Zero Emission Fleet Transition Plan

Atomic City Transit

Final Report

April 2025

Stantec

Atomic City Transit Zero Emission Fleet Transition Plan

Final Report

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Prepared for:

Atomic City Transit

Prepared by:

Stantec Consulting Services Inc.

ATOMIC CITY TRANSIT ZERO EMISSION FLEET TRANSITION PLAN

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Project Team

Stantec Consulting Services Inc.
801 South Figueroa Street Suite 300
Los Angeles CA 90017-3007

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1.0 INTRODUCTION

Atomic City Transit (ACT) developed this Zero-Emission Fleet Transition Plan (plan) to meet the requirements of 49 U.S.C. 5339(c)(3)(D) for applications to the FY2025 or FY2026 Low or No Emission Grant Program (Low-No) that's administered by the Federal Transit Administration (FTA). This plan was developed specifically for this application and includes reference to the project(s) requesting Low-No funding.

The plan is divided into six sections, addressing each of the following elements outlined by the FTA:

1. **Fleet Assessment**: Demonstrate a long-term fleet management plan with a strategy for how the applicant intends to use the current request for resources and future acquisitions.
2. **Funding Needs Assessment**: Address the availability of current and future resources to meet costs for the transition and implementation.
3. **Policy Assessment**: Consider policy and legislation impacting relevant technologies.
4. **Facilities Assessment**: Include an evaluation of existing and future facilities and their relationship to the technology transition.
5. **Partnership Assessment**: Describe the partnership of the applicant with the utility or alternative fuel provider.
6. **Workforce Analysis**: Examine the impact of the transition on the applicant's current workforce by identifying skill gaps, training needs, and retraining needs of the existing workers of the applicant to operate and maintain zero emission vehicles and related infrastructure and avoid the displacement of the existing workforce.

ACT is requesting funding for projects in accordance with the zero-emission fleet transition plan presented in this application. The priority projects are summarized in Table 1-1, with a total funding request of approximately $6.4 million to support these initiatives.

Table 1-1: Summary of proposed projects for Low-No Application

Item	Details	Estimated Cost
Vehicles	• Three 40-ft. battery electric buses (BEBs) • Two battery electric (BE) cutaways	$3,936,000
Infrastructure	• Infrastructure planning • Two 450 kW DC chargers • Two pantographs • Four 150 kW chargers • Eight dispensers • Two 12 kW chargers with dispensers	$2,106,000[1]
Training	• Operator training • Maintenance staff training provided by Original Equipment Manufacturer (OEM) • Use of charging equipment training • Procurement of training equipment • Personal protective equipment (PPE) and tools	$292,840
	Total Estimated Cost	**$6,334,840**

[1] Total infrastructure cost is anticipated at $5.5 billion but the first phase of implementation was estimated at $2,106,000.

2.0 ELEMENT 1: FLEET ASSESSMENT

2.1 FLEET ASSESSMENT OVERVIEW

This Fleet Assessment Section outlines a proposed schedule for replacing current fixed route and demand response vehicles with ZEVs, ensuring alignment with ACT's existing fleet management strategy. This evaluation also includes a forecast of vehicle capital expenses throughout the transition period.

Before the fleet replacement schedule was developed, vehicle performance modeling was conducted for ACT's current fixed route and demand response services to determine the most appropriate ZEV technology for the transition. The modeling used real operations data to simulate how a ZEV fleet would perform while completing current service.

The modeling results show that hydrogen fuel cell electric vehicles could successfully replace considerably more of ACT's service compared to battery electric vehicles.[2] However, there are several reasons why hydrogen fuel cell electric vehicles are not currently a feasible option for ACT:

- Limited hydrogen fuel supply in the region
- Lack of hydrogen fuel cell electric vehicle equivalents
- High capital cost for hydrogen fueling infrastructure
- Updates to maintenance facility to support maintenance of vehicles with high pressure gas systems

Therefore, ACT will start the ZEV fleet transition with battery electric vehicles and the report assumes a full transition to a 100% battery electric vehicle fleet. To successfully operate battery electric vehicles ACT will have to rely on several operational modifications such as increasing the fixed-route fleet by one vehicle and investing in installation and use of on-route charging (i.e., pantographs as seen in Figure 2-1) and mid-day charging. A vehicle fleet size increase of one is recommended to support high ridership on routes 2M and 2T. Prior assessments have identified the Transit Center and the White Rock Library or Visitor Center as ideal locations for the first three on-route chargers to be installed (two at the Transit Center and one at White Rock Library or Visitor Center).

[2] The modeling showed 79% of fixed route service could be completed with hydrogen fuel cell electric vehicles, while 29% of service could be completed with battery electric vehicles (BEV). However, if implementing on-route charging and increasing the fleet by one, the ACT fleet could accomplish 100% service success with BEV. For demand response service, 95% of service could be completed with hydrogen fuel cell electric vehicles, while 77% of service could be completed with battery electric vehicles.

Figure 2-1: On-Route Pantograph Charger by ABB

As hydrogen fueling infrastructure develops in the region and hydrogen fuel cell electric vehicle technology advances, ACT will reassess the integration of hydrogen fuel cell vehicles into their fleet and update the plan as needed. More information about the vehicle performance modeling is provided in Appendix A: Vehicle Performance Modeling.

The next step includes developing a schedule for replacing ACT's current fixed route and demand response fleets with battery electric vehicles.

2.1.1 Fixed Route

ACT operates 12 fixed routes across Los Alamos and White Rock as well as a seasonal service to Bandelier National Monument. The fixed route fleet consists of 22 vehicles, including school buses, 40-ft. buses, 35-ft. buses, 30-ft. buses, and cutaways. These are a mix of diesel and gasoline vehicles and were introduced between 2001 and 2023, with an average vehicle age of 11 years. Additionally, ACT is in

the process of procuring two 35-ft. battery electric buses (BEBs). One of these BEBs will replace a gasoline cutaway, and one will be an expansion vehicle.

For the Low-No application, and in line with ACT's goals and current fleet replacement plan, ACT developed the following transition schedule for its fixed route fleet. Table 2-1 shows the anticipated annual vehicle purchases, and

Table 2-2 shows the schedule for vehicles entering service, reflecting the procurement and delivery lead time.

Table 2-1: Fixed Route Annual Vehicle Purchase Schedule

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Fleet size	22	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Total vehicles purchased	3	1	3	2	2	2	1	0	0	0	2	1	0	2	2	1	5	3	4	0	0
FF vehicles purchased	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ZEVs purchased	3	0	2	2	2	2	1	0	0	0	2	1	0	2	2	1	5	3	4	0	0
Purchases % ZEV	100%	0%	67%	100%	100%	100%	100%	NA	NA	NA	100%	100%	NA	100%	100%	100%	100%	100%	100%	NA	NA

Table 2-2: Fixed Route Annual Vehicles Entering Service

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Total vehicles entering service	1	1	5	1	2	2	2	2	1	0	0	0	2	1	0	3	2	1	5	3	4
Retirements	-1	0	-5	-1	-2	-2	-2	-2	-1	0	0	0	-2	-1	0	-3	-2	-1	-5	-3	-4
FF vehicles entering service	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ZEVs entering service	0	1	4	0	2	2	2	2	1	0	0	0	2	1	0	3	2	1	5	3	4
Vehicles entering service % ZEV	0%	100%	80%	0%	100%	100%	100%	100%	100%	NA	NA	NA	100%	100%	NA	100%	100%	100%	100%	100%	100%

In this schedule, vehicles are replaced with battery electric vehicles based on the following criteria:

- The vehicle has reached the end of its useful life
- Charging infrastructure has been installed
- Operators and maintenance technicians have completed applicable training

The schedule assumes that the fixed route fleet will expand by one vehicle throughout the zero-emission fleet transition timeline. In addition, a one-year lead time from vehicle purchase to entering service was assumed for fossil fuel vehicles, while a two-year lead time was assumed for ZEVs. ACT aims to replace its entire fossil fuel fleet with zero-emission vehicles by 2045.

2.1.2 Demand Response

ACT operates six vehicles for demand response and paratransit service. These are comprised of gasoline cutaways and minivans, with an average age of 11 years. For a Low-No application, and in line with ACT's goals and current fleet management plan, ACT has developed the following demand response fleet transition schedule. Table 2-3 shows the anticipated annual vehicle purchases and

Table 2-4 shows the schedule for vehicles entering service.

Table 2-3: Demand Response Annual Vehicle Purchase Schedule

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Fleet size	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Total vehicles purchased	2	1	0	1	0	2	0	0	1	0	1	2	2	0	0	0	0	0	0	1	0
FF vehicles purchased	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ZEVs purchased	2	0	0	0	0	0	0	0	1	0	1	2	2	0	0	0	0	0	0	1	0
Purchases % ZEV	100%	NA	NA	NA	NA	NA	NA	NA	100%	NA	100%	100%	100%	NA	NA	NA	NA	NA	NA	100%	NA

Table 2-4: Demand Response Annual Vehicle Entering Service

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Total vehicles entering service	0	0	3	0	1	0	2	0	0	0	1	0	1	2	2	0	0	0	0	0	0
Retirements	0	0	-3	0	-1	0	-2	0	0	0	-1	0	-1	-2	-2	0	0	0	0	0	0
FF vehicles entering service	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ZEVs entering service	0	0	2	0	0	0	0	0	0	0	1	0	1	2	2	0	0	0	0	0	0
Vehicles entering service % ZEV	NA	NA	67%	NA	0%	NA	0%	NA	NA	NA	100%	NA	100%	100%	100%	NA	NA	NA	NA	NA	NA

In this schedule, vehicles are replaced with battery electric vehicles based on the following criteria:

- The vehicle has reached the end of its useful life

- Charging infrastructure has been installed
- Operators and maintenance technicians have completed applicable training

The schedule assumes that the demand response fleet will remain the same size throughout the zero-emission fleet transition timeline. In addition, a one-year lead time from vehicle purchase to entering service was assumed for fossil fuel vehicles, while a two-year lead time was assumed for ZEVs. ACT aims to replace its entire fossil fuel fleet with zero-emission vehicles by 2045.

2.2 KEY RESULTS

Figure 2-2 shows ACT's projected fixed route vehicle purchases through 2045. This reflects the proposed scope for the Low-No project, with ACT procuring three BEBs. Figure 2-3 shows the years new vehicles will be entering service, assuming a one-year lead time from vehicle purchase to entering service for fossil fuel vehicles, and a two-year lead time for ZEVs.

Figure 2-2: Projected Fixed Route Annual Vehicle Purchases

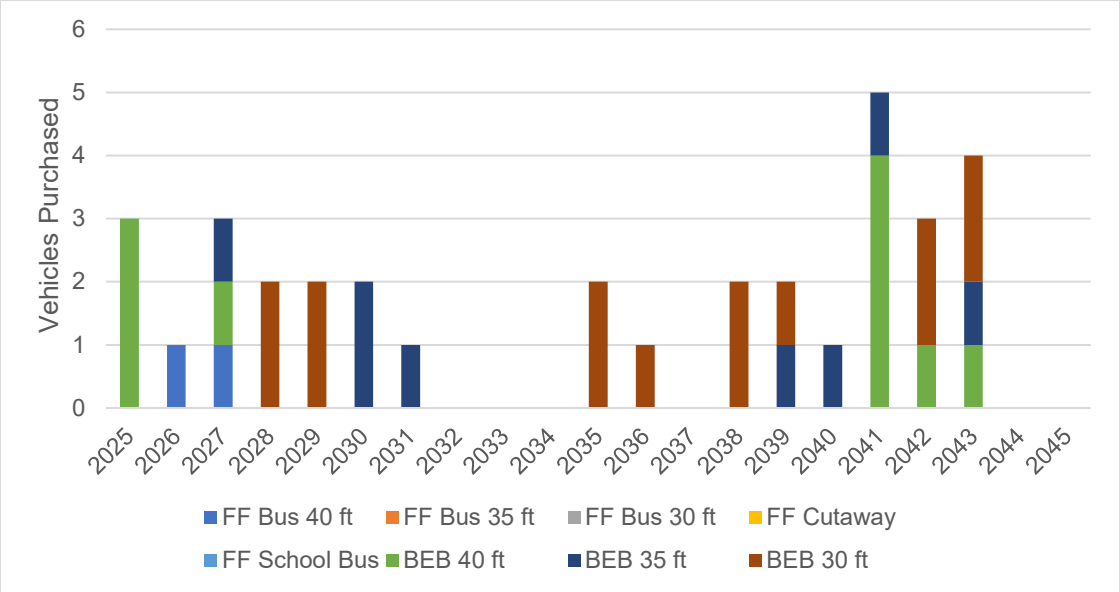


Figure 2-3: Fixed Route Annual New Vehicles in Service

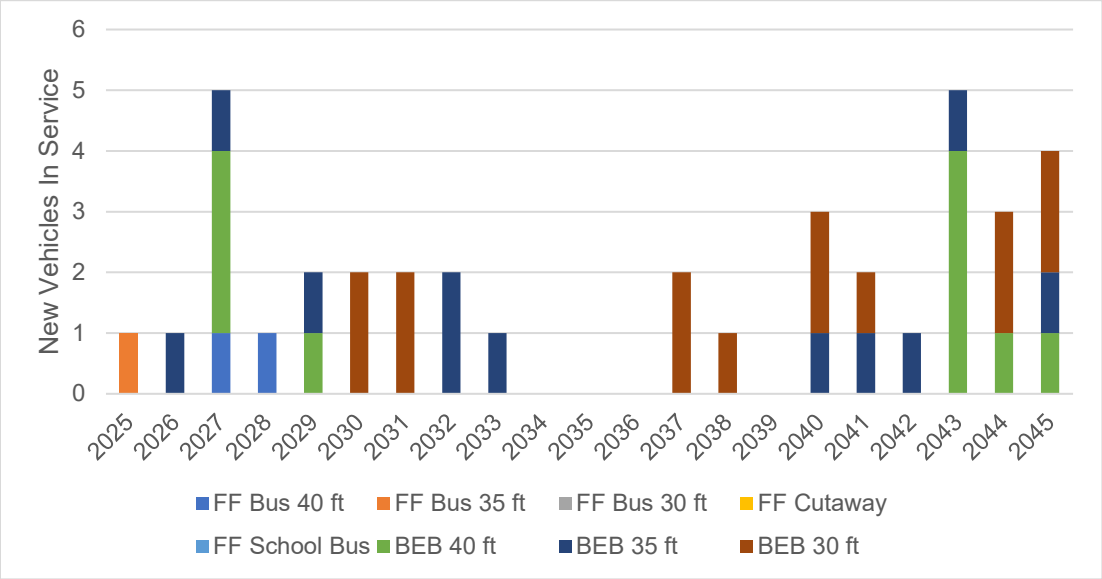


Figure 2-4 shows ACT's projected demand response vehicle purchases through 2045. This reflects the proposed FY2025 of FY2026 Low-No project, with ACT procuring two battery electric cutaways. Figure 2-5 shows the years new vehicles will be entering service, assuming a one-year lead time from vehicle purchase to entering service for fossil fuel vehicles, and a two-year lead time for ZEVs.

Figure 2-4: Projected Demand Response Annual Vehicle Purchases

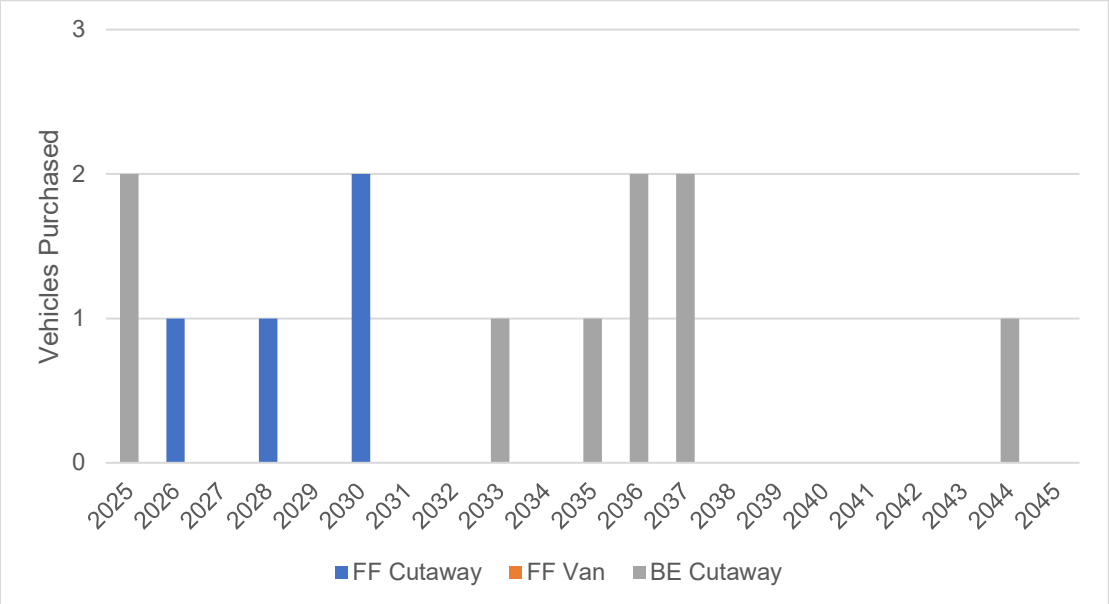


Figure 2-5: Demand Response Annual New Vehicles in Service

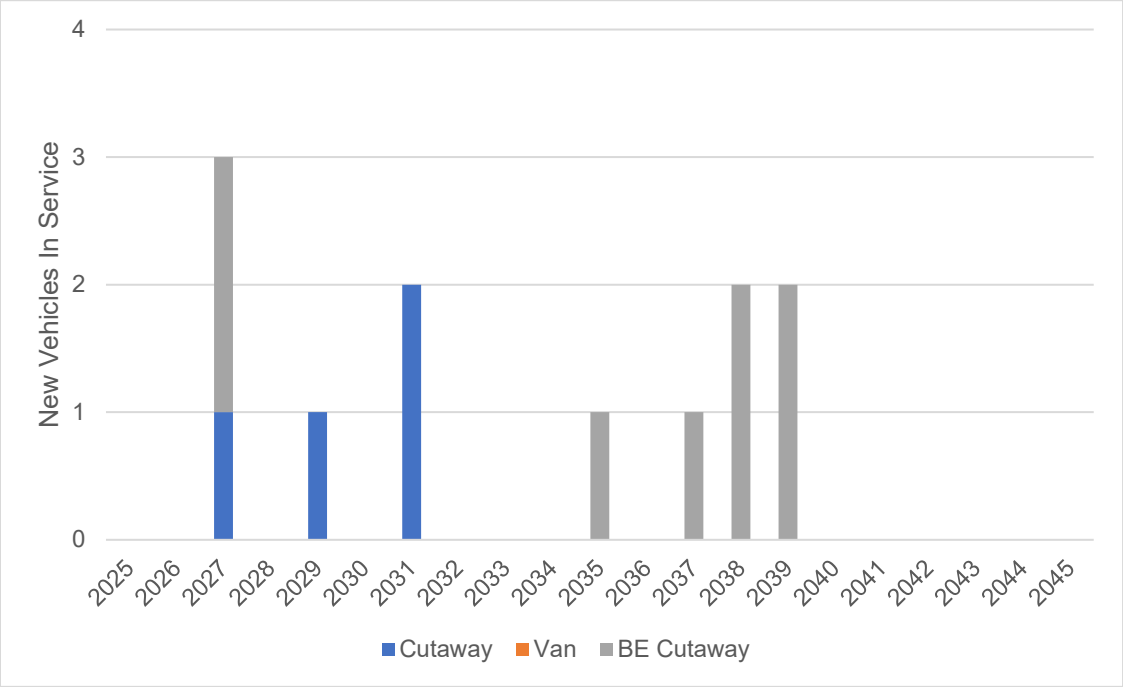


Figure 2-6 shows ACT's projected total vehicle purchases for both fixed route and demand response fleets through 2045. This reflects the plans for Low-No funds request, with ACT procuring five battery electric vehicles in total. Figure 2-7 shows the total new vehicles entering service.

Figure 2-6: Total Annual Vehicle Purchases

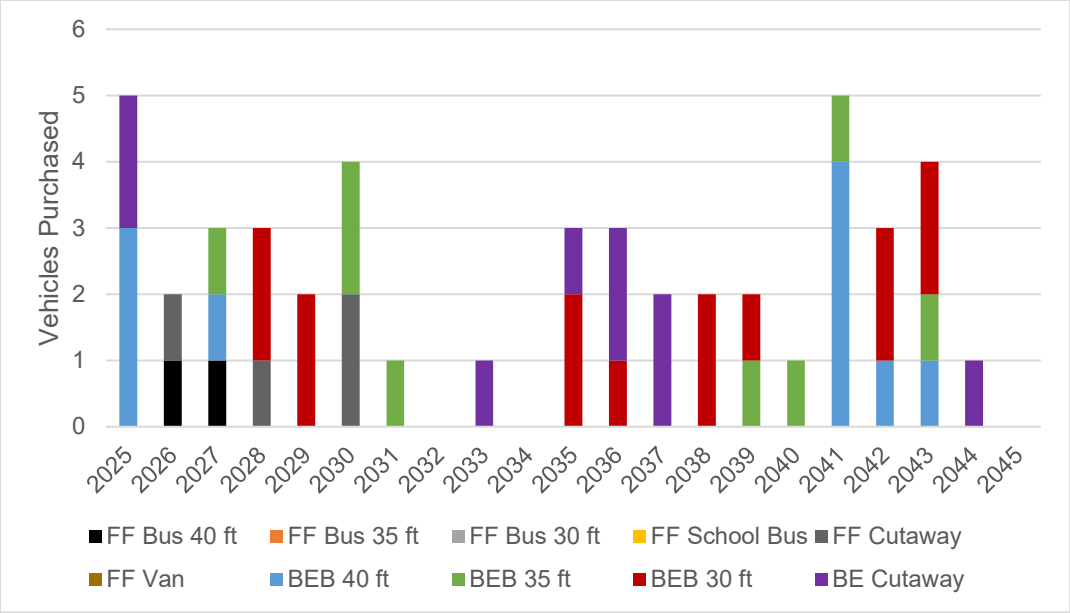


Figure 2-7: Total Annual New Vehicles in Service

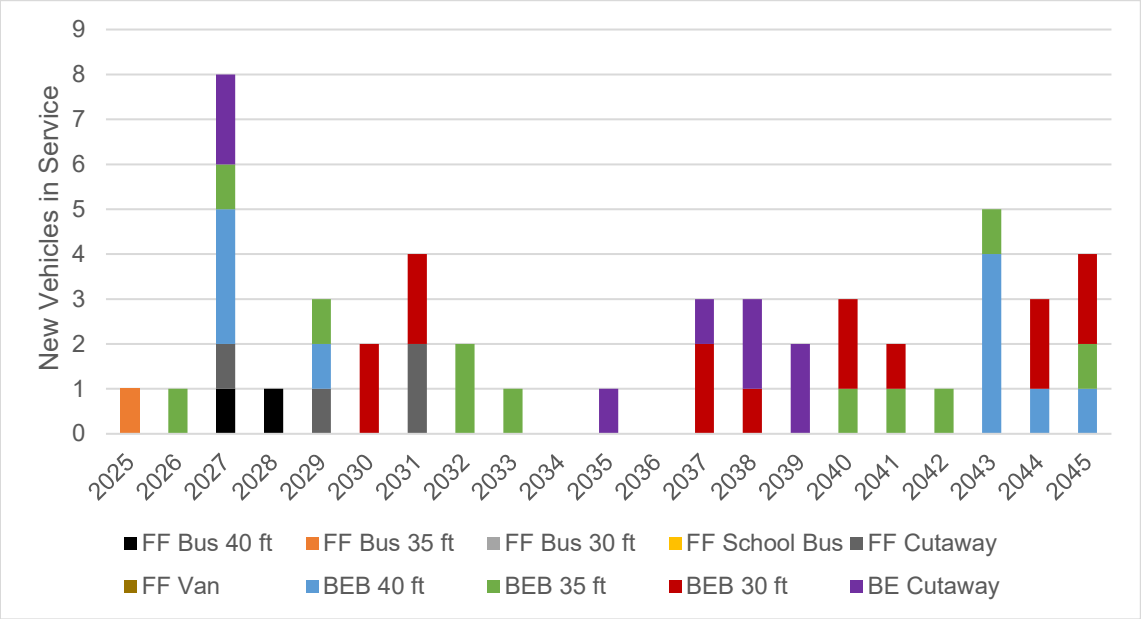


Figure 2-8 depicts ACT's fixed route fleet composition through the transition timeline as it phases out fossil fuel vehicles, while Figure 2-9 shows the percentage of fossil fuel vehicles and ZEVs in the fleet. Both figures are based upon the years vehicles are entering service.

Figure 2-8: Fixed Route Fleet Composition

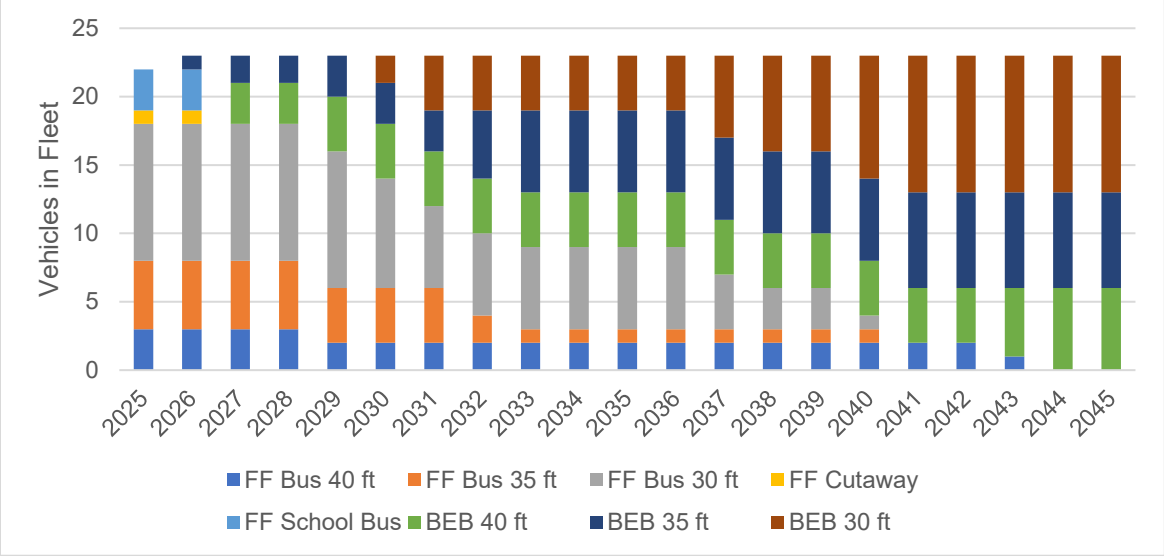


Figure 2-9: Fixed Route Fleet % ZEV in Service

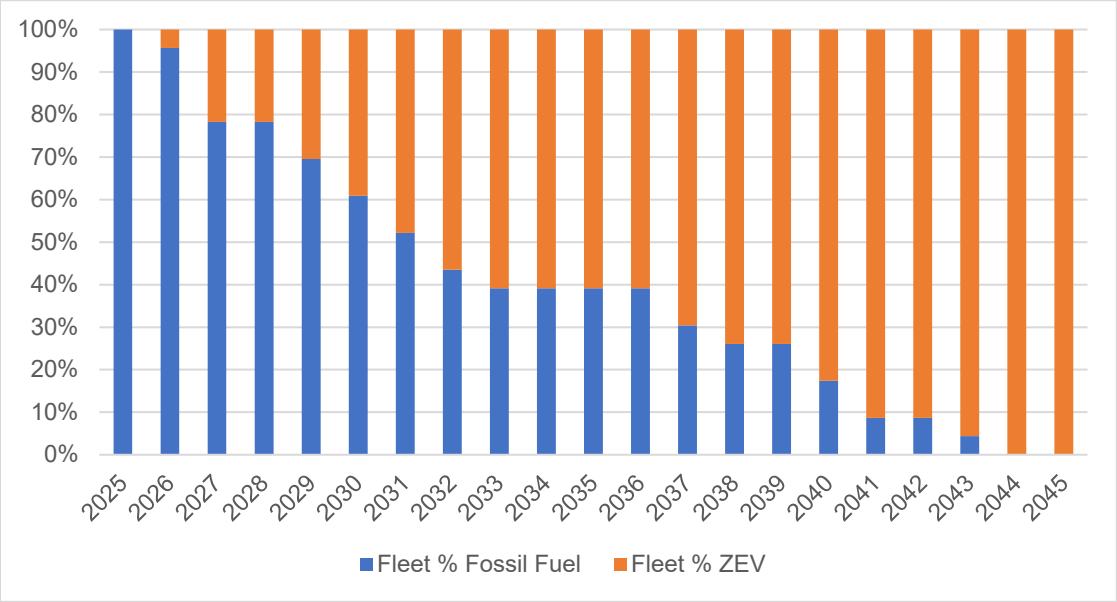


Figure 2-10 depicts ACT's demand response fleet composition through the transition timeline as it phases out fossil fuel vehicles. Figure 2-11 shows the percentage of fossil fuel vehicles and ZEVs in the fleet. Both figures are based upon the years vehicles are entering service.

Figure 2-10: Demand Response Fleet Composition

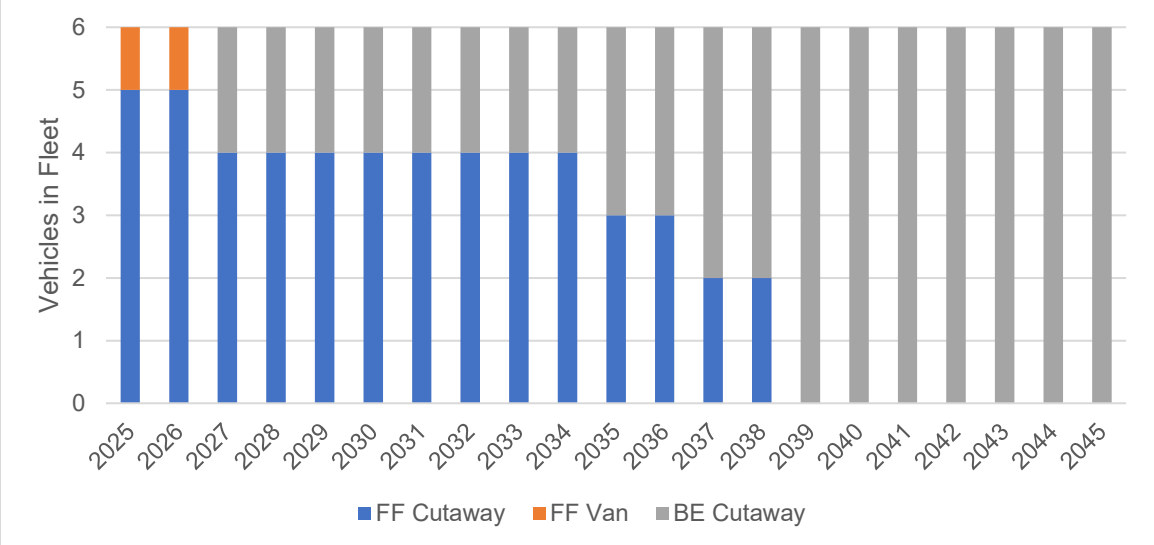


Figure 2-11: Demand Response Fleet % ZEV in Service

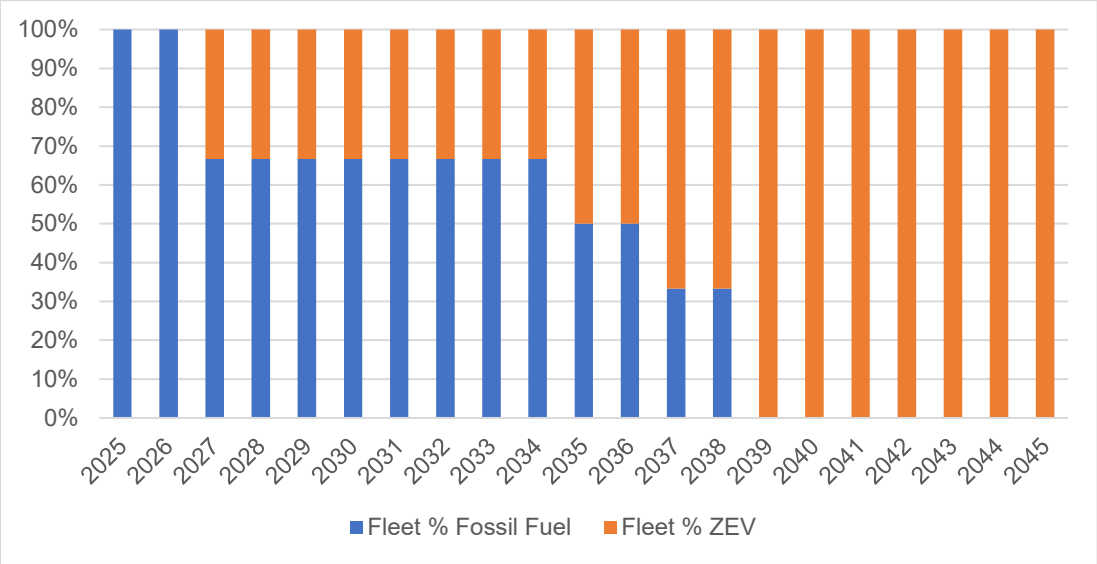


Figure 2-12 shows ACT's projected combined fleet composition for both fixed route and demand response fleets through the transition timeline. Figure 2-13 shows the percentage of fossil fuel vehicles and ZEVs in the combined fleet. Both figures are based upon the years vehicles are entering service.

Figure 2-12: Combined Fleet Composition

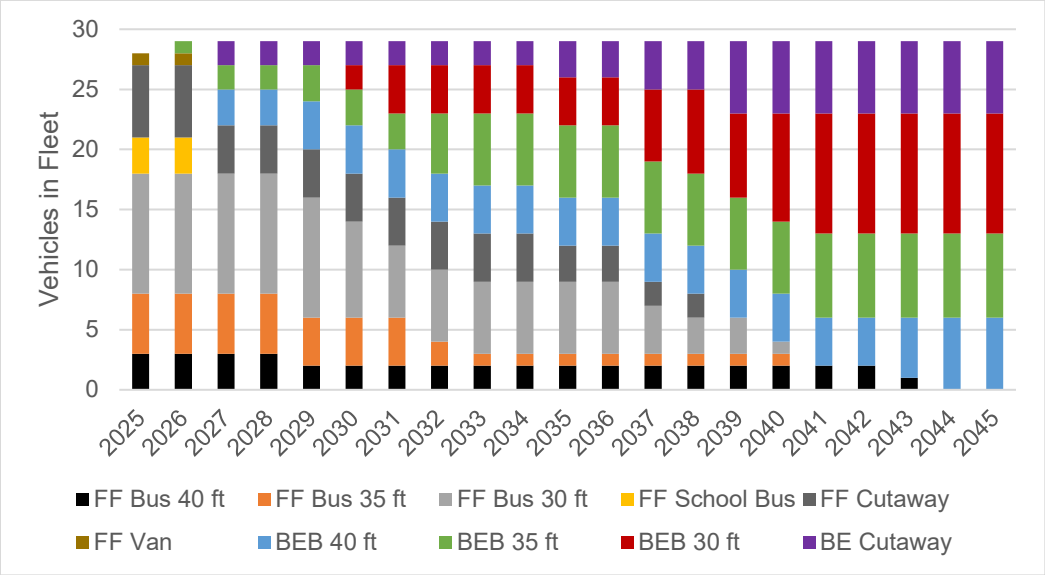
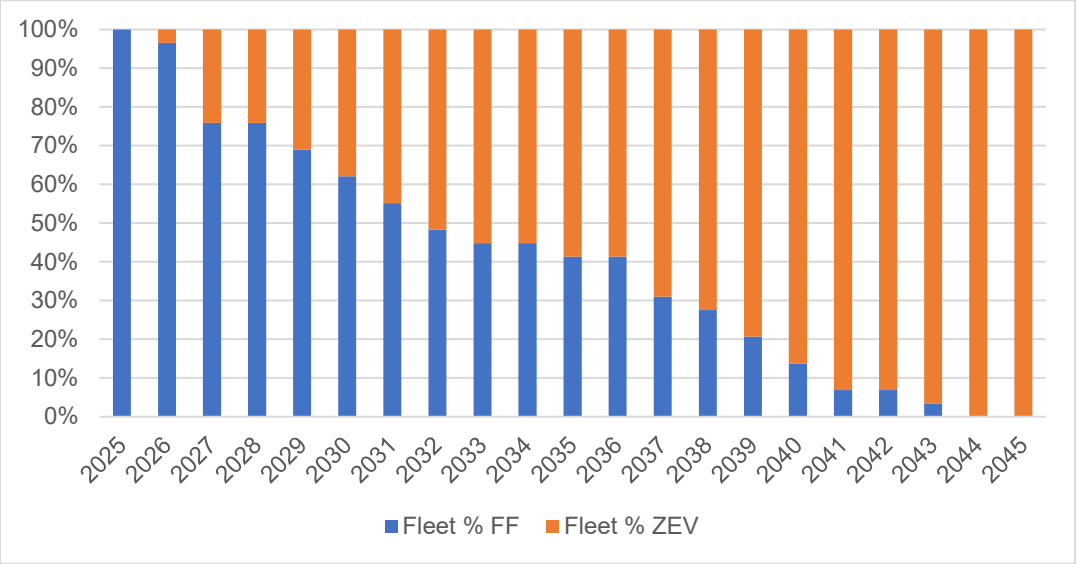


Figure 2-13: Combined Fleet % ZEV in Service



2.3 COST ASSUMPTIONS

The vehicle purchase schedule was used to project the annual capital costs for vehicles purchased each year through 2045. The assumptions used for the cost estimates include:

- Vehicle costs are derived from ACT's latest procurement prices for standard propulsion technologies and industry averages for battery electric technologies
- The costs include an estimate for an extended battery warranty, which covers a mid-life battery replacement
- Inflation is not factored into the vehicle costs
- Costs are presented in 2025 dollars

The figures below illustrate the annual capital costs for vehicles purchased each year through 2045. The projected total cost for the fixed route and demand response ZEVs over the transition period is $35.1 million.[3]

[3] This is the total estimated cost for ZEVs only. Including fossil fuel vehicle replacements, the total estimated cost is $37.2 million over the transition timeline.

Figure 2-14: Fixed Route Annual Vehicle Procurement Cost

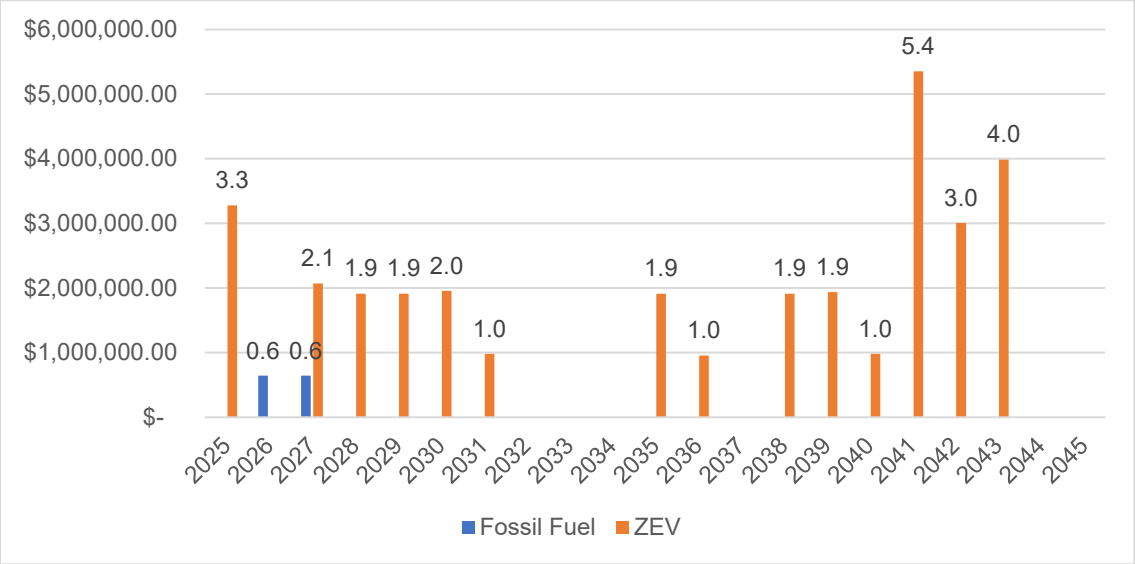


Figure 2-15: Demand Response Annual Vehicle Procurement Cost

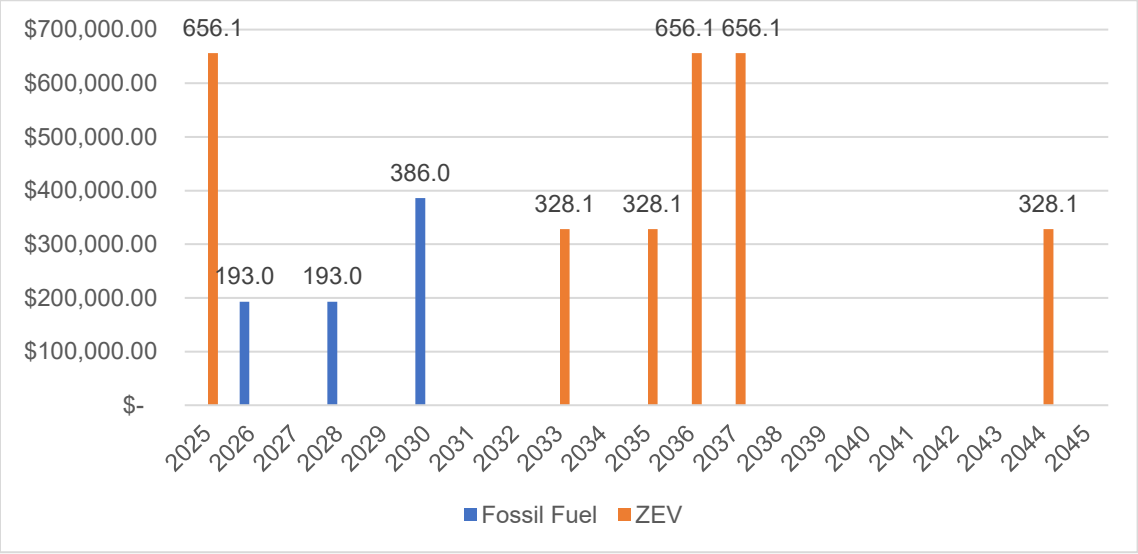
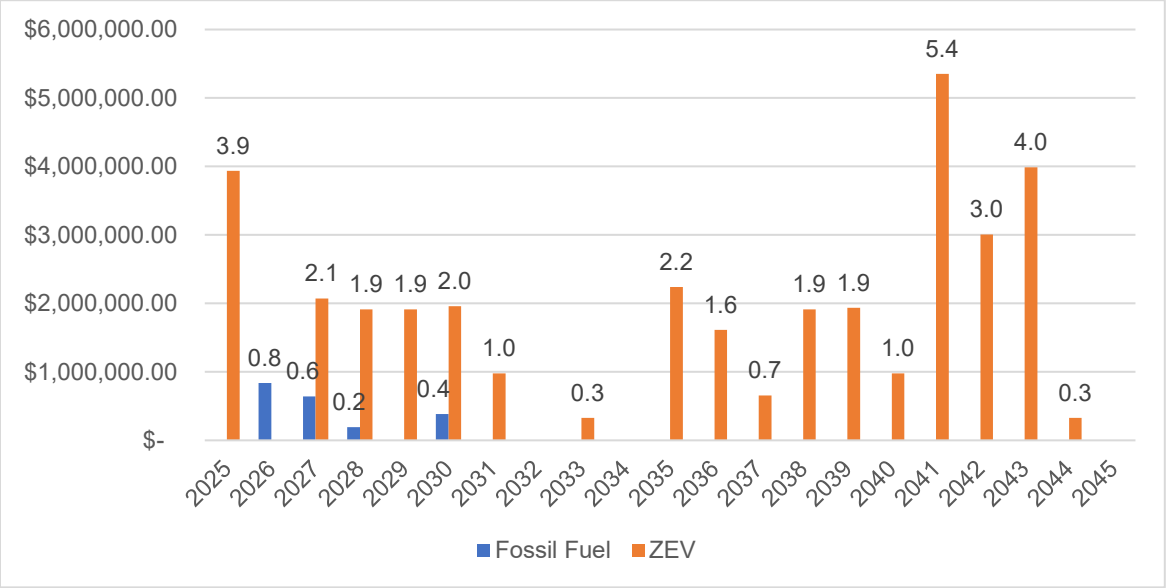


Figure 2-16: Combined Annual Vehicle Procurement Cost



2.4 CONCLUSION

ACT expects to reach full transition to a zero-emission fleet by 2045. The expected total capital cost of vehicles for the transition to a ZEV fleet is estimated at $35.1 million.[4]

[4] Ibid.

3.0 ELEMENT 2: FUNDING NEEDS ASSESSMENT

3.1 FUNDING ASSESSMENT OVERVIEW

ACT allocates funds according to a procurement timeline based on the useful life of its vehicles. Transitioning to a ZEV fleet increases overall costs due to the higher price of ZEVs, the need for new infrastructure, and modifications to maintenance facilities. For example, zero-emission buses (ZEBs) cost between $1,000,000 and $1,900,000, which is about $250,000 to $1,150,000 more than diesel buses. Additionally, the infrastructure required to support ZEVs adds to the financial burden of the transition.

In the Zero Emission Fleet Transition Plan, vehicle and infrastructure costs are evaluated separately in the Fleet and Facilities Assessments. Both cost estimates are compiled here as total costs to identify funding gaps and needs.

3.2 ACT FUNDING NEEDS

ACT plans to transition to a fleet of 29 battery electric vehicles which will also require supporting charging infrastructure and service capacity upgrades. It is recommended that ACT perform a more comprehensive assessment of service and infrastructure needs to determine specific facility upgrades and on-route charging needs.

To achieve a successful deployment of battery electric vehicles, ACT projects will require an estimated $35.1 million for ZEV procurements, and $5.5 million for charging infrastructure and facility upgrades. This cost estimate includes the necessary costs for the transition, as determined via the cost analyses completed for the Fleet and Facilities Assessments under Element 4.

3.3 AVAILABLE FUNDING RESOURCES AND RESULTING FUNDING SHORTFALLS

Based on the identified funding needs, ACT must identify resources that can cover this funding gap. Traditional formula funding can provide support for the transition to a ZEV fleet, but it is likely ACT will require additional funding to offset the higher costs associated with zero-emission technology. ACT is prepared to pursue various funding opportunities as necessary and as available.

ACT currently funds its vehicle procurement, operations, and maintenance through a combination of sources. In 2019, ACT received a $1.8 million Low-No grant award to procure two BEBs and two 125 kW plug-in charging systems. ACT also received $75,000 from the New Mexico Match Fund to support this procurement. Additional potential funding sources for ACT are outlined in Table 3-1.

Table 3-1: Potential Funding Resources

Source	Agency	Fund/Grant/Program	Mechanism	Description
Federal	Federal Transit Administration (FTA)	Low or No Emission Program (Low-No Program) (5339(c)[5]	Competitive	The Low-No Program provides competitive funding for the procurement of low or no emission vehicles, including the leasing or purchasing of vehicles and related supporting infrastructure. This has been an annual program under the FAST Act since 2016 and is a subprogram of the Section 5339 Grants for Bus and Bus Facilities. A 20% local match is required.
Federal	Federal Transit Administration (FTA)	Buses and Bus Facilities Program (5339(a) formula[6], 5339(b) competitive[7])	Formula, Competitive	Grants for Buses and Bus Facilities, 5339 (b) provides Federal resources to States for improvements to bus-related facilities or innovations related to low or no emission vehicles. As a Low or No Emission grant, 5339 (c) provides funding to modernize fleets through the purchase or lease of low- or no-emission vehicles.
Federal	Federal Transit Administration (FTA)	Grants for Rural Areas (5311)[8]	Formula	5311 grant funding makes federal resources available to rural areas for transit capital, planning and operating assistance. Eligible activities include capital investments in bus and bus-related activities such as replacement, overhaul and rebuilding of buses.

[5] https://www.transit.dot.gov/lowno
[6] https://www.transit.dot.gov/funding/grants/busprogram
[7] https://www.transit.dot.gov/bus-program
[8] https://www.transit.dot.gov/rural-formula-grants-5311

Source	Agency	Fund/Grant/Program	Mechanism	Description
Federal	Federal Transit Administration (FTA)	Enhanced Mobility of Seniors & Individuals with Disabilities (5310)[9]	Formula	5310 formula funding provides resources to help meet the transportation needs of older adults and people with disabilities. Eligible subrecipients (from the State for rural areas) include public transit operators. Eligible activities include capital investments in buses and vans, wheelchair lifts and harnesses, and other equipment.
Federal	Federal Highway Administration (FHWA)	Congestion Mitigation and Air Quality Improvement Program (CMAQ)[10]	Competitive	The CMAQ Program provides funds to states for transportation projects designed to reduce traffic congestion and improve air quality, particularly in areas of the country that do not attain national air quality standards. This includes projects that reduce criteria air pollutants regulated from transportation-related sources, such as ZEV projects.
Federal	United States Department of Transportation (USDOT)	Local and Regional Project Assistance Program (RAISE)[11]	Competitive	Previously known as BUILD and TIGER, RAISE is a discretionary grant program aimed to support investment in infrastructure. RAISE funding supports planning and capital investments in roads, bridges, transit, rail, ports, and intermodal transportation.
Federal	Internal Revenue Service (IRS)	30C Alternative Fuel Vehicle Refueling Property Credit[12]	Tax Credit	The Inflation Reduction Act of 2022 (IRA) extended the 30C Alternative Fuel Vehicle Refueling Property Credit, offering an income tax credit for individuals, businesses, and qualifying tax-exempt entities that install alternative fuel vehicle refueling property, including EV charging equipment, in eligible census tracts (low-income community or non-urban census tracts). For businesses and

[9] https://www.transit.dot.gov/funding/grants/enhanced-mobility-seniors-individuals-disabilities-section-5310
[10] https://www.transportation.gov/sustainability/climate/federal-programs-directory-congestion-mitigation-and-air-quality-cmaq
[11] https://www.transportation.gov/RAISEgrants/about
[12] https://www.irs.gov/credits-deductions/alternative-fuel-vehicle-refueling-property-credit#who

Source	Agency	Fund/Grant/Program	Mechanism	Description
				applicable tax-exempt entities, including state, local, tribal, and other qualifying tax-empty organizations, the credit is the lesser of 6% (or 30% if prevailing wage and apprenticeship requirements are met) of the property's cost or $100,000. This credit applies to property placed in service from December 31, 2022, to January 1, 2033.
State	New Mexico Department of Transportation (NMDOT)	New Mexico National Electric Vehicle Infrastructure (NEVI) Planning[13]	Formula	The USDOT NEVI Formula Program provides formula-based funding to states for EV infrastructure deployment. The New Mexico Department of Transportation (NMDOT) must submit an annual EV Infrastructure Deployment Plan to the DOT and the Joint Office of Energy and Transportation, detailing the state's intended use of NEVI funds. This plan, formulated per NEVI guidance, outlines how funds will be allocated to build EV infrastructure across the state, facilitating EV adoption and supporting a national network.
State	New Mexico Department of Transportation (NMDOT)	Electric Vehicle Infrastructure Grant Program[14]	Competitive	The NMDOT will distribute funds appropriated under the Laws of 2024, Chapter 66, Section 33, through the 2025 Electric Vehicle Infrastructure Grant Program. This program aims to plan, design, construct, and equip EV infrastructure statewide with a focus on equity and cost-effectiveness. Applicants are required to consider factors including equity, recreational access, geographic diversity (particularly in rural areas) and Justice40 priorities.

[13] Alternative Fuels Data Center: New Mexico Laws and Incentives
[14] Microsoft Word - EV GRANT FINAL DOC

Source	Agency	Fund/Grant/Program	Mechanism	Description
State	New Mexico Environment Department (NMED)	Diesel Emission Reduction Funding[13]	Competitive	The NMED administers funding from the U.S. Environmental Protection Agency's Diesel Emission Reduction Act (DERA) to support the repowering or replacement of heavy-duty on-road and off-road vehicles. This funding incentivizes projects that reduce diesel emissions by replacing or repowering eligible vehicles with new diesel or alternative fuel engines and, specifically, all-electric options for off-road applications. Priority is given to hydrogen fuel cell projects, and eligible vehicles include school buses, Class 5 transit buses, Class 5-8 heavy-duty vehicles, and non-road equipment used in sectors such as construction, cargo handling, agriculture, mining, and energy production.
State	New Mexico Department of Finance and Administration	New Mexico Match Fund[15]	Competitive	With an initial $75 million appropriation, this fund is designed to amplify federal funding opportunities for infrastructure, research, economic development, the energy transition, and other critical projects that will benefit New Mexico.
State	New Mexico Energy, Minerals, and Natural Resources Department (EMNRD)	Electric Vehicle Charging Station Make-Ready Building Renovation Tax Credit[16]	Tax Credit	The Sustainable Building Tax Credit (SBTC) offers a tax credit for renovations that include the purchase and installation of EV make-ready infrastructure in existing buildings. Residential properties can receive a $500 tax credit, which increases to $1,000 for income-eligible residents. Commercial properties may qualify for a tax credit covering 50% of infrastructure costs, up to $1,500, or 100%, up to $3,000, for affordable housing installations. To qualify, commercial buildings must be no larger than 20,000 square feet and ensure Level

[15] https://www.nmdfa.state.nm.us/nmmatchfund/
[16] https://afdc.energy.gov/laws/all?state=NM

Source	Agency	Fund/Grant/Program	Mechanism	Description
				2 EV charging readiness at 10% of parking spaces. Available for projects completed between January 1, 2022, and December 31, 2027, this tax credit is subject to annual funding limits and is allocated on a first-come, first-served basis.
State	N/A	Alternative Fuel Tax Exemption[17]	Tax Exemption	The Alternative Fuel Tax Exemption exempts alternative fuel used by federal and state government entities, as well as Indian nations, tribes, or pueblos, from the state excise tax.
Other	N/A	Low Carbon Fuel Standard (LCFS credits)[18]	Credits	The purpose of LCFS credits is to reduce greenhouse gas emissions by encouraging the use of low-carbon fuels. LCFS credits can be traded through a broker to help reduce operating costs. Once ZEVs are acquired and in operation, cities can collect LCFS credits and sell them to offset the operating expenses of these vehicles. Both hydrogen and electricity used as fuels are eligible for generating LCFS credits. Projects that include the installation of EV charging stations, hydrogen fueling stations, and the production of renewable fuels are eligible.
Other	N/A	Transportation Development Credits[19]	Credits	Although they are not funds for projects, Transportation Development Credits, also called “Toll Credits”, satisfy the federal government requirement to match federal funds. Toll credits provide a credit toward a project’s local share for certain expenditures with toll revenues. FHWA oversees the toll credits within each state.

[17] https://afdc.energy.gov/laws/9053
[18] https://www.env.nm.gov/climate-change-bureau/clean-fuel-standard/
[19] Ibid.

4.0 ELEMENT 3: POLICY ASSESSMENT

4.1 POLICY ASSESSMENT OVERVIEW

Policies and regulations supporting the transition to ZEV fleets are increasing as efforts to decarbonize the transportation sector expand. ACT is monitoring the implementation of relevant policies and legislation. While relevant funding programs are considered in the Funding Needs Assessment above, policies and regulations that direct aspects of zero-emission transit deployments beyond funding are considered in this section. ACT will periodically and thoroughly assess all relevant policies and legislation throughout the fleet transition.

4.2 ALIGNMENT WITH FEDERAL PRIORITIES AND POLICIES

With the passage of the Bipartisan Infrastructure Law and Executive Order 14008: Tackling the Climate Crisis at Home and Abroad, the federal government has renewed its focus on zero-emission transit. ACT's goal to fully transition its fleet to ZEVs aligns with federal priorities of safety, modernization, climate action, and equity in public transportation. ACT's Low-No request this year supports these goals by allowing the agency to replace five fossil fuel vehicles that have exceeded their useful life with ZEVs that will result in reduced greenhouse and particulate emissions.

4.3 NEW MEXICO POLICIES AND GOALS

New Mexico has implemented a range of state policies that influence the transition to zero-emission technologies. These policies include regulatory actions from Governor Michelle Lujan Grisham's 2019-003 Executive Order Addressing Climate Change and Energy Waste Prevention. These items include emissions standards and ZEV sales mandates, as well as initiatives to expand charging infrastructure and raise public awareness. Together, these efforts are driving the state's progress towards a cleaner transportation system. ACT's transition to a zero-emission fleet will help the State of New Mexico meet its goal of a 45% reduction in greenhouse gas emissions from 2005 levels by 2030.[20]

New Mexico EV Program

The New Mexico EV Program supports the development of a clean energy economy, recognizing that transportation contributes the largest share of U.S. greenhouse gas emissions. The program aligns New Mexico with national goals, aiming to target net-zero emissions by 2050 through widespread EV adoption.[21]

New Mexico EV Infrastructure Deployment Plan

The New Mexico EV Infrastructure Deployment Plan outlines the state's use of NEVI funds to establish publicly accessible DC fast chargers along the interstate corridors over the next two years. Beyond the

[20] https://www.env.nm.gov/climate-change-bureau/
[21] New Mexico Electric Vehicles | NMDOT

initial corridor deployment, the plan provides a framework for further expansion of EV charging infrastructure to meet community, recreational, and broader needs, supported by additional funding and private-sector partnerships. Targeted audiences include the general public, government entities at federal, state, and local levels; advocacy groups; Pueblos, Tribes, and the Navajo Nation; and private sector stakeholders, including EV charging manufacturers, operators, and utilities. This plan supports New Mexico's commitment to a comprehensive and accessible EV charging network.[22]

Utility Electric Vehicle Support

By January 1, 2021, New Mexico public utilities were required to file applications with the New Mexico Public Regulation Commission to support transportation electrification. These applications may include incentives for EV charging infrastructure, public fleet electrification, EV charging rates, and consumer education. The Commission assesses each application's potential to improve utility efficiency, expand access to EV infrastructure (especially in underserved communities), reduce emissions, and encourage EV adoption.[23]

State Emissions Reduction Strategy

The New Mexico Climate Change Task Force, established by the governor, developed a climate strategy to reduce greenhouse gas emissions by 45% from 2005 levels by 2030. This strategy includes exploring low-emission and ZEV standards and is designed to advance emissions reduction across multiple sectors including transportation.[24]

Clean Transportation Fuel Program

The New Mexico Environment Improvement Board is tasked with establishing a Clean Transportation Fuel Standard program that reduces carbon intensity in transportation fuels by 20% below 2018 levels by 2030 and 30% by 2040. This program is set to take effect by July 1, 2026, promoting the use of cleaner fuels and reducing greenhouse gas emissions in the transportation sector.[25]

Energy and Fuel Cost Savings Contracts

Government fleets in New Mexico may finance alternative fuel vehicles and infrastructure through guaranteed utility savings contracts. These contracts use operational and fuel cost savings to pay for capital investments, with savings required to meet or exceed annual contract payments.[26]

[22] TIRS 100322 Item 1 DOT NM EV Infrastructure Deployment Plan 220713.pdf
[23] https://www.dot.nm.gov/electrifying-new-mexico/
[24] https://www.climateaction.nm.gov/wp-content/uploads/2024/09/NMClimateChange_2019-condensed.pdf
[25] https://www.env.nm.gov/climate-change-bureau/clean-fuel-standard/
[26] https://afdc.energy.gov/laws/all?state=NM#:~:text=When%20acquiring%20new%20vehicles%2C%20all,EVs%2C%20PHEVs%2C%20or%20FCEVs.

State Agency Low- and Zero-Emission Vehicle Acquisition Requirement

New Mexico requires state agencies to purchase EVs, plug-in hybrid electric vehicles or hydrogen fuel cell electric vehicles when acquiring new vehicles, aiming for a 100% zero-emission state fleet by 2035. The General Services Department of Transportation must set fleet purchasing guidelines, and state agencies are required to propose annual targets for vehicles and EV charging station acquisitions[27]. New Mexico Depart of Transportation (NMDOT) has stablished that large and small transit agencies increase their zero-emission bus purchases over time, culminating in all new bus purchases being zero-emission by 2029.

Alternative Fuel Vehicle and Hybrid Electric Vehicle Acquisition Requirements

New Mexico mandates that at least 75% of light-duty fleet vehicles purchased by state agencies and educational institutions be hybrid electric or alternative fuel vehicles. Vehicles must meet federal fuel economy standards, with exemptions granted for law enforcement and emergency vehicles based on availability, suitability, and fuel considerations.[28]

Medium- and Heavy-Duty Zero Emission Vehicle Requirement

New Mexico adopted the California Air Resources Board (CARB) Advanced Clean Trucks (ACT) regulation, which requires manufacturers to meet greenhouse gas emissions standards and ZEV sales quotas starting with model year 2026.

ZEV Sales Requirements and Low Emission Vehicle (LEV) Standards

New Mexico has adopted California's motor vehicle emissions standards and compliance requirements. Starting with model year 2026, manufacturers must meet greenhouse gas emissions standards and ZEV production and sales mandates for new passenger cars, light-duty trucks, and SUVs.

In addition, in November 2023, New Mexico also adopted the CARB Advanced Clean Cars II regulation, which requires 82% of new passenger vehicles sold to be ZEVs by 2032, beginning with model year 2027.[29]

Regional Electric Vehicle (REV) West Plan

New Mexico collaborates with seven other states including Arizona, Colorado, Idaho, Montana, Nevada, Utah, and Wyoming, under the Regional Electric Vehicle (REV) West memorandum of understanding (MOU) to create the Intermountain West EV Corridor. Updated in 2019, the REV West plan includes commitments to coordinate charging locations, promote EV awareness, apply voluntary standards, integrate EV infrastructure into planning, encourage a wider variety of EVs, and support direct current fast charging (DCFC) station build outs along major transportation corridors.[30]

[27] Ibid.
[28] Ibid.
[29] Ibid.
[30] https://www.naseo.org/Data/Sites/1/revwest_mou.pdf

4.4 SUPPORT FOR LOCAL POLICY AND GOALS

Los Alamos County aims to reduce greenhouse gas emissions by 50% by 2030 and achieve net-zero emissions by 2045. These goals are part of a broader strategy to enhance environmental stewardship, promote renewable energy, and improve community resilience against climate change impacts. There are several regional and local policies that apply to a ZEV transition and these broader sustainability goals.

ACT's transition to ZEVs will play a crucial role in supporting these goals. By replacing traditional propulsion technology with ZEVs, ACT will reduce carbon emissions, improve air quality, and contribute to a healthier community.

Los Alamos Resiliency, Energy, & Sustainability (LARES) Task Force Recommendations

The LARES Task Force, a citizen-led initiative, developed greenhouse gas reduction and climate resiliency recommendations presented in the February 2022 LARES Report. This report guides Los Alamos County's sustainability initiatives, including several transportation-focused goals. Relevant recommendations are listed below:

- TM-3: Increase publicly accessible electric vehicle charging infrastructure
- TM-4: Grow the County's electric vehicle fleet by at least two ZEVs per year, aiming for 100% plug-in electric light-duty vehicles
- TM-7: Encourage private EV purchase and charging during non-peak hours

These recommendations support Los Alamos County's commitment to reducing emissions and improving sustainable transportation infrastructure for the community.

Los Alamos Climate Action Plan

Los Alamos County's draft Climate Action Plan sets ambitious goals for reducing greenhouse gas emissions from transportation and enhancing community mobility.[31] It highlights strategies to build a sustainable and accessible transportation network by expanding EV infrastructure, promoting multimodal options, and improving cycling and pedestrian paths. Specific EV-related actions are designed to build on the LARES recommendations with several key strategies:

- T1.1: Promote EV adoption by educating the community on tax incentives and rebates for EV purchases, particularly for low-income populations, and working with local partners such as LANL and the school district to explore fleet conversions to EVs.
- T1.2: Develop an EV infrastructure plan to map EV infrastructure needs in collaboration with the Los Alamos Electric Utility, NMDOT, and other organizations, addressing barriers to EV readiness in public spaces, with particular focus on affordable housing access. This aligns with the County's

[31] https://www.losalamosnm.us/files/sharedassets/public/v/2/departments/county-manager/documents/losalamoscap_20241104-reduced.pdf

existing incentives to reduce parking requirements if EV infrastructure or bike facilities are included.

- T1.3: Implement new building codes to incentivize EV readiness for new and redeveloped properties, encouraging EV chargers in multi-family housing, commercial areas, and community spaces, with particular focus on affordable housing access. This aligns with the County's existing incentives to reduce parking requirements if EV infrastructure or bike facilities are included.
- T1.4: Transition the County fleet to EVs by replacement end-of-life vehicles with EVs when feasible. Alternative strategies, such as right-sizing or hybrid vehicle purchases, will be pursued when full EV options are not available. The County is considering aligning its transition goal with New Mexico's target of a 100% zero-emission fleet by 2035.

Los Alamos County 2024 Strategic Leadership Plan

The 2024 Strategic Leadership Plan for Los Alamos County sets environmental stewardship as a core priority, aiming to reduce emissions across county operations. As part of this goal, the plan includes establishing specific targets to achieve net-zero greenhouse gas emissions by integrating sustainability and resiliency practices into all county policies and operations, supporting the broader climate and sustainability objectives.[32]

Los Alamos Integrated Resource Plan (2022)

The Los Alamos Resource Plan (IRP) 2022 provides a roadmap for both near-term and long-term power production to support Los Alamos County's clean energy goals and the anticipated increase in electricity demand from residential, commercial, and industrial customers, including EVs. This plan aims for carbon neutrality by 2040 for Los Alamos County and 100% renewable energy for 2035 for Los Alamos National Laboratory. The IRP evaluates three scenarios:

- **Base Case**: Assumes moderate economic growth, stable commodity prices, and continued innovation. This scenario incorporates expected levels of EV adoption and clean energy incentives, aligning with sustained public and private research and development.
- **High Case**: Projects higher load growth driven by economic activities, increased EV penetration, and green hydrogen generation. This scenario anticipates higher renewable energy demand, reducing research and development funding, and increased capital costs for new energy builds.
- **Low Case**: Envisions accelerated renewable policies, conservation efforts, and innovation leading to rapid technological advancements. This scenario expects low load growth, high conservation, and strong investments in emerging clean technologies.

[32] https://www.losalamosnm.us/files/sharedassets/public/v/1/government/council/documents/20231102_2024-strategic-leadershipplan_final.pdf

By taking a technology-agnostic, least-cost approach, the IRP supports Los Alamos County's commitment to environmental sustainability, including EV infrastructure expansion, electrification, and alignment with statewide carbon reduction goals.[33]

Los Alamos County Greenhouse Gas Emissions Inventory (2023)

The 2023 Greenhouse Gas Emissions Inventory for Los Alamos County identifies key sources of community-wide emissions, with passenger and freight transportation, natural gas consumption, and electricity usage as the largest contributors.[34] In response, the report outlines targeted actions for reducing emissions within these sectors, including:

- Reducing vehicle miles traveled by promoting and expanding sustainable transportation options, such as biking, walking, and public transit
- Expanding EV infrastructure and adoption to support a shift toward electric vehicles across the community
- Increasing energy efficiency across residential, commercial, and industrial sectors
- Increasing the use of renewable energy in the county's energy mix
- Promoting electrification retrofits to transition from fossil fuels to electric power in buildings
- Considering all-electric building codes for new developments to support a transition to carbon-free energy sources

These recommendations provide a framework for Los Alamos County to reduce greenhouse gas emissions and align with its broader climate goals, emphasizing sustainable transportation, electrification, and renewable energy.

[33] integrated-resource-plan-irp-2022-final-report.pdf
[34] https://www.losalamosnm.us/files/sharedassets/public/v/2/departments/county-manager/documents/cap-appendices/appendix-b.-consumption-based-ghg-emissions-inventory-report.pdf

5.0 ELEMENT 4: FACILITIES ASSESSMENT

5.1 FACILITIES ASSESSMENT PROJECTS

The following section introduces the timeline and cost estimates for the infrastructure associated with ACT's transition to battery electric vehicles.

5.2 ACT'S CURRENT FACILITY

ACT currently operates its fleet of fixed route and demand response vehicles out of one facility that is shared between several other Los Alamos County departments. The facility is equipped to maintain and fuel diesel, CNG, and gasoline vehicles. ACT is installing two 125kW plug-in charging systems at the facility using the 2019 Low-No program award.

ACT is identifying the necessary space required to accommodate ten 150kW chargers and 20 dispensers and six 12kW chargers with six dispensers in coordination with parking all 29 of the agency's vehicles. The facility is also being prepared to have the necessary power capacity. In addition, ACT plans to conduct a detailed study to assess on-route charging needs and locations. More information about ACT's facility and infrastructure considerations can be found in Appendix B: Facility and Infrastructure Considerations.

5.3 BATTERY ELECTRIC BUS FACILITIES ASSESSMENT OVERVIEW

Scaling to a full fleet of battery electric vehicles necessitates significant infrastructure enhancements and a different charging strategy compared to smaller deployments. Initially, charging needs can be met with a few plug-in pedestal chargers and minimal infrastructure investment. However, deploying a full fleet requires numerous charging stations and upgrades to the existing electrical infrastructure, such as switchgear or service connections.

Once specific charging equipment is chosen, detailed planning and design work, including electrical and construction drawings for permitting, become essential. This assessment divides the infrastructure work into three main project types: planning, power upgrades, and charging equipment (chargers and dispensers). Estimated costs for each project type are provided in Table 5-1.

Table 5-1: Battery Electric Vehicle Infrastructure Project Cost Assumptions

Project	Estimate Metrics	Cost Estimate	Source
Infrastructure Planning	Infrastructure Design and Planning	$200k per project	Quotes, estimates, industry research
Power Upgrade Projects	Design, Construction, and Equipment	$300k per project assumed. Variable per project dependent on capacity added.	Quotes, estimates, industry research
Charging Installation Projects	Charging Equipment and Installation	• $480k per 450 kW DC fast charger • $160k per 150 kW charger • $43k per 12 kW charger (inclusive of dispenser cost) • $15k per dispenser • $50k per pantograph	Quotes, estimates, industry research

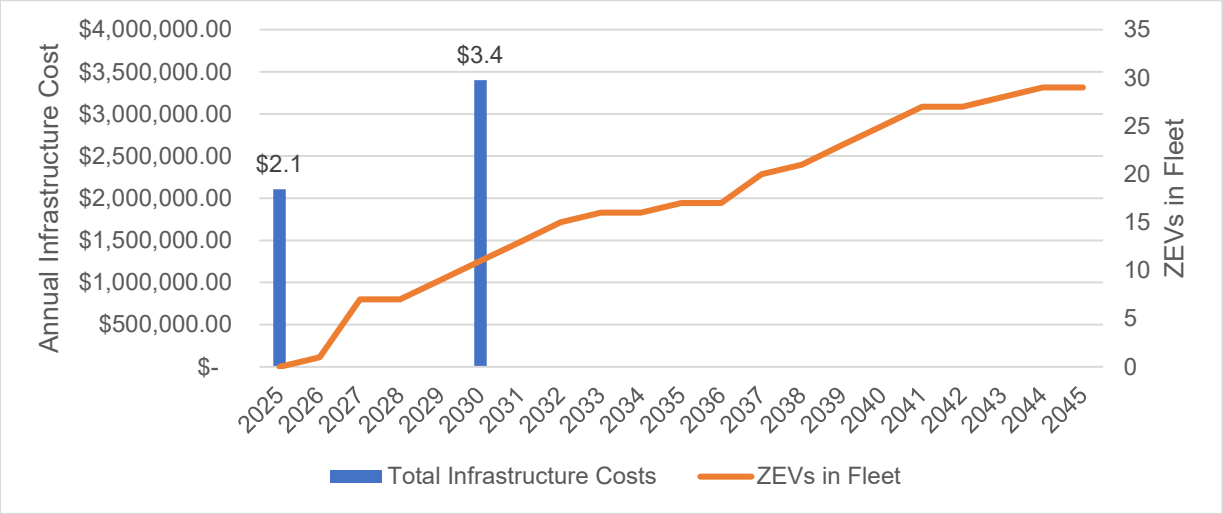
Key assumptions applied in ACT's Facilities Assessment are as follows:

- One pantograph will be connected to each of the thee 450 kW DC fast chargers at on-route facilities (two at the Transit Center and one at White Rock Library or Visitor Center)
- Each bus or vehicle will have a dedicated plug-in dispenser
- Two plug-in dispensers will be connected to each 150 kW DC fast charger (Level 3)
- One plug-in dispenser per 12 kW charger (Level 2)
- Two charge windows, i.e., no more than half the buses charge at any given moment
- Incremental power requirements are met over time. Power upgrades are consolidated to occur in selected years, in accordance with the required demand

5.4 BATTERY ELECTRIC BUS INFRASTRUCTURE COST SUMMARY

Figure 5-1 summarizes all costs for charging infrastructure for ACT's transition to a battery electric vehicle fleet. The estimated total infrastructure costs are approximately $5.5 million. This total cost includes power upgrade projects, charger and dispenser installations, planning projects, and design-engineering costs for the depot as well as on-route charging locations. However, estimated cost does not account for inflation, contractor fees, nor any other upgrades required to bring the existing facility up to code.

Figure 5-1: Depot and On-Route Charging Infrastructure Costs



6.0 ELEMENT 5: PARTNERSHIP ASSESSMENT

6.1 LOS ALAMOS DEPARTMENT OF PUBLIC UTILITIES

The collaboration between ACT and the Los Alamos Department of Public Utilities (DPU), is essential for the successful transition to a battery electric fleet. ACT's discussion of short- and long-term fleet goals with DPU ensures that DPU can properly plan grid-side electrical infrastructure upgrades, and that ACT can adequately upgrade behind-the-meter equipment to support battery electric vehicles. Once the infrastructure upgrade needs are established, ACT will incorporate the design and construction timelines into the overall transition plan timeline.

DPU operates as a municipal utility under the jurisdiction of the Board of Public Utilities and is part of the Los Alamos County government.[35] This setup is similar to ACT, which facilitates smoother collaboration since both entities are integrated within the same county structure. This alignment allows for more efficient communication and coordination, streamlining processes such as infrastructure planning and resource allocation. The shared governance and community-focused approach help ensure that both ACT and DPU can work together effectively to support ACT's transition to a ZEV fleet.

ACT recognizes DPU as a critical partner in electrification and will continue to partner with DPU after the planning stages, so that change management strategies and fleet expansion efforts can be coordinated effectively. DPU and Stantec have met to discuss the expected load at the facility and have confirmed the available capacity to the site, in addition to inform DPU about the implementation timeline. Additionally, DPU will provide a letter of support for the ZEV transition.

6.2 NEW MEXICO DEPARTMENT OF TRANSPORTATION

New Mexico Department of Transportation (NMDOT) has played a crucial role in ACT's ZEV fleet transition planning. NMDOT provided the necessary funding to conduct this comprehensive fleet assessment, enabling ACT to plan effectively for future infrastructure needs and prepare for a Low-No grant submission. Throughout the planning process, NMDOT has been actively involved in providing valuable feedback and guidance, ensuring that the transition aligns with state and regional transportation goals. This ongoing support from NMDOT highlights the collaborative efforts between state and local entities to promote sustainable and efficient public transportation solutions.

[35] https://www.losalamosnm.us/Government/Departments-and-Divisions/Department-of-Public-Utilities

7.0 ELEMENT 6: WORKFORCE ASSESSMENT

ACT, located in Los Alamos, NM, operates an active revenue fleet of 28 vehicles composed of heavy- and medium-duty buses, school buses, cutaways, and vans. ACT is committed to transitioning to a fully battery electric vehicle fleet by 2045. In order to support ZEV operations at this scale, ACT has identified opportunities to ensure the current and future workforce is prepared to manage its full fleet of 29 future ZEVs. This Workforce Development Plan focuses on ZEV operations and maintenance.

In alignment with FTA's requirements under the Workforce Development for the Low-No program, ACT will build a ZEV workforce program and will determine how to best reskill and upskill the current workforce to meet the needs of ACT's future operational and maintenance needs.

7.1 WORKFORCE ANALYSIS OVERVIEW

Developing and training the workforce required to operate and maintain battery electric vehicles requires significant investment and planning. ACT is experienced in recruiting, hiring, training, and integrating new staff to ensure that employees are qualified to provide quality services to the community. ACT recognizes that a trained ZEV workforce is not readily available, and the transit industry must address the shortage of technicians and mechanics together.

ACT plans to develop and maintain a qualified ZEV staff by hiring qualified new staff and retraining existing staff who have previously worked with internal combustion engine (ICE) systems. Meaningful investment is required to upskill maintenance staff and bus operators that were originally trained in diesel vehicle maintenance and fossil fuel fueling infrastructure. Transitioning to ZEVs is a paradigm shift for all aspects of transit operations including but not limited to scheduling, maintenance, and yard operations. ACT's workforce development activities will address the identified skills and tools needed for each relevant team.

7.2 IDENTIFIED TRAINING NEEDS

Several training needs have been identified by ACT to support the transition to a battery electric vehicle fleet. ACT is committed to ensuring new training and technologies do not displace current workers and has placed a priority on training existing staff as well as developing an apprenticeship program. These training needs are expected to evolve as ACT's fleet expands. Therefore, the following training plans are intended to provide a framework.

In addition, ACT aims to become a leading center for organizations in the region, fostering collaboration and serving as a resource for ZEV training, working sessions, and knowledge sharing. Potential partners

include North Central Regional Transit District (NCRTD), the New Mexico Transit Association, the Los Alamos County School District, and other relevant and interested organizations and agencies.

1. **Apprenticeship Program**

   ACT plans to develop and implement an apprenticeship program. The program will include structured on-the-job training and classroom instruction. Apprentices work alongside experienced technicians to gain hands-on experience while also attending courses on ZEV technology and maintenance.

2. **Vendor Training from Vehicle and Charger OEM**

   ACT plans to attend trainings from the bus manufacturers and infrastructure suppliers, including maintenance and operations training, maintenance and safety, first responder training, and other trainings that may be offered by the providers. For example, Gillig trainings provide critical information on operations and maintenance aspects specific to the equipment model procured. ACT training staff will work closely with Gillig to ensure all mechanics, service employees, and bus operators complete necessary training prior to deploying ZEV technology. ACT staff will also be able to bring up any issues or questions they may have about their training with their trainers. Additionally, trainers will observe classes periodically to determine if any staff would benefit from further training.

   Gillig training is comprised of the following programs:

   - Operator Training
   - Maintenance Department General Vehicle Orientation
   - Battery Electric Bus Operator Training
   - Battery Electric Bus Service Personnel Training
   - Battery Electric Bus Technician Safety and Familiarization
   - Air System and Brakes
   - Basic Bus Electrical System
   - Multiplex Electrical System
   - E-FAN System/Hydraulic System
   - Allison EP40 Hybrid Electric Familiarization
   - BAE Hybrid Electric Familiarization
   - Gillig Emissions
   - Entrance/Exit Door Systems

   In addition, ACT plans to complete the EBus High Voltage Training NFPA 70E. The National Fire Protection Association (NFPA) 70E is a comprehensive standard that establishes best electrical safety practices standards on how to protect industrial workers from electric arc flash and arc blast exposure and resulting potential injury and death. Although compliance is not mandatory, ACT is committed to employee safety and electrical safety training.

3. **Train-the-Trainer Approach**

   Many procurement contracts include train-the-trainer courses through which small numbers of agency staff are trained and subsequently train agency colleagues. This method provides a cost-efficient opportunity to minimize the need for external training while onboarding institutional knowledge and supporting initial agency training on new equipment and technologies. ACT will primarily rely on OEM training for their newly acquired ZEV fleet, but a train-the-trainer approach will facilitate the acquisition of knowledge.

4. **ZEB Tools**

   The following tools will used for training. There are specialized tools used to monitor correct operational functions of the electrical power train and diagnose anomalies and failures to the system. These diagnostic tools will be used for training to make sure technicians are well equipped and versed in the correct usage of such tools.

   1. Laptops
      a. Dell E5570 Latitude
      b. Toughbook CF31
      c. Dell Latitude 14 Rugged
   2. Cummins Tools
      a. Datalink Adapter Kit
      b. Battery Locking Device
      c. Heliox Mobile Chargers (25KW and 50KW)
   3. BW Battery Pack System Diagnostic Tools
      a. 24V Rechargeable Power Supply
      b. Various Test Cables and Dummy Plugs
   4. HVAC Tools
      a. Intelligare III, Smart PAC Tool
      b. Diagnostic Kit with USB Webasto
   5. Maintenance & Diagnostic Tools
      a. Coolant Bucket Fill Kit
      b. Modine Radiator Diagnostic Kit
      c. Coolant Extractor/Injector Systems
   6. Electrical Tools
      a. Connector & Terminal Kits
      b. Diagnostic Kits
   7. High Voltage Tools
      a. Digital Multimeter
      b. Torque Wrench and Driver
      c. Insulated Tool Sets
      d. Lockout Devices
      e. Personal Protection Equipment
      f. Insulated Mat

   g. Arc Flash Harness
   h. Lineman Gloves
   i. Arc Flash Kit
8. Software and IT/Tech Tools
   a. INSITE Lite Subscription Software
   b. INSITE Pro Subscription Software
   c. PCAN Explorer 6 Software (Stand Alone)
   d. PCAN Explorer 6 J1939 Add-in
   e. PCAN Explorer 6 – CANdb Add-in
   f. WABCO Software, ABS Toolbox
   g. Utility Program, G5-DINEX
   h. USB Downloader Program
   i. Real-Time Ladder Logic Software
   j. Interface Cables
   k. Maintenance I/O Tool (Tablet)
9. General Tools
   a. Bar Tow, Lowfloor
   b. Diagnostic Thermal Imager
   c. Hydraulic Floor Jack
   d. Various Keys and Kits
   e. Windshield Lifter
   f. On-Vehicle Disc Brake Lathe
   g. Refrigerant RRR Machine
   h. Brake Mate Tool

5. **Retraining and Refresher Courses**

   Access to OEM training resources would be highly desirable to develop refresher and follow-on training programs using OEM source materials.

6. **ZEB Training from Other Transit Agencies**

   ACT would be interested in using any available manuals or training created at sister transit agencies, so long as the content was determined to be directly applicable to the ZEV equipment utilized by ACT. ACT, as much as is possible given certain proprietary claims and copyrights, would reciprocate in the willingness to share ACT materials with other transit agencies.

7. **National Transit Institute (NTI) Training**

   NTI offers zero-emissions courses such as ZEV management and benchmarking and performance. ACT would be receptive to utilizing this training resource.

8. **Local Partnerships and Collaborations**

Building relationships with local schools and technical colleges will help the transition to battery electric vehicles by creating a steady stream of interested and skilled workers. Partnerships with schools such as Santa Fe Community College and Northern New Mexico College, will allow ACT to tap into the specialized training and resources of educational institutions. Graduates of these programs should be prepared to work in ZEV maintenance fields as technicians.

In addition, ACT aims to build local partnerships to create a regional center for ZEV training, working sessions, and knowledge sharing. Potential partners include North Central Regional Transit District (NCRTD), the New Mexico Transit Association, the Los Alamos County School District, and other relevant and interested organizations and agencies.

9. **Professional Associations**

   Associations such as the Zero Emission Bus Resource Alliance (ZEBRA) and the American Public Transportation Association (APTA) offer opportunities for sharing and lessons learned across transit agencies. ACT plans to leverage these resources.

7.3 RESOURCES AND STRATEGIES TO MEET IDENTIFIED NEEDS

To incorporate the identified training needs, ACT plans to use various resources and strategies. Achieving these goals and ensuring the successful deployment of battery electric vehicles will require external funding for the workforce development initiatives. Low-No funding will enable the implementation of the workforce development plan alongside the deployment of vehicles and infrastructure. The workforce development strategies outlined above are included in the budget items requested in Table 7-1. However, this funding request represents only a small percentage of the total needed to transition the entire fleet.

In order to incorporate the above training needs, ACT envisions using the following resources and strategies. To achieve these goals and ensure a successful deployment of ZEVs, ACT will require $292,840 in funding to cover the workforce development initiatives identified. Low-No funding will ensure the workforce development plan can be implemented in parallel with deployment of vehicles and infrastructure.

Table 7-1: Training Resources

Training Resource	Low-No Budget	Source
OEM Operator, Maintenance Staff, and First Responder Training	$48,000	Quote from Gillig, $9,600 per vehicle
Infrastructure Training	$21,840	1% of infrastructure costs
Training Aids, Simulators, Components, Equipment	$132,000	Quote from Gillig
PPE, Tools, and Equipment	$91,000	Quote from Gillig
Total	$292, 840	

7.4 WORKFORCE DEVELOPMENT TIMELINE

Aligning workforce development activities with the fleet transition timeline ensures a qualified workforce is ready to support successful deployment. Based on ACT's plan to become 100% zero-emission by 2045, the anticipated progression is as follows:

- By 2028, 24% of the ACT fleet will be battery electric vehicles
- By 2032, 52% of the ACT fleet will be battery electric vehicles
- By 2038, 72% of the ACT fleet will be battery electric vehicles
- By 2045, ACT will achieve a 100% battery electric vehicle fleet transition

Employees will receive training from the OEM starting three months before the deployment of the battery electric vehicles and will have ongoing training for new employees and refresher training after deployment.

Drivers will receive training once the battery electric vehicles are on-site and before they are deployed in service. Using monitoring tools, drivers will receive additional training as needed to help improve efficiencies in their driving techniques.

Workforce development is an ongoing process that must continue as fleets scale up and deploy additional ZEVs. To ensure the workforce scales efficiently and cost-effectively, ACT will employ training strategies that support future ZEV deployments. ACT anticipates that its needs will shift over time as it adopts new vehicle and fueling technologies, and its workforce development programming will evolve accordingly.

8.0 SUMMARY AND RECOMMENDATIONS

Stantec's system modeling confirms that transitioning to an all-electric fleet, beyond the initial Low-No program implementation, is both feasible and beneficial for ACT. The analysis highlights the importance of on-route charging to maintain operational feasibility and support a successful shift to battery electric vehicles. With the right infrastructure in place, the full transition can be achieved by 2045, including the addition of one fixed-route vehicle. Table 8-1 provides a comparison of the full fleet transition and the initial Low-No program transition, outlining key details and estimated costs.

Table 8-1: Transition Plan Comparison

Item	Full Fleet Transition		Low-No Transition	
	Details	Estimated Cost	Details	Estimated Cost
Vehicles	24 battery-electric buses 6 battery-electric cutaways Includes vehicle replacement through 2045	$35,100,000	3 40-ft. battery electric buses (BEBs) 2 battery electric (BE) cutaways	$3,936,000
Infrastructure	3 on-route 450 kW DC chargers w/pantographs 10 fast chargers (150 kW) with 20 dispensers 6 level 2 (12 kW) with dispensers	$5,500,000	Infrastructure planning 2 450 kW DC chargers 2 pantographs 4 150 kW chargers 8 dispensers	$2,106,00036

[36] Total infrastructure cost is anticipated at $5.5 billion but the first phase of implementation was estimated at $2,106,000.

			2 12 kW chargers with dispensers	
Training	Operator training Maintenance staff training provided by Original Equipment Manufacturer (OEM) Use of charging equipment training Procurement of training equipment Personal protective equipment (PPE) and tools	$292,840	Operator training Maintenance staff training provided by Original Equipment Manufacturer (OEM) Use of charging equipment training Procurement of training equipment Personal protective equipment (PPE) and tools	$292,840
Total Estimated Cost	**$40,892,840**		**$6,334,840**	

Even though this plan recommends the implementation of battery-electric vehicles, keeping an eye on regional hydrogen developments, such as a potential collaboration with Los Alamos National Lab, remains crucial. Additionally, the availability of hydrogen vehicles like cutaways, is important to track because, in the long run, they may offer a more efficient solution for ACT's service design. Lastly, it is important to maintain the relevance and accuracy of this plan, therefore it is recommended to complete updates every 4-5 years. Updates should focus on ACT's shifting priorities, ZEV market advancements, the funding landscape, and any other factor deemed critical to the adoption of ZEV technology.

9.0 APPENDIX A: VEHICLE PERFORMANCE MODELING

To provide a comprehensive understanding of the vehicle technology recommendations, the following sections detail the vehicle performance modeling inputs, methodology, and results for both fixed route and demand response services.

The first step to understanding the feasibility of ZEVs as a replacement for fossil fuel vehicles is to conduct vehicle performance modeling under specific operating conditions. The modeling uses real operations data to simulate how a ZEV fleet would perform while completing current service. The results of the modeling provide insight into fuel economies, energy requirements, and operating ranges and determine the overall viability of implementing a ZEV fleet.

Before the modeling is conducted, there are a variety of factors, known as inputs, that need to be carefully determined. These inputs play a crucial role in accurately simulating and predicting the performance of ZEVs under various operating conditions. The inputs for ACT's fixed route and demand response services are summarized in Table 9-1 and Table 9-2.

Table 9-1: Fixed Route Service Inputs

Input	Value	Notes
Battery & Tank Size	• Bus 40-ft.: 520 kWh, 37.5 kg • Bus 35-ft.: 450 kWh, 37.5 kg • Bus 30-ft.: 450 kWh, 37.5 kg	
Passenger Loads[37]	• High: 100 – 125% • Low: 25%	125% assumed for routes 6, 7, 8, 9, 10, 11,12
Topography	• 5 – 17% penalty based on grade	Higher penalty assumed for routes 2M, 2T, 4,12
Temperature	• 20 degrees F	
Success Criteria	• Battery electric: 30% SOC remaining • Hydrogen: 33.8 kg max usage (90% tank capacity)	

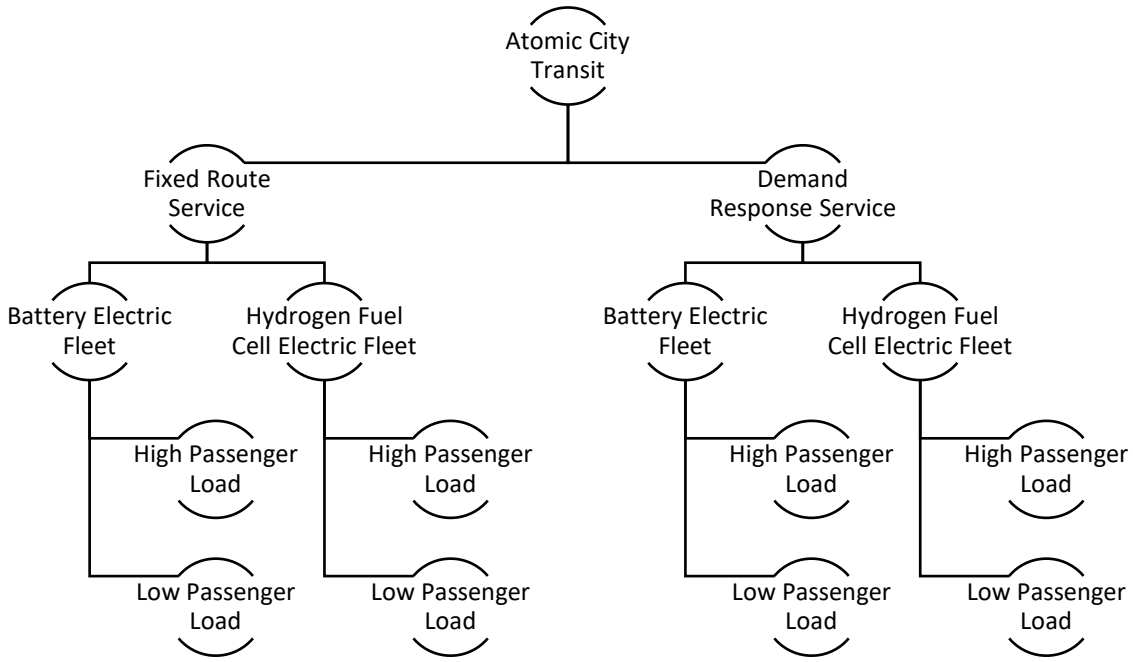
[37] Percentage based on seated capacity

Table 9-2: Demand Response Service Inputs

Input	Value
Battery & Tank Size	• Cutaway: 150 kWh, 13.5 kg
Temperature	• 20 degrees F
Success Criteria	• Battery electric: 30% SOC remaining • Hydrogen: 12.2 kg max usage (90% tank capacity)

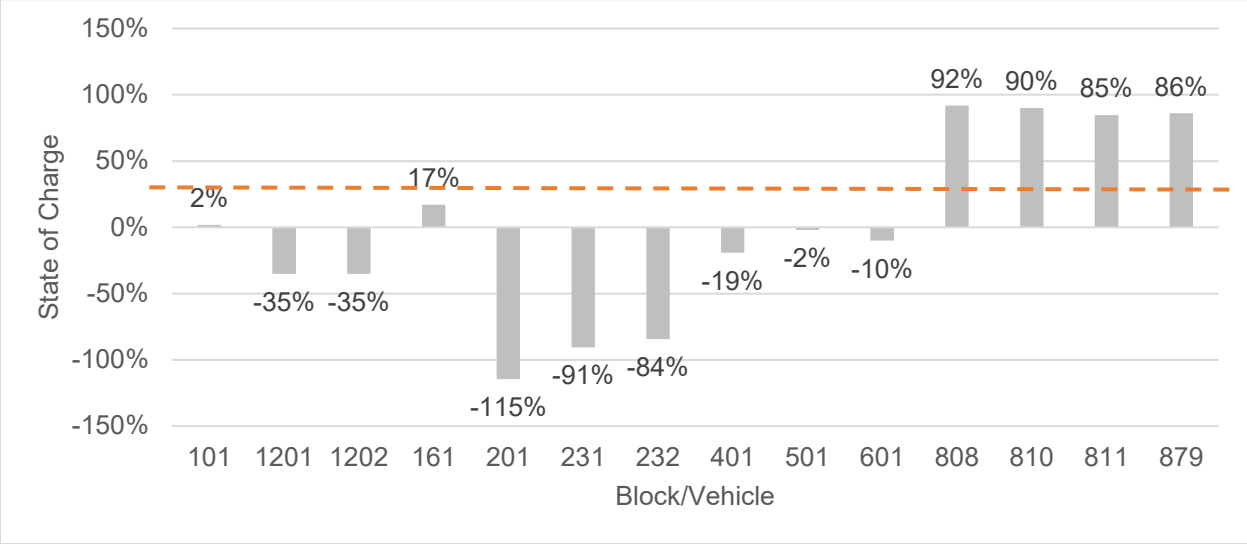
After the inputs were determined, ACT's fixed route and demand response services were modeled with a battery electric vehicle fleet, and a hydrogen fuel cell electric vehicle fleet using sample dispatch data provided by ACT. Each service and technology type were also modeled using a high passenger load and a low passenger load. The modeling process is depicted in Figure 9-1.

Figure 9-1: Vehicle Performance Modeling Methodology



A battery electric vehicle is considered successful if it can complete its scheduled service and return to the facility with at least a 30% state of charge (SOC). Of the fourteen blocks[38] modeled for fixed route service, four are successful (Figure 9-2). This means 29% of service could successfully be completed using battery electric vehicles.

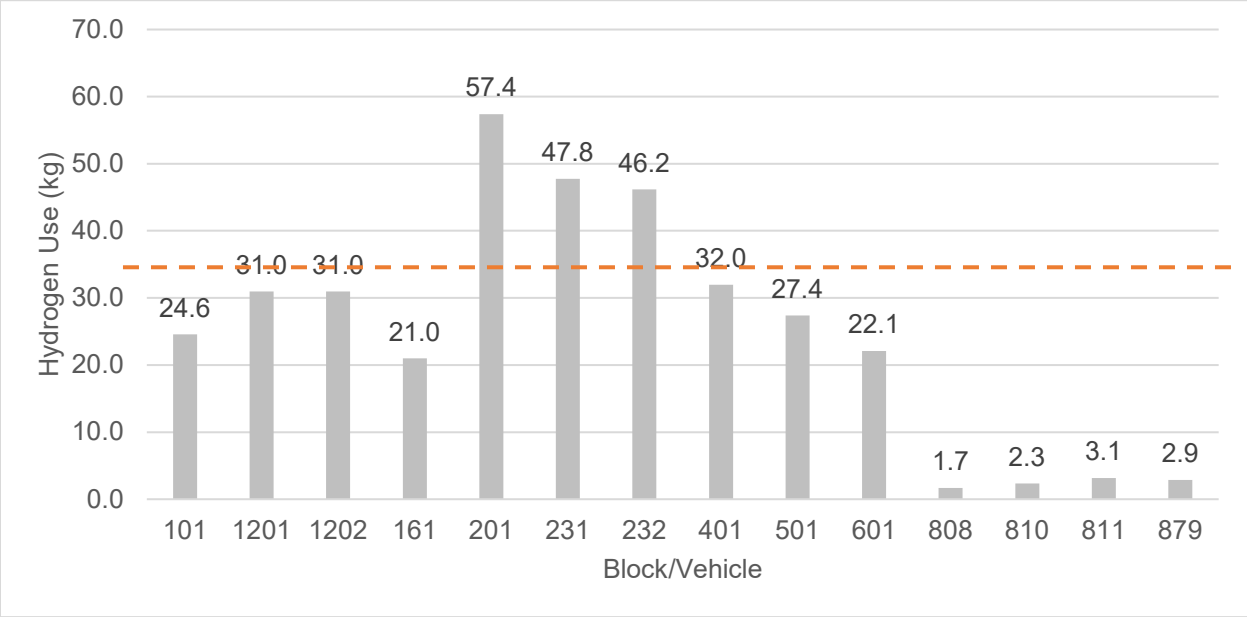
Figure 9-2: Fixed Route Battery Electric Vehicle Modeling Results



A hydrogen fuel cell electric vehicle is considered successful if it can complete its scheduled service using less than 33.8 kg of hydrogen. Of the fourteen blocks modeled, eleven are successful (Figure 9-3). This means 79% of fixed route service could successfully be completed using hydrogen fuel cell electric vehicles.

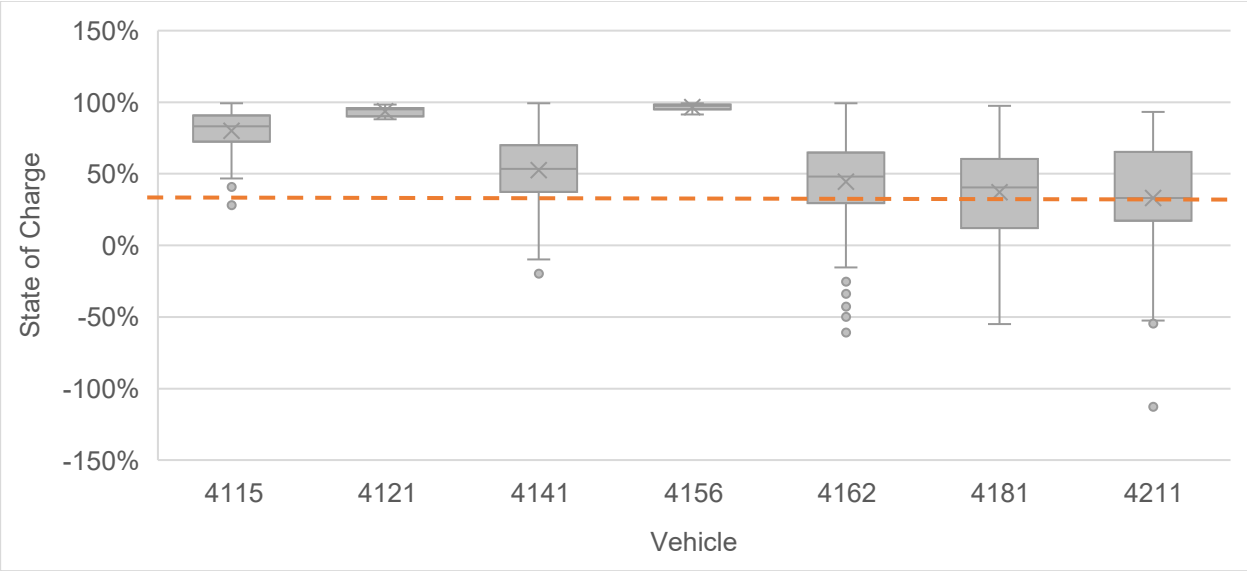
[38] Because ACT assigns one vehicle to one block, the block-level modeling results are synonymous with vehicle-level modeling results.

Figure 9-3: Fixed Route Hydrogen Fuel Cell Electric Vehicle Modeling Results



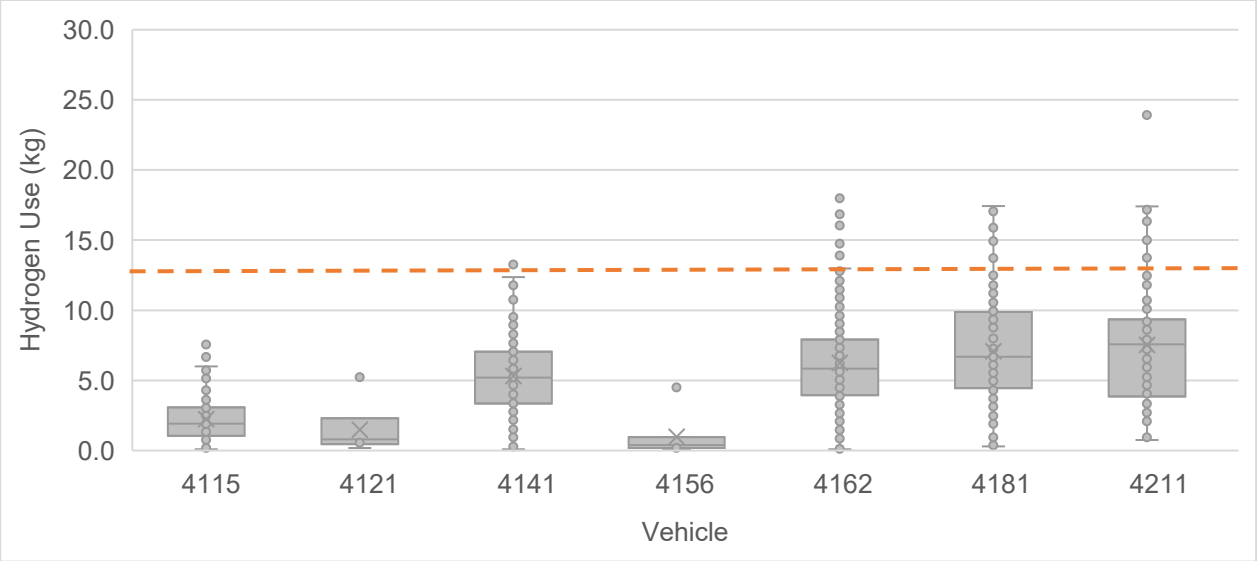
As with fixed route service, a demand response battery electric vehicle is considered successful if it can complete its daily service and return to the facility with at least a 30% SOC. The modeling shows 77% of demand response service could successfully be completed using battery electric vehicles (Figure 9-4).

Figure 9-4: Demand Response Battery Electric Vehicle Modeling Results



For demand response service, a hydrogen fuel cell electric vehicle is considered successful if it uses less than 12.2 kg of hydrogen to complete its daily service. The modeling shows 95% of demand response service could successfully be completed using hydrogen fuel cell electric vehicles (Figure 9-5).

Figure 9-5: Demand Response Hydrogen Fuel Cell Electric Vehicle Modeling Results



All modeling results are summarized in Table 9-3.

Table 9-3: Modeling Results Summary

Service	Blocks Modeled	Successful Blocks	Successful Service Delivery
Fixed Route	14	• Battery electric: 4 • Hydrogen: 11	• Battery electric: 29% • Hydrogen: 79%
Demand Response	N/A	N/A	• Battery electric: 77% • Hydrogen: 95%

In conclusion, the modeling results show that both fixed route and demand response services could be more effectively served with hydrogen fuel cell electric vehicles. However, there are several reasons why hydrogen fuel cell electric vehicles are not currently a feasible option for ACT:

- Limited hydrogen fuel supply in the region
- Lack of hydrogen fuel cell electric vehicle equivalents

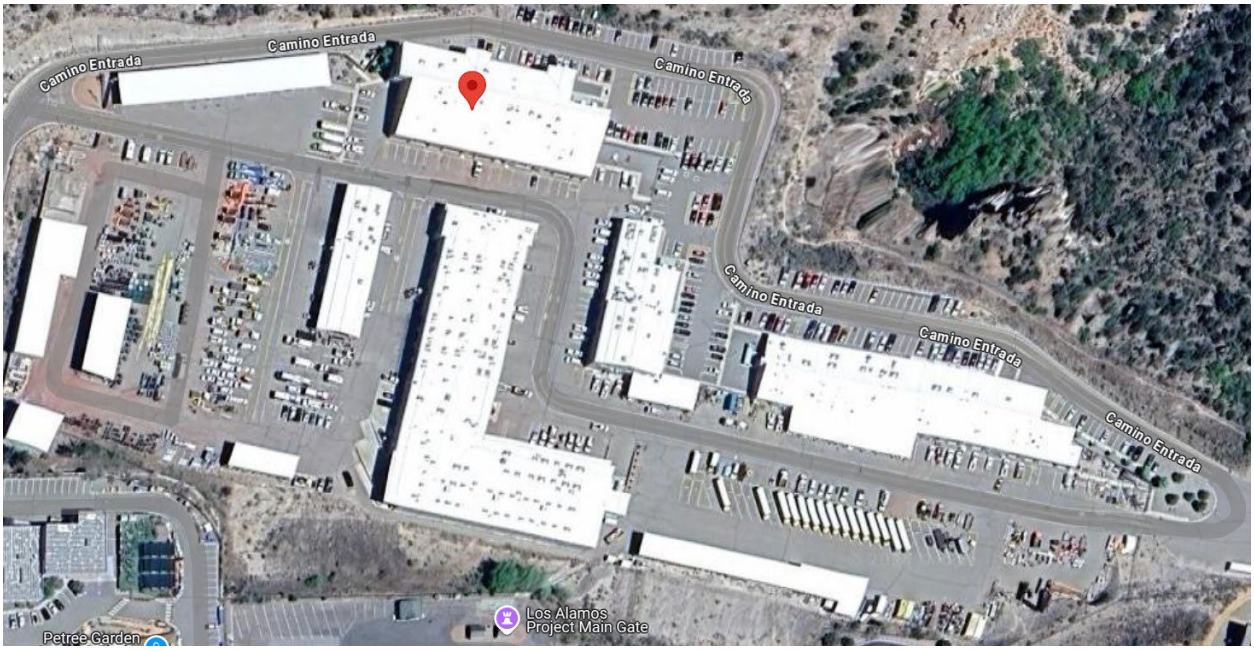
- Capital cost for hydrogen fueling infrastructure
- Updates to maintenance facility to support high pressure gas

Because of this, ACT will begin its ZEV fleet transition with battery electric vehicles. As hydrogen fueling infrastructure develops in the region and hydrogen fuel cell electric vehicle technology advances, ACT will reassess the integration of hydrogen fuel cell vehicles into their fleet and update this plan as needed.

10.0 APPENDIX B: FACILITY AND INFRASTRUCTURE CONSIDERATIONS

The ACT facility is located at 101 Camino Entrada Los Alamos, NM 87544 (Figure 10-1). It is a fenced area that is comprised of five buildings and is shared by several organizations, including the county, school district, utilities, parks, traffic and streets, wastewater, and risk management departments. It is equipped with a diesel-powered generator to maintain operations during power outages, although such events are rare. The parking lot is shared between departments with designated areas and is currently at full capacity.

Figure 10-1: ACT Facility



Service staff operate in shifts, with all operators checking in at the office in the morning for vehicle assignments before heading downstairs to the vehicle storage area. The facility operates from 5 AM to 9:30 PM, Monday through Friday. The morning shifts occur from 5:15 AM to 1:45 PM and afternoon shifts from 11 AM to 7:30-8 PM. Due to staffing constraints, weekend service is not offered. Operators rotate through all shifts and are assigned to different buses as needed.

Transit vehicles enter the facility from the main street and follow a specific service cycle. They first undergo diesel exhaust fluid (DEF) fueling near the canopies, then proceed to the fueling station near the entrance. The fueling station provides both gasoline and diesel. If needed, vehicles are washed at the wash bays next to the fueling station before returning to the canopy area for post-trip and interior cleaning by the operators.

Maintenance activities take place in a dedicated building. The building includes one welding bay and seven maintenance bays that can service up to seven vehicles at a time. The maintenance area is equipped with vacuums for exhaust, a hoist with a 20,000 lbs. capacity, and high ceilings for roof equipment maintenance. The team handles preventive maintenance and breakdowns for various vehicles, including buses, tractors, and snowplows.

Figure 10-2: ACT Maintenance Bays

The front area of the facility is designated for employee and public parking, accommodating vendors, lost and found items, and customers obtaining permits for traffic and streets. There are plans to add chargers for public spots near the first transformer on the right side and another charging station near the second transformer.

ACT identified the ideal location for the first battery electric vehicles and charger locations, shown in Figure 10-3. This placement aims to maximize the use of existing infrastructure while ensuring efficient and accessible charging for the battery electric vehicle fleet.

Figure 10-3: Charger and Dispenser Locations

10.1 CHARGERS AND POWER REQUIREMENTS

For battery electric vehicles, robust charging infrastructure is essential. Based on the vehicle performance modeling, the following charging infrastructure will be required at the facility, as well as on-route charging locations in Los Alamos and White Rock. A high-level assessment of the necessary infrastructure and power needs are summarized in Table 10-1 and Table 10-2. However, a more detailed study is recommended to determine exact on-route charging locations and the required infrastructure.

Table 10-1: Infrastructure Needs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Infrastructure planning	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Power upgrade project	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
450 kW DC charger (on-route)	2	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 kW charger	4	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 kW charger	2	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pantograph (on-route)	2	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dispenser	8	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 10-2: Power Needs

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	Total (kW)
450 kW DC charger	900	0	0	0	0	1350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
150 kW charger	600	0	0	0	0	900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12 kW charger	24	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Main Facility (kW)	**624**	**0**	**0**	**0**	**0**	**948**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1572**
Total Transit Center (kW)	**900**	**0**	**0**	**0**	**0**	**900**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1800**
Total White Rock (kW)	**0**	**0**	**0**	**0**	**0**	**450**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**450**

10.2 OTHER INFRASTRUCTURE

In addition to chargers, ACT's facility may require several upgrades to successfully support the operation of battery electric vehicles, including:

- **Transformer**: The transformer may need to be upgraded to provide adequate additional power to the facility, ensuring that all electrical systems and equipment can operate efficiently.
- **Switchgear**: The switchgear may need to be upgraded to control, protect, and isolate electrical circuits, enhancing the safety and reliability of the power distribution system.
- **Generator**: A new generator may be required to provide backup power during outages, ensuring that critical systems remain operational and minimizing downtime.

- **Power Feeders**: New power feeders may be required to distribute electricity from the main power source to various parts of the facility, supporting the increased power demand.
- **Communication Infrastructure**: The communication systems may be needed to improve monitoring and management of the facility's operations. The charging system will use IP Ethernet (Cat 6 or fiber) for data communication between chargers, dispensers, and a local switch. Data can be managed locally by ACT or sent to a cloud system, requiring security coordination. A Wi-Fi network is recommended for bus communication during upgrades.
- **Pavement and Trenching**: Pavement and trenching work may be required to accommodate the new infrastructure, improving the layout and functionality of the facility.
- **Grid Connection**: The facility may require new electrical service connection(s). The utility will likely require that a service study be performed to identify any transmission or distribution system upgrades that may be needed to support the additional power demands from the vehicle chargers. It will be up to the utility to determine if the local power distribution system has the capacity to serve ACT's new charging loads as well as any other planned loads in the area.

10.3 SAFETY AND RESILIENCY

In addition to facility upgrades, several safety factors must be considered.

- **Fire Protection**: Due to the nascency of battery electric vehicle technology, there are no specific fire protection requirements or building codes for these vehicles. However, best practices may include enhanced sprinkler system coverage, thermal cameras for heat detection, and designated areas on the property for a vehicle experiencing a thermal event. All facility modifications should be reviewed with local authorities, particularly for fire truck and hydrant access.
- **Fall Protection Systems**: Batteries are often located on the roofs of BEBs and need regular maintenance. Fall protection systems ensure safety during maintenance by preventing falls when accessing rooftop equipment.
- **Overhead Cranes**: Heavy rooftop equipment on BEBs requires specialty cranes for safe removal. Depending on fleet size and budget, either a bridge crane for multiple bays or a jib crane for one bay is recommended.

ACT must also consider resiliency factors for grid-outage conditions. Ensuring vehicles can charge during shutdowns is crucial for continuous operation and emergency preparedness. There are a few options for providing emergency power:

- **Battery Electric Storage Systems (BESS)**: These systems store electrical energy in batteries for use during outages. They provide temporary relief but are costly and require supportive energy policies.

- **Generators (Permanent or Mobile)**: These devices generate electricity during outages. Permanent generators need permits and have usage limits, while mobile generators have fewer restrictions but still require coordination with local authorities.
- **Solar Energy**: Solar panels generate renewable energy to supplement power needs and reduce charging costs. However, they are limited in emergencies and typically need to be paired with fossil fuel generators for reliable battery electric vehicle fleet charging.

Each option has its advantages and limitations, and a combination of these solutions may be necessary to ensure a resilient and reliable power supply for ACT's battery electric vehicle fleet.