# 6. Technology Integration

The Vehicle Technologies Office (VTO) supports research, development, demonstration, and deployment (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 and the U.S. Department of Energy (DOE), the VTO 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.

VTO's Technology Integration (TI) program supports a broad technology portfolio that includes alternative fuels, energy efficient mobility systems and technologies, and other efficient advanced technologies that can reduce transportation energy costs for businesses and consumers. The program provides objective, unbiased data and real-world lessons learned to inform future research needs and support local decision making. It also includes projects to disseminate data, information, and insight, as well as online tools and technology assistance to cities and regions working to implement alternative fuels and energy efficient mobility technologies and systems.

The TI goals are to strengthen national security through fuel diversity and the use of domestic fuel sources, reduce transportation energy costs for businesses and consumers, and enable energy resiliency with affordable alternatives to conventional fuels that may face unusually high demand in emergency situations.

## 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 | Collaborations | EEEJ | Weighted Average |
|---|---|---|---|---|---|---|---|---|---|
| TI141 | Integrated Fuel Cell Electric Powertrain Demonstration | Prateek Vaish (Cummins) | 6-5 | 3.00 | 3.00 | 3.17 | 3.33 | 3.00 | 3.10 |
| TI142 | Field Demonstration of a Near-Zero Tier 5 Compliant Natural Gas Hybrid Line-Haul Locomotive | Bart Sowa (Gas Technology Institute) | 6-9 | 3.20 | 3.40 | 3.20 | 3.60 | 2.80 | 3.24 |
| TI144 | Creating the NFPA Distributed Energy Resources Safety Training (DERST) Program | Andrew Klock (Nation Fire Protection Association) | 6-14 | 3.63 | 3.63 | 3.75 | 3.63 | 3.38 | 3.65 |
| TI145 | Electric Vehicle Market Stimulation in Divested Economies | Jenna Znamenak (Metropolitan Energy Center) | 6-18 | 3.50 | 3.33 | 3.33 | 3.33 | 3.33 | 3.37 |
| TI146 | Rural Reimagined Building an EV Ecosystem and Green Economy for Transforming Lives in Economically Distressed Appalachia | Pingen Chen (TN Tech) | 6-21 | 3.75 | 3.63 | 3.63 | 3.88 | 3.75 | 3.69 |

| Presentation ID | Presentation Title | Principal Investigator (Organization) | Page Number | Objectives | Approach | Accomplishments | Collaborations | EEEJ | Weighted Average |
|---|---|---|---|---|---|---|---|---|---|
| TI147 | Affordable Mobility Platform | Connor Herman (Forth Mobility) | 6-25 | 3.63 | 3.50 | 3.13 | 3.50 | 3.63 | 3.39 |
| TI148 | Upper Midwest Inter-Tribal Electric Vehicle (EV) Charging Community Network | Robert Blake (Native Sun Community Power Development) | 6-29 | 3.50 | 3.25 | 3.25 | 3.50 | 3.88 | 3.39 |
| TI153 | Fleet Research Energy Data and Insights | Alicia Birky (National Renewable Energy Laboratory) | 6-33 | 3.50 | 3.38 | 3.25 | 3.50 | 3.13 | 3.34 |
| TI154 | Equitable Mobility Powering Opportunities for Workplace Electrification Readiness (EMPOWER) | Michael Graham (Columbia-Willamette Clean Cities Coalition) | 6-37 | 3.50 | 3.20 | 3.10 | 3.10 | 2.90 | 3.18 |
| TI155 | Charge To Work USA | Jason Zimbler (CALSTART) | 6-42 | 3.40 | 3.30 | 3.40 | 3.50 | 3.50 | 3.40 |
| TI156 | Leadership of Employers for Electrification Program (LEEP) | Prateek Suri (Forth) | 6-47 | 3.38 | 3.38 | 3.00 | 3.25 | 3.25 | 3.20 |
| TI157 | Wasatch Front Multi-Modal Corridor Electrification Plan | Regan Zane (Utah State University) | 6-51 | 3.88 | 3.50 | 3.38 | 3.88 | 3.50 | 3.56 |
| TI158 | East Coast Commercial Zero-Emissions Vehicle (ZEV) Corridor Planning Partnership | Michael Joseph (CALSTART) | 6-55 | 3.63 | 3.13 | 3.00 | 3.38 | 3.50 | 3.24 |

| Presentation ID | Presentation Title | Principal Investigator (Organization) | Page Number | Objectives | Approach | Accomplishments | Collaborations | EEEJ | Weighted Average |
|---|---|---|---|---|---|---|---|---|---|
| TI159 | First to Last Mile Creating an Integrated Goods Movement Charging Network Around the I-710 Corridor | Jack Symington (Los Angeles Cleantech Incubator) | 6-59 | 3.75 | 3.25 | 2.88 | 3.25 | 3.38 | 3.21 |
| TI160 | Northeast Electric Highways Study | Brian Wilkie (National Grid USA Service Company Inc.) | 6-63 | 3.88 | 3.75 | 3.25 | 3.63 | 3.13 | 3.50 |
| TI161 | MD-HD ZEV Infrastructure Planning with Focus on I-80 Midwest (IN-IL-OH) Corridor | Daniel O'Connor (Cummins Inc.) | 6-67 | 3.50 | 3.40 | 3.00 | 3.50 | 2.80 | 3.21 |
| TI162 | San Francisco and Bay Area Regional Medium- and Heavy-Duty Electrification Roadmap | Dave Mullaney (Rocky Mountain Institute) | 6-71 | 3.50 | 3.40 | 2.80 | 3.50 | 3.20 | 3.17 |
| TI163 | Houston to Los Angeles (H2LA)—Interstate 10 (I-10) Hydrogen Corridor Plan | Bart Sowa (Gas Technology Institute) | 6-75 | 3.13 | 3.00 | 3.13 | 2.88 | 3.13 | 3.08 |
| Overall Average | | | | 3.51 | 3.36 | 3.20 | 3.45 | 3.29 | 3.33 |

**Presentation Number:** TI141
**Presentation Title:** Integrated Fuel Cell Electric Powertrain Demonstration
**Principal Investigator:** Prateek Vaish, Cummins

***Presenter***

Prateek Vaish, Cummins

***Reviewer Sample Size***

A total of three reviewers evaluated this project.

***Question 1: 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.***

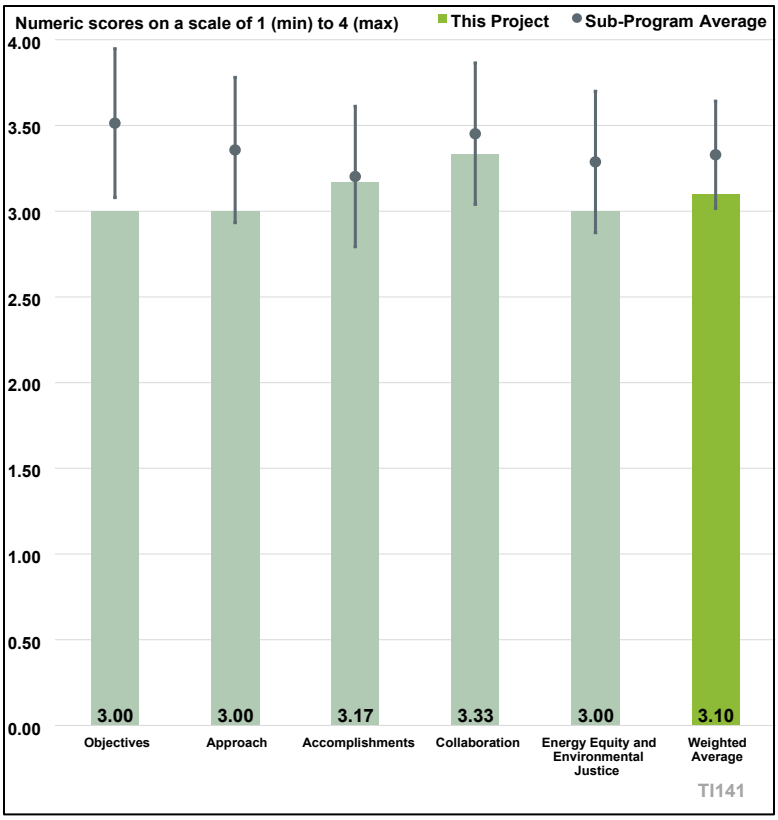


Figure 6-1. Presentation Number: TI141 Presentation Title: Integrated Fuel Cell Electric Powertrain Demonstration Principal Investigator: Prateek Vaish, Cummins

**Reviewer 1**

The reviewer stated that the project is focused on developing and demonstrating a modular, integrated fuel cell drivetrain for a heavy-duty (HD) truck (and originally, also a transit bus). HD trucks are a potential key application for fuel cells as batteries may not necessarily be fully applicable to the sector. Thus, this project is looking to develop an additional option for petroleum and emissions reductions from the HD sector.

**Reviewer 2**

The reviewer commented this project directly supports TI objectives through the development of a market-ready fuel cell electric powertrain with operational performance and total cost of ownership (TCO) that will support near-term, rapid, and substantial penetration of the commercial truck market, enhancing fuel diversity, bolstering local resilience, and diminishing GHG emissions that can be achieved by augmenting the use of alternative fuels and improving transportation efficiency.

**Reviewer 3**

The reviewer stated the project does somewhat address the objective of improving fuel diversity with the manufacture of a $H_2$ fuel cell powered Class 8 tractor. But if the project is assessed with the expectation and reasoning that improving fuel diversity requires building a tractor that is affordable and sought after/desirable in the marketplace, then the answer is clearly that the project has not built that equipment. $600,000 per unit at 1,000 units seems to be well beyond acceptable cost comparison. TCO should be evaluated, but the prototype cost alone is significantly higher than the cost of the diesel engine it is required to replace, and the fuel cost is another issue to consider, all of which makes it difficult to know what TCO will be.

The reviewer asked what the pathway is to $5–$6 per kilogram (kg) as was given in the presentation. There is no significant improvement in the equivalent miles per gallon (MPG) with $H_2$ fuel cells. The project is not responsible for the extremely high cost of $H_2$, but the project team should expect better mileage if the fuel diversity is to be expected to be adopted. This type of equipment and the fuel have to be comparable to equipment they are designed to replace if they are to be adopted in industry. It does not have to be the same as a diesel engine, but it has a long way to go to achieve an acceptable level of parity.

The reviewer stated a belief that the project has not solved for the equipment being extremely more expensive; the range is less; the vehicle is heavier, therefore less capacity, and if range goes up, carrying capacity goes down; no improvement in diesel gallon equivalent (DGE) MPG and the fuel is more expensive; and fueling infrastructure is more expensive. Although this is not in the scope of the project, building out a fuel that is more expensive and scarce does not drive adoption.

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

**Reviewer 1**

The reviewer noted that in Phase 1, the project team has designed a modular and scalable integrated fuel cell electric powertrain by leveraging existing fuel cell powertrains. The powertrain layouts and integration processes are also being refined to be manufacturable. A prototype fuel cell Class 8 truck will be constructed and commissioned. A Product Development and Manufacturing Plan will be developed, covering the overall powertrain cost, the high-volume system component cost, and the quantifying of high-volume production cost estimates; and the team will conduct high-volume TCO scenario analysis.

**Reviewer 2**

The reviewer highlighted that the key focus for the project is the 300-mile range. $H_2$ cost and availability are also still issues. The approach is focused on modular and scalable integrated powertrains to allow users to choose their specific components to meet their needs. The project is using a truck; however, the powertrain should also be applicable to transit buses (though plans for a transit bus under this project previously fell through). This project is also specifically focused on looking at TCO for this technology. The approach started with a discussion with partners to clearly drive design and metrics. Then the project moved on to design for build. Safety has been emphasized in the design of the truck. Reliability has also been a focus for the project approach, both for the truck as a whole as well as for individual components impacted by the move to a fuel cell such as brakes. They are working on improving fuel economy, acceleration, and gradeability. There is a concern on $H_2$ availability and cost (currently $20/kg–$40/kg), though they are working on a deal with Shell to provide full availability of the fuel. Right now, there is not a major focus on marketing and outreach to other potential fleets; the principal investigator (PI) is now considering that.

**Reviewer 3**

The reviewer stated that solving real world problems is building a piece of equipment that will be used in the market at a significant unit volume. The cost to build the unit does not support nor indicate there will be wide adoption. The presented cost of $600,000 per unit at scale for a day cab application is not going to drive adoption. As an example, the reviewer recommended considering the use of a compressed natural gas (CNG) or liquid natural gas tractor. Although the differential on the equipment is 30%–40% of the diesel tractor, the end user will make that up in fuel cost savings without conceding range and cargo weight. The return on investment is achieved quickly. The fuel is

easily delivered to the end user, on site, via existing pipeline infrastructure. TCO improvement is known.

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

**Reviewer 1**

The reviewer acknowledged that an integrated fuel cell electric powertrain design has been completed. The telematics data collection system has been installed. Powertrain module production, build, and assembly processes documents are complete. The prototype vehicle was assembled, commissioned, and validated in February 2024. Functional and performance validation is underway.

**Reviewer 2**

The reviewer noted that a truck has been built and 2,000 miles have been run on it. Another 8,000 miles will be run to complete validation and then the unit will be moved onto the fleet partner for demonstration (in Fontana, California) who expects to run the truck 75,000 miles over the year (300 miles/day). There are still some issues with cost. They will be using a public fueling station for operation, during which data will be collected and analyzed. The transit bus side of the project has been dropped since the project was unable to locate a bus original equipment manufacturing (OEM) partner. The current fuel cell tractor is about 8,000 pounds (lbs) more than a comparable diesel (22,000 lbs vs. 14,000 lbs), which means either lesser payload or the need for weight waivers.

**Reviewer 3**

The reviewer stated that progress has been achieved by building the one unit for the trucking logistics application. But the fact that no bus company was willing to participate is telling. The reviewer asked if it indicates that bus companies do not see a market for the equipment or a need. It was unclear if evaluation of more than the build of a $H_2$ fuel cell powered tractor was accomplished within the timeline.

***Question 4: 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 stated that collaboration appears to be a strong characteristic of this group. The team identified an OEM for the basis of the build and an end user committed to using the equipment as well as numerous vendors supplying necessary equipment. They should be commended for the collaboration.

**Reviewer 2**

The reviewer stated the project has assembled a strong team, led by Cummins and supported by CALSTART, Navistar, Long Beach Clean Cities, and Werner (the fleet). Cummins has been working closely with Navistar to integrate the powertrain into the truck. Outreach to additional fleets to learn about the demonstration unit would be an improvement.

**Reviewer 3**

The reviewer noted that Cummins Electrified Power North America (CEPNA) is the project lead, providing overall project management, task coordination, and administrative functions for the project. CEPNA is managing all technical tasks and working with Navistar to design the integrated fuel cell electric powertrain, and to build, commission, and test the prototype fuel cell vehicle. CEPNA will also provide service and support during the field demonstration at Werner Enterprises in Los

Angeles, California. CALSTART is assisting CEPNA with data collection and analysis, and supporting grant report deliverables (Performance Evaluation, Product Development and Manufacturing Plan, and Commercialization Pathway), Navistar is the OEM, providing the Class 8 truck and collaborating with CEPNA on the design of the integrated fuel cell electric powertrain. Long Beach Clean Cities is assisting CEPNA with project outreach. Southern California Gas Company is providing cost share to the project and providing feedback to the project team on the commercialization of fuel cell and $H_2$ technologies. South Coast Air Quality Management District is providing cost share to the project and providing feedback to the project team on the commercialization of fuel cell and $H_2$ technologies. Werner Enterprises is the fleet partner, conducting and operating the truck for a 12-month demonstration and facilitating driver education and safety training.

***Question 5: 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 an estimated 15,000 gallons of diesel fuel per truck will be displaced annually. The $H_2$ fuel cell truck is estimated to reduce 335,700 lbs of carbon content annually compared to a diesel truck.

**Reviewer 2**

The reviewer conceded that energy equity and environmental justice (EEEJ) contributions are hard to measure, but the reviewer did not see the connection to improving how specific underserved and overburdened communities benefit from building $H_2$ fuel cell tractors. It is not the same as improving air quality in factories adjacent to underserved and overburdened communities.

**Reviewer 3**

The reviewer expressed the hope that if this technology can see cost reductions, it may be used to benefit Justice 40 Initiative (J40) communities. The presentation, however, did not appear to significantly address EEEJ issues.

**Presentation Number:** TI142
**Presentation Title:** Field Demonstration of a Near-Zero Tier 5 Compliant Natural Gas Hybrid Line-Haul Locomotive
**Principal Investigator:** Bart Sowa, Gas Technology Institute

***Presenter***

Bart Sowa, Gas Technology Institute

***Reviewer Sample Size***

A total of five reviewers evaluated this project.

***Question 1: 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.***

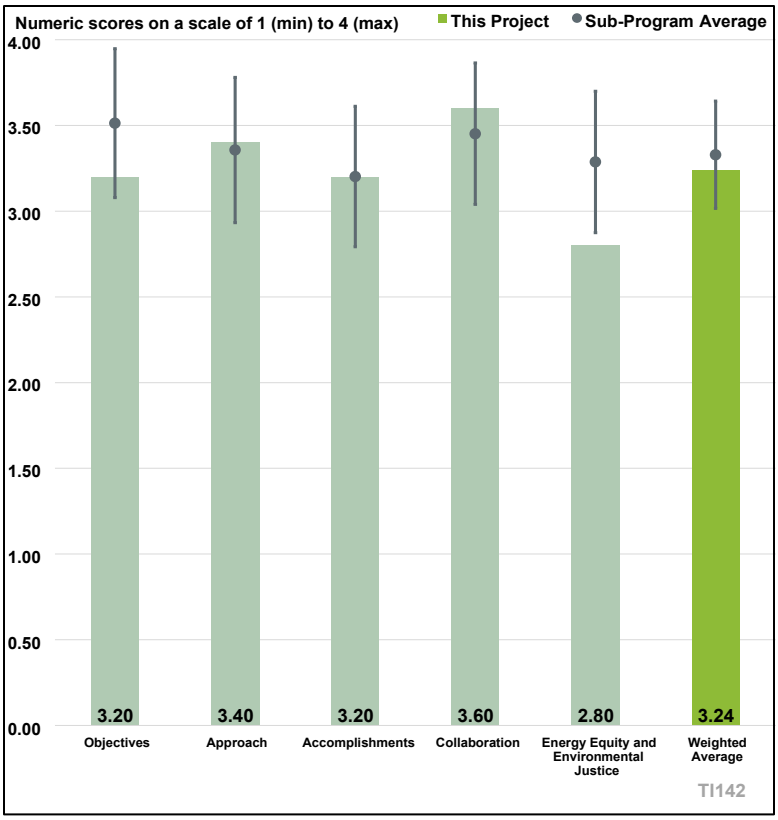


Figure 6-2. Presentation Number: TI142 Presentation Title: Field Demonstration of a Near-Zero Tier 5 Compliant Natural Gas Hybrid Line-Haul Locomotive Principal Investigator: Bart Sowa, Gas Technology Institute

**Reviewer 1**

The reviewer noted a strength of the project is developing and demonstrating a locomotive that exceeds Tier 5 emissions (not yet in effect but are being pursued by California Air Resources Board [CARB]). This is well aligned with VTO goals and objectives.

**Reviewer 2**

The reviewer noted that the project improves the use of an alternative fuel in a hard to decarbonize application. The fuel is readily accessible, competitive to replacing diesel. The fuel reduces GHG emissions and is not burdened with costly, unavailable fuel. The engines selected to use the fuel are proven technology and will benefit from the application of the Cummins engine across the transportation sector.

**Reviewer 3**

The reviewer stated this project strongly supports overall TI and VTO objectives of fuel diversity and emissions reductions. CNG is currently half the cost of diesel fuel, and RNG can be significantly lower if carbon intensity is incorporated. Locomotive repowers are a significant market, with each costing up to $5 million and built to operate for as long as 50 years. This project also shows the potential for major emissions reductions for a sector known for high emissions, particularly in disadvantaged communities (DACs).

**Reviewer 4**

The reviewer commented that this project directly supports improved fuel diversity through the use of RNG and CNG, and $H_2$ in the future, in rail line haul operations. Local resiliency is improved with RNG and CNG infrastructure being reliable with locally produced fuels. The proposed technology will improve fuel efficiency and reduce GHG emissions while reducing criteria pollutants (oxides of nitrogen [$NO_x$], particulate matter [PM]).

**Reviewer 5**

The reviewer noted the objectives are not clearly defined. It should be stated within conventional fuel consumption reduction how much is due to the choice of fuel (i.e., carbon reduction with natural gas [NG]), how much is due to engine efficiency, and how much is due to the hybrid operation over an established baseline cycle. Data collected to dispel concerns of the industry should be defined so that proper baseline information can be compared to results. It was unclear what the actual impact of this project might be. The reviewer asked what the size is of the new locomotive market, and if it is realistic to assume the used market would implement this technology. The reviewer questioned if the technology is a true replacement to the diesel baseline.

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

**Reviewer 1**

The reviewer cited the approach as particularly strong since the project technology is a retrofittable solution for old locomotive stock. Another strength noted is that the project's modular engine pods are innovative as they can be moved around individually with a forklift for service and/or replacement. The opportunity to add fuel "tenders" to the train can cost-effectively extend range, which is a strength.

**Reviewer 2**

The reviewer acknowledged the application of module engine pods to re-power locomotives without the need for crane equipment improves application and location of use. It was stated in the presentation that the current infrastructure to deliver the fuel exists today. Use of RNG creates yet another market for the fuel. The engine and fuel pod and custom-built starter/generator solve for ease of adoption.

**Reviewer 3**

The reviewer stated that the approach for the project is solid and logical. The project has been developed to not only demonstrate alternative fuel in a hard sector to decarbonize, but also to exceed expected emissions regulations requirements. The original plan was for 4,300 horsepower (hp), but the project team found the need to have over 5,000 hp and adjusted the design accordingly. There were also supplier changes and supplier recommendations that changed design. The system is a completely modular construction, so units can be configured based upon the platform to be repowered.

Since the last Annual Merit Review (AMR), the engine was changed from the 12 L to the 15 L model, which is due out soon. These new engines are expected to be more efficient. The project team also included a custom 600 hp starter/generator. The current design is a pod arrangement, and the overall locomotive has 10 pods to reach the 5,100 hp level. Each pod can be lifted with a forklift and are based upon International Organization for Standardization hardware. The unit will be run at the Pueblo, Colorado, test center. The project worked to rely upon off-the-shelf components as much as possible.

There will be a 6-month testing period under a number of different duty cycles. The team does not yet appear to have an estimate for miles or hours of operation that will be run during the test period. An element the project has not looked at is if an individual engine is turned off, the engine across from it may also need to be turned off to balance vibration. Long haul locomotives typically have 2,000–5,000-gallon diesel tanks, so the team may expect to be at a range disadvantage for this unit. OptiFuel is looking at developing tenders over time.

**Reviewer 4**

The reviewer commented that the approach is minimally satisfactory. There needs to be a baseline duty cycle defined so that initial analysis work can be performed to justify the spending on engines, traction equipment, and batteries, and to gain confidence that the chosen fuel consumption reduction can be achieved. It was unclear to the reviewer how or why the battery size was reduced in the final round of powertrain choices. The approach for structuring the fuel consumption reduction needs to be improved. Perhaps it would be beneficial to have a waterfall chart that identifies the gains in efficiency in the locomotive.

**Reviewer 5**

The reviewer recognized that the project has developed a revised design based on the existing, widely used General Motors Electro-Motive Division SD90MAC locomotive platform, 80 ft long with two 3-axle trucks and with 5,100 hp continuous and 5,600 hp peak power. Energy storage employs a 380 kilowatt-hour (kWh) lithium iron phosphate battery and tractive effort is 175 kilopounds (klbs) continuous and 200 klbs starting. Onboard fuel storage is 2,000 DGE of NG in Type 4 tanks.

Activities in the first project phase included the engineering design of the near-zero locomotive, procurement of an existing vehicle for conversion, a production plan, and a system/Transportation Technology Center (TTC)/operational test plan. Advanced technology upgrades included 10 generator sets incorporating the latest X15N Cummins engines with efficiency improved up to 10% compared to the ISX12N, reduced battery pack size, RNG storage increased to 2,000 DGE, a custom 600 hp starter/generator to match the performance/dimension requirements and alternating current traction motors for improved adhesion over direct current traction.

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

**Reviewer 1**

The reviewer acknowledged that the project progress is on time. They have secured the test location with variable, real world terrain to evaluate the design. It should be recognized that the design managed the risk of unproven technology, the project adopted a conventional design that will allow for acceptance and replication, and it is utilizing "off-the-shelf components."

**Reviewer 2**

The reviewer noted the design is complete. The project team is waiting for Cummins to provide the new engines. Fuel storage is also modular at 1,000 DGE above and under the deck at 350 bar (also $H_2$-compatible, since the Cummins engine is $H_2$-compatible). Researchers expect to have everything put together in October 2024, if they receive the engines as planned, in order to have the full locomotive complete by end of December 2024. The team does not anticipate any significant issues with completing the project on time as long as they receive the engines on time.

**Reviewer 3**

The reviewer stated the locomotive design has been completed. The process of locating and procuring a used SD90MAC locomotive is underway. Major components are on order with deliveries expected in Quarters 2–3 (Q2–Q3) 2024. The production plan is complete with locomotive assembly to be conducted by RailServe in Longview, Texas. The test plan is complete with testing to start on January 2025 at the TTC testing facility in Pueblo, Colorado. Dynamic/static vehicle testing, performance, endurance, and component reliability testing will be conducted on a 50-mile, full-scale on-track testing, including a high tonnage loop. The locomotive procurement team is targeting delivery in Q3 2024, and production/assembly is scheduled for Q3–Q4 2024.

**Reviewer 4**

The reviewer cited a strength of the project is that COVID-19-related delays actually allowed time for important design enhancements and adjustments. One weakness is the availability of X15N Cummins engines needed for the project is unclear/uncertain. Another weakness is that the locomotive testing plan/test scenario details are not yet clear or known (important for knowing what range effects from using NG there will be on typical duty hauls).

**Reviewer 5**

The reviewer stated that it appears that most of the project is on track, except for the engine deliveries.

***Question 4: 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 cited a strong/good industry team and key collaboration with Federal Railroad Administration's TTC as a project strength.

**Reviewer 2**

The reviewer acknowledged that GTI Energy Partners appeared to have selected the right project collaborators: VTO as funding agency; GTI Energy as prime recipient; OptiFuel as subcontractor and lead technology developer; Cummins, TMV Control Systems–Next Generation Locomotive Control Systems (TMV), FMW Solutions LLC, BAE Systems, DEF, Development Bank of Latin American and the Caribbean (CAF) as key technology providers; OptiFuel, OneGas, Utilization Technology Development (UTD) as industry stakeholders with cost share; RailServe as manufacturing and assembly services; and TTC for testing services. GTI Energy is an experienced VTO collaborator. The team has decades of experience in R&D, technology development, and the rail industry. GTI Energy has successfully collaborated in the past with OptiFuel, FMW, Cummins, and BAE.

**Reviewer 3**

The reviewer noted the project includes an experienced team, particularly OptiFuel, who has already demonstrated NG in a locomotive application. There are also several technical experts on the team to address specific areas of concern as well as key suppliers. The gas industry is also supporting the project.

**Reviewer 4**

The reviewer reported that GTI Energy is the project lead with overall responsibility for design, integration, testing, and reporting. OptiFuel is the lead technology developer. Cummins, TMV Controls, FMW, BAE, DEF, and CAF are key technology providers. OptiFuel, OneGas, and UTD are

industry stakeholders providing cost share. RailServe provides manufacturing and assembly services. TTC provides testing services. GTI Energy is an experienced VTO collaborator. The team has decades of experience in R&D, technology development and the rail industry. GTI Energy has successfully collaborated in the past with OptiFuel, FMW, Cummins, and BAE.

**Reviewer 5**

The reviewer commented that a production plan is completed, however there is no mention of the product cost due to this technology. The reviewer asked if a production plan is necessary if the technology is not cost effective to the customer.

***Question 5: 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 reducing pollutants in railyards that are often surrounded by underserved communities with continuous operations and engines under power will have an impact in improving air quality and noise reduction. If the replacement of the diesel engine is widely accepted, then the impact will be more rapid than improvements on emissions and will be more readily realized. The use of passenger transit applications will also improve air quality for riders, neighborhoods, and urban areas and will reduce noise.

**Reviewer 2**

The reviewer stated that at scale, the near-zero emission rail technology will contribute to EEEJ by reducing criteria pollutants from locomotives used in railyards and on the rail network across the entire United States. Railyards tend to be in areas where underserved populations have some of the poorest air quality. Similarly, when used in passenger transit applications, the technology will improve the air quality and reduce noise affecting the riders, operators, neighborhoods and urban areas.

**Reviewer 3**

The reviewer stated the project will not provide direct environmental justice (EJ) or equity benefits. However, if commercially developed, the project technology would offer significant emissions savings at rail yards and ports which are typically located in or near DACs, which was noted as a strength by the reviewer.

**Reviewer 4**

The reviewer commented that this is really a one-off demonstration, and the impact will be if the technology is adopted at scale since many railyards are in challenged communities as well as passenger rail operation is often in Justice 40 (J40) communities.

**Reviewer 5**

The reviewer noted the level of criteria pollutant emissions was never discussed. Only a reduction in fuel economy is mentioned. The project target is to “exceed” Tier 5 emissions. The reviewer questioned higher emissions. The reviewer also questioned if the intention is to be certified at Tier 5. Perhaps relevant railyard emissions at a site could be listed, and the impact of this technology on improving emissions could be compared for that site. There are no detailed plans for the Energy Environmental Justice Action Plan (EEJ) work.

**Presentation Number:** TI144
**Presentation Title:** Creating the NFPA Distributed Energy Resources Safety Training (DERST) Program
**Principal Investigator:** Andrew Klock, Nation Fire Protection Association

***Presenter***

Andrew Klock, Nation Fire Protection Association

***Reviewer Sample Size***

A total of four reviewers evaluated this project.

***Question 1: 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.***

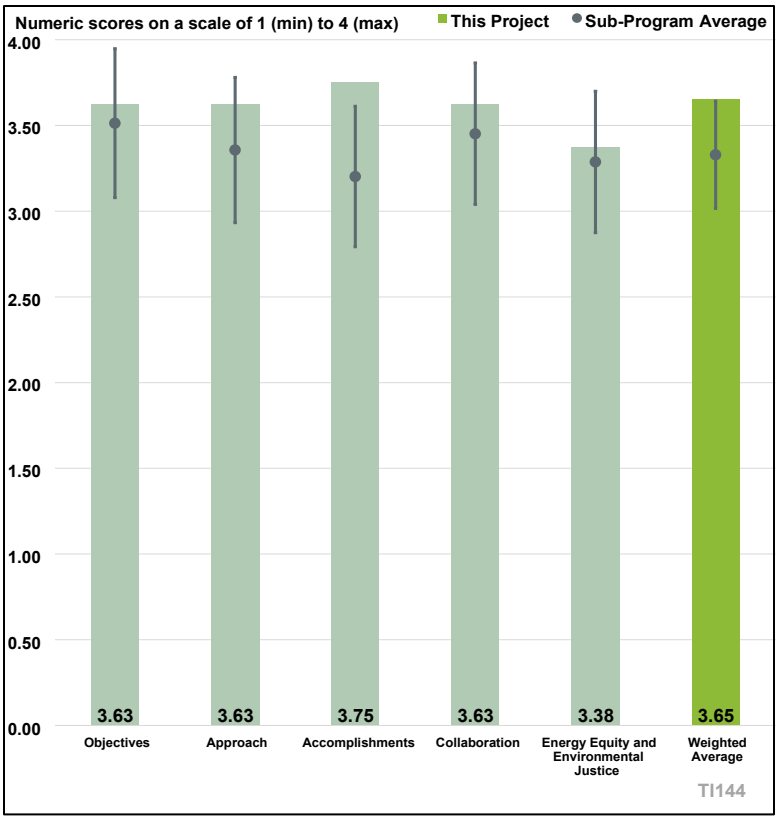


Figure 6-3. Presentation Number: TI144 Presentation Title: Creating the NFPA Distributed Energy Resources Safety Training (DERST) Program Principal Investigator: Andrew Klock, Nation Fire Protection Association

**Reviewer 1**

The reviewer stated belief that this question does not apply as written to the project but may be addressed the next time around. This is a much-needed project and the leader has met the overall listed objective: gather the latest DERST research and data and conduct field testing, gleaning best practices using latest distributed energy resource (DER) equipment (EV, energy storage system [ESS], solar) in controlled fire incidents. Update and modularize our existing train-the-trainer programs for emergency responders (ESS, photovoltaic, EV/electric vehicle supply equipment [EVSE]) and distribute those across the country. Create a multi-user, scenario-based serious gaming platform for fire departments to train on interactive, real-world DERs in structures. Develop and deploy nationwide a DER field evolution and props guide for conducting DERST tactics training at fire academy or outdoor training centers. The reviewer reported having supported three trainings on first responder training and recognized the value of the structure put in place to keep this training relevant and current.

**Reviewer 2**

The reviewer noted one of the current concerns to the driving public (perceived) is for EV battery fires. The National Fire Protection Association (NFPA) has provided a training manual that fire departments can use to train fire fighters so when the public shows a concern, the departments have proof they are trained in the rare case of a fire.

**Reviewer 3**

The reviewer acknowledged the project focuses on training fire professionals to handle fires from alternative energy devices, primarily related to electric/hybrid vehicle batteries and charging equipment and household solar energy related energy storage and equipment. Household fires from alternative energy could be a potential barrier to deployment, so education of fire fighters and homeowners is one component to addressing these barriers.

**Reviewer 4**

The reviewer stated this project addresses a critical need that crosses boundaries from automotive EV applications to distributed energy systems in garages and commercial buildings, all having lithium-ion batteries in common. Fires involving these types of batteries cannot be extinguished effectively using traditional firefighting tactics, so educating firefighters in the latest methods is important. This project will increase local resiliency, boost consumer confidence in the safety of lithium-ion batteries and dispel some of the negative stereotypes that exist about EV fires.

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

**Reviewer 1**

The reviewer noted there is a high demand for this training from first responders; fire response teams, hired and volunteer; tow truck operators; building developers; property owners; and EV owners. There is likely more myth around EV related fires, but that has to be dealt with.

**Reviewer 2**

The reviewer stated this training will give fire departments advanced fire training specific to DERs and EVs. This training document appears to have been researched to address a very specific issue related to this type of fire.

**Reviewer 3**

The reviewer commented that the project has developed an online "multi-player" training tool that is widely accessible, requiring only a computer and internet connection. The training is based on actual burn tests and data analysis collected under the project.

**Reviewer 4**

The reviewer stated this project presents training in an approachable and relatable way through a gaming platform. Lifelike scenarios are easy to comprehend, and lessons are reinforced by actually performing simulated incident responses. There may be a learning curve for the gaming interface with older participants who are not used to playing video games, and younger trainees may find the keyboard interface a little archaic vs. a handheld game controller or a virtual reality headset apparatus.

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

**Reviewer 1**

The reviewer stated the majority of milestones have been completed with just a few items to be reviewed and the vast majority of the training document and training module complete. Budget Period (BP) 1 and 2 are complete.

**Reviewer 2**

The reviewer stated the project has made excellent progress on all tasks.

**Reviewer 3**

The reviewer acknowledged most of the project objectives have been met and others appear to be ahead of schedule. The hardest work has already been done and the training is already benefiting first responders.

**Reviewer 4**

Per the presentation timeline presented, the reviewer noted the project is on schedule. But with less than six months remaining, there is much to do.

***Question 4: 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 acknowledged the level of collaboration and team members selected to participate appears to benefit the project extremely well. The bi-weekly meetings and the benefits listed in the presentation seem appropriate and a value add, focusing on firefighter best practices, communicating lessons and training development, and effective deployment methods, which will consume the last six months of the project.

**Reviewer 2**

The reviewer commented that this project has a very specific program to be developed, and the team that was brought in to work on the project was very appropriate. Particularly, the North American Fire Training Directors (NAFTD) association that has specific skills in developing fire training was appropriate, because not just any training expert understands the nature of the vast members of the fire departments across the United States. NFPA was a very appropriate group to take on this task.

**Reviewer 3**

The reviewer noted that NFPA obviously has the experience and expert knowledge to craft this type of training program. The University of Texas, Argonne National Laboratory, NAFTD, and GHD Digital all bring relevant experience to the project. The team is right sized with an effective number of participating organizations, and each participant has a clear-cut role to play. Coordinating a real-world fire training incident to gather information specific to the training was an excellent idea.

**Reviewer 4**

The reviewer stated that collaboration and coordination within the project team partners seemed to be good. It is not clear how much external collaboration has been performed outside the team. For example, it is not clear how outreach on the training is being performed, such as from which groups and how feedback on the training will be collected.

***Question 5: 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 from the presentation, the takeaway is that the project leaders have thought through the dissemination of the information to make it available to all communities regardless of socio-economic status. Through this project, NFPA is developing DER educational offerings that increase awareness, knowledge, and best practices for the fire service across the country. The DER stakeholders, regardless of the community's socio-economic status, should be able to implement

and use DERs with the assurance that the responder community is familiar with and has the training to handle incidents. NFPA has taken steps to ensure these materials are accessible to U.S. first responders and do not create undue burden.

**Reviewer 2**

The reviewer noted the project team has identified three ways that EJ communities will be served by this training without overburdened cost to the community.

**Reviewer 3**

The reviewer acknowledged the project specifically designed the training course to be web-based and work on any computer connected to the internet. The goal was to eliminate the need for special training equipment and its associated costs that would be burdensome to underserved and small fire departments.

**Reviewer 4**

The reviewer noted that while NFPA provides its online training programs for free, making them widely accessible, there may be issues where firehouses or first responders without reliable internet access may be hindered or unable to use the training. Understandably, there are costs involved with creating hard compact disc or digital video disc copies of the training scenario, even in small numbers, but some accommodation might have been warranted to make the program more universally available.

**Presentation Number:** TI145
**Presentation Title:** Electric Vehicle Market Stimulation in Divested Economies
**Principal Investigator:** Jenna Znamenak, Metropolitan Energy Center

***Presenter***

Kelly Gilbert, Metropolitan Energy Center

***Reviewer Sample Size***

A total of three reviewers evaluated this project.

***Question 1: 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.***

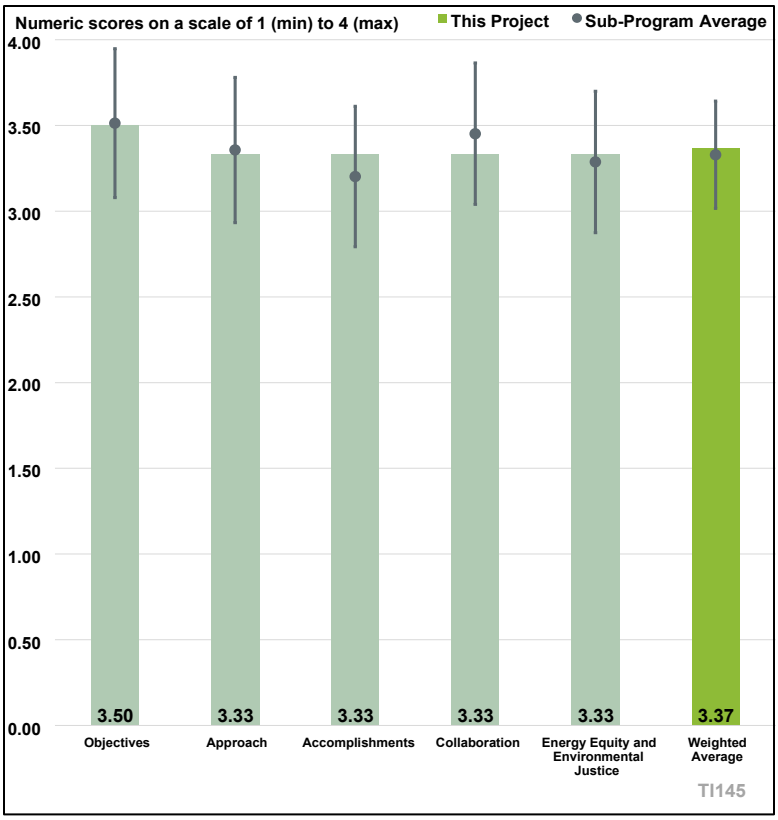


Figure 6-4. Presentation Number: TI145 Presentation Title: Electric Vehicle Market Stimulation in Divested Economies Principal Investigator: Jenna Znamenak, Metropolitan Energy Center

**Reviewer 1**

The reviewer noted the project, which increases access to EVs in underserved markets, directly supports TI objectives of national security through increasing fuel diversification, and the objective of affordability through saving money by use of existing infrastructure.

**Reviewer 2**

The reviewer stated the deployment of EV tractors in four locations and five medium-duty (MD) EVs at another meets the objectives related to fuel diversity and GHG reduction. At this stage in the project, the local resiliency and alternative fuel use have not been fully realized. Data from utilization of the 10 EVSEs in one community and future deployments in additional communities will determine the extent of impact on local resiliency and GHG reductions. The investment is focused on the EVSE deployment with a critical assumption that, "Availability of EVSE will necessarily increase demand from individual and fleet consumers." (Slide 19). An additional approach to further the TI objectives is to provide access to EVs within the communities where the EVSE are located.

**Reviewer 3**

The reviewer stated this project will address and support the overall TI objectives by increasing fuel diversity, improving local resiliency and reducing GHG emissions. Introducing plug-in electric vehicles (PEVs) of various sizes and missions into these communities covers a lot of bases in terms of visibility and demonstrated capability, while installing EVSE in underserved areas enhances access to clean energy and promotes the adoption of PEVs.

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

**Reviewer 1**

The reviewer stated the approach follows best practice of conducting meaningful community engagement that has direct effects on programmatic decision making, specifically through directing site selection for deployment. Additionally, using insights from this work will help to create methods and evaluation frameworks that are transferable to other regions.

**Reviewer 2**

The reviewer noted the project's critical assumption that "Availability of EVSE will necessarily increase demand from individual and fleet consumers" (Slide 19) leaves potential that EV adoption does not occur or occurs much slower than anticipated. An additional approach to further the TI objectives is to provide access to EVs within the communities where the EVSE are located. However, the deployment of several HD and MD vehicles in the region has been successful, indicating success in the notion that higher match rates for industry can help offset some of the challenges of meeting local match in divested communities.

**Reviewer 3**

The reviewer believed this approach has a chance for great success by replacing a significant number of higher-polluting vehicles with PEVs. Deploying PEVs in municipal fleets demonstrates to community members and city employees the capability of EVs and showcases the community being pro-active in reducing its carbon footprint as an example for others.

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

**Reviewer 1**

The reviewer commented that this project is making good progress and appears to be nearly on schedule: 53% of tasks are complete with almost two years left in the timeline. Zero-emission HD vehicles have already been deployed and are at work improving air quality and showcasing the capability of these types of vehicles.

**Reviewer 2**

The reviewer noted the project has conducted community engagement, deployed HD vehicles, deployed light-duty work trucks, and installed EVSE.

**Reviewer 3**

The reviewer acknowledged the deployment delays experienced were caused by factors outside of the project lead's control (supply chain issues with the Ford F-150 Lightning). The project team showed resiliency by pivoting some partners to a different EV model that also met the partners' mission. There is demonstrable success in the completion of six community events.

***Question 4: 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 the project has collaborated with a number of local entities including industry, municipal government, and transportation officials.

**Reviewer 2**

The reviewer noted that completion of six community events indicates successful partner collaboration. The ability to pivot to a different type of vehicle when the Ford F-150 Lightnings were delayed also shows willingness to work together toward the end goal. The community education aspect of BP 2 seems a little behind but it is in progress.

**Reviewer 3**

The reviewer commented that the presentation and supporting document did not give an adequate picture of the team makeup and duties, nor any kind of schedule for team meetings. It appears that there is a prime recipient, some partners tasked with outreach, and other partners who will deploy vehicles within their company or municipality. On the surface, it appears that the right mix of partners have joined the project, and there are vehicle deployments to show for their efforts.

***Question 5: 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 the project is utilizing meaningful community engagement to inform decision making regarding the siting of infrastructure as well as focusing investments in zero-emissions heavy equipment in DACs, ensuring that the benefits of electric transportation accrue to DACs.

**Reviewer 2**

The reviewer acknowledged that deployment of EVSE in divested communities will improve the perception of EV driving and availability of charging. All the chargers will be in such communities and the deployment of EV tractors and MD vehicles within the same communities will have significant air quality impacts. One additional approach to further the TI objectives is to provide access to EVs within the communities where the EVSE are located, not just to chargers themselves.

**Reviewer 3**

The reviewer quoted, “Placement of charging stations in underserved communities by providing access to small grants at reduced cost-share rates will spur adoption of EVs in these markets.” This is a solid plan and involving community leaders in the site selection will give them reason to feel invested, encouraging the community’s continued support for EVSE after project completion. The project will also use data collected and lessons learned to create a strategic plan for other cities looking to deploy EVSE with a community-led process in underserved areas.

**Presentation Number:** TI146
**Presentation Title:** Rural Reimagined Building an EV Ecosystem and Green Economy for Transforming Lives in Economically Distressed Appalachia
**Principal Investigator:** Pingen Chen, TN Tech

***Presenter***

Pingen Chen, TN Tech

***Reviewer Sample Size***

A total of four reviewers evaluated this project.

***Question 1: 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.***

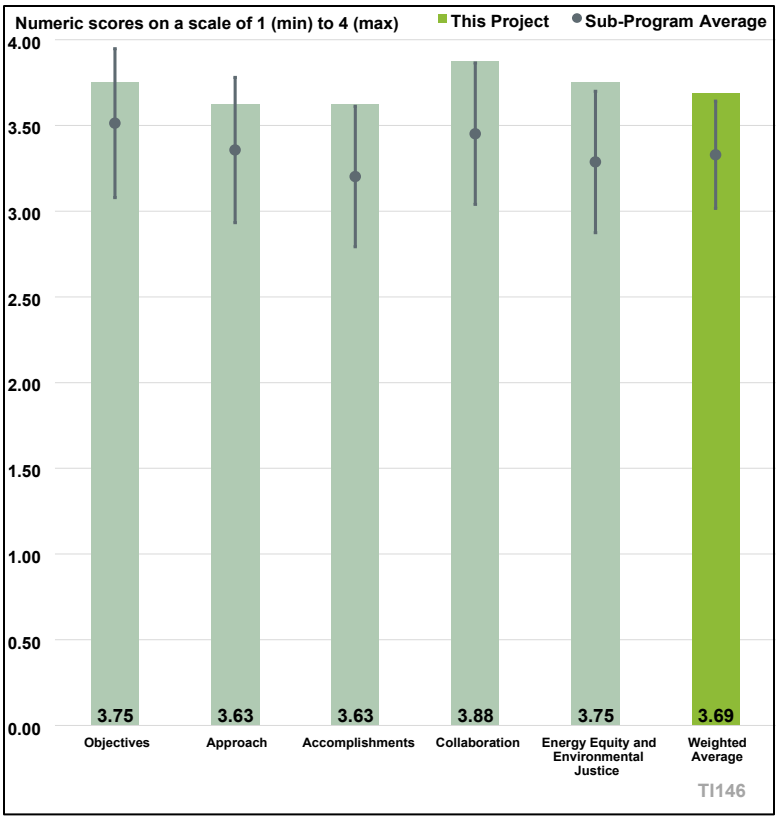


Figure 6-5. Presentation Number: TI146 Presentation Title: Rural Reimagined Building an EV Ecosystem and Green Economy for Transforming Lives in Economically Distressed Appalachia Principal Investigator: Pingen Chen, TN Tech

**Reviewer 1**

The reviewer noted a strength is that the project specially addresses the particularly tough challenge of rural applicant EV adoption and associated issues. This is supportive of and well aligned with VTO goals and objectives. A potential weakness is that direct current fast chargers (DCFCs) are not Federal Highway Administration (FHWA)-compliant (62 kWh)--maybe this is a good thing though? The reviewer suggested the project may address/incorporate Level 1 charging into the project plan.

**Reviewer 2**

The reviewer stated the project objectives are clearly defined, ambitious, and well aligned with TI objectives including national security; affordability; reliability and resilience; and, uniquely, economic growth. The last of the goals addressed by this project is one way that it stands out above the rest, particularly focusing that growth on a historically underserved region of the United States.

**Reviewer 3**

The reviewer noted that ambitious goal statements are in line with TI objectives. EVs introduce fuel diversity, which is enhanced by knowledge transfer. Equipping rural road routes with EV charging increases resiliency for consumers and small businesses, which is enhanced by job awareness. EVs reduce GHG by increasing alternative fuel use.

**Reviewer 4**

The reviewer commented that this is an ambitious and well-rounded program that includes workforce development for PEV technicians and EVSE installers/electricians, both positions of great need. Including ride and drive demos as well as short-term vehicle loans to individuals and fleets is a good strategy to encourage PEV purchases. The project is targeting areas of critical need in terms of geography and economy. The project is well researched and the presentation and supporting documents are thorough and complete.

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

**Reviewer 1**

The reviewer noted the approach does a good job of achieving the project's objectives of improving the region's charging network through the installation of a large number of charging stations throughout a very large region. Another way that the project achieves its objectives is through EV demonstrations that have been shown to change the opinions of potential EV drivers that might be skeptical of the technology. An important component of the project approach that contributes to economic growth is through workforce development and training, which is essential for ensuring that the benefits of transportation electrification are widespread and go beyond simply those with the opportunity to drive EVs.

**Reviewer 2**

The reviewer stated the live presentation was immensely helpful to understanding the approaches being used and their relationship to real-world challenges. Installation of charging stations is a necessary step toward supporting EV adoptions in economically distressed areas. Demonstrating reliability with local fleet deployments is a successful real-world tactic. Long test drives with consumers is evidently (based on Accomplishments numbers) a highly successful experiential educational tool.

**Reviewer 3**

The reviewer noted that by taking a holistic approach to creating a green economy and an EV ecosystem, this project has the potential to make a transformative impact on the underserved rural communities that goes well beyond simply introducing PEVs and installing charging infrastructure. This project will provide the means to sustain and grow the demand for clean transportation options.

**Reviewer 4**

The reviewer designated a strength of the project is that the approach leverages other programs and funding sources to buy down incremental EVSE cost to $0. Another strength is the project builds on and expands prior rural electrification testbed projects that concluded in 2022. A weakness is the charger site selection seems to be somewhat arbitrary and not really based on gap analysis.

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

**Reviewer 1**

The reviewer noted the project has delivered 25 of 30 EVs. The project team has contacted 126 potential charging station site hosts, with 31 currently being installed and 13 already installed. The team has conducted 166 EV test drives. These are impressive figures with much more work still promised.

**Reviewer 2**
The reviewer noted that this project appears to be on schedule to reach its goals and a significant portion of the PEV deployments and EVSE installations have already been accomplished. A large number of community engagement events have already been held. While attendance was sparse at some, the number of communities exposed to the program is bound to have an impact and leave a lasting impression.

**Reviewer 3**
The reviewer stated that extraordinary participation rates in the consumer test drive program are the biggest indicator of the project's potential for achievement of its overall goals. This aspect seems quite replicable and very effective. While the project purchased 62.5 kW DCFC, which is the least powerful version available and not compatible with the National Electric Vehicle Infrastructure (NEVI) and FHWA Alt Fuel Corridor specifications, the justification of cost and electric service capacity is reasonable for purposes of this project. The reviewer recommended more information regarding the site selection process for EVSE be provided, specifically for Level 2 (L2) community charging. An unclear aspect of the project is the update to National Alternative Fuels Training Consortium (NAFTC) hybrid/EV training course and its relationship to Tennessee Tech's training courses. Also unclear is NAFTC's role in the project, and the scope and replicability of the workforce outreach and/or training. Perhaps this will become clear in future work.

**Reviewer 4**
The reviewer cited the 2-week test ride program, which is very popular to date, with a high positive review rate (85%) as a strength. A weakness is that the charger installations are later in the project (unplanned), which reduces the appeal/effectiveness of vehicle demos.

***Question 4: 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 stated the project team is strong and led by a PI with significant experience in this project space. The project is supported by a wide range of key public and private partners and numerous Clean Cities and Communities (CC&C) coalitions.

**Reviewer 2**
The reviewer acknowledged that the ambitious nature of this project requires a great deal of collaboration, which the team has demonstrated. The list of partners is exhaustive, both in geographic scope as well as in type of entity engaged.

**Reviewer 3**
The reviewer commented that the project has a tidy organizational structure with clearly defined roles for all partners. The member organizations have a good track record of success in their areas of expertise, particularly the NAFTC with curriculum development.

**Reviewer 4**
The reviewer recognized that the project has an astonishing number of cooperators. Accomplishments seem to indicate that the coordination among the team is very effective. While some target accomplishments are lagging, it does not seem to be due to any weakness in the collaboration. That said, the presentation did not indicate the methods and purposes of communication that make the project successful; that information would be useful to other projects.

***Question 5: 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 stated a strength of the project is that it includes a substantive workforce development effort targeting those residing within DACs. There is also a scalable train-the-trainer component to increase reach to DACs across Appalachia. Another strength is that the project is entirely focused on providing underserved rural communities with access to EVs, EV infrastructure, and EV education.

**Reviewer 2**

The reviewer acknowledged that the project focuses on expanding the charging network as well as the associated green economy of EVs. The project does so in an historically underserved region.

**Reviewer 3**

The reviewer stated this project is highly targeted to benefit rural underserved populations, and participation rates seem to indicate it is, so far, successful in reaching them. The reviewer would like to see more about self-determination or local leadership with decision making. The lack of such information does not necessarily indicate it is missing from the project implementation. Cost-sharing projects are notoriously difficult to deploy without causing additional burdens on already overburdened communities. The project team has brought in cost-sharing partners and directly taken on costs to alleviate many of these burdens from their target beneficiaries. Sustaining these costs long term on their behalf is a concern for future success/sustainability of outcomes. The test drive program is very interesting, and future results regarding participants may tell us more about the real-world impact of this project on the target rural underserved communities.

**Reviewer 4**

The reviewer noted that the target areas of this project are some of the most distressed and at-risk communities in the country. Focusing on workforce development as a key component of the project will bring many positive and attainable clean energy opportunities to these areas.

**Presentation Number:** TI147
**Presentation Title:** Affordable Mobility Platform
**Principal Investigator:** Connor Herman, Forth Mobility

***Presenter***

Connor Herman, Forth Mobility

***Reviewer Sample Size***

A total of four reviewers evaluated this project.

***Question 1: 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.***

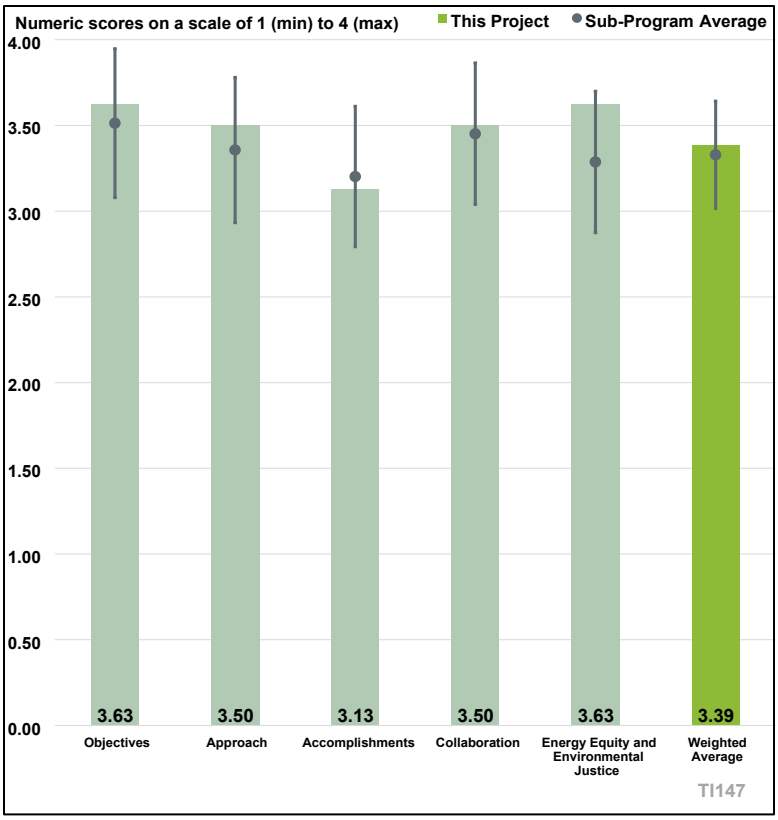


Figure 6-6. Presentation Number: TI147 Presentation Title: Affordable Mobility Platform Principal Investigator: Connor Herman, Forth Mobility

**Reviewer 1**

The reviewer stated the project supports TI objectives of improving fuel diversity by providing a means to access electric transportation for low-income residents of affordable housing through the use of car sharing. This also supports the TI objective of increasing local resiliency as a more diverse mix of fuels is utilized by shared vehicles. Replacing other automotive trips with EV trips will contribute to the TI objective of reducing GHG emissions.

**Reviewer 2**

The reviewer appreciated the project overall. The project met the go/no go milestone for BP 1 and appears to be making steady progress on the milestone for BP 2. The reviewer stated anticipation for some of the use data coming out of the project to verify impact.

**Reviewer 3**

The reviewer stated that project objectives clearly align with TI objectives. EVs improve fuel diversity, which is strengthened by providing positive experiential access to EVs by target populations. Car sharing increases local resiliency by providing reliable and convenient transportation for urban dwellers in affordable-housing complexes. Both EVs and car sharing decrease GHG emissions. All objectives are designed to be replicable within specific market segments.

**Reviewer 4**

The reviewer commended the project's stated objectives, which, when completed, would definitely support TI goals to improve fuel diversity and provide access to clean transportation for the communities. The project has a wide geographic footprint, targeting many different areas of the

country, giving it visibility and exposure. The car-share component of the project is well conceived and works well in reality. The multifamily housing part of the project looks to be more difficult to realize, due to the number of known stumbling blocks inherent in projects like this, namely charging infrastructure is slow to reach underserved, lower income areas with a higher density of multifamily properties and the overall EV adoption rate in historically underserved communities and communities of color is disproportionately low.

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

**Reviewer 1**

The reviewer commented that the union of electric shared vehicles, publicly accessible charging infrastructure, and affordable housing is efficient, equitable, and clever. This is an excellent approach to addressing multiple issues within a single program in a way that is still relatively simple.

**Reviewer 2**

The reviewer noted that recent research out of University of California Berkeley demonstrates EV car sharing is an effective way to improve air quality in DACs. This project will provide related relevant data about its use across many geographic areas. The approach supports decarbonization, transportation equity, and aims to help resolve sustainable funding challenges.

**Reviewer 3**

The reviewer stated that the overall approach is comprehensive. However, the planning timeline for launching a new service in new markets seems very ambitious. Parameters for selecting cities for participation and for selecting target residences are sound, with particular benefit to underserved population groups. The user experience for the car-sharing app provides options for people without smart phones. A keystone approach is not stated in the Approach section. The reviewer suggested the approach include the identification of one or more champions or ambassadors for the car-sharing program from within the resident population of each deployment site. Peer leadership and self-determination are strong indicators of future success.

**Reviewer 4**

The reviewer stated that car sharing with PEVs allows consumers to experience these types of vehicles affordably and without sales or time pressure. Targeting affordable-housing developments is an obvious way, in theory, to reach the desired population for this project. However, making this part of the project work in reality will be difficult as exhibited by the delays already happening.

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

**Reviewer 1**

The reviewer noted that gauging the actual progress against the scheduled timeline was difficult using the presentation and slides. The team has accomplished an impressive amount, it seems, and still has a lot to do.

**Reviewer 2**

The reviewer affirmed the project is moving forward and has accomplished the go/no go milestone for BP 1. The delays in securing host site agreements, vehicles, and installing EVSE appear to be due to executing contracts with city partners, supply chain issues, and permitting challenges. Such challenges probably could have been foreseen but the team showed limited ability to change their approach to mitigate them.

**Reviewer 3**

The reviewer noted the project appears to be behind schedule in some critical areas, such as the deployment of vehicles and EVSE for both the rideshare program and the housing development portion, as well as some of the administrative and training tasks. The reviewer cited an example in the Affordable Mobility Platform rideshare program near Seattle, Washington, which is well configured and easy to use, but stated there is a lot of work left to do in order to get this project over the finish line successfully and to have a meaningful impact.

**Reviewer 4**

The reviewer remarked that it appears that the delay in the transportation needs assessment (TNA) and selection of site hosts is impacting the accomplishment of some project tasks. However, it takes time to do these activities appropriately, particularly with overburdened populations. Per the live presentation, the delays represent good progress toward accomplishments that will underpin success in the remainder of the project objectives. The TNAs are available online, and the reviewer stated anticipation for learning more about how TNAs were conducted and for their various results. The reviewer noted confusion after the presentation whether TNAs were conducted with local participation or solely with modeled Census and other locally- and nationally- sourced data. The project team is conducting continuous engagement with the residents of the affordable housing complexes that host the car-sharing programs. The reviewer noted staff at the complexes are not using the cars at notable rates, but residents are using the cars. The car-sharing program design is attractive and replicable. However, it is unclear at this point in the project whether the outcomes will be sustainable beyond the project period, given there is not a profitability model for privately-run car-sharing programs at this time. Government, foundation, or other support funds for post-project operations have not yet been identified, though the operator is set up as a non-profit organization specifically for the identified need to attract such partnerships and funding.

***Question 4: 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 affirmed that the project has a well-rounded team of contributors with solid credentials in their areas of expertise and a track record of success. Communication and coordination among team members appears to be excellent.

**Reviewer 2**

The reviewer commented that the ambitious nature of the project requires a great deal of collaboration across the entire country, and the project team has included key partners like CC&C coalitions, metropolitan planning organizations, research institutions, deployment hosts, and subject matter experts.

**Reviewer 3**

The reviewer stated Forth, Mobility Development, Argonne National Laboratory, and Portland State University are well known in this arena and provide strong expertise in their fields. Trying to coordinate with 40 host sites would be challenging for any group of partners; however, the project has been largely successful in engaging the vast majority.

**Reviewer 4**

The reviewer remarked that the collaborative is carefully designed to include all the partners necessary for technical success. The planned coordination among the project team is exemplary,

with regular communication planned to mitigate project risks of all kinds. The weakness raised by the reviewer was that collaboration with the beneficiary audience is not well defined.

***Question 5: 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 expressed that the design of the program excellently achieves EEEJ through extending the benefits of transportation electrification to low-income and underserved populations by focusing on affordable housing developments.

**Reviewer 2**

The reviewer noted that this project maximizes benefits to underserved and overburdened communities by listening to the needs in the initial TNA, deploying EVSE in neighborhoods, giving them access to use those vehicles, which will expand their reach to jobs, schools, and other services that can improve quality of life. The project is engaging many communities in need across the country, not just a single community in one area.

**Reviewer 3**

The reviewer reiterated that the project is targeting specific geographic areas and housing developments that are disadvantaged and in most need of assistance. The TNA conducted for this project was very thorough and gave it a good basis for deciding where to focus project resources.

**Reviewer 4**

The reviewer stated this project is sharply focused on EEEJ objectives and outcomes. However, the project plan does not leave much room for collaboration with and leadership from within the target EJ communities. The objectives for BP 2 to train (paid or unpaid is unclear) on-site ambassadors from the resident community, as well as co-design outreach materials (see Diversity, Equity, Inclusion, and Accessibility [DEIA] milestones, slide 17 of presentation), looks promising. The benefits to the community are potential at this time and rely heavily on the fiscal and social sustainability of the program beyond the project term. The project team would do well to prepare the beneficiary populations for advocacy on their own behalf to decision makers and to build a compelling argument (a case statement) to potential future funders who might help make up the up to 75% gap between rider-generated revenue and full operational cost.

**Presentation Number:** TI148
**Presentation Title:** Upper Midwest Inter-Tribal Electric Vehicle (EV) Charging Community Network
**Principal Investigator:** Robert Blake, Native Sun Community Power Development

***Presenter***

Robert Blake, Native Sun Community Power Development

***Reviewer Sample Size***

A total of four reviewers evaluated this project.

***Question 1: 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.***

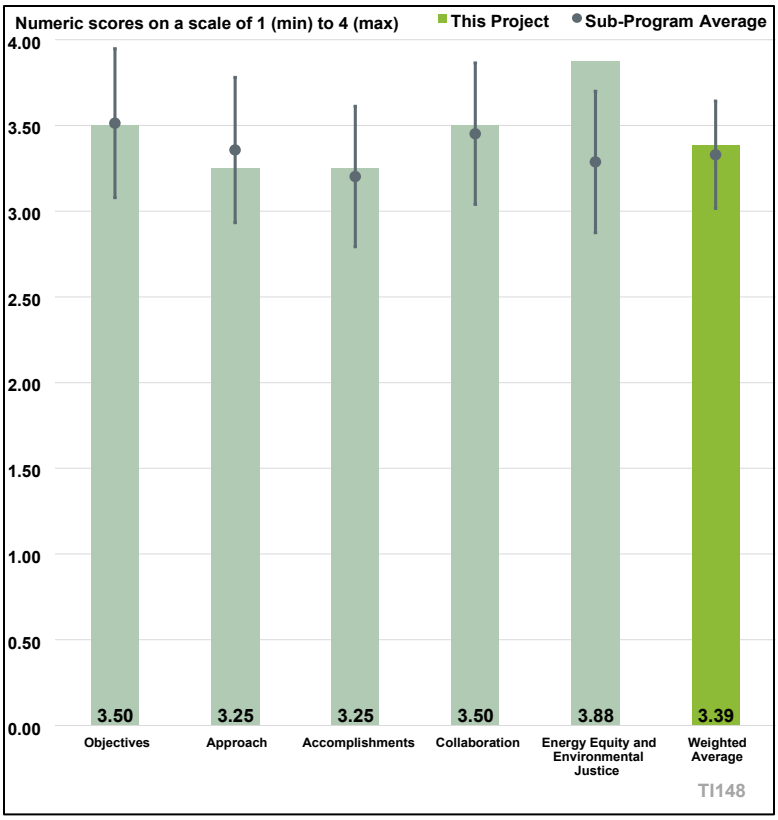


Figure 6-7. Presentation Number: TI148 Presentation Title: Upper Midwest Inter-Tribal Electric Vehicle (EV) Charging Community Network Principal Investigator: Robert Blake, Native Sun Community Power Development

**Reviewer 1**

The reviewer reiterated that the TI objectives addressed in this project include fuel diversity, local resiliency, and GHG emissions reduction. This is achieved by providing PEV and EV vehicles to replace or supplement traditionally fueled vehicles utilized in an historically underserved region in the upper Midwest.

**Reviewer 2**

The reviewer noted that this project's objectives align seamlessly with TI objectives. Its focus on and leadership from vastly underserved tribal lands and communities, along with coordination of utilities, meets local resiliency objectives. Its focus on understanding fossil fuel use before replacement with PEVs improves fuel diversity. Its focus on deploying EV and EVSE contribute to GHG emission reductions.

**Reviewer 3**

The reviewer stated it was a little difficult to assess overall how the project is meeting VTO objectives and follow progress in the slides provided. The goals are clearly outlined on Slide 4; however, the number of chargers and vehicles operating on the ground are confusing on Slide 10. Slide 4 indicates there will be three MD vehicles: one transit shuttle and two electric school buses. Slide 10 indicates five transit shuttles were purchased. The reasons why the changes were made are not clearly laid out. Slide 4 states 60 L2 chargers will be deployed, slide 7 identifies six priority L2 sites, and Slide 10 lists 14 L2 locations, but no information is given on the number of chargers per site.

**Reviewer 4**

The reviewer commented that project objectives are aimed directly at supporting all of the listed TI goals and the project uses a formula similar to many other ongoing projects around the country. The reviewer remarked that the installation of a significant number of EVSE along major travel routes will be the most effective result of this project by increasing access to EV charging, which will in turn spur interest in the purchase of EVs among these populations.

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

**Reviewer 1**

The reviewer stated the project approach is reasonable and straight forward. It improves the landscape for EV adoption by technology demonstration and infrastructure deployment.

**Reviewer 2**

The reviewer commented that the project approach includes evaluation of sites for suitability but does not indicate whether/how the communities were engaged to assess their needs. If such engagement was conducted prior to siting and purchasing the equipment, the information should be presented more clearly. There were successes in procuring vehicles, installing EVSE, and deploying data loggers to begin data collection and analysis.

**Reviewer 3**

The reviewer noted it is difficult to separate the approach from the accomplishments, based on the slides and on the live presentation. However, reviewing the approach based on the milestones presented, it appears to include adequate planning for a successful community need-based site selection process as well as excellent partnerships for technical success. The approach among native nations toward knowledge sharing and interconnectedness, as described in the live presentation, bodes well for replicability.

**Reviewer 4**

The reviewer commented that installing EVSE along travel routes linking tribal lands directly addresses the energy inequities experienced by these communities. Placing EVs in these communities as service and demo vehicles will expose residents to these clean energy transportation options, and the additional vehicles will certainly be appreciated by the community. The reviewer expressed that the number of vehicles being allocated for such a large geographic area is a bit low and expected a higher ratio of MD group transport vehicles like buses and vans, rather than personal-use-sized light-duty vehicles. The reviewer felt that engaging 10,000 people through in-person events is optimistic and stated curiosity to see the actual numbers for the 52 planned events. Three of the participating sites, presumably for EVSE installation, are casinos. The reviewer expressed concern that subsidizing or incentivizing access to gambling establishments for EV owners may not be in the best interest of the poorer members of these communities, nor is it the best use of DOE funding, at least optically.

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

**Reviewer 1**

The reviewer reiterated that the project reports delivery of 15 EVs and two chargers. The project team has conducted the leg work to establish charger locations with agreements with site hosts in place. The project team has also contributed by providing dealership training, in hopes of extending the impact on EV adoption outside of the vehicles purchased directly for this project.

**Reviewer 2**

The reviewer noted that it appears that this project has met many of its critical milestone targets and that the hard work has been done: EVSE have been installed in many locations and vehicles have been ordered, with some already in service. Ongoing activities such as data gathering need to be completed before some end-of-project materials can be generated, as is the case with many such projects.

**Reviewer 3**

The reviewer noted considerable progress appears to have been made, but it is challenging to understand exactly what has been completed since the vehicle counts by type and station descriptions do not align.

**Reviewer 4**

The reviewer commented that site host legal agreements are often a headache for scatter-site EVSE projects, so having those signed at this stage is a terrific accomplishment. Continuous engagement with tribal nations and local communities where deployments and EV charging opportunities are taking place is critical to success. Data loggers allow the participant nations to continually evaluate vehicles for EV replacement feasibility. Consumer and fleet test drive questionnaires show a very great improvement in acceptance of EVs similar to those shown in the rural Appalachia project. The need throughout this project to allow for individuated needs and decisions by sovereign nation tribes presents a unique potential issue (and learning opportunity) with interoperability of travel corridor outcomes.

***Question 4: 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 the project has engaged many important partners including tribal nations, CC&C coalitions, government agencies, industry, and transit agencies.

**Reviewer 2**

The reviewer stated that the partners appear to be collaborating well and making progress on the project delivery efforts. The inclusion of unique components, such as the solar trailers for pow-wows, demonstrate cultural understanding and opportunity to address a need.

**Reviewer 3**

The reviewer remarked that this looks like how a successful project should be administered. The working partners all bring excellent credentials to the project. All parties knew their assignments and did their share of the work.

**Reviewer 4**

The reviewer commented that coordination appears to be effective based on accomplishments. A comprehensive list of cooperating partnerships includes tribal leadership, administrative support and expertise from CC&C coalitions, cost sharing and technical support from utilities, and community partners from various tribal institutions. A description of how the various categories of cooperators work and collaborate would be helpful for others wishing to learn from this project.

***Question 5: 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 stated that the focus on tribal nations and the vision to unite geographically disparate nations through electric transportation is inspirational and exciting.

**Reviewer 2**

The reviewer observed that the project is investing in community resources at 13+ locations that are in underserved communities. It includes workforce development opportunities and lowers transportation costs for residents. It is creating a clean mobility system across rural Minnesota, North Dakota, and South Dakota, which improves access to long-distance destinations and new job opportunities.

**Reviewer 3**

The reviewer noted that clear leadership from within tribe-led organizations means this project is starting from a place of excellence. Its objectives to connect numerous tribal nations to critical services on EV travel corridors and provide personalized community needs speaks to energy equity outcomes and easing of existing community burdens. Replication planning provides additional EJ benefits.

**Reviewer 4**

The reviewer commented that tribal nations are traditionally underserved and underrepresented in the clean energy/clean transportation areas, and this project directly addresses these types of communities by giving them access to more community service vehicles and by adding EVSE to serve the community directly as well as incentivize travelers to stop and spend time in the communities while charging.

**Presentation Number:** TI153
**Presentation Title:** Fleet Research Energy Data and Insights
**Principal Investigator:** Alicia Birky, National Renewable Energy Laboratory

***Presenter***

Alicia Birky, National Renewable Energy Laboratory

***Reviewer Sample Size***

A total of four reviewers evaluated this project.

***Question 1: 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.***

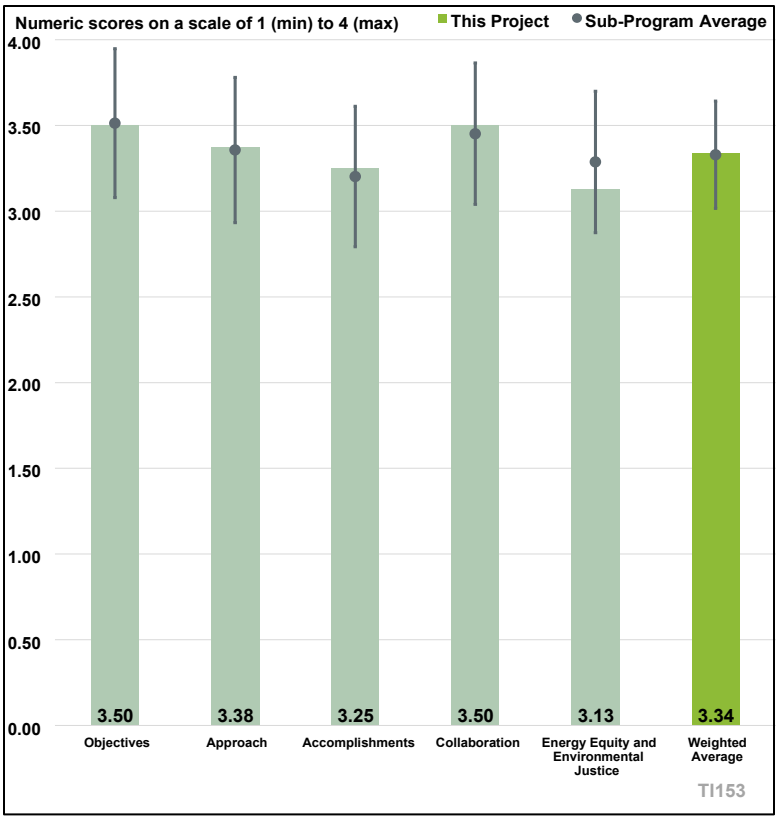


Figure 6-8. Presentation Number: TI153 Presentation Title: Fleet Research Energy Data and Insights Principal Investigator: Alicia Birky, National Renewable Energy Laboratory

**Reviewer 1**

The reviewer noted that this project matches TI objectives by providing the latest data available for the benefit of stakeholders and vehicle analysis.

**Reviewer 2**

The reviewer commented that this project is focused on data gap analysis, data collection, and data analytics to support commercial vehicle (including both conventional vehicles and EVs) RDD&D to achieve decarbonization. This project substantially supports the GHG emission reduction, increase of alternative fuel use, and increasing transportation efficiency, for the commercial vehicle sector.

**Reviewer 3**

The reviewer observed that the lack of usable data, structured to deliver concrete outcomes needed for TI objectives, is a real barrier to effective action. FleetREDI not only gathers data, but also deploys that data to create useful tools available to industry in a way that ensures privacy of the user and applicability at scale.

**Reviewer 4**

The reviewer noted that the project's objective is to create a nationally representative set of fleet data that can be used by researchers.

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

**Reviewer 1**

The reviewer commented that this project developed a standardized operational data processing pipeline which enables the population of data from various sources to support the project objectives, which is very impressive. Since data are collected from different sources, achieving consistency in planning, collecting, and presenting efficiently will be a challenge. The project team is working on the development of a data logger to improve the process.

**Reviewer 2**

The reviewer stated the approach is well crafted and planned. The PI noted that a future solution for data storage will need to be defined. Additionally, there was discussion surrounding the best way to provide stakeholders with confidence that their data is protected, limited, and anonymized. That process may still need some development.

**Reviewer 3**

The reviewer stated that the project idea is sound and much of the analyses being done in FleetREDI are quite innovative. The reviewer appreciated the broad partnership across a number of different stakeholders and the goal of connecting into a variety of tools. Many such tools are emerging, and maintaining cohesion and quality in that ecosystem will be important. The reviewer recommended evaluating different data ingestion mechanisms. Logging individual vehicles as the primary means for data acquisition is inefficient. Vehicle OEMs and a few commercial providers already collect much of this data. Figuring out how to collaborate with those data owners would be a more efficient data acquisition approach and could resolve concerns about data representativeness. That is not necessarily an easy task, but one that is probably worthwhile.

**Reviewer 4**

The reviewer acknowledged that the approach to this project is directly addressing the technical barriers. The development and use of the "data-driven methodology to assess data coverage and sufficiency" in targeting future datasets and fleets is noted as a great example of focusing the limited resources on the most critical data gaps.

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

**Reviewer 1**

The reviewer said the project is on track with progress and accomplishments. In fact, other analysis projects have already begun to use the data collected.

**Reviewer 2**

The reviewer observed it is still early days for this project (20% complete), but some of the tools and analyses developed are promising. The website with dashboard was welcome and has some useful data. The reviewer remarked that it may not be well known that it exists or what it can do. Figuring out how to generate more user awareness and uptake could be valuable.

**Reviewer 3**

The reviewer stated that the project team has made impressive progress, including identifying data availabilities and assessing data gaps as well as development of a public-facing website to visualize the information contained in the data. The project team also realized the challenges associated with the security and consistency of data sharing from OEM and fleet partners. The project team has

been working on addressing these issues. The reviewer recommended the project team emphasize the alternative fuel technology vehicles that support the decarbonization goal in the presentation.

**Reviewer 4**

The reviewer noted the team has made very good progress on the technical aspects of the project. One technical item that was mentioned as a potential issue was ensuring consistency of data from third party data providers. The project team seems to be addressing this through the development of data logging and ingestion standards. However, one issue related to progress is that most of the project's data collection has been related to the diesel fleet. The reviewer recommended that to better meet some of the overall TI objectives related to improving fuel diversity and reducing GHG emissions, the project should continue to try to collect data from alternative fuel fleets.

***Question 4: 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 team has been partnering with the other stakeholders to leverage various decarbonization projects across DOE and beyond. Strong collaboration with the existing projects and broad stakeholders is documented in this project.

**Reviewer 2**

The reviewer stated that the collaborations listed in the opening slide are the right ones. Working with OEMs, regulators, non-profits, other Federal government agencies, and local projects displayed a strong collaborative focus with a broad ecosystem. This will be key for success and is an area where the researchers are encouraged to double down. FleetREDI has high potential but will only reach that potential if it is broadly used by an array of decision makers. The project team is off to a strong start and further effort is encouraged.

**Reviewer 3**

The reviewer applauded the project team for doing an excellent job collaborating with DOE Livewire data platform and third-party data providers. Collaboration with OEMs seems to be more challenging, but the team appears to continue working with OEMs to share data. The project team and data resources are supporting 25+ projects.

**Reviewer 4**

The reviewer questioned what the main project team members are contributing and accomplishing beyond the plan. The reviewer wondered if a few private industry stakeholders could be employed (OEM, Geotab, etc.).

***Question 5: 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 stated the project is using a data driven approach to fill gaps in data availability. This will assist in making sure that the data being collected is representative of all parts of the country including overburdened and underserved communities.

**Reviewer 2**

The reviewer suggested that the ability to overlay DAC scores with datasets would be beneficial. The ease of obtaining this information would benefit the EEEJ plan since it would be easily available in any future analysis work.

**Reviewer 3**

The reviewer noted that the project team focused on data pipe map matching and geospatial data fusion to include DAC scores in the datasets, However, it is important to connect to the fleet owners from DACs and inform them how to utilize the platform developed in this project and make informed decisions towards adoption of low-GHG emission vehicles.

**Reviewer 4**

The reviewer commented that like all research-focused projects, the connection to EEEJ outcomes really depends on how the research is used. It is difficult to evaluate, at this point, how the FleetREDI capabilities will be deployed in EEEJ contexts. The reviewer suggested a more focused approach on EEEJ related outreach and tool uptake by decisions makers could strengthen these aspects of the project.

**Presentation Number:** TI154
**Presentation Title:** Equitable Mobility Powering Opportunities for Workplace Electrification Readiness (EMPOWER)
**Principal Investigator:** Michael Graham, Columbia-Willamette Clean Cities Coalition

***Presenter***

Michael Graham, Columbia-Willamette Clean Cities Coalition

***Reviewer Sample Size***

A total of five reviewers evaluated this project.

***Question 1: 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.***

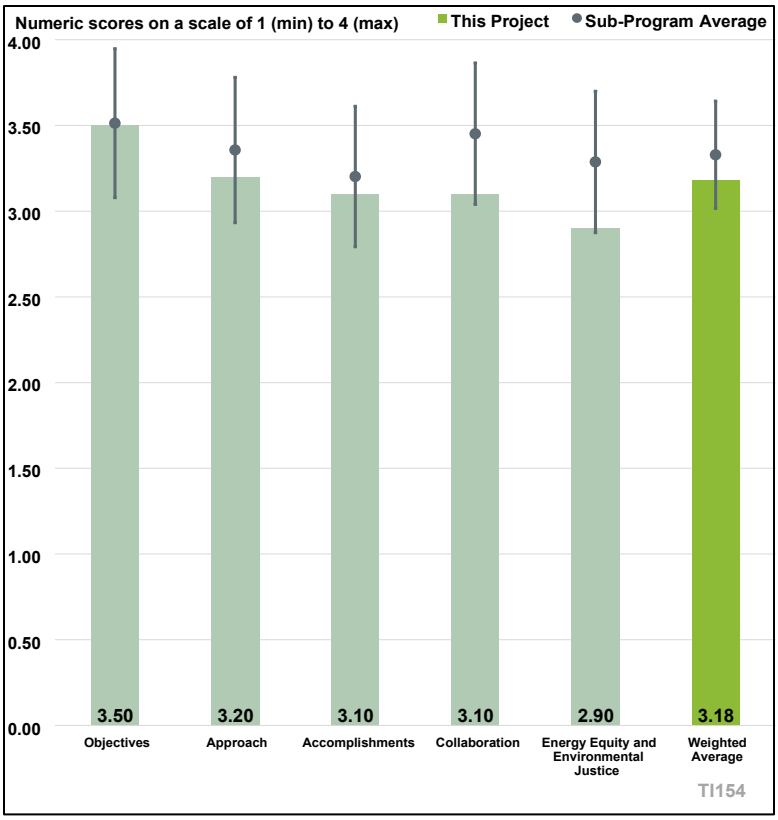


Figure 6-9. Presentation Number: TI154 Presentation Title: Equitable Mobility Powering Opportunities for Workplace Electrification Readiness (EMPOWER) Principal Investigator: Michael Graham, Columbia-Willamette Clean Cities Coalition

**Reviewer 1**

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 VTO objectives of improving fuel diversity, increasing local resiliency, and reducing GHG emissions by accelerating interest and support for workplace charging to advance EV adoption by working with 30 CC&C coalitions across the country. The project objectives appear to be effective and substantially support TI objectives.

**Reviewer 2**

The reviewer noted that the project team has reached out to a large number of workplaces and has involved a large number of CC&C coalitions and communities, which puts this program in touch with VTO's objectives.

**Reviewer 3**

The reviewer noted the project is focused on addressing reliable charging through workplace charging, particularly for those without home charging. Technical information for employers and training for on-site EVSE management are also key elements, which are sorely needed. These objectives are important for expanding the market for EVs, thus improving fuel diversity and reducing GHG emissions through increased use of alternative fuel (electricity).

**Reviewer 4**

The reviewer observed this project strongly supports the overall TI objectives of improving fuel diversity, increasing local resiliency, and reducing GHG emissions. Workplace charging will provide access to charging for those employees who may not have the ability to charge at home, will reduce the impact of peak EV charging demand on utilities, and will encourage the purchase of PEVs.

**Reviewer 5**

The reviewer stated that workplace charging is an important element of the solution space for transportation electrification in light-duty vehicles. Workplace charging takes on barriers like workplace engagement, and some elements of capacity development in terms of providing resources and trainings. It only partially addressed the barrier of lack of access to home charging. It is not clear how well access to workplace charging correlates to access to home charging. It would be good to know if the workplaces engaged are providing an extra option for people with home charging, which is nice, or an option to charge to people who previously had none, which is far more impactful. An understanding of the cost and value propositions of workplace charging is also a barrier which would be good to see addressed. The reviewer questioned if the companies make money or lose money on workplace charging and how much. The reviewer asked if money lost is recovered through other pathways like improved worker satisfaction and retention. These are questions that will be important to motivate many workplaces but that are not well understood.

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

**Reviewer 1**

The reviewer stated the project website is accomplished and a good resource for workplaces.

**Reviewer 2**

The reviewer observed the project has used extensive feedback from project partners to develop resources and training, based upon real-world issues. The project is now planning to focus on increasing marketing efforts to employers during the final BP, to work to increase commitments and EVSE ports. If successful, this project should contribute to key solutions in this deployment area.

**Reviewer 3**

The reviewer commented this project includes some unique and innovative approaches to outreach and education. The project has created a library of handout materials aimed at educating businesses and communities on the benefits of workplace charging and has launched the landing page for an informational website. The project incentivizes participation by recognizing businesses that pledge and install EVSE with an "EV Friendly Workplace" certificate and mention on the project website.

**Reviewer 4**

The reviewer stated a belief that overall, this project takes on two important elements of getting charging installed at workplaces: supporting workplaces with knowledge resources and training and providing recognition of successes. The reviewer suggested that adding some views of how much it costs to install workplace charging, how those costs could be mitigated, what revenue or non-monetary benefits such charging could provide, etc., would strengthen the project. At this moment, the only incentive is recognition, which may be of limited value. The reviewer appreciated the idea of the utility working group and would have liked to see more content on what this group does and how findings from this group could be more broadly publicized and understood. The amount of outreach carried out in this program was appreciated as sometimes getting the word out is of under-appreciated value.

**Reviewer 5**

The reviewer noted 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 into three project periods (planning and preparing, implementation of outreach, and succession planning and wrap-up), each containing associated tasks. The milestone slide appears to only display a subset of the total project milestones. More details related to all the project's milestones, as well as activities/tasks under each BP would have provided more details on the entire project scope.

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

**Reviewer 1**

The reviewer noted that the project appears to be on track to meet its goals. It has engaged over 3,300 workplaces and received 221 commitments, although EVSE installations are just getting started, with 25 ports installed of the planned 3,500.

**Reviewer 2**

The reviewer commented that the project is nearly complete with go/no-go for end of BP 2, completing all BP 2 milestones. The project has completed an EEEJ action plan to direct at least 40% of funds/benefits to DACs. The team kicked off the outreach of BP 2 in advance of schedule. They have engaged more workplaces than planned, but only 34% of pledges at time of presentation development; the update is closer to 50% now. 250 EVSE ports have been installed to date (roughly 8% of goal). The biggest issues have been funding for EVSE plus the number of decisions needed within employers/facilities. The project started the EMPOWER Recognition Program during BP 2. The project has created a number of resources (one-pagers and handouts) in response to needs identified. The project has recently developed a tracking dashboard available on the website, identifying organizations involved in the project.

**Reviewer 3**

The reviewer cited significant outreach, which is a prerequisite for success. Converting engagement to pledges to installations will be where the project ultimately succeeds or fails. The reviewer noted it is still early to know how collecting pledges is going. The reviewer commented that only 25 ports (presumably L2) seems like a low number, but that may be a function of timing lag from engagement to pledge to infrastructure deployment. More details on how that process looks and whether installation numbers are troubling or expected would be valuable. Also, some estimate of causality would be valuable. The reviewer asked if the workplaces that pledged to install would have done so without this program and if the recognition provided by this project was a meaningful motivation to install chargers. The reviewer questioned if the resources and technical support provided enhanced decision making. The reviewer suggested a survey gauging motivations and incremental benefit would help understand those types of questions.

**Reviewer 4**

The reviewer acknowledged that good progress has been made towards achieving project goals. The project has made progress on several key activities: (1) 3,300 workplace engagements vs. the project goal of 2,000, (2) 124% of the pledged workplaces meet Justice40 metrics, and (3) launch of the workplace charging resource center landing page (www.workplacecharging.com), which contains a number of project resources. Goals related to EVSE ports installed appear to be behind schedule with only 1% installed.

**Reviewer 5**

The reviewer noted that the project team missed the mark of installing a large number of EVSEs in workplaces which defeats the purpose of providing an alternative to employees who are garage orphans, (EV owners with no garage or driveway). They have developed nice recognition certificates but have failed to define exceptional commitment in a workplace.

***Question 4: 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 stated the project includes a significant team of partners, including 30 CC&C coalitions. The project appears to have specific roles for all team members with a clear project management hierarchy.

**Reviewer 2**

The reviewer commented that project team members are well chosen and have significant experience in their areas of expertise. The project partners include CC&C coalitions from around the country and regional captains have been identified to oversee operations at a localized level.

**Reviewer 3**

The reviewer noted the broad geographic scope of partners in states of different levels of EV and EVSE deployment and the mobilization of expertise like Smart Electric Power Alliance, American Lung Association, and others was valuable and creates strong opportunities for learning and knowledge sharing. It was not clear, however, how deep that knowledge sharing went and how it ultimately made it to end users. The reviewer understood that there was a training by CC&C implementation partners on workplace charging issues, but it was difficult to understand how effective that was. More information on how that training was carried out, how CC&C partners used the information provided and whether those implementing partners found that it ultimately led to workplace action would be valuable for future merit reviews.

**Reviewer 4**

The reviewer cited an effective project team including Columbia-Willamette Clean Cities (prime), and 30 CC&C coalition partners across the country, as well as numerous other key partners, were assembled to carry out this project and provide an appropriate mix of expertise among team members. Beyond just listing the project partners, the collaboration and coordination slide would have benefited from some details related to the frequency and purpose of project team meetings/interactions.

**Reviewer 5**

The reviewer noted that while the researchers have listed the partners in this project, their roles to accomplish the project goals are not clear. It has been suggested that dealerships be included in their workplaces to contact as they are also employers.

***Question 5: 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 this project will provide greater opportunities for underserved communities by expanding EV options and providing workforce development training for careers in

the clean mobility field. The percentage of pledged workplaces that meet Energy and Environmental Justice Metrics has exceeded projections, and the project's incentive program also includes recognition of businesses for meeting EEEJ criteria.

**Reviewer 2**

The reviewer stated a belief that EEEJ was potentially an important part of providing charging access to low to middle income communities, especially residents of multifamily housing without access to home charging. That energy equity (EE) benefit could be substantial but is highly dependent on what types of workplaces are being engaged and ultimately making commitments. More details on categories of workplace engaged and the type of employee for whom those workplaces are seeking to provide charging would be valuable. For example, a warehouse providing charging may provide considerably more EE benefit than an office park or tech campus.

**Reviewer 3**

The reviewer acknowledged that the project has good potential to contribute to EEEJ goals by reducing GHG emissions by accelerating interest and support for workplace charging. The project contains a goal on the number of pledged workplaces meeting project EEJ metrics and by including in the EMPOWER Recognition Program a category (Level 3) to recognize "exceptional commitment to expanding access to EVs for their employees, especially when meeting EMPOWER's EEJ metrics as an EEJ Workplace." Given the large geographic footprint of this project, it would have benefited from including more community-based organizations, to help provide local priorities for this project and ensuring the connection between the workplaces and their surrounding communities. Finally, 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 significance of the project benefits.

**Reviewer 4**

The reviewer noted that the project is specifically focused on ensuring that at least 40% of funds/benefits are applied to underserved communities through EVSE expansion. This is important, though, overall, the project team does not appear to be emphasizing EEEJ elements, at least in the presentation.

**Reviewer 5**

The reviewer stated it is not clear how this project will have served EJ communities. The team does have an action plan but did not explain what that is.

**Presentation Number:** TI155
**Presentation Title:** Charge To Work USA
**Principal Investigator:** Jason Zimbler, CALSTART

***Presenter***

Jason Zimbler, CALSTART

***Reviewer Sample Size***

A total of five reviewers evaluated this project.

***Question 1: 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.***

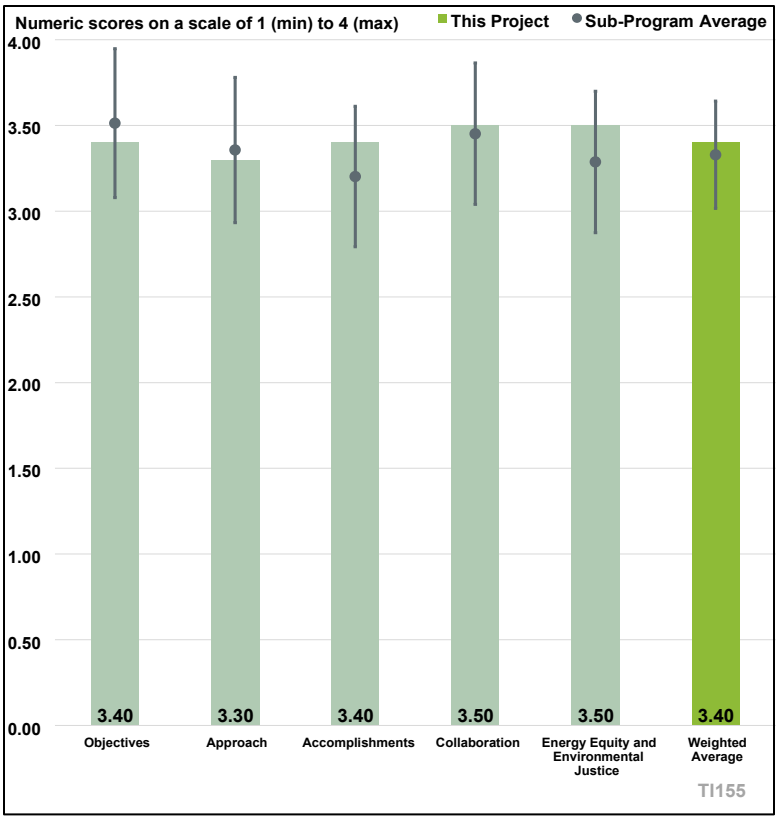


Figure 6-10. Presentation Number: TI155 Presentation Title: Charge To Work USA Principal Investigator: Jason Zimbler, CALSTART

**Reviewer 1**

This reviewer said that this project strongly supports the TI objectives of improving fuel diversity, increasing local resiliency and reducing GHG emissions. The reviewer believed that the project's objective of fostering a large-scale workplace charging initiative will increase the coverage of charging infrastructure, increasing consumer confidence and reduce range anxiety. In addition, the reviewer noted that the project is targeting sites in DACs, so that employees who do not have the means to charge at home will have access to convenient charging at work. The reviewer admired the project's goal of installing at least 100,000 charge ports.

**Reviewer 2**

The reviewer acknowledged that the project objective and overview slides described the project's specific objectives and barriers addressed. The reviewer also said that the project supports the VTO objectives of increasing local resiliency and reducing GHG emissions by creating a self-sustaining market for workplace charging. The reviewer appreciated that the project objectives appear to be effective and substantially support TI objectives.

**Reviewer 3**

This reviewer found that the project is focused on improving access to workplace charging for EV owners by expanding charging capacity at key locations. The reviewer remarked that this project supports TI objectives by allowing EV owners additional opportunities for charging their vehicles, particularly those who may not have charging options at home. The reviewer believes that this is a critical element for expanding the ability for drivers to adopt cleaner technologies that result in petroleum displacement.

**Reviewer 4**

This reviewer noted that the PI laid out a clear plan with specific numbers as to the type of employers to reach out to.

**Reviewer 5**

This reviewer stated that the objectives of this project supported the overall TI objectives. The reviewer appreciated the objective of spurring a marketplace for adoption of workplace for EV charging, though the reviewer was unclear how that objective was being carried out in practice. The reviewer recommended more information on approaches and lessons learned in marketplace development be included in future iterations.

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

**Reviewer 1**

This reviewer acknowledged that this project has a well-rounded approach, shows a thorough understanding of the barriers that stand in the way of workplace charging commitments, and offers effective solutions, like a Project Builder Tool and a project website, to educate business owners and alleviate any concerns the owners may have. The reviewer remarked that the project has effectively used search engine data to identify business owners that may be predisposed to installing EVSE and highlighted the fact that the project team has prioritized healthcare facilities and higher education organizations as targets with a high probability for success. The reviewer also noted that the project team has recruited community officials to help encourage local businesses to sign up for the charging initiative. The reviewer noticed that the co-primes on this project are also co-primes on the very similar Leadership of Employers for Electrification Program (LEEP) project (TI156) and believe that this overlap in leadership will serve to strengthen both projects.

**Reviewer 2**

This reviewer had generally favorable comments for this project. The reviewer found that all project approaches for workplace charging were analogous, focusing on technical capacity development and commitment generation. The reviewer felt that the approach to capacity building and tools provided in this project were stronger than many projects, and that commitment generation appeared to be on course with the project plan.

**Reviewer 3**

This reviewer noted that reaching out to specific, different sized employers has made obtaining workplace charging pledges easier to obtain, showing similarly sized companies' examples and enabling those employers to see what similar companies are doing in the EVSE world.

**Reviewer 4**

The reviewer mentioned that this project is focused on putting charging infrastructure where people work to enable deployment of EVs. The reviewer found that the project provided technical assistance and information to help employers deploy EVSE for workplace charging and that the project specifically looks at how to develop a self-sustaining workplace charging model. The reviewer noted that a unique aspect of this project's approach was to incorporate outreach to public officials to help multiply the message, as well as the inclusion of a workplace resource center and portal. The project team is also working carefully to focus future efforts toward employers who may be closer to considering workplace charging. The reviewer cautioned that the project goal of 100,000 charging ports appears to be overly ambitious and may not match completely with numbers of employers targeted under this project.

**Reviewer 5**

The reviewer found that the project approach section provided a satisfactory methodology to accomplishing the project objectives and supporting the integration of advanced transportation technologies and practices. The reviewer noted that the project approach is divided by three project periods (Lay the Foundation for Workplace Charging Nationwide, Gain Momentum in Workplace Charging Implementation, and Create a Self-Sustaining Market for Workplace Charging), each containing associated tasks. Additionally, the review found that the Milestone slides provided significant detail with regards to the planned tasks per Budget Periods and progress-to-date. The reviewer noted that the project goal of contributing to at least 100,000 EVSE port installations may be unrealistic, given this project would contribute 20% of the ports needed to reach President Biden's 500,000 charging port goal.

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

**Reviewer 1**

This reviewer admired the project website and the project evaluation tool, stating that the tools were unique. The reviewer also appreciated that the website linked directly to the Electric Vehicle Adoption Leadership (EVAL) certification tool. The reviewer noted that the project team's commitments were on track with all established goals. The reviewer suggested that the project would benefit from the discussion of a plan for marketplace creation/support and the discussion of what role the tool/website plays in that.

**Reviewer 2**

This reviewer noted that good progress has been made towards achieving project goals. The reviewer found that the project has made progress on several key activities, notably launching the Charge@Work webpage and Project Builder tool, obtaining 10+ pledges from large employers and 100+ from small/medium sized employers to commit to workplace charging implementation, and hosting nearly 40 programmatic events across the nation via webinars, conferences, and automotive shows. However, the reviewer stated that progress to the "1,000 site assessments" or the "100,000 ports" goals were not covered on the presentation slides.

**Reviewer 3**

The reviewer noted that the project team clearly listed the types of public events and appearances involved in this project (Employee Recruitment) and that the team developed a workplace charging resource center.

**Reviewer 4**

The reviewer remarked that the project hit an issue with availability of chargers (particularly in DACs) as well as demonstrated a difficult economic/business case for workplace charging. The reviewer noted that the project developed tools and resources needed by employers and built relationships with public officials and employers. The person found that the project has a clear path forward for meeting the overall and BP 2 metrics concerning public official and employer commitments, and that the team is particularly close on large employer commitments for BP 2. The reviewer noted that the team has achieved over 200 pledges from employers and over 50 from elected officials, while the overall plan calls for 100,000 chargers. The reviewer remarked that this goal is quite large.

**Reviewer 5**

The reviewer found that the project's groundwork tasks from BP 1 have been completed. The Charge@Work website and Project Builder tool have been demonstrated, and some community

engagement events and webinars have been held, but the reviewer found that many tasks are still in progress near the end of BP 2. The reviewer also noted that at the time of this project's presentation, the project was well short of gaining commitments from 450 businesses and 100 public officials.

***Question 4: 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 mentioned that the project team has a clearly defined structure and schedule for routine communication among team members. The reviewer appreciated that the team co-primes have a strong track record of success in EVSE development and installation, and that the project team recruited officials in many communities to act as ambassadors and liaise with local businesses, encouraging them to sign on for the charge at work program.

**Reviewer 2**

The reviewer found it helpful that the project team clearly defined their collaboration cadence, including how often the project staff meets as a both group and one-on-one.

**Reviewer 3**

The reviewer noted that the project team of CALSTART (prime), five CC&C coalition partners across the country, and numerous other key partners was effectively assembled to carry out this project and provide an appropriate mix of expertise among team members. The reviewer also stated that collaboration and communication among project partners was appropriate for the project scope.

**Reviewer 4**

This reviewer expressed that project coordination appeared to be strong and well organized. The reviewer appreciated the attempts to link to another project's certification scheme, demonstrating inter-project collaboration. The reviewer recommended more discussion about how energy, equity, and inclusion (EEI) fit into the bigger picture, as well as the national grid, and the reviewer felt that utilities were an underappreciated element of the workplace charging equation. The reviewer believes that the project would benefit from insight about how previous commitments were being engaged to support workplace charging development, what lessons exist for utilities beyond NG, and how EEI could facilitate utility learning.

**Reviewer 5**

This reviewer noted that the project team is collaborating closely with the related Forth workplace charging project every few weeks. The person found that the project team includes advocates and implementers, as well as utilities and CC&C coalitions. There are monthly calls with subrecipients (partners). The reviewer encouraged the project team to focus on improving outreach to high value audiences but praised the project's overall plan which identifies clear roles for each member.

***Question 5: 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**

This reviewer appreciated the project survey that assessed the energy equity impacts of this work. The reviewer compared the project to other projects that assume work charging would benefit those who did not have home charging. The reviewer admired that the project team collected information about where chargers were located and the associated equity implications. This reviewer

recommended further investigation of what types of businesses were installing chargers and whether users did or did not have access to home charging. The person acknowledged that location is only a high-level equity indicator and that follow-on surveys could make the impact evaluation more robust.

**Reviewer 2**

The reviewer mentioned that the project has potential to contribute to EEEJ goals by reducing GHG emissions via accelerating interest and support for workplace charging. The reviewer pointed out that the EEEJ presentation slide provided a number of project metrics to demonstrate the commitment to J40 goals. The reviewer also suggested that the project would benefit from including more community-based organizations in each coalition location, to help provide local priorities for this project.

**Reviewer 3**

This reviewer noted that the listing of specific percentages in the EEJ communities and events shows a major commitment to these communities.

**Reviewer 4**

The reviewer found that the project's commitment to EEEJ is demonstrated primarily through six targets, which constitute a thoughtful and inclusive plan for considering diversity, equity, and inclusion (DEI) in the project management plan. These targets include: 60% of employer pledges adjacent or within J40 communities, 30% of employer sites located in underserved areas, 25% of workplace charging stations in underserved areas, 40% of Ride and Drives in underserved areas, 30% of business certifications in DEI areas, and 30% of budget to minority- or women-owned business enterprises (MBWE).

**Reviewer 5**

This reviewer praised the project team for going beyond their goals for many EEEJ metrics, as over 60% of sites pledges are adjacent to or within J40 communities. The project team has found that the project's message can remain consistent among all J40 communities. The reviewer noted that the feedback provided to the project team from communities is largely the same as other communities, in that employees appreciate workplace charging. This reviewer indicated that putting a charger at an employer in an J40 location does not necessarily benefit the community, and that dual use has largely been for fleet vehicles and employee vehicles. The reviewer suggested that the project team explore opportunities for sharing chargers at certain types of employers (like grocery stores), which the team has explored slightly.

**Presentation Number:** TI156
**Presentation Title:** Leadership of Employers for Electrification Program (LEEP)
**Principal Investigator:** Prateek Suri, Forth Mobility

***Presenter***

Prateek Suri, Forth Mobility

***Reviewer Sample Size***

A total of four reviewers evaluated this project.

***Question 1: 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.***

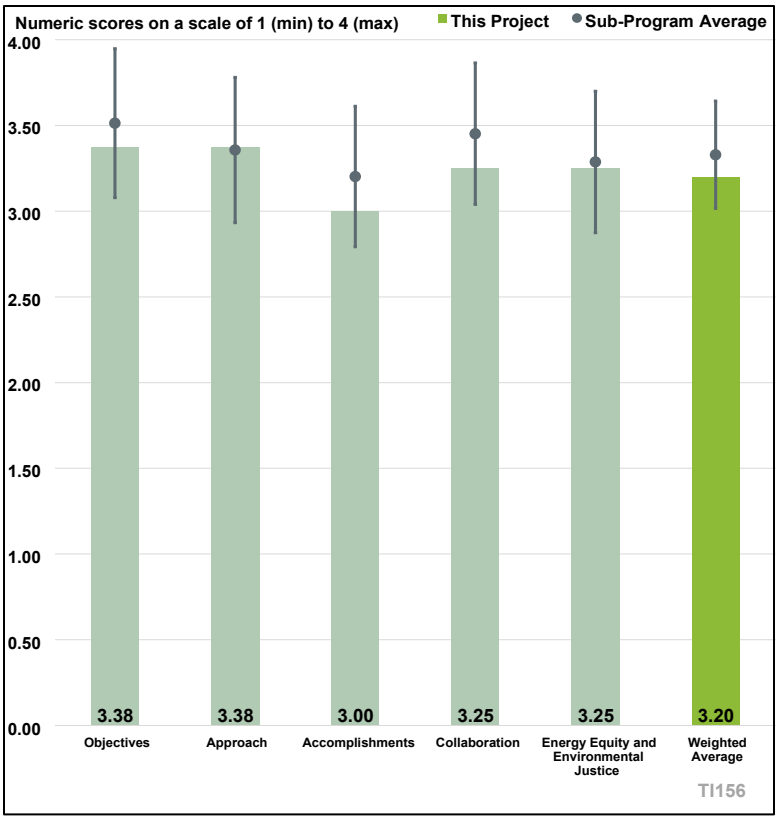


Figure 6-11. Presentation Number: TI156 Presentation Title: Leadership of Employers for Electrification Program (LEEP) Principal Investigator: Prateek Suri, Forth Mobility

**Reviewer 1**

This reviewer found that the objectives of this project can meet the stated TI objectives but acknowledged that their success depends heavily on implementation specifics. The reviewer stated that TI objectives would be marginal if workplace charging is another option for people with access to home charging. However, the impact would be substantial if it is providing access to charging to people without other charging options. The reviewer suggested dedicating a presentation slide to specifically target the latter use cases to enhance alignment with TI's objectives.

**Reviewer 2**

This reviewer stated that communicating to workplaces about EVSE for employees is a positive step for VTO.

**Reviewer 3**

The reviewer confirmed that this project strongly supports the TI goals of improving fuel diversity, increasing local resiliency and reducing GHG emissions by promoting and enabling increased use of PEVs. The reviewer indicated that the project directly targets three distinct barriers: lack of technical knowledge related to the implementation of charging infrastructure, lack of access to electric mobility and charging solutions, and lack of organizational capacity to pursue workplace charging solutions. The reviewer noted that the project team's goal of 2,500+ workplace commitments and 20,000 EVSE port installations is quite high, but it represents a fraction of the total charge ports needed to create an effective national EV charging network, noting that charging at work makes the best sense for most drivers.

**Reviewer 4**

The reviewer found that the project objective and overview slides describe the project's specific objectives and barriers addressed, as well as how the project supports the VTO objectives of increasing local resiliency and reducing GHG emissions by creating a nationwide workplace charging program comprised of education, outreach and technical assistance activities. The person noted that the project objectives appear to be effective and substantially support TI objectives.

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

**Reviewer 1**

This reviewer found that the project approach was good and had a more mature plan than many AMR projects. In particular this reviewer appreciated the project website that was developed, along with the high-quality resources on the website. The reviewer also admired the tracking of employer types engaged and the preparation of user surveys.

**Reviewer 2**

This reviewer praised the project approach section's methodology to accomplishing the project objectives and supporting the integration of advanced transportation technologies and practices. The project approach is divided into three project periods (Platform Design and Distribution Plan, Cohort Launch and Data Collection, and National Campaign Launch), each containing associated tasks and applicable go/no-go decision points. The reviewer noted that the Milestone slide provided appropriate detail with regards to the planned tasks per Budget Periods and progress-to-date.

**Reviewer 3**

This reviewer found that the presentation lacked clarity of how communication to employers is happening. The project team identified robust numbers but did not specify how the team intended to achieve them.

**Reviewer 4**

This reviewer found it innovative and unique how the project team is incentivizing employers to commit to the program through recognition/certification by the EVAL certification. The reviewer also noted that encouraging the installation of dual-use chargers, open to the public at times when employees are not using them, adds benefit to the local communities. The reviewer highlighted that the overlap in leadership between this project and Charge@Work project (TI155) will serve to strengthen both projects.

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

**Reviewer 1**

This reviewer found the project website to be well executed and containing valuable information. However, the reviewer also found it difficult to assess progress towards both engagement and installation goals, namely the 20,000 EVSE installation goal, and requested updates to the progress of those goals in in future reviews.

**Reviewer 2**

The reviewer acknowledged that the team has made satisfactory progress towards achieving project goals, including: 1) completing the buildout of the EVAL website, including public-facing pages, 2) completing numerous outreach and marketing activities, and 3) hosting nearly 40 programmatic events across the nation via webinars, conferences, and automotive shows. The reviewer noted that

progress to the “5000+ employer worksite registrations on the EVAL platform” goal appears to be behind schedule, and that progress to the “2,500+ employer commitments” or the “20,000+ port installations” goals were not covered.

**Reviewer 3**

The reviewer noted that the project team has a series of “in Progress” sections and urged the team to move along with this project.

**Reviewer 4**

This reviewer writes that the project did not produce many tangible results. For instance, EVSE have been installed at workplaces, but most of the education/outreach groundwork and project planning has been done. The reviewer noted a lack of updates on the number of employer commitments received or projections relative to reaching the 2,500 workplaces and 20,000 EVSE goals. The reviewer pointed out the potential for a site’s Leadership in Energy and Environmental Design rating to be adversely affected by the extra power consumption of installed EVSE, highlighting the project team’s awareness of the issue.

***Question 4: 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**

This reviewer found that the project mobilized a strong team of both primes and subs as well as implementation partners, and that the overall collaboration plan was well documented and effectively implemented. The reviewer also felt as though communication and collaboration between three similar workplace charging projects would have been desirable.

**Reviewer 2**

The reviewer highlighted that the project team of Forth (prime), CC&C coalition partners across the country, and numerous other key partners, was effectively assembled to carry out this project and provide an appropriate mix of expertise among team members. The reviewer noted that collaboration and communication among project partners was appropriate for the scope of the project.

**Reviewer 3**

The reviewer noted this project’s large number of sub-recipients, most of whom are local implementation partners. The reviewer also praised the project team’s strong background in EVSE infrastructure planning and deployment, clearly defined organizational structure, and effective communication plan.

**Reviewer 4**

The reviewer found that the project’s collaboration and coordination chart lacked specifics as to what each team member is responsible for.

***Question 5: 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**

This reviewer found that the project has strong potential to contribute to EEEJ goals by bringing outreach, education and resources on EVs and charging access to employers and workers of all

demographics. The reviewer acknowledged that the Energy Equity and EJ presentation slides provided project metrics that demonstrate commitment to J40 goals and project benefits.

**Reviewer 2**

This reviewer noted that this project's ability to meaningfully impact energy equity will rely on the provision of charging to people without the option to home charge. The reviewer suggested including evidence of who is using workplace charging or whether the types of businesses collaborating with this project could reasonably be expected to employ a high number of people without other access to charging.

**Reviewer 3**

The reviewer appreciated the project's robust written plan but found that the project lacked clarity of how it would be implemented.

**Reviewer 4**

This reviewer acknowledged that workplace charging provides access to electric mobility and charging solutions for those who may not have the means or facility to charge at home, therefore this project has the potential to accelerate PEV adoption among a large segment of the population. This reviewer also highlighted that this project is prioritizing opportunities for MBWE to perform the EVSE installations and admired that the project team is convening a focus group to ensure that DEI principles are integrated into its project management plan.

**Presentation Number:** TI157
**Presentation Title:** Wasatch Front Multi-Modal Corridor Electrification Plan
**Principal Investigator:** Regan Zane, Utah State University

***Presenter***

Dustin Maughan, Utah State University

***Reviewer Sample Size***

A total of four reviewers evaluated this project.

***Question 1: 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.***

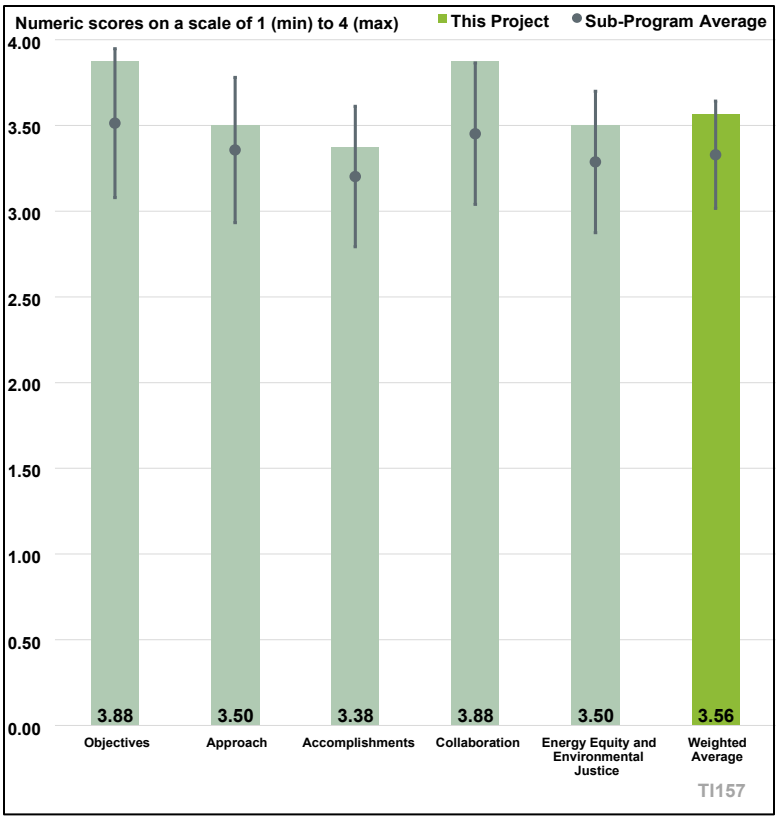


Figure 6-12. Presentation Number: TI157 Presentation Title: Wasatch Front Multi-Modal Corridor Electrification Plan Principal Investigator: Regan Zane, Utah State University

**Reviewer 1**

This reviewer believed that this project's largest strength is that the team is developing a multi-modal plan that supports electrification of freight and people movement, which is strongly relevant to VTO objectives.

**Reviewer 2**

The person noted that the project's multi-modal approach for reducing emissions aligns well with DOE goals.

**Reviewer 3**

The reviewer appreciated that the project team was investigating the impact of corridor transportation emissions on low-income communities, particularly for freight travel, as it is a crucial issue to solve, especially in this area of Utah (UT).

**Reviewer 4**

This reviewer praised the project team's discussion of transportation alternatives, especially the team's mention of light rail/train as an option and the discussion of using analysis tools to establish the best electrification opportunities. The reviewer noted that the project's goals of assisting communities, especially low-income communities, will be met with support from the UT Clean Cities coalition. The reviewer also appreciated that the project focused on small fleets, which are often overlooked.

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

**Reviewer 1**

This reviewer admires the community planning aspect of this study, the fact that the project includes UT inland ports, and that the project team is exploring multiple scenarios and meeting so often.

**Reviewer 2**

This reviewer found that the variety of approaches used in this project are useful and well-thought out to reduce emissions in the corridor, and there seems to be a commonsense approach to the prioritization of solutions. Transit, freight, and utility models will be studied via scenarios to understand the cost and importance of each solution type.

**Reviewer 3**

The reviewer appreciated the technological aspect of this work combined with the community outreach and looks forward to the project's community-forward case study. The reviewer believed that it is interesting to see how medium- and heavy-duty (MD/HD) charging is combined with community charging or electrifying transit, even though many communities are not fully involved in the HD shipping that is a part of this corridor. The reviewer noted that the transit would be difficult, as many residents work jobs that require commuting in the middle of the night when transit is not running. Additionally, among other long-term questions, this reviewer questioned if the study plans to do anything to offset community electric loads or focus on charging during off-peak times. The reviewer recalled the PI noting that attention to the systematic investment plan would be included in the project's annual plans, and that on-site storage would be a temporary solution along with DER.

**Reviewer 4**

This reviewer pointed out that the project has a strong degree of community engagement and input into the plan development process. The reviewer also noted that the project team's scope is too large to the point where it is unclear what the team's main priorities are among the various components. The reviewer also noted that the degree of coordination/focus on interstate connections to the port are not very clear.

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

**Reviewer 1**

This reviewer identified two particular project strengths: 1) the fact that the team has accomplished a reasonable amount of data collection and modeling development work during the performance period, and 2) that the project supports an adjacently funded 5-year effort.

**Reviewer 2**

The reviewer found that the project deadlines for the Inland Port plan are being impacted by changes to UT's Inland Port vision. Data collection and modeling appeared to be detailed from the high-level presentation, although parts of this study have been modeled in recent years already. This reviewer appreciated the project's new, and more holistic, modeling view.

**Reviewer 3**

This reviewer admired the team's work collecting lots of data. This reviewer enjoyed the presentation on the models that have been developed and the "infrastructure optimizer" and looks forward to the models and tools being further refined. However, this reviewer had difficulty following some of charts that were used.

**Reviewer 4**

This reviewer acknowledged the project's large scope, cautioning the project team about running out of time and resources to complete tasks for the transit, freight and utility studies, along with an understanding of the impact on emissions. The reviewer also suggested that the team be more transparent with data analysis regarding the model of energy consumption, transportation costs, and emissions for future electrification scenarios, including discussing how decisions will be made. The reviewer recommended the National Renewable Energy Laboratory's (NREL) scenario analysis tool for classifying Mobility, Energy, and Productivity of land use, which may make analysis easier.

***Question 4: 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 had high praise of the project plan for collaboration and stakeholder input, hoping that input can be efficiently garnered, and that proper communication of scenario outputs can be completed, given the number of stakeholders, advisory boards and partner members.

**Reviewer 2**

This reviewer found that the project had good coordination with the UT Inland Port Authority and admired that the project lead (Advancing Sustainability through Powered Infrastructure for Roadway Electrification [ASPIRE] Center) is a state congressionally directed entity.

**Reviewer 3**

The reviewer found that this study will be extremely useful to other areas of UT as well as other communities nationally if the Advisory Board Team/committee partners engage positively with the project. The project's state funding and the UT Inland Port initiative, combined with this DOE funding, guarantee the attention of the committee members. The reviewer cautioned the project team, saying that care will be needed to balance out the political desires of the state funding with the technical solutions and recommendations from the modeling, as well as the community feedback.

**Reviewer 4**

This reviewer appreciated the project team's time commitment and bi-weekly team meeting schedule, predicting that the team will achieve the project goals without much issue.

***Question 5: 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**

This reviewer praised the team's focus on EEJ, as well as the team's focus on communities that have the poorest air quality, and the largest health risks associated with diesel PM and vehicle emissions. The reviewer also appreciated that the project team is offering/studying solutions that will allow low-income DACs access to more affordable transportation alternatives.

**Reviewer 2**

This reviewer admired that the project directly targets long-term air quality improvement among DACs impacted by freight transport, through MD/HD electrification planning, as well as electrified transit planning.

**Reviewer 3**

This reviewer suggested that the project team include more details on this project's EJ involvement, as the project is moving into the community engagement stage. The reviewer noted that community engagement for this project has been combined with larger community engagement efforts conducted by ASPIRE in the impacted community over the past several years. This reviewer praised the project's ability to build trust but cautioned the team to not allow community engagement to be outweighed by the non-community representatives of the Advisory Board.

**Reviewer 4**

This reviewer would have appreciated additional discussion of the transit and freight emissions impact on the EJ communities and the cost weighed versus health cost on the population. The project team could address this by re-thinking the market impact assessment. This reviewer thought it was unclear if the project team had an understanding of the baseline emissions within the region.

**Presentation Number:** TI158
**Presentation Title:** East Coast Commercial Zero-Emissions Vehicle (ZEV) Corridor Planning Partnership
**Principal Investigator:** Michael Joseph, CALSTART

***Presenter***

Annie Lee, CALSTART

***Reviewer Sample Size***

A total of four reviewers evaluated this project.

***Question 1: 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.***

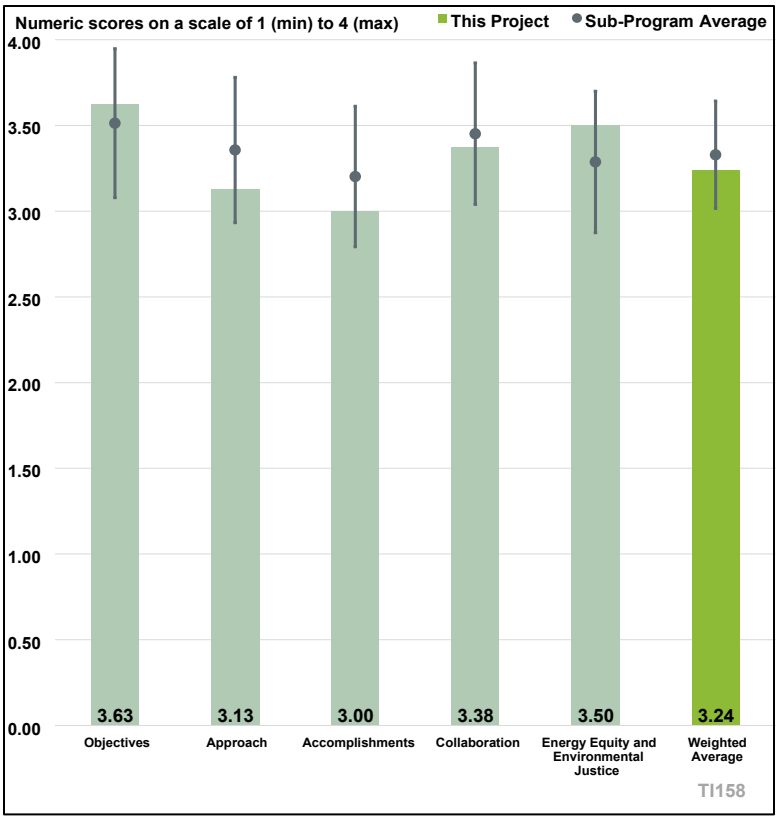


Figure 6-13. Presentation Number: TI158 Presentation Title: East Coast Commercial Zero-Emissions Vehicle (ZEV) Corridor Planning Partnership Principal Investigator: Michael Joseph, CALSTART

**Reviewer 1**

This reviewer admired that the project would produce and publish a plan identifying specific site/node recommendations for zero-emission vehicle (ZEV) infrastructure development along I-95 across 7 states, aligning closely with VTO goals and objectives. Additionally, this reviewer saw it as a strength that there is much existing East Coast ZEV corridor work that this project can leverage.

**Reviewer 2**

This reviewer noted the large scope of this project and its involvement with multiple important stakeholders, thought this reviewer would like to have seen what one of the working group roadmaps looks like to understand the planning process. The reviewer had high praise for the project strategy approach in aligning utilities, financing models, site configurations, and ensuring investment in identified areas, but the reviewer did not understand how the approach would be accomplished.

**Reviewer 3**

Assuming that this project successfully meets the stated goals, then this reviewer believes that it will contribute to the TI objectives, though more information is needed about the electricity generation grid mix along the corridor, as well as where any proposed $H_2$ fuel would be shipped in from.

**Reviewer 4**

This reviewer believed that the two fuels discussed in this project (battery/utility electricity and $H_2$ fuel cell electric) will add to the diversity of fuels available on the I-95 Corridor. This reviewer admired the project team and their work toward meeting TI objectives and "Community First" focus. However, the reviewer felt that the project is moving slowly due to the large number of project partners.

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

**Reviewer 1**

This reviewer did not see analysis of today's baseline GHG emissions for HD freight within the corridor and hopes that the project team will include that in future presentations.

**Reviewer 2**

This reviewer noted the project's wide array of stakeholders with their own regional concerns and believes that the team's coordination efforts to create a functional and replicable model for ZEV deployment will be a challenge. As much of the effort relies on CC&C coalitions to coordinate local efforts, this reviewer wondered how this project will ensure that coalitions are prioritizing this particular effort in their short time frame. The reviewer commented that much of this project involves planning, and that none of the partners (aside from utility partners and some Industry Working Group members) are deploying EV or $H_2$ stations. The reviewer cautioned the project team about avoiding scope creep and prioritizing the right partners, suggesting that existing work should be leveraged to fill in the gaps for something new.

**Reviewer 3**

The reviewer pointed out that the goals of this project may be difficult to achieve. Additionally, this reviewer found that the presentation included too many details and not enough graphics. The reviewer suggested including fleets as a part of the industry team, as it appears that the team consists mostly of suppliers of vehicles and infrastructure. This reviewer warned that it may be difficult to meet the zero emissions standards due to lack of available MD/HD vehicles at this time.

**Reviewer 4**

This reviewer did not see how $H_2$ was included in the current work or partner coordination, even though it is included in the project scope. The reviewer also suggested that the project team consider truck parking as a key aspect of the plan.

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

**Reviewer 1**

This reviewer praised the project team for forming and standing-up an industry working group and utilizing a well-scoped survey to assess their statuses along the I-95 corridor, however the project's milestone progress is slightly behind schedule.

**Reviewer 2**

Due to the project's size and scope, this reviewer had difficulty judging the project's progress. This reviewer found that the project has a good start but could easily fall behind quickly. It appears that the size of the project budget is justified for year two to continue the pace of progress, but the reviewer suggested looking into NREL's mobility planning tool which may be beneficial to project work.

**Reviewer 3**

It was difficult for this reviewer to understand how the project team interacts with different groups on the project (Community, Industry, Infrastructure). The reviewer encouraged the team to communicate often between groups, as it will be critical to developing and deploying the necessary infrastructure. Additionally, the reviewer suggested that the team should focus more on projects that can be easily replicated.

**Reviewer 4**

This reviewer noted that the project accomplishments in Q1 2023 and Q2 2024 are closer to ancillary accomplishments to highlight the project, rather than actual milestones. This reviewer is concerned that, nine months into the project, the project team 1) has not guaranteed involvement from all the relevant ports along this freight corridor, 2) has not secured all their State Energy Office partners, 3) has no plan to coordinate with the Appalachian Hydrogen Hub, and 4) the Industry Working Group is largely OEMs and not shipping companies such as Old Dominion. This project is also not looking at light duty vehicle traffic, though it may be valuable to leverage each state's NEVI planning efforts to learn what EEJ efforts, modeling, and outreach have been done to date. This review highlighted that EV freight corridors may be nominated as part of the open FHWA Alternative Fuel Corridor Request for Nominations.

***Question 4: 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 working group and advisory boards are quite complete, other than missing HD truck fleets. The industry advisory board only has a few small truck fleets. This reviewer suggested that the project team work with large partners like Walmart, Saia, or Old Dominion that regularly use I-95.

**Reviewer 2**

This reviewer found that the project roles among identified partners are well defined, however the team has not engaged many fleet partners yet and the degree of engagement with the ports is unclear.

**Reviewer 3**

The reviewer appreciated that the team's monthly meetings and weekly office hours allowed for a great communication flow, but requested more detail on how CALSTART is holding those partners accountable for a large portion of this work, including working group creation.

**Reviewer 4**

This reviewer praised the project's progress but suggested that the PI state how often project team member meetings occur. The reviewer also recommends incorporating more fleets and fleet managers into the mixture of team members, perhaps some of the larger state fleets who will be using the planned infrastructure involved.

***Question 5: 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**

This reviewer strongly approved of the project plan outline for 2024 and 2025.

**Reviewer 2**

The reviewer highly praised the project team that will carry out the EJ portion of this project, claiming that the team members are all experts and have a long history of successful projects with their stakeholders. This reviewer suggested providing the results of the community outreach in more detail, including what metrics work and/or require improvement.

**Reviewer 3**

The reviewer noted that infrastructure sites and locations will be prioritized in terms of DAC benefits.

**Reviewer 4**

This reviewer commented that many of the EEJ components have not begun, other than project spending. The CC&C partners have been given language and asks to take to the local community representatives, but no information is available yet on the success of that task. The reviewer noted that the goal of the project is to create a replicable model, but when looking at a multistate corridor, it is unclear who the real target is to use this model. The reviewer referred to the presentation that stated, “the project....tasks stakeholders with disseminating the planning process itself beyond the project” but questioned if this means stakeholders will offer free support from the stakeholders to EEJ communities along the freight corridors, or simply provide the report.

**Presentation Number:** TI159
**Presentation Title:** First to Last Mile Creating an Integrated Goods Movement Charging Network Around the I-710 Corridor
**Principal Investigator:** Jack Symington, Los Angeles Cleantech Incubator

***Presenter***

Jack Symington, Los Angeles Cleantech Incubator

***Reviewer Sample Size***

A total of four reviewers evaluated this project.

***Question 1: 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.***

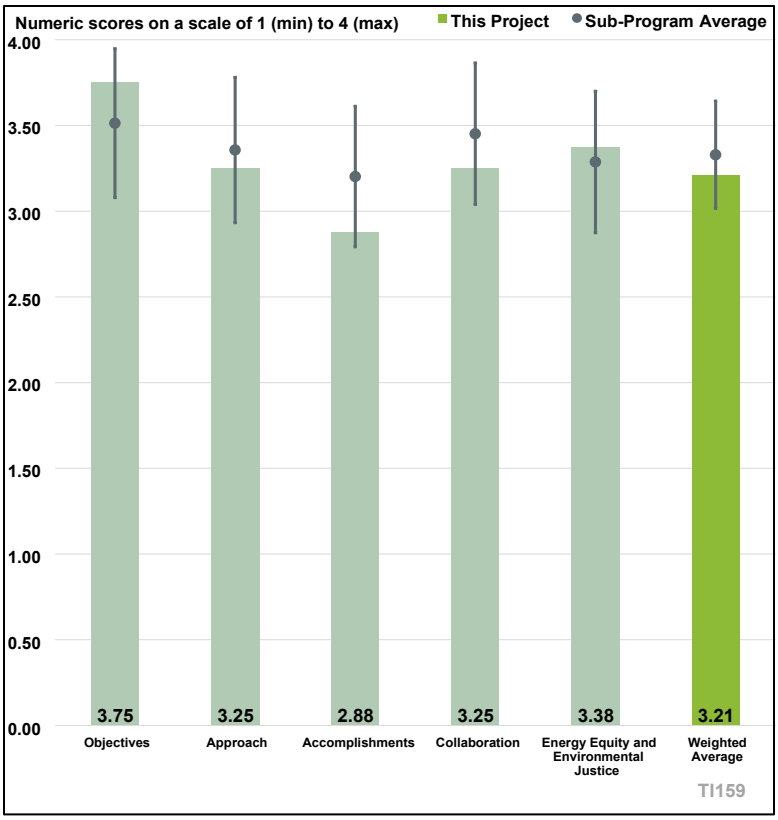


Figure 6-14. Presentation Number: TI159 Presentation Title: First to Last Mile Creating an Integrated Goods Movement Charging Network Around the I-710 Corridor Principal Investigator: Jack Symington, Los Angeles Cleantech Incubator

**Reviewer 1**

This reviewer believed that the project is a good match to help support VTO objectives.

**Reviewer 2**

This reviewer noted that the shared charging model, particularly for MD/HD fleets, is a crucial model needed for the industry as a whole. This reviewer praised the project for being ahead of other VTO TI corridor projects, in that the stations already exist yet are underutilized. The reviewer suggested that finding best practices for sharing these stations, increasing MD/HD EV deployment, and not experiencing power failures, would benefit all freight corridors nationally. The reviewer also mentioned that unique electricity grid generation and distribution in this region demands more intricate modeling than other parts of the country.

**Reviewer 3**

This reviewer assigned this project a high score as it touched on multiple technologies, and it was extremely focused, much smaller, and more concentrated than other larger projects. This reviewer also approved of the project's partners and team members.

**Reviewer 4**

This reviewer stated that the project's focus on MD/HD first- and last-mile travel aligns well with VTO's objectives.

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

**Reviewer 1**

This reviewer liked the project team's approach but noted that the project seems to be behind schedule. This reviewer praised the team's wireless charging approach and use of graphics to show where trucks have 30+ minutes of dwell time.

**Reviewer 2**

The reviewer admired the project's telematics data, traffic map, and building off previous corridor work, noting their assistance in contributing to the project objectives, but mentioned that the presentation had too much of an emphasis on streamlining permitting. The reviewer suggested that the presenter look into California Code 65850.7 and 65850.71, which are working to advance permitting processes in California, and rank city and county permitting procedures publicly if the team is complying with permitting criteria as outlined by state law. The reviewer also recommended that the project team reach out to the California Governor's Office of Business and Economic Development (GO-Biz) to accelerate this permitting stage, and outline if there are different priorities needed for MD/HD EV charger permitting.

**Reviewer 3**

This reviewer highlighted the necessity of engagement to understand the communities' needs in order for successful implementation. The reviewer acknowledged that the project appears to capture community engagement by developing a scope of engagement under data collection and the benefits assessment. The project team's use of data loggers to capture how trucks currently move through the area was praised by the reviewer, who stated that it will provide a valuable resource for understanding behavior and help identify opportunities for efficiency.

**Reviewer 4**

The reviewer requested that the project team identify the specific modeling and evaluation strategies that will be used for MD/HD operational and financial distributed charge solutions. The reviewer suggested that the MD/HD infrastructure plan should not be the last step in the process, but instead should begin as soon as possible so that at least one revision of the final plan can be completed. This reviewer recommended prioritizing other areas of the project to ensure the project finishes on time, as opposed to focusing on truck operational data gathering. Finally, this reviewer recommended having a backup plan for the port areas if the wireless charging solution is not ready by its deadline.

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

**Reviewer 1**

This reviewer mentioned that the team may want to prioritize other areas of the project, such as identification of potential charge locations and the prioritization of which cities can be of the best support, as the reviewer suspected that all 29 cities are not a good match. Additionally, this reviewer wondered why historical data from some of the many projects that have been completed for I-710 was not used.

**Reviewer 2**

The reviewer noted that the project timeline is 42% complete, yet statement of project objectives (SOPO) percentage completion is only at 25%. This reviewer also suggested that efficiencies could be gained by working with GO-Biz for EV charger permitting, under California law.

**Reviewer 3**

This reviewer acknowledged that the project has met some of the goals, but that there will need to be acceleration of the project to ensure it is completed in the time frame stated. One of the project's great accomplishments was trying to utilize existing properties and keeping charging costs low.

**Reviewer 4**

This reviewer found it concerning that Los Angeles Cleantech Incubator is nearly 1-year into the project, though the project is only 25% complete. The person noted that the presentation did not adequately establish the project timeline by BP, so it was difficult to know whether this was anticipated or what was causing the delays.

***Question 4: 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**

This reviewer praised the project team, mentioning the team's history of successful deployment studies in the region. The reviewer suggested the team involving GO-Biz and the California Energy Commission more in the project work, leveraging California streamlined permitting efforts and laws.

**Reviewer 2**

The reviewer also praised the project team but would have appreciated more discussion on how the team keeps in communication with each other. The reviewer anticipates that the project will achieve the community and municipal goals as their input will be vital to the project's success or failure.

**Reviewer 3**

This reviewer found it unclear how the project team is operating or if the advisory group has been beneficial.

**Reviewer 4**

The reviewer pointed out that the core team seems to be collaborating well, but the presentation did not detail how the advisory group participants were being engaged. Additionally, the reviewer was not sure as to why the presentation did not list California Energy Commission and Caltrans, two major state agencies coordinating roll out of the state's national EV infrastructure plan. The reviewer also highlighted that the project's limited progress after nearly a full year indicated some challenges with partnering.

***Question 5: 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 praised the project team's awareness of the project's impact on local EEJ communities, evident by the discussion of keeping ratepayer cost low, reducing pollution burden, and addressing community concerns about the increased weight of EVs. This reviewer noted that this project could adapt into a case study, provided there is additional discussion with the project's utility partners about Olympic electrical grid planning, and the impact additional corridor electrification would have on the local communities. The reviewer was also interested to see if any creative solutions are proposed to avoid placing the financial burden of increased road repair on the most burdened communities.

**Reviewer 2**
The reviewer approved of the project plan.

**Reviewer 3**
This reviewer predicted that the project score will go up by the next AMR, as the Community/EJ process is well stated in the objectives section, but the process has not yet started.

**Reviewer 4**
This reviewer referred to the energy equity slide, which highlighted three areas of benefit for DACs. However, the engagement scope was not presented in detail, making it difficult for this reviewer to assess the degree to which the project is engaging directly with communities regarding community prioritization for goods movement land use investment. This information would have been helpful to better understand how the project is ensuring benefits accrue for underserved communities.

**Presentation Number:** TI160
**Presentation Title:** Northeast Electric Highways Study
**Principal Investigator:** Brian Wilkie, National Grid USA Service Company Inc.

***Presenter***

Pedro Jardim, National Grid USA Service Company Inc.

***Reviewer Sample Size***

A total of four reviewers evaluated this project.

***Question 1: 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.***

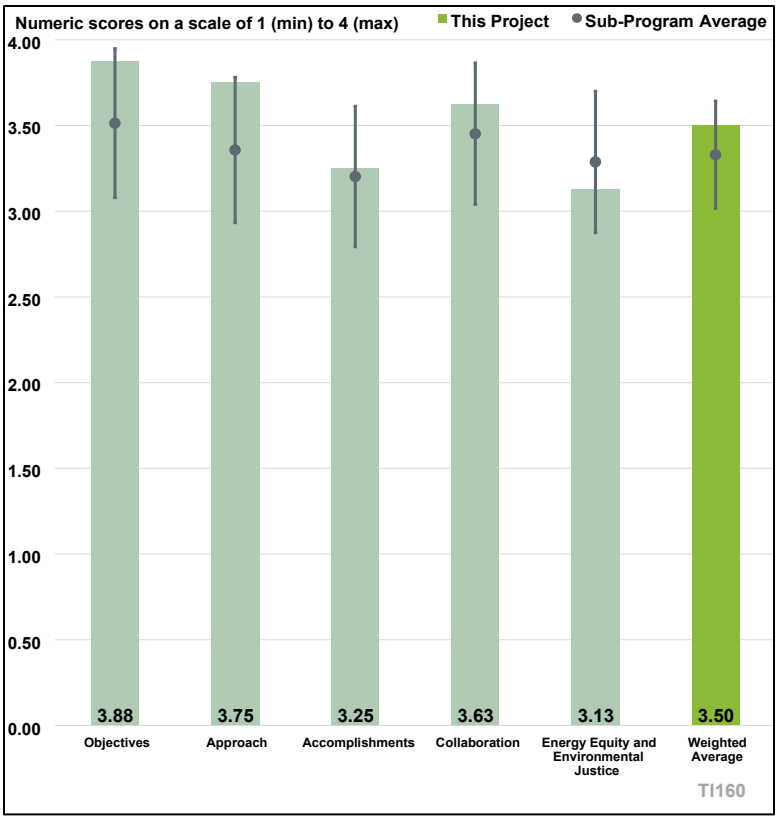


Figure 6-15. Presentation Number: TI160 Presentation Title: Northeast Electric Highways Study Principal Investigator: Brian Wilkie, National Grid USA Service Company Inc.

**Reviewer 1**

The reviewer commented that a project strength is that the project is conducting a high-quality MD/HD ZEV infrastructure study, that is modeling load curves and estimating costs for over 120 station sites across 3,000 miles of pre-defined freight corridors within a dense multi-state Northeast region. This is highly relevant to VTO goals and objectives.

**Reviewer 2**

The reviewer stated that this was a very good match for VTO objectives.

**Reviewer 3**

The reviewer noted that the project objective and overview slides describe the project's specific objectives and impact, as well as how the project supports the VTO objectives of improving fuel diversity and reducing GHG emissions by developing an innovative study approach to forecast electric charging demand at critical sites on freight corridors across the Northeast. The project objectives appear to be effective and substantially support VTO objectives.

**Reviewer 4**

The reviewer said that providing a clear plan for locating EV infrastructure in the northeast region for MD/HD freight is very much needed for the states in the region.

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

**Reviewer 1**

The reviewer noted that a project strength is that it relies on site-specific site assessment rather than modeling-only effort. Utility and partners (including state agencies) will select the sites to examine vs. letting a model do all of it. An additional strength is that the effort is well coordinated with state agencies involved in EV corridor planning and existing NEVI plans. Another strength is that the effort is targeting 30 mile-spacing between stations, exceeding NEVI standard.

**Reviewer 2**

The reviewer commented that working with utilities across the region is a very positive step to getting a project of this nature off the ground.

**Reviewer 3**

The reviewer stated that the project approach section provides an excellent methodology to accomplishing the project objectives and supporting the integration of advanced transportation technologies and practices. The project approach is divided into three project periods (Technical Analysis, Engage Stakeholders, and Develop Regional Plan), each containing associated tasks and applicable go/no-go decision points. The Milestone Slide provides a detailed description of the planned tasks per BP and progress to date.

**Reviewer 4**

The reviewer noted that it is a good project approach, although what is the specific process for down selection of the necessary charge sites? More fleet stakeholders are necessary to gain understanding of the cost and requirements for site locations. Is one monthly core project team meeting sufficient to drive progress? The PIs agree that the individual partner meeting is also a good idea, though the PIs do not think that using California Advanced Clean Truck (ACT) rules to estimate number of trucks is sufficient for the Northeast states and would suggest that something more novel may be required.

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

**Reviewer 1**

The reviewer commented that identifying locations in all the northeast states to eventually providing electrical load information for is a very positive step for states to use to provide the infrastructure needed to head to a clean transportation sector.

**Reviewer 2**

The reviewer commented that good progress has been made towards achieving project goals. The project has made progress on several key activities: (1) finalized list of 120+ sites to be studied that have been vetted by state DOTs and utilities, (2) stood up 3 stakeholder advisory committees (Utility, State Agency and EJ) with 38 different organizations, companies and agencies across 9 states represented, and (3) held the Project Kickoff Event in Brooklyn, in collaboration with the CALSTART project, which had over 100 stakeholders in attendance, demonstrating significant stakeholder interest in the study

**Reviewer 3**

The reviewer commented that it was unclear how close to the project schedule the progress has been so far.

**Reviewer 4**

The reviewer commented that while progress has been mostly steady, there are some large technical tasks remaining. The reviewer viewed this as a weakness.

***Question 4: 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 stated that the project substantially benefits from being utility-led and that the project demonstrates a strong degree of project team coordination.

**Reviewer 2**

The reviewer stated that putting together an advisory team is an excellent way to get a project of this nature off the ground.

**Reviewer 3**

The reviewer noted the project had an effective team including National Grid (prime) and numerous other key partners, who are assembled to carry out this project and provide an appropriate mix of expertise among team members. Collaboration/ communication among project partners appears to be appropriate for the scope of this project. While the Clean Communities of Central New York is named as a project partner, the role of other CC&C coalitions in the nine states covered by this project is unclear.

**Reviewer 4**

The reviewer stated that there is a good stakeholder plan, and the regional states seem to have high interest. The reviewer believed the project needs more fleet truck information (both operational and financial). Whether adding fleets to the advisory board or discussing with fleets in an ad hoc way, more needs done here.

***Question 5: 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 while the project will not provide direct EEJ benefits it will develop a plan for broad MD/HD freight electrification across the Northeast including within and through many DACs, which are now disproportionately impact by freight emissions.

**Reviewer 2**

The reviewer said it was a good plan.

**Reviewer 3**

The reviewer commented that the project has good potential to contribute to EEEJ goals by identifying and convening of EJ groups within the communities impacted by the freight corridors studied to form the Environmental Justice Advisory Committee. The Environmental Justice Advisory Committee will include possible EJ impacts as part of the regional roadmap, and integrate community group recommendations into the project’s regional plan.

**Reviewer 4**

The reviewer commented that most MD/HD freight haulers get their loads in primarily in EJ communities so providing a plan for EV infrastructure will go a long way to clean up emissions in the future in EJ communities.

**Presentation Number:** TI161
**Presentation Title:** MD-HD ZEV Infrastructure Planning with Focus on I-80 Midwest (IN-IL-OH) Corridor
**Principal Investigator:** Daniel O'Connor, Cummins Inc.

***Presenter***

John Kresse, Cummins Inc.

***Reviewer Sample Size***

A total of five reviewers evaluated this project.

***Question 1: 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.***

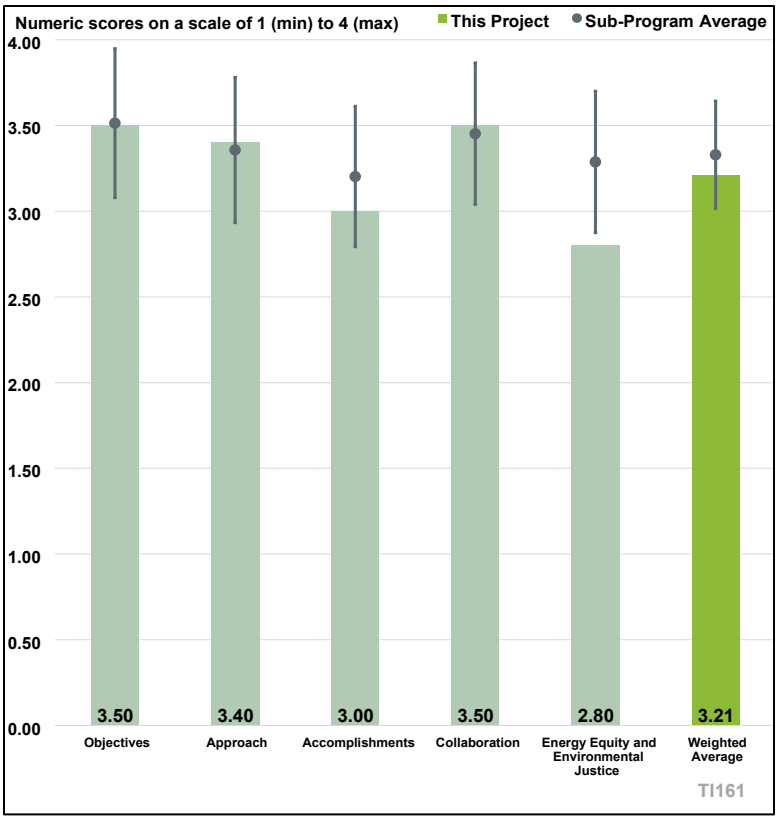


Figure 6-16. Presentation Number: TI161 Presentation Title: MD-HD ZEV Infrastructure Planning with Focus on I-80 Midwest (IN-IL-OH) Corridor Principal Investigator: Daniel O'Connor, Cummins Inc.

**Reviewer 1**

The reviewer commented that the project is tackling the challenge of MD/HD corridor electrification planning and assessment in the Midwest. This closely supports VTO goals and objectives.

**Reviewer 2**

The reviewer that the project objectives directly support the analysis gaps needed to develop clean corridors and reduce GHGs emissions.

**Reviewer 3**

The reviewer said it was very nice to see a $H_2$ and EV corridor project that is coordinating with the $H_2$ Hubs and evaluating technology such as DER, megawatt charging, and wireless charging. This reviewer would have marked a higher score, but it was stated that $H_2$ combustion engines are ZEVs, which is not true. The presenter did note that fuel cell electric vehicles (FCEVs) and $H_2$ combustion engines could be modeled separately, and this would make a great case study from this project—using grey $H_2$ and not green $H_2$. The confusion about the difference between FCEVs and H2 combustion engines is developing, so messaging should be clear about these differences as well as the difference in $H_2$ types.

**Reviewer 4**

The reviewer stated that this is the best potential study/project that the reviewer has had the opportunity to review. The project has a solid SOPO with inclusion of potential $H_2$ infrastructure and a great team of CC&C groups, university, national laboratories and manufacturers. The reviewer wishes the team good luck on this project addressing a heavily travelled corridor.

**Reviewer 5**

The reviewer stated that the project shows support for most DOE objectives; however, the reviewer did not see any analysis planning for what the GHG reduction will ultimately be and how this project will improve the business-as-usual approach.

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

**Reviewer 1**

The reviewer commented that the project is leveraging and building upon existing national laboratory tools (i.e., expanding POLARIS to incorporate wireless inductive charging).

**Reviewer 2**

The reviewer noted that while a good approach is formed using model projections for a phase 1 and phase 2 using vehicle TCO and vehicle volume, there are no EVSE partners identified to aid in the placement of chargers. And there is only one utility partner, leaving the reviewer to wonder how the Illinois (IL) and Ohio (OH) portions of the corridor will be studied. The reviewer would have liked to see a sample of what POLARIS information is and how that data can be used for informing decisions. The reviewer suggested the same for the NREL Projection HD Tool information—even if it were added to the reviewer only slides.

**Reviewer 3**

The reviewer stated that the use of both Argonne and NREL tools in new ways (including weather modeling) and with new data is straightforward, replicable, and easily available to the public after this project. Overcoming the lack of depot-level charging is crucial, and it appears that the right project partners are lined up to support this. The use of Purdue graduate students and then high schools in Disadvantaged Business Enterprise areas is a really interesting approach, hopefully helping spur interest in this research field in the next workforce generation.

**Reviewer 4**

The reviewer was happy to see both $H_2$ and wireless charging being studied, considering this important as there will certainly be areas without adequate infrastructure to support battery electric vehicle (BEV) infrastructure. The reviewer also wants to congratulate the project team for taking advantage of an existing DOE tool (POLARIS) and working to better integrate it into the real world. The reviewer encouraged the project team to do a lot of education and outreach to low-income communities adjacent to the corridor.

**Reviewer 5**

The reviewer commented that the project is leveraging and building upon existing NREL tools (i.e., expanding POLARIS to incorporate wireless inductive charging). The reviewer saw it as a weakness that the project seems to over-focus on Northwest Indiana (IN); whereas it is a three-state corridor project (OH in particular tends to be out of the loop on activities).

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

**Reviewer 1**

The reviewer commented that it appears to be a very realistic schedule; and the project has some outstanding partners. They like the idea of doing the project in two phases.

**Reviewer 2**
The reviewer stated that the project is at the beginning, but it has a clear approach and objectives. It is noteworthy that it will explore advanced technologies in Phase 2. They will be very interested to see how the Phase I baseline compares to the Phase 2 results.

**Reviewer 3**
The reviewer stated that the presentation noted being behind on the project in several areas (contracting, stakeholder summary report, utility data collection, POLARIS calibrations, etc.). Engagement and data collection from small utilities would be a great place to support this project, particularly with their noted issues of grid interconnection challenge understanding.

**Reviewer 4**
The reviewer commented that it appears to be a very realistic schedule; and the project has some outstanding partners. They like the idea of doing the project in two phases.

**Reviewer 5**
The reviewer commented that while it is not specifically stated, it appears that the project will miss the completion date for the first two objectives.

***Question 4: 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 effort includes a good overall team of key public and private partners. Adding that some additional utility partners from IL and OH would be beneficial.

**Reviewer 2**
The reviewer commented that there is a great project team with no weakness. Having a truck stop is huge.

**Reviewer 3**
The reviewer commented that the assembled team covers all the needed components for this work, aside from the high school to be identified at a later time. Coordinating to receive data from 60 small utilities is always going to be a challenge, and a case study or lessons learned debrief would be extremely helpful for other electrification projects. The reviewer was very interested to see what comes out of the $H_2$ Working Group and what can be utilized by the two $H_2$ Hubs located on this corridor. The in-depth interconnection study at the Pilot location in northern IN Public Service Company territory is another example of a potential case study from the project team.

**Reviewer 4**
The reviewer was glad to see the motor truck association and Purdue University involved. Long term this project could be replicable in other parts of the country.

**Reviewer 5**
The reviewer commented that although many applicable partners are listed with the project, it is unclear who are partners and who are valuable stakeholders. Additionally, it is unclear what the project communication/management plan is with this variety of partners and who is responsible for what.

***Question 5: 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 indirectly provides EJ benefits by developing freight electrification plans along urban Midwest corridors that transect numerous DACs where emission impacts are high.

**Reviewer 2**

The reviewer noted that much of the EEJ work will come later from the underserved high school to be determined in IN once a sponsor is found, as well as from outreach from Drive Clean Indiana. The technical education plan that is to be developed from this work could lead to a great workforce development component for EEJ communities

**Reviewer 3**

The reviewer asked what the eight specific milestones are within the EJ plan. Perhaps this could be added on the reviewer only slides. Additionally, the reviewer asked what the technical education plan is and how this plan serves the EJ communities of the corridor. The reviewer also asked if the EJ communities of the corridor are identified.

**Reviewer 4**

The reviewer would have liked to hear more about community outreach, especially environmental benefits for local residents and economic opportunities to be employed by, or to support the charging hubs. Perhaps the project could add an element to the Purdue team to identify potential employment opportunities.

**Reviewer 5**

The reviewer stated that the project is analysis of corridors that are surrounded by DACs, but the specifics of how the communities will be engaged and specific benefits are lacking.

**Presentation Number:** TI162
**Presentation Title:** San Francisco and Bay Area Regional Medium- and Heavy-Duty Electrification Roadmap
**Principal Investigator:** Dave Mullaney, Rocky Mountain Institute

***Presenter***

Dave Mullaney, Rocky Mountain Institute

***Reviewer Sample Size***

A total of five reviewers evaluated this project.

***Question 1: 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.***

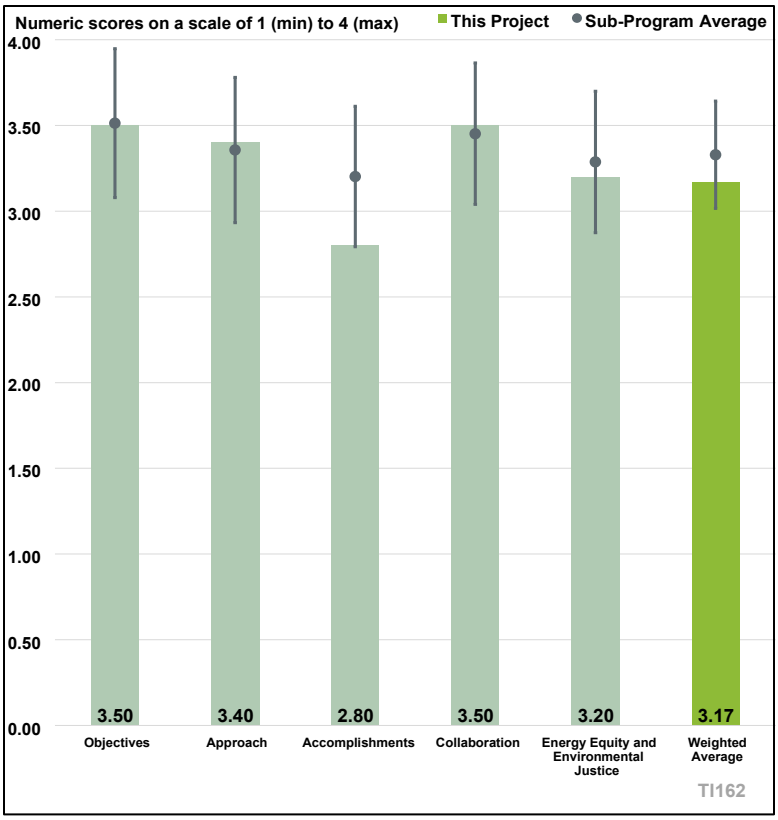


Figure 6-17. Presentation Number: TI162 Presentation Title: San Francisco and Bay Area Regional Medium- and Heavy-Duty Electrification Roadmap Principal Investigator: Dave Mullaney, Rocky Mountain Institute

**Reviewer 1**

The reviewer stated that the project was a great match of objectives to DOE needs.

**Reviewer 2**

The reviewer commented that the impact to the grid is a massive barrier to electrification, particularly the coming MD/HD electrification, so this work is highly relevant to advancing TI's objectives. This being more of a hub-and-spoke modeling versus a corridor modeling presents a new aspect to supporting TI objectives and aiding other hubs nationally.

**Reviewer 3**

The reviewer noted that the project's objectives are well aligned with the goals of VTO and DOE. Zero emission drayage trucks are an important challenge that needs to be solved.

**Reviewer 4**

The reviewer said the project's focus on anticipating growing demand for fleet electrification and the need to align the grid investments to support the transition aligns well with the VTO's objectives.

**Reviewer 5**

The reviewer commented that the objectives are very good; but scored the project low as it has just gotten started. They look forward to learning more in the near future.

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

**Reviewer 1**

The reviewer stated that the project is using data and simulation to map out and understand freight and truck movements, which are quite different from personal vehicles. The results will help determine where and what kind of electric charging infrastructure is needed to support truck electrification. Thoughtful truck charging deployment will help freight fleet operators have more confidence in electrification while also supporting local resiliency and environmental benefits.

**Reviewer 2**

The reviewer noted that this is a national problem, and while this solution will be customized to the Bay Area, it should have several lessons learned, methodologies, and dashboards available for other transportation hubs to replicate this work. The active combination of partners as utility, telematics data, CC&C, Caltrans, and Lawrence Berkeley National Laboratory is fantastic. This combination should help them to accelerate their efforts moving forward. Modeling at the pace of California's regulations is fantastic as it would be considered aggressive for the rest of the nation yet should be realistic for California. It would be scope creep, but if they can address what could potentially be a $H_2$ technology in their modeling, therefore less electrification would be needed, it would really enhance this study. It could be a great case study to see how much electricity is needed to convert MD/HD vehicles to electric, see if the grid can support that, then make an argument for implementing some $H_2$ vehicles if the grid capacity is unattainable.

**Reviewer 3**

That reviewer commented that it is a very impressive project team; and that they are glad to see that the team included Caltrans. There is a very good focus on EJ communities that will potentially benefit and should be included in the project.

**Reviewer 4**

A reviewer commented that the approach is well defined and appears to have been sized correctly and also relates to historical work. The only negative aspect they find is the drayage market aspect. Drayage typically refers to port related haulage. The reviewer believes the project would be better served and more applicable to a broader stakeholder set if the drayage market was replaced by short regional haul, i.e., haulage within 250 miles per day. This would add vehicle volume to the project plans.

**Reviewer 5**

The reviewer commented that the project's narrow aperture of only considering BEVs for drayage in the Port of Oakland is limiting. BEVs will clearly be an important solution in the drayage market, but assuming a 100% market capture is not warranted at this time. The Port of Oakland is a member of the Alliance for Renewable Clean Hydrogen Energy Systems Hub. This feels like a missed opportunity for collaboration.

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

**Reviewer 1**

The reviewer commented that the project is just at the beginning, but it has a clear approach and objectives. Initial data presented is compelling. The reviewer is looking forward to hearing future updates.

**Reviewer 2**
The reviewer commented that the completion rate was at 10%, when the team should be one-third of the way through their project. The milestone slide did not have SOPO deadlines, so it is hard to determine where exactly they have fallen behind. Getting drayage and long-haul partners on board should be an immediate goal for this summer.

**Reviewer 3**
The reviewer noted that they scored this project low due to the length of time it has taken to get the project under contract. Hopefully at the next review there will be meaningful progress.

**Reviewer 4**
The reviewer noted that it is concerning that Rocky Mountain Institute is nearly 1-year into the project period of performance and only 10% complete. The presenter explained the delays are primarily due to contracting. There was little discussion on how this is being addressed and whether activities will pick up enough to help cover the delay.

**Reviewer 5**
The reviewer noted a good start but added that it appears the initial contracting delay has the risk to delay portions of the project. There is a need to catch up.

***Question 4: 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 stated that it is an excellent team with substantial analytical skills. Having a utility in Pacific Gas and Electric Inc., as project partner is a huge benefit.

**Reviewer 2**
The reviewer commented that this is a very strong partner team, as well as advisory board team. The project team itself has all the right partners—many of which can become typically a barrier to a project like this, if they are not actively included. A number of feedback mechanisms were noted, but they need to start collaborating more to bring the project timeline back on track. This was the only freight study to mention working with small owner/operator fleets that might not be able to afford their own private chargers.

**Reviewer 3**
The reviewer stated that the project team made progress by having team meetings. Good job in putting team members together, this should be a great collaborative effort.

**Reviewer 4**
The reviewer commented that the partners listed along with their roles in Slide 12 provide good coverage of all areas of expertise and engagement needed. Having the utility as a partner is critical given it will be the primary entity responsible for grid expansion to support growing fleet electrification.

**Reviewer 5**
The reviewer commented that the team is well formed, and responsibilities are identified. One missing partner they see is truck fleets. A few large private fleets would be a valuable addition to the project advisory board.

***Question 5: 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 said that the project addressed an important problem with a positive benefit to the surrounding community.

**Reviewer 2**

The reviewer stated that the project will absolutely support EEJ for local communities along these freight routes and by the ports. The community involvement will be more reactionary to modeling however, with potentially more to be decided in the future. It would be great to hear some of the early community concerns. They asked if road ownership could be built into the model, so that the results do not suggest increasing wear and tear on roads that the local community has to pay for.

**Reviewer 3**

The reviewer commented that they have reviewed many projects, and they are impressed that the project team got EJ input very early on for this study. The reviewer is looking forward to the project team's success and a lot more progress by next year.

**Reviewer 4**

The reviewer stated that the project leverages the East Bay Clean Cities Coalition for local engagement plus other community-based organizations (Slide 8). They are tasked with coordinating and capturing community listening sessions to gather feedback in multiple project phases. The project is also creating a dashboard and roadmap that "allows exploration of recommended charging deployment in Justice40 communities."

**Reviewer 5**

The reviewer commented that the project team was a reasonable and apparently qualified set of partners who are enlisted to support the EEEJ activity. The reviewer did not see a plan to quantify the EEEJ local emissions reductions or total GHG savings of the project.

**Presentation Number:** TI163
**Presentation Title:** Houston to Los Angeles (H2LA)—Interstate 10 (I-10) Hydrogen Corridor Plan
**Principal Investigator:** Bart Sowa, Gas Technology Institute

***Presenter***

Bart Sowa, Gas Technology Institute

***Reviewer Sample Size***

A total of four reviewers evaluated this project.

***Question 1: 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.***

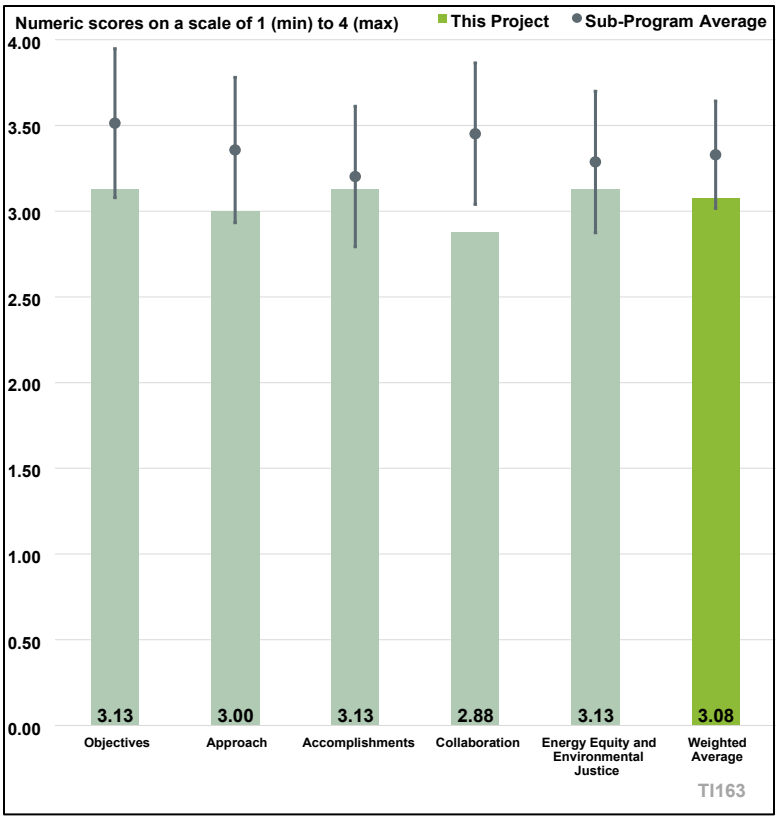


Figure 6-18. Presentation Number: TI163 Presentation Title: Houston to Los Angeles (H2LA)—Interstate 10 (I-10) Hydrogen Corridor Plan Principal Investigator: Bart Sowa, Gas Technology Institute

**Reviewer 1**

The reviewer stated that the project aligned is closely with the TI objectives of improving fuel diversity, increasing alternative fuel use and local resiliency.

**Reviewer 2**

The reviewer noted the project objective and overview slides describe the project's specific objectives and impact, as well as how the project supports the VTO objectives of improving fuel diversity, improving local resiliency, and reducing GHG emissions by developing a model of a $H_2$ -powered freight corridor, to inform the feasibility of investment, in the Texas Triangle and I-10 corridor between Houston and Los Angeles. The project objectives appear to be effective and substantially support TI objectives, as well as supporting the National Zero-Emission Freight Corridor Strategy.

**Reviewer 3**

The reviewer stated the project has assembled a great team; they hope that they are all contributing. The objectives as stated are clear; what may be missing is a discussion of the potential economic impact of using $H_2$ as a fuel. The team is doing a good job of getting community input.

**Reviewer 4**

The reviewer commented that the list of project/technology barriers is stated and written in an incomplete fashion. The potential reductions in criteria pollutants and GHG emissions are not quantified, and they see no approach for performing this activity in the project. The manner of $H_2$ production is not mentioned—is this green or brown $H_2$? The identification of technology cost, fuel

cost and infrastructure cost are not addressed to the degree that is required so that stakeholders can make an informed decision on the customer and societal costs of this project.

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

**Reviewer 1**

The reviewer said that the project took a comprehensive approach to solving real world challenges by doing extensive community listening sessions and working closely with technology and industry partners to explore innovative deployment solutions.

**Reviewer 2**

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 into two project tasks (Model Construction and DEIA Efforts, and Scenario Analysis/Risk Assessment), each containing associated tasks/activities. The Milestone slide provides a description of the project milestones and progress to date.

**Reviewer 3**

The reviewer stated that the project has assembled a powerful team and asked if all team members contributing? They did not see much input from Exxon and Walmart in the presentation; it would be good to have their input included from the beginning of the project.

**Reviewer 4**

The reviewer noted that the potential reductions in criteria pollutants and GHG emissions are not quantified and sees no approach for performing this activity in the project. The manner of $H_2$ production is not mentioned—is this green or brown $H_2$? The identification of technology cost, fuel cost and infrastructure cost are not addressed to the degree that is required so that stakeholders can make an informed decision on the customer and societal costs of this project.

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

**Reviewer 1**

The reviewer noted that most of the project tasks appear on track and there is an informative listing of model interactions on Slide 9.

**Reviewer 2**

The reviewer stated that satisfactory progress has been made towards achieving project goals. The project has made progress on several key activities: (1) formed Local Project Advisory Groups, (2) a significant portion of the modeling work is underway and/or completed, and (3) kicked off the Community Benefits Team planning.

**Reviewer 3**

The reviewer said that this project seems to be on track. They are impressed that the team is using some existing studies/projects and existing tools, which is good for keeping costs down and also for replicability. The project team made a good choice in using their local CC&C for outreach.

**Reviewer 4**

The reviewer noted that the project achieved significant milestones including building a refining a mobility and freight network energy demand model, developing a vehicle dynamics and weather impact model, and developing a national implementation blueprint.

***Question 4: 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 there were positive and significant collaborations within the project team, including from Oak Ridge National Laboratory, University of Texas at Austin and from key industry stakeholders such as Exxon and Walmart.

**Reviewer 2**

The reviewer said it was an effective project team including GTI (prime) and numerous other key partners which were assembled to carry out this project and provide an appropriate mix of expertise among team members. Collaboration/communication among project partners appears to be appropriate for the scope of this project. Beyond the three CC&C coalition partners, the project team may benefit from local community groups.

**Reviewer 3**

The reviewer offered congratulations on getting the bi-weekly meetings going; adding this will be critical as the project moves forward. They would like to see evidence that Exxon/Mobil and Walmart are contributing as they are critical to the success of the study.

**Reviewer 4**

The reviewer felt it would have been beneficial to have some results from the first advisory group meeting, perhaps on reviewer only slides. It is unclear how well collaboration is proceeding since Slide 16 simply restates the listing of project partners.

***Question 5: 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 team closely engaged community stakeholders to examine impacts and economic and environmental benefits. Input gathered from the community indicated particular concern about the introduction of a relatively unknown new fuel technology. However, implementing the technology will significantly reduce GHG and criteria pollutants from on-road transportation.

**Reviewer 2**

The reviewer said that the project has a satisfactory potential to contribute to EEEJ goals. Due to its analytical nature, this project is expected to contribute to Community Benefits and EEEJ by applying lessons learned to modeling and planning efforts for the $H_2$ corridor, ultimately impacting future investments. Until the modeling and planning are completed and the anticipated results are documented, it is difficult to evaluate the significance of the project benefits at this time.

**Reviewer 3**

The reviewer felt it is a great choice of team members. This part of the project will be difficult to explain as $H_2$ as a fuel is still in its infancy in the U.S. Continue to make progress and hold more meetings with local EJ groups and residents.

**Reviewer 4**

The reviewer said it was a good listing of project deliverables for the EEEJ plan and asked where the overburdened communities are within the corridor. They only saw information for Texas and did not see a plan for quantifying emission benefits (relative to today) within the EEEJ communities.

## Acronyms and Abbreviations – TI

| Abbreviation | Definition |
|---|---|
| **ACT** | California Advanced Clean Truck rule |
| **AMR** | Annual Merit Review |
| **ASPIRE** | Advancing Sustainability through Powered Infrastructure for Roadway Electrification |
| **BAE** | BAE Systems Inc. |
| **BEV** | Battery electric vehicle |
| **BP** | Budget Period |
| **CAF** | Development Bank of Latin American and the Caribbean |
| **CC&C** | Clean Cities and Communities |
| **CEPNA** | Cummins Electrified Power North America |
| **CNG** | Compressed natural gas |
| **DAC** | Disadvantaged community |
| **DCFC** | Direct current fast charger |
| **DEI** | Diversity, equity, and inclusion |
| **DEIA** | Diversity, Equity, Inclusion, and Accessibility |
| **DER** | Distributed energy resource(s) |
| **DERST** | NFPA Distributed Energy Resources Safety Training (DERST) Program |
| **DGE** | Diesel gallon equivalent |
| **DOE** | U.S. Department of Energy |
| **EE** | Energy Equity |
| **EEEJ** | Energy equity and environmental justice |
| **EEI** | Energy, Equity and Inclusion |
| **EEJ** | Energy Environmental Justice Action Plan |
| **EJ** | Environmental Justice |
| **EMPOWER** | Equitable Mobility Powering Opportunities for Workplace Electrification Readiness |
| **ESS** | Energy storage system |
| **EV** | Electric vehicle |

| Abbreviation | Definition |
|---|---|
| **EVAL** | Electric Vehicle Adoption Leadership |
| **EVSE** | Electric vehicle supply equipment |
| **FCEV** | Fuel cell electric vehicle |
| **FHWA** | Federal Highway Administration |
| **FMW** | FMW Solutions LLC |
| **GHG** | Greenhouse gas |
| **GO** | California Governor's Office of Business and Economic Development, or GO-Biz |
| **GTI** | GTI Energy Partners |
| **$H_2$** | Hydrogen |
| **HD** | Heavy-duty |
| **Hp** | Horsepower |
| **IL** | Illinois |
| **IN** | Indiana |
| **J40** | Justice 40 Initiative |
| **kg** | Kilogram |
| **klbs** | Kilopounds |
| **kWh** | Kilowatt-Hour |
| **L2** | Level 2 |
| **Lbs** | Pounds |
| **LEEP** | Leadership of Employers for Electrification Program |
| **MBWE** | Minority- or women-owned business enterprises |
| **MD** | Medium-duty |
| **MD/HD** | Medium-duty/heavy-duty |
| **MPG** | Miles per Gallon |
| **NAFTC** | National Alternative Fuels Training Consortium |
| **NAFTD** | North American Fire Training Directors |
| **NEVI** | National Electric Vehicle Infrastructure |
| **NFPA** | National Fire Protection Association |

| Abbreviation | Definition |
|---|---|
| **NG** | Natural gas |
| **NREL** | National Renewable Energy Laboratory |
| **OEM** | Original equipment manufacturer |
| **OH** | Ohio |
| **PEV** | Plug-in Electric Vehicle |
| **PI** | Principal Investigator |
| **PM** | Particulate matter |
| **Q1/Q2/Q3/Q4** | Quarter |
| **RDD&D** | Research, development, demonstration, and deployment |
| **RNG** | Renewable natural gas |
| **SOPO** | Statement of Project Objectives |
| **TCO** | Total cost of ownership |
| **TI** | VTO Technology Integration subprogram |
| **TMV** | TMV Control Systems–Next Generation Locomotive Control Systems |
| **TNA** | Transportation needs assessment |
| **TTC** | Transportation Technology Center |
| **UT** | Utah |
| **UTD** | Utilization Technology Development |
| **VTO** | Vehicle Technologies Office |
| **ZEV** | Zero Emission Vehicle |

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