

**DECLARATION OF DR. DAVE COOKE**

I, Dr. Dave Cooke, declare as follows:

1. I am a senior vehicles analyst in the Clean Vehicles Program at the Union of Concerned Scientists, specializing in light-duty and heavy-duty vehicle fuel economy. I conduct research on greenhouse-gas reducing vehicle technologies and their implications for fuel efficiency and oil consumption across the transportation sector. In the course of my research, I regularly use a number of computational models, including EPA's Optimization Model for Reducing Emissions of Greenhouse gases from Automobiles ("OMEGA"), the Volpe model used by the National Highway Traffic Safety Administration to estimate manufacturer compliance pathways for the Corporate Average Fuel Economy Standards, and EPA's Advanced Light-duty Powertrain and Hybrid Analysis ("ALPHA") model. I am familiar with the OMEGA model interface, and have run several previous versions of the OMEGA model.

2. I received my Ph.D. in condensed matter physics from the University of California, Berkeley. I received my M.S. in physics from the University of California, San Diego and my B.S. in physics from Harvey Mudd College. Before joining the Union of Concerned Scientists, I was a Mirzayan Science and Technology Policy Fellow and associate program officer with the National Academies' National Research Council. My work there focused on automotive technologies, including peer-reviewed consensus studies on the development of advanced technology vehicles by 2050, and pathways and barriers to electric vehicle deployment.

### **EPA's Consumer Choice Model**

3. EPA has published five versions of the OMEGA model on its website.<sup>1</sup> Most recently, in July 2016, EPA released OMEGA version 1.4.56.

4. EPA commissioned the Oak Ridge National Laboratory to develop a consumer choice model for use within the OMEGA model, which was completed in 2012. The consumer choice model was “developed to test the concept of predicting the differential sales impacts of fuel economy changes together with price changes brought about by fuel economy standards.”<sup>2</sup>

5. In 2015, EPA staff performed a validation exercise for the consumer choice model and concluded that it “did not do well” at projecting sales impacts.<sup>3</sup>

6. EPA published information about the consumer choice model beginning in 2012, and EPA made the model itself public through the agency's release of OMEGA version 1.4.56 in 2016. However, EPA has never applied the consumer choice model in OMEGA runs to inform any published EPA analysis.

### **Review of the Consumer Choice Source Code and Inputs**

7. I have reviewed relevant sections of the published source code for version 1.4.56 of the OMEGA model. The source code is the blueprint of the core model, written in the C# programming language.<sup>4</sup> The source code is run through a “compiler” that converts the source

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<sup>1</sup> EPA, Optimization Model for reducing Emissions of Greenhouse Gases from Automobiles (OMEGA), <https://www.epa.gov/regulations-emissions-vehicles-and-engines/optimization-model-reducing-emissions-greenhouse-gases#omega-1.3.1> (last visited May 12, 2019).

<sup>2</sup> Greene, David & Changzheng Liu, *Consumer Vehicle Choice Model Documentation* at 2, Prepared for EPA by Oak Ridge National Laboratory, EPA-420-B-12-052 (Mar. 2012), <https://www.regulations.gov/document?D=EPA-HQ-OAR-2010-0799-11831>.

<sup>3</sup> EPA, *Testing a Model of Consumer Vehicle Purchases: Draft*, at 4, EPA-420-D-15-011 (Dec. 2015).

<sup>4</sup> An excerpt of the source code for version 1.4.56 of the OMEGA model is available in Exhibit K to Plaintiffs' Memorandum (Dkt. 40-11).

code into an executable package, written in machine language that can be read by a computer. The machine language is unreadable to humans.

8. When I open the core OMEGA model to run it, I open a file within the executable package.<sup>5</sup> When I open that file on my computer, the screen appears to me (and any other user) as a simple user interface analogous to using a phone app or computer program. A screen capture of the OMEGA interface is attached as Exhibit A.

9. EPA can make available the executable package, the source code, or both. I do not need access to the source code to run the executable package.

10. The source code for OMEGA version 1.4.56 includes code for the consumer choice model.

11. I have reviewed the published input files for version 1.4.56 of the OMEGA model. These files include inputs for the consumer choice model.

12. I have also reviewed the input files that EPA produced to the Environmental Defense Fund and Natural Resources Defense Council on March 4, 2019, which EPA has stated are part of version 1.4.59 of the OMEGA model. The version 1.4.59 input files contain the same consumer choice inputs that are contained in the version 1.4.56 input files.

13. Accordingly, it is clear that EPA did not update or alter the consumer choice inputs in its most current version of the OMEGA model. The input files accompanying versions 1.4.56 and 1.4.59 utilize the same coefficients of the consumer choice model published by EPA in 2016.<sup>6</sup> Based on my experience with computational modeling tools, the fact that EPA did not

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<sup>5</sup> The executable package contains multiple files, including supporting “.DLL” library files and the “.exe” executable file that opens the OMEGA core model program.

<sup>6</sup> The coefficients of the consumer choice model are found in the “Logit” tab of the Market\*.xls OMEGA input files and are identical to those published by EPA in its analysis of the accuracy of consumer choice models (Table 2, EPA-420-D-15-011).

update the inputs for the consumer choice model over this three-year period strongly suggests that EPA did not update the fundamental behavior or structure of the consumer choice model itself. While EPA may have made changes to the consumer choice model that could make it run more smoothly, from reviewing the available materials I do not believe that EPA has altered the basic operation of the consumer choice model.

14. Furthermore, the input files for versions 1.4.56 and 1.4.59 of the OMEGA model contain an “on/off switch” for the consumer choice model. This switch is located in the Scenario.xls input file.<sup>7</sup> In the Scenario.xls input files for both versions 1.4.56 and 1.4.59, the switch is set to “off.” This indicates that EPA did not use the consumer choice model in 2016, and that EPA is not using the consumer choice model in the current version of OMEGA. Further evidence for EPA’s decision not to use the consumer choice model can be found in the Market\*.xls files. The consumer choice model class is set to zero for all vehicles in the Market\*.xls input files for both versions 1.4.56 and 1.4.59. This means the consumer choice model could not be run without further modification of the inputs.

15. Based on the information EPA has released about the current version of the OMEGA model, version 1.4.59, through the input files; and based on my experiences using this model; it is my opinion that it is highly unlikely that EPA has altered the v1.4.59 core model by changing the consumer choice model that is currently built into the core model’s executable package.

16. EPA Assistant Administrator William Wehrum states in his declaration, at paragraph 19, that “[t]he mere fact of whether or not policy consideration was given to

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<sup>7</sup> In the Scenario.xls file, a user can select the maximum iterations of the consumer choice model. Setting this to zero effectively turns “off” the consumer choice model when the OMEGA model is run.

including” a tool like the consumer choice model “in the current version of the OMEGA model, and the outlines and parameters of any such hypothetical tool,” would “reveal EPA’s pre-decisional thinking.” But as explained above, EPA has already made such considerations public in other documents. Furthermore, all evidence indicates that EPA has not altered the consumer choice inputs or model since 2016.

I declare under penalty of perjury that the foregoing is true and correct.



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Dave Cooke

Dated May 13, 2019  
Washington, DC