Charleston Area Regional Transportation Authority

CLIMATE ACTION PLAN

May 2022

CARTA

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1 INTRODUCTION

PURPOSE

This Climate Action Plan sets the stage for the Charleston Area Regional Transportation Authority (CARTA) to electrify its transit fleet by 2045 and to reach net zero emissions agencywide by 2050. This Plan guides development of a policy framework and a fully integrated strategic plan in order achieve these two goals. It will be used to direct planning, programing and operating activities undertaken by CARTA to support a cleaner, healthier and more environmentally-sustainable transit system.

HISTORY

In 2018, CARTA passed a resolution to convert its entire fixed-route fleet to battery-electric buses. See Appendix 8.1: CARTA Resolution for more information. This Plan builds on the resolution by establishing a 2045 target year to complete the fleet transition; in addition, it expands CARTA's climate goal to include all vehicles and facilities agencywide.

CONTENTS

Components of the plan include an overview of the transit system and activities it has taken to-date to reduce its greenhouse gas emissions. Using a baseline year of 2018, this plan presents a baseline inventory of the agency's transit fleet emissions. This is followed by a policy statement to guide the next steps for developing a strategic action plan to support this policy.

Figure 1: CARTA Climate Action Plan Timeline

2 AGENCY OVERVIEW

ADMINISTRATION

CARTA's mission is to deliver high-quality, affordable transit service that efficiently links people to employment, education opportunities, and healthcare in the Charleston-North Charleston urbanized area. An 18-member board governs the agency, with members representing the following jurisdictions:

- Charleston County
- City of Charleston
- City of North Charleston
- City of Hanahan
- City of Isle of Palms
- Town of Kiawah Island
- Town of Mt. Pleasant,
- Town of Sullivan's Island.

Although CARTA has its own board, in July 2015, the Berkeley-Charleston-Dorchester Council of Governments (BCDCOG) and CARTA executed an agreement where BCDCOG provides management and supportive services for CARTA. BCDCOG's Executive Director provides management services to CARTA and makes all decisions related to personnel, budget, contracts, and any other needs as they arise.

Other supportive services provided by BCDCOG staff include accounting and financial management (budget analysis/preparation and grant compliance), transit planning services (developing, evaluating, and planning routes) and CARTA Board support services (preparing, scheduling, and hosting Board meetings and various committee meetings).

Further, CARA outsources the provision of fixed route and paratransit service, legal functions, public relations, maintenance oversight, facility maintenance functions and engineering services. CARTA is responsible for all contract administration duties related to the outsourced services and functions, and the contractor for paratransit and fixed-route services use a CARTA-owned operations and maintenance facility.

SERVICE AREA

CARTA provides fixed route transit service to the urbanized area of Charleston-North Charleston, SC, primarily in Charleston County. The population in CARTA's service area has grown rapidly over the last 10 years. According to the most recent 2019 estimates from the U.S. Census Bureau, approximately 628,000 people live in the Charleston-North Charleston urbanized area, a 35% increase from 2010.

The population within the urbanized area is expected to continue to grow, in large part due to the area's thriving student population, flourishing economic base, and growing retiree population. Educational institutions like the Medical University of South Carolina (MUSC), College of Charleston, the Citadel, Charleston Southern

University, and Trident Technical College anchor the area's economy.

In addition to students, a growing retiree population has been drawn to the area in part because the Charleston peninsula serves as a vital healthcare hub within the region and the state. The downtown Charleston medical district is home to MUSC, the Ralph H. Johnson Department of Veterans Affairs Medical Center, and Roper Hospital.

The area's economy is further rounded out by a strong port and manufacturing base, several IT headquarters, the presence of multiple military installations, and a tourism industry built around the area's cultural, historical, natural, and recreational resources.

CARTA SERVICES

To keep the urban area moving, CARTA operates South Carolina's largest public transportation provider, serving more than 11,000 passengers on a typical weekday and more than 3 million passengers per year. As shown in **Appendix 8.2: CARTA System Map**, CARTA services include a combination of express airport and commuter routes, free circulator routes, and fixed routes.

The agency operates an express shuttle between downtown Charleston and the Charleston International Airport, along with three express commuter routes during peak hours for workers traveling from park-and-ride lots to employment centers in downtown Charleston. Once on the peninsula, the free Downtown Area Shuttle (DASH) and Hospitality on Peninsula (HOP) circulators transport workers, students, tourists, and residents around downtown Charleston.

In addition, CARTA operates 18 fixed routes serving the municipalities of Charleston, North Charleston, James Island, and Mount Pleasant in Charleston County. Almost all of these routes connect to one of two transfer centers located in the cities of Charleston and North Charleston.

CARTA FACILITIES

To support its services, CARTA serves two major transfer centers that represent the most active bus stops in the entire system:

- Charleston Visitor Reception & Transportation Center (375 Meeting Street) in downtown Charleston
- The CARTA SuperStop (3376 Rivers Avenue) in North Charleston

CARTA owns the SuperStop facility, and current operations at the facility exceed its capacity. The SuperStop currently serves eight (8) routes, with 15 buses using the facility's two (2) bus bays every hour. The facility provides a small waiting area for passengers and restrooms for CARTA drivers.

In order to expand capacity, a new bus terminal near the SuperStop is under design and slated to include 10 bus bays designed in a sawtooth manner. Early concepts include dynamic assignments for bus routes to allow the bays to facilitate transfers and overhead battery-electric bus charging.

CARTA's 7.2-acre maintenance facility is located in North Charleston (3664 Leeds Avenue). CARTA leases an additional 0.8-acre portion of the adjacent parcel at 3680 Leeds Avenue from SCE&G / Dominion Energy for additional parking space. In addition to vehicle service, fueling (including a plug-in depot for battery-electric bus charging), and fleet parking, the facility provides offices for administrative staff and employee parking.

In 2019, BCDCOG complete a Park-&-Ride Study to identify opportunities for expanding the number of park-and-ride lots in Berkeley, Charleston, and Dorchester counties. Currently, CARTA owns two Park-&-Ride lots:

- North Charleston Rivers Avenue Park&-Ride lot (2150 Melnick Drive) with 200+ parking spaces
- A new Hospitality on Peninsula (HOP) lot under development in downtown Charleston

Six other park-and-ride lots throughout the service area exist through agreements with businesses. There are currently no fees for using these lots.

CARTA Fleet

To provide this wide-range of services, CARTA operates a mixed fleet of vehicles. CARTA's fleet includes four (4) cutaways for paratransit services, 20 vans/SUVs for paratransit services, sixteen (16) 30' buses for DASH/HOP/Airport service, thirty-six (36) 35' buses for fixed route local services, eight (8) 40 ft buses for fixed route and twenty-two (22) 40' commuter style buses. On the historic peninsula, a fleet of smaller 30-foot buses are used to navigate the narrow streets, while 40-foot commuter coaches are used on the express routes. The fixed-route services include line-haul routes, which operate 35- and 40-foot buses, and neighborhood circulators that use smaller 20- and 25-foot cutaway vehicles. CARTA's Tel-A-Ride service operates a fleet of smaller vans and cutaways used to provide complementary paratransit.

CARTA Funding

CARTA's operation budget for Fiscal Year (FY) 2021 was $23.4 million, and its capital budget was $20.3 million (including vehicles). These budgets are funded by a combination of federal and local sources. CARTA typically receives about $600,000 in state funds for operations, and federal funds make up approximately 30% of CARTA's operating budget.

A large portion of CARTA's funding comes from local sources. The primary source of local funds is provided from two half-cent sales tax programs from Charleston County. First in November 2004, Charleston County voters approved a half-cent Transportation Sales Tax on purchases over a 25-year period, or until $1.3 billion was collected. Charleston County allocates 18% of the revenues to CARTA and Tri-County Link, the rural service provider, to provide mass transit to the urban and rural areas of Charleston County. CARTA's share of the sales tax revenue is not restricted to specific categories and does not have limits on how the funds can be expended. A second Transportation Sales Tax program was approved by Charleston County voters by referendum in November 2016, providing additional transit funds over a

25-year period or until $2.1 billion was collected. The collection periods for the two programs overlap, and 29% of the second Transportation Sales Tax are dedicated to transit.

FLEET MODERNIZATION PROJECT

In 2014, CARTA identified a need for a large capital effort to replace its aging rolling stock as part of its **Fleet Modernization Project** to bring the agency's fleet to a state of good repair. To accomplish this, CARTA has decided to gradually transition to a battery-electric bus (BEB) fleet as part of this project. CARTA received its first BEB in 2019 and had six BEBs in operation by 2021. Twenty-seven more are scheduled for delivery by the end of 2022. Currently, the buses are powered with plug-in depot charging; however, the buses are programmed to include overhead on-route charging.

Funding for CARTA's Fleet Modernization Project has come from a range of local, state, and federal sources. CARTA has used both competitive and programmed funding, such as the South Carolina Volkswagen Settlement funds, Diesel Emissions Reduction Act (DERA) funds, FTA 5339 Program Funds (Bus and Bus Facilities and FTA Lo-No Program, and Annual Allocations), and state capital funds. For more information on the Fleet Modernization Project, see **Appendix 8.3: ZEB Transition Plan**.

In addition, the region is planning its first bus rapid transit (BRT) line, called Lowcountry Rapid Transit (LCRT). The intention is to operate LCRT entirely with 60' BEBs.

3 EMISSIONS INVENTORY

Table 1 presents the baseline emissions inventory for CARTA's fixed-route, diesel transit buses using a baseline year of 2018, which is consistent with the fleet emissions when CARTA resolved to transition its fleet to battery-electric buses. This also represents peak service levels prior to the 2020 COVID-19 Pandemic. In total 74 diesel vehicles emitted 36 short tons of Nitrous Oxides (NOx), less than 1 short ton of fine grain particulate matter ($PM_{2.5}$), 2 short tons of Hydrocarbons(HC), over 12 short tons of Carbon Monoxide (CO),and over 5,100 short tons of Carbon Dioxide (CO_2).

Table 1: 2018 CARTA Diesel Fleet Annual Emissions (Source: USEPA Diesel Emissions Quantifier 5/10/2022)

Number of Diesel Transit Buses in Service	**Model Year**	**Average Vehicle Miles Traveled (VMT)/ Vehicle/Year**	**Annual Baseline of Diesel Vehicles**				
			NOx, short tons	PM2.5, short tons	HC, short tons	CO, short tons	CO2, short tons
18	1994	19286	12.80050552	0.307748337	0.716210249	3.931978793	1241.5275
5	2003	31267	1.944320495	0.065594126	0.175102313	0.715414423	344.86875
3	2015	46139	0.370774261	0.000479207	0.007066084	0.279407856	206.92125
3	2014	22145	0.143894167	0.001236877	0.004286756	0.056841425	206.92125
7	2016	27826	0.341376151	0.003346423	0.007571042	0.153298521	482.81625
22	1996	19286	15.64506607	0.268669148	0.875367774	4.805757532	1517.4225
11	2010	59932	3.541772289	0.004117465	0.185101627	1.68506626	758.71125
5	2012	67491	1.357940356	0.001917661	0.042262738	1.065699807	344.86875
74			**36.14564931**	**0.653109243**	**2.012968582**	**12.69346462**	**5104.05750**

Future updates to this plan will incorporate the baseline for CARTA's gasoline fleet (paratransit, cutaways, and staff vehicles), facility operations, displaced emissions, and equity measures as data sources and availability are refined.

4 PAST AND CURRENT INITIATIVES

Following completion of a Comprehensive Operational Analysis (COA) and a five-year strategic plan in 2014, CARTA identified a $43 million fleet replacement need.

CARTA completed a full replacement of its DASH and Commuter fleets with diesel vehicles because reliable electric coach style buses and smaller shuttles were not available at the time for these specialized services. Although the Commuter and DASH fleets were replaced with diesel vehicles, it is expected that battery-electric or other zero emissions technology will be available for these specialized vehicles on the next replacement cycle starting in 2028.

In 2019, CARTA passed a resolution to convert its entire fixed-route fleet to battery-electric buses (see **Appendix 8.1: CARTA Resolution**). To further this goal, CARTA completed the agency's first **Zero Emissions Bus Transition Plan** in 2022 to support the agency's new and growing battery electric bus fleet. For CARTA's fixed-route fleet, which is comprised of 35- and 40-foot heavy-duty buses, CARTA purchased and received or is waiting to receive 33 BEBs, as shown in Table 2. Since adoption of the resolution, CARTA has replaced over 30 percent of its fixed-route fleet with battery-electric buses.

Table 2: Summary of CARTA's current BEB Fleet

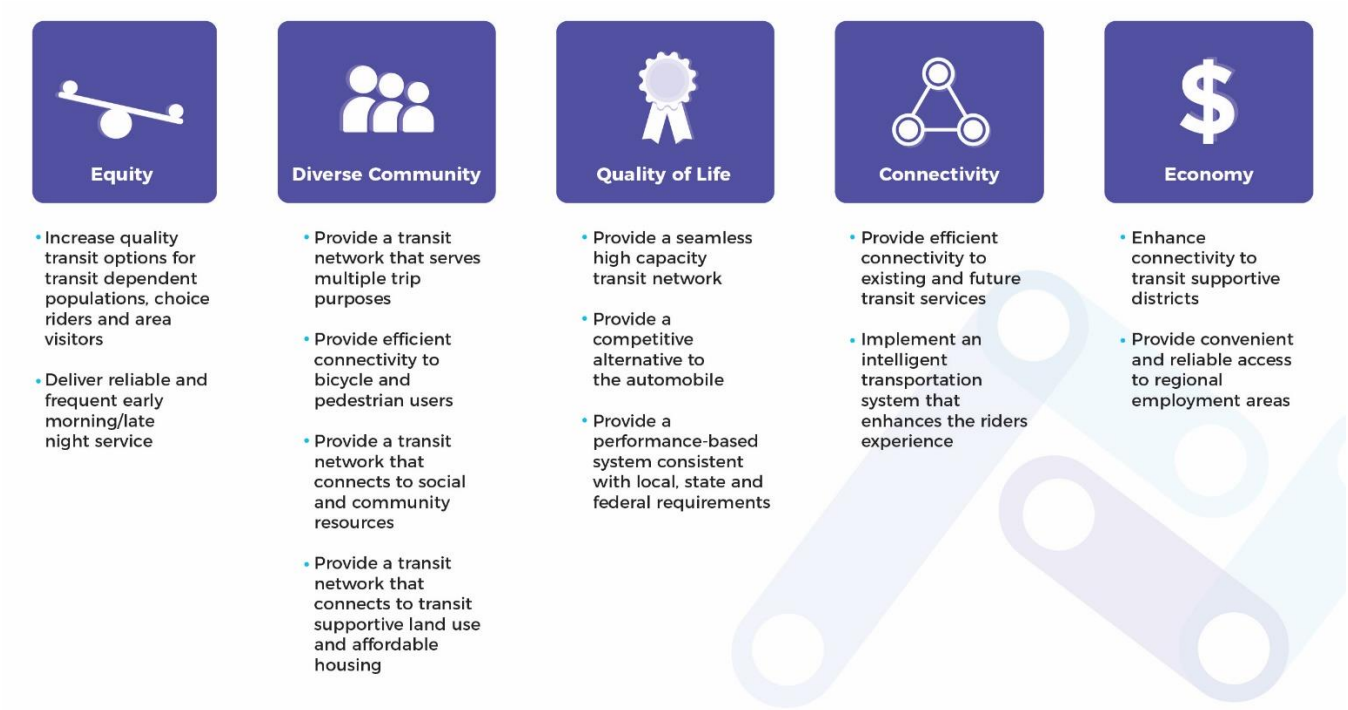
Bus type	Battery pack size	Bus length	Quantity	Schedule
Proterra E2 Catalyst	440 kWh	40'	3	In service since December 2019
Proterra ZX5	440 kWh	40'	3	In service since March 2021
New Flyer Xcelsior Charge	466 kWh	40'	7	In service since November 2021
Proterra ZX5	440 kWh	35'	20	Pending revenue service in July 2022
Total			**33**	

CARTA is currently updating and expanding its **maintenance facility** to support plug-in depot charging for its electric fleet, and the agency is programming its first on-route fast-charger to be added to the system. As part of a new transit center in North Charleston, currently in final design, CARTA will have the capacity to add four (4) more on-route fast chargers to support the battery electric bus fleet.

CARTA has also implemented **solar lighting** at shelters and transit stops throughout the system.

In 2018, BCDCOG in partnership with CARTA, developed a ***Regional Transit Framework Plan*** that identified a 20-year vision for transit in the region. This vision included a service area expansion and new services, such as a network of Bus Rapid Transit lines. **Figure 2Error! Reference source not found.** shows the objectives from the *Framework*.

Figure 2: Regional Transit Framework Plan Objectives



LOWCOUNTRY RAPID TRANSIT

Lowcountry Rapid Transit (LCRT) is a planned 21.5-mile bus rapid transit line that connects Charleston and North Charleston with fast, reliable, and modern bus service. The service includes over 11 miles of dedicated bus lanes, transit signal prioritization, and 60-foot BEBs. The project is currently transitioning to the engineering phase of the **Capital Investment Grant Program** as a New Starts Project. LCRT is scheduled to open in 2028, and although BCDCOG is the project sponsor, CARTA will operate, own, and maintain the transit buses and facilities.

In 2022, BCDCOG completed the first of several phases of a ***Transit-oriented Development Study*** to support land use policy, infrastructure investment, and corridor wide strategies for land use and transit at the regional level.

Rendering of a planned Lowcountry Rapid Transit Station

LONG RANGE TRANSPORTATION PLAN

The region's Metropolitan Planning Organization, **CHATS**, is currently updating its *Long-range Transportation Plan*, and CARTA is working closely with the long-range planning team to develop performance measures and initiatives to support its regional goals. As part of the update, climate change and resiliency will be integrated into the long-range plan.

MUNICIPAL CLIMATE ACTION PLANS

CARTA works closely with its regional partners, including local jurisdictions. The **City of Charleston** adopted a Climate Action Plan in May 2021, which identified several strategies that support CARTA's goals to increase the use of public transportation and increasing commuter options. The City's development ordinance requires new development to construct transit infrastructure and to coordinate with CARTA to support this goal.

Together, these past and current initiatives will support the mode shift from single-occupancy vehicles to transit and the reduction of greenhouse gas emissions.

This *Plan* sets the framework to ensure that the implementation of these connected initiatives support the CARTA's zero emissions goal.

5 EMISSIONS REDUCTIONS GOALS AND TARGETS

This plan identifies two primary goals and targets for CARTA:

Goal 1: Transition to a Fully Electric Transit Fleet by 2045: As of Summer 2022, over 30% of CARTA's transit fleet consists of zero-emissions BEBs. This Plan sets a target to transition CARTA's fixed-route, commuter, Downtown Area Shuttles, and Tel-A-Ride fleets, as well as any future fleets, such as Bus Rapid Transit or CARTA On Demand fleets to BEBs or other Zero-Emission Buses (ZEBs) and vehicles by 2045.

Goal 2: Achieve Net Zero Emissions Agencywide by 2050: In addition to its transit fleet, CARTA has the opportunity to achieve net zero emissions at its facilities by 2050. This is consistent with the current energy provider's goal to achieve net zero emissions by 2050.

6 STRATEGIES AND ACTIONS

To achieve a zero emissions fleet by 2045 and net zero emissions agency-wide by 2050, there are several near-term steps that CARTA must take. The strategies and actions identified in this Plan are designed to develop the tools that CARTA will need to reach these goals. It is anticipated that as data and resources become available, the agency will continue to refine these metrics to reach all facets of the organization from procurement to construction, employee habits, waste management, recycling and other activities. Recommended near-term policy and planning strategies are outlined below.

STRATEGY	ACTION	METRIC	TIMEFRAME
1. ELECTRIFY BUS FLEET	• Adopt a ZEB Transition Plan and continue to expand as new fleet types become available • Incorporate the ZEB Transition Plan recommendations into 2045 LRTP • Develop North Charleston Transit Center with on-route charging capacity	• ZEB performance measures in LRTP • Number and percent of BEBs in fleet • Reduction in deadhead hours (for Charging) • Number of on route chargers	December 2023
2. DEVELOP PLAN TO ACHIEVE NET ZERO EMISSIONS AGENCYWIDE BY 2050	• Work with partners to refine agency-wide emissions baseline and performance measures • Develop a Strategic Implementation Plan for Resiliency and Climate Action as part of systemwide COA/LCRT route review	• Agency-wide emissions baseline developed • Plan developed/ adopted	December 2024

STRATEGY	ACTION	METRIC	TIMEFRAME
3. INCREASE RIDERSHIP AND MODE SHIFT TO TRANSIT	• Implement recommendations from the Regional Transit Framework and other studies • Continue to develop park-and-ride facilities • Continue to coordinate with the Transit Oriented Development (TOD) Study team and local municipalities to encourage transit-oriented land use policy and transit design guidelines as part of new development • Continue to conduct outreach to community members and stakeholders to support transit initiatives	• Transit Ridership • Service area coverage • Mode share • New TOD ordinances/policies • Transit design guidelines/ordinances • Count of transit infrastructure improvements (park-and-rides, shelters, guideways, etc.)	Annually
4. CONTRIBUTE TO THE QUALITY OF LIFE, HEALTH AND RESILIENCY OF THE COMMUNITY CARTA SERVES	• Prioritize transit initiatives that support equitable development of services and facilities • Continue to implement solar lighting and renewable energy features to transit stops and facilities	• Percent of disadvantaged communities benefiting from transit investments • Title VI analysis with no adverse impacts • Number of solar powered lights	At start of planning and throughout project lifecycle

7 IMPLEMENTATION AND MONITORING

This Plan is a critical step for CARTA to realize its goal to fully electrify its transit fleet by 2045 and achieve net zero emissions by 2050. Working in partnership with BCDCOG and other stakeholders, CARTA will monitor the performance of this Plan and report annually on progress.

There are several challenges that CARTA must overcome to monitor progress. The first is developing and maintaining reliable data. Several tools and methodologies are available for calculating and measuring agency emissions. While this plan used one method to measure fleet emissions, it will be important for CARTA to develop performance measures that use reliable and consistent data sources. CARTA will work with BCDCOG and other partners with expertise, such as the State of SC Energy Office, to refine its methodology.

CARTA planning staff will work to ensure that future planning initiatives incorporate these targets and goals to ensure that implementation of this plan is consistent throughout the agency. As battery technology and electric fleet types expand, CARTA will need to continue to monitor and update this plan as well as its ZEB Transition Plan to ensure that technology assumptions, fleet replacement plans, and funding are consistent with the current state of practice. Additionally, the agency will continue to seek out grant funding and programs to support the development of this Plan and other zero emissions programs.

CARTA Solar-powered bus stop light

8 APPENDICES

8.1 CARTA RESOLUTION

8.2 CARTA System Map

8.3 CARTA ZEB TRANSITION PLAN