SANTA CRUZ METROPOLITAN TRANSIT DISTRICT
ZERO-EMISSION BUS ROLLOUT PLAN

February 2023

Created by Santa Cruz Metropolitan Transit District
with assistance from
the Center for Transportation and the Environment

CENTER FOR TRANSPORTATION AND THE ENVIRONMENT

Santa Cruz METRO ICT Zero-Emission Bus Rollout Plan
Prepared by CTE and METRO

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Section A: Transit Agency Information

Santa Cruz Metropolitan Transit District (METRO) provides bus and paratransit service throughout Santa Cruz County, California, serving approximately 273,213 people in the service area. METRO's service territory spans (or is contained within) the Monterey Bay Air Resources District within the North Central Coast Air Basin. To maintain transit service for these communities, METRO operates a maximum of 85 buses annually.

METRO is headquartered at 110 Vernon, Santa Cruz, CA 95060. For more information on METRO, contact Wondimu Mengistu, Capital Planning and Grants Program Manager at 831-420-2580 or Wmengistu@scmtd.com.

1. Transit agency's name	**Santa Cruz Metropolitan Transit District**			
2. Mailing address	**Number, street:**	110 Vernon Street		
	City, County, Zip:	Santa Cruz, CA 95060		
3. Name of transit agency's air districts	Monterey Bay Air Resources District		**4. Name of Transit agency's air basin(s)**	North Central Coast Air Basin
5. Total number of buses in Annual Maximum Service	100		**6. Population of the urbanized area transit agency is serving as last published by the Census Bureau before 12/31/17**	273,213
7. Contact information of the general manager, chief operating officer, or equivalent	**A: Contact name**	Michael Tree		
	B: Title	CEO/General Manager		
	C: Phone number	831-420-2501		
	D: Email	Mtree@scmtd.com		
8. Is your transit agency part of a Joint Group (13 CCR § 2023.1(d)(3))?	**Yes** ☐ **No** ■			

Section B: Rollout Plan General Information

1. **Does your transit agency's Rollout Plan have a goal of full transition to zero-emission technologies by 2040 that avoids early retirement of conventional transit buses (13 CCR § 2023.1(d)(1)(A))?**

METRO's Rollout Plan will enable the agency to fully transition its bus fleet to zero-emission by 2037, which is three years ahead of the deadline set in the Innovative Clean Transit (ICT) Regulation. All buses will operate for their expected useful life to avoid early retirement of any vehicle. Starting in 2023-2024, all new fixed route vehicle purchases will be zero-emission buses (ZEBs). Since each bus will operate for their entire useful life of 12-14 years, the last Compressed Natural Gas (CNG) buses purchased will dictate the year in which the fleet is fully transitioned to zero-emission. Any fixed route CNG bus purchases beyond 2023 will delay the transition.

The paratransit cutaway buses will be replaced on-schedule with the ICT regulation. However, the turnover of these vehicles is quicker because they are designed to a shorter lifespan. This will enable the paratransit gasoline vehicles to be phased out of the fleet before 2037.

2. **The ICT regulation requires 100% ZEB purchase in 2029. Conventional transit buses that are purchased in 2028 could be delivered in or after 2029. Please explain how your transit agency plans to avoid potential early retirement of conventional buses in order to meet the 2040 goal.**

METRO has committed to purchasing the required percentage of zero-emission buses as required by the ICT. All procurements are planned in corresponding end-of-life years for its historical fleets of diesel and CNG buses. METRO will begin to purchase fuel cell electric buses (FCEB) in 2023-2024 to achieve the duty cycles of longer routes and blocks with larger energy demands than the current battery electric bus (BEB) achievable ranges on the market allow. Keeping the traditional, non-zero-emission vehicles in service until their 14-year end of life allows METRO the time to build infrastructure and acquire enough FCEBs to support the more demanding routes.

3. **When did your transit agency's board or governing body approve the Rollout Plan?**
    a. **Rollout Plan's approval date**
    b. **Resolution number (optional)**
    c. **Is a copy of the board approved resolution attached to the Rollout Plan submitted to CARB (13 CCR § 2023.1(d) (2))?** (Yes/No) (required)

This Rollout Plan was approved by Santa Cruz Metropolitan Transit District on January 27, 2023 via ***23-07-04***. A copy of the board approved resolution is attached to the Rollout Plan.

4. **Please provide contact information for CARB to follow up on details of the Rollout Plan, if needed.**
    a. **Contact name:** Michael Tree
    b. **Title:** CEO
    c. **Phone Number: 831-426-6080**
    d. **Email:** Mtree@scmtd.com

5. **Who has created the Rollout Plan?**

This Rollout Plan was created by METRO with assistance from the Center for Transportation and the Environment (CTE).

Section C: Technology Portfolio

1. **What type(s) of zero-emission bus technologies does your transit agency plan to deploy through 2040? (13 CCR § 2023.1(d)(1)(B))**

Established in 1968, METRO'S mission is to provide environmentally sustainable transportation to Santa Cruz County. METRO directly operates county-wide, fixed-route and Highway 17 commuter service, with connections to Santa Clara County at Diridon Station and Monterey Salinas Transit at our Watsonville Transit Center. The agency also operates ParaCruz paratransit service. With a fleet of approximately 104 buses and 32 paratransit gasoline vehicles, METRO operates 24 bus lines, carrying approximately 5,045,972 passengers annually. METRO operates four transit centers in Santa Cruz County: Santa Cruz Metro Center (located in downtown Santa Cruz), Cavallaro Transit Center (located in Scotts Valley), Capitola Mall Transit Center (located in Capitola), and Watsonville Transit Center (located in Watsonville). METRO recently took delivery of four BEBs into their fleet, with two of the BEBs operating on the newly established Watsonville Circulate and two BEBs the remaining vehicles operate on various routes throughout the METRO service area. METRO is also scheduled to receive five additional BEBs in 2023.

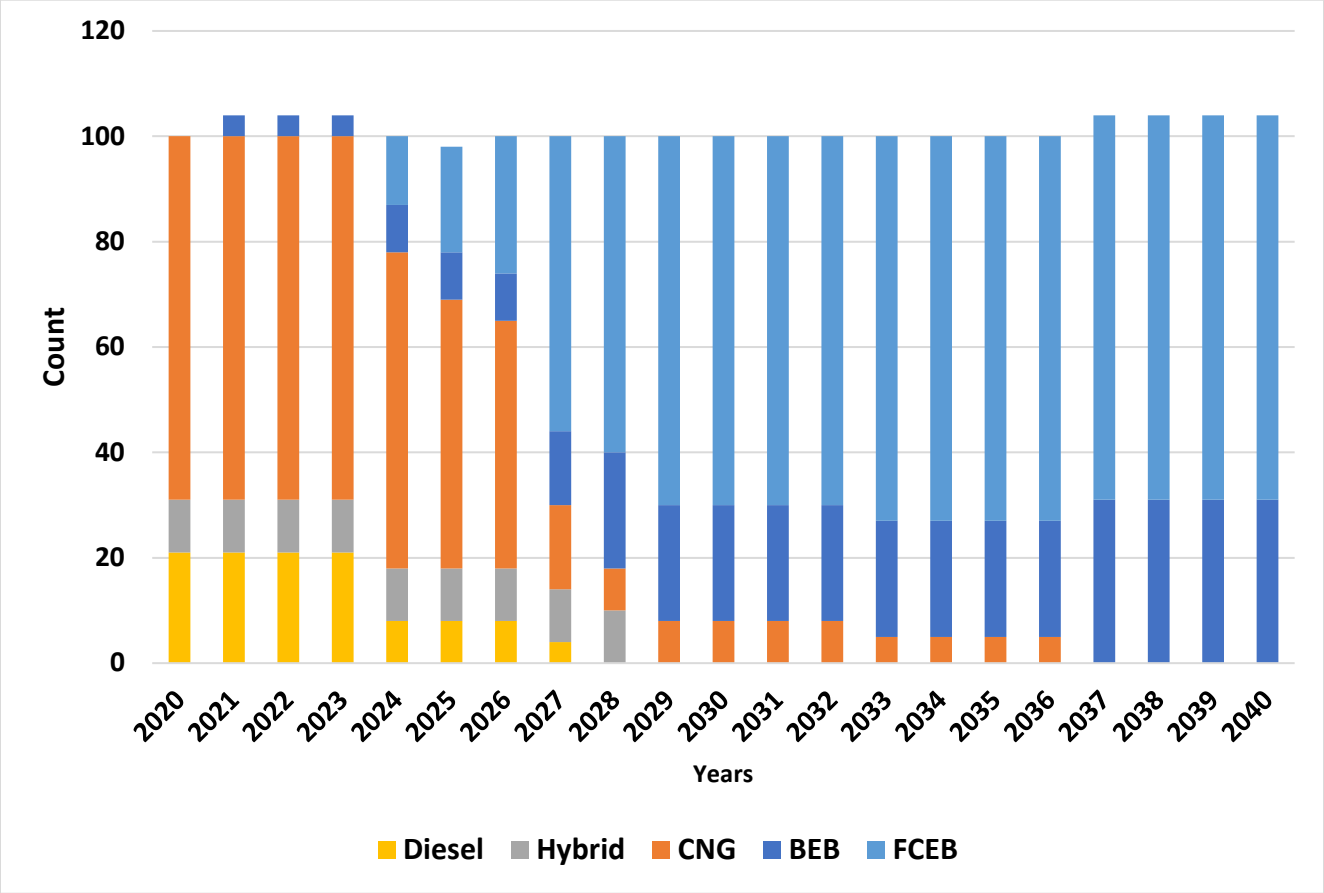
METRO intends to continue to transition to zero-emission fleet through both BEBs and FCEBs. **Figure 1** shows METRO's projected procurement schedule that supports a realistic timeline for infrastructure build, considers route achievability, and maintains vehicles through the end of their useful life.

As detailed in **Figured 1**, METRO's transition to ZEBs began in 2021 with the deployment of 4 BEBs. Between 2023 and 2029, METRO will begin procuring FCEBs. By 2030, more than a half of METRO's fleet will be ZEB. With FCEB delivery scheduled in 2024-2025, this will allow METRO time to plan and deploy the required hydrogen fueling infrastructure as well as prepare operations and maintenance teams in receiving and supporting this new technology.

METRO will begin to purchase FCEBs in 2023-2024 to achieve the duty cycles of longer routes and blocks with larger energy demands. METRO intends to continue to transition its fleet to ZEB through both BEBs and FCEBs. METRO will continue to procure FCEB's in subsequent years,

eventually achieving a 100% ZEB fleet by 2037. The procurement schedule assumes that if more funds become available, METRO will attempt to accelerate its ZEB procurement timeline.
If more funds become available, METRO intends to accelerate the ZEB procurement timeline.

Figure 1: METRO's Fleet Composition Over 20-Year ZEB Transition Period



Section D: Current Bus Fleet Composition and Future Bus Purchases

1. **Please complete Table 1 with information on each individual bus in your current bus fleet.** *Please identify the fuel type of each individual conventional bus as diesel, compressed natural gas (CNG), liquefied natural gas (LNG), diesel hybrid (dHEB), gasoline hybrid (gHEB), propane, or gasoline. For zero-emission technologies, identify the fuel type as hydrogen or electricity and indicate which charging technology (depot, wireless, and/or on-route) will be used. Bus types include standard, articulated, over-the-road, double decker and cutaway buses.*

METRO's fleet currently consists of 69 CNG buses, 21 diesel buses, 10 hybrids buses, 4 battery

electric buses, and 32 paratransit vehicles. **Table 1** is representative of the METRO's fleet as of January 2023. It lists vehicles that are routinely operated in service, as well as a supporting contingency fleet.

Table 1: Individual Bus Information for Current Bus Fleet

Bus Series	Number of Buses	Engine Model Year	Bus Model Year	Fuel Type	Bus Type
9800	9	1998	1998	Diesel	New Flyer Standard 35 Foot
9800	8	1998	1998	Diesel	New Flyer Standard 40 Foot
2200	14	2007	2002	CNG	New Flyer Standard 35 Foot
2200	10	2007	2002	CNG	New Flyer Standard 40 Foot
2300	4	2002	2002	Diesel	New Flyer Articulated 60 Foot
2600	2	2019	2006	CNG	New Flyer Standard 40 Foot
2800	13	2008	2008	CNG	New Flyer Standard 40 Foot
1000	5	2011	2011	CNG	New Flyer Standard 40 Foot
1200	11	2012	2012	CNG	New Flyer Standard 40 Foot
1300	6	2013	2013	CNG	New Flyer Standard 35 Foot
4200	10	2014	2014	Hybrid	GILLIG Standard 40 Foot
1600	3	2016	2016	CNG	New Flyer Standard 40 Foot
1900	5	2019	2019	CNG	GILLIG Standard 40 Foot
0320/0420	4	2020	2020	Depot charged	Proterra 660kWh 40 Foot

2. **Please complete Table 2 regarding expected future bus purchases, including the number of buses in total expected to be purchased or leased in the year of purchase.** *Identify the number and percentage of zero-emission buses of the total bus purchases each year, as well as bus types and fuel types. Identify the same type of information for purchases of conventional buses. Bus types include standard, articulated, over-the-road, double decker and cutaway buses. For zero-emission technologies, please identify the fuel type as hydrogen or electricity and the type of charging technology (depot, wireless, and/ or on-route). For conventional technologies, identify the fuel type as diesel, compressed natural gas (CNG), liquefied natural gas (LNG), diesel hybrid (dHEB), gasoline hybrid (gHEB), propane, or gasoline. (13 CCR § 2023.1(d)(1)(D))*

As described in Section C Technology Portfolio, METRO intends to transition their current fleet composition to a mixed fleet of both BEBs and FCEBs. Figure 2 presents METRO's projected schedule of bus purchases. This schedule allows METRO to maintain the same level of service and achieve the energy demands of the current regular service. It also reflects the 14-year life span of the current fleet and the first ZEB replacement cycle which takes place in 2036 when the initial four Proterra BEBs will be replaced.

As show in Figure 2, beginning in 2023-2024, all new fixed route vehicle purchases will be zero-emission buses (ZEB). METRO intends to continue to transition its fleet to ZEB through both BEBs and FCEBs. METRO will continue to procure FCEB's in subsequent years, eventually achieving a 100% ZEB fleet by 2037. The procurement schedule assumes that if more funds become available, METRO will attempt to accelerate its ZEB procurement timeline.

As previously stated, METRO's current purchase schedule is based on available grant funding. If more funding becomes available METRO will look for opportunities to move up the transition timeline. Table 2 provides a breakdown of each annual purchase and associated ZEBs. It also includes the anticipated phasing of the required hydrogen fueling infrastructure.

Figure 2: METRO's Projected Annual Bus Procurements

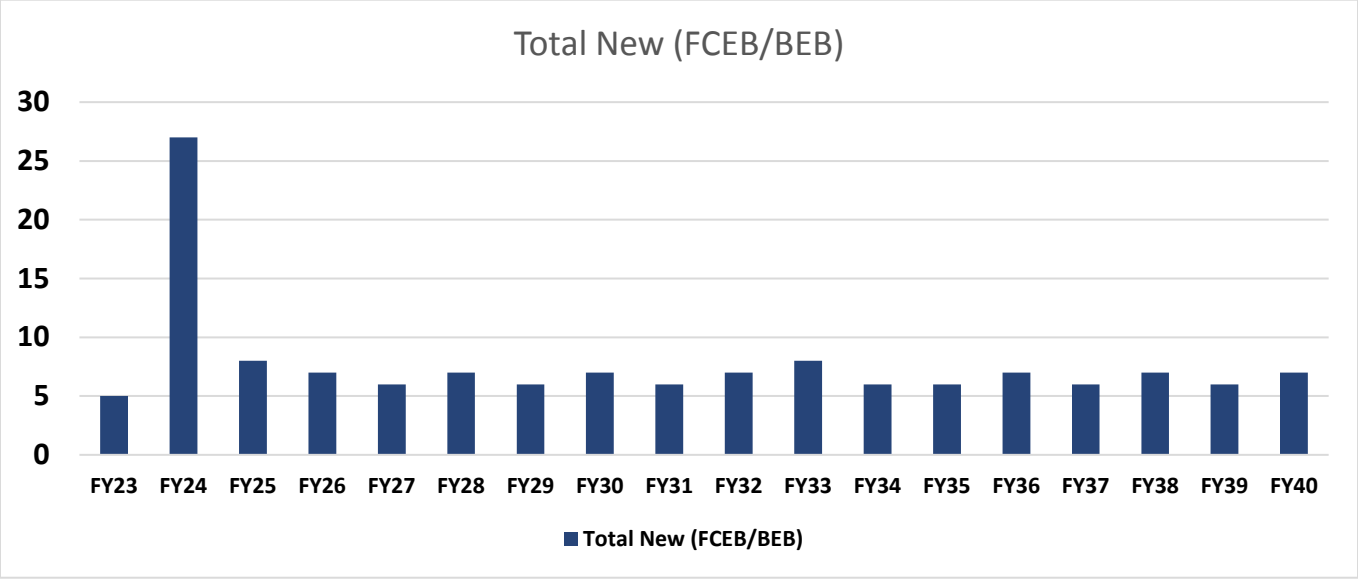


Table 2: METRO's Projected Annual Bus ZEB Procurement Details

Timeline (Year)	Total Number of Buses to Purchase	Number of ZEB Purchases	Percentage of Annual Bus Purchases	ZEB Bus Type(s) / ZEB Fuel Type(s)	Number of Conventional Vehicles
2021	--	--	--	4 BEB	--
2023	5	5	100%	5 BEB	--
2024	27	27	100%	27 FCEB	--
2025	8	8	100%	8 FCEB	--
2025 : Phase 1 Hydrogen Fueling Infrastructure					
2026	7	7	100%	7 FCEB	--
2027	6	6	100%	6 FCEB	--
2028 : Phase 2 Charging Infrastructure					
2028	7	7	100%	7 FCEB/BEB	--
2029	6	6	100%	6 FCEB/BEB	--
2030	7	7	100%	7 FCEB	--
2031	6	6	100%	6 FCEB	--
2032	7	7	7	7 FCEB	
2033	8	8	100%	8FCEB/BEB	--
2034	6	6	100%	6 FCEB/BEB	--

2035	6	6	100%	6 FCEB	--
2036	7	7	100%	7 FCEB/BEB	--
2037	6	6	100%	6 FCEB	--
2038	7	7	100%	7 FCEB	--
2039	6	6	100%	6 FCEB	--
2040 : Phase 3 Hydrogen Fueling Infrastructure					
2040	7	7	100%	7 FCEB	--

3. **Following the same bus purchase timeline as identified in Table 2, please identify in Table 3 the required operational range your future zero-emission buses should have to be able to serve in your fleet. Please provide the estimated cost of each bus with that required operational range.**

The price shown in **Table 3** reflects the price of the 40' New Flyer FCEB on the California state contract, because at this time it is the only 40' FCEB option currently listed on the contract. **Table 3** reflects METRO's historic configurable options costs and the state tax. **Table 3** also lists the required operational range needed from a ZEB for METRO's operations.

Table 3: Estimated Costs and Range Requirements of Future ZEB Purchases

	Cost Requirements				Range Requirement
	Average Bus Base Price from CA State Contract	**Estimated Cost of Configurable Options**	**Tax**	**Estimated Total Cost ***	**METRO's Required Operational Range**
40' FCEB	$1,015,000	$88,000	3.5%	$1,489,050	285 miles

*2021 pricing shown. The general expectation is that FCEB prices will fall, although there is not enough information to make a confident projection in future pricing.

4. **Is your transit agency considering converting some of the conventional buses in service to zero-emission buses (13 CCR § 2023.1(d)(1)(E))?**

   No.

Section E: Facilities and Infrastructure Modifications

1. **Please complete Table 5 with names, locations, and main functions of transit agency divisions or facilities that would be involved in deploying and maintaining zero-emission buses.** *Please limit the facilities to bus yards and facilities with maintenance, fueling, and charging functions, and exclude other operational functions like training centers, information and trip planning offices, and administrative buildings. Please identify which facility(ies) require construction, infrastructure modifications, or upgrades to support your transit agency's long-term transition to zero-emission technologies and the estimated timeline for such an upgrade. Please also specify the type(s) of infrastructure planned in each division or facility and provide their service capacities (e.g., en-route high-power charging system to deploy 20 BEB in 2025). (13 CCR § 2023.1(d)(1)(C)).*

METRO currently has one facility, at Judy K Souza Operations Facility (JKS) that includes a service lane, a CNG fueling station, parking, 4 BEB charging stations with conduit ready for an addition 6 charging stations. The parking available to METRO is not sufficient to house its entire fleet, with about 10% of the fleet being required to park at the maintenance facility across the street from JKS.

The proposed hydrogen fueling station at JKS has an explicit goal of enabling METRO to convert 100% of its fleet serving Watsonville's Historically Disadvantaged Communities (HDCs) to ZEBs by 2027. Anticipated infrastructure required to accommodate METRO's fleet transition as laid out in the ZEB Rollout Plan includes two major phases of buildout of a hydrogen fueling station, with the first phase supporting a 85 FCEB capacity at JKS. Currently, METRO's facilities are not adequate in size to support the full build out of infrastructure to support BEBs (charging cabinets, dispensers, and associated utility equipment). In contrast, the infrastructure required for FCEBs (storage tanks, dispensers, etc.) can all be contained within the existing JKS facility. METRO is proactively exploring several options in order to adapt BEBs, including a facility in South County.

The potential South County Facility will serve as the base of operations for buses currently deadheading from Santa Cruz to Watsonville to conduct local service in South County. The South County Facility has the potential to significantly improve operational efficiency and ZEB feasibility through reduced deadheading.

Figure 3 reflects the anticipated infrastructure required to accommodate METRO's fleet transition. The infrastructure builds are planned to support the buses identified in the **Figure 2** procurement schedule. Each infrastructure project cost is associated with the project year in the **Figure 3** timeline and the related procurements of the vehicles that require that phase of infrastructure development. Hydrogen infrastructure costs include maintenance bay upgrades for H2 detection, ventilation systems, and the build-out of a hydrogen fueling station, including design, construction, and equipment installation costs. For planning purposes, CTE assumed two

major phases of build out of the hydrogen fueling station. For cost estimation purposes, an 85 FCEB capacity was assumed for first phase. The estimated FCEB fleet size will remain below 85 buses until the planned purchase of additional FCEBs beyond 2040, requiring an upgrade to the station to support the increased throughput demand. This phased approach serves to optimize system efficiency and reduce operating costs.

METRO has 11 maintenance bays that are currently CNG compliant; METRO assumes each maintenance bay will cost $136,000 to upgrade gaseous fuel detection and ventilation systems to comply with the requirements for hydrogen facilities, totaling to $1,496,000 in maintenance facility upgrades. Hydrogen storage and dispensing capacity is assumed to be 85 FCEBs. Since METRO plans to have under 85 FCEBs until 2040, the build out of the hydrogen station is phased, with an initial build in 2024-2025 to support the first FCEBs and an expansion planned in 2040 to support the additional FCEBs scheduled for procurement that year. The first phased build is estimated to cost $9M while the second phase is estimated to be $2M for the charging infrastructure and $4.6M, including all storage, compression, and dispensing equipment.

Figure 3: METRO's Estimated Annual Infrastructure Costs

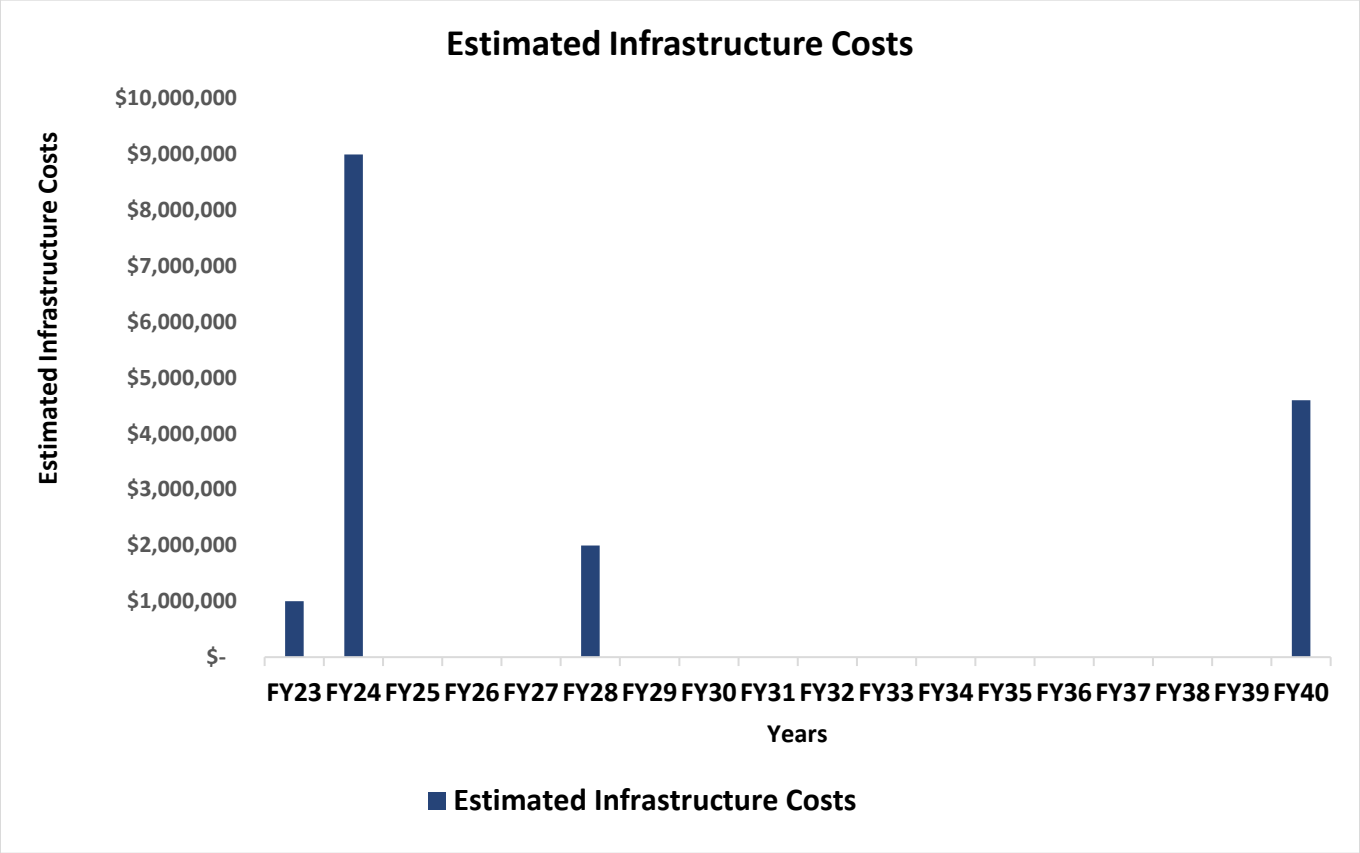


Table 5: Facilities Information and Construction Timeline

Division/Facility Name	Address	Main Function(s)	Type(s) of ZEB Infrastructure	Service Capacity	Needs Upgrade?
JKS Facility	1200 River St, Santa Cruz, CA 95060	Bus Storage, Fueling and Daily Service	Electric Charging Depot and Planned Hydrogen Fueling Station	Entire Fleet	Yes, planned hydrogen fueling infrastructure installation
METRO Maintenance Facility	171 Vernon , Santa Cruz, CA 95060	Bus Maintenance and Storage	Planned hydrogen detection system	Entire Fleet	Yes, planned hydrogen detection system
South County Facility	TBD	Bus Storage, Fueling and Daily Service	TBD	TBD	No.

1. **Regarding the information provided in Table 5, please explain the types of necessary upgrades or infrastructure modifications each facility or division needs to support your transit agency's long-term transition to ZEB. Please also provide the specification of each infrastructure in the related facility or division before and after the upgrades or modifications.**

JKS will require a hydrogen station including storage, compression, maintenance facility upgrades and dispensers to support up to 85 FCEBs. The METRO Maintenance Facility will require upgrades to gaseous fuel detection and ventilation systems to comply with the requirements for supporting hydrogen vehicles. These upgrades will apply to all 11 bays at the facility.

2. **Do you expect to make any modifications to your bus parking arrangements? Explain the modifications and why they are needed.**

Yes. METRO has been working with CTE to develop conceptual layouts of charging/fueling infrastructure and used those preliminary analyses to quantify the parking impact of such infrastructure. METRO's current bus parking layout, accommodating 68 buses in striped parking spaces, and 15 in the drive lanes for a total of 83 buses. METRO has enough room for 67 FCEBs to be parked in striped spaces, and 10 buses in the drive lanes, for a total of 77 buses. This net loss of 6 parking spaces indicates that large-scale FCEBs fueling infrastructure is likely to impact parking capacity at METRO.

3. **Do you expect to need additional parking spaces for completing the transition to zero-emission technologies? Explain why.**
   No, METRO does not need additional parking spaces for completing their transition. METRO plans to park 6 buses at METRO's Maintenance Facility.

4. **In Table 6, please identify the propulsion system of all buses that will be dispatched from the facilities identified in Table 5.**

5. **Please identify the electric utilities in your transit agency's service area.**
   METRO provides transit service within PG&E service territories.

Table 6: NOx-Exempt Area and Electric Utilities' Territories

Division/Facility Name	Type(s) of Bus Propulsion Systems Dispatched	Located in NOx-Exempt Area?	Name(s) of Electric Utility in Service Area
JKS	Diesel, CNG, BEB, FCEB	No	PG&E

Note: The ICT regulation defines "NOx Exempt Areas" (13 CCR § 2023(b)(39)) as the following counties and air basins: Alpine, Amador, Butte, Calaveras, Colusa, Del Norte, Eastern Kern (the portion of Kern County within the Eastern Kern Air Pollution Control District), Glenn, Humboldt, Inyo, Lake, Lassen, Mariposa, Mendocino, Modoc, Mono, Monterey, Nevada, Northern Sonoma (as defined in title 17, California Code of Regulations, section 60100(e)), Plumas, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz, Shasta, Sierra, Siskiyou, Northern Sutter (the portion of Sutter County that is north of the line that extends from the south east corner of Colusa County to the southwest corner of Yuba County), the portion of El Dorado County that is within the Lake Tahoe Air Basin (as defined in title 17, California Code of Regulations, section 60113), the portion of Placer County that is East of Highway 89 or within the Lake Tahoe Air Basin, Trinity, Tehama, Tuolumne, and Yub

Section F: Providing Service in Disadvantaged Communities

1. **Does your transit agency serve one or more disadvantaged communities, as listed in the latest version of CalEnviroScreen?**

a. **If yes, please describe how your transit agency is planning to deploy zero-emission buses in disadvantaged communities (13 CCR § 2023.1(d)(1)(F)).**

b. **Please complete Table 7 with the estimated number of zero-emission buses your transit agency is planning to deploy in disadvantaged communities and the estimated timeline.**

METRO provides service to one unique disadvantaged community (DAC). METRO's Phase I ZEB Implementation Plan has an explicit goal of converting 100% of its fleet serving Watsonville's DAC to ZEBs by 2027. The current METRO fleet serves the DAC with nine routes, which are shown in the map provided in Appendix A.

Since 2021 METRO has deployed two BEB buses in Watsonville for a Circulator route[1]; this route provides frequent service to desirable destinations in Watsonville between noon and 7:45pm.
The new the Zero-Emission Watsonville Circulator Project is funded by the California Department of Transportation's Low Carbon Transit Operations Program (LCTOP). The new route is designed to reduce the number of riders using intercity buses for local trips and increase the number of transit passengers by providing more frequent service to desirable destinations in Watsonville between 10am and 8pm daily. The route will continue to serves one of the lowest income communities in METRO's service area. The project would not only supplant the greenhouse gas emissions from a fossil fueled bus, but it would also provide additional service in an area of the county with a high proportion of transit users. METRO will offer free fares to the public to encourage ridership and promote public transportation through a one-year pilot program.

Due to the difficulty in assigning specific future bus procurements to routes, and with respect to METRO's needs to frequently arrange and adapt service, the Expected Year of First ZEB Deployment is indicative of when METRO expects to deploy and house ZEBs. Because the end date of METRO's transition is to be determined there is not a definite date for completion of route electrification at this time.

Table 7: Service in Disadvantaged Communities

METRO Route	Expected Year of First ZEB Deployment	Year of Complete Route Electrification/Fueling Infrastructure	Location of Disadvantaged Community By Census Tract Number
69A	2027	2025	6053010101 6087110400 6087110300
69W	2027	2025	6053010101 6087110400 6087110300
71	2027	2025	6053010101 6087110400 6087110300
72	2027	2025	6053010101 6087110400 6087110300
72W	2027	2025	6053010101 6087110400

[1] https://www.scmtd.com/en/routes/watsonville-circulator

			6087110300
75	2027	2025	6053010101 6087110400 6087110300
75S	2027	2025	6053010101 6087110400 6087110300
79	2027	2025	6053010101 6087110400 6087110300
91	2027	2025	6053010101 6087110400 6087110300
Watsonville Circulator	2021	2021-2024	6053010101 6087110400 6087110300

Note: The ICT regulation defines the "CalEnviroScreen" (13 CCR § 2023(b)(10)) as a mapping tool that is developed by the Office of Environmental Health Hazard Assessment (OEHHA) at the request of the California Environmental Protection Agency (CalEPA) to identify California's most pollution-burdened and vulnerable communities based on geographic, socioeconomic, public health, and environmental hazard criteria. The CalEnviroScreen is available for public use at https://oehha.ca.gov/calenviroscreen.

Section G: Workforce Training

1. **Please describe your transit agency's plan and schedule for the training of bus operators and maintenance and repair staff on zero-emission bus technologies (13 CCR § 2023.1(d)(1)(G)).**

METRO plans to implement ZEB training programs for bus operators, mechanics, utility maintenance workers, and supervisors on an annual basis, including new operator training and the State Mandated Annual Refresher Training (SMART).

Training courses include Operator Refresher Training, New Operator Training, Bus Familiarization, and Bus Refresher Training. The annual training programs reach approximately 160 operators, 21 Transit Service Delivery (TSD) Supervisors, 2 Trainers and 1 TSD Superintendents in the Transit Service Delivery department. In the Maintenance divisions, annual trainings prepare 21 Mechanics, 9 Utility Personnel, 2 Maintenance Supervisors, 1 Senior Account Manager, and the Fleet Maintenance Manager. Trainings encompass all propulsion technologies at METRO.

The in-house curriculum includes New Bus Training, which incorporates pre-trip inspections, door operations, emergency equipment operations, steering, operational concerns, DMV pre-trip, bus components, and other portions of the bus functions and operations across bus technologies. Maintenance trainings are also an important element of a bumper-to-bumper technical training curriculum for mechanics, utility workers, and supervisors. These trainings focus on preventive maintenance requirements, hazards related to high voltage, personal protective equipment, component training, and charging and fueling source training.

METRO also takes advantage of trainings from manufacturers of ZEB equipment, whether it is the bus, charge management software, or charging equipment. OEM trainings provide critical information on operations and maintenance aspects specific to the equipment model procured. Additionally, 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 provide widespread agency training on new equipment and technologies.

Section H: Potential Funding Sources

1. **Please identify all potential funding sources your transit agency expects to use to acquire zero-emission technologies (both vehicles and infrastructure) (13 CCR § 2023.1(d)(1)(H)).**

METRO is prepared to pursue funding opportunities at the federal, state, and local level, as necessary and as available.

METRO is exploring federal grants through the following funding programs: Federal Funding sources METRO is considering include:

- United States Department of Transportation (USDOT)
    - Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grants
- Federal Transportation Administration (FTA)
    - Bus and Bus Facilities Discretionary Grant
    - Low-or No-Emission Vehicle Grant
    - Urbanized Area Formula Grants (5307) Flexible Funding Program – Surface Transportation Block Grant Program
- Environmental Protection Agency (EPA)
    - Environmental Justice Collaborative Program-Solving Cooperative Agreement Program

State funding sources METRO is considering include:

- CalSTA Transit and Intercity Rail Capital Program (TIRCP)
- California Energy Commission
- Caltrans Low Carbon Transit Operations Program
- California Transportation Commission
- Local Partnership Competitive Program
- Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program (HVIP)
- State Transportation Improvement Program (STIP) |
- SB1 State of Good Repair
- Low Carbon Fuel Standard (LCFS) Credits

Local funding sources METRO is considering include:

- Monterey Bay Air Resources District (MBARD)

Section I: Start-up and Scale-up Challenges

a. Please describe any major challenges your transit agency is currently facing in small scale zero-emission bus deployment. How might CARB assist you to overcome these challenges? Please share your recommendations.

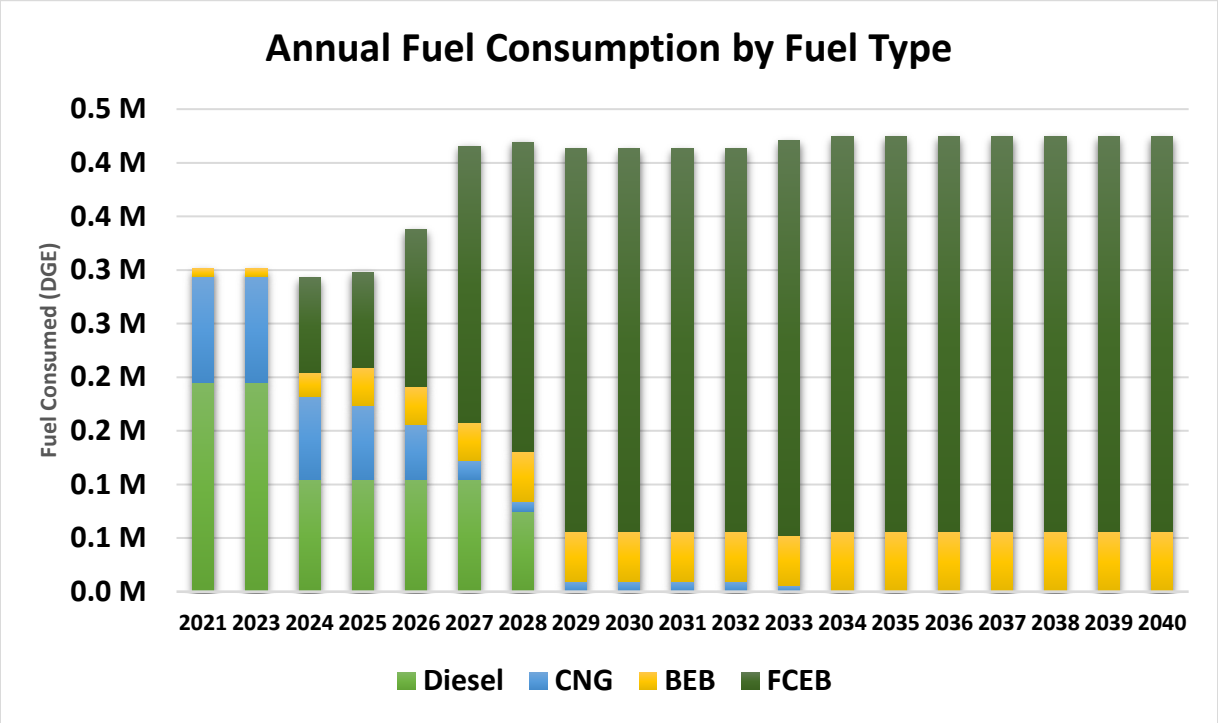
Currently, METRO is not facing any major challenges to ZEB deployment.

b. Please describe any challenges your transit agency may face in scaling up zero-emission bus deployment. How might CARB assist you to overcome these challenges? Please share your recommendations.

Challenges can arise with any new propulsion technology, its corresponding infrastructure, or in training operators and maintenance staff. While not all challenges can be foreseen, nearly all transit agencies must contend with the cost hurdles posed by these new zero-emission technologies. The current market cost of ZEBs is between $750,000 and $1,200,000, which is about $250,000 to $700,000 more costly than traditional diesel buses. METRO will seek financial support to cover the incremental cost of ZEBs from the resources discussed in Section H.

Costs of required fueling infrastructure and fueling operations for ZEB technologies pose another hurdle for transit agencies transitioning to zero-emission service. The combined METRO's Estimated Annual Fuel Consumption by Fuel Type are shown in Figure 4.

Figure 4: METRO's Estimated Annual Fuel Consumption by Fuel Type



Continued support for the capital cost of this new infrastructure is imperative, but creating cost efficiencies for fueling operations cannot be overlooked. For alternative fuels such as hydrogen, support for hydrogen supply chains and increasing economies of scale on the production side will ultimately benefit transit agencies deploying and planning for FCEBs.

Beyond cost hurdles, transit agencies must also ensure that available zero-emission technologies can meet basic service requirements of the agency's duty cycles. The applicability of specific zero-emission technologies will vary widely among service areas and agencies. As such, it is critical that transit agencies in need of technical and planning support have access to these resources to avoid failed deployment efforts. Support in the form of technical consultants and experienced zero-emission transit planners will be critical to turning Rollout Plans into successful deployments and tangible emissions reductions.

CARB can support METRO by ensuring continued funding for the incremental cost of zero-emission buses, as well as infrastructure funding and legislative support. These support activities should emphasize proper transition and deployment planning and should not preclude hiring consultants to ensure best practices and successful deployments. Availability and the price of hydrogen, both renewable and not, continue to be an affordability challenge that can be allayed by legislation subsidizing renewable fuel production.

Appendix A: METRO Disadvantaged Community and Low-Income Service Map