

## 6. Technology Integration

The Vehicle Technologies Office (VTO) supports research, development, deployment, and demonstration (RDD&D) of new, efficient, and clean mobility options that are affordable for all Americans. The office's investments leverage the unique capabilities and world-class expertise of the national laboratory system to develop new innovations in vehicle technologies, including: advanced battery technologies; advanced materials for lighter-weight vehicle structures and better powertrains; energy-efficient mobility technologies and systems (including automated and connected vehicles as well as innovations in connected infrastructure for significant systems-level energy efficiency improvement); combustion engines to reduce greenhouse gas (GHG) emissions; and technology deployment and integration at the local and state level. In coordination with the other offices across the Office of Energy Efficiency and Renewable Energy (EERE) and the U.S. Department of Energy (DOE), the Vehicle Technologies Office advances technologies that assure affordable, reliable mobility solutions for people and goods across all economic and social groups; enable and support competitiveness for industry and the economy/workforce; and address local air quality and use of water, land, and domestic resources.

The VTO Technology Integration (TI) subprogram covers a broad technology portfolio that includes alternative fuels (e.g., advanced biofuels, electricity, hydrogen, renewable natural gas) and energy efficient mobility systems. The successful deployment of these technologies can support the decarbonization of the transportation sector, strengthen national security through fuel diversity and the use of domestic fuel sources, reduce transportation energy costs for businesses and consumers, address the needs of underrepresented communities, and support energy resiliency with affordable alternatives to conventional fuels that may face unusually high demand in emergency situations. At the national level, the Technology Integration Program offers technical assistance, information resources, online training, and an array of data and analysis tools. At the local level, Clean Cities coalitions leverage these resources to create networks of community stakeholders and provide hands-on technical assistance to fleets.

The Technical Assistance activities support projects to provide information, insight, online tools, and technology assistance to cities and regions working to implement alternative fuels and energy efficient mobility technologies and systems. Projects will; demonstrate proof-of-concept of alternative fuel/advanced technology vehicles, charging infrastructure, new mobility systems for goods and people movement and modeling and simulation.

The Data Collection and Dissemination activity will collect and provide objective, unbiased data, information, and real-world lessons learned to inform future research needs and provide fleets and local decision makers with a suite of resources to identify and address technology barriers. This includes projects to disseminate data, information, and insights.

The EcoCar Mobility Challenge challenges 12 university teams to apply advanced powertrain systems, as well as connected and automated vehicle technology to improve efficiency, safety, and consumer appeal. In FY 2022, student teams completed and implemented their vehicle design through hardware development and engineering.

## 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 6-1 – Project Feedback**

Presentation ID	Presentation Title	Principal Investigator (Organization)	Page Number	Objectives	Approach	Accomplishments	Collaboration	EEJ	Weighted Average
ti126	Twin Cities Electric Vehicle Community Mobility Network	Lisa Thurstin (American Lung Association)	6-5	3.75	3.63	3.13	3.63	3.75	3.46
ti127	Mid-Atlantic Electrification Partnership	Al Christopher (Virginia Department of Mines, Minerals, and Energy)	6-9	3.38	3.13	3.00	3.38	3.38	3.18
ti128	Western Smart Regional Electric Vehicle Adoption and Infrastructure at Scale	James Campbell (PacifiCorp)	6-13	3.50	3.25	3.00	3.25	3.75	3.25
ti129	Helping America's Rural Counties Transition to Cleaner Fuels and Vehicles	Ken Brown (Transportation Energy Partners)	6-16	3.75	3.25	3.00	3.50	3.50	3.30
ti130	VOICE-MR:Vocation Integrated Cost Estimation for Maintenance and Repair of Alternative Fuel Vehicles	Arvind Thiruvengadam (West Virginia University)	6-19	3.50	3.17	2.83	2.83	2.83	3.03

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ti131	DRIVE (Developing Replicable, Innovative Variants for Engagement) for Electric Vehicles (Evs) in the USA	Jonathan Overly (East Tennessee Clean Fuels Coalition)	6-23	4.00	3.50	3.50	3.83	2.83	3.57
ti132	The National Fire Protection-Association (NFPA) Spurs the Safe Adoption of Electric Vehicles through Education and Outreach	Andrew Klock (National Fire Protection Association)	6-26	3.50	3.38	3.63	3.50	2.75	3.45
ti134	Delivering Clean Air in Denver: Propane Truck and Infrastructure in Mail Delivery Application	Bonnie Trowbridge (Drive Clean Colorado)	6-29	3.50	3.38	3.00	3.50	3.38	3.26
ti135	Advancing Climate & Innovation Goals of Memphis & Shelby County: Electrification of Key Fleet Vehicles to Capture Cost Savings and Climate Benefits	Leigh Huffman (Shelby County)	6-33	3.13	2.88	2.63	3.13	2.38	2.80
ti136	Zero Emission Freight Future	Megan Stein (Clean Fuels Ohio)	6-38	3.63	3.25	3.50	3.38	3.13	3.43

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ti137	Cold-Weather Operation, Observation and Learning Electric Vehicles	Lisa Thurstin (American Lung Association)	6-42	3.38	3.38	3.13	3.25	3.25	3.25
ti138	Demonstrating Electric Shuttles for the New Orleans Region	Elizabeth Davey (Tulane University)	6-46	3.30	3.20	2.80	3.10	2.90	3.02
ti139	Pilot Heavy-Duty Electric Vehicle (EV) Deployment for Municipal Solid Waste Collection	Shaina Kilcoyne (Municipality of Anchorage)	6-50	3.30	3.30	2.90	3.20	3.20	3.12
ti140	St. Louis Vehicle Electrification Rides for Seniors	Connor Herman (Forth Mobility)	6-54	3.30	3.20	3.70	3.50	3.70	3.50
Overall Average				3.49	3.28	3.12	3.35	3.19	3.26

**Presentation Number: ti126**  
**Presentation Title: Twin Cities Electric Vehicle Community Mobility Network**  
**Principal Investigator: Lisa Thurstin, American Lung Association**

**Presenter**

Lisa Thurstin, American Lung Association

**Reviewer Sample Size**

A total of four reviewers evaluated this project.

**Question 1: Project Objectives—**  
*Please provide comments on this project’s degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.*

**Reviewer 1**

The reviewer stated that this is a leading example of building out community level electric car sharing, and added that it is also a leading example of right of way charging in collaboration with cities. Overall, the reviewer found it to be a very exciting project with a lot of potential.

**Reviewer 2**

The reviewer found several strengths in the project, including its focus on electric vehicle (EV) and electric vehicle supply equipment (EVSE) deployment, the creation of a community-focused mobility network, and education and outreach to car-share customers and community-based organizations is strongly aligned with TI objectives. The reviewer also found the incorporation of cost-effective renewable electricity (via utility wind program) to be a strong component of the project that was well-aligned with DOE objectives. The reviewer added that the project will indirectly help inform an adjacent project the principal investigators (PI) is conducting that focuses on EV cold weather performance.

**Reviewer 3**

The reviewer stated that this project helps to complete all four objectives. It involved improving fuel diversity and increasing alternative fuel vehicle use through the deployment of electric vehicles and charging stations and increased local resiliency through adding 70 renewably powered curbside EV spots in Saint Paul and Minneapolis. The reviewer added that the project created transportation efficiencies through focusing on carshare—a way to target many individuals that promotes moving away from individual car ownership.

**Reviewer 4**

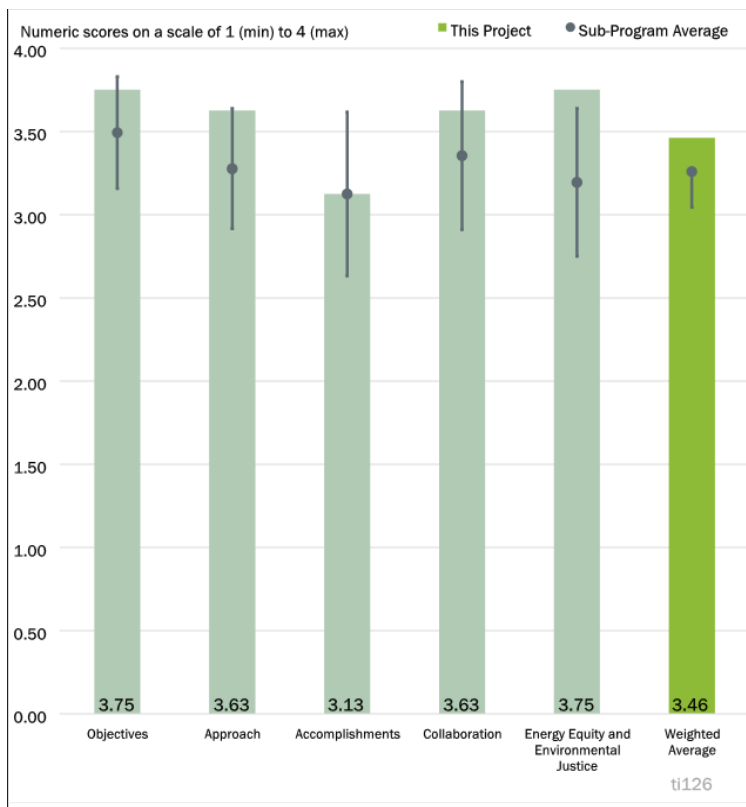


Figure 6-1 - Presentation Number: ti126 Presentation Title: Twin Cities Electric Vehicle Community Mobility Network Principal Investigator: Lisa Thurstin, American Lung Association

The reviewer commented that dual use stations (carshare+ public) maximize accessibility for all community members and found that the integration of the carshare program with other transit modes improves overall transportation efficiency by encouraging transit use while allowing car access when needed for specific trips.

***Question 2: Project Approach-Please comment on this project’s approach for integrating advanced transportation technologies and practices to solve real-world challenges.***

**Reviewer 1**

The reviewer commented that this project addresses bringing electric vehicles in an affordable manner (via carsharing), to communities not previously served. It also focuses on solving the issue of how carsharing can work, and how social norms or technology can solve the problem of keeping cars in carsharing programs charged. The reviewer further noted that the project brings electric vehicles which are often more expensive to traditionally underserved populations that might not be able to or willing to afford electric vehicles. The reviewer remarked that the funding partners make the project sustainable beyond the period of performance which makes the project outlast even the initial deployment of vehicles and stations.

**Reviewer 2**

The reviewer found that despite challenges related to COVID, the project successfully deployed charging infrastructure, while managing multiple local partners including municipalities, the utility and vehicle and charging station providers to make the project happen.

**Reviewer 3**

The reviewer found that the project approach involves a fairly robust multi-unit dwelling (MUD) vetting/selection criteria process, and noted that the EV carshare service includes parking, which is a big incentive for attracting new urban users. The reviewer also cited as a strength that DC fast charging is included in the project, and will be right-sized to fit the urban/boulevard settings scoped within the project.

The reviewer posited that there could be potential conflicts between different types of station users (carshare clients vs. public users), and noted that the presentation didn’t really discuss how this might be mitigated.

**Reviewer 4**

The reviewer found the combination of public and affordable housing, and one way and two way carshare, along with public charging, to be quite innovative. The reviewer stated that this is also a leading example of engaging cities as full partners in providing carshare, and in providing public right of way charging. The reviewer commented that providing shared EVs at affordable housing is a great way to ensure charging is used, and provides benefits to the local residents and community when not simply built as an amenity that may drive gentrification.

The reviewer found the major concern to be the project’s long term business model. The reviewer indicated that the statistic of “300 to 400 uses per month” equates to approximately three to four rentals per car per month, yet profitable private carshares typically see usage more like five hours per car per day. The reviewer noted that that is an order of magnitude growth needed to get close to breakeven. The reviewer stated that long term public funding may be inevitable, but if the service is not being heavily used and showing progress towards breakeven, it risks losing public and political support. The reviewer added that it is also less replicable or scalable to other regions at that point. The reviewer commented that, to be fair, nobody has this problem solved, but the project could take this challenge more seriously and move towards self-sufficiency.

***Question 3: Project Accomplishments and Progress-Please comment on the project’s progress and significant accomplishments to date.***

**Reviewer 1**

The reviewer stated that supply chain woes for charging, delays with permitting, etc. are inevitable right now, but, given the many challenges faced, the project seems to have made great progress. The reviewer added that the recall of Chevy Bolts has set back many projects recently as well. The reviewer was particularly impressed that the project has moved along as well as it has given all the moving parts and involvement of multiple partners, including two cities installing hardware in their rights of way.

#### **Reviewer 2**

The reviewer commented that, despite charging station installations taking years, challenges with recalls, microchip shortages, and coordination between the groups etc. this project has already seen much success, and noted that 30 Level 2 hubs have been installed or commissioned, 12 DC Fast locations have been confirmed and 12 of 50 vehicles for use by residents of MUDs have been secured. The reviewer remarked that, although the project has more than 50%-60% of installs to go, it has already created the basis for a highly visible and sustainable EV ecosystem in Saint Paul. The reviewer noted that this project has momentum and partners to amplify its message.

#### **Reviewer 3**

The reviewer commented that the delays in vehicle deliveries have limited the impact of the carshare vehicles, although early data does indicate the potential for strong usage. The reviewer recommended that the impacts be further evaluated when the project has been in use for longer.

#### **Reviewer 4**

The reviewer remarked that vehicle and EVSE procurements have reasonably progressed, despite supply chain constraints.

The reviewer observed that it seems that making progress in securing multi-unit dwelling (MUD) partners has been a challenge, in part due to their reluctance to commit parking spaces and staffing resources to support EV charging, and that the project would have benefited from including MUD partners as direct project participants. The reviewer found the number of outreach events held to be somewhat low at this point in the project (8 out of 25 held).

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

#### **Reviewer 1**

The reviewer remarked that there seems to be an impressive level of collaboration and alignment between the cities and other stakeholders in this project.

#### **Reviewer 2**

The reviewer found that the project demonstrated good collaboration among strong industry, local government, fleet, utility, community organizations and Clean Cities partners.

The reviewer commented that the project would have benefited from having MUD partners at the onset of the project.

#### **Reviewer 3**

The reviewer noted that this project involved coordination between many groups, and included working with the Utility (Xcel Energy), which likely involved paperwork and advanced planning, working with HOURCAR, identifying drivers, and working with Saint Paul to identify MUDs and garage locations.

#### **Reviewer 4**

The reviewer commented that the project involved coordination among partners including municipalities, the utility and vehicle and charging station providers to make the project happen, and noted that the leases were designed so the cities will own and operate by the end of the project.

***Question 5: Energy Equity and Environmental Justice Project Contribution-Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

#### **Reviewer 1**

The reviewer noted that project locations were selected using energy and environmental justice (EEJ) metrics, and that carshare programs have a sliding scale based on user income. In addition, the reviewer commented that the availability of program materials in multiple languages and translations services makes the program accessible to all linguistic groups.

#### **Reviewer 2**

The reviewer noted several strengths including that the project will provide charging for both car sharing service and non-carshare users, making the infrastructure open to the widest number of users in the community. Further, a large share of EV hub sites are sited or planned to be located in areas where 50% or more of residents are people of color.

#### **Reviewer 3**

The reviewer commented that this project found an innovative way to bring charging stations to underserved communities, in the form of an app that makes 24/7 translation and interpretation services available and that has a relatively fast verification and member approval process.

#### **Reviewer 4**

The reviewer remarked that East Metro Strong seems to be a solid community partner, but that beyond that, it is not clear how much engagement and support there is with community based organizations. In the selection of multifamily housing locations, the criteria seemed to emphasize city priorities. The reviewer commented that the criteria did not include more issues like the need for residents to commute to work, history of redlining or gentrification, etc.

The reviewer commented that more funding and capacity for the project to actively recruit and inform community housing operators, and more funding and support to the housing operators for staffing and outreach was needed. The reviewer added that the project is counting on community based organizations to dedicate staff time and resources to supporting this program, when best practice would be to provide resources to those organizations to ensure this project does not place further burdens on them.

The reviewer noted that the project did not seem to intentionally work with minority and women owned business enterprise (MWBES) in the acquisition and installation of the charging infrastructure.



**Presentation Number:** ti127  
**Presentation Title:** Mid-Atlantic Electrification Partnership  
**Principal Investigator:** Al Christopher, Virginia Department of Mines, Minerals, and Energy

**Presenter**

Al Christopher, Virginia Department of Mines, Minerals, and Energy

**Reviewer Sample Size**

A total of four reviewers evaluated this project.

**Question 1: Project Objectives—**  
*Please provide comments on this project’s degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.*

**Reviewer 1**

The reviewer noted that the project is developing an electrification ecosystem focused on private light-duty EVs, rideshare EVs, freight, and transit electrification throughout the mid-Atlantic, which is strongly aligned with DOE/VTO/TI objectives.

The reviewer commented that Argonne National Laboratory-developed tools (generated under the project) can be more widely used/leveraged outside the project.

**Reviewer 2**

The reviewer stated that the project generally meets the overall objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency. The reviewer noted that integrating EVs helps with fuel diversity, and ensures that more community members with EVs look to drive their electric vehicles to Baltimore/Washington International Airport (BWI), versus rideshare with an internal combustion engine vehicle. Solar stations help bring more resiliency.

**Reviewer 3**

The reviewer commented that the project includes a number of different applications for electric vehicles and charging. The reviewer noted that project impacts were somewhat limited due to pandemic related delays to vehicle delivery and infrastructure completion.

**Reviewer 4**

The reviewer noted that the project seems to be largely a straightforward installation of EVSE, provision of vehicles, and related outreach activities, a broad approach that includes a little bit of everything, but stated that

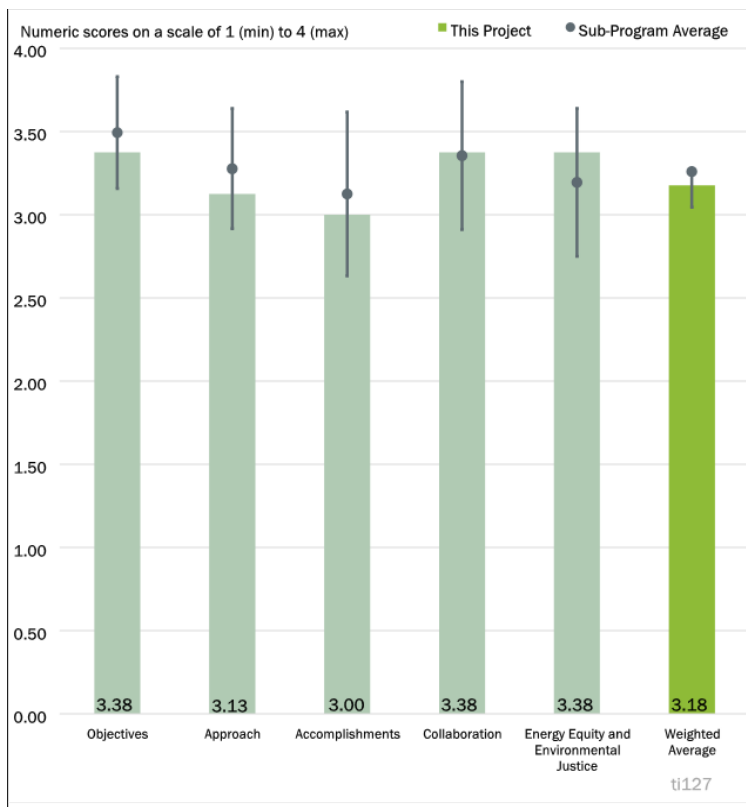


Figure 6-2 - Presentation Number: ti127 Presentation Title: Mid-Atlantic Electrification Partnership Principal Investigator: Al Christopher, Virginia Department of Mines, Minerals, and Energy

it is not clear there is a compelling or innovative underlying approach or theory of change about barriers the project is trying to overcome. The reviewer added that it seems to be a very general project to support and advise Virginia and some other mid-Atlantic states about EV matters. The reviewer posited that some of this may be a function of the presentation, which was lacking in details, some of which came out during the oral presentation.

The reviewer indicated a need for a stronger understanding of what systemic barriers the project is attempting to overcome, what tools it is working to develop, and what systems change it is trying to achieve in order to “build an EV ecosystem” in the region.

***Question 2: Project Approach-Please comment on this project’s approach for integrating advanced transportation technologies and practices to solve real-world challenges.***

**Reviewer 1**

The reviewer commented that the project approach involves strong innovative components, including a solar canopy charging deployment/demonstration station targeted towards workplace charging, and that it includes outreach components that are important for helping to drive interest and infrastructure use.

The reviewer remarked that some of the tool’s development seems disjointed from the Mid-Atlantic focused activities, added that the degree to which station maintenance and uptime/reliability will be covered/addressed is not really discussed or known.

**Reviewer 2**

The reviewer stated that by focusing on BWI, the project would serve to help BWI and increase traffic from farther distances than would otherwise have been able to drive and fly from BWI; however, it is not necessarily the local community that would go to local retail stores. The reviewer noted that the project did add 25 vehicles to a rideshare which certainly helps reduce greenhouse gases (GHGs) and increases local resiliency.

**Reviewer 3**

The reviewer noted that the project addresses a number of different facets of transportation electrification; however, this multi-pronged approach may limit the impact in any single area.

**Reviewer 4**

The reviewer stated that it is not clear how the project is integrating technologies to overcome real world challenges, other than simply providing some charging, vehicles, and outreach. The reviewer added that the presenter talked about it as a “miniature laboratory of democracy,” but it was not clear from the presentation what sort of tools or playbooks will be developed to facilitate scaling or replication beyond the project period. The reviewer acknowledged, however, that the project does seem to be starting to show success in delivering concrete benefits (vehicles and charging) across the region.

***Question 3: Project Accomplishments and Progress-Please comment on the project’s progress and significant accomplishments to date.***

**Reviewer 1**

The project exceeded goals on outreach and laid the groundwork for widespread infrastructure deployment.

**Reviewer 2**

The reviewer commented that this project involved educating at more than 15 in-person and online outreach events held (8 were planned), which shows this group is getting the word out, and added that the group selected project partners in minority groups or those that would truly be able to understand what an equitable

transition should look like. The reviewer opined that selecting a university as a place to install a renewable solar station serves to get the word out in a big way and encourage students to go electric, and that with over 21,000 students, James Madison University was an ideal location to choose. The reviewer speculated that, if popular, it may encourage University officials to get more stations.

### **Reviewer 3**

The reviewer stated that the project accomplishments made to date are impressive, particularly the outreach and education tasks. The reviewer added that charging station and vehicle deployments have been slower, but this is presumably due to post-pandemic supply chain constraints. Strengths included that some of the first revenue-generating stations in WV were installed under this project, and the stations installed at BWI are NEVI-compliant.

The reviewer observed that the project is underspent by quite a bit, and assumed this is due to vehicle and equipment procurement delays, although this wasn't explained during the presentation.

### **Reviewer 4**

The reviewer observed that, even with the extension, this project seems to be well behind schedule, with about 10% of funding expended with 25% of project period past. The reviewer expressed sympathy regarding the supply chain delays, vehicle acquisition challenges, and delays of working with public agencies, but added that it seems the project also brought some of this on itself through design, e.g. by focusing on working with cities to install charging and serve as site hosts. The reviewer opined that it sounds like the project has lacked focus and has been pulled into providing whatever support the region wants (e.g., help with National Electric Vehicle Infrastructure [NEVI] planning.), which shows responsiveness to the communities served, but also seems to distract the team from achieving the core goals outlined in the project proposal.

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

### **Reviewer 1**

The reviewer noted that the project has forced utilities from significantly different jurisdictions to talk and work together on numerous key issues, and added that the team includes a diverse set of community, industry, lab, utility, end-user and Clean Cities partners that have worked well together in carrying out accomplishments to date.

### **Reviewer 2**

The reviewer commented that research informed education and vice versa. The reviewer noted that the team could have brought in the analysis collaboration and even EV charging station stakeholders such as utilities and vendors to help in their education material, but that, overall, they did a great job. The reviewer found that the project does not address the affordability issue of electric vehicles and the inability of certain groups to access them, but that the analysis piece allows project partners to identify charging gaps and assess their location in relation to underserved communities, which could help when entities do have funding in the future.

### **Reviewer 3**

The reviewer found that the large number of stakeholders involved reflects positively on the coordination abilities of the project staff; however, it was not clear how much interaction there is between different aspects of the project. For example, does the ride and drive outreach contain information on the infrastructure that is being deployed?

#### **Reviewer 4**

The reviewer stated that the roles of team members are not entirely clear. The reviewer added that EVNoire and some Clean Cities coalitions seem to be doing some regional outreach, though details are unclear, and it is not clear how they are engaging with other stakeholders in the region that influence vehicle purchase and charging installation decisions.

The reviewer noted that the labs seem to be working together fairly well to do modeling and studies, but that it is not entirely clear how those are then being used by states or utilities in the region.

***Question 5: Energy Equity and Environmental Justice Project Contribution-Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

#### **Reviewer 1**

The reviewer commented that the project provides some analysis that can serve as starting points for NEVI recipients and law makers when thinking of how to disperse funding, stations and resources. The reviewer added that the study addresses carsharing as one method of getting electric vehicles into use by all members of a society. The reviewer noted that there are still issues with how to fully address funding inequities, but that law makers and others can certainly use this project as a great starting point. Great work!

#### **Reviewer 2**

The reviewer commented that project partners have working relationships with Historically Black Colleges and Universities (HBCUs) and the National Society of Black Engineers.

The reviewer noted that infrastructure placement under the project will be informed by Argonne's Energy Zones Mapping Tool (EZMT), taking some of the same approach and data being used for the development of the Electric Vehicle Charging Justice 40 Map.

#### **Reviewer 3**

The reviewer commented that the project features strong outreach to historically underserved populations, as well as infrastructure placed in EEJ identified communities.

#### **Reviewer 4**

The reviewer stated that the modeling work / EZMT is interesting and seems beneficial, as does the recent case study, but that the project could be doing more to share and promote those results. The reviewer commented that the sample outputs provided seem a bit off, if they are estimating household transportation costs of less than 5%, which seems shockingly low.

The reviewer observed that the connection with HBCUs is interesting but not well explained. No details were presented on how many such events were organized, how many people participated, etc. The reviewer added that the E-Mobility Equity conference that was noted was funded by other sources, and was national in scope. That conference did create an opportunity to talk about some of the work this project is doing—but it was not part of this project.

**Presentation Number: ti128**  
**Presentation Title: Western Smart Regional Electric Vehicle Adoption and Infrastructure at Scale**  
**Principal Investigator: James Campbell, PacifiCorp**

**Presenter**

James Campbell, PacifiCorp

**Reviewer Sample Size**

A total of two reviewers evaluated this project.

**Question 1: Project Objectives—**  
**Please provide comments on this project’s degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.**

**Reviewer 1**

The reviewer found the project to be highly aligned with VTO/TI objectives as it addresses five timely/relevant focus areas: highway EV corridors, urban EV mobility, freight and port electrification, community and workplace charging, and EV access and training for underserved regions. The reviewer added that energy resiliency is a key component of the project that strongly aligns with DOE objectives.

**Reviewer 2**

The reviewer stated that this project supports charging deployments addressing multiple users in both urban and rural areas, and shows the capabilities of electric transportation in a variety of use cases.

**Question 2: Project Approach—Please comment on this project’s approach for integrating advanced transportation technologies and practices to solve real-world challenges.**

**Reviewer 1**

The reviewer stated that multiple approach areas broaden project impacts to corridors, underserved communities, and freight issues, among others.

**Reviewer 2**

The reviewer stated that the effort is focused on procuring the right vehicles with best available range (for eCarshare), and that coupling the carshare service with affordable housing and targeting users that would benefit from not needing a car to start with, or would have issues getting insurance, etc., is a smart approach. The reviewer added that coupling electrified rail with medium-duty/light-duty (MD/LD)/micro-mobility charging (intermodal hub) is also an smart and innovative approach.

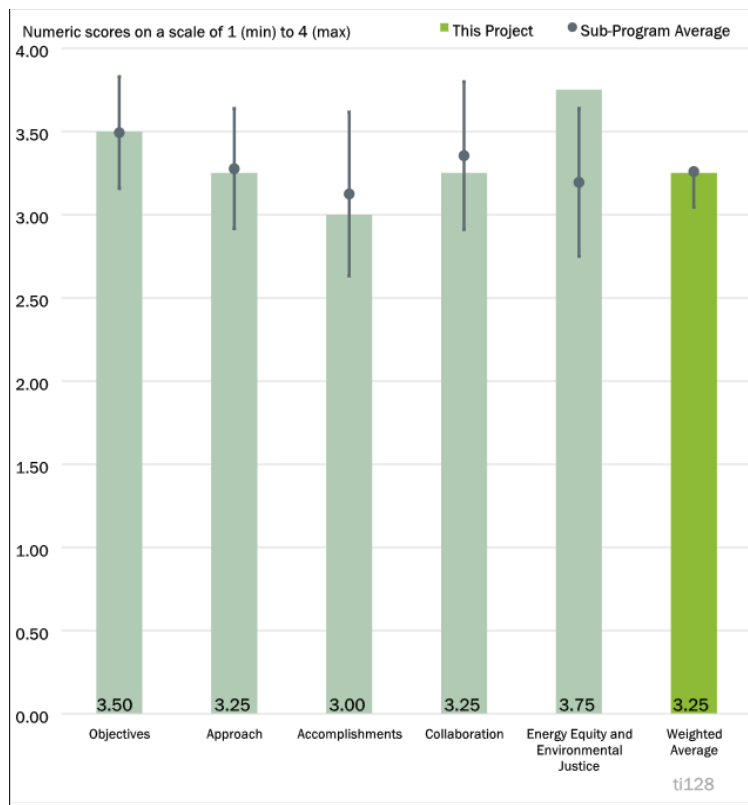


Figure 6-3 - Presentation Number: ti128 Presentation Title: Western Smart Regional Electric Vehicle Adoption and Infrastructure at Scale Principal Investigator: James Campbell, PacifiCorp

The reviewer expressed the view that there perhaps should have been a better plan for approaching National Park Managers (who are apparently the gatekeepers to park coordination and vary in terms of their interest and accessibility), at the onset of the project. Additionally, the project may be somewhat unwieldy, as it is seeking to do a lot, and perhaps too much.

***Question 3: Project Accomplishments and Progress—Please comment on the project’s progress and significant accomplishments to date.***

**Reviewer 1**

The reviewer noted that the project has completed the modeling and planning stages and is now well into deployment, data collection on subprojects will help to further quantify the impacts of these effort, and the use of NREL’s EVI-Roadtrip model was good.

**Reviewer 2**

The reviewer remarked that the project has 50 transportation network company (TNC) drivers engaged and providing EV use data, which is excellent, and noted that the project has made significant progress in data collection activities across a wide range of sub-project areas, including TNCs, inland port electrification, airport electrification, and workplace charging.

The reviewer commented that the project’s budget seems underspent, and noted that this was not explained during the presentation, nor was the plan to catch-up on progress.

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

**Reviewer 1**

The reviewer remarked that the project includes strong participation from multiple states in the utility territory, multiple Clean Cities Coalitions, academic and community partner, and noted that regular communications and collaborations leveraged this wide network.

**Reviewer 2**

The reviewer noted that the project team includes a wide range of utility, lab, university, advocacy, and Clean Cities partners that appear to be collaborating well in executing various sub-project/task areas under the project.

The reviewer commented that it is not completely clear to what extent relevant data sharing/coordination is happening with the Regional Electric Vehicle (REV) West project and the National Association of State Energy Officials (NASEO). The reviewer added that it also is not clear to what extent the project is coordinating with or consulting with state Departments of Transportation (DOTs) on Alternative Fuel Corridor planning. Additionally, the engagement of parks/FLMAs has been a tough aspect for the project.

***Question 5: Energy Equity and Environmental Justice Project Contribution—Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

**Reviewer 1**

The reviewer observed that the project is supporting EV training programs in underserved rural areas (i.e., Western Wyoming, and noted that the project’s focus on freight electrification and EV hub placement at affordable housing locations substantively supports equity and environmental justice (EJ) goals.

**Reviewer 2**

The reviewer noted that multiple project activities directly and indirectly served to advance EEJ efforts; notably, workforce trainings were directly geared to these communities, while carshare and TNC efforts served underserved community members.

**Presentation Number: ti129**  
**Presentation Title: Helping America’s Rural Counties Transition to Cleaner Fuels and Vehicles**  
**Principal Investigator: Ken Brown, Transportation Energy Partners**

**Presenter**

Ken Brown, Transportation Energy Partners

**Reviewer Sample Size**

A total of two reviewers evaluated this project.

**Question 1: Project Objectives—**  
*Please provide comments on this project’s degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.*

**Reviewer 1**

The reviewer found that this project directly supports the Technology Integration program’s objective of improving fuel diversity through the use of alternative fuels, specifically in its focus on rural communities. The objective of the project is to work with rural communities to understand their challenges in implementing alternative fuel vehicles (AFVs) and then distribute a playbook of lessons learned so that successes can be replicated across the country. The reviewer remarked that this project would provide Clean Cities coalitions important information on how to work with rural communities in their areas.

**Reviewer 2**

The reviewer remarked that this is a truly “all of the above” approach to clean fuels, which is innovative and a strength, and that it also seems to focus almost exclusively on vehicles that are not passenger cars, which is innovative.

The reviewer opined that, the project’s broad range of vehicle types (from 3 wheeled Arcimoto to heavy-duty (HD) bucket trucks and school buses,) and some of its activities feel slightly random, and noted that it is not clear what the project’s key theory of change is.

**Question 2: Project Approach—**  
*Please comment on this project’s approach for integrating advanced transportation technologies and practices to solve real-world challenges.*

**Reviewer 1**

The reviewer observed that the project approach seems to mirror the successful strategies of Clean Cities coalitions working with stakeholders to implement projects. The reviewer added that one of the key factors often cited in successful projects is having a “champion” within the organization that is deploying vehicles, and noted that the project’s ultimate goal is to find local leaders that could be used as national spokespersons.

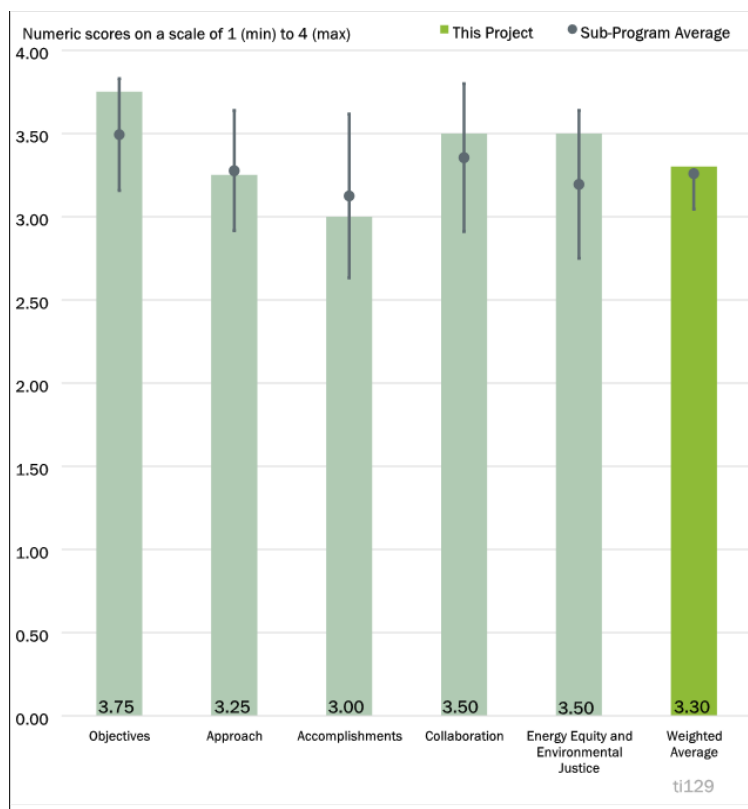


Figure 6-4 - Presentation Number: ti129 Presentation Title: Helping America’s Rural Counties Transition to Cleaner Fuels and Vehicles Principal Investigator: Ken Brown, Transportation Energy Partners



The reviewer noted that the first part of the project focused on identifying interested parties in rural communities that would want to participate in the effort. The project also obtained a range of industry partners to cover a wide variety of fuel/powertrain types, which will help with the success of the effort by allowing communities to have the options to choose what vehicles make sense for them. The reviewer observed that the project’s approach involves connecting these communities with subject matter experts. In the reviewer’s opinion, one challenge of this approach is that it seems the project is relying on industry partners representing specific fuels to be the experts, and project partners will need to make sure that the Clean Cities coalitions act as the neutral party to provide unbiased information.

#### **Reviewer 2**

The reviewer commented that this project identifies several barriers to clean fuels and new technologies in small and rural communities, but it is not clear that the project is well designed to address many of them. The reviewer added that it does seem likely to provide some support and help create some success stories that can be shared peer-to-peer, however. The reviewer added that more troubling is that the project does not have a clear definition of “small” or “rural”, and at least some of the selected counties are not particularly rural.

#### ***Question 3: Project Accomplishments and Progress—Please comment on the project’s progress and significant accomplishments to date.***

#### **Reviewer 1**

The reviewer commented that the project seems to be fairly well on track for budget period 1, which was mostly outreach and education; however, it is much less clear whether the project will be able to deliver its ambitious program of hands-on technical assistance in eight states, and connect communities in these states with demonstration vehicles, during BP2. The reviewer expressed deep skepticism that the project can deliver that level of support and shuttle demonstration vehicles across the country within a year or so.

#### **Reviewer 2**

The reviewer commented that the major accomplishment of the project so far was being able to identify fifteen “champions” in the eight states that are part of the project. In addition, eight demonstration vehicles were contracted with project partners. The reviewer noted, however, that the project was still in negotiation about additional natural gas and propane vehicles, and it was unclear if they would be able to secure a demonstration of electric vehicles. Supply chain issues have impacted the availability of vehicles for this project, which could limit the success of the engagement with the community leaders. The reviewer noted that the project partners were able to complete the national outreach webinars, and that, while in progress, coalitions have not yet completed their stated goal of 24 outreach events with at least three performed in each state as of the presentation.

#### ***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

#### **Reviewer 1**

The reviewer remarked that Clean Cities coalitions have a strong history of working well together and have selected industry partners that have done significant work to support the Clean Cities mission. The reviewer noted that the presentation stated that the coalitions are having monthly calls, and quarterly all team meetings. The reviewer opined that at this early point in the project as the team is trying to identify community leaders, it seems collaboration may be less of a focus, but as the project progresses to do fleet analyses and collect lessons learned, strong collaboration and coordination will be needed.

#### **Reviewer 2**

The reviewer observed that participation by eight Clean Cities coalitions seems to be strong, and that participation of multiple fuel stakeholders on the steering committee and in the project is strong and impressive. The reviewer noted, however, that there seems to be limited participation from electric vehicle and charging stakeholders, and electric utilities, which would strengthen the project.

The reviewer commented that rural counties and communities are identified as key partners, but do not seem to be formal partners in the project, and noted that it would strengthen the project a lot if it could build partnerships and support within state and national associations of counties, cities, city managers, school districts, etc.

***Question 5: Energy Equity and Environmental Justice Project Contribution-Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

**Reviewer 1**

The reviewer commented that rural communities are often underserved, but it is not clear that can be taken for granted. The reviewer noted that this project does not seem to have a clear and consistent understanding or approach to defining and centering underserved and overburdened communities. In other words, there is a big difference between a “rural community” on Martha’s Vineyard and a rural cotton-growing community in Alabama, for example. The reviewer added that it is not clear that there are strong equity voices on the project steering committee.

The reviewer remarked that, apparently, twelve of the 24 counties being focused on have above average poverty and a couple have “above average” shares of Black and Native residents. The reviewer added that it is understandable to focus on counties that are most interested, as this project does, but that is going to select for early adopters rather than equity. The reviewer commented that benefits would be stronger if the project did more focused outreach and recruitment and DEI were a more explicit criteria in selection of the 24 counties that will receive focused support.

**Reviewer 2**

The reviewer remarked that this project is focused on supporting rural communities that have the resources to effectively analyze the use of alternative fuel vehicles in their area. The reviewer noted that the project includes rural areas in eight different states (with the goal of working in 24 counties), that will provide geographic variety. This variety will be beneficial as different communities have different priorities and being able to work through those issues should provide significant lessons learned for others trying to implement projects in their rural communities. The reviewer observed that the project stated that cost savings have typically been a key focus, as well as downtime, for rural communities looking at alternative fuel vehicles. This project has the opportunity to demonstrate vehicles to new communities that may provide those benefits as well as others, including lower emissions and fuel diversity.

**Presentation Number:** ti130  
**Presentation Title:** VOICE-MR:Vocation Integrated Cost Estimation for Maintenance and Repair of Alternative Fuel Vehicles  
**Principal Investigator:** Arvind Thiruvengadam, West Virginia University

**Presenter**

Arvind Thiruvengadam, West Virginia University

**Reviewer Sample Size**

A total of three reviewers evaluated this project.

**Question 1: Project Objectives—**  
*Please provide comments on this project’s degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.*

**Reviewer 1**

The reviewer commented that this effort addresses a key data gap that is missing when performing cost of ownership analysis of heavy-duty alternative fuel vehicles versus their diesel counterparts by examining the potential maintenance savings that AFVs may provide based on fuel type, vocation, and geographic region. The reviewer added that public maintenance data is very limited for both diesel with new aftertreatment technologies (selected catalytic reduction and particulate filters) and AFVs. If the data shows that there are clear maintenance savings for certain AFVs that would help in the deployment of these technologies, which would improve fuel diversity and potentially improving resiliency. Further, this may also lead to GHG benefits, but not necessarily, as fossil natural gas and propane vehicles may not provide much, if any, benefits, even though they have lower maintenance costs.

**Reviewer 2**

The reviewer stated that this effort is very important to overcoming fleet resistance to using alternative fuel vehicles that support the TI objectives highlighted above. The resistance addressed relates to uncertainty regarding operational costs and potential savings related to maintenance so this project’s focus on identifying better data and using artificial intelligence to project similar costs and benefits for other applications is good use of DOE funding.

**Reviewer 3**

The reviewer remarked that this project is directly addressing identified barriers for fleets to transition to AFVs and, importantly, is delineating data by vocation, duty-cycle and regional temperature variations which will make the end result more precise and thus more informative to fleets.

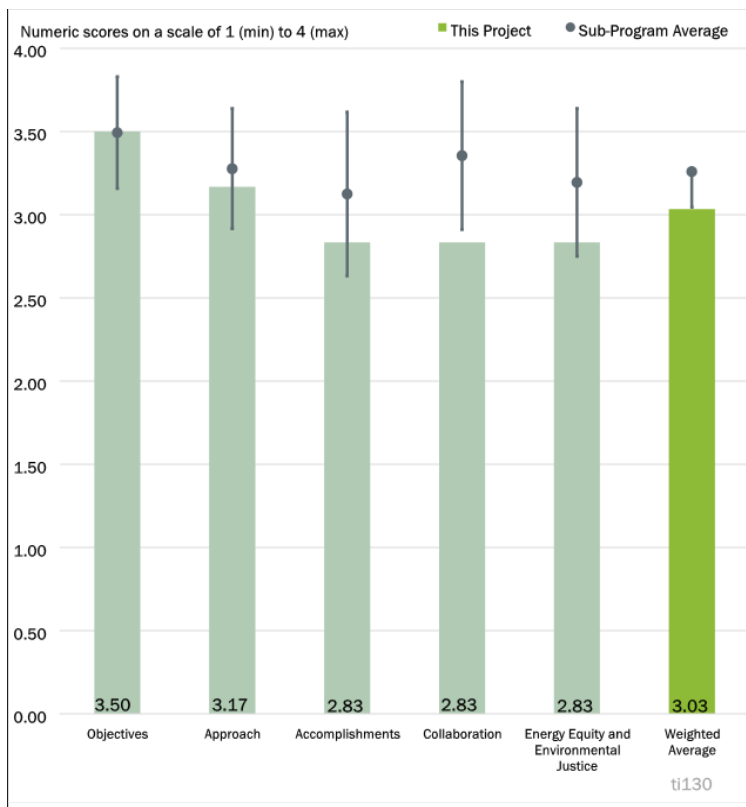


Figure 6-5 - Presentation Number: ti130 Presentation Title: VOICE-MR:Vocation Integrated Cost Estimation for Maintenance and Repair of Alternative Fuel Vehicles Principal Investigator: Arvind Thiruvengadam, West Virginia University

***Question 2: Project Approach-Please comment on this project's approach for integrating advanced transportation technologies and practices to solve real-world challenges.***

**Reviewer 1**

The reviewer remarked that the key to success of this project is being able to collect significant amounts of maintenance and repair data from a variety of fleets/vehicles efficiently. The project benefits from being able to leverage data collection from one of its partners projects (South Coast Air Quality Management District [SCAQMD]) to the right. The challenge of this type of effort is that while it is beneficial to collect as much data as possible from a wide variety of fleets, this can lead to significant data cleaning efforts by the project team due to the variability in record-keeping of different fleets. The reviewer noted that the presenter mentioned that they have been scanning paper records to put into a database, which is a laborious process. Still, it is necessary to have a good relationship with the fleets to be able to do their fleet interviews and follow-up on the data. The project task to create a web interface for data gathering is a good idea if it allows fleets to submit data easily.

The reviewer noted two other major components of the project and issues related to them: One was the project's effort to tie maintenance cost data to the vehicle's duty cycle through the use of telemetry data and other factors such as ambient temperatures and vehicle age. This is an important factor to understand as anecdotal discussions of maintenance of diesel vehicles with the most recent aftertreatment technologies have suggested that low speed and low load conditions were problematic. Therefore, it is necessary to differentiate duty cycles when doing comparisons with alternative fuel vehicles. A second factor cited by the reviewer was creating a machine learning model to estimate maintenance costs based on duty cycle. From the presentation, the machine learning aspects of the project are not necessarily clear on how they will be implemented and how the project team will mitigate biases in training this model.

**Reviewer 2**

The reviewer remarked that this may not directly involve integrating technology but rather is about understanding the advantages of different advanced technologies by reviewing and assessing data on maintenance and costs. The reviewer added that the technology integration could be the development of the artificial intelligence used in this project.

**Reviewer 3**

The reviewer indicated that there is so much variety in the medium and heavy duty vehicle space and this is a difficult task to tackle, but this project is a good starting point. The sample size and vocation list is a good start, but may not reach a statistically significant threshold to draw accurate conclusions for all vocations and regions of the country. The reviewer pointed out that the vocation list in particular is quite limited compared to the Engine Manufacturers Association's (EMA)'s list of 90+ vocations and is missing some key applications such as regional haul, transit, etc.

***Question 3: Project Accomplishments and Progress-Please comment on the project's progress and significant accomplishments to date.***

**Reviewer 1**

The reviewer commented that it sounds like there have been some delays that are not surprising; however, it would be useful to make sure alternative fuel data increases to better match diesel data.

**Reviewer 2**

The reviewer noted that the project seems to be largely on track after a delayed start, and that it would be helpful to see more fleets committing to contributing data, especially fleets in the middle of the country, along with a greater diversity of vocational types.

### **Reviewer 3**

The reviewer noted that the project looks to be behind schedule, and the presenter mentioned that the pandemic had led to challenges in collecting fleet data. In addition, delays in sub award agreements with Clean Cities coalitions have slowed participation as well. It was mentioned when the presentation was developed that 200 vehicles were providing data (100 coming from a SCAQMD project), and that by the time the presentation was done they were up to 350. The presentation showed that 17 fleet types were identified for agreements to share data, while 7 fleets were sharing data at the time of the presentation being developed. The reviewer commented that it was not clear from the presentation what the project's goal was for data collection for each vehicle vocation, so it is difficult to gauge how close they are to meeting their own expectations at the beginning of the project.

The reviewer added that as the project is only focusing on production vehicles, it is understandable that they have so few electric vehicles; however, they are missing a key vocation in transit buses to collect EV as well as other alternative fuel powertrain maintenance cost data. The reviewer strongly recommended that they collect this data even in cases where they may not have a diesel counterpart to compare to, and noted that this seems to be the plan for some of their propane vehicles. Collecting transit bus data would likely provide some hybrid diesel data as well. The reviewer noted that there is a significant percentage of propane vehicles being collected so far, which is understandable since the Propane Education and Research Council (PERC) is one of the project partners; however, it would be beneficial to focus efforts on collecting additional natural gas vehicle data.

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

### **Reviewer 1**

The reviewer remarked that it looks like a great team has been put together, as well as processes to collect and review data.

### **Reviewer 2**

The reviewer noted that the project team is quite small and academically focused, and the addition of Clean Cities partners, fleets and industry groups from other regions of the country, and other AFV types, would be beneficial to ensure the final product is useful to fleets as a decision making tool.

### **Reviewer 3**

The reviewer noted that Clean Cities coordinators have helped with initial conversations to introduce fleets to West Virginia University (WVU); however, delays in sub award agreements with Clean Cities coalitions have slowed participation. The reviewer commented on the presenter's statement that funding partners help target which fleets to go after, saying that the process was not explained very well. The reviewer added that it seems the team needs further coordination to make sure that a wide range of fleets in different vocations throughout the country are being engaged.

***Question 5: Energy Equity and Environmental Justice Project Contribution-Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

**Reviewer 1**

The reviewer indicated that it is difficult to grade this project on equity and environmental justice, as the focus is on collecting data to support fleet decision-making, but added that ultimately, the data from this project can lead to increased AFV adoption, which may ultimately provide emissions benefits to communities in both rural and underserved areas. The reviewer noted that the project is trying to get data in rural regions and help fleets in those areas to understand their experience, although it is not clear how successful they have been so far at this.

**Reviewer 2**

The reviewer stated that this type of project is a precursor to future deployment that will provide benefits sought here, i.e., equity and environmental justice, so this is important. The reviewer added that this work will not directly influence those objectives but will be useful to future projects directed at serving those objectives.

**Reviewer 3**

The reviewer observed that the presenter did not address impacts to underserved and overburdened communities in slides or in the presentation. The reviewer surmised that increased use of alternative fuel vehicles will positively impact air quality and potentially lower transportation and health costs in these communities, but stated that it was not directly noted in the presentation.

**Presentation Number: ti131**  
**Presentation Title: DRIVE (Developing Replicable, Innovative Variants for Engagement) for Electric Vehicles (Evs) in the USA**  
**Principal Investigator: Jonathan Overly, East Tennessee Clean Fuels Coalition**

**Presenter**

Jonathan Overly, East Tennessee Clean Fuels Coalition

**Reviewer Sample Size**

A total of three reviewers evaluated this project.

**Question 1: Project Objectives—**  
*Please provide comments on this project’s degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.*

**Reviewer 1**

The reviewer remarked that the project is focused on creating 14 replicable, statewide programs that are thriving in creating partnerships in each state, to greatly accelerate EV adoption across LD, MD and HD vehicle types. The reviewer praised this project as being strongly responsive and aligned with VTO/TI objectives.

**Reviewer 2**

The reviewer commented that this project is tackling education and outreach in a big way across a broad coalition of stakeholders, and applauded it for having a good mix of grassroots engagement paired with an overarching objective, and for being built in a way that is intended to be easily replicated.

**Reviewer 3**

The reviewer commended the project for its strong multistate team, and for leveraging many different activities including a statewide, branded program; consumer education; utility and regulator engagement; EV charging infrastructure and planning; education of state and local government officials; dealer engagement; and fleet engagement and EV adoption. The reviewer found this to be an admiral set of objectives, but posited that it remains to be seen if the project will be more effective in some issue areas than in others.

**Question 2: Project Approach—**  
*Please comment on this project’s approach for integrating advanced transportation technologies and practices to solve real-world challenges.*

**Reviewer 1**

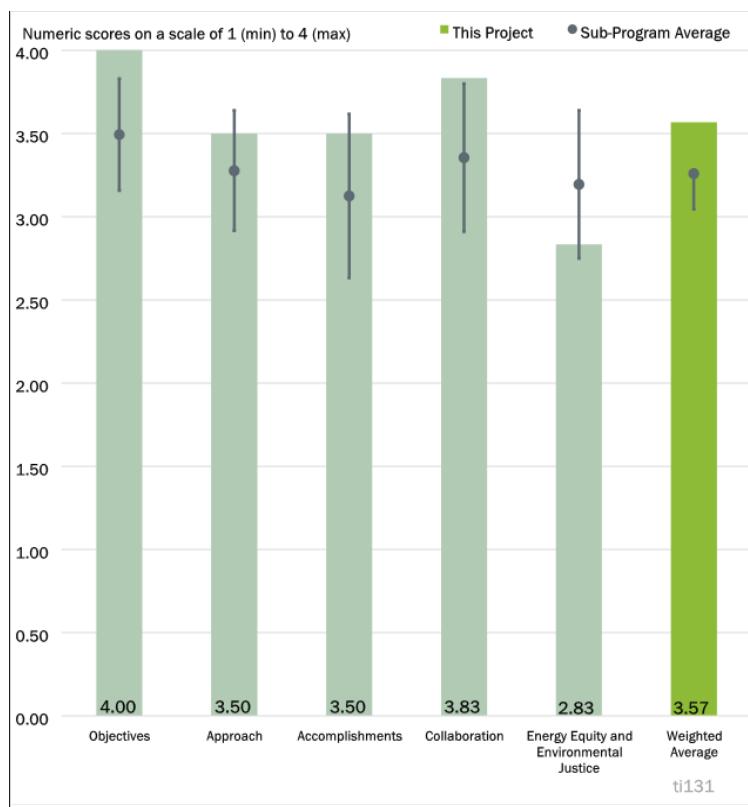


Figure 6-6 - Presentation Number: ti131 Presentation Title: DRIVE (Developing Replicable, Innovative Variants for Engagement) for Electric Vehicles (Evs) in the USA Principal Investigator: Jonathan Overly, East Tennessee Clean Fuels Coalition

The reviewer remarked that the project approach is very focused on building a replicable EV education and outreach program, and noted that it has seven priority areas, with project objectives and milestones that are well aligned with those priorities.

#### **Reviewer 2**

The reviewer commented that the DRIVE USA project is bringing many different activities together, with priority areas that include consumer education, utility engagement, dealer engagement, and charging infrastructure planning.

#### **Reviewer 3**

The reviewer commented that the project comprehensively assesses each state's EV readiness, and noted that local dealer engagement and targeted general management at each local dealer to address staff turnover is a key part of the project's strategy/approach.

The reviewer observed that the project is collecting a lot of information on activities and programs within each participating state, but noted that it was not clear from the presentation to what extent, if any, the project is providing valuable state data to the Alternative Fuels Data Center (AFDC), and stated that this could be a missed opportunity.

***Question 3: Project Accomplishments and Progress—Please comment on the project's progress and significant accomplishments to date.***

#### **Reviewer 1**

The reviewer observed that the project has completed all budget period one activities on schedule and has also completed many of the budget period two activities, and noted that they are also well ahead of their stated goals for media engagements, media impressions and direct engagements, including two high profile events with state governors.

#### **Reviewer 2**

The reviewer commented that collaboration leading to the creation or strengthening of 14 statewide programs will be a solid impact, and noted that the group seems to have done a good job of establishing the process and connections to make that happen. The reviewer also commented that they are recording significant outreach impacts from digital engagements and impressions, as well as in person outreach, and that these numbers will exceed the original goals.

#### **Reviewer 3**

The reviewer remarked that the project has started (from ground up) new EV initiatives in nine states, and has furthered existing EV initiatives in five states.

The reviewer commented that the project's budget seems underspent, and noted that neither this nor a plan to catch up on progress was explained during the presentation.

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

#### **Reviewer 1**

The reviewer commented that the well-represented Project Advisory Committee (PAC,) consisting of 53 individuals from 34 different key organizations, such as Plug In America, NASEO, National Rural Elec. Coop. Assn., CALSTART, etc., is an excellent feature of the project. The reviewer added that the project involves an impressive statewide partner mix within each participating state.



**Reviewer 2**

The reviewer expressed appreciation for the project leadership team’s approach to bringing this particular collection of states together, and stated that the involvement of 14 states that are in the middle of the pack on EV adoption is very helpful in tackling the EV adoption challenges being experienced by the average citizen, fleet manager, government leader, etc. The reviewer noted that the team seems to be collaborating effectively and even attracting new partnerships in the process.

**Reviewer 3**

The reviewer noted strong collaboration among 14 different Clean Cities Coalitions, and a PAC that has 34 additional organizations participating. The reviewer commented that with various subcommittee meetings, the level of participation and engagement seems very high.

***Question 5: Energy Equity and Environmental Justice Project Contribution-Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

**Reviewer 1**

The reviewer remarked that the project has been committed to inclusive statewide partnerships since the beginning and is incorporating additional communities that are of interest to DOE.

**Reviewer 2**

The reviewer commented that there are many indirect equity and EJ benefits from the project, although this is not a main focus of the scope.

**Reviewer 3**

The reviewer stated that, overall, this seems like a strong project with statewide engagement, including states that have not yet had strong EV programs. The reviewer observed that although EEJ had not been a core focus, the project sought strong rural outreach, and is supporting Clean Cities coalitions that are looking to ensure equity considers are included as part of their core operations.

**Presentation Number:** ti132  
**Presentation Title:** The National Fire Protection-Association (NFPA) Spurs the Safe Adoption of Electric Vehicles through Education and Outreach  
**Principal Investigator:** Andrew Klock, National Fire Protection Association

**Presenter**

Michael Gorin, National Fire Protection Association

**Reviewer Sample Size**

A total of four reviewers evaluated this project.

**Question 1: Project Objectives—**  
*Please provide comments on this project’s degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.*

**Reviewer 1**

The reviewer commented that the project was created to directly support Technology Integration objectives

with regard to the adoption of electric transportation, and noted that education and training are key to adoption of an alternative fuel (electricity). The reviewer added that the project targets the public and particularly those directly involved with code enforcement and safety, and thoughtfully includes dealerships and insurance adjusters.

**Reviewer 2**

The reviewer remarked that the project is focused on increasing EV knowledge and enabling better community planning and preparedness that supports mass EV adoption, and noted that they are doing this through development of web-based learning and workshops with specific target audiences in mind.

**Reviewer 3**

The reviewer stated that the project supports the overall TI objectives, especially, increasing local resiliency, by providing local training on EV Community Preparedness.

**Reviewer 4**

The reviewer commented that this project actively increases local resiliency; however, it does not improve fuel diversity or reduce GHG emissions.

**Question 2: Project Approach—**  
*Please comment on this project’s approach for integrating advanced transportation technologies and practices to solve real-world challenges.*

**Reviewer 1**

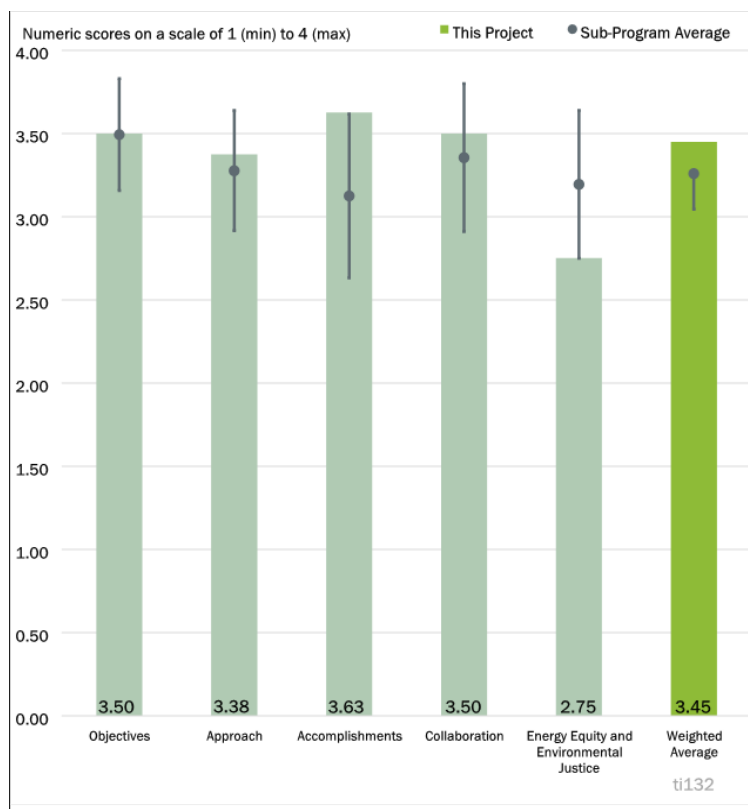


Figure 6-7 - Presentation Number: ti132 Presentation Title: The National Fire Protection-Association (NFPA) Spurs the Safe Adoption of Electric Vehicles through Education and Outreach Principal Investigator: Andrew Klock, National Fire Protection Association

The reviewer remarked that the project team has significant experience in providing training programs and has outlined an effective project approach, including development of multiple formats for training and segmented training modules based on the needs of specific audiences. The reviewer found the inclusion of many different audiences in the training curriculum to be particularly notable, and noted that beyond just first responders, there are also courses specific to insurance adjusters, crash reconstruction specialists, utilities, etc.

#### **Reviewer 2**

The reviewer commented that the project's approach was excellent, and noted that the workshops are being designed for both virtual and in-person attendance, which increases the potential for wider participation.

#### **Reviewer 3**

The reviewer remarked that the project supports integration of technologies, as it addresses education, the first step needed for individuals and fleets to consider integration of advanced technologies. The reviewer noted that lack of basic (and targeted) knowledge of EVs is a real world challenge to all who use transportation, and stated that the resulting online training and workshops offer an easy way to find the facts, benefits and pitfalls of the technology.

#### **Reviewer 4**

The reviewer applauded the project and the development phase of the modules, but saw room for improvement in the rollout process. The reviewer recommended that 40% of these workshops be held in disadvantaged communities and that at least one should be held in each state, and stated that there could be more marketing around the workshops and the online modules.

***Question 3: Project Accomplishments and Progress—Please comment on the project's progress and significant accomplishments to date.***

#### **Reviewer 1**

The reviewer observed that all budget period one milestones are completed and some from budget period two, and that the online training components have been fully implemented and some pilot workshops have been conducted. The reviewer complimented the project website as being highly polished and professional.

#### **Reviewer 2**

The reviewer commented that the project is on track and many achievements have been made. The reviewer was very impressed with the online modules.

#### **Reviewer 3**

The reviewer commented that the project is on target, all courses are complete, and Clean Cities coalitions are currently conducting Community Preparedness Assessment workshops.

#### **Reviewer 4**

The reviewer stated that the project has completed all the material for conducting workshops, and the only remaining major milestones are delivering the workshops.

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

#### **Reviewer 1**

The reviewer commented that the Principal Investigator was very informed and the team seems to work smoothly together.

**Reviewer 2**

The reviewer noted that the project team has a diverse advisory group and has also assembled a large list of workshop hosts.

**Reviewer 3**

The reviewer stated that the project team was very small, but exhibited good collaboration and coordination.

**Reviewer 4**

The reviewer commented that the project lead and partners are doing an excellent job with incentivizing clean cities coalitions to run these workshops, and noted the presenter’s statement that the website has been made available at no cost, which guarantees the online courses will be available after the project end date. The reviewer indicated that the workshops have value beyond the project end date that hopefully will continue beyond 2023. The reviewer added that as we learn more about adoption and community preparedness assessing, these tools will need to be updated, but noted that the presenter did not indicate if there is a plan for revision of these courses as policy and best practices change, and as newer models of charging and vehicles become available.

***Question 5: Energy Equity and Environmental Justice Project Contribution-Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

**Reviewer 1**

The reviewer commented that the project partners are interested in making their event accessible to everyone through virtual delivery options, and have identified both large and small communities to target for workshops. Marketing materials are targeted to audiences beyond the “usual suspects”.

**Reviewer 2**

The reviewer remarked that the project workshops and resources will support all communities; they are not specifically targeted toward underserved and overburdened communities.

**Reviewer 3**

The reviewer commented that the project can be a contributor to EEJ in the long term, and saw the benefit to the underserved as the result of the education received by communities.

**Reviewer 4**

The reviewer observed that, when asked about equity, the PI could really only point to the fact that these courses are free and available to everyone. The reviewer expressed the view that this is not enough, and that underserved and overburdened communities should be marketed to, to ensure the awareness of the tool, and that workshops should be held in these communities.

**Presentation Number: ti134**  
**Presentation Title: Delivering Clean Air in Denver: Propane Truck and Infrastructure in Mail Delivery Application**  
**Principal Investigator: Bonnie Trowbridge, Drive Clean Colorado**

**Presenter**

Bonnie Trowbridge, Drive Clean Colorado

**Reviewer Sample Size**

A total of four reviewers evaluated this project.

**Question 1: Project Objectives—**  
*Please provide comments on this project’s degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.*

**Reviewer 1**

The reviewer commented that deploying alternative fuel vehicles in higher mileage applications provides an excellent opportunity to displace petroleum and reduce GHG emissions, and the more that can be learned about duty cycles and operational needs of specific applications like this (regional mail delivery), the greater the likelihood others will undertake similar projects.

**Reviewer 2**

The reviewer observed that the project is clearly focused on using alternative fuel (liquefied petroleum gas, [LPG]) in a specific application (U.S. Postal delivery from depots to local post offices). The reviewer stated that there has been a lack of understanding of how this fuel could be applied to this application, which provides the opportunity to see significant per-vehicle fuel cost savings. The reviewer noted that the trucks operate 100 to 200 miles per day, and added that the idea is to help other fleets with similar types of trucks transition their fleets. The reviewer also noted that significant outreach and education are included as part of the project.

**Reviewer 3**

The reviewer commented that the project objectives are clear, i.e., to demonstrate the impact of a propane-powered fleet, by conducting real-world data collection and analysis on a United States Postal Service (USPS) fleet near Denver, Colorado.

**Reviewer 4**

The reviewer observed that propane is important in transportation fuel diversification and although this project involves a small number of trucks to be owned by one company (Hi Pro), the company is a nationwide

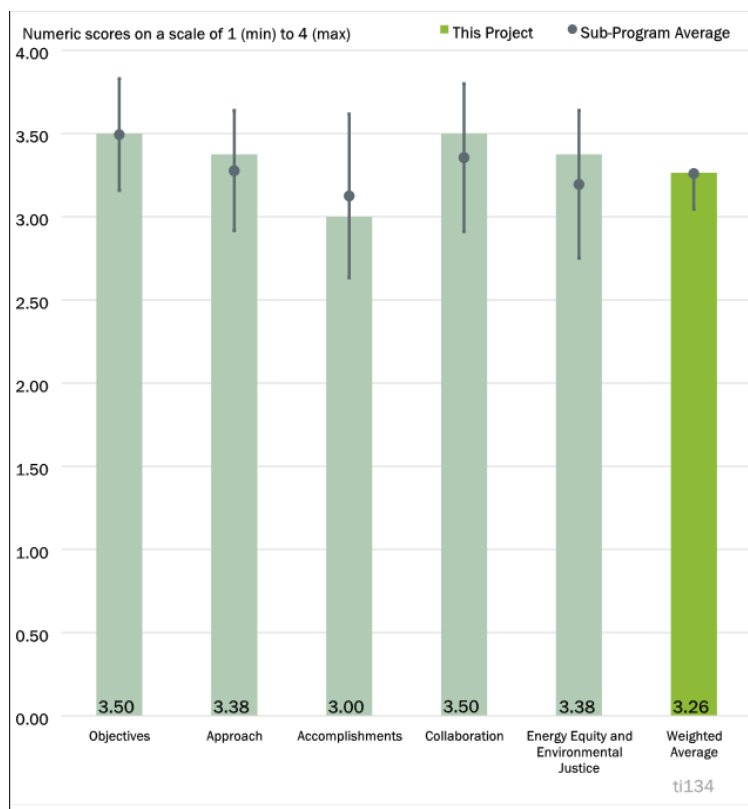


Figure 6-8 - Presentation Number: ti134 Presentation Title: Delivering Clean Air in Denver: Propane Truck and Infrastructure in Mail Delivery Application Principal Investigator: Bonnie Trowbridge, Drive Clean Colorado

contractor for the USPS, so there is the potential for propane trucks to be a significant part of their large fleet. The reviewer referenced the presenter indicating that Hi Pro is discussing transitioning its entire fleet to propane.

The reviewer stated that transporting mail consumes a huge amount of resources, significantly contributing to air pollution. The reviewer observed that the USPS is enthusiastic about the cleaner fuel, and that Drive Clean Colorado is helping Hi Pro through the process, and added that it was fortunate that Hi Pro could secure a longer, more secure contract from USPS.

The reviewer expressed the opinion that it was disturbing to hear that the State of Colorado appears to be leaning toward electrification of fleets rather than being open to other options that might be as good or better depending on the MD/HD applications.

***Question 2: Project Approach-Please comment on this project's approach for integrating advanced transportation technologies and practices to solve real-world challenges.***

**Reviewer 1**

The reviewer commented that collecting data on actual vehicles in actual service is critical to understanding real-world benefits, so this is very useful.

**Reviewer 2**

The reviewer observed that the project focused on putting five LPG box trucks into a fleet application and evaluating performance, particularly for relatively high-fuel use vehicles, and noted that the project partners are also working closely with the manufacturer (Roush) to help them improve their product.

The reviewer commented that the data collection plan is for 10 days of operation in the summer and 10 days in the winter, and while they seem to have a plan to collect useful information, that is probably a little light as far as duration; ideally a month in each season would be a bit better. The reviewer added that a longer duration would help to eliminate the impacts of possible unique or one-time events on operation.

**Reviewer 3**

The reviewer stated that the approach is clear and the PI will be collecting data on both the fleet operations and the propane fueling infrastructure, and added that the outreach component in budget period three will be very important.

**Reviewer 4**

The reviewer commented that transportation of mail is a constant and as an independent agency operated by the federal government and subject to pressure to reduce harmful vehicle emissions, USPS needs to diversify its fleet to include cleaner fuels/better technology. The reviewer stated that this project directly addresses the challenge by providing a large contractor an opportunity to see how propane works in the mail delivery system.

The reviewer observed that a more recent real-world challenge has been dealing with shortages of workers and materials needed to manufacture, upfit and convert these vehicles within the time frame of the project, and added that the price increase (partially due to these factors) is a hard sell to a company that is new to the technology and a bit nervous. The reviewer noted that a mistake that brought the trucks to the wrong address and a second mistake of installing the wrong box on the chassis adds to the partners' frustrations. The reviewer commented that it is commendable that the PI was able to work through these issues with minimal fallout, and added that double and triple checking details at every step, with representatives from the manufacturer, upfitter and all other liaisons may be necessary going forward and may reduce these errors.

The reviewer noted that data will be collected over a ten-day period, and that this information prompted questions about the types of data to be collected. The reviewer expressed the view that ten days is a short period of time, there are many factors involved (weather, temps, driver), and that a longer span of time for data collection could yield more reliable information.

***Question 3: Project Accomplishments and Progress—Please comment on the project's progress and significant accomplishments to date.***

**Reviewer 1**

The reviewer commented that, given the current environment and supply chain delays, it is understandable this project has encountered some delays, and added that there might be some good lessons learned that could be shared with others, as these issues could persist for some time.

**Reviewer 2**

The reviewer noted that delivery of the trucks has been delayed but is scheduled for this week or next, and that the control (diesel) vehicles have already been instrumented. The reviewer observed that LPG trucks and infrastructure were expected to be in operation by the end of 2021, but the schedule got shifted to mid-2022. (They were ordered as expected in March 2021, but supply chain issues were significant.) The reviewer commented that during the delay, Ford increased the price of the trucks by \$7500, which was not budgeted in the project, but the project team worked with the operating fleets and kept them on board. The reviewer observed that the fleets' contracts with USPS were being renegotiated, but USPS was willing to pay more since they needed the service. In addition, Ford incorrectly shipped the trucks to the box installer first, rather than to the LPG installer (Roush). The reviewer observed that this caused additional problems, but the project team has stepped in to keep things on track. The reviewer added that they saw similar delays for the refueling system, particularly with permitting, due to staffing issues, but the station is now permitted and active on the site and should see initial operation very soon.

**Reviewer 3**

The reviewer observed that the project is a bit behind; however, the PI's ability to keep the project together given all the setbacks with the manufacturer, change in price, and upfit mistake is commendable, and it is hoped that the vehicles arrive and be in operation soon. The presenter mentioned that the infrastructure has been installed but not yet used. The reviewer expressed the view that it would be helpful if it could fuel a vehicle prior to the arrival of the pilot vehicles to be certain it's in working order, and suggested that all project partners keep tabs on price and purchasing options of propane.

**Reviewer 4**

The reviewer stated that the project has undergone a number of delays and price increases related to supply chain issues; however, they were able to collect baseline data and the trucks were to be delivered at the time of the Annual Merit Review (AMR) (June 2022).

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

**Reviewer 1**

The reviewer observed that the project team has been working closely with the fleets, manufacturer, dealer, station installer, and local officials, and added that the project team has had to spend a lot of time working through the relationships due to the project delays. In particular, the principal investigator mentioned working with the station installer early. The reviewer stated that, overall, these are the types of organizations required

for this kind of project and the project team has worked hard to maintain the necessary relationships under less-than-perfect conditions. The reviewer added that they are to be commended on that.

**Reviewer 2**

The reviewer observed that Drive Clean Colorado has a strong group of partners that meet regularly for updates and discussion, and stated that the PI's patient and skillful handling of the myriad of problems that have occurred during this project has strengthened relationships in the supply chain and with partners. The reviewer added that the PI's diplomacy, Hi Pro's patience with regards to barriers to the smooth delivery and deployment of vehicles, and USPS's enthusiasm for a contracted company to use propane in its vehicles has kept this project afloat and headed forward.

**Reviewer 3**

The reviewer commented that there is a strong team in place.

**Reviewer 4**

The reviewer stated that the team requires coordination with the fleet owner, the National Renewable Energy Laboratory (NREL), and the propane company, and the coordination appears to be going well.

***Question 5: Energy Equity and Environmental Justice Project Contribution-Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

**Reviewer 1**

The reviewer observed that the trucks will reduce emissions in one of dirtiest zip codes in the country; therefore, removing diesel at this location is critical, and this project can show a pathway to much lower emissions in an area with high asthma rates, etc. The reviewer added that the fleet owner has indicated they would like to convert their entire fleet to LPG and be a hub for other nearby fleets.

**Reviewer 2**

The reviewer remarked that the vehicles will be operating in one of the dirtiest areas in the country, home to an oil refinery and major highway exchanges, so this project has the potential to significantly benefit overburdened communities by way of cleaner air and reduced particulate matter. The reviewer noted that this pilot is designed to be replicated, and the expansion of Hi Pro's propane fleet from gas and diesel to cleaner propane will likely have far reaching benefits in the mail services industry.

**Reviewer 3**

The reviewer commented that this project supports the goal of energy equity and environmental justice as these trucks will be based in an urban setting with very poor air quality, so the emission reductions should benefit communities disproportionately impacted by poor air quality and exposed to vehicle pollution.

**Reviewer 4**

The reviewer commented that the project goal of reducing harmful vehicle emissions in the Denver area will improve air quality, and poor air quality has a bigger impact on underserved and overburdened communities.



**Presentation Number: ti135**  
**Presentation Title: Advancing Climate & Innovation Goals of Memphis & Shelby County: Electrification of Key Fleet Vehicles to Capture Cost Savings and Climate Benefits**  
**Principal Investigator: Leigh Huffman, Shelby County**

**Presenter**

Leigh Huffman, Shelby County

**Reviewer Sample Size**

A total of four reviewers evaluated this project.

**Question 1: Project Objectives—**  
*Please provide comments on this project’s degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.*

**Reviewer 1**

The reviewer stated that the project supports fuel diversity and resiliency for this government. This will be Shelby County’s first procurement of fully electric vehicles and more EVs are likely to be added to the County’s fleet if this pilot is successful.

The reviewer observed that the project changed from the original plan, which was to purchase four F250s converted to plug-in hybrid-electric vehicles (PHEVs), but the current plan is to purchase “2-3 Mustang Mach-Es” and “1-2 Ford Lightnings.” Because the project is procuring EVs and not PHEVs, the reviewer gave an “excellent” rating on project objectives.

The reviewer noted that the Mach-Es will be inspection vehicles for the Roads, Bridges and Engineering Department which, when delivered, should bring positive feedback from drivers; it’s not your typical county-owned inspector’s vehicle.

**Reviewer 2**

The reviewer commented that the project is good as a very first project of alternative fueled vehicles with a fleet that has not had previous experience, and noted that it will certainly provide exposure and experience to a fleet with electric vehicles even if with a very small number of vehicles (five total) plus infrastructure.

**Reviewer 3**

The reviewer remarked that the project is focused on addressing the lack of EVs in the county’s fleet, but there is very little familiarity with EV technologies and little data to support decision-making. The reviewer noted

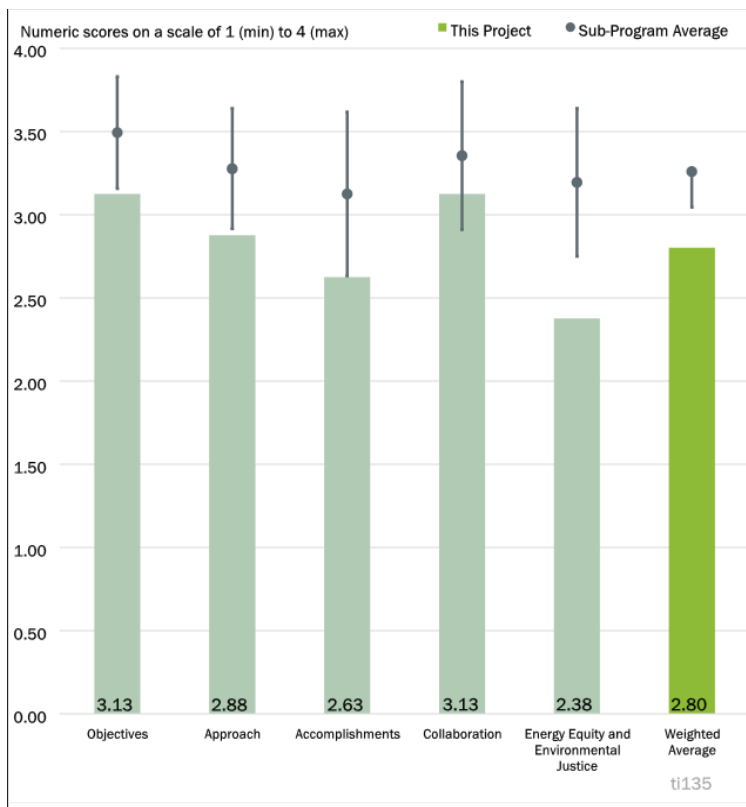


Figure 6-9 - Presentation Number: ti135 Presentation Title: Advancing Climate & Innovation Goals of Memphis & Shelby County: Electrification of Key Fleet Vehicles to Capture Cost Savings and Climate Benefits Principal Investigator: Leigh Huffman, Shelby County

that the idea is to do the homework to allow for expansion to much of the rest of the county’s fleet and ideally serve as an example to others in the area.

**Reviewer 4**

The reviewer commented that this project improves fuel diversity and increases local resiliency; however, since these vehicles are new vehicles and will not be replacing current fleet vehicles, the project does not reduce GHG emissions and actually increases GHG emissions if the original fleet use continues at a business as usual rate.

***Question 2: Project Approach—Please comment on this project’s approach for integrating advanced transportation technologies and practices to solve real-world challenges.***

**Reviewer 1**

The reviewer commented that the approach is direct and simple: order vehicles, install charging, receive vehicles, train staff, collect data and share the positive impact while educating the community (good PR).

**Reviewer 2**

The reviewer stated that the approach is to deploy five EVs into the county fleet—four light-duty vehicles (LDVs) and one MD truck (Class 6 Lion), and noted that they are also installing EVSE and training operations and maintenance staff. The reviewer noted that they did have to adjust their approach on vehicle types significantly, as the original plan was for F-250s converted by XLFleet, but an evaluation showed that the supplier’s (XL’s) product probably would not work for the planned application. The reviewer stated that for the MD truck, the original supplier also indicated they could not get a vehicle to convert for 18 months, so the project team had to shift to Lion.

The reviewer commented that the approach does sound a bit light on plans for outreach both within the county government and outside; however, to be fair, the principal investigator came into the project only last fall, so the plan for outreach would likely be expected to evolve a bit over time.

**Reviewer 3**

The reviewer expressed approval that the fleet targeted for this pilot was the largest city fleet and was tied into current division goals, and appreciated the flexibility in approach of the project as it ran into road blocks and barriers. The reviewer commented that it would be better to use the new electric vehicles as replacement vehicles and expressed a desire to see more equity considerations.

**Reviewer 4**

The reviewer remarked that the fleet will get some valuable experience from integrating charging infrastructure and EVs. The reviewer added that engaging the fleet(s) as a willing partner in the proposal phase and understanding their needs and routes ahead of time would be recommended.

***Question 3: Project Accomplishments and Progress—Please comment on the project’s progress and significant accomplishments to date.***

**Reviewer 1**

The reviewer remarked that project progress is as far as allowed by the supply chain delays.

**Reviewer 2**

The reviewer observed that the project is significantly behind due to procurement delays, so the team received the ability to move budget period one (budget period 1) funds into budget period 2. The reviewer noted the following progress: they are working on installing the EVSE as part of an overall Engineering facility upgrade;

the renovation design kicked off yesterday and EVSE will be a priority; they have decided on their EVSE location and equipment; they held several EV demonstrations for county staff so they could see if the vehicles could meet their needs, particularly for meeting fleet needs with EVs other than pickups in some cases; they issued the purchase orders for the first EV (Ford Mach-E). The reviewer noted that the reworked plan is now to get 2-3 Mach-Es and 1-2 F-150 Lightnings, a data collection plan has been developed, and efforts have begun to collect data on control vehicles.

The reviewer commented that while they have not accomplished a great deal compared to their original plan, a lot of the delays were out of their control, such as COVID-19 and related supply chain issues.

### **Reviewer 3**

The reviewer noted that there have been delays and problems, the most concerning being staff turnover, i.e., the change (twice) in project administrators. The reviewer added that supply chain issues are plaguing all who have procurement projects with strict end dates.

The reviewer gave the project a fair rating, but commented that this should not be a reflection of the work of the current administrator, as many of the glitches with this project were out of her control, and it takes time to get up to speed in a project, particularly one with vehicle procurement issues/delays.

The reviewer stated that the PI has kept the project moving, although completion is only 34% halfway through the project period with less than \$35,000 spent to date on a project with a \$1million budget. The reviewer added that the project is moving forward and it is expected that money will be quickly expended once the vehicles arrive. The reviewer found it disconcerting that charging stations have yet to be installed, but discussions with team partners may generate ideas that can move that along more quickly.

### **Reviewer 4**

The reviewer noted that the project was slow to start and had some challenges with change in project lead and supply chain issues. The reviewer added that the charging location has been selected, EV demonstrations were held, and key data points in the data collection plan were identified; however, the acquisition of the vehicles has been slow. The reviewer commented that the data collection plan elements could have been included in the slides, as well as information on who will be collecting the data.

The reviewer recommended that, in addition to the return on investment (ROI) for vehicles and charging stations, the PI conduct surveys with the user fleet and gather input on satisfaction and what could be improved.

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

### **Reviewer 1**

The reviewer complimented the project on the wide net of project partners and the coordination among the teams.

### **Reviewer 2**

The reviewer noted that partners include the county fleet; county roads/bridges/engineering; the Clean Cities coalition; the utility; Ford; and Lion, and added that they have been working closely with all team members, particularly through the delay process.

### **Reviewer 3**

The reviewer stated that choosing to procure fully electric vehicles better promotes TI’s goal of diversity, efficiency, energy security, and lower greenhouse gas emissions. The reviewer commented that it was the right move and no doubt was fully embraced, and perhaps suggested, by the partnered Clean Cities Coalition and Memphis Light, Gas and Water. The reviewer added that the project has just a handful of partners but the two aforementioned will help champion this effort, and noted that project partners currently meet bimonthly according to the presenter, although there may be times when the group should connect more often (perhaps with weekly calls/emails given the problems they are currently facing).

#### **Reviewer 4**

The reviewer commented that the collaboration between the chosen fleet and the technical assistance partners is unclear, and stated that more details on how the ROI and total cost of ownership (TCO) will be evaluated and who will be conducting the evaluations would be helpful.

***Question 5: Energy Equity and Environmental Justice Project Contribution-Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

#### **Reviewer 1**

The reviewer commented that the project has a goal of changing the County fleet over time, creating a reduction in environmental impacts from the County fleet, and while the fleet is skeptical, the mayor really wants to convert the fleet. The reviewer noted that the mayor is planning on an Executive Order to address the fleet transition, and added that it sounds like it is a bit early in the process to determine the overall impact that could come from this.

#### **Reviewer 2**

The reviewer stated that these vehicles, when deployed in underserved areas, will have some benefit such as increasing fuel diversity, but if these vehicles are not replacing current fleet vehicles there will not be an air quality or environmental benefit to these communities. The reviewer also questioned how this project can increase its outreach and education efforts.

#### **Reviewer 3**

The reviewer stated that this project is aimed at encouraging the county fleet to replace some of its gas or diesel vehicles with fully electric, and that, if successful, the county will be reducing its production of harmful vehicle emissions, thereby keeping the air cleaner. The reviewer noted that that the area was previously in non-attainment but is no longer, and they are hoping this step will help to keep them out of non-attainment. The reviewer commented that the data collection will be used to determine future purchases, but there does not appear to be a plan to make the information shareable to other fleets to broaden outreach. The reviewer stated that the project is not directly aimed at contributing to energy equity or environment justice.

The reviewer remarked that the data collection includes ROI for vehicles and charging stations, but it is unclear how the charging stations will show a return on investment. The reviewer speculated that it would be perhaps by comparing savings to gas purchases. The reviewer added that it will be tough to show a favorable ROI on the Mach-E, a \$43,000 vehicle, especially within the project period. The presenter mentioned that there is reluctance by current fleet people to introduce EVs into the fleet, that it is hoped this pilot will change minds, and that reducing emissions in the county will be enough incentive to consider adding more EVs to the fleet. The reviewer commented that requesting the price of a Mach-E to be put in the county’s replacement vehicle budget would be a hard sell, particularly when there are less pricey EVs available.

**Reviewer 4**

The reviewer commented that the map shows the regions that have higher air toxics in Shelby County and are clearly overburdened with air pollution, and that we can only presume that these communities are underserved as well. The reviewer remarked that sharing information on the driving cycle or usage expected from the five vehicles, as well as the overall fleet usage, would be helpful.

**Presentation Number:** ti136  
**Presentation Title:** Zero Emission Freight Future  
**Principal Investigator:** Megan Stein, Clean Fuels Ohio

**Presenter**

Megan Stein, Clean Fuels Ohio

**Reviewer Sample Size**

A total of four reviewers evaluated this project.

**Question 1: Project Objectives—**  
*Please provide comments on this project's degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.*

**Reviewer 1**

The reviewer stated that this project meets all of the objectives. It improves fuel diversity, increases local resiliency and reduces GHG emissions through increasing alternative fuel use!

**Reviewer 2**

The reviewer commented that the project is focused on deploying EVs in MD/HD freight, refuse, and other class 4-8 applications, and that these applications tend to be less familiar, so this project's value is in generating exposure and data in these areas, to allow fleets to begin to adopt EVs. The reviewer stated that, as such, the project is focused on making the operational and financial cases for EVs in these uses, which are often gaps in the existing knowledge base.

**Reviewer 3**

The reviewer remarked that the project will collect data and document successes of and issues with Class 7 and Class 8 EVs, an area that needs more input before there is widespread adoption. The reviewer added that use of these vehicles will reduce greenhouse gas emissions and increase transportation efficiency, and further noted that the analysis findings and tools will be disseminated for replication.

The reviewer commented that it is not indicated where these tools will reside after the end date of this project; it is hoped that the information will be easily accessible to other fleets.

**Reviewer 4**

The reviewer commented that the project is closely supporting the overall TI objectives by evaluating the integration and demonstration of three MD and HD electric trucks in different applications: a step van for

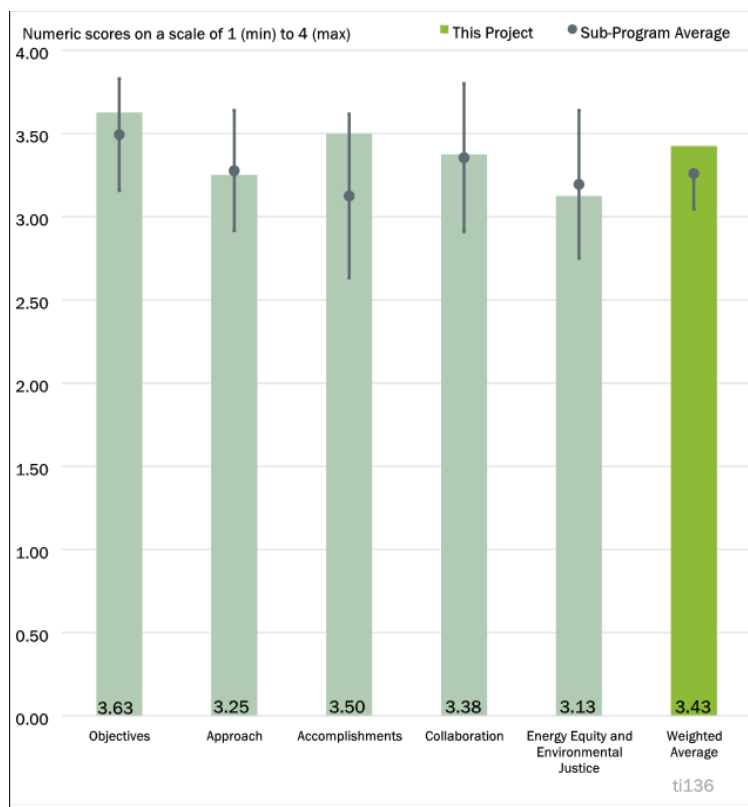


Figure 6-10 - Presentation Number: ti136 Presentation Title: Zero Emission Freight Future Principal Investigator: Megan Stein, Clean Fuels Ohio

bakery delivery, a refuse truck, and class 8 straight trucks in Columbus, OH. The objective is to increase deployment of MD and HD EVs through the experience and data collection and analysis of their performance.

***Question 2: Project Approach-Please comment on this project's approach for integrating advanced transportation technologies and practices to solve real-world challenges.***

**Reviewer 1**

The reviewer praised this project, as it meets all of the objectives, looks into an area that needs a good deal more research, and had great equity considerations. The reviewer noted that it is looking at three different use cases as well, and suggested that the only improvement might be scrapping the vehicles that were replaced in the fleets, therefore reducing GHG emissions overall, instead of moving the emissions to a different fleet.

**Reviewer 2**

The reviewer commented that the project has a very straightforward approach laid out, focused on deploying EVs and EVSE plus data collection and analysis. The reviewer noted that the plan includes development of a model tool for analysis, based upon 3 months of data, and had a concern that this short period might not sufficiently account for weather variations. The reviewer added that, at this time, it is also a bit unclear what the special value is of the new tool vs. what is out there now.

**Reviewer 3**

The reviewer remarked that the PI presented an excellent game plan to achieve the goals of this project: Clean Fuels Ohio (CFO) has partnered with Sawatch Labs to develop analysis tools and resources. Prior to the ordering and deployment of the vehicles, CFO tapped into its Project Advisory Committee for feedback on analysis and vehicle specifications. They created a data collection and engineering and deployment plan. After the vehicles are deployed, they will follow through with data collection, demonstrations, and the development of tools and resources for other fleets. The reviewer found that the approach is thorough, thoughtful, and directly addresses the objective of increasing knowledge of HD EVs, leading to an eventual increase in vehicle purchases by area fleets.

**Reviewer 4**

The reviewer commented that the project approach is well laid out: deploy the MD and HD EVs, demonstrate them and collect data, and develop an analysis model tool. The reviewer found the model tool to be one of the more interesting aspects of the project as its purpose is to support fleets that are considering a transition to EVs to determine if it makes sense and which models would suit the fleets' needs best.

The reviewer remarked that the EV analysis model tool was insufficiently described, however, and that it was unclear what types of data collected will inform the tool. The reviewer noted that Sawatch Labs is gathering the data from the OEMs and developing the tool, but how the developed tool would be used in the future is unclear. The reviewer questioned whether the tool would be provided as a free tool to fleets (given it is developed with public funding) or if it is a tool that would help Sawatch Labs conduct consulting work in the future. The reviewer indicated that more information on the type of tool, and where it will be available is needed.

***Question 3: Project Accomplishments and Progress-Please comment on the project's progress and significant accomplishments to date.***

**Reviewer 1**

The reviewer stated that the project is well underway and has achieved its goals so far.

**Reviewer 2**

The reviewer commented that the presentation appears to indicate that milestones are on track, but the principal investigator indicated that deliveries of EVs have been delayed primarily due to supply chain issues. (The step van and refuse truck are delayed until early 2023, while the Volvo straight truck was delivered in April 2022.) The reviewer noted that, in the meantime, the project has been developing its data collection and analysis plan and begun collecting data on control vehicles. They are also looking at national data to influence analysis tool development, and they have received commitments from fleets on data. The reviewer stated that it appears that the tool developer will require 3 months of data.

### **Reviewer 3**

The reviewer noted that project milestones are 50% complete, and on target. One vehicle was received in April and data is being gathered, and once all vehicles are received and data collected, tools and resources will be made available for replication of this pilot.

The reviewer commented that it appears the only issue has been the delay of the vehicles, which pushes back the gathering of data. The other two vehicles will be delivered later in the year. The reviewer suggested that the project's data collecting period may need to be extended beyond the project end date to gather enough data on the vehicles for accurate analysis.

### **Reviewer 4**

The reviewer commented that the vehicles have been either purchased or deployed, together with the EVSE, and a data collection and analysis plan was created. The reviewer found the main drawback to be a lack of information on the tool that will be developed, and requested that the PI provide more details on the tool and how it and other replication resources will be implemented at the end of the project.

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

### **Reviewer 1**

The reviewer applauded the great project team and collaboration.

### **Reviewer 2**

The reviewer commented that CFO has an impressive team that goes beyond the primary partners, and its Project Advisory Committee consists of those experienced in fleets and the industry. The reviewer added that the project's primary partners are established companies, and the original equipment manufacturer (OEM) and technical partners are knowledgeable and dedicated to the project.

### **Reviewer 3**

The reviewer noted that the project includes involvement of Clean Fuels Ohio, Sawatch Labs, PittOhio, Bimbo Bakeries, the City of Columbus, and vehicle manufacturers, and that the operational site for these vehicles is specifically for an overburdened area. The reviewer noted that each fleet was responsible for contracting for EVSE installations on their own, so no EVSE partners were explicitly part of the project.

### **Reviewer 4**

The reviewer noted that the collaboration is overall good, or seems good. The reviewer commented that the impact of the tool and plans that Sawatch Labs has should be explained, and questioned whether there are meetings where the three fleets in question share experiences and provide learnings. The reviewer recommended exposing additional fleets to the results to disseminate the information outside of the named project fleets more broadly.



***Question 5: Energy Equity and Environmental Justice Project Contribution-Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

**Reviewer 1**

The reviewer noted that the vehicles were all deployed in underserved/overburdened areas, and commended the project team on a great job. The reviewer suggested that there could have been more details about this in the presentation.

**Reviewer 2**

The reviewer stated that if EVs in these applications can take off, there can be significant energy equity/environmental justice benefits, as many of these vehicles operate in compromised areas. The reviewer added that the deployment sites in the project were specifically selected as overburdened areas.

**Reviewer 3**

The reviewer remarked that, while not directly targeted to support underserved and overburdened communities, replication of this pilot will help to reduce greenhouse gases and improve air quality in all communities, including disadvantaged. The reviewer added that this project is also in line with the City of Columbus's Climate Action Plan.

**Reviewer 4**

The reviewer commented that, while electric MD and HD vehicles provide zero emission operation and can benefit communities, the project does not sufficiently demonstrate which communities overburdened with pollution will benefit during this project and how energy equity and environmental justice will be positively impacted.

**Presentation Number: ti137**  
**Presentation Title: Cold-Weather Operation, Observation and Learning Electric Vehicles**  
**Principal Investigator: Lisa Thurstin, American Lung Association**

**Presenter**

Lisa Thurstin, American Lung Association

**Reviewer Sample Size**

A total of four reviewers evaluated this project.

**Question 1: Project Objectives—**  
*Please provide comments on this project’s degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.*

**Reviewer 1**

The reviewer commented that this project is specifically focused on generating cold-weather data on MD/HD EVs, a critical need. The reviewer noted that the project has several different types of vehicles involved, too, including school bus, transit bus, delivery, and recycling vehicles, and added that getting quality cold-weather data on EVs will be very important for allowing EVs to move into operation in more localities.

**Reviewer 2**

The reviewer noted that the project meets the needs of TI by deploying and evaluating four EVs in three different fleets along with the associated EV charging infrastructure. The reviewer added that the specific topic to be studied is EV operation in cold weather environments, which is an important consideration for many regions.

**Reviewer 3**

The reviewer commented that this project seeks to address the main reason progressive fleets located in colder climates have EV hesitancy, and noted the value of locating the pilot in Minnesota, where the temperatures frequently go below 0° in the winter months. The reviewer noted that data from this project will inform TI of issues that can be addressed in its work with OEMs and when providing funding opportunities to improve the technology and EV experience. The presenter mentioned that recent hot weather in Minnesota will allow this project to also gather data on MD/HD EVs in the hotter months. The reviewer found this to be useful, and noted that the data from this project will help fleet managers from Idaho to Maine make informed decisions and choices, increasing the chances of a positive EV experience. The reviewer added that positive experiences lead to more EV purchases, and more happy fleets mean more purchases of alternative fuels and, ultimately, lower greenhouse gas emissions.

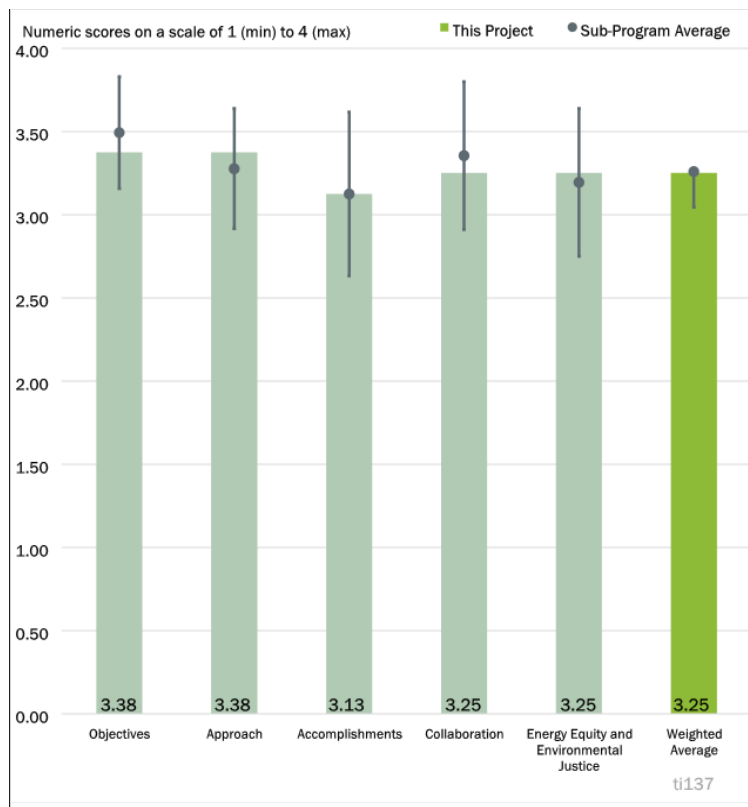


Figure 6-11 - Presentation Number: ti137 Presentation Title: Cold-Weather Operation, Observation and Learning Electric Vehicles Principal Investigator: Lisa Thurstin, American Lung Association

#### **Reviewer 4**

The reviewer stated that deployment and evaluation of MD and HD EVs with new fleets are important steps that will lead to a reduction of greenhouse gas emissions, fuel diversity and resiliency.

The reviewer commented that on Slide 3, Project Objectives, an item stating the project will provide best practices for one-way and two-way carshare was not clear and was not mentioned anywhere later in the project, and needs clarification.

***Question 2: Project Approach—Please comment on this project’s approach for integrating advanced transportation technologies and practices to solve real-world challenges.***

#### **Reviewer 1**

The reviewer commented that the approach is solid—deploy 4 MD/HD EVs, supported by data collection/analysis and outreach, and added that the applications include school buses and recycling collection. The reviewer noted that outreach and education has been a strong part of the project, to date focused heavily on the school bus.

#### **Reviewer 2**

The reviewer stated that more information on the specific data that will be collected and the specific analyses that will be conducted would be helpful, especially, the particular metrics that will be used to assess performance in cold weather conditions. The reviewer noted that this information was not presented during the AMR.

#### **Reviewer 3**

The reviewer commented that, on its face, the project is simple: deploy MD/HD EVs and gather data on operation in the crippling cold (and when very hot). The reviewer added that the approach is direct: gather partners, choose vehicles, install EVSE, get vehicles, gather data while implementing training and outreach, and noted that the PI wields years of experience, so even losing a partner mid-project, and supply chain shortages and pandemic-related delays do not affect the foundation of the project’s objectives. The reviewer added that the PI researched which vehicles in these classes would be the best fit, given service locations and other considerations to ensure reliability for data collecting and operation.

#### **Reviewer 4**

The reviewer remarked that evaluating the cold weather performance is important clearly for fleets in Minnesota, but stated that more details on the evaluation process of cold weather performance should be included. The reviewer added that including dissemination of learning to other local fleets in the region, perhaps through the Clean Cities relationships, would be very helpful and is recommended.

***Question 3: Project Accomplishments and Progress—Please comment on the project’s progress and significant accomplishments to date.***

#### **Reviewer 1**

The reviewer noted that although only one of the four vehicles has been deployed, all other milestones and targets are on track. The reviewer added that the school bus has already been part of demonstrations and there is no doubt once the other three vehicles are received, the balance of tasks will be underway quickly.

#### **Reviewer 2**

The reviewer noted that the overall project progress has been delayed by the supply chain issues; however, the school system was able to deploy the EV bus and has been using it in operation and collecting data.

**Reviewer 3**

The reviewer noted that the project had one fleet back out and needed to bring in a new one, which resulted in some delays, and the project team did learn a lot along the way on how to carefully select the EVs as well as charging; these had some impacts on procurement and budget, and deliveries for two of the fleets have been delayed. The reviewer commented that the school district has had its Blue Bird bus on the road since last August and that there was no route optimization work before it went into operation, but that will now happen this summer. The reviewer added that they have done a number of outreach and education events, exposing a lot of fleets to EV technologies. The plan is to potentially ask for a project extension to allow for keeping a six-month period for data collection.

**Reviewer 4**

The reviewer stated that the e-school bus has been deployed and two other vehicles on order, which is encouraging, but it is not clear what the fourth fleet is. The reviewer recommended that details on performance monitoring be included, given the focus on cold weather evaluation.

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

**Reviewer 1**

The reviewer noted that this project involves just a handful of partners, however most partners on this project have had a longstanding relationship with Minnesota Clean Cities. The reviewer added that the PI is very experienced with outreach, and the data/information will be shared, although it was not clear where the resulting case study will wind up after the project end date. The reviewer expressed hope that the information and experiences gathered will continue to be accessible to fleets.

**Reviewer 2**

The reviewer commented that the partners include the fleets (although one changed), the utility, and CTE (technical assistance), and noted that the team had to work carefully to replace one fleet, which had cancelled due to COVID-19 and staffing. The reviewer stated that twelve fleets were interviewed to replace the departing fleet, the University of Minnesota was selected as the replacement, and the team will continue relationships with the non-selected fleets for future involvement. The Principal Investigator (PI) indicated that the reason they were able to successfully replace the fleet that pulled out was that the PI has an on-going list of projects and partners built through the Clean Cities Coalition's strong relationships in the local fleet community, and the reviewer stated that this provided an important starting point for reaching out to potential replacements.

***Question 5: Energy Equity and Environmental Justice Project Contribution—Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

**Reviewer 1**

The reviewer remarked that the PI indicated the vehicles will be deployed in two communities of low income and that case studies/demonstrations will be provided to underserved communities. The reviewer added that the long-term benefit here would be the increase in the adoption of MD/HD EVs that frequent these communities (local company trucks and school buses for instance), which would lead to lower emissions in the overburdened communities.

**Reviewer 2**

The reviewer noted that two of the three communities where the vehicles will be deployed are low-income communities, and the project case studies and demonstrations are being targeted to underserved communities.

**Reviewer 3**

The reviewer commented that if the vehicles succeed, they will be in applications that will result in significant improvements in disadvantaged and compromised communities. The reviewer noted that several of the communities selected for the project are low-income and the project plans to develop case studies and demonstrations to benefit under-served communities.

**Reviewer 4**

The reviewer echoed an earlier recommendation to include other regional fleets in the outreach and dissemination of learning and stated that more and increased focus on addressing equity for the communities most in need is highly recommended. The reviewer suggested developing a specific plan for the desired outcome in terms of equity and environmental justice.

**Presentation Number: ti138**  
**Presentation Title: Demonstrating Electric Shuttles for the New Orleans Region**  
**Principal Investigator: Elizabeth Davey, Tulane University**

**Presenter**

Elizabeth Davey, Tulane University

**Reviewer Sample Size**

A total of five reviewers evaluated this project.

**Question 1: Project Objectives—**  
**Please provide comments on this project’s degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.**

**Reviewer 1**

The reviewer stated that this project deploys electric shuttle busses, which directly reduce the use of conventional fuels and emissions and added that outreach and education connected to the projects should expand the impact.

**Reviewer 2**

The reviewer remarked that the project is focused on overcoming limited local experience with EVs among local shuttle operators, contractors, and the utility, and that this is important to providing an opportunity for growth in the region. In addition, there is little data currently available. The reviewer noted that the fleet has 10 shuttles in operation, ranging from 20-40 passengers, and commented that there are a number of similar-size shuttles operating in the area and the project is focused on sharing data with them.

**Reviewer 3**

The reviewer stated that the project objective and overview slides describe the project’s specific objectives and barriers addressed, as well as how the project supports the DOE/VTO objectives of improving fuel diversity by adding electric vehicles to the Tulane University campus shuttle fleet and reducing greenhouse gas emissions by shifting to electricity increasingly sourced from clean and renewable sources. The reviewer commented that the project objectives appear to be generally effective for the planned scope.

**Reviewer 4**

The reviewer remarked that EV shuttles for Tulane University will be a good example of electric MD and HD vehicles.

**Reviewer 5**

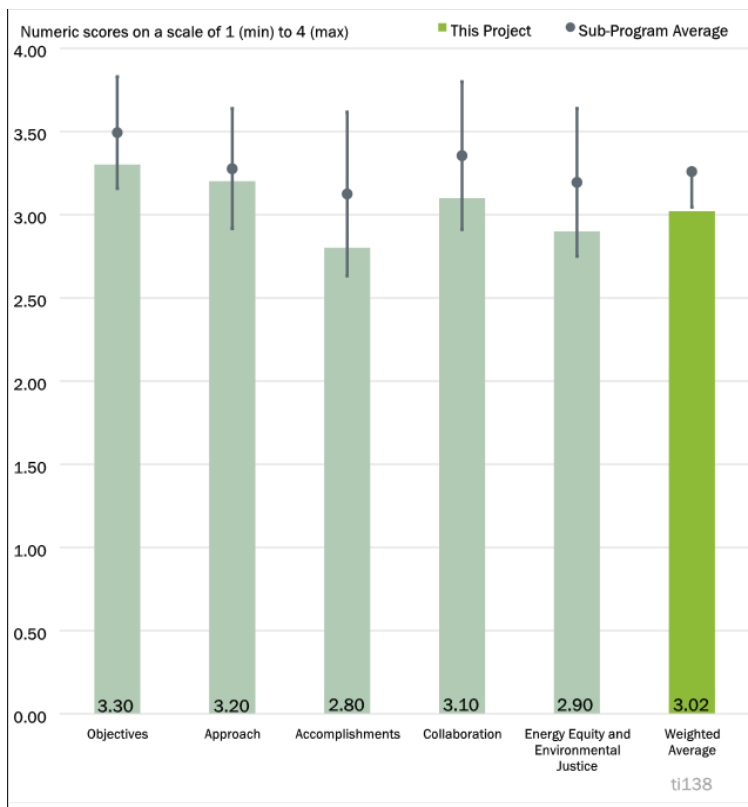


Figure 6-12 - Presentation Number: ti138 Presentation Title: Demonstrating Electric Shuttles for the New Orleans Region Principal Investigator: Elizabeth Davey, Tulane University

The reviewer stated that this project meets all TI objectives, but it could go further in reducing barriers.

***Question 2: Project Approach-Please comment on this project's approach for integrating advanced transportation technologies and practices to solve real-world challenges.***

**Reviewer 1**

The reviewer noted that the project objective and overview slides describe the project's specific objectives and barriers addressed, as well as how the project supports the DOE/VTO objectives of improving fuel diversity by adding electric vehicles to the Tulane University campus shuttle fleet and reducing greenhouse gas emissions by shifting to electricity increasingly sourced from clean and renewable sources. The reviewer found that the project objectives appear to be generally effective for the planned scope.

**Reviewer 2**

The reviewer commented that the project approach is simple: procure electric vehicles, deploy those vehicles and collect data, and then conduct data analysis and outreach; in particular, significant outreach within the local community is planned. The reviewer noted that the project planned for one charger per bus; because of the duty cycle, the fleet was interested in being able to charge all at the same time. They did not even look at L2 charging, as they had assumed the chargers were coming with the EVs, due to lack of experience. The reviewer noted that they are now considering what their back-up plan might be, particularly in the case of emergency. The reviewer observed that the University has a combined heat and power (microgrid) system, so it can provide power in the case of emergency. The reviewer stated that the plan is for six to nine months of data collection for analysis, which should work for performance, but might not be long enough for maintenance.

**Reviewer 3**

The reviewer stated that this is a very interesting evaluation of impact that includes carbon pricing, and looks forward to seeing more details on that.

**Reviewer 4**

The reviewer remarked that the project team had to deal with a change in vehicle vendor and COVID-19 related impacts that have delayed project deployment.

**Reviewer 5**

The reviewer expressed appreciation for what this project is doing for the University, but felt that more dissemination is necessary to be able to claim that these shuttles are a demonstration for the entire New Orleans region.

***Question 3: Project Accomplishments and Progress-Please comment on the project's progress and significant accomplishments to date.***

**Reviewer 1**

The reviewer commented that the project has made significant progress even in the face of Hurricane Ida and supply chain constraints.

**Reviewer 2**

The reviewer stated that satisfactory progress has been made towards achieving project goals, taking into account delays associated with supply chain disruptions/price increases and the continued COVID-19 pandemic. The reviewer added that the project has made progress on several key activities: Four Lightning

Electric E-450 shuttle buses are on order with an expected delivery in December 2022; and the five DC fast chargers site work has been completed and will soon be operational.

The reviewer noted that delays associated with cost increases and vehicle availability resulted in the project scope being changed from the deployment of five to four electric shuttles.

### **Reviewer 3**

The reviewer commented that the delayed delivery of the vehicles has prevented the project from presenting actual results beyond the infrastructure deployment.

### **Reviewer 4**

The reviewer remarked that BP1 tasks were focused on procurement and EVSE design, the EVSE has not been installed or commissioned, and the vehicles have not been received, due to supply chain delays. The reviewer stated that working through procurement has been a bit of a nightmare. They put in the order for buses, but during the delay, the bus supplier was purchased and the new owner indicated a very significant (60%) price increase, and there was a concern that the higher price would mean higher insurance prices. The reviewer noted that the project team fully vetted the Lightning Electric E-450 shuttles, then put in a purchase order in June 2022 for delivery now in December 2022.

The reviewer commented that the EVSE site has been fully planned, which took some effort. Five ABB 50 kW fast chargers will be installed and have already been procured. The reviewer noted that the utility and contractor were able to accomplish all the site preparation work and chargers will be installed as the vehicles approach. There was a bit of a delay in construction due to Hurricane Ida.

### **Reviewer 5**

The reviewer commented that the infrastructure is currently being installed, and noted that the amount of funding that has been spent to date is not that significant, given all the infrastructure installation costs. The reviewer questioned whether there will be enough time to complete the evaluation once the vehicles arrive.

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

### **Reviewer 1**

The reviewer remarked that the project has a great project team.

### **Reviewer 2**

The reviewer stated that there was good teaming collaboration within the university itself and with the utility and Clean Cities.

### **Reviewer 3**

The reviewer noted that the partners include Clean Cities, the fleet (Tulane), the utility, and the bus dealer, and there are three offices within Tulane participating, with assistance of a few others. The reviewer added that the utility has designated one point of contact for the project and the new bus supplier has become a partner in the project.

### **Reviewer 4**

The reviewer commented that it is a satisfactory project team including Tulane University, Entergy New Orleans, the local bus provider (Creative Bus Sales), and the local Clean Cities coalition (Southeast Louisiana Clean Fuel Partnership) that has been assembled to carry out this project and provide an appropriate mix of



expertise among team members. The reviewer remarked that the project would have benefited from an active role by community-based organizations, which appear to be missing from the project team. The reviewer added that collaboration/ communication among project partners appears to be appropriate for a project of this scope.

**Reviewer 5**

The reviewer commented that the project team seemed to be in frequent conversations around project status; however, the original vehicle vendors could have communicated earlier as it became clear they would be unable to deliver the vehicles as ordered.

***Question 5: Energy Equity and Environmental Justice Project Contribution-Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

**Reviewer 1**

The reviewer noted that the project specifically includes a financial analysis with carbon pricing, to identify the full impacts on the community and added that the project is demonstrating the replacement of diesels with EVs to improve air quality in a majority-minority city. The reviewer commented that Entergy has a Renewable and Clean Energy Portfolio Standard so that future electric vehicles will operate on cleaner electricity, further benefiting the community, and there is interest in opening charging stations to selected additional fleets to help expand EV adoption.

**Reviewer 2**

The reviewer stated that the shuttle buses will be operating in area with underserved and impacted communities and added that the next step from this project would be to see how other bus services in the city can take this example and implement EV shuttle buses in their operations.

**Reviewer 3**

The reviewer commented that demonstration events and further dissemination of the project and related lessons learned would improve the project and bring the project closer to meeting its objectives.

**Reviewer 4**

The reviewer remarked that the project has good potential to contribute to energy equity and environmental justice goals by increasing transportation efficiency by demonstrating the replacement of diesel vehicles with zero emission EVs, fostering action to improve local air quality in a city with a majority Black population. The reviewer suggested that the project would have benefited from including community-based organizations, to help provide local priorities for this project and similar ones that may be undertaken. The reviewer stated that, until the deployment of the project is up and running at full capacity and the anticipated results are documented, it is difficult to evaluate the effectiveness of the project.

**Reviewer 5**

The reviewer expressed the view that, while the vehicle deployments and outreach will have some impacts to EEJ communities, the project could have done more to include EEJ community representatives on the team to ensure benefits were maximized.

**Presentation Number: ti139**  
**Presentation Title: Pilot Heavy-Duty Electric Vehicle (EV) Deployment for Municipal Solid Waste Collection**  
**Principal Investigator: Shaina Kilcoyne, Municipality of Anchorage**

**Presenter**

Shaina Kilcoyne, Municipality of Anchorage

**Reviewer Sample Size**

A total of five reviewers evaluated this project.

**Question 1: Project Objectives—**  
*Please provide comments on this project’s degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.*

**Reviewer 1**

The reviewer stated that this project meets all three TI objectives in a clever and unique way.

**Reviewer 2**

The reviewer observed that the project is focused on cold-climate performance of MD/HD EVs, with an additional element focused on reduction of demand charges through managed charging. (Anchorage demand charges are \$23/kW, with double that in other parts of Alaska.) The reviewer stated that the results of this project could not only show others in similar climates that EVs can work, but also how to operate them to provide additional benefits.

**Reviewer 3**

The reviewer commented that the project objective and overview slides describe the project’s specific objectives and barriers addressed, as well as how the project supports the DOE/VTO objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions by deploying three MD/HD electric vehicles (two garbage trucks and one box truck) in the City of Anchorage’s municipal fleet. The reviewer added that the project objectives appear to be generally effective for the planned scope.

**Reviewer 4**

The reviewer remarked that this is important work to look at performance in cold climates for electric HD vehicles and to focus on workforce development.

**Reviewer 5**

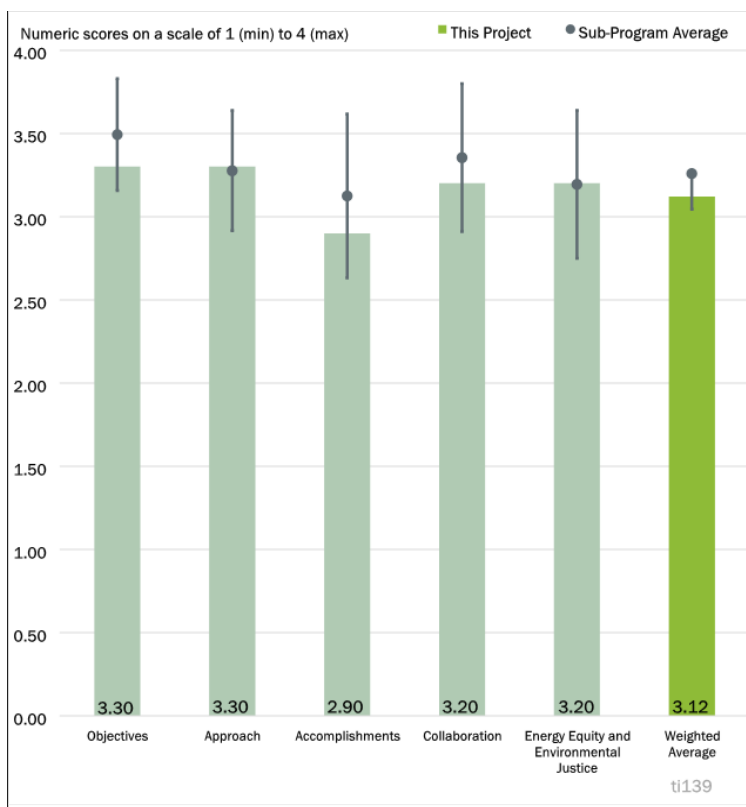


Figure 6-13 - Presentation Number: ti139 Presentation Title: Pilot Heavy-Duty Electric Vehicle (EV) Deployment for Municipal Solid Waste Collection Principal Investigator: Shaina Kilcoyne, Municipality of Anchorage

The reviewer commented that the project addresses the refuse sector, which is a promising target for electrification but has limited deployments to date. The reviewer added that measuring the cold weather performance of these vehicles can give confidence to operators in all climates that these vehicles will meet performance specifications.

***Question 2: Project Approach-Please comment on this project's approach for integrating advanced transportation technologies and practices to solve real-world challenges.***

**Reviewer 1**

The reviewer complimented the overall approach as being well organized with planning, demonstrations and evaluation. The reviewer noted that the inclusion of a box truck in addition to the refuse trucks allowed some project activities to proceed while waiting for the refuse truck delivery.

**Reviewer 2**

The reviewer commented that this is a basic approach to demonstration, although they did have a box truck already in place which allowed for efforts in advance of the arrival of the newly-procured refuse trucks. The reviewer observed that, because of their rate situation, they are looking at charging strategy very carefully.

**Reviewer 3**

The reviewer stated that the project approach section provides a satisfactory methodology to accomplishing the project objectives and supporting the integration of advanced transportation technologies and practices. The project approach is divided by three project periods (Initiate Pilot Deployment, Monitor Pilot Deployment, and Continued Equipment Maintenance) each containing associated tasks and go/no-go decision points. The reviewer added that the Milestone slide provides adequate detail with regard to the planned tasks per Budget Periods and progress to date.

**Reviewer 4**

The reviewer remarked that this is an impressive project on deploying EV HD vehicles in Alaska together with batteries for peak shaving and future proofing the installation. The reviewer noted that it was interesting to hear that the decision in selecting vehicles was determined by the availability of service support in the region, an interesting point that the reviewer suggested should be communicated to the manufacturers.

**Reviewer 5**

The reviewer stated that this is a great and well thought out project. The reviewer suggested that the project could be improved by scrapping the vehicles that the new vehicles replaced, to have an overall reduction of GHG, instead of moving the emissions to another fleet, and including a workforce development plan to train local technicians to be able to work on the vehicles and charging equipment instead of having to have a technician fly in. The reviewer added that the First Responder Training for EVs from the National Association of Fleet Administrators (NAFA) would be a great tie in here.

***Question 3: Project Accomplishments and Progress-Please comment on the project's progress and significant accomplishments to date.***

**Reviewer 1**

The reviewer commented that the project was able to proceed through early stages while waiting on the delivery of refuse trucks; the project made good use of this additional time to plan for additional infrastructure installation and new refuse facility.

**Reviewer 2**

The reviewer noted some delays that seem to be related to supply chain delays. The reviewer commented that future proofing of the site is very good enabling it for the next phases.

**Reviewer 3**

The reviewer commented that the project vetted EV options and chose their existing supplier (Peterbilt), which has a facility in Anchorage, and noted that they did find that some manufacturers did not want to sell only 1-2 vehicles (offering a minimum of 10), but added that some efforts have started using the existing box truck. The reviewer observed that the team spent a lot of effort on EVSE design for the specific conditions for the project, as well as future-proofing the system, and noted that their EVSE includes a battery to allow for spreading load further. The reviewer observed that, as a bit of a break-through, the team has developed what they believe is a lower-cost approach for incorporating EVSE-ready technical needs, which they are planning to share with other local fleet operators.

The reviewer noted that there have been some issues with the box truck since it is only two-wheel-drive, and that has impacted operational use and made data analysis challenging.

**Reviewer 4**

The reviewer commented that this project is as far along as it can be given the supply chain delays.

**Reviewer 5**

The reviewer remarked that fair progress has been made towards achieving project goals, taking into account delays associated with delivery of the electric garbage trucks, which have not yet been delivered/deployed. The reviewer found that the project has made progress on several key activities: The electric box truck has been delivered, and Solid Waste Services laid conduit pathways to five bays from the battery and to seven bays from the electrical room.

The reviewer noted that the project also includes battery storage to mitigate significant demand charges, however the battery has still not arrived. The reviewer added that the EV chargers are not installed/operational, and much of the project appears to be behind schedule at this point.

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

**Reviewer 1**

The reviewer praised the great team.

**Reviewer 2**

The reviewer praised the great collaboration between team members.

**Reviewer 3**

The reviewer commented that the project team displays good collaboration between the City, the Utility, the academic community and the technology providers.

**Reviewer 4**

The reviewer noted that partners include the Alaska Energy Authority and Alaska Center for Energy and Power, as well as eCamion (charging station), and stated that these are useful partners, but more partners on board to provide a greater element for outreach could have been useful. The reviewer found that, in particular, the project team has found Peterbilt to be very responsive.

### **Reviewer 5**

The reviewer stated that a satisfactory project team including City of Anchorage’s Solid Waste Services, the Alaska Energy Authority, University of Alaska Fairbanks/Alaska Center for Energy & Power, and the local truck provider (Peterbilt) are assembled to carry out this project and provide an appropriate mix of expertise among team members. The reviewer suggested, however, that the project would have benefited from an active role by community-based organizations, which appear to be missing from the project team. The reviewer found that collaboration/communication among project partners appears to be appropriate for the project of this scope.

***Question 5: Energy Equity and Environmental Justice Project Contribution-Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

### **Reviewer 1**

The reviewer observed that parts of the project area include very high asthma rates and other environmental concerns and stated that the electric refuse haulers should benefit this area significantly, particularly if this project leads to greater deployments. The reviewer noted that the route is also designated as an alternative fuel corridor, eligible for Federal funding and observed that, in 2020 at the time of application, diesel was priced at \$2.85/gal versus \$5.14/gal in June, therefore, resulting in sizable energy cost savings for the project.

### **Reviewer 2**

The reviewer observed that the units will be operating in corridors that are affected heavily by pollution.

### **Reviewer 3**

The reviewer observed that refuse routes include communities most impacted by poor air quality, and the additional EV readiness added to the refuse facility will allow additional expansion of the electric fleet if the demonstrations proves feasible.

### **Reviewer 4**

The reviewer commented that the project has a satisfactory potential to contribute to energy equity and environmental justice goals by replacing diesel vehicles with zero emission EVs, which will result in improving local air quality. The reviewer noted that Solid Waste Services’ service territory includes areas with the highest asthma rates and health insurance stress, including much of Mountain View along the highway to the landfill, and stated that electric garbage trucks will reduce pollution along this corridor. The reviewer suggested that the project would have benefited from including community-based organizations, to help provide local priorities for this project and similar ones that may be undertaken. The reviewer stated that, until the deployment of the project is up and running at full capacity and the anticipated results are documented, it is difficult to evaluate the effectiveness of the project.

### **Reviewer 5**

The reviewer praised the fact that these vehicles were deployed on corridors of high asthma rates and high insurance burden. The reviewer wondered about further ensuring the demos, and whether information sharing is reaching fleet managers in overburdened and under resourced communities.

**Presentation Number:** ti140  
**Presentation Title:** St. Louis Vehicle Electrification Rides for Seniors  
**Principal Investigator:** Connor Herman, Forth Mobility

**Presenter**

Connor Herman, Forth Mobility

**Reviewer Sample Size**

A total of five reviewers evaluated this project.

**Question 1: Project Objectives—**  
*Please provide comments on this project's degree of support for the overall Technology Integration (TI) objectives of improving fuel diversity, increasing local resiliency, and reducing greenhouse gas emissions through increasing alternative fuel use and transportation efficiency.*

**Reviewer 1**

The reviewer indicated that the project has strong objectives in measuring if and how EV fleets can serve social service agencies, save money and improve service delivery, and added that it is a model for deploying EVSE that serves both fleets and community members.

**Reviewer 2**

The reviewer commented that this effort examines the viability of electric vehicles for smaller nonprofits, specifically community-based organizations (CBOs) that do not have capacity to analyze TCO of installing charging and using EVs, and added that, if successful, this would provide a model for small fleets that do not have a fleet manager to utilize EVs. In addition, as CBOs work with local community members, the successful use of EVs could lead to further EV deployment through word-of-mouth. The reviewer stated that, in that case, the project could improve local fuel diversity and resiliency, as well as reduce greenhouse gas emissions due to the low emission profile of electric vehicles.

**Reviewer 3**

The reviewer noted that the project objective and overview slides describe the project's specific objectives and barriers addressed, as well as how the project supports the DOE/VTO objectives of improving fuel diversity by adding electric vehicles and charging to two community-based organization's fleets (Northside Youth & Senior Center and City Seniors, Inc.). The reviewer added that the project will measure how EV fleets can save community-based organizations and social service agencies money and improve service delivery and create a model for deploying EVSE that serves those fleets and can also serve employees and community members. The reviewer commented that the Project Objectives appear to be generally effective for the planned scope.

**Reviewer 4**

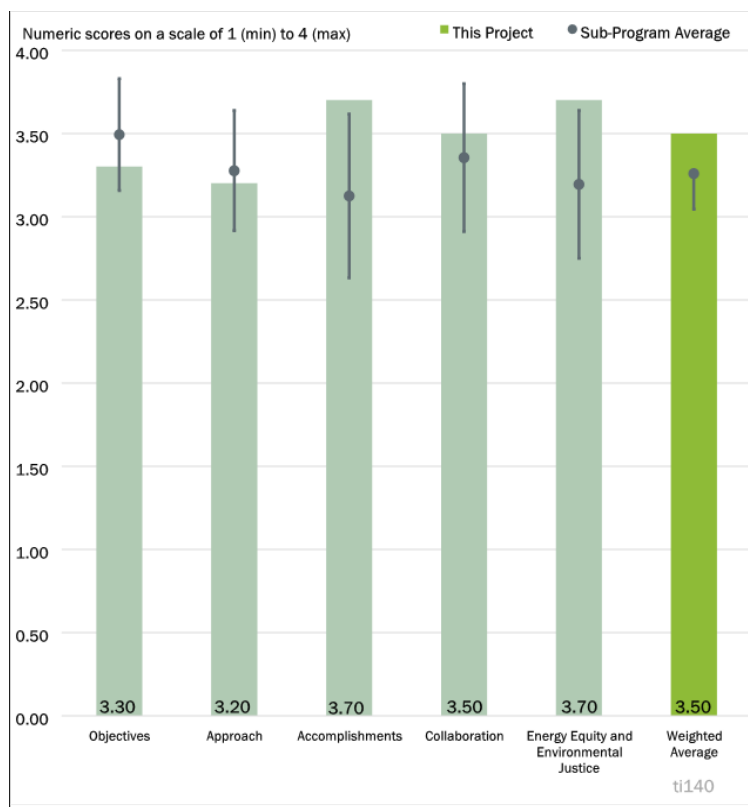


Figure 6-14 - Presentation Number: ti140 Presentation Title: St. Louis Vehicle Electrification Rides for Seniors Principal Investigator: Connor Herman, Forth Mobility

The reviewer praised the project and said it meets the objectives of improving fuel diversity and increasing local resiliency. The reviewer indicated that it is not clear whether these vehicles were replacement vehicles or additional vehicles for the fleet, and whether the reducing GHG emissions objective is being met.

#### **Reviewer 5**

The reviewer commented on a positive outcome of this project—helping seniors and resolving the issue of volunteers having to use their own vehicles. The reviewer stated that the project helps to support technology integration objectives of improving fuel diversity by adding these five Chevy Bolts to organizations that at the time had no vehicles to provide to their volunteers, thereby exposing the area to a cleaner vehicle technology. The reviewer added that EVs help transportation efficiency and adding them to community organizations for seniors based in a lower socio-economic area furthers efforts to assist underserved and overburden populations.

The reviewer noted that the insurance is currently paid for by Forth and it is assumed that the expense will be the responsibility of the CBO when the project period ends. The reviewer commented that the insurance, maintenance, repair and cost of electricity for the EVs, and EVSE management and maintenance may be more than the community-based organization (CBO) can bear once the project ends, and added that for smaller agencies with bare bones budgets (which at present rely on volunteer drivers and their vehicles), owning EVs may be cost prohibitive, particularly if gas prices go down. The reviewer opined that adding vehicle ownership to programs that are currently working adequately using volunteer vehicles may be a hard sell if there is not an appealing ROI. It is hoped that other organizations will step in and assist if needed so this program can continue.

***Question 2: Project Approach—Please comment on this project’s approach for integrating advanced transportation technologies and practices to solve real-world challenges.***

#### **Reviewer 1**

The reviewer observed that the project approach section provides an excellent methodology to accomplish the project objectives and support the integration of advanced transportation technologies and practices. The reviewer noted that the project approach is divided by three project periods (Project Initiation and Launch, Project Refinement, and Project Wrap-up & Results Dissemination), each containing associated tasks and applicable go/no-go decision points, and added that the Milestone slide provides significant detail with regards to the planned tasks per budget periods and progress to date.

#### **Reviewer 2**

The reviewer noted that the project aims to measure the costs and benefits of EV fleets in social service agencies to improve delivery of service and to produce a case study in hopes the practice will be replicated. The reviewer stated that, for agencies with funds and a desire to own and maintain their own vehicles, this is a much needed pilot and they eagerly await the case study. The reviewer commented that the approach is simple and direct: procure vehicles, install charging stations, train staff, launch program, gather data, conduct workshops/outreach, produce and share model/case study.

#### **Reviewer 3**

The reviewer remarked that the approach was logical in planning for deployments, conducting outreach, deploying the vehicles and monitoring impacts, and the program design with sites in the north and south of the city gives an interesting opportunity to make comparisons.

#### **Reviewer 4**

The reviewer noted that the project consists of three major phases, phase one including initiation and launch, phase two collecting/analyzing data and refining the project, and phase three disseminating lessons learned

locally and nationally. A key part of the project approach was to procure the electric vehicles and install the chargers for the two CBOs participating in the project and then train the staff to use them. The reviewer commented that the project set aside CBO personnel time for both training and promotion to the community, and said it was a good approach to make sure that training for the CBO workers and general technical assistance is a prominent part of the project. The reviewer added that the project has a detailed plan for disseminating results to several Clean Cities coalitions directly (via hands-on technical assistance), as well as providing presentations of the results at both local and national venues. In addition, a case study will be valuable to understand lessons learned.

The reviewer stated that it would have been beneficial to understand how the project plans to compare the use of baseline vehicles for each CBO versus the new electric vehicles, and added that there could be an issue of not comparing apples to apples, due to the vehicles' sizes (e.g., the EVs being smaller than the typical vehicles, and not having wheelchair accessibility) and the vehicles' ages (e.g., the EVs being newer than typical vehicles used and not getting a fair comparison of cost of ownership [comparing new EV to new gasoline]).

#### **Reviewer 5**

The reviewer commented that a meeting with those that are using the vehicles to better understand their needs from the vehicle could have prevented some of the challenges being seen currently, such as being too low and therefore difficult for seniors to access vehicle, as well as wheelchair accessibility. The reviewer did not understand the reasoning behind having one pilot project in a disadvantaged and underserved area of the community and the other in a part of the community that is not underserved, as opposed to both being in the underserved area.

***Question 3: Project Accomplishments and Progress-Please comment on the project's progress and significant accomplishments to date.***

#### **Reviewer 1**

The reviewer commented that the project had tremendous success in procuring the electric vehicles and installing the chargers without significant delays, and added that this is especially impressive due to the pandemic and resulting supply chain issues. As that is such a crucial part of the project, that allowed additional project tasks to be completed. They were able to kick off the project and do virtual training right after the electric vehicle chargers were installed. The reviewer noted that the project has already demonstrated vehicle utilization as well as charging data, and this has put the project on a very good path to being completed and meeting its goals.

#### **Reviewer 2**

The reviewer commented that excellent progress has been made towards achieving project goals, and noted that the project has made progress on several key activities:

Five Chevy Bolts have been deployed since Q3 2021, and

Five L2 Chargers have been operational since Q3 2021.

The service was officially launched on Sept 30, 2021 and between Dec 2021 and March 2022, 358 rides have been conducted and 3,629 meals were delivered. Additionally, data collection has commenced.

#### **Reviewer 3**

The reviewer remarked that this project is well underway and is already providing lessons learned and valuable data.

#### **Reviewer 4**



The reviewer commented that the project faced some delays and changes in operations due to the COVID-19 pandemic; however, the project successfully deployed the vehicles and infrastructure and has begun giving rides and doing meal deliveries.

#### **Reviewer 5**

The reviewer remarked that the project milestones and accomplishments were met on time with no noticeable hiccups. The reviewer pointed out that the presenter did not mention the Bolt recall, so it is assumed that these vehicles did not suffer any significant break in service, and noted that the presentation included the first sets of data.

***Question 4: Collaboration and Coordination Among Project Team—Please comment on the level of collaboration within the project team and the degree to which the project team has identified and leveraged the proper connections to achieve its project goals.***

#### **Reviewer 1**

The reviewer commented that the project demonstrated significant coordination with project partners in its ability to quickly obtain the electric vehicles, install the chargers, and work with the two CBOs to initiate the project. The reviewer added that the presentation highlighted that the project team is in frequent communication about the status of the project, and they are trying to engage the team to help get feedback on how to improve the project as it proceeds.

#### **Reviewer 2**

The reviewer commented that an excellent project team, including the lead recipient (Forth), community partners (Northside Youth & Senior Center and City Seniors, Inc.), industry partners (GM, AmpUp, Ameren, Natural Resources Defense Council), additional community organizations (North Newstead Association and the St. Louis Area Agency on Aging), and the local Clean Cities coalition (St. Louis Regional), has been assembled to carry out this project and provide an appropriate mix of expertise among team members. The reviewer added that collaboration/communication among project partners appears to be appropriate for a project of this scope.

#### **Reviewer 3**

The reviewer observed that the project team has regular project calls and updates to the broader community, and noted that they have also presented at conferences and will more broadly distribute a toolkit once development is complete.

#### **Reviewer 4**

The reviewer observed that the presentation clearly outlined how the team conducted meetings, check ins and communication, and noted that this project has an impressive list of ten partners.

The presenter stated that the case study and findings will be shared at conferences and through media release and project marketing, and that Forth would be available to assist Clean Cities as needed, but the reviewer noted that it is unclear what happens to the tool kit and case study after the completion of the project.

#### **Reviewer 5**

The reviewer remarked on the great set of stakeholders on the team. With the vehicle accessibility oversight/ lessons learned, the reviewer wondered how much of a voice each team member has in the project development and implementation.

***Question 5: Energy Equity and Environmental Justice Project Contribution-Please provide comment on the contribution of this project to energy equity and environmental justice by ensuring the project benefits underserved and overburdened communities and does not cause increased burdens to these communities.***

**Reviewer 1**

The reviewer commented that, of the two CBOs participating in the project, one is in a location with a significant percentage of the clientele population being low income and/or a minority, while the other is not in an underserved community, but both are supporting elderly populations. The reviewer noted that, in addition to the direct impact on the communities that the project is involved with, the overall lessons learned from the project could lead to other nonprofit groups supporting disadvantaged communities implementing electric vehicles. The reviewer stated that the goal of the project is to demonstrate whether these vehicles are cost-effective and meet the operational requirements of these organizations, and if it is found to be the case, this could lead to cost savings and help these organizations focus more of their resources on their mission. In addition, the use of electric vehicles offer zero tailpipe emissions in the communities where the vehicles are driven.

**Reviewer 2**

The reviewer remarked that the project has an excellent potential to contribute to energy equity and environmental justice goals by demonstrating how EV fleets can save community-based organizations and social service agencies money and improve service delivery and create a model for deploying EVSE that serves those fleets and can also serve employees and community members. The reviewer observed that the project is providing electric vehicle service in a section of St. Louis with little to no EVSE availability; additionally, the project has significant and active participation from a number of community-based organizations.

**Reviewer 3**

The reviewer commented that this project is very impactful to an underserved community, it added charging to an area with no access, and provides services to a disadvantage population. The reviewer added that, beyond providing services with no tailpipe emissions, it serves to broaden the exposure to clean transportation technology.

**Reviewer 4**

The reviewer commented that the average North St. Louis location client is described in the presentation as “low-income African American” in the 65-74 age range, and observed that this program aims directly at this overburdened community with a disadvantaged population. The reviewer added that Meals on Wheels and similar organizations are designed to help the elderly and low income, and those in need, and this project is targeted at those organizations.

**Reviewer 5**

The reviewer commented that half of the project is in an underserved community, which is great. The reviewer added that consideration should be given to why both fleet pilots were not deployed in the underserved area.

## Acronyms and Abbreviations

AFDC	Alternative Fuels Data Center
AFV	Alternative fuel vehicle
AMR	Annual Merit Review
BWI	Baltimore/Washington International Airport
CBO	community-based organizations
CFO	Clean Fuels Ohio
DOE	U.S. Department of Energy
DOTs	Departments of Transportation
EEJ	Energy and environmental justice
EJ	Environmental Justice
EMA	Engine Manufacturers Association
EV	Electric vehicle
EVI	Electric vehicle infrastructure
EVSE	Electric vehicle supply equipment
EZMT	Energy Zones Mapping Tool
GHG	Greenhouse gas
HBCU	Historically Black Colleges and Universities
HD	Heavy-duty
LD	Light-duty
LDV	Light-duty vehicle
LPG	Liquified petroleum gas (propane)
MD	Medium-duty
MUD	Multi-unit dwelling
MWBE's	Minority and women owned business enterprise
NAFA	National Association of Fleet Administrators
NASEO	National Association of State Energy Officials
NEVI	National Electric Vehicle Infrastructure
NREL	National Renewable Energy Laboratory
OEM	Original equipment manufacturer
PAC	Project advisory committee
PERC	Propane Education and Research Council

PHEV	Plug-in hybrid-electric vehicle
PI	Principal investigator
REV	Regional Electric Vehicle
ROI	Return on investment
SCAQMD	South Coast Air Quality Management District
TCO	Total cost of ownership
TI	Technology Integration
TNC	Transportation network company
USPS	United States Postal Service
VTO	Vehicle Technologies Office
WVU	West Virginia University
kW	Kilowatt

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