response: *The data used to derive the new statistical model for fatality rates was obtained from IHS Markit (formerly R.L. Polk & Company) is proprietary information. Thus, I am withholding the data in its entirety from disclosure because it is related to trade secrets and commercial or financial information pursuant to FOIA*

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[17] Code that is "commented out" is a programming technique that instructs the computer to skip the calculations or other instructions in those lines of code.

Exemption 4. 49 U.S.C. § 552(b)(4). To request a copy of the data, please contact IHS Markit directly.

CARB Rebuttal: CARB appeals this response, pursuant to FOIA (5 U.S.C. § 552) and Department of Transportation FOIA regulations (*see, e.g.*, 49 C.F.R. § 7.32(d)).

Again, FOIA itself directs "partial disclosure of information" where possible, and specifies that agencies must take "reasonable steps necessary to segregate and release nonexempt information." (5 U.S.C. 552(a)(8)(A)(ii).) Yet, NHTSA has denied all information without making this determination, and again does not appear to have followed its FOIA regulations in making this trade secret determination. Those regulations require NHTSA to notify the submitter of the data "expeditiously" and ask for any written objections to release. Notably, "[t]he burden is on the submitter to identify with specificity all information for which exempt treatment is sought and to persuade the agency that the information should not be disclosed." (49 C.F.R. 7.29(a).) NHTSA has not demonstrated that *all* relevant information is trade secret under FOIA in the first instance, that the submitter (here, likely, IHS Markit) objects to their release, or even that NHTSA has sought IHS Markit's views.[18]

Further, CARB requested all information used to derive the new modeling coefficients. Even if some of the data is truly proprietary, NHTSA has not demonstrated that *all* information or relevant records based upon it are confidential. Further, aggregated data is very unlikely to be proprietary. We again note that aggregated data may be in the Agencies' possession and must be produced.

As described in the request for information, different sets of coefficients are referenced in the SAFE Vehicles Rule and supporting documents. The Agencies have failed to acknowledge or clarify which coefficients the Vehicles Rule is actually based upon; that is, whether it was the coefficients provided in the PRIA or those identified in the actual model source code. When using the different coefficients to attempt to understand the Agencies' analysis, the model irrationally predicts negative fleet populations.[19] CARB appeals the response for this reason as well. CARB further notes, as we have discussed in more detail above, that failing to provide information upon which proposed rules are based is contrary to core principles of administrative law.

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[18] To the degree 49 C.F.R. Part 512's trade secret rules for NHTSA apply (which NHTSA has not asserted), it is unclear whether any final determinations have been made under those provisions
[19] *See* CARB Detailed Comments, pp. 217-218.

12. CARB's Request:[20] Modeling tools developed by U.S. EPA including:

    a. All files necessary to utilize - with the Advanced Light-Duty Powertrain and Hybrid Analysis (ALPHA) and the Optimization Model for reducing Emissions of Greenhouse gases from Automobiles (OMEGA) - the response surface equations developed by U.S. EPA as identified or referenced in: "Peer Review of EPA's Response Surface Equation Report" (Docket ID No. EPA-HQ-OAR-2018-0283-0025); and SAE paper 2018-01-1273 authored by U.S. EPA (Docket ID No. EPA-HQ-OAR-2018-0283-0028).

    b. All new or modified input files, source code, and executable files for U.S. EPA's OMEGA model developed since the release of the Proposed Determination in late 2016.

    c. All current and new input files, source code, and executable files for ALPHA used for the Proposed Determination in late 2016 and/or modified since then.

    d. All current and new pre-processors and their inputs used for the Proposed Determination in late 2016 or modified since then to categorize, sort, and rank technology packages and costs for use with OMEGA.

NHTSA's Response: *Records related to the EPA's modeling tools fall under that agency's jurisdiction and must be requested from the EPA directly.*

U.S. EPA's Response: *EPA's last publicly available version of the ALPHA and OMEGA model is on the EPA web site (and MTE docket) and dated November 2016 (released as part of the Proposed Determination). While EPA has draft updates to the OMEGA and ALPHA models since November 2016, these updates have not been made available to the public. In any event, the ALPHA and OMEGA models were not used to develop the proposed rule.*

CARB's Rebuttal: This response is improper and fails to meet U.S. EPA's FOIA obligations. FOIA obligates the agency to promptly provide records (5 U.S.C. § 552). U.S. EPA has failed to meet its statutory obligations. Moreover, U.S. EPA created the OMEGA model to assist in the analysis of technology costs when developing its greenhouse gas emissions standards.[21] The results of the OMEGA and ALPHA models are relevant for comparison to the CAFE model for checking its reliability. Even if these versions of the models were not used to develop the proposed rule,

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[20] CARB's Requests nos. 10 and 11 are omitted.
[21] *See* Proposed Rulemaking To Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 74 Fed.Reg. 49,454, 49,545 (September 29, 2009).

there is no justification provided for withholding them from public review. Please provide the draft updates.

II. Reliance on the NERA-Trinity Analysis, in Whole or in Part, Would Compound the Procedural and Substantive Errors in the

As our substantive comments outlined, in the areas for which sufficient information was provided to allow for public review the SAFE proposal is rife with errors. The failure to provide meaningful information upon which the Agencies' relied for public review as outlined above and in other public comments increases the risk that a final rule will be similarly flawed. During the Agencies' review, it is important, therefore, that they rely upon only accurate information, and that – if they seek to rely upon new information – the public be given access to the information and sufficient opportunity for notice and comment.

The NERA-Trinity analyses provided by the Auto Alliance[22] purport to attempt to resolve some of the substantive problems with the Agencies' analyses, but it would be improper for U.S. EPA and NHTSA to rely upon them in a final rule—because the public is unable to fully understand and provide comment on the Alliance analyses, because critical information and modeling tools have been withheld (compounding similar procedural errors and informational gaps by the Agencies), because there has been inadequate opportunity to comment upon these analyses, and because even with inadequate information it is clear that the analyses are deeply flawed.[23] We highlight some of these obvious and critical flaws here to demonstrate the critical importance of a further public access to and review of this information, if it were to form the basis of any regulatory decision.

The information provided by the Auto Alliance and NERA-Trinity in support of its analysis is limited and inadequate to provide a reasonable opportunity for meaningful review. Should the Agencies adopt or rely on it, at minimum the following data and information would need to be made public for review:

- The NERA-Trinity models of the "New Vehicle Market" for new sales, scrappage, fleet composition, and vehicle miles traveled (VMT) and their underlying equations, coefficients, parameters, data and inputs, results, sensitivity tests, and justifications.
- The explanation and justifications for NERA-Trinity's calculation of consumers' willingness-to-pay for fuel economy, including any assumptions or data used or

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[22] NHTSA-2018-0067-12073.

[23] Likewise, for all the reasons stated herein, it would be improper for NHTSA to rely upon the flawed NERA-Trinity Analyses in its final environmental impact statement. Any introduction of data that lacks scientific integrity would entirely undermine and distort the analysis of alternatives and environmental impacts in the final environmental impact statement, thereby depriving the document of any legitimacy. See DEIS Comments, Section II, B.

> relied upon.
- The explanation and justifications for NERA-Trinity's calculation of "Petroleum Market Externalities," including any assumptions or data used or relied upon.

The NERA-Trinity models have not been subject to peer review. For the Agencies to adopt or rely upon the NERA-Trinity analysis, the Agencies would need to subject these models to the peer review process and make appropriate improvements based upon that review.

What review can be performed shows the analysis is fundamentally flawed and does not support relaxing the existing standards. The NERA-Trinity analyses expressly adopts many of the same fundamentally-flawed assumptions and approaches employed by the Agencies in the proposal, including assumptions and approaches concerning the costs of vehicle technology, the rebound effect, and that fleet size, rather than demand for transportation, determines total vehicle miles traveled.[24]

Our review of the limited information provided by NERA-Trinity and the Auto Alliance suggests that the underlying data has been aggregated, but we are unable to determine how or to what extent. For example, the final list of vehicle models used in the analysis, the nesting structure, and method for developing the coefficients used in the sales model to make its predictions are not provided. Without complete information, we have been unable to evaluate the soundness of the model's design, reproduce the analysis to confirm it reaches the results described, or perform any additional statistical tests. Such analysis is necessary to be able to determine whether the results are significant, unbiased, or reasonable and reliable.

A more troubling component of the analysis, which is equally, if not more, difficult to disentangle without more details or interim model outputs, is the scrappage model. As discussed in the enclosed memo from Professor Gillingham, the purportedly more reasonable fleet sizes produced in the Auto Alliance's analysis may be the result of one error masking another. The on-road fleet population is a combination of both new vehicle sales and used vehicle scrappage. Simply put:

The Total On-Road Fleet (this year) =   Total On-Road Fleet (last year) +
                                            New Sales (this year) –
                                            Scrapped Vehicles (this year).

In its analysis for the Auto Alliance, NERA-Trinity use a price elasticity for new vehicles of -1.0,[25] which apparently was selected based on a study from nearly two decades ago and is potentially an over-estimate of current and future elasticities. The NERA-Trinity

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[24] *See,* e.g., Comment by the Institute for Policy Integrity at New York University School of Law (Policy Integrity), Docket #EPA-HQ-OAR-2018-0283-5083; NHTSA-2018-0067-12213, at 79-86.
[25] A price elasticity of -1.0 means that the percent increase in new vehicle prices will result in an equivalent percent decrease in new vehicle sales (all other attributes remaining constant), e.g. 5% increase in prices results in a 5% decrease in sales.

elasticity therefore predicts a greater decline in new vehicle sales under the existing standards (or conversely, a greater increase in new sales under the rollback standards) than a smaller elasticity, such as -0.2 that was derived by the Agencies' new sales model. As a result, even if the NERA-Trinity scrappage model were producing results inconsistent with economic theory as the Agencies' model does, i.e. greater demand of used vehicles at a higher price, then the elasticity of -1.0 would obscure that effect and paint the overall fleet size as being more stable. The predicted new vehicle sales would offset any economically inconsistent prediction of the number of vehicles scrapped. However, both the underlying components (i.e., the new sales estimate and the scrappage estimate) may be incorrect. Without additional information about the NERA-Trinity scrappage model, we cannot assess what is actually happening within the model to check for consistency with economic theory, but it seems possible that NERA-Trinity have simply masked, rather than corrected, the fundamental flaws in the Agencies' scrappage modeling.

Even without the information above, the analysis is patently flawed due to two major decisions made by NERA-Trinity that bias the analysis to ensure that it predicts benefits from a rollback. First, like the Agencies, the NERA-Trinity analysis assumes that automakers will install, without any regulations, available fuel-saving technology that will pay for itself within a specified time. As noted in CARB's Detailed Comments, there is no historical evidence for the assumption that automakers will systematically do so in the absence of standards requiring this technology.[26] In addition, the Auto Alliance provides no evidence in support of its assumption.[27] This has the subsequent effect of significantly, but erroneously, diminishing the increase in fuel consumption caused by a rollback. In other words, this assumption makes the rollback appear more beneficial, or at least less costly, than it would be by minimizing the increase in fuel consumption that would result from the rollback.

The NERA-Trinity analysis assumes manufacturers would install all technologies with a 60-month payback period, which is twice the 30-month payback period the Agencies used in the SAFE Vehicles Rule and further reduces the harm created by rolling back the standards. NERA-Trinity's 60-month payback period appears to be based on the willingness-to-pay calculation for fuel economy derived from its new sales model. However, this value represents the purported *consumer's* willingness-to-pay, which does not necessarily measure or capture a *manufacturer's* decision-making process. It is inappropriate to substitute, without reason, a consumer's valuation into an auto manufacturer's decision-making process, and NERA-Trinity and the Auto Alliance fail to

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[26] *See* CARB Detailed Comments, p. 164, et seq.
[27] However, as noted in CARB's Detailed Comments pp. 164-66, such "over-compliance" has historically never occurred and average new fuel economy tracks very closely to the standards, while vehicles improve along other dimensions such as performance or size.

provide any justification for doing so. While consumer preferences may be important considerations for automakers' vehicle design decisions, other factors may also be relevant, related to engineering limitations, manufacturing capability, supplier constraints, or other financial and market conditions that may necessitate some compromises such that demand and supply for fuel efficiency will not be aligned perfectly. Even if it were appropriate to substitute a consumer's valuation, NERA-Trinity's 60-month willingness-to-pay estimate falls within a wide range of other estimates in the economic literature (as discussed in the Vehicles Rule) and they provide no justification as to why their value is superior to others, aside from circular consistency with the New Vehicle Market Model.

The Auto Alliance's suggested analysis uses an improper methodology for calculating the societal benefits from fuel economy improvements. The analysis relied solely on the CAFE Model as developed by the Agencies for technology costs and effectiveness, thereby incorporating the errors in that analysis.[28] However, NERA-Trinity considered only *some* of the fuel savings produced by the existing standards or, to put it more precisely, only *some* of the lost fuel savings that would be produced by the proposed rollback.

Specifically, the analysis includes only 60-months' worth of fuel savings rather than all of the savings that actually accrue over the life of a vehicle. While consumers may not value all future fuel savings at the time of a new vehicle purchase, there is no justification provided by the analysis for why *society* should not account for the benefit from all the actual fuel savings that actually occur—savings that leave money in the consumer's pocket and thus produce a real benefit, whether or not the consumer factored those savings into the initial purchase.

As Professor Gillingham noted, this is not supported in the relevant economic literature.[29] To not include the post-payback period fuel savings, all of which will be realized by the consumer and by society regardless of whether or not the individual consumer values them *at the time of making a vehicle purchase*, is wholly inconsistent with proper regulatory impact analysis. The amount a consumer is "willing to pay" for fuel savings when purchasing a vehicle—the consumer's *ex ante* valuation of fuel savings—is not relevant to the question of what costs and benefits actually accrue to society under emission and fuel economy standards. When undertaking cost benefit analysis, it is the costs and benefits that will actually accrue—*ex post*—that are relevant. NERA-Trinity provide no explanation of why consumers (or a society) would fail to fully value the money saved by driving more fuel efficient vehicles, even if consumers did not fully value these savings when making decisions about which vehicles to purchase.

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[28] *See* CARB Detailed Comments at p. 93, et seq.
[29] See enclosed comments from Professor Ken Gillingham, p. 5.

NERA-Trinity's analysis here is internally inconsistent. It accounts for *all* of the mobility and refueling benefits associated with improved fuel economy over the *full lifetime* of vehicles, as opposed to accounting for only some of these benefits as with the approach taken for fuel savings. NERA-Trinity provides no explanation for why two different methodologies are used for related benefits.

The analysis appears to calculate the increase in fuel tax revenue from more than the first five years of vehicle usage; this is also inconsistent with the approach taken for fuel savings. Moreover, the fuel tax revenue is not appropriate to include as a societal benefit because, as the Agencies note, fuel taxes are transfer payments and thus should be excluded.[30]

As noted above, the Auto Alliance's analysis perpetuates some of the Agencies' erroneous assumptions and thus cannot support a rollback. Regardless of what payback period is selected, by relying on the Agencies' CAFE Model and inputs used to support the proposal, the technology costs remain overstated due to the reasons previously discussed in CARB's comment letter. These include, but are by no means limited to, invalid input assumptions, algorithms that do not function correctly, and a failure to maintain performance neutrality with the addition of new fuel-saving/emission-reducing technologies.

The NERA-Trinity analysis uses the same exaggerated rebound effect of 20 percent based on a selective review of the literature as well as the Agencies' dramatically undervalued domestic social cost of carbon. NERA-Trinity also adopts the Agencies' incorrect assumptions regarding the sources of crude oil and where it will be refined – dramatically limiting the upstream emissions impacts of the increased fuel consumption under the rollback. Like the Agencies' analysis, the NERA-Trinity analysis fails to interact fleet size and total vehicle miles traveled, assuming that, regardless of the number of vehicles in operation, vehicles will each be driven a fixed, age-specific number of miles, which leads to unsupportably large VMT estimates under the original standards and therefore falsely inflates the benefits of the rollback.

Given the limited information provided by the Auto Alliance, it is impossible to recreate NERA-Trinity's analysis and correct all of the errors described here (or identify any others that may exist). However, these errors alone illustrate that any reliance on the NERA-Trinity analysis, in whole or in part, would be entirely arbitrary. In comparison, CARB's prior critique of the SAFE Vehicles Rule analysis, the previous analyses by the Agencies and CARB that concluded that existing standards remain appropriate, and the
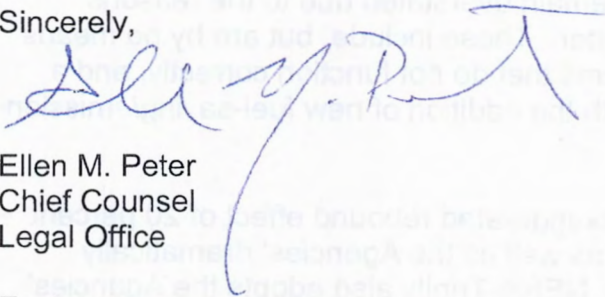
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[30] 83 Fed.Reg. at 43,088.

underlying TAR demonstrate that the NERA-Trinity conclusions are likely wrong and that the rollback would result in significant net societal costs.[31]

III. Conclusion.

Having failed to meet their obligations under the law, NHTSA and U.S. EPA must withdraw the SAFE Vehicles Rule. CARB continues to evaluate progress towards reducing motor vehicle emissions and remains willing to discuss sensible, supported adjustments to ensure the emissions are reduced while promoting a sustainable economy, clean transportation system, and an innovative, competitive manufacturing capability.

If you have any questions regarding the enclosed materials, please contact Mr. Pippin C. Brehler, Senior Attorney, at Pippin.Brehler@arb.ca.gov or by phone at (916) 445-8239.

Sincerely,

Ellen M. Peter
Chief Counsel
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[31] *See* CARB's Detailed Comments at 330-336.

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Comments on the NERA-Trinity "Evaluation of Alternative Passenger Car and Light Truck Corporate Average Fuel Economy (CAFE) Standards for Model Years 2021-2026"

Prepared by:
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December 10, 2018

Short biographical statement:

Kenneth Gillingham is an Associate Professor of Economics at Yale University, with appointments in the School of Forestry & Environmental Studies, Department of Economics, and School of Management. He is also a faculty research fellow at the National Bureau of Economic Research. In 2015-2016 he served as the Senior Economist for Energy & the Environment at the White House Council of Economic Advisers and in 2005 he served as a Fellow for Energy & the Environment at the White House Council of Economic Advisers. He is an energy and environmental economist, with research in transportation, energy efficiency, and the adoption of new technologies.

He has published over 40 publications, including in top journals in economics, science, and business. Many of these publications focus on the economics of fuel economy standards and related issues. He has presented this work at top universities both in the United States and internationally. In 2007, he was a Fulbright Fellow in New Zealand and he has held visiting positions at the University of Chicago, Stanford University, Indiana University, and University of California-Berkeley. He holds a PhD from Stanford University in Management Science & Engineering and Economics, an MS in Statistics and an MS in Management Science & Engineering from Stanford, and an AB in Economics and Environmental Studies from Dartmouth College.

This comment is based on his expertise in the modeling of fuel economy standards and involved a review of the literature and discussions with colleagues also working on this issue, such as Arthur van Benthem of the University of Pennsylvania and Mark Jacobsen at the University of California-San Diego.

1. Introduction

This brief comment provides a high-level summary of potential concerns with the NERA-Trinity CAFE analysis prepared for the Alliance of Automobile Manufacturers (docket number NHTSA-2018-0067-12073). My first and most important comment is that the NERA-Trinity comment does not provide enough information to fully examine the validity of the analysis. For example, unlike the NPRM, there is no breakdown of the crash fatalities by source, nor is there any sensitivity analysis performed. Without sufficient information, it is very difficult to evaluate the comment. Based on my experience reviewing regulations at the White House Council of Economic Advisers, a regulatory analysis with such limited information would be unacceptable for use in rulemaking.

However, despite this, I have carefully reviewed the analysis and have the following most important concerns: (1) the -1.0 price elasticity of new vehicle sales is based on old studies and is inappropriately applied in the model, (2) there appears to be a similar issue of too many used vehicles in the scrappage model as in the Agencies NPRM/PRIA analysis, and (3) the willingness-to-pay methodology and payback period assumption is based on an incorrect understanding of the economic literature.

There are other concerns with the NERA-Trinity analysis as well, such as concerns about modeling choices that remain the same between the NERA-Trinity analysis and the NPRM analysis. I will not discuss these here, as they are fully covered in the comments in the docket. The key point is that these concerns alone indicate that NERA-Trinity made specific choices that appear designed to increase the estimated costs of the augural standards upwards and benefits downwards, raising questions about the objectivity of the analysis.

2. Price Elasticity of New Vehicle Sales

In Appendix B, section e of the report (page B-8), NERA-Trinity describe their assumptions for the aggregate price elasticity of new vehicle sales. They assume an aggregate price elasticity of -1.0, basing it on an unpublished comment performed nearly two decades ago (Gruenspecht 2000). Moreover, the basis for the estimate in the study over two decades old is a variety of other sources, such as McCarthy (1996), who estimates an elasticity of -0.87 based on a 1989 household survey. No other sources are given in the NERA-Trinity report, despite the claims that their estimate is "consistent with various literature sources." For reference, the Agencies performed their own analysis using updated data and found a much less elastic response of -0.2 to -0.3, although there are concerns that even this is an overestimate of the response as well (see Stock-Gillingham-Davis comments on the NPRM).[1]

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[1] These comments can be found both on the docket and here:
https://scholar.harvard.edu/files/stock/files/comments_on_safe_nprm_stock-gillingham-davis_102618.pdf.

There are strong reasons to believe that this aggregate price elasticity of new vehicle sales is inappropriate for use today in an analysis of fuel economy standards. First, it is based on a single analysis from over two decades ago. Today we have recent publicly available data from the Bureau of Economic Analysis and other sources that can be used to estimate the aggregate price elasticity of new vehicle sales. Vehicles today have different attributes and last longer than vehicles in the past, so the price elasticity could be expected to be different than it was over two decades ago. At a minimum, it seems inappropriate to ignore the most recent data without a good explanation, and NERA-Trinity do not provide any explanation. In addition, the time series methods used to estimate such an aggregate price elasticity have substantially improved in the past two decades. Thus, I have trouble understanding why the NERA-Trinity analysis relied upon such old and weak evidence.

Second, the aggregate price elasticity of new vehicle sales tells us how sales will change in equilibrium when new vehicle prices change. When appropriately estimated using historical data, they show how changes in new vehicle prices that occurred in the market lead to changes in new vehicle sales. This is a specifically different parameter than the changes in new vehicle sales that would accompany an increase in new vehicle prices at the same time as an improvement in fuel economy (holding all other attributes roughly constant, as the Volpe CAFE model does). Thus, one might expect that the consumer benefits from the improved fuel economy at least partly (or entirely) offset the increase in the vehicle prices with fuel economy standards. Such offsetting consumer benefits imply that the change in new vehicle sales would be smaller, and thus a price elasticity closer to zero would be more appropriate.

This change of the aggregate price elasticity of vehicle sales turns out to be important when taken in context of the NERA-Trinity scrappage model.

3. The Scrappage Model in the NERA-Trinity Analysis is Still Problematic

One of the major concerns about the modeling in the Agencies' NPRM/PRIA analysis is that it leads to an *increase* of the number of vehicles in the fleet when the price of new vehicles increases and the price of used vehicles increases, due to the augural standards. This violates basic economic principles. The result can occur for one of two reasons. First, the agencies could have underestimated the aggregate price elasticity of new vehicle sales. As mentioned above, it is unlikely that the estimate is underestimated by the agencies, and it may have even been overestimated (again, see Stock-Gillingham-Davis comments on the NPRM). Second, the Agencies' analysis of vehicle scrappage may have vastly overestimated how many additional vehicles are scrapped due to the change in fuel economy of new vehicles.

The Agencies' scrappage model captures the feature that when new car prices rise, some people hold on to old cars longer, rather than scrapping them, so the used car fleet increases in size. The parameterization of this effect in the NPRM is such that it leads to so many used cars in the fleet being held longer that they outweigh the fewer new cars being sold leading the modeling to have the aggregate fleet increase (defying standard economic logic). Clearly, this suggests that there is something problematic in the Agencies' scrappage modeling.

While it is tough to fully comment on, given the limited information provided in the analysis, it appears that the NERA-Trinity analysis does not solve this issue in the scrappage modeling but instead changes the aggregate price elasticity of new vehicle sales. Specifically, the NERA-Trinity analysis uses a much larger (in absolute value) elasticity and thus models many fewer new vehicles being sold when the price of new vehicles increases due to fuel economy standards. The NERA-Trinity analysis also slightly modifies the scrappage model, using a different set of coefficients than the NPRM. The net combined effect of these changes means that the NERA-Trinity numbers suggest that the total fleet size decreases under the augural standards, a result that appears more consistent with economic theory than the NPRM result.

Thus, the NERA-Trinity analysis obtains a more reasonable result primarily by increasing the change in the number of new vehicles by three to four times, masking what appears (but it is tough to say for sure given the limited information provided) to be an inappropriate scrappage model. If the new vehicle price elasticity in the NERA-Trinity analysis is changed to -0.2 or -0.3, as in the Agencies' analysis, then it appears that the NERA-Trinity analysis would also result in unreasonable increases in fleet size. Accordingly, this observation exposes flaws in the NERA-Trinity analysis that mirror the flaws in the Agencies' NPRM analysis.

This suggests that as long as the aggregate price elasticity is overstated, as is likely the case, then the NERA-Trinity analysis must be problematic, just as the Agencies' analysis was. By overstating scrappage, the NERA analysis will keep more older vehicles on the road longer, reducing the environmental benefits and increasing the crash costs of the augural standards.

4. Inappropriate Methodology on the Benefits of Future Fuel Savings

The NERA-Trinity study departs from the Agencies' NPRM analysis in several key ways relating to how consumers value fuel economy and how automakers believe that consumers value fuel economy. For reference, the NPRM analysis argues that it assumes that automakers meet fuel economy standards by adding new (costly) technology to

vehicles, while keeping the vehicles otherwise the same.[2] This discussion takes this assumption as given. Under this assumption, the Agencies include all years of expected future fuel savings as consumer benefits. The logic for this is that consumers will actually receive these future fuel savings, and this is the ex post perspective one would want to take for regulatory analysis. These savings are then weighed against the cost of adding the fuel economy-improving technologies (and other external effects of course).

The NERA-Trinity analysis deviates from this logic. It still uses the CAFE Model used by the Agencies, so it continues to make the same assumption that automakers meet standards only by adding new technologies, while maintaining other attributes of the vehicles. The difference in the NERA-Trinity analysis is that only 5 years of the future fuel savings are counted as benefits. In effect, the NERA-Trinity study is arguing that from years 5 to the end of the vehicle's lifespan (e.g., 12-14 years), consumers are not receiving any benefits from the improved fuel economy that they paid for through the increased technology costs. From a benefit-cost analysis perspective, this assumption, which clearly biases the net benefits of the augural standards downward, is highly suspect.

The NERA-Trinity analysis approach calculates a willingness-to-pay for fuel economy by consumers in their vehicle purchase decision.[3] This willingness-to-pay parameter is then used to scale the benefits from future fuel savings downwards. Effectively, the NERA-Trinity analysis is arguing that because consumers are not willing to pay for all years of the future fuel savings, it is as if those future fuel savings do not happen.

The logic is flawed because regulatory analysis must be made based on ex post benefits and costs, rather than ex ante benefits and costs. Regardless of whether the willingness to pay estimate is appropriately estimated,[4] the bottom-line is that this willingness-to-pay approach is using an ex ante value from the time of the vehicle purchase decision when an ex post value is the correct one to use. I am not aware of any economic literature using the NERA-Trinity willingness-to-pay approach in a policy analysis.[5] The basic theory of cost-benefit analysis requires all benefits and costs to be calculated and included in the analysis.

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[2] Note that ARB's comment in the docket argues that in fact the Agencies' analysis does not hold performance constant in the CAFE Model, despite claims in the NPRM that this is done. I will not comment on this here, as this makes things even more complicated and even more difficult to evaluate.

[3] The NERA-Trinity analysis calculates this based on a nested logit model of vehicle choice and a second-stage in which the alternative-specific coefficient (a coefficient for the relative utility for each alternative or vehicle type) is regressed on vehicle characteristics and dummy variables. Only a few vehicle characteristics are used: horsepower, weight, size, and the cost of fuel per mile driven. The coefficient on the cost per mile of driving is assumed then to be the willingness-to-pay for a change in the cost per mile of driving (or fuel economy). This willingness to pay parameter is then used to scale the benefits from future fuel savings downwards.

[4] And for several technical reasons I am concerned about this estimation. For example, only a small number of attributes are included in the estimation, so there is almost certainly an endogeneity issue. If the coefficients in the analysis are poorly-identified, as I believe they are, then the entire analysis is suspect.

[5] There is indeed a small body of economic literature on the (under)valuation of fuel economy, but none of the papers on the valuation of fuel economy use the NERA-Trinity willingness-to-pay approach.

To see this, consider a simple example. Suppose there was a free innovation that improved fuel economy, but consumers do not recognize that these fuel economy gains would happen when they are buying a new vehicle, so they are not willing to pay anything for it. The innovation provides real future fuel savings to consumers, so they receive benefits, and it does not cost anything. A correct benefit-cost analysis would account for the future fuel savings, as they are real savings that occur. In the context of fuel economy standards, there are some technology costs and the goal of the standards is to weigh these against the future fuel savings. The approach used by NERA-Trinity simply does not make economic sense.

The second major change made is to assume that automakers install all fuel economy technologies that have a payback period of 60 months (5 years) regardless of whether there is a fuel economy standard. NERA-Trinity stated that they made this modeling choice because the New Vehicle Market Model implies that new vehicle purchasers require a payback period of 60 months (see page A-5). However, it appears that NERA-Trinity misunderstood the model. The modeling assumption is about what *automakers actually do*. NERA-Trinity do not provide any evidence supporting the assumption that automakers actually add fuel economy technologies that have a payback period of 5 years in the absence of fuel economy standards. Indeed, the average fuel economy of the fleet remained relatively constant for decades when fuel economy standards were unchanged, contrary to the assumption.

The modeling assumption of a much longer payback period affects the costs and benefits of fuel economy standards. This assumption implies that the automakers are already including many low-cost technologies without the standards, so that the remaining technologies that can be added for fuel economy standards are higher cost technologies. In effect, the NERA-Trinity assumption changes the baseline that standards are compared to. A longer payback period generally should imply lower net benefits because more cost-effective technologies will have already been installed, leaving higher cost technologies remaining to achieve the net benefits. The fact that these lower net benefits stem from a dubious assumption by NERA-Trinity raises further questions about the reliability of the NERA-Trinity net benefits estimates.