Zero-Emission Bus (ZEB) Rollout Plan

City of Laguna Beach

June 2023

Prepared by

ICF

Table of Contents

Section A: Transit Agency Information

The City of Laguna Beach (dba: Laguna Beach Transit) offers free year-round trolley services to both visitors and residents of Laguna Beach. The trolleys operate along designated routes that cover areas such as Pacific Coast Highway (PCH), Laguna Canyon Road, and even extend as far south as Dana Point. Prior to the COVID-19 pandemic, the trolley system served over 800,000 trips annually and had an operating budget of approximately $3 million per year.

These trolleys operate on three different routes during summer season: Canyon, Coastal, and Summer Breeze and two different routes off season: Canyon and Coastal, as shown in Table 1. It is worth noting that trolleys usually depart 20-30 minutes before their scheduled start times and return 20-30 minutes after their scheduled end times. These trolleys operate in two shifts (AM and PM), and drivers have around 30 minutes for lunch. During the summer months, these trolleys run for 13-15 hours a day, and some of them could reach a maximum daily mileage as high as 250 miles.

Table 1. Laguna Beach Transit Routes and Schedules

Season	Routes	Schedules
Summer Season	Canyon Route	7 Days a Week From 8:30am to 11:30pm
	Coastal Route	7 Day A Week from 9:30am to 11:30pm
	Summer Breeze	Fridays: Noon to 11:30pm Saturday/Sunday: 10:00am to 11:30pm
Off Season	Canyon Route	Saturday/Sunday: 9 am to 7 pm
	Coastal Route	Monday-Thursday: 7:30 am to 6 pm Friday: 7:30 am to 10 pm Saturday: 9 am to 10 pm Sunday: 9 am to 7 pm

Currently, the Laguna Beach Transit is comprised of 25 propane powered trolley buses. Management, marketing, planning, and vehicle maintenance are provided by City employees, while day-to-day operations are provided by a private contractor, LAZ Parking. The Corp Yard (Parking Lot 16), located at 1900 Laguna Canyon Road, serves as the main bus parking and maintenance depot. Laguna Beach Transit is not part of a Joint Zero-Emission Bus Group.

Transit Agency's Name	City of Laguna Beach (dba: Laguna Beach Transit)
Transit Agency's Mailing Address	505 Forest Avenue Laguna Beach, CA 92651
Name of Transit Agency's Air District(s)	South Coast Air Quality Management District
Name of Transit Agency's Air Basin(s)	South Coast Air Basin
Total Number of Buses in Fleet	25
Population of the Urbanized Area[1]	583,681
Contact Information of the general manager, Chief operating officer, or equivalent:	
Contact Name (Last Name, First Name)	Michael Litschi
Title	Director of Transit and Community Service
Phone Number	(949) 497-0303
Email	mlitschi@lagunabeachcity.net

[1] NTD, 2020 Census Changes UZA/Population (available at: 90119 2021 Agency Profile (dot.gov))

Section B: Rollout Plan General Information

This ZEB Rollout Plan for City of Laguna Beach will ensure the agency has fully transitioned its bus fleet to a zero-emission fleet by 2040, in alignment with the California Air Resources Board's (CARB) Innovative Clean Transit (ICT) regulation, adopted in December 2018. The regulation requires a progressive increase of an agency's new bus purchases to be zero-emission buses (ZEB) based on their fleet size. According to the ICT regulation, each agency or Joint Group's requirements are based on its classification as either a "Large Transit Agency" or a "Small Transit Agency." Based on its definition, Laguna Beach Transit is categorized as a small transit agency and must comply with the following requirements:

- By July 1, 2023 – Governing body approved Rollout Plan must be submitted to CARB
- Starting January 1, 2026 – 25 percent of new bus purchases must be ZEBs
- Starting January 1, 2029 – 100 percent of all new bus purchases must be ZEBs
- By January 1, 2040 – 100 percent of the fleet must be ZEBs
- March 2021 – Annual compliance report due to CARB[2]

Laguna Beach Transit's Rollout Plan was developed based on the ICT ZEB purchase requirements for small transit agencies along with its current purchasing schedules, model years and lifetime of the existing fleet, daily mileage requirements, and total cost of ownership (TCO) considerations.

Laguna Beach Transit's fleet will be fully served by ZEBs by 2031, 9 years ahead of the 2040 ICT requirement, as detailed in Section D. The last non-ZEB (propane) trolleys were leased in 2019. After this, Laguna Beach Transit will purchase zero-emission trolleys in 2025 through 2031 to transition to zero-emission fleet. The bus replacement schedule has been designed to allow each bus to serve its full useful lifetime, without any early retirements. Because of (1) the limited ranges of the existing battery electric trolleys, (2) high daily mileage demand at summer peak season, and (3) constrained time available for depot charging, Laguna Beach Transit may need to consider 2:1 replacement for at least 8 of their existing buses which makes the total number of buses to 33 battery electric trolleys after the full transition to ZEB fleet. Out of the 33 buses, 20 are active buses that will operate year-round, 5 buses are spares, and 8 buses serve as backups for summer peak operation (due to the limited range of electric buses).

Laguna Beach Transit will phase in depot charging infrastructure, with electric vehicle supply equipment (EVSE) installation at the same time of bus purchases. Ground mounted dual port chargers will be installed at the Corp Yard. The charging infrastructure was planned with the consideration of up to six hours charging window. Particularly during summer peak season, a sub fleet will be charged in the afternoon, while the rest will be charged in the evening to ensure the high mileage demand daily. To support a total of 33 battery electric trolleys, ten (10) 75 kW dual port chargers are needed, which would result in an incremental power demand of 750 kW and require installation of a 750 kVA transformer. The number of ports (i.e., 20 ports) is determined based on the count of active buses, assuming that spare and back-up buses can utilize the same charging infrastructure as the active fleet.

As ZEB technologies are rapidly evolving, this Rollout Plan will be used as a guidance for ZEB transition. Findings and recommendations in this report could be updated at the time of implementation. This

[2] https://ww2.arb.ca.gov/our-work/programs/innovative-clean-transit/reporting-tool-data

ZEB Rollout Plan was approved by the Laguna Beach City Council on June 27, 2023. The Council's approval is documented in Appendix A.

This rollout plan was developed by ICF Incorporated L.L.C in collaboration with the City of Laguna Beach. For additional information on the rollout plan, please contact:

Nabila Guzman, Senior Administrative Analyst
505 Forest Avenue
Laguna Beach, CA 92651
(949) 497-0766

Section C: Technology Portfolio

Battery electric trolleys are identified as the technology for Laguna Beach Transit's ZEB transition in this Rollout Plan. No fuel cell electric trolleys are commercially available at the time of this Rollout Plan submission. Very limited battery electric trolleys are commercially available, as identified and shown in Table 2. Hometown Manufacturing, Inc. offers two models with full electric powertrain: Villager (medium-duty) and Streetcar (heavy-duty). Motiv uses EPIC6 platform and provides a medium-duty trolley model with a battery capacity of 127 kWh and a range of 105 miles.

Table 2. Currently Available Battery Electric Trolley Makes and Models

Manufacturer	Model	Length	Battery Capacity	Range	Additional Notes
Hometown	Villager	24'-42'	226 kWh	150-170+ miles	• 7-year Altoona tested • 14-30 people capacity
Hometown	Streetcar	30'-40'	320 kWh	140-200 miles	• 28-40 people capacity
Motiv	EPIC6	29'	127 kWh	105 miles	• Up to 30 passengers

Section D: Current Bus Fleet Composition and Future Bus Purchases

Current Bus Fleet Composition

Laguna Beach Transit's current fleet consists of 25 propane trolleys, with a maximum daily service of 20 vehicles. Although the City's data indicates certain days when all 25 buses had non-zero mileage, according to the City, some of the buses were either taken to the maintenance shop or utilized for other purposes. Table 4 shows Laguna Beach Transit's fleet inventory grouped by vehicle model year, make and model. Note that Laguna Beach Transit follows the useful life of 12-year to plan a vehicle procurement and replacement schedules except for the 2010 Molly buses of which the City intends to replace them in 2025 once they reach 15 years of age.

Table 4. Current Vehicle Inventory

Number of Buses	Model Year	Fuel/Size	Bus Type	Make/Model	Planned Replacement Year
4	2010	Propane/35'	Trolley	Molly Corporation/Trolley	2025
6	2013	Propane/34'	Trolley	Double K, Inc. (form. Hometown Trolley)/Mainstreet	2025
3	2015	Propane/34'	Trolley	Double K, Inc. (form. Hometown Trolley) /Mainstreet	2027
4	2018	Propane/25'	Trolley	Double K, Inc. (form. Hometown Trolley)/Villager	2030
8	2019	Propane/31'	Trolley	Double K, Inc. (form. Hometown Trolley)/Villager	2031

Operational Characteristics

Laguna Beach Transit's trolleys operate on various routes throughout the year. During the peak summer season, approximately 20 trolleys are in service, while the remaining ones are either undergoing maintenance or parked in the Corp Yard. During these months, which have highest demand for the usage of trolley buses, these trolleys operate on three different routes: Canyon, Coastal, and Summer Breeze. For most of these routes, the trolleys are dispatched between 8 am and 10 am and run continuously until 11:30 pm. Figure 1 shows the routes and schedule for these trolleys during the Summer 2022.

Figure 1. Laguna Beach Trolley Routes and

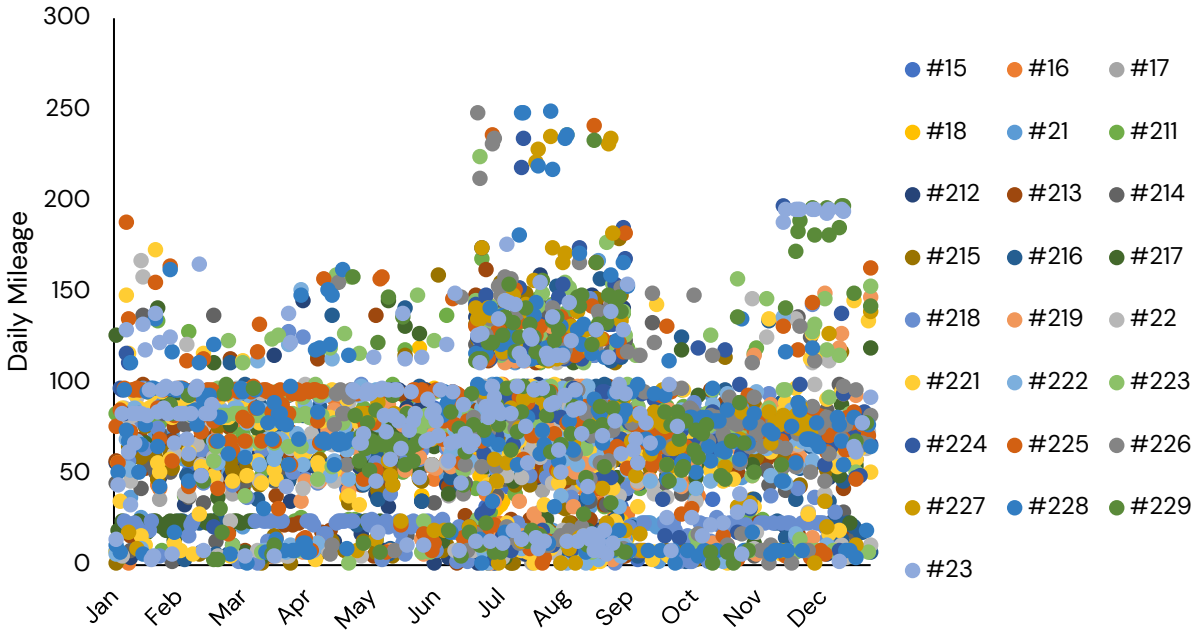
According to the City's transit supervisor, approximately 11 trolleys operate on the coastal routes. They are dispatched at 9:30 am and run until 11:30 pm. The Canyon route is served by four to six trolleys, starting at 8:30 am and ending at 11:30 pm. Two trolleys operate on the Summer Breeze route, running from 10 am to 11:30 pm on weekends. It is worth noting that trolleys usually depart 20-30 minutes before their scheduled start times and return 20-30 minutes after their scheduled end times. These trolleys operate in two shifts (AM and PM), and drivers have around 30 minutes for lunch.

The project team were able to access the daily mileage data collected by the City for each trolley bus for the year of 2022 through their DoubleMap CAD/AVL (Computer-Aided Dispatch/Automatic Vehicle Location) system. The DoubleMap system integrates CAD and AVL functionalities, allowing transit operators to have a comprehensive view of their fleet's location and status. It provides features

such as real-time vehicle tracking, route optimization, automatic dispatching, and communication tools. With the help of GPS technology, DoubleMap can display the precise location of each vehicle on a map, enabling operators to monitor their fleet's movements, respond to incidents or delays, and provide accurate arrival time predictions to passengers.

According to the project team's analysis of DoubleMap data, the daily mileage for Laguna Beach Transit's trolleys varies significantly over the course of the year, with the maximum daily mileage reaching 250 miles, particularly for buses operating on the Summer Breeze route. As shown in Figure 2, for most of the year, the majority of trolleys operate less than 100 miles per day, except during the summer months when the daily mileage increases beyond 100 miles.

Figure 2. Daily Mileage of Laguna Beach Transit's Trolleys in 2022 by Bus Number



Future Bus Purchases

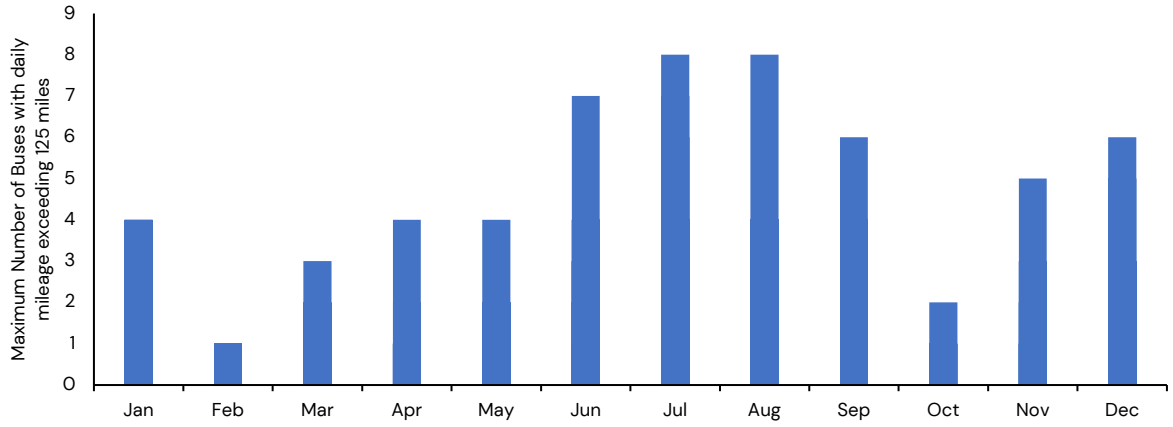
In compliance with ICT (Innovative Clean Transit) regulations, Laguna Beach Transit is obligated to prioritize the purchase of ZEBs and gradually increase the proportion of ZEB purchases from 2026 onwards. The regulations stipulate that by 2029, all bus purchases must consist entirely of ZEBs, achieving a 100 percent ZEB purchase requirement. Laguna Beach Transit is planning to start with 100 percent ZEB purchases when it becomes necessary to replace the existing fleet. According to the current vehicle inventory, the first battery electric trolley is anticipated to be acquired in 2025. The final replacement of the propane trolley within the existing fleet is scheduled for 2031. This gradual transition will ensure that the entire fleet consists of ZEBs by the completion of the replacement cycle.

The Hometown Villager EV Trolley is being evaluated as a potential replacement for the existing bus fleet in the Rollout Plan. The manufacturer has indicated that the base price for these vehicles is approximately $450,000. With an assumed energy efficiency of 1.8 kWh per mile, these trolleys are projected to have a range of approximately 125 miles, taking into account their battery capacity of 226 kWh, which is slightly lower than the advertised range of 150-170 miles. Since the electric range of

Hometown Villager trolleys is lower than the peak daily mileage for a fraction of the transit's existing trolleys, these vehicles would need to utilize mid-day opportunity charging to meet peak demands.

To fully recharge the Hometown Villager EV model from a 20 percent state of charge to 100 percent within 30 minutes (the maximum available time between shifts), a charging power of approximately 360 kW would be necessary. However, based on the manufacturer's specifications, these electric trolleys can currently accept a maximum charging power of 150 kW. As a result, if the City decides to utilize mid-day charging and operate a single bus on the block with a daily mileage exceeding 125 miles, that specific electric trolley would need to be parked for at least 1.2 hours to recharge (assuming the City leverages 150 kW per port charger). Given that this downtime is not feasible during peak demand, the project team suggests a 2:1 replacement for trolleys which serve blocks with daily mileage demand more than the currently available electric ranges of Hometown Villager. Based on the project team's analysis of 2022 mileage data, it was found that on special occasions, only up to 8 trolley buses exceed a daily mileage of 125 miles on the same day. This is also illustrated in Figure 3.

Figure 3. Maximum number of buses with daily mileage exceeding 125 miles



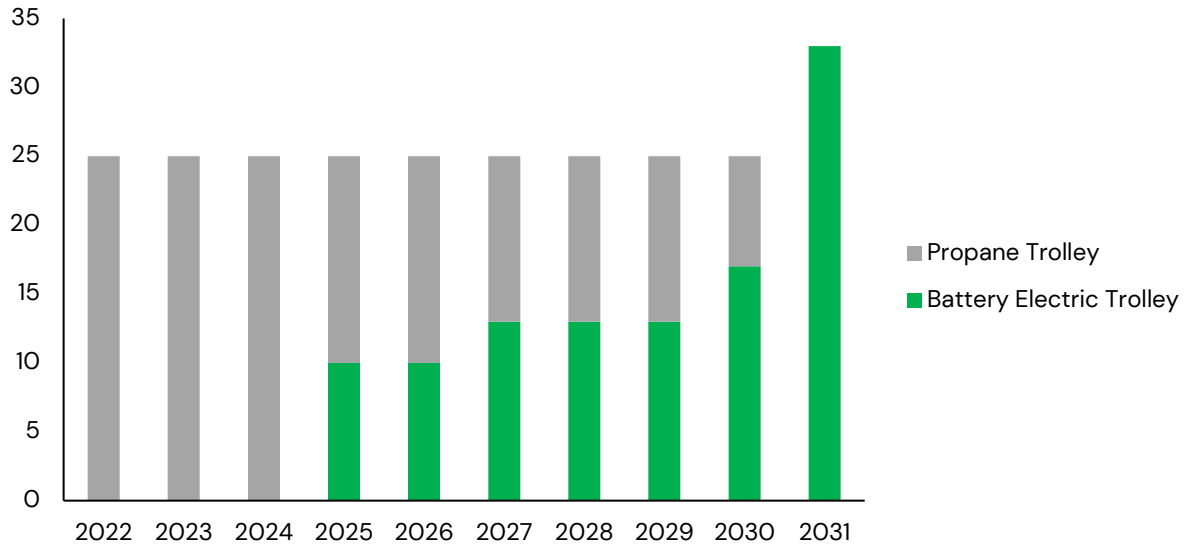
To ensure seamless operations using Hometown Villager EV trolleys, Laguna Beach Transit has determined that a 2:1 replacement ratio will be necessary for the eight trolley buses when the final batch of propane trolleys is replaced. Consequently, the transition to EV Hometown Villager trolleys will require the transit agency to procure, operate, and maintain a fleet of 33 buses, rather than the existing total of 25 buses. This approach ensures sufficient capacity and availability for uninterrupted service. Table 5 shows the schedule of future ZEB purchase schedule through 2040.

Table 4. Future Bus Purchase Schedule

Year	Total Bus Purchase No.	ZEB Purchases				Conventional Bus Purchases			
		No.	%	Bus Type	Fuel Type	No.	%	Bus Type	Fuel Type
2023	0	0	0%			0	0%		
2024	0	0	0%			0	0%		
2025	10	10	100%	Trolley	Battery Electric	0	0%		
2026	0	0	0%			0	0%		
2027	3	3	100%	Trolley	Battery Electric	0	0%		
2028	0	0	0%			0	0%		
2029	0	0	0%			0	0%		
2030	4	4	100%	Trolley	Battery Electric	0	0%		
2031	16	16	100%	Trolley	Battery Electric	0	0%		

This solution, however, may present logistical challenges, such as parking availability and maintenance. An alternative, less conservative approach entails proceeding with a 1:1 replacement of the existing trolleys while investigating the potential for other zero-emission bus types (such as common low-floor buses instead of vintage trolley) or technologies (such as fuel cell electric buses) to accommodate the significant range demand during the summer months. That said, it is advisable that moving forward the transit agency keeps monitoring the availability of extended range electric trolley offerings that can more effectively meet operational needs and is closer to a 1:1 replacement scenario. Following the ZEB purchase schedule in Table 4, Laguna Beach Transit is expected to have 100% ZEBs in the fleet by 2031, as presented in Figure 4. Note that conventional bus conversions to ZEB technologies are not currently being considered. This rollout plan is based on new purchases of ZEBs only.

Figure 4. ZEB Fleet Transition from 2022 to 2031.



Section E: Facilities and Infrastructure Modifications

Laguna Beach Transit currently utilizes the Corp Yard, located in downtown Laguna Beach at 1900 Laguna Canyon Road, as the primary parking location for their fleet of 25 trolley buses. This yard is also shared with City's non-transit public fleets. The Corp Yard also serves as the overnight storage facility for the trolleys, with approximately 22 parking bays for trolleys, with the remaining trolleys currently parked outside the secured area in an adjacent public parking lot, as depicted in Figure 5. This arrangement poses challenges when transitioning to EV trolleys since the current layout and structure lack sufficient space for the deployment of chargers. Therefore, it is imperative for Laguna Beach Transit to undertake a restructuring of the Corp Yard parking layout, creating additional spaces to meet two critical objectives: a) enabling the parking of all EV trolleys within the fenced area, and b) providing ample space for the installation of charging infrastructure.

Figure 5. Aerial Map of Corp Yard Parking Layout

Additionally, Laguna Beach Transit's transition to a ZEB fleet will require a number of modifications and changes to the existing facilities and infrastructure. These changes include installation of EVSEs, additional electrical capacity, and modification of parking strategy and infrastructure.

Charging and Parking Infrastructure

To estimate charging infrastructure needs, the following key assumptions are made to evaluate number and level of chargers to develop the EVSE rollout plan:

- Daily electricity consumption (kWh) is estimated based on maximum daily mileage (here the project team assumed 125 miles considering the maximum allowable range on hometown villagers) and energy efficiency (kWh per mile);
- Average of 6 hours of charging time per vehicle;
- 1:1 vehicle to charging port ratio, with dual port chargers, meaning one charger will provide power for two charging dispensers;

- Charging infrastructure is assumed for a maximum of 20 trolley buses since that is the anticipated number of buses in operation on any given day

To meet the peak demand during the summer season and considering the limited range of Hometown Villager battery electric trolleys under circumstances that a vehicle need to operate more than 125 miles per day, a strategy of swapping vehicles between shifts is anticipated to ensure continuous operation and meet service demand. For a worst-case scenario where a trolley bus needs to operate 250 miles per day, assuming an average speed of 20 miles per hour or less, the EV trolley buses are expected to be swapped approximately every 6 hours.

Considering that a maximum of 20 trolleys will be in operation at any given time, our analysis indicates a requirement for twenty (20) 37.5 kW charging ports to effectively charge the Hometown Villager electric trolleys within a 6-hour timeframe. Assuming the use of dual port chargers, this translates to a total of 10 charging stations, each with a maximum capacity of 75 kW, as depicted in Table 6. No dedicated chargers will be needed for spare buses. Assessing efficacy, costs, and spatial requirements, ground mounted plug-in chargers could be most viable for Laguna Beach Transit. A total of 10 dual port chargers, each with a maximum capacity of 75 kW, would result in a cumulative power demand of 750 kW. To accommodate this increased demand, installation of a 750 kVA transformer would be necessary. According to SCE, the transformer feeding the Corp Yard currently has a capacity of 250 kW and the substation feeding this facility has a capacity of about 9 MW. The estimated cost for this upgrade at the grid level is around $117,420, while at the facility level, it is approximately $100,000. While these grid and facility level electrical infrastructure upgrades incur costs, there is a potential solution available through Southern California Edison (SCE) Charge Ready Transport (CRT) program where the program can cover the costs associated with the required upgrades.

Table 5. Number and Power Level of Chargers Needed

Number of ports needed	20
Maximum power (kW) at each port	37.5 kW
Number of dual port charging stations	10
Maximum power (kW) for each charging stations	75 kW

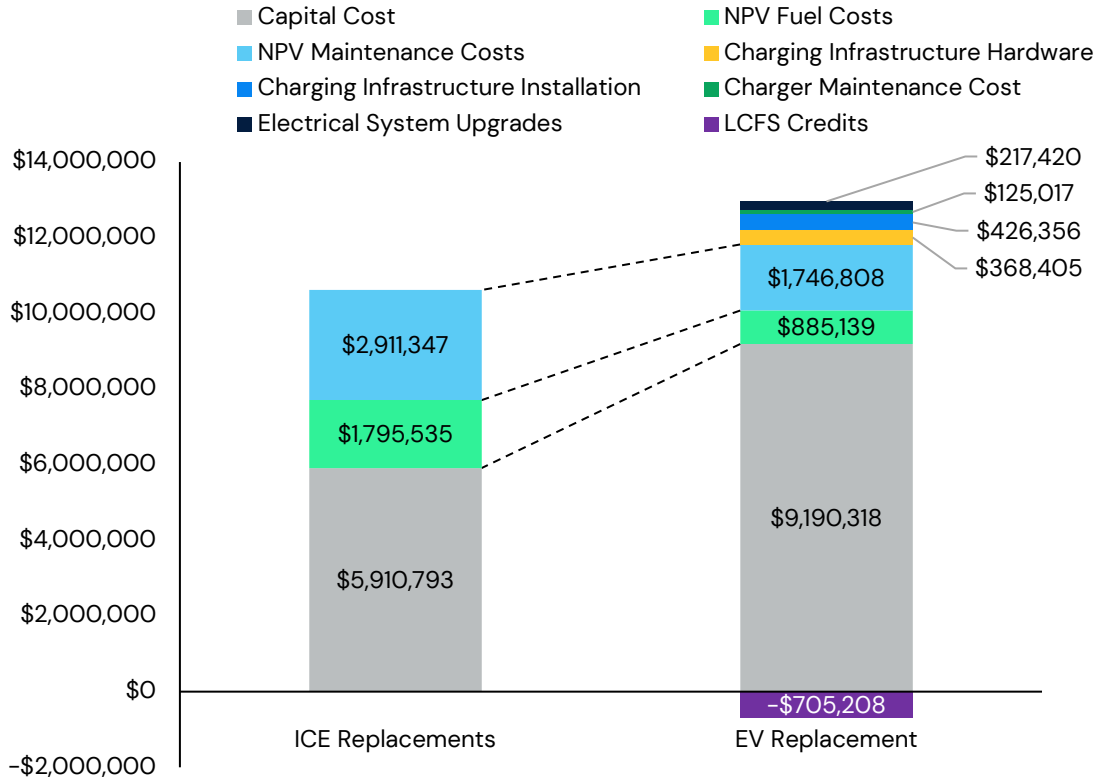
The procurement and installation costs for each type of electric charger were estimated using previous quotes and literature reviews. It's important to note that the installation costs provided in the table below do not encompass anticipated construction expenses, such as trenching, digging, and other associated costs however, those costs are included in the electrical infrastructure upgrade costs mentioned earlier. The estimated charger capacity, as well as the equipment and installation costs required to facilitate trolley charging, are presented in Table 6.

Table 6. Estimated Equipment and Installation Costs of Future EVSEs

Year	No. of Chargers	Charger Power Level (kW)	Charger Equipment Cost (USD)	Charger Installation Cost (USD)	Total Cost (USD)
2025	5	75	$222,500	$257,500	$480,000
2027	2	75	$89,000	$103,000	$192,000
2030	2	75	$89,000	$103,000	$192,000
2031	1	75	$44,500	$51,500	$96,000

Figure 6 shows total cost of ownership (TCO) in Net Present Value (NPV – assuming 5 percent discount rate) to fully transition the bus fleet to ZEB. The TCO encompasses various factors that contribute to the overall expenses associated with operating and maintaining these vehicles. Firstly, the initial purchase cost of the buses themselves constitutes a significant component. For example, under the current scenario, the capital cost of buses is expected to be approximately 55 percent higher. Note that for ZEBs, the project team assumes that the capital cost of the buses will reduce over time as the cost of batteries decreases.[3] Additionally, ongoing operational costs play a crucial role, including fuel or electricity expenses. In the case of Laguna Transit, the city can cut fuel costs by 50 percent by transitioning to electric trolley buses. Regular maintenance and repairs are another key aspect of the total cost of ownership, as buses require routine servicing, inspections, and occasional repairs to ensure their optimal functionality and safety. Additionally, for electric buses, the TCO accounts for the capital and installation costs of charging infrastructure, as well as the electrical system upgrades. While it is anticipated that the electrical infrastructure upgrades to be covered by the SCE CRT program, the project team included an estimate cost of such upgrades in this TCO analysis. Also, considering that the transit agency can earn Low Carbon Fuel Standard (LCFS) credits due to electricity used by EV trolleys, the TCO also takes into account the LCFS credits. Currently, the project team assumes $0.10 of LCFS credit per kWh electricity consumption, while this value may change at the operation pending on LCFS credit prices and CARB's regulatory amendments. Overall, the TCO for transitioning to EV fleet will be approximately 15 percent higher.

Figure 6. Total Cost of Ownership (TCO) in Net Present Value (NPV) for Full ZEB Transition



[3] Based on the ICF's Comparison of Medium- and Heavy-Duty Technologies in California report for the California Electric Transportation Coalition

Maintenance Facility

The City of Laguna Beach operates a consolidated maintenance facility known as the Corp Yard, situated at 1900 Laguna Canyon Road. This facility serves as a maintenance hub for various City vehicles, including trolleys, as well as on- and off-road vehicles used by other City departments such as Public Works, Fire, Marine Safety, and Community Development. The Corp Yard features four maintenance bays that can readily accommodate trolleys for routine maintenance activities. By making some minor reconfigurations to the yard, it is anticipated that the facility would be able to effectively maintain a total of 33 trolleys resulting from this transition.

Table 8 summarizes the facility and infrastructure modifications required to support the Laguna Beach Transit's ZEB transition.

Table 8. Summary of Facility and Infrastructure Modifications

Facility	Infrastructure Modifications*	No. of BEBs to Support	Year	Estimated Cost (USD)
Corp Yard.	A new transformer installation (at 750 kVA) and electrical upgrade from grid and facility level (including hardware for transformer, pole mounted detector, cable, meter, panel, installation and make ready, and etc.).	33	2025	$217,420**
	5 dual port 75 kW charger (10 ports)	10	2025	$480,000
	2 dual port 75 kW chargers (4 ports)	4	2025	$192,000
	2 dual port 75 kW chargers (4 ports)	4	2027	$192,000
	1 dual port 75 kW charger (2 ports)	2	2030	$96,000

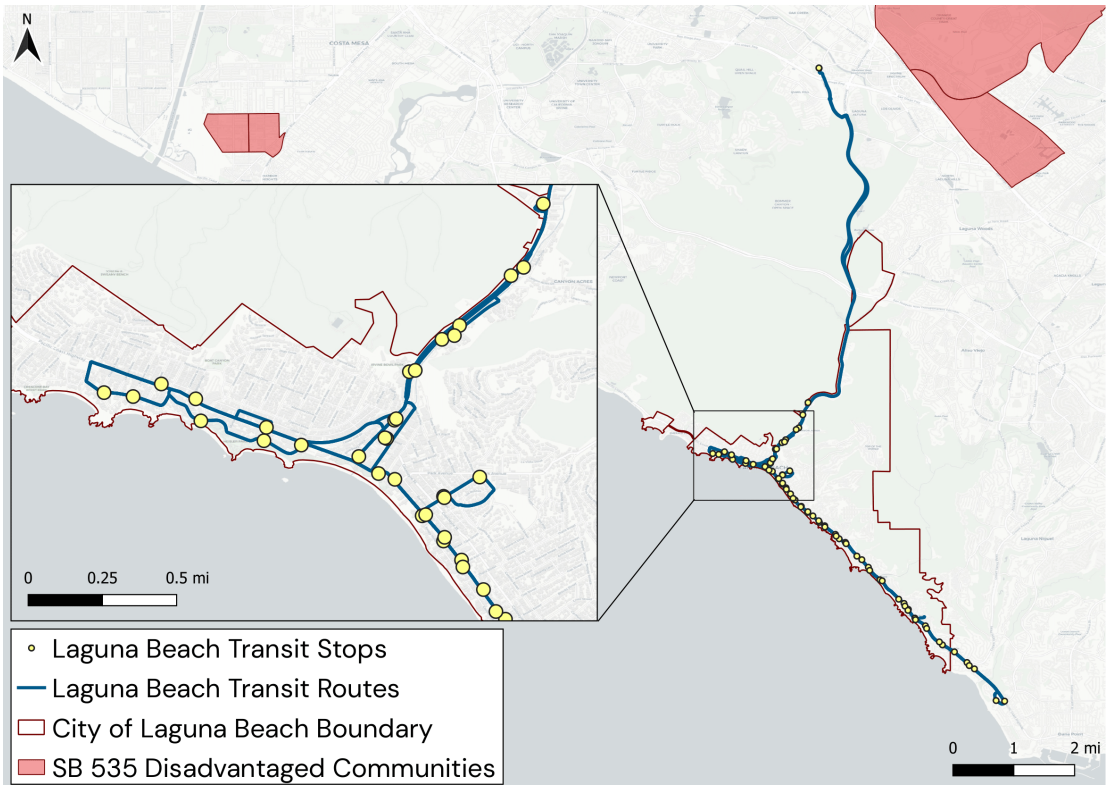
* Note that this plan does not anticipate needing additional chargers for spare or back up vehicles. Those vehicles could be charged at the time that the main fleet is out in operation (i.e., during daytime) or utilize the other charging infrastructure within the Corp Yard if the City decides to transition the rest of the fleet to EV

** While we expect the electrical infrastructure upgrades to be covered by the SCE CRT program, the project team has included an estimated cost for these upgrades for the completeness of the analysis

Section F: Providing Service in Disadvantaged Communities

The map below (Figure 7) shows Laguna Beach Transit's trolley service coverage along with disadvantaged communities defined by CalEnviroScreen 4.0.[4] As shown, currently there are no disadvantaged communities identified within Laguna Beach or along the Laguna Beach transit routes.

Figure 7. SB 535 Disadvantaged Communities Map



The transition to ZEBs can have positive impacts on mobility options for residents, tourists, and workers in the area as well as local air quality and public health. Laguna Beach Transit is located at South Coast air basin, one of two air basins in the country that are classified as 'Extreme' – the worst category for nonattainment of the federal ozone standard of 70 parts per billion (ppb). While vehicles with internal combustion engines produce both air pollutants (e.g., PM, NO_x) and greenhouse gases (e.g., CO_2, CH_4) emissions via tailpipes, battery electric trolleys will produce no tailpipe emissions, helping the region improve compliance with federal air quality standards and subsequently improve public health conditions. This will also help support equity in the region, given air quality improvements around disadvantaged communities can help these communities combat their disproportionate rates of environmental burdens.

[4] California Office of Environmental Health Hazard Assessment (OEHHA). CalEnviroScreen 4.0. Available at: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40, released on October 13, 2021. '

Section G: Workforce Training

Laguna Beach Transit staff will require training as battery electric technology is deployed to ensure safe and efficient practices are being used. There are several different training programs Laguna Beach Transit can participate in, including training from vehicle OEMs, technology suppliers, and infrastructure providers. Laguna Beach Transit can also receive training with courses offered by other transit agencies and outside programs, such as the West Coast Center of Excellence in Zero Emission Technology (CoEZET) hosted by SunLine Transit Agency.

Laguna Beach Transit can adopt a "train the trainer" approach by which key operations and maintenance personnel, such as lead technicians and supervisors, should participate in the OEM training programs to bring the technical expertise and knowledge in-house.

Laguna Beach Transit will also look for the OEMs of the battery electric trolleys to provide safety and hands-on maintenance training for its lead maintenance personnel. After participating in and completing the program, the technicians should capture the learnings and create an in-house training program to train the rest of Laguna Beach Transit's operations and maintenance staff on the specific knowledge and skills required for each role.

The Orange County Transportation Authority (OCTA) has successfully developed a four-tier plan to train personnels across all levels of the transit agency. Laguna Beach Transit could follow or piggyback on OCTA's training plan about battery electric buses (BEBs).

Trainings that should be provided by the selected vehicle OEM (e.g., Hometown, Motiv) fall in the following areas: bus introduction, safety training, operator training, structural composites training, and bus maintenance and repair training. EVSE vendors should be able to provide training in charging infrastructure maintenance and emergency first responder.

Table 10 shows the detailed workforce training plan. The information is based on general training outlines provided by OEMs and does not reflect a mandatory curriculum. Laguna Beach Transit can structure its staff training fully around the OEM training programs or a combination of OEM training and other coursework offered through organizations.

Table 10. Workforce Training Plan

Year	Training Program/ Class	Purpose of Training	Training Provider	Trainee's Positions	Training Hours	Training Frequency	Estimated Costs/ Class
BEB Training Plan							
2025	Bus Introduction	Overview of the bus	BEB OEM	Maintenance technicians or other yard personnel who need to be aware of bus operation during initial acceptance and launch period	16	One time	TBD
	Safety Training	high voltage safety awareness, personal protective equipment (PPE), safety measures, and preventive maintenance	BEB OEM	Maintenance technicians or other yard personnel	30	One time	TBD
	Operator Training	Operator orientation	BEB OEM	Operator trainers, supervisors, or bus operators	16	One time	TBD
	Structural Composites Training	Hands-on training for structural composites repairs on buses	BEB OEM	Maintenance technicians	24	One time	TBD
	Bus Maintenance and repair Training	Training of bus maintenance technicians on routine servicing	BEB OEM	Maintenance technicians	32	One time	TBD
Electric Charging Infrastructure Training Plan							
2025	Charger Maintenance Training	Training of charger infrastructure maintenance	Electric Charger Vendor	Charger Infrastructure maintenance technicians	16	One Time	TBD
	Emergency First Responder Training	First responder training on electrical buses and infrastructure	Electric Charger Vendor	Laguna Beach Transit first responder representatives	4	One Time	TBD

Section H: Potential Funding Sources

Table 11 summarizes potential funding opportunities to offset the capital cost of ZEB procurement and infrastructure. Note that Laguna Beach Transit does not directly receive state or federal funds for its operations. Instead, OCTA serves as the entity responsible for securing and allocating state and federal funding on behalf of the City. OCTA acts as the intermediary for state and federal funds, ensuring that the City of Laguna Beach can access the necessary financial resources to support its transit initiatives and projects. This arrangement allows for effective coordination and management of state and federal funding within the region, with OCTA playing a vital role in facilitating the flow of funds to support the transit needs of the City.

Table 11. Summary Potential Funding Opportunities

Type	Name	Purpose
Formula	FTA 5307 Urbanized Area Formula Grants	Bus procurement, related facilities, and operating expenses
	FTA 5339 (a) Bus and Bus Facilities Program	Bus procurement and related facilities
	FTA 5310 Enhanced Mobility of Seniors & Individuals with Disabilities Program	Support the transportation needs of seniors and individuals with disabilities
	State of Good Repair (SGR) (SB1)	Bus procurement and related facilities
Competitive	FTA 5339 (b) Bus & Bus Facilities	Bus procurement and related facilities
	FTA 5339 (c) Low or No Emission Vehicle	ZEB procurement and related facilities
	Caltrans Low Carbon Transit Operations Program	Transit agency GHG emissions reduction
	CalSTA Transit and Intercity Rail Capital Program	Transit agency GHG emissions reduction
	California Congestion Mitigation and Air Quality (CMAQ) Improvement Program	Transit agency GHG emissions reduction
Voucher	The Volkswagen Environmental Mitigation Trust for California	ZEB procurement
	Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)	ZEB procurement
Market Credit	Low Carbon Fuel Standard (LCFS) Credits	LCFS credits generated from use of low carbon transportation fuels, such as electricity and hydrogen

In addition to the funding programs described above, the SCE CRT Program offers cost-effective electrical upgrades for fleets of medium and heavy-duty vehicles to install EV charging equipment. The CRT program offers two rebate options: the Charging Equipment Rebate and the Make-Ready Rebate. SCE can design, construct, and install the necessary infrastructure on both the utility and customer side of the meter, including electrical design, construction work, and new or upgraded transformers, electrical panels, conduit and trenching. Alternatively, the Make-Ready Rebate is available to any participant who chooses to design, procure, and install the customer side of the meter infrastructure work (also referred to as "customer side make-ready"). However, customers are responsible for purchasing and installing their own charging equipment. To be eligible, customers must select, purchase and install SCE approved charging equipment in the quantity approved by SCE. Additionally, customers are required to make a 10-year commitment to own/operate the infrastructure, providing data related to charging equipment usage for a minimum of 5 years. The CRT program application process can be initiated on SCE's Charge Ready Transport Program Application page. The program also offers on-site evaluations, permitting, and dedicated EV charging meters with waived demand charges through 2024.

Section I: Start-up and Scale-up Challenges

Laguna Beach Transit is eager to fulfill the ICT regulations and transition to a ZEB fleet. While the plan put forth in this document presents a clear pathway for this transition, the transit agency is anticipating how various challenges may arise during the transition process. Major challenges are summarized in this section.

Incremental Cost and Funding. While there will be various operational, infrastructure installation, and technology procurement challenges associated with the transition to a ZEB fleet, funding remains the greatest challenge for Laguna Beach Transit. Although ZEBs have significantly lower operating costs, these cost savings will take some time to be realized. Initial upfront costs for battery electric trolleys remain high. In addition to battery electric trolley capital costs, infrastructure costs related to equipment and installation of EVSEs and additional transformer to meet power demand are not trivial.

Overall, external financial support from federal and state governments for initial procurement and workforce development programs will be critical to support efficient ZEB transitions under the ICT regulation.

Procurement. The COVID-19 pandemic disrupted global supply chains, including those related to vehicle manufacturing and delivery. It is not uncommon to see a 1-2 years delay between vehicle purchase and delivery; and continued supply chain disruptions could cause additional unanticipated delays. While procuring many vehicles in the same year could help potentially reduce per-vehicle costs, feasibility may be impacted through manufacturing or delivery delays. A centralized, state-led procurement management and purchasing process to purchase ZEBs in bulk from manufacturers at pre-negotiated costs could aid agencies' ability to procure vehicles in a reasonable timeframe. Similar systems exist for other use cases, e.g., Cal-ITP's Mobility Marketplace for fare collection-related procurement needs.

Parking and Infrastructure Capacities. The Laguna Beach Transit Agency faces a potential challenge concerning its consolidated maintenance facility, known as the Corp Yard, located at 1900 Laguna Canyon Road. This facility serves as a crucial hub for servicing the agency's vehicles, including trolleys, and on- and off-road vehicles used by various City departments such as Public Works, Fire, Marine Safety, and Community Development. The Corp Yard currently possesses four maintenance bays, adequately accommodating routine maintenance activities for the trolleys. However, the parking capacity is a concern. With approximately 22 parking bays available within the secured area, the remaining trolleys are presently parked outside in an adjacent public parking lot. This arrangement poses logistical difficulties and security risks for the agency. To address this challenge, a reconfiguration of the yard is necessary to expand the parking and maintenance capacity, allowing for the accommodation of up to 33 trolleys within the secured area.

Grid and Facility Electrical Capacity. The grid load capacity poses a significant limitation for the Corp Yard. Currently, the Corp Yard does not have the necessary load capacity to support the increased power demand from charging electric trolleys. To overcome this limitation and enable the charging of the agency's growing fleet of electric trolleys, grid upgrades provided by the local utility company, Southern California Edison, will be essential. These upgrades would involve enhancing the electrical infrastructure and capacity of the Corp Yard to ensure it can accommodate the increased energy requirements for charging multiple electric trolleys simultaneously.

Limited Availability of Long-Range Battery Electric Trolley Makes/Models. The BEB technology is rapidly evolving. The current suite of BEBs, particularly for trolleys, on the market is limited, but new vehicle models will continue to emerge at different cost points with different ranges.

Workforce Training. To support the ZEB transition, staff will need training on operations, maintenance, and management of ZEBs. In-depth training will be necessary both to ensure optimal operating conditions (including optimizing vehicle ranges through efficient driving behaviors) as well as staff buy-in for the technologies (which may translate to community buy-in through future education campaigns). Managerial staff will also need to be familiarized with ZEB operations and safety procedures.

Appendix A: City Council's Approval

RESOLUTION NO. 23.040

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LAGUNA BEACH, CALIFORNIA, APPROVING THE ZERO-EMISSION BUS ROLLOUT PLAN

WHEREAS, California Code of Regulations Title 13, Division 3, Chapter 1, Article 4.3, Part 2023. l(d), titled "Zero Emissions Bus Rollout Plan Requirements," requires that a transit agency Zero-Emission Bus Rollout Plan must be approved by its governing board; and

WHEREAS, the proposed Zero-Emission Bus Rollout Plan for the City of Laguna Beach sets forth the City's plan and meets the following requirements:

- A goal of full transition to zero-emission buses by 2040 with careful planning that avoids early retirement of conventional internal combustion engine buses;
- Identification of the types of zero-emission bus technologies the City of Laguna Beach is planning to deploy;
- A schedule for zero-emission and conventional internal combustion engine bus purchases and lease options;
- A schedule for conversion of conventional internal combustion engine buses to zero-emission technologies;
- A schedule for construction of facilities and infrastructure modifications or upgrades, including charging, fueling, and maintenance facilities, to deploy and maintain zero-emission buses;
- Explanation of how the City of Laguna Beach plans to deploy zero-emission buses in Disadvantaged Communities;
- A training plan and schedule for zero-emission bus operators and maintenance and repair staff; and
- Identification of potential funding sources.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF LAGUNA BEACH DOES RESOLVE that the City of Laguna Beach's Zero-Emission Bus Rollout Plan is approved as set forth in full.

BE IT FURTHER RESOLVED that insofar as the provision of any Ordinance, Resolution or previous action of the City Council or any administrative policy or regulation of the City

Manager, prior to the effective date of the Resolution, are inconsistent with the provisions of this Resolution, this Resolution and its provisions shall control.

ADOPTED this 27th day of June, 2023.

Bob Whalen, Mayor

ATTEST:

Ann Marie McKay, City Clerk

I, Ann Marie McKay, City Clerk of the City of Laguna Beach, certify that the foregoing Resolution No. 23.040 was duly adopted at a regular meeting of the City Council of said City held on June 27, 2023, by the following vote:

AYES:	COUNCILMEMBERS:	Orgill, Rounaghi, Weiss, Kempf, Whalen
NOES:	COUNCILMEMBERS:	None
ABSENT:	COUNCILMEMBERS:	None

City Clerk, City of Laguna Beach, California