Sustainable Transportation Eco-Hub Project

1. Overall Project Summary and Approach

New Jersey is a national leader in advancing a cleaner transportation and energy future. Our laws, regulations, strategic plans, and policies outline a necessarily ambitious framework to mitigate climate change, protect public health, and improve the quality of life for New Jersey residents. Decarbonizing our transportation infrastructure – predominantly through adoption of electric vehicles – is a critical component of achieving these goals. Through the *Sustainable Transportation Eco-Hub Project* (STEP), the New Jersey Department of Environmental Protection (NJDEP) will use a holistic approach to reduce transportation emissions from schools.

STEP is a pilot project to implement New Jersey's first-ever holistic and transformative approach to greenhouse gas reductions. It includes two primary measures:

1. Transition six of the State's school bus fleets from diesel to electric, integrating grid supportive bi-directional capable charging infrastructure; and
2. Implement a renewable, independent energy system including on-site solar electricity generation, stationary battery storage, and a microgrid controller.

This project will establish a proof of concept for a Sustainable Transportation Eco-Hub – an integrated system of electric vehicles with bi-directional charging powered by a fully renewable microgrid, leading to a replicable, durable, and transformative change to the way we approach transportation decarbonization, clean energy, and resilience. The project is implementation-ready, directly responsive to community needs, has a transformative impact on the transportation and electric generation sectors, and results in significant greenhouse gas, criteria, and hazardous air pollutant reductions. This project supports EPA's fiscal year (FY) 2022-2026 Strategic Plan, Goal 1, "Tackle the Climate Crisis"; Objective 1.1, "Reduce Emissions that Cause Climate Change" and Goal 4, "Ensure Clean and Healthy Air for All Communities;" Objective 4.1 "Improve Air Quality and Reduce Localized Pollution and Health Impacts".

New Jersey's keystone climate change statute, the Global Warming Response Act, requires a reduction in statewide CO_2e emissions of 80 percent below a 2006 baseline by 2050. Transportation is the largest source of greenhouse gas emissions in New Jersey; in 2021, transportation contributed 37.3 million metric tons of carbon dioxide equivalent, or 37 percent of total net statewide emissions (NJDEP, 2024b). While accounting for just four percent of on-road vehicles in the State, medium- and heavy-duty vehicles, including school buses, emit nearly 25 percent of the greenhouse gas emissions from the transportation sector (NJDEP, 2023). These diesel fueled vehicles are the largest sources of fine particulate matter, black carbon, and NO_x (NJDEP, 2023; US EPA, 2017) which disproportionately impact residents of low-income and disadvantaged communities (LIDACs), who make up 24 percent of New Jersey's population[1]. While providing vital transportation services, these buses often operate in densely populated areas, adversely impacting the health of students, drivers, and residents of communities in which they operate. Exposure to these pollutants increases the risk of heart and lung illnesses and premature death for thousands of New Jersey residents (NJDEP, 2023)

To mitigate impacts from the medium- and heavy-duty vehicle transportation sector and meet the emission goals in the Global Warming Response Act 80X50 report, New Jersey needs to transition the nearly 21,700 school buses registered in the State to zero-emission buses (NJDEP, 2020). On average,

[1] Low-income and disadvantaged communities are defined using the Climate and Economic Justice Screening Tool

school buses operate just over five hours per day, have a low daily mileage, and frequently stop and start (Duran & Walkowicz, 2013) which makes them well suited for electrification. However, as of June 2023, just 21 electric school buses were registered in the State.

This project will take a holistic approach to the transition by combining electric school buses, bi-directional capable charging infrastructure, on-site renewable electricity generation and stationary storage, and a microgrid controller. The electric school buses will be connected to a fully renewable electricity based microgrid via bi-directional capable charging stations which allow for full interconnection and power exchange between the buses and microgrid, and vice versa. These project components are detailed in Section 1.1. Approaching climate mitigation in a holistic, integrated fashion, rather than sector by sector, enables us to achieve our climate mitigation and resilience goals more quickly. This project is the first of its kind in New Jersey to demonstrate the feasibility and effectiveness of implementing a multi-faceted decarbonization strategy at schools in LIDACs.

In New Jersey and across the country, our ambition for vehicle and building electrification is challenging the speed at which we can build out the grid. By utilizing innovative solutions for reducing grid impacts as part of this project, NJDEP will enable more transportation electrification projects to move forward in New Jersey.

This project will result in the deployment of approximately six microgrids, 1.4 MW of solar generation capacity, 19.7 MWh of storage capacity, 33 electric school buses, and 33 DC Fast Charging stations at New Jersey schools. This will lead to significant benefits including greenhouse gas emissions reductions, criteria and hazardous air pollutant reductions, improved health for residents of LIDACs, community resilience, community engagement, workforce training and jobs, and a replicable blueprint for other schools. The proposed measures are anticipated to avoid 3,212 total cumulative metric tons of CO_2 equivalent emissions through 2030 and 24,903 cumulative metric tons of CO_2 equivalent emissions through 2050. These pilots additionally boost community resilience to power outages caused by severe storms, heat waves, and other impacts of climate change.

While the primary benefit of this project is to reduce greenhouse gas emissions, it is expected to also generate co-benefits:

- Transitioning from diesel to electric school buses provides significant health benefits for students, drivers, and the communities in which these buses operate. This project will provide energy justice by prioritizing bus electrification in low-income and disadvantaged communities.
- Utilizing bidirectional charging, on-site renewable electricity generation, and microgrid systems improves community resilience during disruptions to the electric grid.
- Energy storage and microgrid components provide grid benefits by shaving peak electricity demand, allowing transportation electrification projects to continue with fewer grid upgrades.
- These systems have the potential to generate significant financial savings for schools, allowing them to reinvest in their students.
- This project will establish a proof of concept for an integrated system of electric vehicles powered by a fully renewable microgrid. This will lead to a replicable, durable, and transformative change to the electric system.
- This project will invest in the workforce of the future by developing a training program which provides students with opportunities to learn about electric vehicles, renewable energy, and the impacts of greenhouse gas emissions and criteria and hazardous air pollutants. Funding will be used to support the development of hands-on educational programs for students and to develop pathways for careers in clean energy and transportation systems.

1.1 Description of GHG Reduction Measures

New Jersey's Priority Climate Action Plan (PCAP) examined emissions reduction measures in the transportation, buildings, electric generation, food waste, halogenated gases, and natural and working lands sectors. Within these sectors, New Jersey identified 12 priority measures and 68 enabling actions. Of the enabling actions, "*Incentivize replacement of diesel medium-and heavy-duty vehicles, including school buses, with battery electric vehicles or green hydrogen fuel cell electric vehicles*" and "*Pilot grid supportive technologies such as Vehicle-to-Everything "V2X" and microgrid systems*" were identified as priorities for funding.

This project proposes to implement the following greenhouse gas emissions reduction measures:

1. Transition six of the State's school bus fleets from diesel to electric, integrating grid supportive bi-directional capable charging infrastructure; and
2. Implement a renewable, independent energy system including on-site solar electricity generation, stationary battery storage, and a microgrid controller.

The project is implementation-ready, directly responsive to community needs, has a transformative impact on the transportation and electric generation sectors, and results in significant greenhouse gas, criteria, and hazardous air pollutant reductions.

Of the measures outlined in New Jersey's PCAP, electrifying medium- and heavy-duty vehicles, including school buses, was identified as having the highest benefit to low-income and disadvantaged communities (NJDEP, 2024b). In addition to the greenhouse gas emissions reductions, this measure improves local air quality and provides many physical and mental health benefits to these communities. Nearly 95% of school buses in the U.S. run on diesel fuel (Budzynski et al., n.d.). The exhaust produced by these vehicles has been directly linked to asthma, cancer, premature death, and other respiratory illnesses for students, drivers, and the communities in which the buses travel (California EPA & The American Lung Association, n.d.; The Lancet, 2020).

To ensure the benefits are felt across the State, this project will be carried out at six sites owned by schools and school districts that New Jersey selected through a competitive process. As shown in Figure 1, each site will have four primary components which, in total, contribute to a holistic, integrated system for maximum emissions reduction: electric school buses, bi-directional capable charging infrastructure, on-site renewable solar electricity generation, stationary storage, and a microgrid controller.

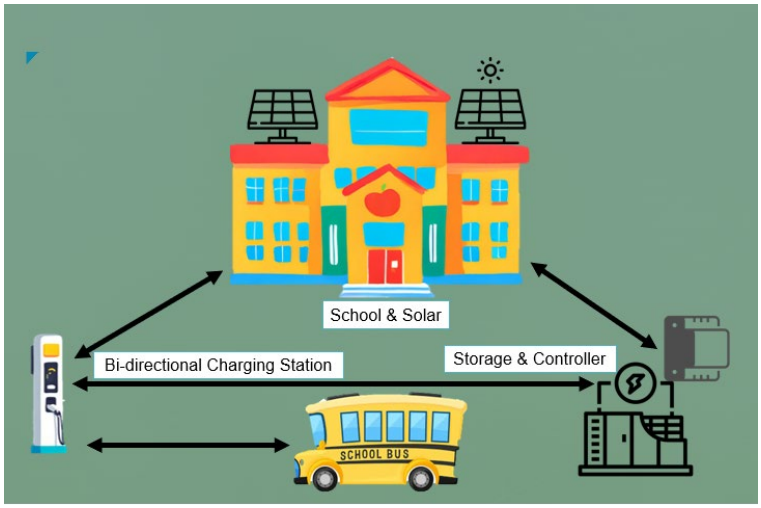


Figure 1: Bi-directional functionality of project components allows each component to power another component.

Electric school buses: The project will enable the purchase of approximately 33 electric school buses, which will replace fossil fuel powered school buses. The routes on which these buses operate will be selected based on operational feasibility and to optimize the benefits to low-income and disadvantaged communities. These buses will also act as a mobile battery storage source which will provide power to the school buildings during grid outages and during periods of peak electricity demand. This supports New Jersey's overall climate strategy by supporting community resilience during disruptions to the electric grid. Electric school buses produce no tailpipe emissions and buses charged from the electric grid produce between one quarter and one third of the greenhouse gas emissions of a diesel or gasoline school buses (Argonne National Lab, 2023). The buses involved in this project will be charged using renewable electricity, resulting in additional emissions reductions.

Bi-directional capable charging infrastructure: The buses will be charged using low-power Direct Current Fast Chargers (DCFC) due to their bi-directional charging capabilities. Each electric school bus will be paired with a DCFC at a ratio of one charging station to one bus. Given that electric school buses are typically unused during the evening and overnight hours, these buses are well suited to act as a source of energy storage and emergency power. This allows for emissions reductions to occur in both the transportation and electricity sectors by allowing electricity to flow into the batteries during times of high renewable energy production and then releasing the electricity back to the building during periods of low renewable energy generation. It has been estimated that if every school bus in New Jersey was a bi-directional capable bus, over 2,179 MWh of electric storage capacity would be added to the grid (Horrox et al., 2022). This is enough power to support the average home for over 186 years.

Resilient on-site renewable electricity generation and stationary storage: To maximize emissions reductions, this project will fund the installation of on-site renewable electricity generation and stationary battery storage. This includes the installation of photovoltaic solar on the schools and a battery storage system, ensuring the electricity used to charge the school buses is fully renewable. Given that the lifecycle greenhouse gas emissions from electric school buses are largely attributable to their electricity source, the use of on-site renewable electricity generation will ensure the cleanest possible school buses. Integration of batteries for stationary storage extends the usable time of the electricity created by the photovoltaic solar system and allows it to be used during times when the photovoltaic solar system is not generating electricity. This lessens the need for new fossil fuel fired power plants to be built. The battery and solar systems will be sized with enough capacity to support the building's typical electrical load for 24-hours, including daily school bus charging. This will increase resiliency for the bus and building operations and minimize the need for additional fossil electricity generation.

Microgrid controller: The preceding project components will be tied together into a single integrated system via a microgrid controller. The microgrid controller will manage the school bus charging and discharging, renewable electricity generation, and battery storage. This will optimize the use of renewable energy, prevent the need for additional fossil electric generation to support the buses, improve resiliency of the buildings and vehicles during grid outages, and decrease the need for, or magnitude of, costly and time-consuming grid upgrades typically associated with charging infrastructure projects. Under normal operating conditions, the microgrid controller will use the generated and stored electricity to power the buildings and school buses during peak hours. In the case of a power outage, electricity from these systems will be used only to support critical loads such as heating, lighting, and bus charging. This allows the electric buses to continue operations during electric outages and assist in evacuations in the case of severe storms and other disaster scenarios. The control systems will allow for real-time monitoring and asynchronous control of the microgrid. In cases of a grid outage, the microgrid can be islanded to provide additional resilience to the school and surrounding communities. Under

normal working conditions, the microgrid can be managed remotely to shave peak demand and reduce electric demand charges.

While the number of school buses and size of the on-site renewable electricity generation systems used at each pilot eco-hub will vary based on the educational partner's needs, an average of 5.5 electric school buses, 1.4 MW of photovoltaic solar, and 19.7 MWh of battery storage will be included per site.

NJDEP plans to work with educational partners (schools and school districts) to implement these eco-hub projects at six New Jersey schools:

- French American Academy (Jersey City, NJ)
- Summit Board of Education (Summit, NJ)
- Hanover Park Regional High School District (East Hanver, NJ)
- Hopewell Valley Regional School District (Pennington, NJ)
- Belmar Elementary School District (Belmar, NJ)
- Dumont Board of Education (Dumont, NJ)

Recruitment for this project was conducted via a Request for Expressions of Interest (RFEI), which was sent to New Jersey schools and school districts, including private school bus operators, public schools, and private schools. The RFEI assessed respondent's interest in partnering with NJDEP on school bus electrification and microgrids. In total, 80 responses were received. These responses were ranked to prioritize schools who were interested in all project components and whose schools and school buses serve LIDACs[2]. NJDEP met with the top ranked school bus operators to discuss project scope, define roles and responsibilities, and confirm their commitment to the program.

1.1.1 Risk Mitigation

As shown in Table 1, this project has a number of associated risks, which NJDEP has worked to minimize.

Table 1: Project risks, emissions impacts of risks, and mitigation strategies.

Risk	Effect on greenhouse gas emissions reductions	Probability of Risk	Mitigation Strategy
Higher than expected equipment costs.	Cost effectiveness of emissions reductions may change due to higher-than-expected total construction or equipment costs.	Medium	To keep costs low, educational partners will procure equipment through a rigorous, competitive process. While the cost assumptions used here are based on the best available data at the time of this analysis, actual expenditures within each category may change as technical details are finalized and quotes are obtained.
Lack of administrative capacity to support these programs, and other unforeseen circumstances may cause school districts to	Delays may diminish cumulative greenhouse gas emission reductions in the near-term.	Medium	The budget includes funding for educational partners to hire contractors to provide technical and administrative support and oversee day to day management of each school's eco-hub. If an educational partner withdraws from the project, NJDEP will identify a replacement school district that has similar characteristics to the current school district including the number of electric school buses requested, the amount of solar and storage capacity, and the same or greater

[2] Low-income and disadvantaged communities are defined using the Climate and Economic Justice Screening Tool

drop out of the program.			benefits to LIDACs. This will ensure the anticipated emissions reductions are achieved.
Educational partners may have building constraints which lead to project delays.	Delays may diminish cumulative greenhouse gas emission reductions in the near-term. If roofs are unable to support solar panels, ground-mounted solar may be required. This may impact the amount of useable area available for solar, leading to lower emissions reductions.	Medium	This project assumes all educational partners will have buildings able to support roof-mounted solar installations. In some cases, schools may need to have roofs repaired before they are able to support solar panels or may only be able to support panels on a certain portion of the roof. In this case, project partners will work to identify the best solutions, such as transitioning to overhead parking lot installations, or installing panels in other open spaces. This may affect the project costs or lead to delays in the timeline.
Electric school buses may not be suitable for every route.	Current emissions estimates are based on the anticipated range of electric school buses, so greenhouse gas reductions are not anticipated to be impacted. May impact criteria and hazardous air pollutant benefits for LIDACs and overburdened communities.	Medium	Educational partners may face operational constraints which limit their ability to deploy electric school buses on routes with the highest fuel consumption or that go through LIDACs. These constraints will be accounted for when selecting routes for these electric buses.
Electric school buses may have longer lead times than anticipated.	Delays may diminish cumulative greenhouse gas emission reductions in the near-term.	Low	Historically, electric school buses have experienced longer delivery times than fossil fuel-powered school buses. Recently, electric school bus production has increased, and fossil fuel-powered school bus production has decreased, eliminating the stigma of longer than normal lead times for the delivery of electric buses.
Delays in charging station delivery may delay the start of electric school bus use.	Delays may diminish cumulative greenhouse gas emission reductions in the near-term.	Medium	With proper planning, the bus delivery and associated charging infrastructure can be completed concurrently. The timeline initiates procurement early in the project timeline. If delays in charging station installation impact the ability to charge electric school buses, temporary portable charging stations may be utilized to charge the buses while issues with the permanent charging stations are resolved.
Selection of incompatible software on the bus/bi-	Delays may diminish cumulative greenhouse gas emission reductions in the near-term.	Low	While bi-directional capable charging stations and school buses are available today, these technologies are relatively nascent. The New Jersey Motor Vehicle Commission has

directional charger can lead to delays as software issues are resolved.			regulatory requirements with which only three electric school bus manufacturers are able to comply. All three manufacturers' buses are bi-directional capable, and they each provide guidance on compatible bi-directional charging stations, which increases the success of the project and eliminates preliminary compatibility issues.

1.2 Demonstration of Funding Need

> *"The cost to implement electric school buses exceeds the general fund budget." –* New Jersey School District
>
> *"Electric buses are expensive to make, which makes it expensive to buy a fleet. The cost is two to three times the cost of a standard bus. School Districts are struggling."*- New Jersey School District

Schools and school districts in New Jersey have demonstrated a strong desire to reduce their greenhouse gas emissions and improve student, driver, and community health, but have been hampered by lack of sufficient funding. Developing an integrated electric school bus and renewable energy system requires school districts to support the upfront costs of procuring the electric school buses, charging station hardware and installation, electric grid upgrades, a microgrid controller, solar panels, battery energy storage, construction, and project management teams. Despite the federal tax credits available for electric school buses, charging infrastructure, solar, and storage, schools and school districts lack the funding to pay these high upfront costs and existing grant opportunities are insufficient. Despite NJDEP's efforts thus far, funding as of June 2023 has only supported the transition of 1.4 percent of New Jersey's school bus fleet to electric. $6.4 billion dollars is needed to electrify the remainder of the New Jersey school bus fleet. NJDEP has not applied for, secured, or received any previous funding for the measures described in this application.

1.2.1 State Funding Applied

NJDEP has been working with its schools and school districts to increase their awareness of electric school bus technologies and available funding sources. NJDEP has provided grants for 201 electric school buses to date. New Jersey has further demonstrated its commitment to school bus electrification with the release of a $15 million electric school bus grant program in February 2024 and estimates 50 electric school buses will be funded (NJDEP, 2024a).

1.2.2 Federal Funding Explored

The State has worked to promote the EPA's Clean School Bus Grant and Rebate Programs and the Diesel Emissions Reduction Act (DERA) Funding program. Six New Jersey school districts received awards for a total of 44 buses under the 2022 Clean School Bus Rebate and 2023 Clean School Bus Grant Programs.

While programs such as the Charging and Fueling Infrastructure Discretionary Grant Program and the National Electric Vehicle Infrastructure program provide funding for charging infrastructure, these programs focus on the charging needs of light-duty vehicles or have public accessibility requirements; these programs do not meet the specific charging needs of electric school bus fleets.

1.2.3 Federal and State Funding Explored

While conducting outreach, NJDEP heard from schools and school districts that they lack the administrative and technical capacity and expertise to apply for and implement these individual grant opportunities. Funding provided through the CPRG program will allow educational partners to hire

technical project contractors to provide tailored, hands-on support. This includes assistance with carrying out indirect project requirements such as training drivers and school district staff, understanding which routes are best suited for electrification, the amount of power needed to serve their duty cycle, monitoring equipment performance, and understanding how bi-directional and microgrid components impact their financial and technical operations. Initial purchases of electric school buses require school districts to invest additional time and expenses compared to diesel school bus purchases. By dedicating funding for technical assistance, educational partners face fewer disruptions to their day-to-day operations and are more likely to be successful in maximizing project impact.

While funding is available for most of the individual project components, no funding programs are available to support schools and school districts that want to adopt a system-wide approach to bus electrification and resilience, including the union of electric school buses, bi-directional charging, solar microgrid, and student education programs described in this application. School districts indicated the importance of pursuing this unified suite of program components as school buses cannot be deployed without reliable, cost-effective charging infrastructure. Renewable energy through a solar microgrid is consistent with State goals and the EPA Strategic Plan Goal 1, Objective 1.1.

> *"Our local electric company provides very unreliable service in our area and has previously indicated that they may not be able to support electrification projects."* -New Jersey School District

New Jersey is projected to face significant increases in electric grid demand from transportation through 2030, and the State's electric utilities have indicated long lead times for service upgrades (EPRI, 2024; Ragon et al., 2023; Wood et al., 2023). School districts have indicated these electric service upgrade delays have been a significant contributing factor in their inability to apply to previous federal funding programs. By utilizing innovative solutions for reducing grid impacts, this project enables transportation electrification projects to move forward while we build out the grid capacity needed to achieve our statewide decarbonization goals.

NJDEP has not applied for, secured, or received any previous funding for the measures being applied for under this application.

1.3 Transformative Impact

These eco-hubs will result in several transformative effects: piloting a holistic approach to transportation and electric system emissions reductions, improving community resilience, supporting workforce development, and serving as a case study for other transportation sectors. This project is the first of its kind in New Jersey to demonstrate the feasibility and effectiveness of implementing a multi-faceted decarbonization strategy at schools in LIDACs. Tackling the climate change problem holistically by simultaneously leveraging various innovative technologies for transportation, electric generation, stationary storage, and microgrids will result in climate mitigation along with climate resilience. Additionally, children are the workforce of the future, so we will dedicate funding to educate middle school and high school children at our partner schools about the potential for green careers in clean energy and transportation decarbonization.

Funding received under this program will be used to procure school buses, bi-directional charging infrastructure, on-site renewable energy generation, and microgrid controllers. While the scope of projects funded under this grant will be limited to the six pilot sites, these pilots will be used to demonstrate the viability of creating an integrated system connecting these technologies. While electric school buses have seen increasing adoption rates, they have only been adopted by early movers, making up just over one percent of school buses in the U.S. (Budzynski et al., n.d.). Bi-directional charging and

microgrid projects are just beginning to emerge and have not yet been paired together to develop a holistic system. This project will connect these components to develop a holistic approach to transportation electrification which will serve as a model for other schools in New Jersey and nationally.

This program will identify and address technological challenges, develop a set of best practices, serve as a case study, demonstrate feasibility and cost effectiveness, and provide an economic pathway for combined bi-directional charging, storage, and microgrid use-cases. By sharing lessons learned from these initial deployments, other school districts will better be able to anticipate potential challenges and optimize their electrification plans. Each pilot will collect data on cost effectiveness and feasibility, with a focus on creating a replicable model, promoting familiarity with the technology, and demonstrating these technologies will work in the New Jersey context. This will allow other school districts to build off the lessons learned from these initial pilots and replicate similar systems at their schools. By demonstrating cost effectiveness and feasibility, other schools will more easily be able to communicate the benefits of these systems to their school boards and community.

The buses deployed under this project will be the centerpiece of the educational portions of this grant. They will be used to conduct outreach events, such as ride and drive events with other school districts. Allowing other school districts to interact with electric school buses provides an opportunity for school decision-makers to evaluate the bus's performance, handling, comfort, safety features, and compatibility with their needs.

Another primary benefit of these eco-hubs is that schools can still run their electric school buses when grid outages would have prevented their operation. By creating redundant systems of on-site power generation and stationary storage, this project strives to lessen concerns around the impacts of grid outages on school bus operations.

To reach full electrification of our transportation and building sectors, we will need to expand grid capacity. Projects like this enable transportation electrification projects to move forward in the interim. A 2023 report from the National Renewable Energy Laboratory estimated that, by 2030, 2,047,246 kWh of electricity and an installed nameplate capacity of 1,149 MW of power will be needed to support New Jersey's zero-emission medium- and heavy-duty vehicles (Bauer et al., 2021). Microgrids support the use of low-carbon renewable energy, create demand flexibility and load shifting, and allow resiliency during grid outages. By utilizing renewable-energy microgrids with storage, electric utilities may be able to delay, reduce, or eliminate the need for upgrades to the electric system. Demand on the grid will be reduced by using the microgrid to charge the buses and power buildings during peak demand hours and when renewable electricity generation is low.

Beyond the school bus use case, if these pilot projects successfully demonstrate cost effectiveness and emissions reductions, they can serve as a model for electrification in other medium- and heavy-duty vehicle applications, such as transit, drayage, and local delivery fleets. Successful demonstration of these concepts can inspire future private sector investments in this work and create best practices that decrease financial and technological risks.

NJDEP will work with the New Jersey Board of Public Utilities to coordinate and share this demonstration data. Due to the technological naissance of vehicle-to-grid and vehicle-to-buildings, the ability to develop framework regulations allowing the sale of electricity back to the grid has not been explored by agencies in New Jersey. By expanding the use of these technologies, NJDEP will be able to share the results of the program with our sister agency, the Board of Public Utilities, so that they can proceed with the regulatory framework that will promote widespread use of bi-directional charging. To create a new rate program will require confidence in the technology and data to understand the economics to customers, both of which will be provided by this program.

2. Impact of GHG Reduction Measures

In total, this project is estimated to avoid 3,212 cumulative metric tons of CO_2 equivalent emissions through 2030 and 24,903 cumulative metric tons of CO_2 equivalent emissions through 2050. This was calculated using the National Renewable Energy Laboratory's REopt tool and Argonne National Laboratory's AFLEET tool. With an overall budget of $27,127,666, this gives the project an estimated cost effectiveness of $8,445 per metric ton of CO_2 equivalent emissions for the 2025-2030 timeframe. For the 2025-2050 timeframe, the project's cost effectiveness is $1,089 per metric ton of CO_2 equivalent.

These calculations are scaled by the fraction of total funding that is attributable to the CPRG program. Project assumptions and descriptions of these calculations used are included in the attachment Techappx_NewJerseyDEP.

2.1 Magnitude of GHG Reductions from 2025 through 2030

The proposed measures are anticipated to avoid 3,212 total cumulative metric tons of CO_2 equivalent emissions through 2030 (Table 2). The majority of these emissions reductions are attributed to the electric school bus and charging stations, which avoid an estimated 2,434 metric tons of CO_2 equivalent emissions. The solar, storage, and microgrid installations are estimated to avoid an additional 788 metric tons of CO_2 equivalent emissions.

Table 2: Greenhouse gas reductions from 2025 through 2030. "(1)" refers to the "School Bus and Charging" measure, and "(2)" refers to the "Solar, Storage, and Microgrid" measure.

School/ School district	(1) School bus and Charging (MT CO_2e)	(2) Solar, Storage, and microgrid (MT CO_2e)	Total (MT CO_2e)
French American Academy of Jersey City	149	28	176
Summit Board of Education	422	222	644
Hanover Park Regional High School District	498	102	600
Hopewell Valley Regional School District	746	156	903
Belmar Elementary School District	223	156	379
Dumont Board of Education	396	115	511
Total	2,434	778	3,212

The project measures are assumed to be implemented according to the timeline presented in Table 7. Under this timeline, the electric school buses begin operating in quarter 3 of 2026 while the solar, storage, and microgrid components are operational in quarter 1 of 2028. To determine emissions reductions of these projects through 2030, the first 2 and 3.5 years of the solar/ storage and school bus lifetimes, respectively, were calculated. Once operational, all project components will remain in service through at least 2030.

2.2 Magnitude of GHG Reductions from 2025 through 2050

The proposed measures are anticipated to avoid 24,903 total cumulative metric tons of CO_2 equivalent emissions through 2050 (Table 3). The electric school bus and charging stations are estimated to avoid 16,340 metric tons of CO_2 equivalent emissions. The solar, storage, and microgrid installations are estimated to avoid an additional 8,562 metric tons of CO_2 equivalent emissions.

Table 3: Greenhouse gas reductions from 2025 through 2050. "(1)" refers to the "School Bus and Charging" measure, and "(2)" refers to the "Solar, Storage, and Microgrid" measure.

School/ School district	(1) School bus and Charging (MT CO_2e)	(2) Solar and Storage (MT CO_2e)	Total (MT CO_2e)

French American Academy of Jersey City	997	307	1,304
Summit Board of Education	2,834	2,437	5,271
Hanover Park Regional High School District	3,345	1,117	4,461
Hopewell Valley Regional School District	5,011	1,718	6,729
Belmar Elementary School District	1,496	1,720	3,216
Dumont Board of Education	2,657	1,264	3,921
Total	16,340	8,563	24,903

The project measures are assumed to be implemented according to the timeline presented in Table 7. Under this timeline, the electric school buses begin operating in quarter 3 of 2026 while the solar, storage, and microgrid components are operational in quarter 1 of 2028. To determine emissions reductions of these projects through 2050, the first 22 years of the solar, storage, and microgrid lifetimes were calculated. The solar panels and microgrid controllers have estimated lifespans of over 30 years and are thus assumed to remain operational through at least 2050. In New Jersey, school buses have a maximum lifespan of 20 years. With these funded school buses going into operation in quarter 3 of 2026, they would reach their maximum lifespan by quarter 2 of 2046, at which point they are assumed to be scrapped. Using the experience they gain with electric school buses through this program, our educational partners will be more confident in the ability of electric school buses to meet their needs. This will allow them to commit to replacing the buses funded under this program with electric buses, rather than returning to fossil fuel powered buses. In this way, the emissions reductions are expected to be durable and continue past 2050.

2.3 Cost Effectiveness of GHG Reductions

This project is estimated to have a cost effectiveness of $8,445 per metric ton of CO_2 equivalent emissions for the 2025-2030 timeframe. For the 2025-2050 timeframe, the project's cost effectiveness is $1,089 per metric ton of CO_2 equivalent. These calculations are scaled by the fraction of total funding that is attributable to the CPRG program. When accounting for the 30% tax credits offered for solar and storage and the $40,000 per electric school bus tax credit, CPRG funding will be used to cover 88.8% of the total cost of this project. The total emissions attributable to CPRG were therefore scaled to 88.8% of the total emissions from the project.

3. Environmental Results – Outputs, Outcomes, and Performance Measures

3.1 Expected Outputs and Outcomes

This project will result in the deployment of approximately six microgrids, 1.4 MW of solar generation capacity, 19.7 MWh of storage capacity, 33 electric school buses, and 33 DCFC Stations at New Jersey schools. This will lead to significant benefits including greenhouse gas emissions reductions, criteria and hazardous air pollutant reductions, benefits to LIDACs and overburdened communities, community resilience, community engagement, workforce benefits, and a replicable model.

As discussed in Section 2, these eco-hubs will result in significant greenhouse gas, criteria, and hazardous air pollutant reductions. In total, this project is estimated to avoid 3,212 cumulative metric tons of CO_2 equivalent emissions through 2030 and 24,903 cumulative metric tons of CO_2 equivalent emissions through 2050. As shown in Table 4, the project will additionally provide reductions in criteria air pollutant emissions as a co-benefit.

Table 4: Summary of total cumulative greenhouse gas and criteria air emissions reduction outcomes of the eco-hubs.

	CO_2e (MT)	**NO_X (MT)**	**SO_2 (MT)**	**$PM_{2.5}$ (MT)**

2025 through 2030	3,212	2	2	1
2025 through 2050	24,903	21	25	12

The project team will prioritize benefits to residents of LIDACs and overburdened communities by prioritizing electric school buses on routes in areas identified as low-income or disadvantaged according to the Climate and Economic Justice Screening Tool (CEJST) or identified as at or above the 90th percentile for EJScreen's supplemental indexes compared to the nation or State. All schools and school districts serving LIDACs who responded to NJDEP's RFEI were reviewed for inclusion in this project. After outreach to these districts was conducted, three schools and school districts serving LIDACs agreed to participate in the program. The remaining three school districts included in this program do not serve federally defined LIDAC communities, however, they meet New Jersey's definition of overburdened communities[3]. The extent to which LIDACs and overburdened communities realize the benefits of this project will be measured on an ongoing basis using the methods outlined in Section 3.2.

The expected short- and long-term outputs and outcomes of this project are described in Table 5.

Table 5: Outputs and Outcomes for greenhouse gas reduction measures. "(1)" refers to the "School Bus and Charging" measure, "(2)" refers to the "Solar, Storage, and Microgrid" measure, and (1) and (2) refer to the entire eco-hub.

-- Short-term (2025-2030) --		
Output/ Outcome #	**Outputs**	**Outcomes**
1	(1) Deployment of 33 electric school buses with bi-directional charging infrastructure.	Reduction of greenhouse gas emissions and criteria and hazardous air pollutants (in LIDACs and overburdened communities) from the displacement of fossil fuel powered buses, as shown in Table 4.
2	(1) & (2) Six eco-hubs deployed.	Increase in schools with complete eco-hubs installed. Improved resilience to grid outages.
3	(2) 1.4 MW of on-site solar electricity generation deployed and 19.7 MWh of stationary battery storage capacity.	Reduction of greenhouse gas emissions and criteria and hazardous air pollutants (in LIDACs and overburdened communities) from reduced use of grid-based fossil fuel-fired electricity, as shown in Table 4. Lower energy costs for educational partners. Lower electric grid demand, allowing other electrification projects to move forward.
4	(1) & (2) Formation of workforce training programs.	Increase in school staff and students with training in this field.
5	(1) & (2) Development of community engagement materials and number of outreach events held.	Improved community and school knowledge of electric school buses, microgrids, and related aspects of these projects.
-- Long-term (2025-2050) --		
Output/ Outcome #	**Outputs**	**Outcomes**

[3] New Jersey defines overburdened communities as block groups with at least 35% low-income households, 40% of the residents identify as minority or as members of a State recognized tribal community, or 40% of households have limited English proficiency. Additional information can be found at https://dep.nj.gov/ej/communities/

6	(1) & (2) Continued emissions reductions from the use of the school buses and eco-hubs.	Reduction of greenhouse gas emissions and criteria and hazardous air pollutants (in LIDACs and overburdened communities), as shown in Table 4.
7	(1) & (2) Replication of measure in additional schools and other medium- and heavy-duty vehicle applications.	Expansion of these eco-hubs to cover more communities. Increased number of communities experiencing the outcomes of the eco-hubs.

3.2 Performance Measures and Plan

The progress of each of the six eco-hubs will be tracked according to the implementation schedule shown in Table 7 and in accordance with the outputs/outcomes shown in Table 5. NJDEP will track overall progress towards the final goal and will manage each technical project contractor's performance and ability to meet milestones. Project performance will be measured in accordance with the strategies outlined here and will be used as the basis for developing semi-annual and final reports.

Table 6: Performance Measures for greenhouse gas reduction measures.

-- Short-term (2025-2030) --	
Output/ Outcome #	**Performance Measures**
1	Once deployed, the performance of each electric school bus will be monitored through onboard telematics devices provided by NJDEP to the school district[4]. The telematics devices will measure key performance metrics including the number of miles driven, the percentage of miles driven in and out of LIDACs, energy use, charging behavior, etc. This data will be used to assess the program's impacts on greenhouse gas emissions and air quality and to understand where the vehicles are used (e.g., how often the bus is operating in a LIDAC or non-LIDAC), how frequently they're charged, and whether there are any operational issues related to the vehicle battery. Information on charging events will be supplied by the charging station software, which will report information on the bi-directional charging events in accordance with the IEEE 2030.5 communication protocol. This includes information on the frequency of bi-directional charging usage, the amount of power dispensed from the bus during bi-directional charging events, battery status, etc. As part of the grant agreement between NJDEP and educational subrecipients, project partners will be required to use one of NJDEP's verified compliant network service providers for charging stations funded through this grant. These providers utilize software that operates smart charging stations and have demonstrated that they are willing and able to report certain detailed, anonymized charging session data to comply with grant requirements. The software typically offers an online portal for charging station owners to manage their equipment – including the ability for remote diagnostics, turning equipment on and off, managing access, and reporting data on usage, among other functions. By incorporating the use of a reliable network service provider, partners can ensure annual uptime requirements for charging stations are met, contributing towards a dependable charging system.
2	NJDEP will track the number of schools that have received electric school buses with bidirectional DC fast charging stations, the progress of solar generation capacity

[4] Telematics devices are provided to the school district at no cost as they are funded under a separate program.

	installations, and the implementation of stationary battery storage systems. This will be used to ensure all six eco-hubs are successfully completed. Under a grid outage scenario, the microgrid's performance will be measured via the controller, which will provide data on the length of the grid outage, the amount of electricity supplied to the building, and the length of time the microgrid was able to support building and vehicle operations. To ensure data on the microgrid functionality is available, the microgrid's performance will be evaluated through annual testing to ensure all components are functioning.
3	Emissions reductions from the solar, storage, and microgrid system will be measured via the megawatts of solar generation capacity installed and the quantity of electricity displaced. For the microgrid, performance will be measured through the system's ability to supply power during grid outage events. The microgrid controller will measure performance under two scenarios: normal operations and grid outages. Under normal operations, the microgrid will be used so that the school and the school bus are less reliant on the grid during high-emissions, peak demand hours and more reliant on the grid during low-emission, low-demand hours. During the daytime, the solar installation is used to charge the stationary and bus batteries. In the evening and nighttime hours, the stationary storage batteries and bus batteries will power the building's electricity demands. This provides both emissions reductions and grid services by shifting electricity demand from on-peak, high-emissions electricity to off-peak, low-emissions electricity.
4	Workforce-related outputs will be measured via progress towards the development of materials to help students learn about career pathways tied to clean transportation and renewable energy. Metrics will include the number of trainings for school staff, the types of programs and materials developed, and the number of school lessons provided.
5	Development of public-facing outreach programs pertaining to this project, including public tours of the eco-hubs for parents and community members. This will be measured via the number of community members engaged and public outreach meetings held.
--Long-Term (2025-2050) --	
Output/ Outcome #	**Performance Measures**
6	Reduction in cumulative metric tons of greenhouse gas emissions from 2025 through 2050, reduction in criteria pollutants such as particulate matter and NOx, of reduction of hazardous air pollutants, reduction in ozone action days in affected communities, reduction in asthma visits to nurses/ER among school children in affected communities.
7	These pilots will serve as a case study to demonstrate the viability and cost effectiveness of creating an eco-hub system, allowing other schools and non-school medium- and heavy-duty vehicle applications to replicate this model. A report will be developed identifying and addressing technological challenges and best practices. The number of additional schools which adopt these technologies will be an indicator of performance.

3.3 Authorities, Implementation Timeline, and Milestones

The project team will be led by NJDEP's Division of Climate Change Mitigation and Monitoring which will administer the CPRG funding, oversee the project team's progress, and ensure compliance with all program requirements. NJDEP has broad authority to implement policies and programs to prevent, control, and prohibit air pollution throughout the State, including air contaminants from motor vehicles pursuant to N.J.S.A. 13:1D-9, 26:2C-1 et seq. Further, NJDEP has existing authority to conduct education programs (N.J.S.A. 13:1D-9) and to implement an Electric School Bus Program (N.J.S.A. 26:2C-8.58).

NJDEP will be supported by other state agencies including the New Jersey Department of Labor and the New Jersey Board of Public Utilities (NJBPU). NJDEP will consult with these agencies, as well as leaders in the workforce development and equity fields on matters related to workforce development, jobs, and utility interactions. Based on these conversations, NJDEP will develop programs to educate students about the benefits of clean energy and transportation, possible career opportunities, and pathways to achieving these careers. These programs will then be administered by NJDEP's educational partners.

In line with State and federal procurement guidelines, NJDEP issued an open and competitive Request for Expressions of Interest (RFEI) to select educational partners for this program. Responses to this RFEI were used to select the educational partners who were best prepared to support these technologies (e.g., buses are stored at a central depot located at a school building, willingness and ability to support these technologies, etc.) and who met the prioritization criteria (e.g., schools serving LIDACs, diversity of school or school district size, etc.). Educational partners will work with NJDEP to understand the user perspective of project components and will implement educational materials for students to get involved in these projects and understand career pathways tied to clean energy technologies. They will additionally work with NJDEP to conduct outreach to the community about the project and its benefits. Each educational partner retains the authority to implement programs at their project site.

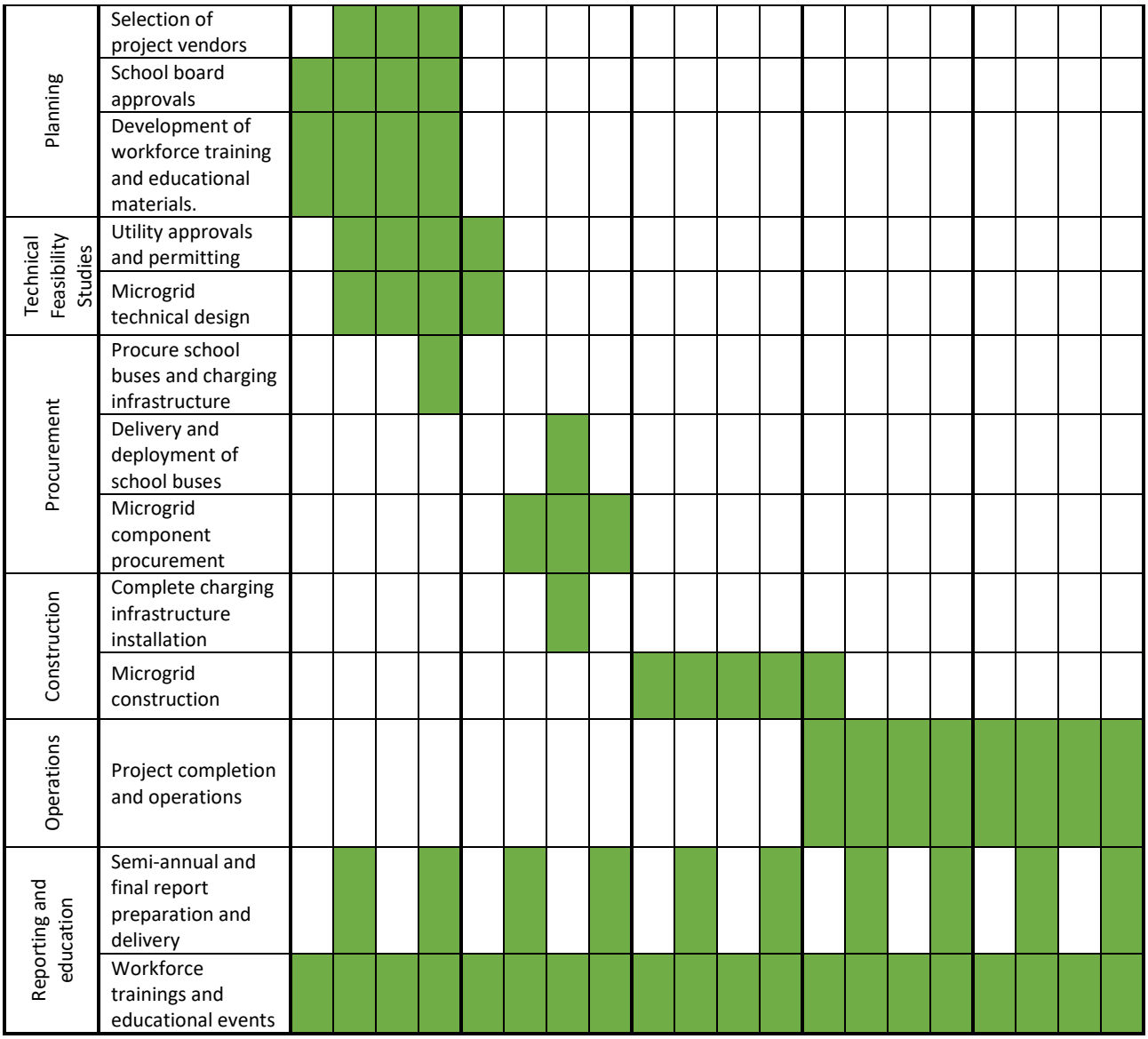
These educational partners will be responsible for awarding contracts to technical support contractors and technology vendors. NJDEP will require that educational partners work with contractors with expertise in transportation electrification and microgrid projects to oversee the project's technological components. In consultation with the project team, the technical support contractor will oversee the design, planning, procurement, and construction phases. They will additionally assist project partners in identifying routes best suited for electrification, identifying appropriate electric buses and charging stations, monitoring equipment performance, sizing solar and storage components of the microgrid, and understanding how project components impact financial and technical operations. The contractor will remain on board for the entirety of the project to manage program progress and assist educational partners in meeting program requirements.

Once specifications have been set by the project team, educational partners will be responsible for procuring the needed technologies. Technology vendors will provide hardware, software, and training to school district staff, including bus drivers, maintenance staff, and other relevant personnel.

As the program manager, NJDEP will work with the schools, school districts, vendors, and municipalities with authority over these facilities to implement all project components. From the time the project is initiated, NJDEP anticipates all eco-hubs will be fully functional within four years. The anticipated project timeline is shown in Table 7, which is based on timelines seen in existing New Jersey microgrid projects as well as conversations with utility companies and other experts in the microgrid field.

Table 7: Estimated timeline of project milestones. Approximate dates are based on an October 2024 anticipated award date and will be adjusted based on the final award date.

Project Phase	Project Milestone	Year 1				Year 2				Year 3				Year 4				Year 5			
		Q4 2024	Q1 2025	Q2 2025	Q3 2025	Q4 2025	Q1 2026	Q2 2026	Q3 2026	Q4 2026	Q1 2027	Q2 2027	Q3 2027	Q4 2027	Q1 2028	Q2 2028	Q3 2028	Q4 2028	Q1 2029	Q2 2029	Q3 2029
	Estimated Award Date																				



The timeline shows six key phases to the development process: planning, technical feasibility studies, procurement, construction, operations, and reporting. In the planning phase, our educational partners will seek formal approvals from their school boards and hire technical support contractors and technology vendors. Selection by the educational partners of a technical support contractor is estimated to occur within 3-6 months of the award date while their selection of the technology vendors will occur within one year of the award date. This phase also includes the development of workforce training and educational materials which will be overseen by NJDEP's operations contractor.

Concurrent to the planning phase, the technical support contractors will conduct a microgrid technical feasibility and design study for their pilot site. These studies will provide detailed technical designs, a cost-benefit analysis, and solidify each site's electric demand requirements. This will be used to determine the optimal microgrid configuration, ownership structure, and technology requirements. During this time, the school districts will also contact their utility provider and municipalities to gain necessary project approvals. These studies are anticipated to take approximately one year to complete.

In the procurement and construction phases, technology vendors will deliver and install electric school buses, bi-directional charging infrastructure, on-site renewable energy generation, and microgrid components. As the project components are delivered, suppliers will train school district personnel, including drivers, facility managers, and maintenance personnel on using the new technologies. Depending upon the electric grid feeder capacity at the school site, electric grid upgrades may be needed and carried out during this phase. On-site project components will be integrated with the electric grid during this stage, which is anticipated to take up to two years to complete at all pilot sites.

In the operations phase, the buses will be fully operational and integrated with the microgrid system, receiving and delivering power via the bi-directional charging system. Ongoing maintenance and repairs for these systems will be managed by the educational partners in conjunction with the technology vendors. NJDEP will continue to meet with all project partners throughout the five-year performance period and will collect and analyze data on operational feasibility, emissions reductions, and best practices for other schools looking to replicate this model.

The reporting and education phase will occur throughout the five-year project period. Workforce training and educational events will be held across the six pilots on an ongoing basis. The cadence of these events will be developed in conjunction with the school districts. In January and July of each year following project award, and continuing for five years, NJDEP will meet with all project partners to review technical progress, accomplishments, milestones achieved, any updates to timelines, the cost to operate and maintain these systems, and any reliability issues related to the operation, delivery, and/or procurement of project components. Information reviewed during these meetings will be used to develop semi-annual reports to the EPA and, at the end of the project period, will culminate in a final report. These reports will additionally review the outputs, outcomes, and planned activities for the next six months, and a summary of expenditures to date. This includes a summary of the community engagement activities carried out under the program, any strategies being used to mitigate environmental risk, progress on the workforce development and job quality components of the program, and the quantified benefits to low-income and disadvantaged communities.

4. Low-Income and Disadvantaged Communities

4.1 Community Benefits

All schools and school districts serving LIDACs who responded to NJDEP's RFEI were initially evaluated for inclusion in this project. After outreach to these districts was conducted, three schools and school districts serving LIDACs agreed to participate in the program. The remaining three school districts included in this program do not serve federally defined LIDAC communities, however, they meet New Jersey's definition of overburdened communities[5].

Using the CEJST, NJDEP identified 85 low-income and disadvantaged community census tracts in 15 municipalities which would benefit from this project. Using communities identified as at or above the 90th percentile for EPA's EJScreen supplemental indexes compared to the nation or State, 265 LIDAC census block groups in 25 municipalities were identified as benefiting from this project. These communities are listed in the attachment *Areas_NewJerseyDEP*. Additionally, 37 municipalities meeting New Jersey's definition of overburdened communities will benefit from this project.

This project will improve resilience of LIDACs to climate change, improve public health (including physical and mental health), mitigate the need for new fossil fuel power plants, and invest in education

[5] New Jersey defines overburdened communities as block groups with at least 35% low-income households, 40% of the residents identify as minority or as members of a State recognized tribal community, or 40% of households have limited English proficiency. Additional information can be found at https://dep.nj.gov/ej/communities/

and workforce training. Low-income and disadvantaged communities are often disproportionately impacted by environmental stressors (e.g., flood events, temperature extremes, pollution) because they are in areas which are more vulnerable to environmental stressors and have been subject to historic inequities that hinder their ability to adapt to these stressors. By developing an integrated electric school bus and microgrid system, LIDACs will benefit from access to critical transportation and warming services during natural disasters and other grid outage scenarios, and children, one of our most vulnerable populations, will benefit from emissions free transportation.

Of the measures identified in New Jersey's PCAP, electrifying medium- and heavy-duty vehicles, including school buses, was identified as having the greatest benefit to LIDACs (NJDEP, 2024b). This measure improves local air quality and provides many physical and mental health benefits to these communities. Nearly 95% of school buses in the U.S. run on diesel (Budzynski et al., n.d.). Diesel exhaust has been shown to adversely affect students' academic performance and school attendance (Chacon et al., 2024). Exhaust produced by these vehicles has been directly linked to asthma, cancer, premature death, and other respiratory illnesses for students, drivers, and the communities in which the buses travel (California EPA & The American Lung Association, n.d.; The Lancet, 2020). In New Jersey, the transition to zero-emission vehicles is expected to result in $43.6 billion in health benefits and avoid 3,960 premature deaths, 92,400 asthma attacks, and 464,000 lost days of work (American Lung Association, 2022). Low-income communities and communities of color have faced higher levels of exposure to harmful air emissions from transportation. In particular, studies have found that children with disabilities and those from low-income households are more likely to take the bus to school, disproportionately exposing them to diesel exhaust (Bureau of Transportation Statistics, 2021; Wheeler et al., 2009). This effect is even more pronounced for students in wheelchairs as wheelchair lifts are typically located near the tailpipe. NJDEP will address these impacts by transitioning from fossil fuel to electric school buses, eliminating exposure to tailpipe emissions and reducing exposure to traffic noise.

Funding will be allocated to ensure the maximum possible benefits of transportation electrification reach these communities, who are typically overlooked by private investments. NJDEP will ensure that at least 40 percent of overall project benefits flow to the three schools and school districts who serve residents of LIDACs. In addition to these minimum requirements, NJDEP will ensure maximum benefits are achieved in overburdened communities served by the three school districts included in this program which do not serve federally defined LIDAC communities, but which meet New Jersey's definition of overburdened communities. We expect to exceed the 40 percent Justice40 target by including LIDACs as a core criterion for bus route selection. Educational partners will prioritize operation of the electric buses on routes serving LIDACs, as defined in the attachment *Areas_NewJerseyDEP*. Once these school buses are deployed, NJDEP will continue to assess, quantify, and report the benefits and avoided disbenefits to these communities using the data collection methods described in Section 3.2.

While developing New Jersey's PCAP, NJDEP's Environmental Justice Advisory Committee was periodically consulted, and in December 2023, NJDEP held an in-person community dialogue with key environmental justice community members to hear their climate action priorities. Meeting attendees identified transportation electrification as a priority but raised concerns about potential new fossil fuel fired power plants that could be constructed due to the resulting increased electricity demand. This grant proposal is directly responsive to this input and addresses these concerns by creating a holistic approach to transportation electrification which accounts for the upstream impacts of vehicle charging.

During the public engagement process, stakeholders indicated that job creation and training should be a priority for any grants received and that local jobs should be available to the local community. To support this goal, NJDEP will develop programs to support educational opportunities for students which focus on career pathways in the clean energy and transportation fields. Over the past year, NJDEP has

increasingly engaged with leaders in the workforce development space including the International Brotherhood of Electrical Workers (IBEW), Vocational-Technical Schools, Community Colleges, the New Jersey Department of Labor, the U.S. Department of Labor, and workforce-oriented community-based organizations. These conversations repeatedly identified the need to begin engaging students at the middle- and high-school levels to prepare them for entering the clean energy and transportation workforce. This helps prepare students to enter apprenticeship and pre-apprenticeship programs and promotes equity in green jobs. In response to these conversations, NJDEP will work with these groups to develop programs to educate students about the benefits of these technologies, the array of possible career opportunities, and pathways to achieving these careers. These programs will provide a foundation for students interested in pursuing careers in clean energy and transportation fields. NJDEP will also share this knowledge with the community at Parent-Teacher Association meetings, school board meetings, and via educational webinars.

New Jersey's Council on the Green Economy was established in 2021 and developed a report defining pathways for green job creation and development of workforce capacity, including in the transportation sector. This report found electricians to be one of the fastest growing sectors for green jobs in the State with an estimated 16% growth in demand between 2022 and 2031 (Steger, 2022). This project will be developed in line with the Council's recommended approaches for developing high-quality jobs, supporting registered apprenticeship programs, and supporting small and disadvantaged business enterprises. This includes engaging with representatives from communities, labor organizations, chambers of commerce, community colleges, technical schools, universities, training organizations, and industry to develop additional measures to expand support for workforce development programs.

4.2 Community Engagement

This grant will address New Jersey specific transportation electrification needs by reducing the impact of electric vehicle charging on the electric grid and prioritizing pilots in LIDACs. New Jersey has undertaken extensive community engagement to inform its approach to transportation electrification and statewide build-out of electric vehicle charging infrastructure. In 2019, New Jersey released an Energy Master Plan, which was developed with substantial stakeholder input, and which calls on NJDEP to work with schools and school districts to acquire electric school buses and to pilot bi-directional charging infrastructure to understand the impacts of this technology on school district emissions and costs (NJBPU, 2019; State of New Jersey, n.d.). In 2019 and again in 2023, New Jersey released Regional Greenhouse Gas Initiative (RGGI) Strategic Funding Plans which were also developed with stakeholder input. For the 2023 Plan, stakeholder feedback showed extensive support for MHD electrification: "fund projects that improve and expand electric buses to reach more New Jersey communities," and "deliver grants to schools so they can electrify their school bus fleets, which could provide back-up power to the school when needed."

From 2018-2023, State agencies conducted in-person meetings, webinars, surveys, public hearings, RFEIs, and opportunities for written comment around the initiatives below, all of which addressed transportation electrification and charging. These opportunities allowed stakeholders and members of the public to share their priorities, which in turn helped influence the State's priorities.

- Advanced Clean Cars II (2023)
- National Electric Vehicle Infrastructure Deployment Plan (2022)
- Overburdened Communities Electric Vehicle Affordability Program Study (2022)
- RGGI Strategic Funding Plan 2020-2022 (2019) and 2023-2025 (2023)
- Minimum Filing Requirements for Light Duty Electric Vehicle Charging Infrastructure (2021)
- Advanced Clean Trucks Program and Fleet Reporting Requirements (2021)

- Energy Master Plan (2019)
- Volkswagen Settlement Beneficiary Mitigation Plan (2018)Clean Air Council Public Hearing: Zero Emission Vehicles - Clearing the Air (2018)

NJDEP used this previous community feedback as a foundation for developing the CPRG PCAP which was submitted to USEPA on March 1, 2024. One public webinar was held to introduce the CPRG planning grant, and five sector-specific webinars were held to gather input on each of NJ's priority sectors for the PCAP. These webinars were open to the public, were offered in both English and Spanish, and included a diverse range of stakeholders from the environmental, local government, industry, utility, environmental justice, workforce and labor, transportation, and business sectors. NJDEP additionally collected feedback via the State's CPRG website[6], hosted two local government meetings, and held an in-person community dialogue with environmental justice stakeholders to gain their input on projects which most reflect the needs of low-income and disadvantaged communities. These engagement efforts solidified school bus electrification and grid-supportive strategies as key priorities for the State.

Throughout the implementation of this grant, we will coordinate and communicate with underserved, overburdened, and low-income and disadvantaged communities as defined by the CEJST. NJDEP has regular meetings with representatives from low-income and disadvantaged communities through forums such as the New Jersey Environmental Justice Advisory Council. Additionally, NJDEP will work with each educational partner to conduct outreach and engagement about the project with students, parents, and community members to ensure they understand the impacts of these eco-hubs and gather feedback. Through continuing outreach to community leaders and environmental justice advocates, these eco-hubs will create a synergistic relationship with the communities they serve. Workforce development will also be a critical role for NJDEP who will work to coordinate with local and county unions, technical schools, and other relevant parties to create education and outreach programs, using the buses funded by this grant as the centerpiece of those programs.

5. Job Quality

An analysis was performed to understand the workforce and labor market implications of the measures included in New Jersey's PCAP. This analysis found that overburdened communities tend to have lower access to job-related educational resources and have historically had inadequate investment in high-quality career education. This project seeks to address these issues by paving the way for jobs in electric vehicle maintenance, charging station installation and repair, and renewable electricity.

New Jersey is committed to creating a system where all residents have the skills, abilities, and connections that lead to meaningful careers and to building a skilled workforce that drives economic growth, including in the electric vehicle industry. Electric vehicles and their charging infrastructure offer a tremendous opportunity to develop an emerging technologies pipeline in New Jersey's trade and technology schools, universities, workforce, and communities. NJDEP and its subrecipients will work to provide equitable economic opportunities by expanding access to job training for the safe installation, testing, and maintenance of charging equipment. This will be done by incorporating provisions for workforce development and job quality into vendor contracts. In line with the National Electric Vehicle Infrastructure Program's standards and requirements, this includes employing installers certified through workforce development programs such as the Electric Vehicle Infrastructure Training Program (EVITP) or who have graduated or received a continuing education certificate from a registered apprenticeship program, such as those offered through Rutgers University, the International Brotherhood of Electrical Workers, or the Atlantic County Workforce Development Board. Registered

[6] https://dep.nj.gov/climatechange/mitigation/cprg/

apprenticeship programs are industry-led and aligned with employer needs, providing structured learning and mentorship opportunities which lead to high-quality jobs with progressive wages. NJDEP will additionally work to support and build upon electric vehicle technician training programs such as Brookdale Community College's Automotive Technology program and the partnership between Mercedes-Benz USA and the US Department of Labor's Job Corps program.

Although workforce development is typically focused on training for adults, working to educate the youth is also an important component. NJDEP will focus on education and information transfer from the schools to the students. Some educational partners have expressed interest in additional curriculum pertaining to clean energy and sustainable transportation. NJDEP will work to support these existing programs while developing programs that engage students at all participating schools. Providing hands-on education for the new renewable electricity and electric transportation will help get students excited about these technologies and potential careers in this field. Additionally, transporting students on electric school buses every day will be vital in spurring interest in these technologies.

Contractors for this project will be required to meet strong labor standards and certify their commitment to meeting the U.S. Department of Labor's Good Jobs Principles[7]. This includes meeting prevailing wage requirements, supporting the use of Registered Apprenticeship labor, and utilizing Project Labor Agreements or Community Workforce Agreements where applicable. NJDEP will employ installers certified through the Electric Vehicle Infrastructure Training Program (EVITP) or those who have graduated or received a continuing education certificate from a registered apprenticeship program. Through this standard, we can ensure that on-site installation, maintenance, and operations are performed by a well-qualified, highly skilled, and certified, licensed, trained, and well-compensated workforce, promoting a safe and reliable microgrid and bus charging system.

In January 2024, New Jersey released a report detailing the results of a statewide study to understand potential disparities in opportunities presented to small-, minority-, women-, and veteran-owned businesses who contract with the State (Mason Tillman Associates, 2024). The results of this study will be used to inform additional pathways for equitable hiring and contract selection processes. This will identify and open new opportunities for these businesses to contract with the State, granting us the opportunity to create a more equitable environment for our local workforce.

6. Programmatic Capability and Past Performance

6.1 Past Performance

1) Diesel Emissions Reduction Act (DERA) State Program-Non- Road equipment modernization
    a) Assistance agreement number: DS96230121
    b) Federal funding agency and assistance listing number: USEPA- CFDA-66.040
    c) Description: $915,684 in DERA assistance agreements which provides funding for non-road replacements to Tier 4 or electric.
    d) Funding Agency Contact: Michael Gordon – Gordon.Michael@epa.gov
    e) Description of successful management: NJDEP has a dedicated program manager that oversees all DERA funding. The program manager is responsible for working with

[7] These principles include ensuring recruitment and hiring are free from discrimination, workers are given family-sustaining benefits, all workers have equal opportunities and are empowered, workers can form or access unions, workplaces are safe and healthy, all workers are values and respected, workers are paid stable and predictable wages, and workers have tools to progress to future good jobs. Details of these principles can be found at https://www.dol.gov/general/good-jobs/principles.

grantees to ensure projects remain on schedule and to submit quarterly reports accurately and on time. Bi-weekly meetings are held to discuss project progress.

2) Diesel Emissions Reduction Act (DERA) State Program - Marine Vessel Emission Reduction & Electric Transport Refrigeration Unit (eTRUs) Projects
    a) Assistance agreement number: DS96253401
    b) Federal funding agency and assistance listing number: USEPA- CFDA-66.040
    c) Description: $683,218 in DERA assistance agreements which provide funding for marine repowers and on-road electrification of transport refrigeration units.
    d) Funding Agency Contact: Michael Gordon –Gordon.Michael@epa.gov
    e) Description of successful management: NJDEP has a dedicated program manager that oversees all DERA funding. The program manager is responsible for working with grantees to ensure projects remain on schedule and to submit quarterly reports accurately and on time. Bi-weekly meetings are held to discuss project progress.
3) Diesel Emissions Reduction Act (DERA) State Program-Non- Road replacements and Marine Vessel Repowers
    a) Assistance agreement number: DS96267717
    b) Federal funding agency and assistance listing number: USEPA- CFDA-66.040
    c) Description: $536,130 in DERA assistance agreements provided funding for non-road modernization and marine repowers.
    d) Funding agency contact: Michael Gordon – Gordon.Michael@epa.gov
    e) Description of successful management: NJDEP has a dedicated program manager that oversees all DERA funding. The project manager worked with grantees to ensure project timelines were met and quarterly reports were submitted on time. NJDEP is currently in the process of closing out this assistance agreement and submitting the final report.
4) Volkswagen Mitigation Trust
    a) Assistance agreement number: N/A
    b) Federal or non-federal funding agency and assistance listing number – N/A
    c) Description: In accordance with the Consent Decree, NJDEP used $75 million in VW funds for the purchases of electric vehicle charging stations, medium and heavy-duty electric trucks, electric ground support equipment, electric cargo handling equipment, electric school and transit buses and marine vessels.
    d) Funding agency contact: Michael Bochanski, Jr – mbochanski@wilmingtontrust.com
    e) Description of successful management: NJDEP has encumbered the majority of VW funding through two project solicitations. A dedicated VW project manager is assigned to manage and track existing projects. NJDEP is working on the final funding request to encumber the remaining $3 million dollars. Bi-weekly meetings are held to discuss project progress.
5) Regional Greenhouse Gas Initiative Investments - Catalyze Clean, Equitable Transportation Outcomes
    a) Assistance agreement number: N/A
    b) Federal or non-federal funding agency and assistance listing number: N/A
    c) Description: In accordance with the RGGI Strategic Funding Plan, NJDEP has administered $138 million in funding to transition medium and heavy-duty vehicles and non-road equipment to electric, prioritizing projects located in low-income and disadvantaged communities.
    d) Funding agency contact: Helaine Barr – Helaine.Barr@dep.nj.gov

e) Description of successful management: NJDEP receives funding on a quarterly basis and continues to allocate funds for medium-heavy duty vehicle electrification. A team of project managers work on funding for this program. Bi-weekly meetings are held to discuss project progress.

6.2 Reporting Requirements

1) Diesel Emissions Reduction Act (DERA) State Program - Non- Road equipment modernization. NJDEP adequately submits quarterly and/or final reports to EPA Region 2 DERA project officer.
2) Diesel Emissions Reduction Act (DERA) State Program - Marine Vessel Emission Reduction and Electric Transport Refrigeration Units (eTRUs) Projects. NJDEP adequately submits quarterly and/or final reports to EPA Region 2 DERA project officer.
3) Diesel Emissions Reduction Act (DERA) State Program-Non- Road replacements and Marine Vessel Repowers. NJDEP adequately submitted quarterly reports and is currently preparing the final report to EPA Region 2 DERA project officer.
4) Volkswagen Mitigation Trust. NJDEP submits semi-annual reports every January 1 and July 1 of every year.
5) Regional Greenhouse Gas Initiative Investments. NJDEP submits annual reports to RGGI Inc.

6.3 Staff Expertise

NJDEP has decades of experience administering transportation projects and programs with federal and state funds. The Division is well positioned to ensure projects are successfully launched, meet key scheduled milestones, and obligate and expend awards on time. NJDEP received $35.5 million in federal funds from the Federal Highway Administration, U.S. Department of Transportation, and the U.S. EPA. Previous projects have involved the purchase, installation, and operation of electric vehicle charging stations, as well as projects that reduce emissions from non-road and on-road vehicles. NJDEP is experienced in incorporating federal funding requirements into grant agreements while following accounting, recordkeeping, and reporting procedures that ensure our staff and grantees meet all federal requirements. Additionally, NJDEP has coordinated complex projects across multiple state agencies, successfully administering $246 million in State and settlement funds to install charging stations; modernize existing fleet equipment/vehicles, electrify medium- and heavy-duty vehicles, electrify marine port and airport equipment, and repower marine vessels. Governor Murphy designated NJDEP as the lead agency to administer New Jersey's $75.4 million allocation from the Volkswagen Settlement. Additionally, the NJDEP continues to use strategies introduced under the Volkswagen Mitigation Trust, particularly the replacement of diesel-fueled medium- and heavy-duty vehicles and non-road equipment with electric-powered vehicles and equipment in low-income and disadvantaged communities. In addition, understanding that the mobility needs of environmental justice communities differ from those of residents in other communities, NJDEP continues to work to bring clean transportation options to residents of low-income and disadvantaged communities with successful electric ride sharing and ride hailing projects.

The resumes for key staff members from NJDEP are included in the attachment Hanna_Evanego_bio_NewJerseyDEP.

7. Budget

7.1 Budget Detail

As shown in Table 8 below, the majority of project funds will be sub-granted to the six educational partners, who will be responsible for hiring technical project contractors and procuring all equipment components. 6.7 percent of the overall budget is reserved for NJDEP's project oversight and project operations contractors to oversee progress across all six pilots, conduct community outreach events in

coordination with the educational partners, and manage the development of a climate, clean energy, and transportation workforce development educational programs. A detailed description of the budget is provided in the attachment Budget_NewJerseyDEP.

Table 8: Budget overview table with cost per project category

Budget category		Total cost	Cost Percentage	Total project cost
i.	Personnel			$27,127,666
ii.	Fringe Benefits			
iii.	Travel			
iv.	Equipment			
v.	Supplies			
vi.	Contractual	$1,823,835	6.7%	
vii	Other	$25,303,831	93.3%	
vii	Indirect Charges			

7.2 Expenditure of Awarded Funds

NJDEP will expend and account for awarded funds in accordance with state laws and procedures for the state's own funds. The financial management system for NJDEP complies with the requirements of 2 CFR 200.302(b). NJDEP will assign an experienced project manager to ensure the grant funds are expended in a timely and efficient manner within the five-year grant period. All project requirements will be written into the subaward agreements with each educational partner. These agreements will include all applicable pass-through requirements for subrecipients in accordance with 2 CFR 200, EPA's Subaward Policy and EPA's General Term and Condition for Subawards.

7.3 Reasonableness of Costs

To ensure all requested project costs are reasonable, NJDEP used costs from recently funded projects. For electric school buses and charging infrastructure, the costs for competitively bid projects in New Jersey from 2022 were used. These prices were checked against the US EPA's *Flipping the Switch on Electric School Buses: Cost Factors* report to ensure they were within the EPA's reasonable estimates. The cost of the project's microgrid components (solar panels, battery storage, and microgrid controller) were estimated using the National Renewable Energy Laboratory's REopt tool, which rigorously analyzes all costs associated with solar and storage installations.

While the cost assumptions used here are based on the best available data at the time of this analysis, actual expenditures within each category may change as technical details are finalized and quotes are obtained. A detailed description of these cost estimates is provided in the attachment Budget_NewJerseyDEP.

8. References

American Lung Association. (2022). *Zeroing in on Healthy Air*. https://www.lung.org/getmedia/13248145-06f0-4e35-b79b-6dfacfd29a71/zeroing-in-on-healthy-air-report-2022.pdf

Argonne National Lab. (2023). *AFLEET Online*. https://afleet.es.anl.gov/afleet/

Bauer, G., Hsu, C.-W., Nicholas, M., & Lutsey, M. (2021). *Charging up America: Assessing the growing need for U.S. charging infrastructure through 2030*. International Council on Clean Transportation. https://theicct.org/publication/charging-up-america-assessing-the-growing-need-for-u-s-charging-infrastructure-through-2030/

Budzynski, C., Fried, I., & Walsh, L. (n.d.). *The Electric School Bus Transition*. https://calstart.org/wp-content/uploads/2023/12/The-ESB-Transition-December-final.pdf

Bureau of Transportation Statistics. (2021, January 12). *The Longer Route To School*. https://www.bts.gov/topics/passenger-travel/back-school-2019

California EPA, & The American Lung Association. (n.d.). *Health Effects of Diesel Exhaust*.

Chacon, C., Gander, S., Hayman, B., Kwak, A., Mudd, S., & Roboff, K. (2024). *A State Playbook for Equitable Electric School Bus Policy*.

Duran, A., & Walkowicz, K. (2013). A Statistical Characterization of School Bus Drive Cycles Collected via Onboard Logging Systems. *SAE International Journal of Commercial Vehicles*, *6*(2), 400–406. https://doi.org/10.4271/2013-01-2400

EPRI. (2024). *EPRI eRoadMap*. https://eroadmap.epri.com/

Horrox, J., Nick, S., & Casale, M. (2022). *Electric School Buses and the Grid: Unlocking the power of school transportation to build resilience and a clean energy future*. https://publicinterestnetwork.org/wp-content/uploads/2022/04/FG-Electric-school-buses-and-the-grid.pdf

Mason Tillman Associates. (2024, January). *New Jersey Study on Disparity in State Procurement*. https://www.nj.gov/treasury/pdf/New%20Jersey%20Study%20on%20Disparity%20in%20State%20Procurement%20January%202024.pdf

NJBPU. (2019). *2019 New Jersey Energy Master Plan Pathway to 2050*. https://nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf

NJDEP. (2020). *New Jersey's Global Warming Response Act 80X50 Report*. https://www.nj.gov/dep/climatechange/docs/nj-gwra-80x50-report-2020.pdf

NJDEP. (2023). *Drive Green NJ*. Drive Green NJ. https://dep.nj.gov/drivegreen/

NJDEP. (2024a). *Electric School Bus Program*. Stop the Soot. https://dep.nj.gov/stopthesoot/electric-school-bus-program/

NJDEP. (2024b). *New Jersey's Priority Climate Action Plan*. https://dep.nj.gov/wp-content/uploads/climatechange/nj_pcap_final-1.pdf

Ragon, P.-L., Kelly, S., Egerstrom, N., Brito, J., Sharpe, B., Allcock, C., Minjares, R., & Rodriguez, F. (2023). *Near-term infrastructure deployment to support zero-emission medium- and heavy-duty vehicles in the United States*. International Council on Clean Transportation. https://theicct.org/publication/infrastructure-deployment-mhdv-may23/

State of New Jersey. (n.d.). *RGGI Strategic Funding Plan Years 2023-2025*. https://nj.gov/rggi/docs/rggi-strategic-funding-plan.pdf

Steger, C. (2022). *Green Jobs for a Sustainable Future*. https://nj.gov/governor/climateaction/documents/CGE%20Roadmap.pdf

The Lancet. (2020, October). *Ambient particulate matter pollution*. https://www.thelancet.com/pb-assets/Lancet/gbd/summaries/risks/ambient-particulate-matter-pollution.pdf

US EPA. (2017). *2017 National Emissions Inventory Report*. https://gispub.epa.gov/neireport/2017/

Wheeler, K., Yang, Y., & Xiang, H. (2009). Transportation use patterns of U.S. children and teenagers with disabilities. *Disability and Health Journal*, *2*(3), 158–164. https://doi.org/10.1016/j.dhjo.2009.03.003

Wood, E., Borlaug, B., Moniot, M., Lee, D.-Y., Ge, Y., Yang, F., & Liu, Z. (2023). *The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure*.