

**WA 0-14: Peer Review of
“Population and Activity of On-road Vehicles in MOVES201X”**

Peer Review Charge

1. Purpose

Over 125 million Americans experience unhealthy levels of air pollution. Motor vehicle exhaust is a particularly important source of exposure to air pollutants, with more than 50 million people living, working, or going to school in close proximity to high-traffic roadways. The U.S. Environmental Protection Agency’s (EPA) Office of Transportation and Air Quality (OTAQ) is tasked with identifying policy options to reduce ozone, particulate matter (PM), and nitrogen dioxide emissions, among other pollutants, from light-duty vehicles (LDVs) in the U.S. As new policy options are brought forth, there is a need to evaluate their soundness and utility.

Models can be used to help address questions that may be too large to study directly but may yield to approximations from smaller sets of real data. These models can provide insights into how drivers will change their vehicle operating patterns in response to, for example, a required increase in fuel economy across the LDV fleet. Tools, like EPA’s MOrtor Vehicle Emission Simulator (MOVES), describe the result of various inquiries into the nature of fuel and vehicle emission interactions. Specifically, the MOVES model estimates the impact of LDV, heavy-duty vehicle, and nonroad equipment exhaust and/or evaporative emissions on air quality in the U.S.

EPA is updating the MOVES model to include information from “Population and Activity of On-road Vehicles in MOVES201X,” and thereby refine the model’s ability to estimate accurately the emissions impacts of motor vehicles. This report describes proposed updates to MOVES data and methods.

ICF, which is under contract with OTAQ to facilitate a peer review of the aforementioned report, has selected you as a reviewer. This charge letter provides you with a detailed scope of services for this review. It includes:

- A list of both general and specific questions for your review, with instructions;
- The review schedule;
- A draft copy of the report for review; and
- A list of materials, including a Conflict of Interest (COI) form, to be submitted to ICF at the conclusion of the review.

2. Charge Questions

EPA is seeking your review of and comments on the draft report entitled, “Population and Activity of On-road Vehicles in MOVES201X.” This report has been updated from the MOVES2014 documentation, which was peer reviewed as part of the MOVES2014 release. Most sections have been substantially updated since the MOVES2014 report, so EPA requests that you review the entire draft report (i.e., Sections 1-17). Please note, though, that with a few exceptions, this peer review excludes the various appendices to the draft report. The exceptions are Appendix C (Detailed Derivation of Age Distributions), Appendix I (Freeway Ramp Contribution at the County-Scale), Appendix J.3 (Limitations of the MOVES Highway Ramp Operating Mode Distribution Tool), and Appendix J.4 (Technical Background of the MOVES Highway Ramp Operating Mode Distribution Tool). In sum, EPA requests that you review the entire body of the draft report as well as Appendix C, Appendix I, Appendix J.3, and Appendix

J.4. The other appendices are provided as supplemental information/background, and are not within the charge of this peer review.

EPA requests that you review the selected methods and underlying assumptions, their consistency with the current science as you understand it, and the clarity and completeness of the presentation. For this review, no independent data analysis is required. Rather, EPA asks that you assess whether the information provided is representative of the state of current understanding, and whether incorporating the resulting default inputs into the MOVES model will result in appropriate predictions and conclusions. The draft report references other MOVES201X draft reports. We will provide these to you at your request, but emphasize that EPA does not anticipate they will be needed for this work.

Your written comments should address, sequentially, the substantive content of the draft report that you are charged with reviewing. Comments on organization, formatting, and other minor issues are welcome, but should be provided separately.

EPA has provided the following general and specific charge questions to define the scope of your review. EPA does not expect individual responses to the general questions, but would like these questions to help guide your comments. EPA does, however, seek individual responses to the specific questions. Please note that you are welcome to identify additional topics or depart from the questions as necessary to best apply your particular area(s) of expertise. You may also include any additional comments that are not specific to the charge questions using the table provided.

In your written comments, you should distinguish between recommendations for clearly defined improvements that can be readily made based on data or literature reasonably available to EPA, and improvements that are more exploratory or dependent on information not readily available to EPA. Your comments should be sufficiently clear and detailed to allow readers to understand thoroughly their relevance to the subject report.

EPA requests that you treat all materials as confidential. Do not release or discuss with others the peer review materials or your comments. Your comments will be listed as an appendix to EPA's final published report, along with EPA's responses to them.

If you are unclear about what is required to complete this review or need additional background material, please contact Ira Dassa at ICF by telephone (443-573-0551) or email (Ira.Dassa@icf.com).

Charge Questions

General Questions to Consider:

1. Does the presentation describe the selected data sources sufficiently to allow the reader to form a general view of the quantity, quality, and representativeness of data used in the analysis? Are you able to recommend alternate data sources that might better allow the model to estimate national or regional default values?
2. Is the description of analytic methods and procedures clear and detailed enough to allow the reader to develop an adequate understanding of the steps taken and assumptions made by EPA while developing the model inputs? Are the examples selected for tables and figures well-chosen and effective in improving the reader's understanding of approaches and methods?
3. Are the methods and procedures employed technically appropriate and reasonable, with respect to the relevant disciplines, including physics, transportation research,

engineering, mathematics, and statistics? Are you able to suggest or recommend alternate approaches that might better achieve the goal of developing accurate and representative model inputs? In making recommendations for alternate approaches, please distinguish between instances involving reasonable disagreement in choice of methods as opposed to instances where you conclude that the methods described involve specific technical errors.

4. Where EPA has concluded that applicable data is meager or unavailable, and consequently has made assumptions to frame approaches and arrive at solutions, do you agree that the assumptions are appropriate and reasonable? If not, and you are able to do so, please suggest alternative assumptions that might lead to more reasonable or accurate model inputs.
5. Are the resulting model inputs appropriate and, to the best of your knowledge and experience, reasonably consistent with history and trends in onroad vehicle populations and activity? Are the resulting model inputs empirically consistent with the body of data and literature with which you are familiar?

Specific Questions:

In addition to the general review, EPA requests specific responses to the following questions:

1. Do you have any recommendations of better sources or techniques for projecting bus populations and VMT estimates?
2. Are there any sources of vehicle survivability or scrappage information that are missing, particularly for heavy-duty vehicles? Are there alternatives to this approach for estimating age distributions for future calendar years?

As described in Sections 10 and 12, EPA intends to use information from instrumented vehicles to develop default inputs for idle and start activity for heavy-duty trucks. EPA has not yet completed this analysis, so the draft report does not include results. However, EPA would appreciate feedback on its proposed techniques and data sources.

3. In Section 11, EPA has updated the national default hotelling rate to be consistent with current hours-of-service regulations. For this updated report, EPA evaluated studies of extended activity to inform the hotelling rate, but found that the studies did not report hotelling activity data in sufficient detail for EPA to update its national hotelling rate. For example, Frey et al. (2012) did not report extended idle and APU usage that occurred for stop durations between 3 and 7 hours, and less than 15 minutes. As described in Sections 10 and 12, EPA is currently analyzing truck activity data from the instrumented truck database maintained by the National Renewable Energy Laboratory (NREL). From this data set, EPA can obtain detailed data on extended idling, but not hotelling activity when the main engine is not on, including when the driver is using an APU. By using EPA's current hotelling activity distribution assumptions about the fraction of hotelling

that operators idle the main engine, EPA could potentially use the NREL database to inform the national hotelling rate, instead of using the current assumptions with hours-of-service. Would you recommend that EPA use this approach (instrumented truck data on extended idling and assumptions regarding the hotelling activity distribution) to estimate the national hotelling rate?

4. As described in Sections 10 and 12, EPA intends to use information from Verizon Telematics to develop default inputs for idle and start activity for light-duty cars and trucks. Are there any concerns about using this data source? In particular, do you recommend any techniques that would allow us to investigate selection bias or other bias in the data?
5. EPA has not updated the average speed distributions in MOVES since MOVES2014. New information, such as the telematics analytics used in the CRC A-100 analysis, "Improvement of Default Inputs for MOVES and SMOKE-MOVES,"¹ may be available in time for inclusion in the next version of MOVES. How important is it to update the national average speed distributions to account for such data?
6. EPA has not updated the geographical allocation of activity since MOVES2014, but it intends to update these allocations when Version 2 of the 2014 National Emission Inventory is available. Are there any concerns about using the new data with the same MOVES2014 approach described in this report?
7. EPA is considering a new approach for estimating heavy-duty source mass and heavy-duty fixed mass factors such that they vary by regulatory class and are more closely linked to the actual mass of the heavy-duty vehicles. Details on the proposal for updating source mass values are provided in Attachment A to this Peer Review Charge. Would the new approach be an improvement for MOVES? Are the proposed data sources and analysis approaches appropriate and reasonable? Are there better data sources or techniques for estimating bus source mass?

¹

See https://crao.org/reports/recentstudies2017/A-100/ERG_FinalReport_CRCA100_28Feb2017.pdf.

ADDITIONAL OVERALL COMMENTS PROVIDED (NOT CHARGE QUESTION-SPECIFIC):
ADDITIONAL COMMENTS BY SPECIFIC REPORT CHAPTER:

3. Schedule

The schedule for this peer review is as follows:

- September 8, 2017 (tentative): Conference call with EPA, ICF, and all reviewers to address any preliminary questions.
- September 25, 2017: Comments/review due to ICF via email (send to Ira.Dassa@icf.com, with a cc to Lindsay.Kirschner@icf.com).

ICF will arrange the teleconference between the reviewers, relevant EPA staff, and ICF. The purpose of this teleconference will be to answer any questions you and the other reviewer may have regarding the EPA peer review process and the particular material you are reviewing. ICF will contact you in advance to assess the best time for you and the other reviewer to participate in the conference call.

Any questions that you have after this teleconference should be directed to ICF, which will then seek resolution from EPA. Any answer provided and the question to which it refers will be shared with the other reviewer.

4. Materials to Submit

Upon completion of your review, please submit the following to ICF:

1. A cover letter that states:
 - Your name; and
 - The name and address of your organization.
2. A completed COI form (attached).
3. Your written comments.

5. Material for Review

The following files are appended:

- *Attachment A to Peer Review Charge.docx*
- *Population and Activity of On-road Vehicles in MOVES201X.docx*
- *COI Form.pdf* (please complete this and submit it with your review)