

Technical Charge to External Peer Reviewers

Contract 68HE0C18C0001

Work Assignment 4-22

April 2023

External Peer Review of Report: Heavy-Duty Technology Resource Use Case Scenario (HD TRUCS) Tool: Used to analyze HD vehicle energy usage and associated component cost.

ALL WRITTEN COMMENTS ARE DUE TO ERG BY FRIDAY, MAY 19, 2023

BACKGROUND

Within the transportation sector as a whole, onroad vehicles are the predominant source of greenhouse gas (GHG) emissions, principally CO₂ emissions. Heavy-duty (HD) vehicles, 2b/3 incompletes, classes 4-8 vocational vehicles and tractors produce 23% of transportation sector related GHG emissions. As EPA's Office of Transportation and Air Quality continues the regulation of CO₂ and other GHG emission control measures in onroad and nonroad vehicles and equipment, there is likewise a continuing need to evaluate the costs and benefits of any such regulations. As such, EPA has developed its Heavy-Duty Technology Resource Use Case Scenario (HD TRUCS) tool, to facilitate its analysis of the vehicle segment adoption rates via determination of vehicle energy use and associated costs of HD zero-emission vehicles (ZEV), both battery electric (BEV) and fuel cell (FCEV).

The HD TRUCS tool is used to estimate heavy-duty ZEV technology feasibility and adoption rates that are then used to calculate proposed standards for model years (MYs) 2027 through 2032. To conduct the analysis, a flexible spreadsheet-based framework was developed in-house at EPA. It evaluates design features needed to meet the power and energy demands of various heavy-duty conventional vehicles using ZEV technologies, as well as costs related to purchasing and operating conventional and zero-emission vehicles. HD TRUCS defines EPA's understanding of heavy-duty vehicle performance as well as the market, based on data and resources available to EPA as deemed appropriate for regulatory purposes.

In addition to technical feasibility, EPA evaluated costs in 2021 dollars to determine the payback period, or the number of years it would take to offset any upfront cost increase with the difference in operating costs between an internal combustion engine (ICE) vehicle and each ZEV equivalent. Cost estimates were applied to each vehicle component based on sizing to assess the difference in total powertrain costs between the ICE and ZEV powertrains. EPA also compared operating costs due to fuel consumption and maintenance and repair. In addition, EPA considered the costs to install and operate charging infrastructure for BEVs.

REVIEW MATERIALS PROVIDED (focus of this review)

- HD TRUCS Tool (Excel spreadsheet tool)

BACKGROUND MATERIALS

Background materials are provided to assist reviewers throughout the review and are not the focus of this review. You do not need to comment on these materials.

- HD TRUCS Docket memo: Provides a short introduction to the tool.

- Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles: Phase 3: Draft Regulatory Impact analysis (RIA) https://www.epa.gov/system/files/documents/2023-04/420d23001_0.pdf
 - Please see Chapter 2.2.7-HD TRUCS Functionality for a complete overview of the model's functionality, page 204.

GENERAL INSTRUCTIONS

- Read ERG's Letter of Instruction (email).
- Please follow the *Review Guidelines and Formatting Instructions* at the end of this charge.
- Respond to the charge questions using the comment template in Attachment A of this charge.
- Please explain and justify your rationale for your responses to the charge questions.

CHARGE QUESTIONS

In preparing comments, please 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, which would be based on information not readily available to EPA.

Comments should be clear and detailed enough to EPA readers or other parties familiar with the tool to allow a thorough understanding of the comment's relevance to material provided for review. Additionally, EPA requests that the reviewers not release the peer review materials or their comments until the Agency makes its report/cost model and supporting documentation public.

No independent data analysis will be required for this review Instead, EPA is seeking the reviewer's expert opinion on the methodologies, cost inputs of this tool, and whether they are likely to yield an accurate assessment of the true cost of ownership of these vehicles and their subsystems. Reviewers should comment on all aspects of the tool.

Using the comment template provided in Attachment A of this charge, please organize all responses according to the charge questions for each of the two categories listed below.

1. Methodology/Results:

- 1a. Is the methodology documented in the report generally reasonable and likely to yield accurate results? Is any bias likely to be introduced to the results due to methodological issues? If so, please indicate the direction of this bias and potential remedies.
- 1b. Please identify any general flaws inherent in the scope of the tool. Do you feel the results would be altered if the scope were more limited or expanded? Please explain.
- 1c. Are all appropriate inputs for the tool being considered? Conversely, are all inputs considered in the tool appropriate? Please cite any particular inputs or assumptions made by the tool that you feel are inappropriate or likely to bias the results and how they could be remedied, with particular emphasis on sources of information used in determining material prices, manufacturing burdens and other key factors.
- 1d. Are the assumptions embedded in the tool that affect projected cost or performance reasonable? Such assumptions might include learning curve, economies of scale, scaling parameters such as weight and power, material costs, and infrastructure cost.
- 1e. 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 tool inputs.

- 1f. Are the results expected of the tool appropriate for the given scope, assumptions, and inputs? Is appropriate validation made on the costing methodology and results? Please expand on any recommendations that you would make for analyses of tool results.

2. Editorial content:

- 2a. Is sufficient detail provided in the body of the model for a reader familiar with the subject to understand the process and conclusions? Please specify any specific content that you recommend be added or removed.
- 2b. Please comment on any editorial issues that should be addressed in the tool, including any comments on general organization or grammar and wording.