

7. Vehicle Analysis

The Vehicle Technologies Office (VTO) has a comprehensive portfolio of early-stage research to enable industry to accelerate the development and widespread use of a variety of promising sustainable transportation technologies. The research pathways focus on fuel diversification, vehicle efficiency, energy storage, and mobility energy productivity that can improve the overall energy efficiency and efficacy of the transportation or mobility system. VTO leverages the unique capabilities and world-class expertise of the National Laboratory system to develop innovations in electrification, including advanced battery technologies; advanced combustion engines and fuels, including co-optimized systems; advanced materials for lighter-weight vehicle structures; and energy efficient mobility systems. VTO is uniquely positioned to address early-stage challenges due to strategic public-private research partnerships with industry (e.g. U.S. DRIVE, 21st Century Truck Partnership) that leverage relevant expertise. These partnerships prevent duplication of effort, focus DOE research on critical R&D barriers, and accelerate progress. VTO focuses on research that industry does not have the technical capability to undertake on its own, usually due to a high degree of scientific or technical uncertainty, or that is too far from market realization to merit industry resources.

The VTO Analysis (VAN) subprogram supports the planning and execution of technology, economic, and interdisciplinary analyses to inform and prioritize VTO research portfolio planning, including activities such as research target-setting and benefits estimation. VAN supports vehicle data, modeling and simulation, and integrated and applied analysis activities using the unique capabilities, analytical tools, and expertise resident in the U.S. Department of Energy's (DOE) national laboratory system. These activities explore advancements in vehicles and transportation systems and resulting energy impacts to inform early-stage R&D and offer analytical direction for potential and future research investments.

Project Feedback

In this merit review activity, each reviewer was asked to respond to a series of questions, involving multiple-choice responses, expository responses where text comments were requested, and numeric score responses (*on a scale of 1.0 to 4.0*). In the pages that follow, the reviewer responses to each question for each project will be summarized: the multiple choice and numeric score questions will be presented in graph form for each project, and the expository text responses will be summarized in paragraph form for each question. A table presenting the average numeric score for each question for each project is presented below.

Table 7-1 – Project Feedback

Presentation ID	Presentation Title	Principal Investigator (Organization)	Page Number	Approach	Technical Accomplishments	Collaborations	Future Research	Weighted Average
van016	Transportation Data Programs	Stacy Davis (Oak Ridge National Laboratory)	7-4	3.75	3.88	3.75	3.38	3.77
van017	Argonne National Laboratory Vehicle Technologies Office (VTO) Analysis Modeling Program	Michael Wang (Argonne National Laboratory)	7-8	3.50	3.63	3.25	3.50	3.53
van018	Light-Duty Vehicle Choice Modeling and Transportation Decarbonization Analysis	Aaron Brooker (National Renewable Energy Laboratory)	7-12	3.75	3.75	3.38	3.38	3.66
van023	Assessing Energy and Cost Impact of Advanced Vehicle Technologies	Ram Vijayagopal (Argonne National Laboratory)	7-16	3.88	3.63	4.00	3.75	3.75
van032	Tracking the Evolution of Electric Vehicles and New Mobility Technology	Joann Zhou (Argonne National Laboratory)	7-20	3.63	3.50	3.00	3.63	3.48
van033	Transportation Macroeconomic Accounting Models: Vision and Non-Light Duty Energy and Greenhouse Gas (GHG) Emissions Accounting Tool (NEAT)	Joann Zhou (Argonne National Laboratory)	7-24	3.88	3.63	3.38	3.63	3.66

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van044	Micromobility Screening for City Opportunities Online Tool	Don McKenzie (University of Washington)	7-28	3.50	3.50	2.38	3.38	3.34
van045	Analysis of Electric Heavy-Duty Driving and Infrastructure Requirements Within A Regional Area	Marcus Alexander (EPRI)	7-32	3.13	3.00	3.63	3.00	3.11
van046	EVI-Equity	D-Y Lee (National Renewable Energy Laboratory)	7-36	3.50	3.75	3.38	3.38	3.59
van047	Integrated Modeling and Technoeconomic Assessment of Electric Vehicle Community Charging Hubs	Eleftheria Kontou (University of Illinois)	7-40	3.75	3.63	3.50	3.38	3.61
van048	Heavy-Duty Electric Vehicle Integration and Implementation (HEVII) Tool	William Northrop (University of Minnesota)	7-44	3.75	3.75	4.00	3.38	3.73
Overall Average				3.64	3.60	3.42	3.43	3.57

Presentation Number: van016
Presentation Title: Transportation Data Programs
Principal Investigator: Stacy Davis, Oak Ridge National Laboratory

Presenter

Stacy Davis, ORNL

Reviewer Sample Size

A total of four reviewers evaluated this project.

Project Relevance and Resources

100% of reviewers felt that the project was relevant to current DOE objectives, 0% of reviewers felt that the project was not relevant, and 0% of reviewers did not indicate an answer. 75% of reviewers felt that the resources were sufficient, 25% of reviewers felt that the resources were insufficient, 0% of reviewers felt that the resources were excessive, and 0% of reviewers did not indicate an answer.

Question 1: Approach to Performing the Work: Is the project well designed, and is the timeline reasonably planned?

Reviewer 1

The reviewer declared that the project, including the timeline, is well designed, as it has been for a number of years. Stacy and the team at Oak Ridge National Laboratory (ORNL) have successfully maintained and updated the Transportation Energy Data Book (TEDB), and published Facts of the Week, for many years using a similar approach.

Reviewer 2

The reviewer thought that it would be interesting to understand in the longer term if there are opportunities to streamline or automate the connection of the TEDB and other government related data source (Federal Reserve Economic Data, Energy Information Administration [EIA], U.S. Environmental Protection Agency [EPA], etc.). The reviewer asked if further investment would be worthwhile to create more of a living data ecosystem.

Reviewer 3

The reviewer mentioned that this project is an ongoing data collection and compilation project, using source data from many sources, including other agencies and, when available, surveys. The reviewer added that while some data is dependent on other funding (e.g., for Vehicle Inventory and Use Survey [VIUS] funding), more methods for identifying outdated data to target for additional study are a bit ad hoc and could be more systematized. The reviewer concluded by saying that the process for finding and cleaning the data still seems to be fairly labor-intensive and requires a significant amount of staff time.

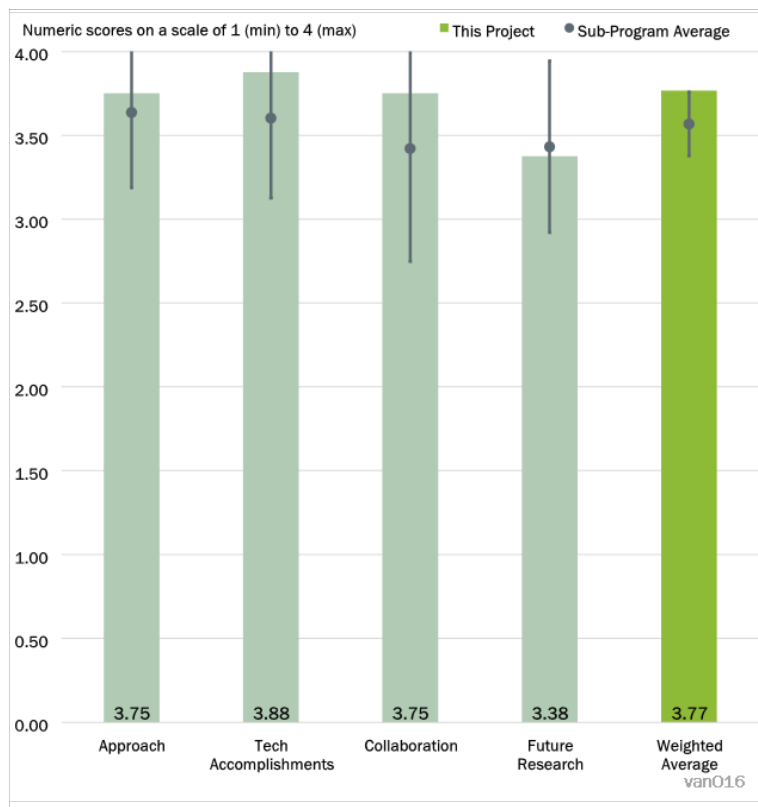


Figure 7-1 - Presentation Number: van016 Presentation Title: Transportation Data Programs Principal Investigator: Stacy Davis, Oak Ridge National Laboratory

Reviewer 4

The reviewer had no specific comments here.

Question 2: *Technical Accomplishments and Progress: Comments on the technical progress that has been made compared to project plan.*

Reviewer 1

The reviewer mentioned that the TEDB has been updated as planned in the approach (PDF and Excel online, updated with current data between editions), and that the Transportation Fact of the Week has been selected, written, and published all year (the reviewer noted receiving the emails). The reviewer added that the team collaborated to update light-duty vehicle (LDV) scrappage rates and help finalize the 2021 VIUS questionnaire, which are not part of regular TEDB or Fact of the Week (FOTW) updates. The reviewer stated that both the TEDB and Fact of the Week appear to maintain a wide audience (50k/year for TEDB, FOTW accounted for half of all VTO site pageviews in 2022), which is great!

Reviewer 2

The reviewer noted that project milestones for the Data Book are generally on schedule (pending some data availability), and that the Facts of the Week were consistently delivered.

Reviewer 3

The reviewer made no specific comments here.

Reviewer 4

The reviewer stated that data science is advancing rapidly, particularly with the integration of artificial intelligence algorithms for data processing. The reviewer said that, based on the merit review presentation, it seems like a lot of the data processing and management methods used for this project are quite manual. The reviewer added that this does contribute to data accessibility in the final product, but that it does not necessarily provide an efficient method for data collection and collation.

Question 3: *Collaboration and Coordination Across Project Team: Are there specific contributions made by industry, national laboratories, or other external entities? Are there areas where more collaboration is needed?*

Reviewer 1

The reviewer noted that the project has good collaboration with other labs and projects within the broader VTO portfolio, in both providing data and highlighting other work through the FOTW.

Reviewer 2

The reviewer stated that the ORNL team works closely with the public/private entities that provide data for the TEDB, and with VTO and the national labs for FOTW. The reviewer mentioned that these are key stakeholders for both products.

Reviewer 3

The reviewer declared that it's clear that this team collaborates closely with many other teams in the VTO to ensure that the data required by the overall team is made available in a consistent manner on an annual basis.

Reviewer 4

The reviewer mentioned that the discussion on how collaborations are decided on or not, for expanding the data book, could be improved. The reviewer asked how new data points and partner options are prioritized

when funding becomes available. The reviewer additionally asked if it is merely serendipitous, or if the presenter has a list of points to expand and a process to evaluate how to do that.

Question 4: *Proposed Future Research: Has the project clearly defined a purpose for future work? To what extent will future work likely achieve its targets?*

Reviewer 1

The reviewer mentioned that the future research for this project includes continued updating of the TEDB and publication of the FOTW, in addition to streamlining and adding new data where possible. The reviewer said that this is exactly what users (including VTO) will need—updated data to feed their modeling and analysis efforts.

Reviewer 2

The reviewer stated that the future work focused on continuing to make regular updates, expanding the topics covered (including metrics of transportation access for underserved populations), and using more application programming interface (APIs) from other sources to automate the data collection process. The reviewer thought that the use of APIs will be helpful for streamlining some of the data collection process, especially from sources that are updated frequently. The reviewer added that other scripts could also help with data collection and formatting from other sources that are used consistently but may not have an API.

Reviewer 3

The reviewer noted that it is clear that commercial vehicle, off road applications, and underserved populations are foci for the VTO in the coming years. The reviewer thought that there would also be some value in automating data collection and collation processes more where available.

Reviewer 4

The reviewer was interested in more information on how the presenter prioritizes and decides what information will be included in future versions of the data book. The reviewer asked how the team prioritizes existing and potential data points that could be published.

Question 5: *Relevance: Does the project support the overall VTO subprogram objectives?*

Reviewer 1

The reviewer stated that the project provides foundational data for many of the other VTO programs through the Data Book, and that it highlights ongoing work through the FOTW.

Reviewer 2

The reviewer noted that this project strongly aligns with the first VTO Analysis objective: Create and maintain a strong foundation of data.

Reviewer 3

The reviewer declared that the TEDB provides a consistent and trustworthy transportation data set for government, commercial, and educational organizations. The reviewer said that the further expansion to include more information about medium-duty (MD)/heavy-duty vehicles (HDVs), off-road applications, and underserved populations will enhance the availability of public data for the study of transportation.

Reviewer 4

The reviewer mentioned that the Data Book is clearly useful to both government agencies as well as academia, industry and the public. The reviewer added that good official data on roadway fleet, travel demand and energy

use is vital to many projects and that without this effort it would be scattered across many different sources, or not publicly available.

Question 6: Resources: Are the resources sufficient for the project to achieve the stated milestones in a timely fashion?

Reviewer 1

The reviewer noted that the resources are sufficient, and that Stacy and team have a long record of completing this work in a timely fashion.

Reviewer 2

The reviewer stated that the resources are sufficient to support staff to produce the Data Book and FOTW. The reviewer mentioned that it is somewhat unclear how much additional support is necessary to do deeper dives (perhaps in collaboration) with difficult-to-collect data that needs updates and does not get funded through other agencies.

Reviewer 3

The reviewer said that it would be good to see a slight bump in resources to automate a bit more of the data management.

Reviewer 4

The reviewer declared that the presenters noted that funding was a major limitation to expanding the Data Book's expansion and maintenance. The reviewer added that this is one of those projects where this will likely always be true and that the U.S. Department of Transportation/VTO must make a decision on how expansive it needs to be. The reviewer and other colleagues still have issues finding data that they know federal and local agencies collect, which would fit in the Data Book, so the reviewer knows that there would be demand for expansion here.

Presentation Number: van017
Presentation Title: Argonne National Laboratory Vehicle Technologies Office (VTO) Analysis Modeling Program
Principal Investigator: Michael Wang, Argonne National Laboratory

Presenter

Michael Wang, ANL

Reviewer Sample Size

A total of four reviewers evaluated this project.

Project Relevance and Resources

100% of reviewers felt that the project was relevant to current DOE objectives, 0% of reviewers felt that the project was not relevant, and 0% of reviewers did not indicate an answer. 100% of reviewers felt that the resources were sufficient, 0% of reviewers felt that the resources were insufficient, 0% of reviewers felt that the resources were excessive, and 0% of reviewers did not indicate an answer.

Question 1: Approach to Performing the Work: Is the project well designed, and is the timeline reasonably planned?

Reviewer 1

The reviewer stated that this project is well structured and that it is addressing the technical barriers as identified.

Reviewer 2

The reviewer mentioned that the model is updated regularly with new information for vehicle information and assumptions about the life cycle impacts of input materials and energy. The reviewer added that the move to have monthly estimates of grid greenhouse gas (GHG) and criteria air pollutant impacts based on energy consumption, rather than generation mix, is good, although some additional time resolution may be important, especially as electric vehicle charging becomes a larger proportion of energy consumption. The reviewer stated that utilizing the Battery Performance and Cost (BatPaC) model as a resource for battery chemistry information is a good strategy, although it's unclear whether there's any additional study to try and assess how different manufacturers select battery materials, and the overall impact that would have on some of the fleet-wide studies at the state or national level. The reviewer thinks that the strategy of not being a grid capacity expansion model to try and predict future emissions is a good approach, and that there are other models (several from the National Renewable Energy Laboratory [NREL] outside of the VTO portfolio that may be helpful if the team wanted to examine future grid emissions scenarios.

Reviewer 3

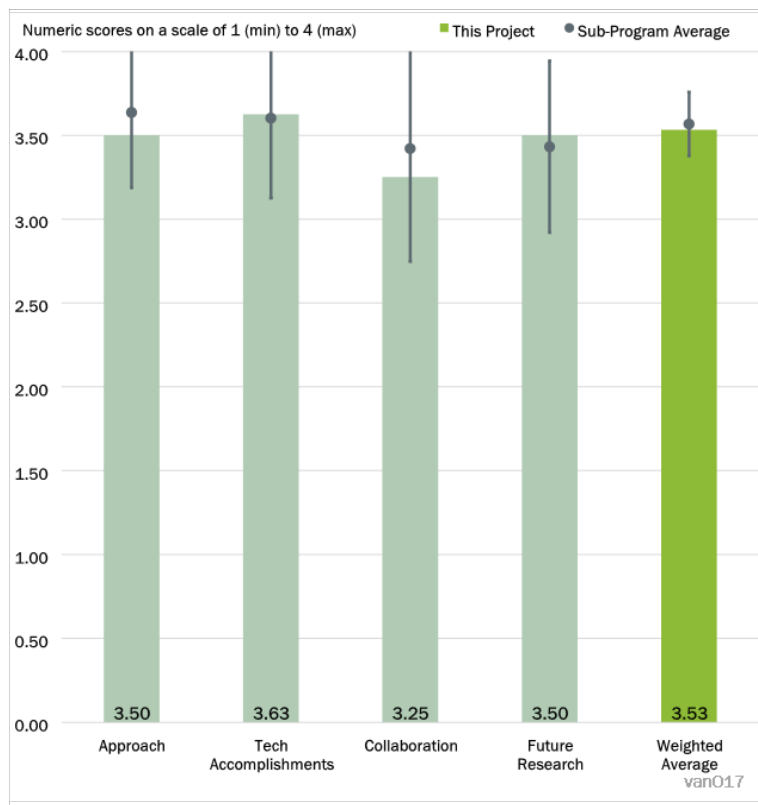


Figure 7-2 - Presentation Number: van017 Presentation Title: Argonne National Laboratory Vehicle Technologies Office (VTO) Analysis Modeling Program Principal Investigator: Michael Wang, Argonne National Laboratory

The reviewer noted that GREET aims to overcome the listed technical barriers: inconsistent data, assumptions, and guidelines; lack of indicators/methodology for evaluating environmental sustainability; need for evaluation of energy/emissions benefits of vehicle/fuel systems. The reviewer added that the approach for this specific project (van017, 2019-2022) helps expand GREET's ability to overcome these barriers, particularly with respect to freight trucks and vehicle electrification. The reviewer said that the data availability and quality issue should be presented in more depth, and that this model is clearly extremely detailed, and there are a large number of assumptions required to impute missing data. The reviewer concludes that the timeline seems to have been reasonably planned, since the milestones have all been either met or are on track.

Reviewer 4

The reviewer declared that a larger discussion on the consistency and transparency aspects of this project would be helpful. The reviewer is still not certain how the team plans to square all the different input life-cycle analysis (LCA) components with each other in GREET.

Question 2: Technical Accomplishments and Progress: Comments on the technical progress that has been made compared to project plan.

Reviewer 1

The reviewer mentioned that the regular updates of the model (yearly) are on schedule, and that the model has been expanded to cover MD/HDV.

Reviewer 2

The reviewer stated that the project appears to be on time and on schedule to deliver as planned. The reviewer added that the remaining challenges are well defined.

Reviewer 3

The reviewer made no specific comments.

Reviewer 4

The reviewer said that expanding GREET to include MD/HDVs (and to compare their well-to-wheel emissions) was successful, with significant detail, but the final result metrics are reported on a per-mile basis. The reviewer added that a per-ton-mile metric would more accurately show emissions per unit of work, and that battery electric vehicles (BEVs) (particularly for Class 8 long haul) will likely produce less work (payload-ton-movement) per mile than the equivalent internal combustion engine (ICE). The reviewer also questioned what the assumed battery size was. The reviewer mentioned that the cradle-to-grave analysis and annual GREET model publication are both either completed or on-track for completion.

Question 3: Collaboration and Coordination Across Project Team: Are there specific contributions made by industry, national laboratories, or other external entities? Are there areas where more collaboration is needed?

Reviewer 1

The reviewer stated that the project makes good use of collaborations with other labs, universities, and trade organizations to source information for the model.

Reviewer 2

The reviewer said that there was close collaboration with other VTO teams, government organizations, academic institutions and industry groups.

Reviewer 3

The reviewer noted that the collaboration was excellent for the light-duty vehicle and grid work, but that there was not much collaboration on the MD/HDV side of the analysis.

Reviewer 4

The reviewer recommended a larger discussion about verification of appropriate, and consistency of provided input data, and how similarity is verified. The reviewer noted that the team works with, or uses data from, many different actors here and it identifies consistency and quality of this data as a problem. The reviewer suggested going further in putting forward a plan to address this.

Question 4: Proposed Future Research: Has the project clearly defined a purpose for future work? To what extent will future work likely achieve its targets?

Reviewer 1

The reviewer declared that future work appears to be achievable and relevant to further overcoming the stated barriers.

Reviewer 2

The reviewer noted a clear plan for future work.

Reviewer 3

The reviewer remarked that the proposed work includes continuing to update existing models, and expanding the MD/HDV models. The reviewer suggested considering including some other non-highway (but still on-ground) vehicles if that aligns with other VTO priorities. The reviewer didn't know that this is the best program to address techno-economic issues (it was listed as a "challenge"). The reviewer added that including other pollutants besides CAP and GHG would be helpful when assessing the equity considerations associated with different transportation technologies and their production.

Reviewer 4

The reviewer said that GREET is a very complex project and perfecting it will always be limited by resources. The reviewer declared that while the presenters explain what they plan to do next, this type of continuous project would benefit from a larger discussion on how improvements and fixes are identified and prioritized.

Question 5: Relevance: Does the project support the overall VTO subprogram objectives?

Reviewer 1

The reviewer said that the project provides a consistent resource in evaluating the GHG emissions and other key pollutant and resource consumption impacts of different VTO programs.

Reviewer 2

The reviewer mentioned that the project directly supports the VTO Analysis Program goals by supporting quantitative assessment of vehicle and mobility technology impacts.

Reviewer 3

The reviewer noted that it's relevant across subprograms.

Reviewer 4

The reviewer noted that this is a vital tool, with few publicly accessible or modular alternatives. The reviewer added that the improvements can be expected to greatly improve this tool.

Question 6: Resources: Are the resources sufficient for the project to achieve the stated milestones in a timely fashion?

Reviewer 1

The reviewer stated that funding levels were sufficient for maintaining and continuing to expand the current model scope.

Reviewer 2

The reviewer noted that the resources seemed sufficient.

Reviewer 3

The reviewer said that the resources appear to be sufficient.

Reviewer 4

The reviewer made no specific comment.

Presentation Number: van018
Presentation Title: Light-Duty Vehicle Choice Modeling and Transportation Decarbonization Analysis
Principal Investigator: Aaron Brooker, National Renewable Energy Laboratory

Presenter

Aaron Brooker, NREL

Reviewer Sample Size

A total of four reviewers evaluated this project.

Project Relevance and Resources

100% of reviewers felt that the project was relevant to current DOE objectives, 0% of reviewers felt that the project was not relevant, and 0% of reviewers did not indicate an answer. 100% of reviewers felt that the resources were sufficient, 0% of reviewers felt that the resources were insufficient, 0% of reviewers felt that the resources were excessive, and 0% of reviewers did not indicate an answer.

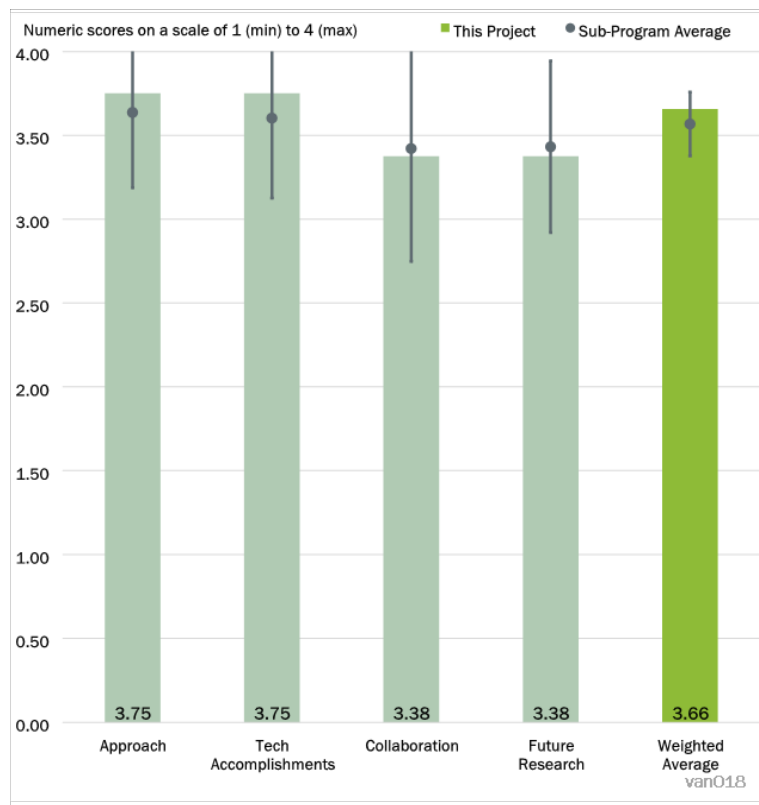


Figure 7-3 - Presentation Number: van018 Presentation Title: Light-Duty Vehicle Choice Modeling and Transportation Decarbonization Analysis Principal Investigator: Aaron Brooker, National Renewable Energy Laboratory

Question 1: Approach to Performing the Work: Is the project well designed, and is the timeline reasonably planned?

Reviewer 1

The reviewer declared that the project is well designed and the timeline is reasonable (the team has already met most of the planned milestones). The reviewer added that the work so far—implementing decarbonization technology pathways in Automotive Deployment Options Projection Tool (ADOPT)—directly addresses the stated barrier, specifically an exploration of how VTO’s decarbonization-related technologies might play out in the market. The reviewer added that using ADOPT (as opposed to a different or new modeling framework) is reasonable given the extensive validation against real-world market outcomes.

Reviewer 2

The reviewer said that the approach seemed reasonable.

Reviewer 3

The reviewer made no specific comments.

Reviewer 4

The reviewer stated that the project has incorporated other recent policy changes and targets to provide insight into potential impacts of these programs. The reviewer added that technology models informed by specific programs (e.g., batteries and fuel cells) are a positive step, although the reviewer was not sure about the price

vs. cost assumptions, especially as original equipment manufacturers (OEMs) are playing a more active role in funding the construction of manufacturing facilities for these inputs (batteries especially), and may be able to negotiate better terms than a standard 1.5x fixed profit margin). The reviewer suggested that it may also be worth discussing some additional negative feedback loops on battery size: as the range continues to increase, there are also negative implications because of available battery materials, and a market-wide shift to even longer-range vehicles may exacerbate material costs beyond the more temporary price fluctuations that we've seen recently.

Question 2: Technical Accomplishments and Progress: Comments on the technical progress that has been made compared to project plan.

Reviewer 1

The reviewer stated that the project continues to make routine updates based on vehicle projections and inputs like fuel/material costs, and has successfully implemented multiple incentive policy scenarios. The reviewer added that the tool is able to estimate sales by household income, although other Diversity, Equity, Inclusion and Accessibility (DEIA) metrics are lacking.

Reviewer 2

The reviewer said that the team has accomplished a number of model improvements, both methodological (changing LDV market offerings by income bin) as well as policy-related (new corporate average fuel economy [CAFÉ], new pending BEV incentives). The reviewer specified that the former is a great way to further align the model output with BEV market reality (BEV manufacturer's suggested retail price is ~40% higher than conventional ICEs, and therefore are primarily purchased by those in higher income brackets). The reviewer added that the updated key assumptions seem reasonable. The reviewer had a hard time believing sub-¢0.20 electricity prices through 2050, particularly in scenarios where BEVs take large portions of the LDV market and lower-income and other non-single-family-home-owning folks have EVs and have to charge publicly. The reviewer understood that this is likely pulled directly from EIA's Annual Energy Outlook (AEO), but suggested that it would be helpful to explore the sensitivity of the model to electricity price. The reviewer concluded that overall, it looks like the team explored a wide range of scenarios, which is great!

Reviewer 3

The reviewer mentioned that the approach appears to be robust to analyze future scenarios. The reviewer added that final reports could likely use a little more explanation as to how various scenarios are selected.

Reviewer 4

The reviewer made no specific comments.

Question 3: Collaboration and Coordination Across Project Team: Are there specific contributions made by industry, national laboratories, or other external entities? Are there areas where more collaboration is needed?

Reviewer 1

The reviewer said the day-to-day project work is led by the NREL team, although other program managers/offices provide feedback regarding cost and performance targets of electrification technologies.

Reviewer 2

The reviewer stated that the work is all done by NREL, although there was a significant amount of DOE inter-office coordination and collaboration required to develop and agree on the modeling assumptions.

Reviewer 3

The reviewer noted that there appears to be good coordination within DOE, but that there may be a bit more opportunity for collaboration with external organizations/educational institutions, particularly on the development and rationale of scenario options.

Reviewer 4

The reviewer made no specific comments.

Question 4: Proposed Future Research: Has the project clearly defined a purpose for future work? To what extent will future work likely achieve its targets?

Reviewer 1

The reviewer stated that the future work is clearly defined and aligns with both VAN and wider VTO goals, including the Justice40 initiative. The reviewer added that the principal investigator (PI) also included regular annual updates in the proposed future research, which will enable ADOPT to stay up-to-date with the latest market developments.

Reviewer 2

The reviewer said that the proposed work for continuing/updating existing model capabilities is on track, and did not think there are any “missing” technologies at the passenger vehicle level that are missing from the technology basket; however, the plan for expanding the DEIA metrics is a bit lacking. The reviewer asked if there was any geospatial consideration within the model. The reviewer added that while there was agreement between the ADOPT predictions and actual vehicle sales by income, ADOPT tended to over-estimate sales in the highest income bracket, while states with large electric vehicle (EV) markets have made some efforts at income-based incentives for EV adoption (California being the largest). The reviewer asked what other metrics included in the model already have DEIA implications.

Reviewer 3

The reviewer noted that the proposed future research is aligned with other VTO light vehicle initiatives, with gained focus on DEIA expansion. It was not clear to the reviewer if there is any intent to be able to do similar scenario evaluation with more commercial applications in the MD/HDV space and off road.

Reviewer 4

The reviewer made no specific comments.

Question 5: Relevance: Does the project support the overall VTO subprogram objectives?

Reviewer 1

The reviewer said that estimating trends in the passenger vehicle market is important, and that the model has done a good job interfacing with other programs to show how technology improvement in the DOE portfolio can have an impact.

Reviewer 2

The reviewer declared that the project directly supports all of the VAN goals, particularly Assist VTO in prioritizing technology investments and inform research portfolio planning; and Support quantitative assessment of vehicle and mobility technology impacts.

Reviewer 3

The reviewer mentioned that the subprogram objectives are supported.

Reviewer 4

The reviewer stated that this project does seem more single purpose than the other projects.

Question 6: Resources: Are the resources sufficient for the project to achieve the stated milestones in a timely fashion?

Reviewer 1

The reviewer stated that the project resources are sufficient for maintaining a team to conduct routine updates (although potentially integrating more data through the EIA API for AEO updates may speed up the process and allow more time for implementing policy considerations/other new technologies/DEIA considerations).

Reviewer 2

The reviewer said that NREL, and specifically Aaron Brooker, have been working on developing and maintaining ADOPT for a long time now. The reviewer added that they appear to be fully capable of achieving the stated milestones (as they have done so far).

Reviewer 3

The reviewer noted that the resources appear to be sufficient, and that the project appears to be on-time, on-budget.

Reviewer 4

The reviewer made no specific comments.

Presentation Number: van023
Presentation Title: Assessing Energy and Cost Impact of Advanced Vehicle Technologies
Principal Investigator: Ram Vijayagopal, Argonne National Laboratory

Presenter

Ram Vijayagopal, Argonne National Laboratory

Reviewer Sample Size

A total of four reviewers evaluated this project.

Project Relevance and Resources

100% of reviewers felt that the project was relevant to current DOE objectives, 0% of reviewers felt that the project was not relevant, and 0% of reviewers did not indicate an answer. 100% of reviewers felt that the resources were sufficient, 0% of reviewers felt that the resources were insufficient, 0% of reviewers felt that the resources were excessive, and 0% of reviewers did not indicate an answer.

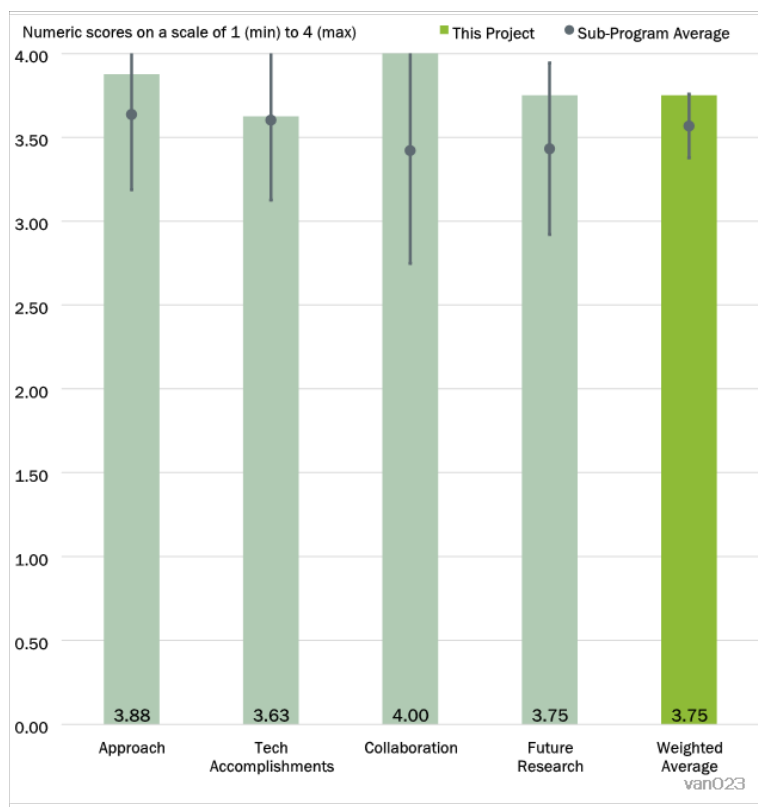


Figure 7-4 - Presentation Number: van023 Presentation Title: Assessing Energy and Cost Impact of Advanced Vehicle Technologies Principal Investigator: Ram Vijayagopal, Argonne National Laboratory

Question 1: Approach to Performing the Work: Is the project well designed, and is the timeline reasonably planned?

Reviewer 1

The reviewer mentioned that this project specifically addresses a key VTO barrier: determining whether the research portfolio will achieve the broader goals of the office. The reviewer noted that it addresses this barrier by implementing the new technology targets (cost and performance) into Autonomie to determine impacts on vehicle operations (energy, total cost of ownership (TCO), price). The reviewer concluded that the project is well-defined and the timeline, while packed full, will likely be met based on progress to date.

Reviewer 2

The reviewer stated that the data management and use of high performance computing (HPC) for the Autonomie model is excellent, especially when there are so many possible technical pathways to vehicles with similar performance characteristics. The reviewer added that the use of spreadsheets for the BEAN tool makes sense, especially to serve as an easily-accessible solution, however there may need to be some additional barriers or warnings within such a tool, especially if users are able to input parameter values that are well outside of the range of inputs included in the post-processed dataset.

Reviewer 3

The reviewer declared that the approach appears to be sound with respect to how the tools evaluate cost and technology implication, but that at the same time the scenarios evaluated and presented rely on some assumptions that may not hold. The reviewer pointed to, for example, the following assumptions: 1) powertrain cost reductions for battery electric vehicles are passed down directly from the OEM to the consumer, 2) powertrain cost reductions are not offset by the addition of further vehicle content (connected, advanced driver-assistance system (ADAS), infotainment, comfort/trim, etc...), and 3) consumer vehicle purchase decisions are more economic than emotional. The reviewer concluded that while these types of externalities are impossible to fully capture in any analysis, with final reporting they should be addressed more explicitly than in the AMR presentation where there potentially was no time.

Reviewer 4

The reviewer made no specific comments.

Question 2: Technical Accomplishments and Progress: Comments on the technical progress that has been made compared to project plan.

Reviewer 1

The reviewer stated that the passenger vehicle market and technology combinations continue to be well represented, and the number of MD/HDVs included has been greatly expanded. The reviewer added that the BEAN model was released to provide easier access to compiled results, although the spreadsheet could be refined to provide a bit more user guidance when values entered are outside of the modeled input values.

Reviewer 2

The reviewer said that the team completed a report for all LD/MD/HDV classes and deployed the new BEAN tool to enable stakeholders to adjust assumptions and develop their own scenarios. The reviewer noted that the former is a large task on its own, and that the latter is a significant contribution to making the overall analysis more transparent. The reviewer recommended that the team should strongly consider using a different electricity cost for EVs (sub-¢0.20 /kWh through 2050 seems optimistic), as this has a significant impact on the TCO and payback calculations. The reviewer emphasized that the team did an excellent job making this entire framework more accessible and “open-source”. The reviewer said that the timing of the model updates is a little ambiguous. The reviewer explained that the team significantly expanded the number of vehicle and powertrain permutations that are being modeled, but that it wasn’t clear that this was a VAN023 accomplishment. The reviewer added that the only comparison is to 2016, which long predates the project. The reviewer asked if the expansion from 2,600 to 12,000, and from 5 LDV classes to 30 LD/MD/HDV classes was completed as part of this project or before this project.

Reviewer 3

The reviewer noted that the technical approach is sound.

Reviewer 4

The reviewer made no specific comments.

Question 3: Collaboration and Coordination Across Project Team: Are there specific contributions made by industry, national laboratories, or other external entities? Are there areas where more collaboration is needed?

Reviewer 1

The reviewer said that the project team is well-integrated with other teams for gathering the vehicle efficiency technology cost/performance data, and communicates with relevant stakeholders to ensure that the most relevant metrics are included as output metrics within public-facing tools.

Reviewer 2

The reviewer highlighted that the team works with a wide range of stakeholders to generate the input assumptions for this modeling work. The reviewer acknowledged that it isn't easy to corral and synthesize all of the recommendations from the diverse crowd, and emphasized the great work done.

Reviewer 3

The reviewer noted the excellent collaboration with public and private partners.

Reviewer 4

The reviewer declared that the presenters gave a thorough discussion of what they got from collaborators and how they got potential user input on how the product should be used.

Question 4: Proposed Future Research: Has the project clearly defined a purpose for future work? To what extent will future work likely achieve its targets?

Reviewer 1

The reviewer stated that the data management and HPC framework is scalable for integrating the additional technologies and vehicle classes. The reviewer added that the BEAN tool can probably be further refined as a spreadsheet-based tool with some “guardrails” to inform users when they are departing from the space modeled in the post-processed data.

Reviewer 2

The reviewer noted that the focus on proposed future research is aligned with the commercial vehicle markets where there are more frequent “rational” customer vehicle decisions based on TCO and application suitability.

Reviewer 3

The reviewer made no specific comments.

Reviewer 4

The reviewer said that future research is wide-ranging and that the team should focus on refining its current on-road model, which will require significant effort just to maintain and keep up to date.

Question 5: Relevance: Does the project support the overall VTO subprogram objectives?

Reviewer 1

The reviewer stated that the project provides useful information about the cost of technologies in the VTO portfolio, and that the Autonomie model is a key tool that uses good data management techniques to rapidly assess the full design space for fuel economy technologies in the passenger vehicle space, with increasing resources for other vehicle categories.

Reviewer 2

The reviewer said that this is specifically relevant to all of VAN's goals: Assist VTO in prioritizing technology investments and inform research portfolio planning; Support quantitative assessment of vehicle and mobility technology impacts; Provide insight into transportation and energy use problems for a broad range of internal and external stakeholders.

Reviewer 3

The reviewer noted that this project provides a methodology to evaluate the potential impact of all other development programs.

Reviewer 4

The reviewer declared that this project should contribute to cost parity work which is vital to long term projects and decision making.

Question 6: Resources: Are the resources sufficient for the project to achieve the stated milestones in a timely fashion?

Reviewer 1

The reviewer said that resources are sufficient to complete the outlined scope of work.

Reviewer 2

The reviewer stated that the ANL team has many years of success developing, maintaining, and improving this modeling framework.

Reviewer 3

The reviewer noted that the project appears to be on time and on budget.

Reviewer 4

The reviewer made no specific comments.

Presentation Number: van032
Presentation Title: Tracking the Evolution of Electric Vehicles and New Mobility Technology
Principal Investigator: Joann Zhou, Argonne National Laboratory

Presenter

Joann Zhou, ANL

Reviewer Sample Size

A total of four reviewers evaluated this project.

Project Relevance and Resources

100% of reviewers felt that the project was relevant to current DOE objectives, 0% of reviewers felt that the project was not relevant, and 0% of reviewers did not indicate an answer. 100% of reviewers felt that the resources were sufficient, 0% of reviewers felt that the resources were insufficient, 0% of reviewers felt that the resources were excessive, and 0% of reviewers did not indicate an answer.

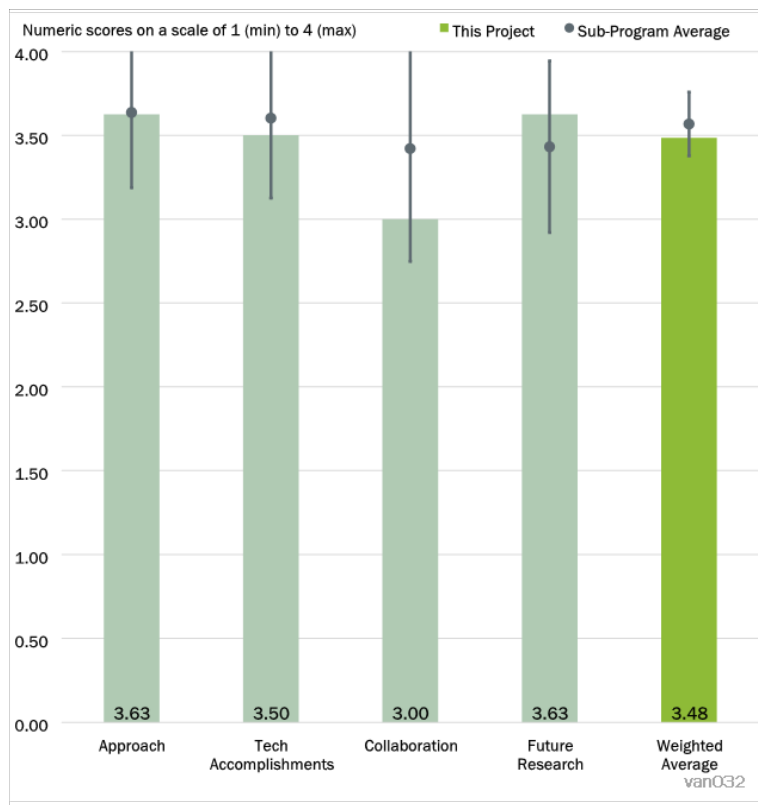


Figure 7-5 - Presentation Number: van032 Presentation Title: Tracking the Evolution of Electric Vehicles and New Mobility Technology Principal Investigator: Joann Zhou, Argonne National Laboratory

Question 1: Approach to Performing the Work: Is the project well designed, and is the timeline reasonably planned?

Reviewer 1

The reviewer stated that the project has expanded the scope to include commercial sales data on EVs, information about the supply chain for electrified vehicle technologies, and has begun to provide analysis for geospatial and equity-based analysis of mobility technology adoption. The reviewer added that while the data format does periodically change over time, any additional post-processing automation would be helpful for cleaning and compiling the data.

Reviewer 2

The reviewer noted that this project aims to address data-related barriers, particularly related to vehicle electrification but also including emerging and advanced mobility, while also addressing what appears to be VTO’s need for ad-hoc analyses to answer internal/external inquiries. The reviewer added that the approach is to append new data to ANL’s historical dataset (back to 1999), and then to leverage the growing dataset for further analysis like tracking trends or estimating energy or emissions impacts. The reviewer mentioned that this is reasonable considering the wide breadth of information collection and analysis the project team aims to complete. The reviewer stated that it would have been helpful if the team included the process for selecting which ad-hoc analyses to complete for VTO. The reviewer acknowledged that these can’t be known ahead of time, but asked how the specific reports or analyses were selected. The reviewer emphasized that since this is a project specifically focused on data, the summary presentation should clearly include the data sources as part

of the approach, even just a single quick slide, i.e., “Sales: Wards Intelligence; Stocks: Experian Automotive; vehicle-miles traveled /vehicle: IHS Polk odometer records; Vehicle specs: OEM fact sheets.”

Reviewer 3

The reviewer mentioned that there is value to the data being collected and the analysis being completed. The reviewer added that it is not clear how the various vehicle technology office data collection initiatives are integrated.

Reviewer 4

The reviewer made no specific comments.

Question 2: Technical Accomplishments and Progress: Comments on the technical progress that has been made compared to project plan.

Reviewer 1

The reviewer said that this project makes use of existing data sources like sales data from Wards, and that data visualization has expanded since previous iterations with the inclusion of Sankey diagrams and geospatial analyses. The reviewer mentioned that it is a bit less clear whether the data used in the figures is available or compiled to be easily downloaded.

Reviewer 2

The reviewer mentioned that the team appears to have successfully completed monthly data updates and annual reports as planned, along with a few standalone analyses/papers from the resulting findings, and that there are lots of interesting things to pick through. The reviewer recommended that the team provide a range of results for those assumptions that are least vetted and most important. The reviewer asked the following questions: How does ANL estimate sales-weighted range when Ward’s doesn’t include any detail on the trim level of Tesla vehicles and when there is no way to know what share of Model 3, Y, S, or X vehicles were Standard versus Long range? What annual mileage was assumed for BEVs for the gasoline displacement analysis? The reviewer clarified that, regardless of agreements/disagreements with the assumption shown in Figure 1 of the ANL/ESD-21/2 report, it is a key unknown, and should therefore be explicitly stated on freestanding graphics (e.g., “Assumes longer range (250 mi+) BEVs travel about the same mileage as conventional vehicles in a given year”) so that the audience knows this is a potential caveat. The reviewer added that Ward’s is very protective of its data, and asked if ANL actually distributes Ward’s make/model sales to the public. If not, the reviewer recommended that this should be made clear in the slides as well.

Reviewer 3

The reviewer stated that there is still room for improvement on data visualization and “so what” explanations.

Reviewer 4

The reviewer made no specific comments.

Question 3: Collaboration and Coordination Across Project Team: Are there specific contributions made by industry, national laboratories, or other external entities? Are there areas where more collaboration is needed?

Reviewer 1

The reviewer stated that the team has partners at Wards for regular sales data updates, and with city agencies working with mobility data. The reviewer added that some additional collaboration may help to gather more information about vehicle (fast) charging characteristics.

Reviewer 2

The reviewer mentioned that the team collaborates as needed to ensure data is collected in a timely fashion, but that it isn't clear that other non-DOE/lab experts were consulted for review of the analysis reports, "Assessment of Light-Duty Plug-In Electric Vehicles in the United States, 2010–2020," and "Regionally-Resolved Emissions from Electric Vehicles in the United States." The reviewer added that these should be reviewed by outside experts who have already thought through many of these assumptions.

Reviewer 3

The reviewer noted that the presenters provided information on their plans to gather more information from users. The reviewer asked what has been done up till now.

Reviewer 4

The reviewer said that this project and the TEDB seem to have similar objectives. The reviewer noted that it is not clear why these are separate projects with separate investigators. It seemed to the reviewer that there are similarities in the purpose and the execution. The reviewer added that, as with that project, it seems like this project could benefit from automation in data collection, analysis and management.

Question 4: Proposed Future Research: Has the project clearly defined a purpose for future work? To what extent will future work likely achieve its targets?

Reviewer 1

The reviewer said that the proposed future work is basically to continue current work of collecting data, completing monthly/annual reports, and publishing updated analyses based on the latest data. The reviewer added that this is reasonable, and that hopefully it will not require as much effort now that the entire data pipeline and analysis process has been developed and demonstrated.

Reviewer 2

The reviewer noted that future research tracts appear to be reasonable.

Reviewer 3

The reviewer made no specific comments.

Reviewer 4

The reviewer mentioned that the continued work in micromobility trip analysis is well aligned with broader goals around DEI. The reviewer suggested that, on the technical side, the team might consider collecting data on the fast-charging capabilities and protocols for different passenger EVs (<https://insideevs.com/news/514857/mic-tesla-model3-srp-charging/>) and as it becomes available, MD/HD EVs.

Question 5: Relevance: Does the project support the overall VTO subprogram objectives?

Reviewer 1

The reviewer noted that the project provides key foundational datasets for electric vehicle adoption rates and market parameters, and that it has begun to collect and analyze publicly available micromobility data from different cities.

Reviewer 2

The reviewer stated that yes, this project clearly supports the first VTO Analysis Program objective of creating and maintaining a strong foundation of data.

Reviewer 3

The reviewer mentioned that this project is relevant to multiple subprogram objectives.

Reviewer 4

The reviewer made no specific comments.

Question 6: Resources: Are the resources sufficient for the project to achieve the stated milestones in a timely fashion?

Reviewer 1

The reviewer stated that the resources are sufficient to support staff to compile related data and conduct some analysis on micromobility access.

Reviewer 2

The reviewer noted that the resources seem to have been sufficient for this effort of standing up the pipeline and analysis processes and completing the work.

Reviewer 3

The reviewer said that the project appears to be on time and on budget.

Reviewer 4

The reviewer made no specific comments.

Presentation Number: van033
Presentation Title: Transportation Macroeconomic Accounting Models: Vision and Non-Light Duty Energy and Greenhouse Gas (GHG) Emissions Accounting Tool (NEAT)
Principal Investigator: Joann Zhou, Argonne National Laboratory

Presenter

Joann Zhou, ANL

Reviewer Sample Size

A total of four reviewers evaluated this project.

Project Relevance and Resources

100% of reviewers felt that the project was relevant to current DOE objectives, 0% of reviewers felt that the project was not relevant, and 0% of reviewers did not indicate an answer. 100% of reviewers felt that the resources were sufficient, 0% of reviewers felt that the resources were insufficient, 0% of reviewers felt that the resources were excessive, and 0% of reviewers did not indicate an answer.

Question 1: Approach to Performing the Work: Is the project well designed, and is the timeline reasonably planned?

Reviewer 1

The reviewer noted that the project has continued to update the technologies considered, including more heavy-duty vehicles. The reviewer added that the partnerships with other projects with relevant data on electricity and vehicle emissions are incorporated. The reviewer mentioned that the geospatial analysis includes large metro vs. other areas, which is important for providing future insight into the disparities in low-carbon transportation systems.

Reviewer 2

The reviewer stated that the approach is to update, maintain, and apply ANL’s VISION/NEAT modeling framework to evaluate environmental sustainability, energy benefits, and emissions benefits of vehicle/fuel systems. The reviewer added that this requires overcoming—or even just working with—inconsistent data, assumptions, and guidelines, given the realities of the available datasets, stakeholders, and policies. The reviewer noted that a key piece of the approach is to calibrate the models to EIA AEO projections, thereby ensuring top-line consistency with official U.S. government transportation energy projections. The reviewer declared that to bring in emissions, the team planned to use Cambium and GREET. The reviewer concluded that this is a great approach using the best of existing (and often VTO-funded) data and models to feed a model that estimates energy/emissions.

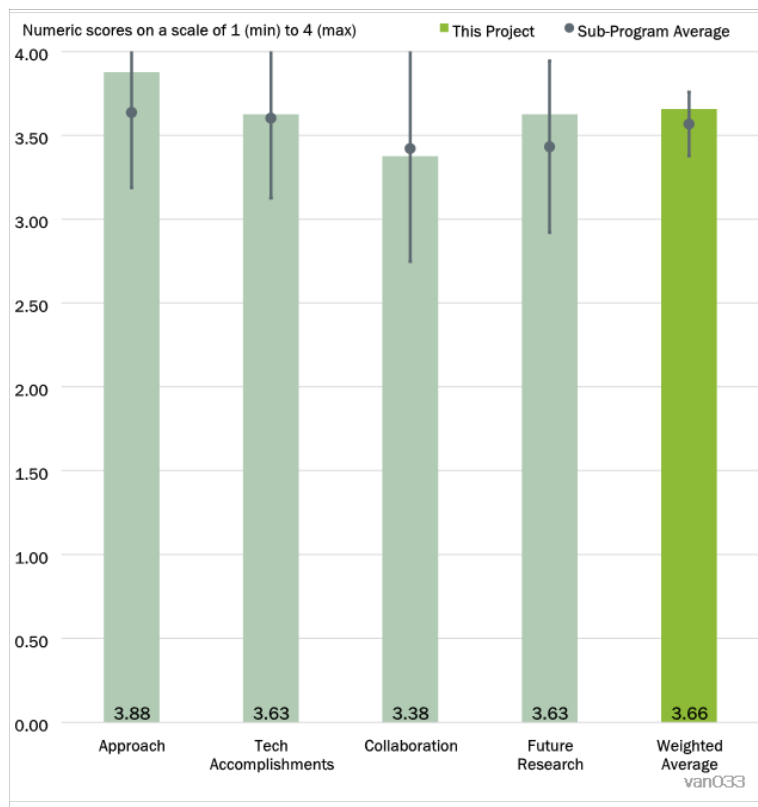


Figure 7-6 - Presentation Number: van033 Presentation Title: Transportation Macroeconomic Accounting Models: Vision and Non-Light Duty Energy and Greenhouse Gas (GHG) Emissions Accounting Tool (NEAT) Principal Investigator: Joann Zhou, Argonne National Laboratory

Reviewer 3

The reviewer mentioned that the model improvements and scenario evaluations are clear and concise. The reviewer suggested that it would be nice if the conclusions from the scenarios evaluated to date were presented a little more clearly in order to be consumable by a broader audience.

Reviewer 4

The reviewer made no specific comments.

Question 2: Technical Accomplishments and Progress: Comments on the technical progress that has been made compared to project plan.

Reviewer 1

The reviewer stated that the project has incorporated more geospatially-resolved data, which is helpful for considering different policy scenarios. The reviewer added that updates for both light- and heavy-duty vehicles have been incorporated.

Reviewer 2

The reviewer stated that this is the first level of evaluation in the VTO analysis program currently capable of including off-road applications.

Reviewer 3

The reviewer made no specific comments.

Reviewer 4

The reviewer declared that the team has successfully achieved its 4 objectives although there were no specific milestones listed: annual VISION/NEAT update, enhancing MD/HDV modeling, LDV upsizing, and regional EV emissions analysis. The reviewer noted that an additional Class 7/8 segment was added to the MD/HDV component to simplify application of EPA/ National Highway Traffic Safety Administration regulations and calibration to the AEO, which is great both for the modelers (likely saves time) and for the results, which now better represent the medium/heavy truck market. The reviewer added that the team completed an analysis of alternative LDV upsizing scenarios, but that it wasn't clear why the team used AEO2020 as the baseline for the analysis, as the last historical year for AEO2020 vehicle attributes was 2017 (stocks: 2018). The reviewer noted that this renders the entire effort out of date and nearly irrelevant given the large changes in the market and in policy (e.g., CAFE). The reviewer explained that AEO2022 may have been "too late" (February 2022), but that AEO2021 (February 2021) was certainly released with enough time for inclusion. The reviewer added that while the team clearly stated this was a scenario analysis, it wasn't clear why they would include scenarios that are implausible. The reviewer stated that those shown on Slide 8 are highly unlikely futures. The reviewer said they assume that manufacturers will migrate a large number of their offerings from unibody (CUVs) to body-on-frame (SUVs), even though consumers clearly prefer unibodies (hence the small share of SUVs which only include body-on-frame in the historical data and future projections). The reviewer clarified that perhaps the other scenarios are plausible, but that the team should have left out any that just don't make sense. The reviewer suggested that it would be good, in the future, to ask EIA to review anything that uses AEO data and projections. The reviewer recommended that the team should more clearly state whether the model was updated or not (language in Slide 6 just says "Models are annually updated, calibrated and released to users").

Question 3: *Collaboration and Coordination Across Project Team: Are there specific contributions made by industry, national laboratories, or other external entities? Are there areas where more collaboration is needed?*

Reviewer 1

The reviewer stated that this project leverages other data from projects at ANL and NREL to provide insight into vehicle-level and grid-level emissions and energy consumption.

Reviewer 2

The reviewer noted excellent collaboration within the team, and that it wasn't clear if there is significant collaboration outside of the national labs/DOE VTO.

Reviewer 3

The reviewer would like more information on collaboration, particularly with users (government, academia, etc.) and data sources. The reviewer asked how the team makes certain that users know how to properly use the model to create useful and correct results, and what happens when a bug is reported.

Reviewer 4

The reviewer noted that the team collaborated with NREL, which has expertise in MD/HDV modeling, and ORNL, which has access to detailed data and the capability to analyze it. The reviewer suggested that the team should consider checking in with EIA at some point in the process, since VISION is an Excel representation of NEMS TRAN components and EIA can let them know what has changed since the previous AEO.

Question 4: *Proposed Future Research: Has the project clearly defined a purpose for future work? To what extent will future work likely achieve its targets?*

Reviewer 1

The reviewer stated that the inclusion of off-road technologies is important as on-road vehicles are beginning to have clearer paths towards decarbonization. The reviewer suggested considering adding ammonia as a potential fuel (or as a hydrogen carrier in pipelines/other shipping), and perhaps some synfuel options for jet fuels.

Reviewer 2

The reviewer said that proposed future research is clearly defined as continuing to update VISION/NEAT and estimating regional emissions while investigating off-road technologies and energy equity. The reviewer added that off-road vehicle data is very limited, so it may be more useful to continue refining VISION/NEAT.

Reviewer 3

The reviewer asked how off-road equipment will be categorized and how potential for decarbonization will be evaluated.

Reviewer 4

The reviewer mentioned that the presenters gave a clear goal and plan to address the issue of regionalism in EV effects, and that this is a clear problem that has been identified by many actors.

Question 5: *Relevance: Does the project support the overall VTO subprogram objectives?*

Reviewer 1

The reviewer said that the project provides a key tool for assessing the impacts of different vehicle adoption patterns, and that it is expanding to include more geospatial resolution, which is a critical piece of information for place-based interventions and improvements in transportation equity.

Reviewer 2

The reviewer stated that this project is relevant to all of the VTO Analysis Program goals and objectives (data, modeling, analysis/insight).

Reviewer 3

The reviewer mentioned that this project supports the subprogram objectives.

Reviewer 4

The reviewer declared that both products are important, not only for government and regulator work, but also for academia and NGOs. The reviewer added that keeping these tools public allows for more effective public engagement on agency actions and that, therefore, these improvements can be expected to deliver improvements to both direct agency work and final outcomes.

Question 6: Resources: Are the resources sufficient for the project to achieve the stated milestones in a timely fashion?

Reviewer 1

The reviewer stated that the project resources are sufficient for updating the existing model and for beginning to expand the technologies included, although the pace at which new off-road technologies are going to be added to the model may justify additional funding given the diversity of technologies and fuels.

Reviewer 2

The reviewer mentioned that the resources seem reasonable.

Reviewer 3

The reviewer noted that the project appears to be on time and on budget.

Reviewer 4

The reviewer made no specific comments.

Presentation Number: van044
Presentation Title: Micromobility Screening for City Opportunities Online Tool
Principal Investigator: Don McKenzie, University of Washington

Presenter

Don McKenzie, University of Washington

Reviewer Sample Size

A total of four reviewers evaluated this project.

Project Relevance and Resources

100% of reviewers felt that the project was relevant to current DOE objectives, 0% of reviewers felt that the project was not relevant, and 0% of reviewers did not indicate an answer. 75% of reviewers felt that the resources were sufficient, 25% of reviewers felt that the resources were insufficient, 0% of reviewers felt that the resources were excessive, and 0% of reviewers did not indicate an answer.

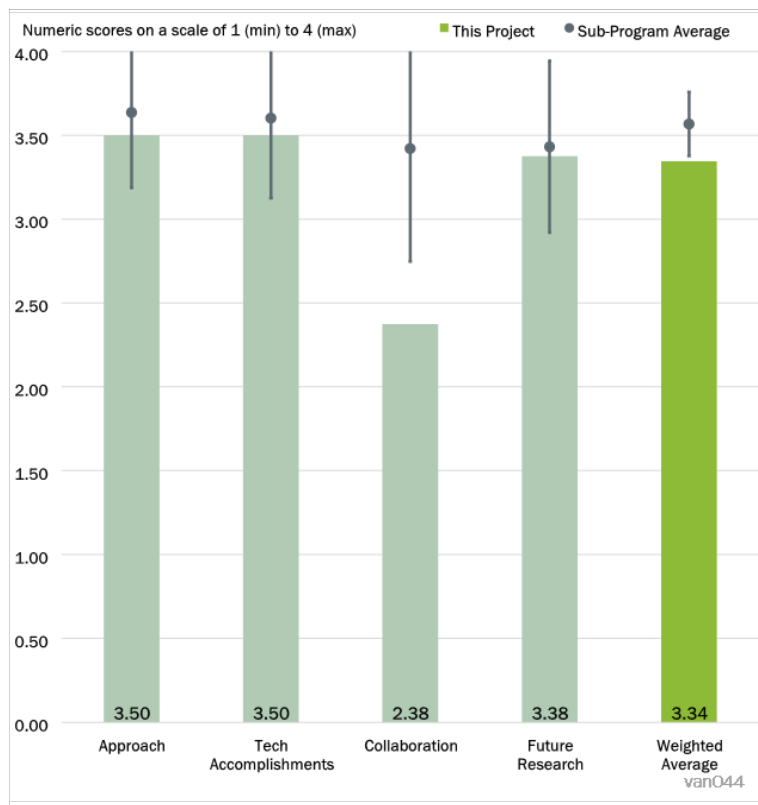


Figure 7-7 - Presentation Number: van044 Presentation Title: Micromobility Screening for City Opportunities Online Tool Principal Investigator: Don McKenzie, University of Washington

Question 1: Approach to Performing the Work: Is the project well designed, and is the timeline reasonably planned?

Reviewer 1

The reviewer stated that the survey was designed and fielded as part of the initial scope of work, and has been incorporated into a choice model. The reviewer added that some barriers remain related to the trip destination generation, and that some approaches for addressing this challenge were included, although one (additional computing power) may require additional resources.

Reviewer 2

The reviewer mentioned that this work intends to expand VTO Analysis Program’s mobility system analysis and modeling capabilities, specifically aiming to investigate and even enhance the cost-effectiveness and energy productivity of micromobility systems by building a new tool. The reviewer added that it directly addresses a key question from the 2020 VAN annual report: “Which vehicle use domains offer the potential to provide clean mobility benefits and at a reasonable cost to both businesses and the consumer? In which applications can specific new technologies make the greatest impact?”. The reviewer noted that the tool’s design—population synthesis, trip/tour generation, mode choice, and calculation of the resulting impacts on demand, energy productivity, and accessibility—should make substantial progress toward understanding how clean and affordable micromobility is. The reviewer concluded that the design is reasonable and that the timeline is feasible.

Reviewer 3

The reviewer noted that the approach is sound, but that it was not clear how remaining challenges and barriers would be overcome (particularly computational complexity).

Reviewer 4

The reviewer made no specific comments.

Question 2: Technical Accomplishments and Progress: Comments on the technical progress that has been made compared to project plan.

Reviewer 1

The reviewer stated that the project is ambitious in the number and diversity of tasks and public-facing outputs as part of the scope of work.

Reviewer 2

The reviewer noted that the team has completed a large portion of the model build and assembly as well as input data collection and processing. The reviewer added that literature review and data inventory were each thorough and appear to have provided valuable information to direct the model development (and geographic focus for validation). The reviewer declared that the SP/RP survey was completed with a reasonable response rate, although it wasn't clear whether it is representative of the population. The reviewer asked if most MTurk users are tech-savvy, and therefore more likely to use app-based micromobility in the first place.

Reviewer 3

The reviewer made no specific comments.

Reviewer 4

The reviewer declared that only achieved project milestones were shown in the AMR presentation, and that it was unclear exactly what milestones remain.

Question 3: Collaboration and Coordination Across Project Team: Are there specific contributions made by industry, national laboratories, or other external entities? Are there areas where more collaboration is needed?

Reviewer 1

The reviewer noted that there are no partners on this project.

Reviewer 2

The reviewer stated that this is a single-entity project, which makes sense given the funding level. The reviewer added that the PI mentioned that there had been previous work with Toyota, but that it is unclear whether they are involved in any capacity in the current work. The reviewer said that there may be areas of synergy (e.g., processing micromobility trip data with other projects as they expand the cities studied has overlap with some of the work from VAN032), and partnerships with some of the cities studied, or transit organizations/nonprofits in these cities that could help with disseminating the research.

Reviewer 3

The reviewer declared that, though the University of Washington is the only organization on this project, it seems like an opportunity is being missed to coordinate with commercial, nonprofit, and other entities in the micromobility space to understand the requirements for this kind of market identification and some of the pitfalls that they have encountered. The reviewer added that a few interviews facilitated by DOE project sponsors or at conferences could go a long way to inform the presentation and visualization of data, and to identify potential biases and artifacts in the attribute data.

Reviewer 4

The reviewer commented that more information is needed on how to determine that this product is useful to users. The reviewer asked how the team is getting feedback or ensuring that the tool is being designed for end user needs.

Question 4: Proposed Future Research: Has the project clearly defined a purpose for future work? To what extent will future work likely achieve its targets?

Reviewer 1

The reviewer mentioned that the proposed work for the remainder of this project focuses on refining previous modeling work, calculating energy productivity of different modes, and displaying accessibility metrics to be published as part of a web tool. The reviewer added that some additional computational challenges may remain for calculating routes between destinations and expanding it to other cities in the future.

Reviewer 2

The reviewer commented that future work within the project is as expected, and that the proposed future work would be great to further refine the methodology and get at some of the heterogeneity.

Reviewer 3

The reviewer noted that there appears to be some infrastructure related factors that have been considered, such as whether or not there is a bike lane, but that, from a DEI perspective, there may be more infrastructure considerations for some cities and neighborhoods such as: sidewalk availability; what the condition of the road/sidewalk is; if roads have shoulders; if all roadways are paved. The reviewer added that population density may not be fully representative of required distances of travel for shopping, groceries/schools. The reviewer asked if this has been taken into account.

Reviewer 4

The reviewer made no specific comments.

Question 5: Relevance: Does the project support the overall VTO subprogram objectives?

Reviewer 1

The reviewer stated that the project has compiled a substantial amount of trip data from different cities that requires mobility companies to provide it, and have used it to model trips in conjunction with user preference surveys. The reviewer added that the goal of the project is to provide quickly-returned analyses for other cities considering mobility technologies insight into the types of services and infrastructure necessary to support these services and expand access to low-carbon transportation. The reviewer noted that this can be especially helpful for providing additional access in low-resource communities that are a focus of the Justice 40 Initiative.

Reviewer 2

The reviewer commented that it directly aligns with and supports all of VAN's listed goals.

Reviewer 3

The reviewer commented that this research is highly relevant to VTO subprogram objectives, and that understanding the requirements to effectively deploy micromobility is a critical component of the overall transportation question.

Reviewer 4

The reviewer made no specific comments.

Question 6: Resources: Are the resources sufficient for the project to achieve the stated milestones in a timely fashion?

Reviewer 1

The reviewer mentioned that the resources are sufficient, and that the PI has met all of the milestones so far.

Reviewer 2

The reviewer noted that the resources are sufficient to complete the outlined scope of work for this project. The reviewer added that small project budgets make it difficult to bring in smaller organizations/additional partners as collaborators, potentially limiting the broader dissemination of results to interested stakeholders.

Reviewer 3

The reviewer stated that this project only has funding through U.S. government fiscal year 2022, but that it is scheduled to be complete in December 2022. This appears to the reviewer to be 2 months late, and the reviewer asked if an extension has been granted.

Reviewer 4

The reviewer made no specific comments.

Presentation Number: van045
Presentation Title: Analysis of Electric Heavy-Duty Driving and Infrastructure Requirements Within A Regional Area
Principal Investigator: Marcus Alexander, EPRI

Presenter

Marcus Alexander, EPRI

Reviewer Sample Size

A total of four reviewers evaluated this project.

Project Relevance and Resources

100% of reviewers felt that the project was relevant to current DOE objectives, 0% of reviewers felt that the project was not relevant, and 0% of reviewers did not indicate an answer. 75% of reviewers felt that the resources were sufficient, 25% of reviewers felt that the resources were insufficient, 0% of reviewers felt that the resources were excessive, and 0% of reviewers did not indicate an answer.

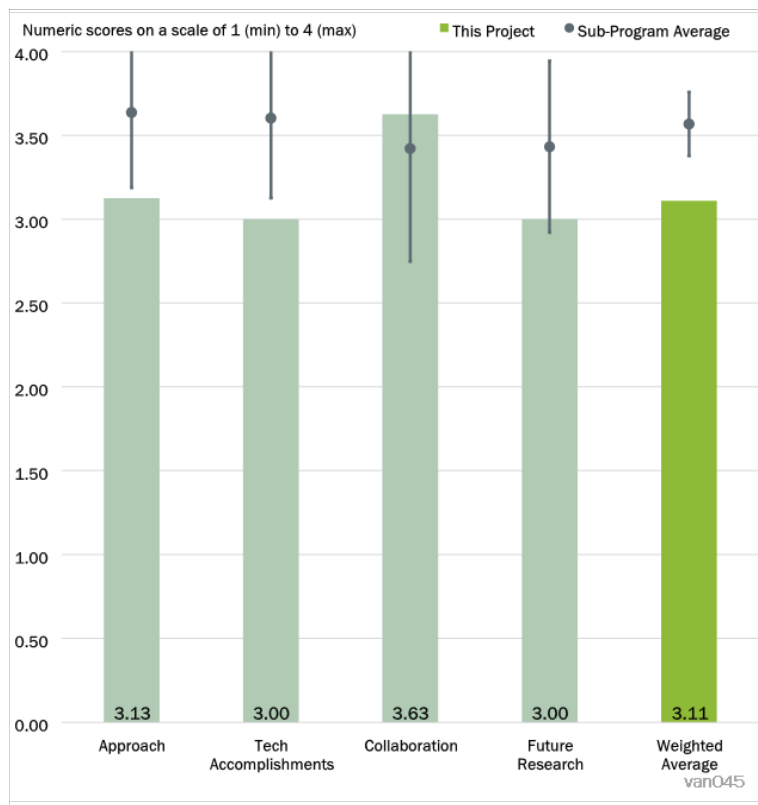


Figure 7-8 - Presentation Number: van045 Presentation Title: Analysis of Electric Heavy-Duty Driving and Infrastructure Requirements Within A Regional Area Principal Investigator: Marcus Alexander, EPRI

Question 1: Approach to Performing the Work: Is the project well designed, and is the timeline reasonably planned?

Reviewer 1

The reviewer mentioned that the project combines NREL models of freight demand with real utility data on distribution infrastructure for urban and highway truck stop charging. The reviewer added that the NREL models make use of existing, open models, and that it’s difficult to assess the quality of the analysis for the other project partners. The reviewer noted that even if specific model information/data cannot be provided, broad strokes about assumptions or general data sources, if they’re publicly available, and model methodology would be helpful.

Reviewer 2

The reviewer mentioned that if successful, this project will directly address the listed barriers, specifically understanding how much it will cost to build out infrastructure for MD/HD electric vehicles. The reviewer commented that the approach is well designed and that it estimates where electricity will be needed (mission profile/load shape), how much it costs to get electricity to that location, and how much it costs to get the electricity into the truck at that location. The reviewer noted that one potential weak point is the voluntary participation of the grid/utility folks, although they might be sufficiently interested in and concerned about the impact of adding powerful EV chargers to their systems. The reviewer added that it is difficult to know how generalizable these results will be and is hopeful that the team will be able to shed some light on that in the final report/presentation.

Reviewer 3

The reviewer stated that the premise and purpose of this work is clear, but that the specific approach to be taken modeling the required charging infrastructure is lacking in details. The reviewer said that it is not fully clear what incremental work was done by NREL to their Fleet DNA tool, which has existed for some time, with respect to this activity, and why that work took a full year. It is also not clear to the reviewer what approach EPRI and Tri-State plan to take to their components of this project.

Reviewer 4

The reviewer made no specific comments.

Question 2: Technical Accomplishments and Progress: Comments on the technical progress that has been made compared to project plan.

Reviewer 1

It appears to the reviewer that the team completed everything they expected to during the first year of the project, including derivation of truck load shapes, gathering/processing of utility data, and some of the modeling. The reviewer stated that as they stand, this sets a good foundation on which to complete full modeling in the second year.

Reviewer 2

The reviewer made no specific comments.

Reviewer 3

The reviewer noted that the freight data has been collected, and preliminary models of the urban depot distribution system modeling is reportedly completed. The reviewer said that the progress on the highway/truck stop modeling is less certain and was not detailed in this presentation. It was unclear to the reviewer what NREL's role in communicating with the unfunded/voluntary partner is and whether additional coordination was/will be necessary for this portion of the work.

Reviewer 4

The reviewer mentioned that the budget indicates funding in fiscal year 2021 and 2022, and that the project completion date is listed as March 2024. It is not clear to the reviewer how the project will be completed. The reviewer commented that based on the budget breakdown, it would be expected that the project be 50-60% complete at this point, but completion is shown only at the 30% level. The reviewer added that this gap is not addressed in the presentation, nor in the initial proposed project plan.

Question 3: Collaboration and Coordination Across Project Team: Are there specific contributions made by industry, national laboratories, or other external entities? Are there areas where more collaboration is needed?

Reviewer 1

The reviewer stated that the project team appropriately distributes the technical work across experts in each space: NREL for transportation modeling, EPRI and Tri-State for grid modeling, and Salt River Project/Xcel Energy for site-specific information.

Reviewer 2

The reviewer noted that the coordination between EPRI, relevant utilities, and the NREL team modeling the freight demand seems to be making appropriate progress and is generally on track given the project timeline. The reviewer added that coordination with other partners seems to be a bit less clear, especially if they are to be included in the workshop or other public outputs from this work. The reviewer commented that additional details about the stakeholders that will be invited to the workshop would also be helpful. The reviewer asked if

the workshop is just targeting the utilities that participated, other similar entities, or other DOE/lab organizations.

Reviewer 3

The reviewer noted that this project appears to have a strong cross functional team, but that further detail on the approach of each party would be appreciated.

Reviewer 4

The reviewer made no specific comments.

Question 4: Proposed Future Research: Has the project clearly defined a purpose for future work? To what extent will future work likely achieve its targets?

Reviewer 1

The reviewer noted that proposed future research appears to primarily fall within the initial scope as described.

Reviewer 2

The reviewer said that the team didn't propose any future work beyond completing this project. If successful, the reviewer hoped that the team will be able to expand to do similar analyses for other charging installations.

Reviewer 3

The reviewer made no specific comments.

Reviewer 4

The reviewer stated that the next phase of research involves completing the modeling of distribution systems to support freight charging infrastructure and beginning to investigate alternative technical solutions to reduce the cost of supporting this infrastructure. The reviewer added that the details about what technical alternatives (energy storage, distributed generation) will be included are a bit vague, and that it was unclear if the models exist to handle many possible technical scenarios easily or if it would be more helpful to select a few case studies or technologies to explore the existing design space of technical solutions.

Question 5: Relevance: Does the project support the overall VTO subprogram objectives?

Reviewer 1

The reviewer noted that the project has access to real-world transmission/distribution data, which is helpful for estimating the actual cost of urban and highway freight charging infrastructure, which is important for creating a pathway for electrified freight.

Reviewer 2

The reviewer stated that this is specifically relevant to the following VAN goal: Provide insight into transportation and energy use problems for a broad range of internal and external stakeholders. The reviewer mentioned that it will also help to create a solid foundation of data for VAN models that need MD/HD EV infrastructure costs and perhaps identify some key barriers that other pieces of the VTO portfolio should address.

Reviewer 3

The reviewer declared that the topic is relevant.

Reviewer 4

The reviewer said that the project addresses a major problem and presents a good opportunity to release information to agencies and the public.

Question 6: Resources: Are the resources sufficient for the project to achieve the stated milestones in a timely fashion?

Reviewer 1

The reviewer commented that the resources for this project appear to be sufficient.

Reviewer 2

The reviewer noted that much of the NREL portion of the scope of work seems to have been completed. The reviewer added that the EPRI preliminary results have been analyzed, although there may be difficulty allocating sufficient resources with the project budget to scope out different cost mitigation strategies mentioned in the “future work” portion of the presentation unless private funds are also available to supplement that work.

Reviewer 3

The reviewer declared that this project is at 30% completion and had used up about 55% of budget, assuming all fiscal year 2021 funds were spent. The reviewer noted that the project is scheduled to continue into March 2024, but that it has no fiscal year 2023 funding shown.

Reviewer 4

The reviewer made no specific comments.

Presentation Number: van046
Presentation Title: EVI-Equity
Principal Investigator: D-Y Lee,
National Renewable Energy
Laboratory

Presenter

D-Y Lee, NREL

Reviewer Sample Size

A total of four reviewers evaluated this project.

Project Relevance and Resources

100% of reviewers felt that the project was relevant to current DOE objectives, 0% of reviewers felt that the project was not relevant, and 0% of reviewers did not indicate an answer. 100% of reviewers felt that the resources were sufficient, 0% of reviewers felt that the resources were insufficient, 0% of reviewers felt that the resources were excessive, and 0% of reviewers did not indicate an answer.

Question 1: Approach to Performing the Work: Is the project well designed, and is the timeline reasonably planned?

Reviewer 1

The reviewer noted that the project consisted of a survey about EV attitudes and preferences, which was used to determine the air quality that most EV owners are exposed to, relative to the general population. The reviewer added that similar geospatial estimates of the cost and energy burden associated with using public over private/home chargers was conducted. The reviewer stated that finally, some of the survey results were used to generate network scenarios that varied across one dimension (e.g., increasing access in low-income areas, or areas with more people of color) and showed the overall impact to the community in terms of EV access to charging and vehicles. The reviewer concluded that overall, the model is fairly simple in how it determines who is served by the new EV charger access; it does not currently account for trip distances or travel patterns, but is a first step.

Reviewer 2

The reviewer noted that a key barrier is the lack of a comprehensive, yet detailed, model/tool to evaluate equity of EV adoption and corresponding electric vehicle supply equipment (EVSE) infrastructure. The reviewer added that the project approach—creating a new EVI-Equity tool to juxtapose demographic variables, EVSE installations, and EV adoption—is a great step toward understanding the equity component of the EV rollout.

Reviewer 3

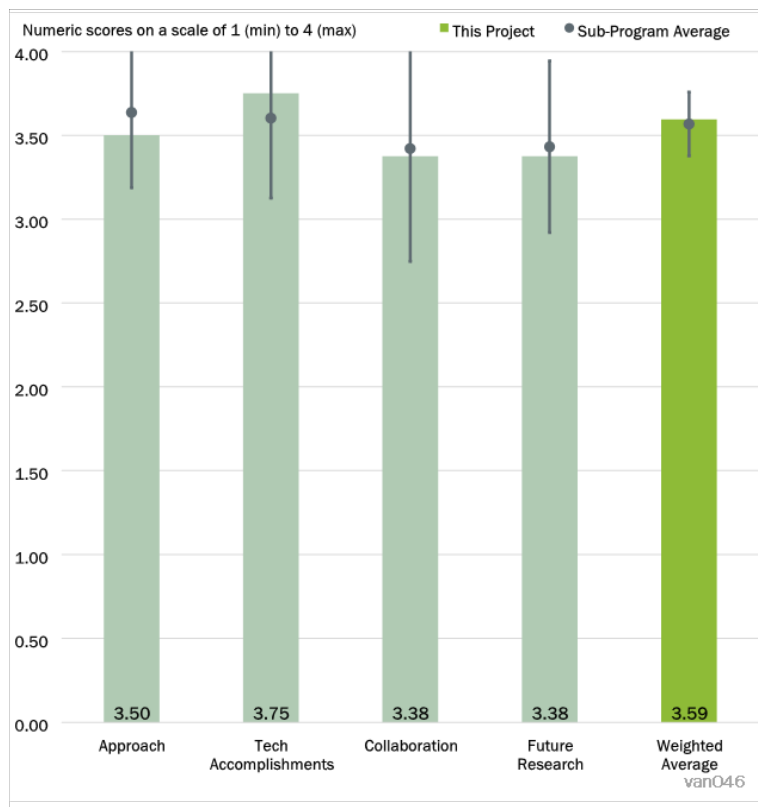


Figure 7-9 - Presentation Number: van046 Presentation Title: EVI-Equity Principal Investigator: D-Y Lee, National Renewable Energy Laboratory

The reviewer mentioned that the team is clearly focused on understanding and quantifying specific barriers. The reviewer noted that it would have been interesting to see a bit more evaluation of the secondary market for electric vehicles and the cost and access to repair and for parts for second and third owners, but acknowledged that this market is nascent and that there may not be sufficient data to truly incorporate and generate effective conclusions.

Reviewer 4

The reviewer suggested that this project could use a discussion on stated vs. revealed preference.

Question 2: Technical Accomplishments and Progress: Comments on the technical progress that has been made compared to project plan.

Reviewer 1

The reviewer noted that the majority of goals have been accomplished.

Reviewer 2

The reviewer noted that this was a single-year project, although the initial scope of work is somewhat unclear to assess whether the goals for this year have been met. The reviewer mentioned that the project team was able to field a survey to gather information on EV preferences and to construct a tool that generates two alternative scenarios of EV charging networks to improve equity along racial and economic dimensions.

Reviewer 3

The reviewer stated that the team has done a great job completing several specific analyses using the tool (case studies) and supporting the tool (surveys). The reviewer added that the team has successfully demonstrated how the tool can be used to estimate the equity impacts of EV charging siting and installation on EV adoption and on cost-to-charge for different demographics. The reviewer declared that the team analyzed how EVs impact equity through variation in price-to-charge (\$/kWh), i.e., EV charging as “regressive”, or, the lower your income, the more you pay to drive. The reviewer emphasized that this piece is much more important and needs to be fleshed out more, perhaps in future work. The reviewer added that not only is EV cost-to-drive likely to be negatively correlated with income due to charging location type (residential versus public/multi-unit dwelling (MUD)), but EV capital cost limitations will also likely constrain the business case for EVSE providers to install and operate EVSE in low-income communities in the first place; hence why they are installed between and around low-income communities rather than in and through them. The reviewer noted that it currently seems less like disadvantaging a community by intentionally skipping placement of a metro rail stop and more like a country club chain skipping over what is likely to be a failed location.

Reviewer 4

The reviewer made no specific comments.

Question 3: Collaboration and Coordination Across Project Team: Are there specific contributions made by industry, national laboratories, or other external entities? Are there areas where more collaboration is needed?

Reviewer 1

The reviewer commented that the project has several outside collaborators that have helped to provide input on the structure of distributional and geospatial models. The reviewer noted that future work is focused on incorporating many of the existing EVI tools, which seems to have overlap with the project team. The reviewer stated that more specific information about the collaborations with other DOE Office of Energy Efficiency and

Renewable Energy (EERE) offices beyond VTO would be helpful as these parallel projects work to address energy equity.

Reviewer 2

The reviewer noted an excellent team of collaborators to assist with collecting the data and providing feedback on concepts and methods for the tool. The reviewer added that the team also coordinated with NREL and led sessions with other agencies/organizations in order to solicit feedback.

Reviewer 3

The reviewer declared that there is a high level of collaboration across organizations. The reviewer said it would be interesting to see increased collaboration, or the mention of collaboration with underserved communities, tribes, and groups and their own representative organizations.

Reviewer 4

The reviewer suggested that more discussion here would be useful.

Question 4: Proposed Future Research: Has the project clearly defined a purpose for future work? To what extent will future work likely achieve its targets?

Reviewer 1

The reviewer noted that there were several targeted areas for proposed future work. The reviewer added that one area of focus was to include EVI tools to better predict demand for charging for personal vehicles and ridesharing. The reviewer suggested that additional information would be helpful in determining both the amount of travel demand that could be served if access to charging infrastructure was expanded, and if travel demand were itself more equitable than the current system. The reviewer mentioned that proposed future work about incorporating other vehicles is less clear. The reviewer stated that many heavy-duty vehicles within communities operate with centralized depots, so it is less clear that these vehicles would be as reliant on public EV chargers. The reviewer recommended that further differentiation between the vehicle uses (e.g., buses and paratransit vs. shipping) would likely be necessary to scope out this type of analysis.

Reviewer 2

The reviewer commented that proposed future work is all interesting and added that it feels a little early to be pushing distributional equity (if distributional equity is an end goal). The reviewer stated that this is not a mass-market technology as EVs are still 50% more expensive than the average LDV, and that the latter is already too expensive for low-income communities, and that therefore the business case for both chargers and vehicles would have to be sacrificed to make EVs accessible to all. The reviewer also suggested that exploring how far down market EVs would have to drop, and how much money EVSE providers would have to lose, for each kWh, to make EVs accessible to all, would be a helpful analysis to include alongside the demographic “state of play” assessment.

Reviewer 3

The reviewer was interested to see some non-academic outreach.

Reviewer 4

The reviewer made no specific comments.

Question 5: Relevance: Does the project support the overall VTO subprogram objectives?

Reviewer 1

The reviewer noted that the project provides useful information regarding distributional equity of EV resources (both personal vehicles and charging stations).

Reviewer 2

The reviewer stated that equity aligns with broader DOE Justice40 goals.

Reviewer 3

The reviewer declared that it is highly relevant and important work.

Reviewer 4

It was not clear to the reviewer if the final product is the results of the model or a model that individuals can run. The reviewer said that it is relevant in either case, but the use case is different.

Question 6: Resources: Are the resources sufficient for the project to achieve the stated milestones in a timely fashion?

Reviewer 1

The reviewer stated that the project resources are sufficient for completing the survey and the initial analysis included in the first year's scope of work.

Reviewer 2

The reviewer noted that the team has successfully reached its milestones so far and appears able to finish the remainder in time for the project end date.

Reviewer 3

The reviewer mentioned that it is on time, and on budget.

Reviewer 4

The reviewer made no specific comments.

Presentation Number: van047
Presentation Title: Integrated Modeling and Technoeconomic Assessment of Electric Vehicle Community Charging Hubs
Principal Investigator: Eleftheria Kontou, University of Illinois

Presenter

Eleftheria Kontou, University of Illinois

Reviewer Sample Size

A total of four reviewers evaluated this project.

Project Relevance and Resources

100% of reviewers felt that the project was relevant to current DOE objectives, 0% of reviewers felt that the project was not relevant, and 0% of reviewers did not indicate an answer. 100% of reviewers felt that the resources were sufficient, 0% of reviewers felt that the resources were insufficient, 0% of reviewers felt that the resources were excessive, and 0% of reviewers did not indicate an answer.

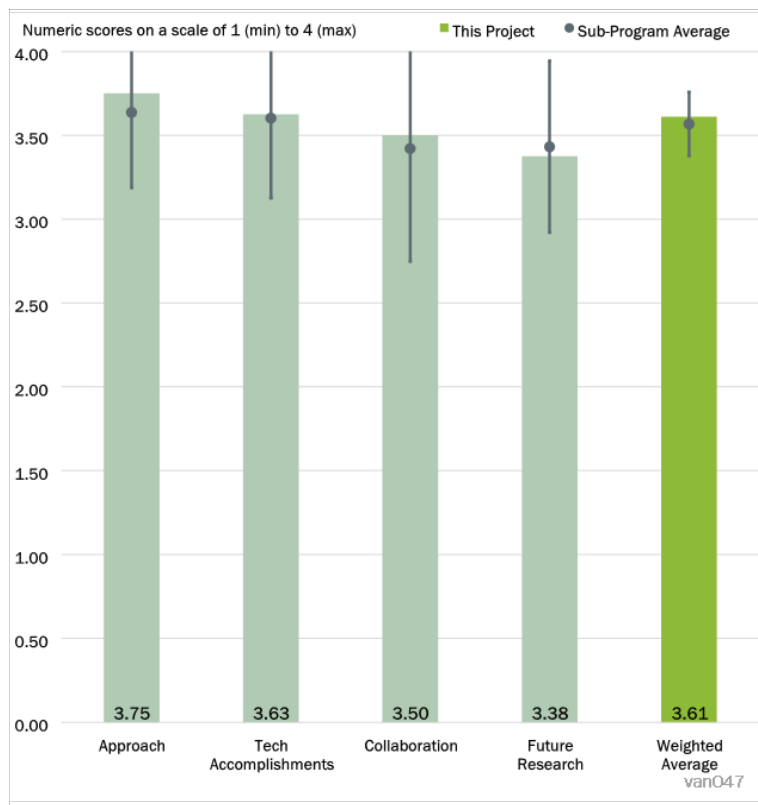


Figure 7-10 - Presentation Number: van047 Presentation Title: Integrated Modeling and Technoeconomic Assessment of Electric Vehicle Community Charging Hubs Principal Investigator: Eleftheria Kontou, University of Illinois

Question 1: Approach to Performing the Work: Is the project well designed, and is the timeline reasonably planned?

Reviewer 1

The reviewer stated that the project uses multiple combinations of charging technologies and business models to show the costs of systems with comparable performance in terms of wait time and cost, which is helpful for informing different infrastructure decisions. The reviewer added that the focus on multi-unit dwellings is important for expanding EV access.

Reviewer 2

The reviewer noted that the project is well-designed and proposes to address the key barrier (gaps in modeling/assessment of MUD EV charging hubs) through the development and application of an EV charge scheduling optimization tool. The reviewer added that the problem of EVSE management and optimization has been explored by a number of other publications, but that this project uniquely includes cost/kWh optimization for three different business models as well.

Reviewer 3

The reviewer would like to see a little more about how all the externalities of MUD parking situations are addressed in this study, such as visitor parking, requirements that vehicles be moved, but they are not, etc.

Reviewer 4

The reviewer made no specific comments.

Question 2: Technical Accomplishments and Progress: Comments on the technical progress that has been made compared to project plan.

Reviewer 1

The reviewer declared that the team completed analysis of three different metropolitan areas—Chicago, Los Angeles, and New York City—and is on track to complete the project on time. The reviewer commented that the team estimated the distribution of battery pack sizes for each, and then optimized charging infrastructure buildout and \$/kWh pricing for a fleet of MUD vehicles in each. The reviewer said that this is a great step toward understanding how much it will actually cost to drive EVs for folks who don't have a private driveway/garage, and the reviewer is very interested in reading the paper when it is out.

Reviewer 2

The reviewer noted that the model has established three different test case cities, estimated the number of residents in the average multi-unit dwelling, determined typical travel patterns for those residents, and constructed charging infrastructure scenarios and business models to meet that projected demand.

Reviewer 3

The reviewer mentioned that the project has accomplished its stated goals.

Reviewer 4

The reviewer made no specific comments.

Question 3: Collaboration and Coordination Across Project Team: Are there specific contributions made by industry, national laboratories, or other external entities? Are there areas where more collaboration is needed?

Reviewer 1

The reviewer noted that the project includes partners at ANL and collaborates with the Chicago Clean Cities Coalition, and that there are plans for open-source access to the model and publications/summaries for a more general non-academic audience.

Reviewer 2

The reviewer said that the team has specific contributions from ANL and is collaborating with appropriate government entities like Clean Cities and Illinois Department of Transportation.

Reviewer 3

The reviewer mentioned a multi-partner collaboration, but that it would have been nice to see some collaboration with commercial charging providers.

Reviewer 4

The reviewer commented that more discussion on collaboration would be useful here.

Question 4: Proposed Future Research: Has the project clearly defined a purpose for future work? To what extent will future work likely achieve its targets?

Reviewer 1

The reviewer noted that future work includes providing open access to the model, incorporating charging in mixed use developments, and addressing techno-economic uncertainty. The reviewer suggested potentially exploring the variability of the power supplied for fast charging as each EV has its own “signature” charge

profile. The reviewer added that this variability may also have behavioral implications: fast charging usually only works until the batteries reach some threshold state of charge (usually 80%-90% state of charge), and then charge at a “normal” rate. The reviewer mentioned that it may be helpful to consider that residents or customers charging during the day may value the fast and slow charge differently.

Reviewer 2

The reviewer stated that proposed future research goals are justified and would further expand the explanatory power of this analysis framework. The reviewer added that understanding the variety of charging behaviors will widen the resulting costs and waiting times, but it would be a valuable exercise for many stakeholders.

Reviewer 3

The reviewer expressed interest in seeing more on the configuration of MUDs and the behavioral impacts of charging location and requirements.

Reviewer 4

The reviewer made no specific comments.

Question 5: Relevance: Does the project support the overall VTO subprogram objectives?

Reviewer 1

The reviewer mentioned that the project provides information regarding the cost and performance in terms of wait times of multi-unit vehicle charging, a key component to further increasing EV adoption in a more economically-diverse cross section of communities. The reviewer added that the project also provides information on how business models and different technology combinations can provide similar levels of service.

Reviewer 2

The reviewer said that the research is aligned with the VTO mission of accelerating the development and widespread use of innovative transportation technologies and enabling equitable access to electric vehicle charging.

Reviewer 3

The reviewer stated that the research is relevant to the subprogram objectives.

Reviewer 4

The reviewer made no specific comments.

Question 6: Resources: Are the resources sufficient for the project to achieve the stated milestones in a timely fashion?

Reviewer 1

The reviewer said that the project resources are sufficient for completing publication of previous results and for completing the scoped future work.

Reviewer 2

The reviewer noted that the resources appear to be sufficient.

Reviewer 3

The reviewer commented that the project appears to be on time and on budget.

Reviewer 4

The reviewer made no specific comments.

Presentation Number: van048
Presentation Title: Heavy-Duty Electric Vehicle Integration and Implementation (HEVII) Tool
Principal Investigator: William Northrop, University of Minnesota

Presenter

William Northrop, University of Minnesota

Reviewer Sample Size

A total of four reviewers evaluated this project.

Project Relevance and Resources

100% of reviewers felt that the project was relevant to current DOE objectives, 0% of reviewers felt that the project was not relevant, and 0% of reviewers did not indicate an answer. 75% of reviewers felt that the resources were sufficient, 0% of reviewers felt that the resources were insufficient, 25% of reviewers felt that the resources were excessive, and 0% of reviewers did not indicate an answer.

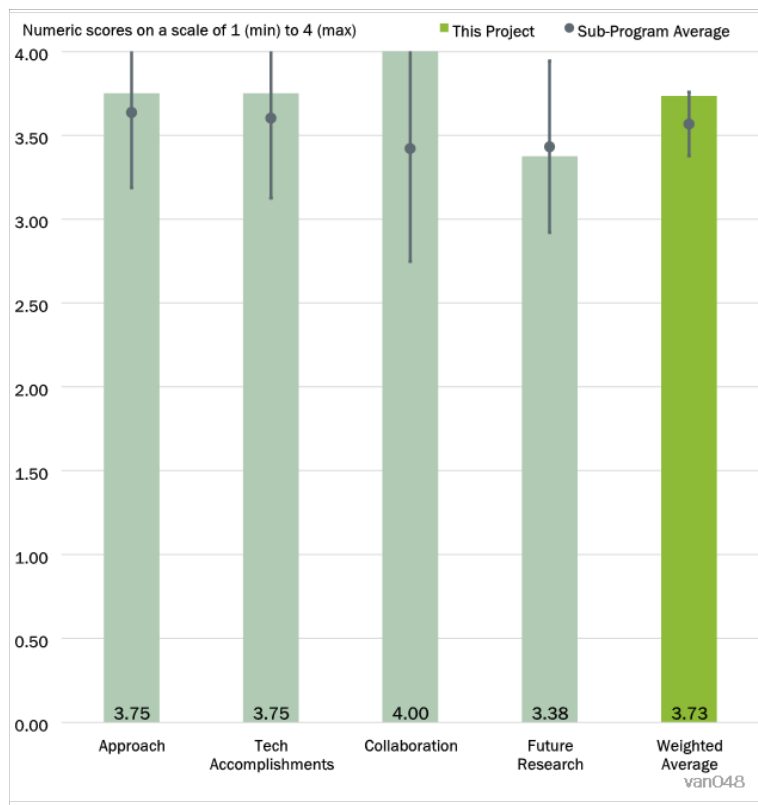


Figure 7-11 - Presentation Number: van048 Presentation Title: Heavy-Duty Electric Vehicle Integration and Implementation (HEVII) Tool Principal Investigator: William Northrop, University of Minnesota

Question 1: Approach to Performing the Work: Is the project well designed, and is the timeline reasonably planned?

Reviewer 1

The reviewer said that this project addresses a major barrier to understanding the electrification potential of commercial fleets, which is payload weight across a full vehicle mission or trip. The reviewer added that the team’s approach is to use data from on-board loggers, and Fast-Sim, to estimate vehicle weight and the corresponding battery size, charge rate, and infrastructure location requirements. The reviewer agreed that this is a good approach and should produce some novel data that will be highly valuable for a number of VTO and other stakeholders.

Reviewer 2

The reviewer noted the solid premise to model electrification requirements for fleets.

Reviewer 3

The reviewer stated that the project combined real fleet data from fleet operators and the producers of commercial fleet data loggers to gather data about the trips made by fleet vehicles. The reviewer added that the data was then used to estimate vehicle mass as fuel is consumed in ICE vehicles and deliveries are made. The reviewer noted that this model outperformed physics-based models using a constant vehicle mass, and that it used the information about fleet travel patterns to identify areas, in the form of hexagonal cells, where there is significant driver activity. The reviewer added that, while this is helpful to have, it is less clear whether a) there

is a coincidence of busy traffic areas, b) if the driver activity in an area is already driven by refueling considerations, or c) if those high traffic areas are well-aligned with EV charging demands.

Reviewer 4

The reviewer made no specific comments.

Question 2: Technical Accomplishments and Progress: Comments on the technical progress that has been made compared to project plan.

Reviewer 1

The reviewer stated that the project has conducted significant portions of the analysis with additional iterations using more consistent data and for different vehicle fleets.

Reviewer 2

The reviewer noted that the team completed several key tasks, including collecting data from 24 diesel Class 6-8 vehicles, validating the mass prediction model, and determining baseline fleet charger locations. The reviewer added that this lays the groundwork for the EV analysis component of the project.

Reviewer 3

The reviewer said that the milestone numbers appear to be confounded between Slides 3 and 6-8. The reviewer mentioned that the progress appears to match the target, but that it is a little unclear in the presentation materials without a speaker.

Reviewer 4

The reviewer made no specific comments.

Question 3: Collaboration and Coordination Across Project Team: Are there specific contributions made by industry, national laboratories, or other external entities? Are there areas where more collaboration is needed?

Reviewer 1

The reviewer noted that the close partnership between the collaborators was critical in getting access to fleet vehicle travel patterns and improving the collection of data at a consistent frequency.

Reviewer 2

The reviewer said that the University of Minnesota is collaborating with the right folks for this work: NREL, which has experience with FleetDNA data and is also the home of FastSim; PepsiCo, which is a test fleet; and Geotab, which has a long history of analysis on data logger data.

Reviewer 3

The reviewer noted excellent cross-functional collaboration with parties from multiple sectors working together.

Reviewer 4

The reviewer commented that this is one of the better showcases of both academia and multiple industry players providing their expertise to solve a problem. The reviewer added that it is refreshing to see industry change their product to make data collection for research easier.

Question 4: Proposed Future Research: Has the project clearly defined a purpose for future work? To what extent will future work likely achieve its targets?

Reviewer 1

The reviewer mentioned that the remaining work focuses on further refinement of an existing model, using additional fleet travel patterns as a test case, and publishing the code to a repository.

Reviewer 2

The reviewer said that proposed future work, including expanding the tool to other vehicle data sets and creating a GUI, would be valuable. The reviewer expressed uncertainty about such a small sample (24 trucks, single fleet) and whether it would be generalizable. The reviewer suggested that the future work should focus on the former (more data) rather than the latter (public-facing tool).

Reviewer 3

It is a little unclear to the reviewer what the difference between the proposed tool and the future proposed tool with a simpler user interface will be.

Reviewer 4

The reviewer would like to see validation for other users. The reviewer added that there needs to be safeguards to ensure that the solution is not inadvertently tuned to the development scenario (i.e., a single industrial customer) and that it is transferable.

Question 5: Relevance: Does the project support the overall VTO subprogram objectives?

Reviewer 1

The reviewer commented that understanding how fuel consumption varies over the course of medium- and heavy-duty drive cycles is important in correctly estimating the demand for EV charging that would need to be met, either with privately-operated mini depots or public chargers.

Reviewer 2

The reviewer mentioned that this work is relevant to VAN's goal of providing insight into transportation and energy use problems for a broad range of internal and external stakeholders, as well as all three of the broader objectives in support of VAN goals.

Reviewer 3

The reviewer said that the project is relevant to subprogram objectives.

Reviewer 4

The reviewer made no specific comments.

Question 6: Resources: Are the resources sufficient for the project to achieve the stated milestones in a timely fashion?

Reviewer 1

The reviewer stated that the resources are sufficient to complete the outlined scope of work for this project.

Reviewer 2

The reviewer said that the team and resources seem sufficient for the planned work.

Reviewer 3

The reviewer noted that, as reported, this is a little confusing. The reviewer clarified that the project is reported as 75% complete, with a final completion date of 12/31/2022, but based on the numbers reported, it appears that only about 51% of the project funding has been used. It is not clear to the reviewer if it is planned to have increased funding requirements later in the project cycle, or why this mismatch is occurring.

Reviewer 4

The reviewer made no specific comments.

Acronyms and Abbreviations

ADAS	Advanced driver-assistance system
ADOPT	Automotive Deployment Options Projection Tool
AEO	Annual Energy Outlook
ANL	Argonne National Laboratory
API	Application programming interface
BatPac	Battery Performance and Cost
CAFE	Corporate average fuel economy
DEIA	Diversity, Equity, Inclusion and Accessibility
DOE	U.S. Department of Energy
EIA	Energy Information Administration
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
EV	Electric vehicle
FOTW	Fact of the Week
GHG	Greenhouse gas
REET	Greenhouse gases, Regulated Emissions, and Energy use in Transportation model
HDV	Heavy-duty vehicle
HPC	High performance computing
ICE	Internal combustion engine
LCA	Life-cycle analysis
LDV	Light-duty vehicle
MD	Medium-duty
MUD	Multi-unit dwelling
NREL	National Renewable Energy Laboratory
OEM	Original equipment manufacturer
ORNL	Oak Ridge National Laboratory
PI	Principal Investigator
TCO	Total cost of ownership
TEDB	Transportation Energy Data Book
VAN	Vehicle Analysis Program
VIUS	Vehicle Inventory and Use Survey

VTO Vehicle Technologies Office
kWh Kilowatt hour

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