

# Riverside Transit Agency – Climate Action Plan

Pathway to Zero-Emissions



March 24, 2022



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# Table of Contents

<b>1. Introduction .....</b>	<b>3</b>
<b>2. Agency Overview .....</b>	<b>4</b>
<b>3. Emissions Inventory.....</b>	<b>6</b>
<b>4. Local, State and Federal Policies .....</b>	<b>7</b>
<b>5. Emission Reduction Goals and Targets .....</b>	<b>9</b>
<b>6. Implementation and Monitoring.....</b>	<b>13</b>
<b>References .....</b>	<b>15</b>

# I. Introduction

Climate change is taking place across the globe. It can be seen in the increasing global temperatures, shrinking ice sheets and rising sea levels. Extreme weather events are taking place internationally and locally in Riverside County, California (CA) and include record breaking droughts, wildfires and rains leading to dangerous mud slides and flash flooding. According to the Federal Emergency Management Agency’s (FEMA) National Risk Index, which identifies counties in the United States (US) that are most at risk to 18 natural hazards, Riverside County ranks number four (FEMA, 2021). Among counties in the state of CA, Riverside County is the second most vulnerable county to natural hazards (FEMA, 2021). Increasing concentrations of greenhouse gases (GHG) in the atmosphere significantly contribute to the environmental issues and extreme weather events taking place. It is imperative that global efforts are made to immediately decrease GHG emissions to help mitigate the current and future effects of climate change for generations to come. Moreover, the US Environmental Protection Agency (EPA) found that the most severe harms from climate change fall disproportionately on socially vulnerable populations and communities that are least able to anticipate, cope with and recover from the adverse impacts (EPA, 2021). Global commitment and implementation of climate related policies have helped but additional efforts are needed to slow the increasing concentration of GHG emissions that are estimated to occur with continued population and economic growth.

In the US, the transportation sector accounts for the largest source of GHG emissions at 29 percent with the majority of transportation emissions coming from cars, trucks, ships, trains and planes (EPA, 2021). Public transportation plays a

vital role in reducing GHG emissions by reducing congestion and removing single occupancy vehicles. As the public transportation provider for western Riverside County, the Riverside Transit Agency (RTA) is committed to providing safe, accessible public transportation that meets the needs of the region. Western Riverside County is located in the South Coast Air Basin and is designated as a nonattainment area for the following National Ambient Air Quality Standards (NAAQS) pollutants: 8-Hour Ozone 2008 (extreme) and 2015 (extreme) and Particulate Matter (PM)-

2.5 1997 (moderate), 2006 (serious) and 2012 (serious) (EPA, 2022). The EPA defines a nonattainment area as a geographic area in which the level of a criteria air pollutant is higher than the level allowed by federal standards ranging from marginal, moderate, serious, severe and extreme. US Senate Bill (SB) 535 defines a disadvantaged community (DAC) as the highest scoring 25 percent of CA census tracts from CalEnviroScreen 3.0 which identifies the most pollution burdened and vulnerable communities. In RTA’s service area, 85 census tracts are identified as a DAC and almost every RTA route serves at least one DAC. These communities suffer the most from economic, health and environmental burdens including poverty, air pollution and asthma. The Climate Action Plan (CAP) reflects the Agency’s pledge to providing clean, sustainable public transportation. It sets the Agency on a path to decreasing GHG

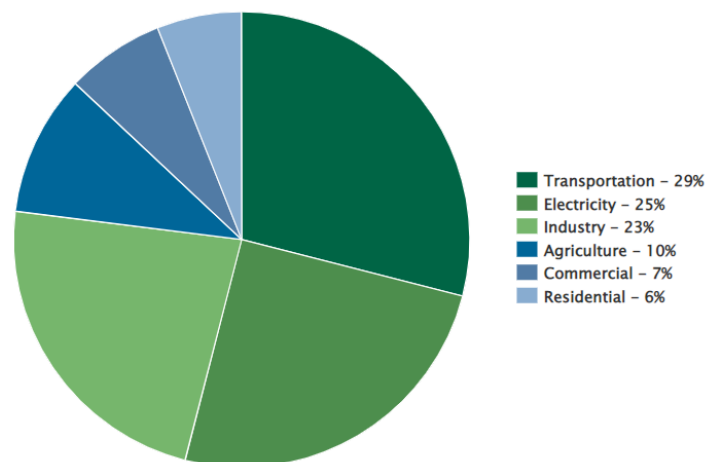


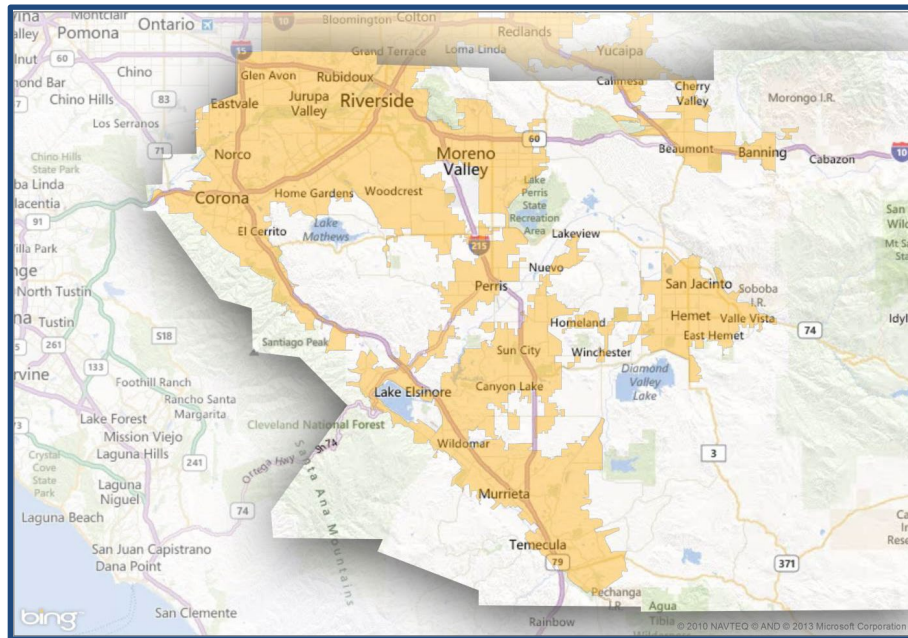
Figure 1: EPA 2019 U.S. GHG Emissions by Sector

emissions and improving the air quality in these areas leading to improved environmental and public health outcomes.

The CAP was developed as part of the Federal Transit Administration’s (FTA) Sustainable Transit for a Healthy Planet Challenge. It will be presented to the RTA Board of Directors for their review and consideration in March 2022. If approved by the Board of Directors, the CAP will be submitted to the FTA in April 2022 and presented on April 22, 2022, Earth Day. The goal of the plan is to outline strategic and measurable actions the Agency can take to reduce its impact on climate change and become more sustainable and resilient to environmental events. The foundation of the CAP is the Agency’s Zero-Emission Bus Rollout and Implementation Plan (ZEB Plan) which was approved by the Board of Directors in December 2020 and includes the Agency’s Rollout Plan for hydrogen fuel cell electric buses (FCEB). The CAP builds upon these plans and calculates current GHG emission levels. Limitations of the CAP include continued impacts of the COVID-19 pandemic, which affects ridership and supply chain delays/demands, procurement of zero-emission cutaway buses as these have not yet passed Altoona testing, advancements in technology and funding availability. To ensure effective, impactful results, the CAP will continue to be built upon and reevaluated in future years as technology improves, CAP goals are adjusted and Agency plans or resources change. The Agency is committed to decreasing GHG emissions through innovative action, policies and partnerships that will help combat the effects of climate change, lead to sustainable growth and an improved quality of life.

## 2. Agency Overview

RTA was established as a Joint Powers Agency in 1975 and began operating bus service in 1977. As the Consolidated Transportation Service Agency for western Riverside County, RTA is responsible for coordinating transit services, providing driver training, assisting with grant applications and developing Short Range Transit Plans (SRTP). RTA’s jurisdiction is among the largest in the nation for a transit system, encompassing approximately 2,500 square miles of western Riverside County. Included in RTA’s service area are the eighteen (18) cities of Banning, Beaumont, Calimesa, Canyon Lake, Corona, Eastvale, Hemet, Jurupa Valley, Lake Elsinore, Menifee, Moreno Valley, Murrieta, Norco, Perris, Riverside, San Jacinto, Temecula and Wildomar and the unincorporated areas of Riverside County Supervisorial Districts 1, 2, 3 and 5. RTA provides service in urban, small urban and rural areas. Urbanized and rural areas are defined by the United States Census Bureau (US Census) based on population size and are revised every 10 years with each new census. The urbanized areas (UZA) served by RTA are Riverside-San Bernardino, Hemet and Murrieta-Temecula-Menifee. Portions of RTA routes also connect to Los Angeles-Long Beach-Anaheim, providing interregional mobility options to RTA customers. The map below illustrates RTA’s jurisdictional boundaries and highlights the portions of the region considered urbanized.



RTA's primary facility, Division I, is located in the City of Riverside and is utilized for directly operated routes in the northern portion of the service area. RTA's secondary facility, Division II, is located in the City of Hemet and is utilized for directly operated routes in the southern portion of the service area. RTA also contracts fixed-route service with Empire Transportation, who operates from a facility they lease in the City of Perris. Dial-A-Ride (DAR) service, to include DAR Plus, is currently provided by Southland Transit, Inc. and operates from a facility they lease in the City of Perris. Both contractors are responsible for housing, operating and maintaining RTA vehicles. The DAR facility in Perris also houses the DAR reservation call center.

RTA's service consists of 33 local fixed routes and four CommuterLink express routes. Route frequencies range between 15 and 90 minutes based on ridership demand. RTA offers complementary demand-response paratransit DAR service to persons with disabilities and seniors (age 65 and older). DAR is an advanced-reservation service that operates at the same time as local fixed-route bus service and within 0.75 miles of an active RTA fixed-route (excluding express buses).

RTA has a total active fleet of 334 buses that are replaced once they reach their useful life, per FTA regulations. The fleet is made up of:

- One hundred forty-five 40-foot buses, which run on compressed natural gas (CNG), for high ridership fixed-route services directly operated by RTA drivers.
- Seventy-nine 32-foot buses, which run on CNG, for lower ridership fixed-route services operated by contracted drivers.
- One hundred ten DAR buses, which run on gasoline, for paratransit services operated by contracted drivers.

### 3. Emissions Inventory

Emission calculations are necessary to inform CAP goals and provide a baseline on which to compare future GHG emission reductions. The Agency calculated GHG emissions for revenue vehicles for fiscal years (FY) 2019, 2020 and 2021 using a template provided by the FTA. The following data points were collected for directly operated, contract operated and DAR service for each FY:

- CNG and gasoline fuel consumption in gallons
- Vehicle miles travelled (VMT)
- Revenue vehicle miles (RVM)
- Revenue Hours (RH)
- # of unlinked passenger trips (PT)

GHG emission information was collected for methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and carbon dioxide (CO<sub>2</sub>). Methane and nitrous oxide emissions are calculated using VMTs while carbon dioxide emissions are based on the volume of fuel consumed. The Agency’s directly operated and contract operated vehicles run on low-emission CNG fuel. To calculate carbon dioxide emissions released from CNG fuel, the gallons of CNG first need to be converted to gasoline gallon equivalents (GGE), which is the amount of alternative fuel needed to equal the energy content of one gallon of gasoline (US Department of Energy). The GGE is then converted to standard cubic feet (sc f) to calculate carbon dioxide emissions from CNG fuel (US Department of Energy).

$$\begin{aligned} \text{Gallons of CNG @ 3,600 pounds per square inch (PSI)} \times 0.287 &= \text{GGE} \\ \text{GGE} \times 123.57 \text{ sc f / 1 GGE} &= \text{CNG standard cubic feet} \end{aligned}$$

Methane, nitrous oxide and carbon dioxide emissions are then converted into annual metric tons of carbon dioxide (MTCO<sub>2</sub>). Below is the Agency’s MTCO<sub>2</sub> emissions across three fiscal years for directly operated, contract operated and DAR services.

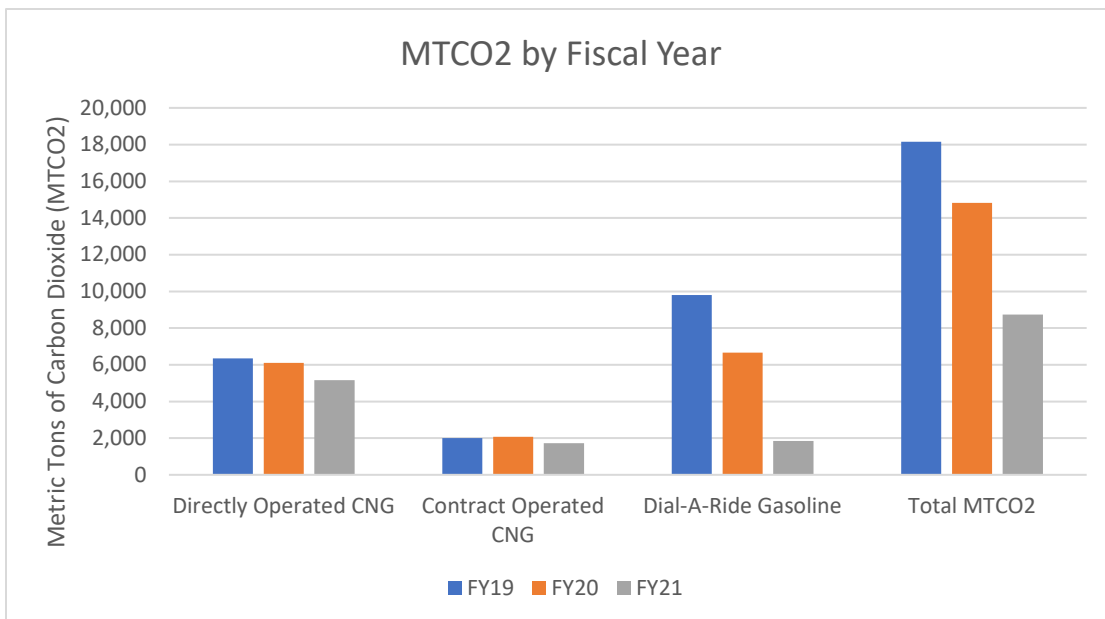


Table 1 shows additional metrics that are related to MTCO<sub>2</sub> emissions per revenue mile, revenue hour and passenger trip.

Bus Type	Emissions (E) MTCO <sub>2</sub>	Revenue Vehicle Miles (RVM)		Revenue Hours (RH)		Unlinked Passenger Trips (PT)	
		Total RVM	E/RVM (MTCO <sub>2</sub> )	Total RH	E/RH (MTCO <sub>2</sub> )	Total PT	E/PT (MTCO <sub>2</sub> )
FY19 DO CNG	6,341	6,634,855	0.00095571	477,158	0.0132891	6,825,680	0.000929
FY20 DO CNG	6,095	6,398,547	0.00095256	455,049	0.01339416	5,506,023	0.001107
FY21 DO CNG	5,165	5,000,963	0.0010328	335,223	0.01540765	2,468,278	0.0020926
FY19 CO CNG	2,011	3,424,494	0.00058724	209,163	0.00961451	1,465,889	0.0013719
FY20 CO CNG	2,068	3,118,952	0.0006630	193,170	0.0107056	1,187,470	0.0017415
FY21 CO CNG	1,719	2,025,881	0.00084852	128,888	0.01333716	451,701	0.0038056
FY19 DAR Gasoline	9,803	3,317,600	0.00295485	193,707	0.05060736	406,083	0.024140
FY20 DAR Gasoline	6,655	2,489,834	0.00267287	145,585	0.04571213	283,349	0.0234869
FY21 DAR Gasoline	1,850	1,181,750	0.00156547	63,762	0.02901415	95,627	0.019346

Table 1: MTCO<sub>2</sub> Emission Metrics for Revenue Vehicles

GHG emission calculations were completed for three years. Due to the COVID-19 pandemic and resulting stay at home mandates, service levels were reduced to seven-day Sunday service on April 5, 2020. As businesses reopened and schools returned to in-person sessions, service on the Agency’s top five performing routes were increased in August 2021. GHG emissions for FY19 were calculated to show the Agency’s pre-COVID emission and service levels. FY20 GHG emission metrics are partially impacted by the COVID-19 pandemic. As a result, FY21 GHG emission calculations will be used as a baseline for the Agency’s CAP goals.

## 4. Local, State and Federal Policies

The CAP is informed by local, state and federal government policies. The strategic actions defined in the CAP will help achieve the main goals and priorities of the following policies:

### Local and Regional

- 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), which is a 25-year visioning plan for the six-county Southern California region developed by the Southern California Association of Governments (SCAG). The plan charts a pathway towards a more sustainable, mobile and prosperous region. It specifically looks at new initiatives that can be implemented to better intersect land use, transportation and technology to help achieve a reduction in GHG emissions.
- Western Riverside Council of Governments (WRCOG) Subregional Climate Action Plan which works to mitigate climate change by focusing on 4 primary sectors:
  - Energy
  - Transportation and Land Use
  - Solid Waste

- Water

State

- California Air Resources Board (CARB) Innovative Clean Transit regulation which requires CA transit agencies to gradually transition to a 100 percent zero-emission bus (ZEB) fleet with the goal of a full transition by the year 2040. Depending on the size of the transit agency, bus procurements follow a specific schedule with a certain percentage of new bus procurements required to be ZEBs. As a large transit agency, RTA is required to begin procuring ZEBs as early as the year 2023.

Year	Large Transit	Small Transit
2023	25%	-
2024	25%	-
2025	25%	-
2026	50%	25%
2027	50%	25%
2028	50%	25%
2029	100%	100%

Table 2: ZEB Purchase Schedule (ZEB Percentage of Total New Bus Purchases)

- Executive Order (EO) B-30-15 and SB 32 which aims to reduce GHG emissions by 40 percent and 80 percent from 1990 levels by 2030 and 2050 respectively.
- EO N-19-19 signed in September 2019 works to redouble efforts to reduce GHG emissions and mitigate impacts of climate change while building a sustainable economy.
- EO-N-79-20, passed in September 2020, works to decrease the state’s reliance on climate changing fossil fuels by requiring all new passenger vehicles and trucks sold in CA be zero-emission by the year 2035.
- 2050 California Transportation Plan (CTP) which is the state’s fiscally unconstrained long range transportation roadmap that works toward achieving the CTP 2050 vision:  
*“California’s safe, resilient, and universally accessible transportation system supports vibrant communities, advances racial and economic justice, and improves public and environmental health.”*  
 To help achieve that vision, transportation planning and decisions will be guided by eight priority goals:



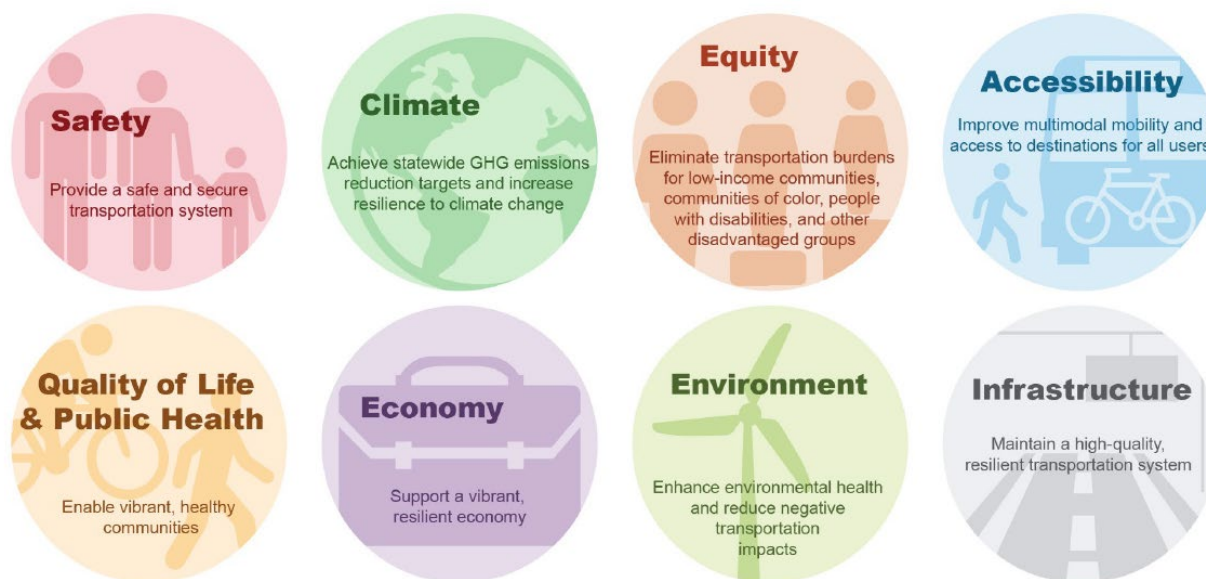


Figure 3: CTP 2050 Priority Goals

- Safeguarding California Plan: 2018 Update - California's Climate Adaptation Goals which works to identify current and future actions that need to be taken to increase resiliency to climate change.

Federal

- President Biden’s ambitious goal for the US to achieve a 50-52 percent reduction from 2005 levels in economy wide net GHG pollution by 2030.
- FTA Sustainable Transit for a Healthy Planet Challenge which encourages transit agencies to take bold actions to reduce GHG emissions. Agencies who participate will submit Climate Action Plans and/or Sustainability Plans.

These collaborative efforts will help reduce GHG emissions and mitigate the effects of climate change with the goal of ensuring a sustainable future that improves the quality of life for all.



## 5. Emission Reduction Goals and Targets

In CA, the transportation sector accounts for 50 percent of GHG emissions, 80 percent of NO<sub>x</sub> emissions and 90 percent of diesel particulate matter (CA Energy Commission, 2019). Temperatures in CA have increased by 1.8 degrees Fahrenheit over the past century and the most extreme droughts occurred in 2012-2016 (CA Natural Resources Agency, 2018). According to the California Department of Forestry and Fire Protection (CAL FIRE), of the 20 largest wildfires in the history of CA, nine of the 20 wildfires, or 45 percent, occurred between 2020-2021 alone (CAL FIRE, 2022). The Agency is committed to taking innovative action to decrease GHG emissions and work towards a sustainable, resilient region. To further reduce public transportation’s carbon footprint, the Agency will work towards achieving the following goals, which are consistent with the Agency’s Board-approved Zero-Emission Bus Rollout and

Implementation Plan:

**Goal #1: Decrease GHG emissions from heavy duty revenue buses by 20 percent from 2021 levels by the year 2035.**

Strategy	Actions	Metric to track progress	Timeframe	Responsible Department
Electrify bus fleet	Purchase 5 FCEBs	Number of buses purchased	June 2026	Maintenance and Procurement
	Complete workforce development training for coach operators and mechanics	Y/N training completed	June 2026	Operations, Human Resources and Maintenance
	Purchase 15 FCEBs	Number of buses purchased	June 2028	Maintenance and Procurement
	Purchase 9 FCEBs	Number of buses purchased	June 2030	Maintenance and Procurement

The Agency currently utilizes low emission CNG buses. Included in the ZEB Plan is a Rollout Plan which details RTA's transition to an all FCEB fleet by the year 2040. It includes bus procurements and facility improvements that need to be made in the next 20 years. The Rollout Plan takes into account the Agency's current reduced service levels due to the COVID-19 pandemic and projects when buses will meet their minimum useful life and need to be replaced. The Agency is estimated to begin procuring FCEBs in 2024 with FCEBs delivered and used for service in 2026. CNG buses will continue to be replaced with FCEBs as they reach their useful life as defined by the FTA.

Transitioning to new FCEBs, will improve air quality and provide residents with access to safe and affordable public transportation. Switching from CNG to hydrogen fuel will reduce harmful emissions including volatile organic compounds, which contribute to smog; carbon monoxide; oxides of nitrogen, a major component of acid rain and smog; and Particulate Matter (PM), which impairs breathing and creates a visible haze. From the tailpipe, FCEBs release zero pollutants and GHGs into the air and run quieter than CNG buses, resulting in reduced noise pollution and improved health and quality of life for residents throughout the region.

**Goal #2: Transition non-revenue support vehicle fleet to 100 percent electric by the year 2035.**

Strategy	Actions	Metric to track progress	Timeframe	Responsible Department
Electrify non-revenue support vehicle fleet	Install electric vehicle chargers at the Riverside and Hemet facility	# of electric chargers installed	June 2035	Maintenance and Facilities
	Purchase electric vehicle support cars	# of electric vehicles purchased	June 2035	Maintenance and Procurement

Support trucks are used for the stops and zones crew who service all of RTA’s bus stop amenities and support cars are used for coach operator shift change, operations supervisors and administrative staff. Support vehicles cover a lot of miles per year due to RTA’s extensive service area. These gasoline fueled vehicles will be replaced with electric vehicles to further mitigate transportation related GHG emissions.

**Goal #3: Plan facility modifications to accommodate zero-emission technology.**

Strategy	Actions	Metric to track progress	Timeframe	Responsible Department
Install zero-emission technology	Install electric vehicle chargers at the Vine Street Mobility Hub	# of electric chargers installed	April 2023	Maintenance and Facilities
	Complete Architectural and Engineering (A&E) for the Riverside and Hemet hydrogen fueling stations	Y/N A&E phase completed	December 2023	Maintenance and Facilities
	Construct hydrogen fueling station at the Hemet facility	Y/N fueling station constructed	September 2025	Maintenance and Facilities
	Construct hydrogen fueling station at the Riverside facility	Y/N fueling station constructed	September 2027	Maintenance and Facilities

To efficiently and sustainably transition to FCEBs and electric vehicles, all facilities need to be equipped with zero-emission technology. The Agency’s current facilities in the cities of Riverside and Hemet will need hydrogen fueling stations. With the closest operating hydrogen fueling station 30 to 40 miles away, an onsite hydrogen fueling station will enable the Agency to run FCEBs efficiently and cost effectively. The large service area combined with high temperatures and a variable landscape, will require FCEBs and support vehicles to refuel and recharge at strategic locations throughout the service area. With the increased costs associated with transitioning to zero-emissions, transit agencies will need to collaborate and strategically share resources to ensure seamless service.

CA is the first state in the nation to pass an executive order that requires all new cars and passenger trucks sold in CA to be zero-emission vehicles (ZEV) by the year 2035. During the A&E phase for the Agency’s onsite hydrogen fueling stations, the Agency will explore adding publicly accessible hydrogen pumps. With the closest operating hydrogen fueling station 30 to 40 miles away, a publicly accessible

hydrogen fueling station will ensure that resources are equitably distributed and provides low income and minority populations with increased access and opportunity to transition to ZEVs.

**Goal #4: Collaborate with government and community organizations and educational institutions to accelerate innovative technologies that further reduce GHGs.**

Strategy	Actions	Metric to track progress	Timeframe	Responsible Department
Partner with organizations and educational institutions	Continue to collaborate with UCR and CARB.	# of meetings and correspondence	June 2035	Planning
	Research potential grant opportunities for clean energy.	# of researched grant opportunities	June 2035	Planning and Finance

From the tank to the wheel, FCEBs have zero tailpipe emissions meaning no release of harmful pollutants and GHGs which are typically expelled by combustion engines. In CA, at least 33 percent of hydrogen is produced from renewable sources meaning the full fuel cycle, from well to wheels, produces virtually zero GHG emissions (CARB, 2021). As technology improves, it is probable that the amount of CO<sub>2</sub> emitted during hydrogen production will diminish further. In July of 2020, the Agency successfully partnered with the City of Riverside, the University of California, Riverside (UCR) College of Engineering, Center for Environmental Research and Technology (CE-CERT) and other non-profit partners on a grant. The Agency will continue to collaborate with CE-CERT and is willing to work together to explore clean hydrogen production. Moreover, the new CARB facility in Riverside opened in November 2021 and it is expected to be one of the most advanced vehicle emissions testing and research facilities in the world. The Agency is committed to partnering with government and community organizations and educational institutions to explore renewable hydrogen production.

**Goal #5: Optimize service efficiency and implement projects that increase ridership.**

Strategy	Actions	Metric to track progress	Timeframe	Responsible Department
Optimize service	Review service for underperforming routes/trips/runs	Service and equity analyses	June 2025	Planning
Increase ridership	Increase service on high performing routes.	# of increased revenue service miles, ridership growth	June 2025	Planning
	Improve transit passenger amenities.	# of improved transit amenities, ridership growth	June 2025	Maintenance and Marketing

It is the Agency’s mission to provide for a variety of transportation needs in a cost-effective, efficient manner. Analyzing route performances is key to creating and maintaining an efficient and sustainable system through the reduction of underperforming routes, trips and/or runs. This will also allow the Agency’s limited resources to be reinvested where they will have the greatest benefit for the public thus maximizing increases in ridership. Improved transit amenities will encourage additional ridership by making public transportation safe, secure and comfortable. The more people on public transportation the

less single occupancy vehicles there are on the road resulting in decreased congestion, reduced GHG emissions and improved environmental and public health.

## 6. Implementation and Monitoring

To successfully achieve the goals of the CAP, strategic actions need to be implemented and monitored. The Agency will utilize the Plan-Do-Check-Act (PDCA) framework recommended by the American Public Transportation Association (APTA) for the creation of CAPs. PDCA is a step-by-step process used by many disciplines for monitoring continuous improvement. It is used by the National Institutes of Health (NIH) Environmental Management System (NEMS) and focuses on “Planning” for environmental improvements, “Doing” the activities identified in the planning phase to achieve goals, “Checking” the results of the activities, which includes collecting and analyzing data and lastly “Acting” on the analyses to identify lessons learned, areas for improvement and to update the original plan as needed to produce effective results. The Agency’s CAP is a living document that will be evaluated and built upon using the PDCA framework to ensure that data driven recommendations and changes are taken into consideration when updating the CAP.

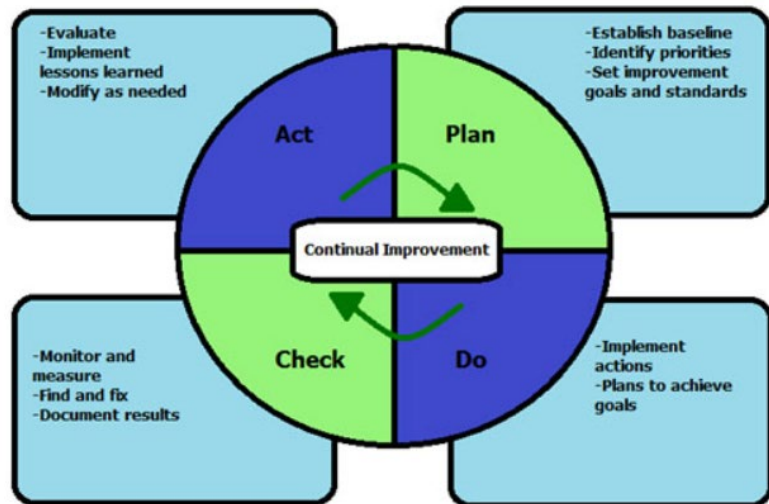


Figure 4: NIH Plan-Do-Check-Act Framework

### Looking Ahead

Funding availability will play a key factor in completing CAP activities. Per the ZEB Plan, it is estimated to cost the Agency an additional \$76 million in capital costs, adjusted for inflation, to transition from CNG buses to FCEBs. This additional funding is over and beyond the CNG fleet replacement the Agency had been planning for. The total capital cost is estimated to be over \$400 million. The Infrastructure Investment and Jobs Act, passed by the Biden Administration, will provide additional funding towards climate change projects. The Agency will continue to pursue local and federal funding to support the implementation of the CAP.

It is unknown how long the economic and social effects from the COVID-19 pandemic will last. Ridership continues to be lower than pre-pandemic levels. It is anticipated that some commuters will continue to work from home, whether it be part-time or full-time, well into the future. The pandemic has also resulted in rising costs in materials and services. Supply chain delays have resulted in prolonged projects and increased costs, all of which may affect the implementation of the CAP. The Agency continues to monitor ridership levels.

The effects of climate change can be seen around the world and will continue to disproportionately affect vulnerable populations. The Agency is committed to doing its part to reduce

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GHG emissions and work towards a sustainable, resilient transportation system that meets the needs of the community and improves environmental and public health.

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