

Zero-Emission Bus Rollout Plan Guidance for Transit Agencies

(Last updated January 9, 2020)

The Innovative Clean Transit (ICT) regulation became effective October 1, 2019, and requires all public transit agencies to gradually transition their bus fleets to zero-emission technologies. The ICT regulation applies to all transit agencies that own, operate, or lease buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds. It covers standard, articulated, over-the-road, double decker, and cutaway buses. The ICT regulation requires a percentage of new bus purchases to be zero-emission buses (ZEBs). The ZEB percentage increases gradually with time. The ZEB purchase requirements begin in 2023 and 2026 for large¹ and small² transit agencies, respectively. Starting 2029, 100 percent of all transit agencies' new bus purchases must be ZEBs, with a goal of complete transition to ZEBs (all buses in each transit agency's fleet to be ZEBs) by 2040.

Successful transformation of transit bus fleets to zero-emission technologies requires early planning which includes, route simulations, charging or hydrogen fueling site assessment, and identification and addressing of potential resource gaps, among the many preparatory steps. Transit agencies that have begun the transition to zero-emission technologies stress that early communication and engagement with ZEB manufacturers, technology providers, infrastructure providers, fuel providers, and other related parties are key to a successful and well-coordinated transition.

The ICT regulation requires each transit agency to submit a complete Zero-Emission Bus Rollout Plan (Rollout Plan) before ZEB purchase requirements take effect. The Rollout Plan should be a living document and is meant to guide the implementation of zero-emission bus fleets and help transit agencies work through many of the potential challenges and explore solutions. Transit agencies should provide estimated timelines based on best available information for their bus purchases, infrastructure upgrades, workforce training, or any other timelines in a Rollout Plan. Once the Rollout Plan is

¹ The ICT regulation defines a "Large Transit Agency" (13 CCR § 2023(b)(30)) as a transit agency that meets one of the following criteria:

1. It operates either in the South Coast or the San Joaquin Valley Air Basin and operates more than 65 buses in annual maximum service; or
2. It operates outside of these areas, but in an urbanized area with a population of at least 200,000 as last published by the Bureau of Census before December 31, 2017, and has at least 100 buses in annual maximum service.

² The ICT regulation defines a "Small Transit Agency" (13 CCR § 2023(b)(49)) as all other transit agencies that do not meet the definition of the "Large Transit Agency".

submitted and approved by CARB, a transit agency may update the Rollout Plan as it sees fit. It is recommended, but not required, that updates be resubmitted to CARB.

Transit agencies' Rollout Plans will provide information on the strategies each transit agency has determined to be the best for their own unique situations. The components of a Rollout Plan will provide the State with crucial information, such as the probable number of buses to be deployed by each transit agency, which will inform future policy and funding decisions, and other ways State agencies can support transit agencies through this transition. The Rollout Plans will also help fuel providers learn about transit agencies' infrastructure needs during different stages of transition, and help inform decisions regarding what support would best help transit agencies as they develop and expand the needed charging infrastructure. Information provided in the Rollout Plans is necessary to address barriers to implementation.

Each Rollout Plan must include all of the required components to be considered complete, and must be approved by the transit agency's governing body through the adoption of a resolution, prior to submitting it to CARB. Large transit agencies must submit their approved Rollout Plans by July 1, 2020, and small transit agencies must submit Rollout Plans by July 1, 2023 (13 CCR § 2023.1(d)(2)). The ICT regulation allows two or more transit agencies to pool their resources and form a Joint Zero-Emission Bus Group (Joint Group)³ to collectively comply with the ZEB purchase requirements. Members of an approved Joint Group may submit one Rollout Plan that is approved by each participating transit agency's governing board, in lieu of submitting individual Rollout Plans.

The purpose of this document is to serve as guidance to support transit agencies with preparation of their Rollout Plans. It summarizes the information required in a Rollout Plan to meet the requirements of the ICT regulation. In addition to mandatory requirements, this document includes a request for supplementary details that are intended to help transit agencies create a more thorough plan for meeting their future needs. These supplementary details will also improve the State's understanding of transit agencies' operations and plans so the State can provide more targeted support. Response to these supplementary details is highly recommended, but not mandatory. The fields required by the regulation are identified by citing the specific code sections or including the word "required," whereas the supplementary fields are identified by the word "optional." This guidance contains nine (9) sections:

³ A Joint Group must meet at least one of the following eligibility criteria (13 CCR § 2023.2(a)): All members of a Joint group must be located within the same service area of a Metropolitan Planning Organization (MPO) or Regional Transportation Planning Organization; or be located within the same air basin, Air Quality Management District, Air Pollution Control District, or Air Resources District; or share infrastructure.

Section A: Transit Agency Information
Section B: Rollout Plan General Information
Section C: Technology Portfolio
Section D: Current Bus Fleet Composition and Future Bus Purchases
Section E: Facilities and Infrastructure Modifications
Section F: Providing Service in Disadvantaged Communities
Section G: Workforce Training
Section H: Potential Funding Sources
Section I: Start-up and Scale-up Challenges

This guidance document does not replace the adopted regulatory text, which takes precedence in all instances. The purpose of this document is to provide guidance on the content of the Rollout Plan, but transit agencies are not required to follow the exact format of this guidance document.

The ICT regulation and other regulatory documents are available at the Innovative Clean Transit website (<https://ww2.arb.ca.gov/our-work/programs/innovative-clean-transit>.) For questions, please contact: Yachun Chow at yachun.chow@arb.ca.gov or (916) 322-7450, or Shirin Barfjani at shirin.barfjani@arb.ca.gov or (916) 445-6017.

Updates to the Rollout Plan guidance document are summarized below:

1. Page 1, last paragraph: Additional information on implementation of the Rollout Plans was added.
2. Page 2, second paragraph: The phrase “California Air Resources Board” was deleted.
3. Table 4a: two columns (Removed Propulsion System and New Propulsion System) were inserted to reflect missing information that was removed during compliance with the American with Disabilities Act of 1990, the Rehabilitation Act of 1973, and Assembly Bill 434 (2017).
4. Table 5: A page break was inserted after Table 5 that moved question number two to page 11.
5. Table 6: The title for Table 6 was changed from NOx-Exempt Area and Electric Utilities' Territories (Optional) to NOx-Exempt Area (Optional).
6. Table 6: the column “Name(s) of Electric Utility in Your Service Area was deleted to fix duplication error with question number six.

Section A: Transit Agency Information

Please provide the following information regarding your transit agencies:

1. Transit agency's name (required)
2. Mailing address (number, street, city, county, Zip Code) (optional)
3. Name of transit agency's air district(s) (optional)
4. Name of transit agency's air basin(s) (optional)
5. Total number of buses in Annual Maximum Service⁴ (optional)
6. Population of the urbanized area a transit agency is serving as last published by the Census Bureau before December 31, 2017. (optional)
7. Contact information of the general manager, chief operating officer, or equivalent (optional)
 - a. Contact name (last name, first name, MI)
 - b. Title
 - c. Phone number
 - d. Email address
8. Is your transit agency part of a Joint Group⁵ (13 CCR § 2023.1(d)(3))? (Yes/No) (required)
 - a. If yes, please provide the following information:
 - i. Is your transit agency submitting a separate Rollout Plan specific to your agency, or will one Rollout Plan be submitted for all participating members of the Joint Group (13 CCR § 2023.1(d)(3))? (required)
 - ii. Please provide a complete list of the transit agencies that are members of the Joint Group. (optional)

⁴ The ICT regulation defines "Annual Maximum Service" (13 CCR § 2023(b)(3)) as the number of buses in revenue service that are operated during the peak season of the year, on the week and day that maximum service is provided, but excludes demand response buses. Annual maximum service excludes an atypical service day, on which a transit agency provides extra service to meet the demands for special events such as conventions, parades, or public celebrations, or operates significantly reduced service because of unusually bad weather (e.g. snowstorms) or major public disruptions (e.g. earthquakes or terrorism); or one-time special events.

⁵ The ICT regulation defines a Joint Zero-Emission Bus Group or Joint Group (13 CCR § 2023.2) as two or more transit agencies that choose to form a group to comply collectively with the zero-emission bus requirements of section 2023.1 of the ICT regulation.

- iii. Please provide contact information for the general manager, chief operating officer, or equivalent staff member of each participating transit agency member. (full name, title, affiliation, phone number, and email address) (optional)

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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))? (Yes/No) (required)
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. (optional)
3. When did your transit agency's board or governing body approve the Rollout Plan?
 - a. Rollout Plan's approval date (MM/DD/YYYY) (optional)
 - 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)
4. Please provide contact information for CARB to follow up on details of the Rollout Plan, if needed. (optional)
 - a. Contact name (first and last name)
 - b. Title
 - c. Phone number
 - d. Email
5. Who has created the Rollout Plan? (My transit agency / A consultant) (optional)
 - a. If it was created by a consultant, please identify the consulting company's name.
6. What was the cost for the creation of the Rollout Plan? (optional)
7. How many person-hours did it take to create the Rollout Plan? (optional)

Section C: Technology Portfolio

1. What type(s) of zero-emission bus technologies (e.g. battery electric and fuel cell electric buses) does your transit agency plan to deploy through 2040? (13 CCR § 2023.1(d)(1)(B)) (required)

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. For ease of use, you can group the bus information based on a parameter that makes the most sense for your transit agency. For example, California-Heritage Transit has 12 standard diesel buses that are 2017 bus model year with 2016 model year engines. In addition, this transit agency has 3 articulated diesel buses that are 2011 bus model year with 2010 model year engine. (optional)

Table 1: Individual Bus Information of Current Bus Fleet (Optional)

Number of Buses	Engine Model Year	Bus Model Year	Fuel Type	Bus Type

2. Please complete Table 2 regarding expected future bus purchases,⁶ 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

⁶ The ICT regulation defines a “bus purchase” (13 CCR § 2023(b)(7)) as occurring when a transit agency executes one of the following after it has identified, committed, and encumbered funds:

1. A written Notice to Proceed to a bus manufacturer to begin production of a bus either under a previously-entered purchase contract; or to execute a contract option;
2. If no Notice to Proceed is issued, a written purchase agreement between a transit agency and a bus manufacturer that specifies the date when the bus manufacturer is to proceed with the work to manufacture the bus; or

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 indicate which 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)) (required)

Table 2: Future Bus Purchases (Required)

Timeline (Year)	Total Number of Buses to Purchase	Number of ZEB Purchases	Percentage of Annual ZEB Purchases	ZEB Bus Type(s)	ZEB Fuel Type(s)	Number of Conv. Bus Purchases	Percentage of Annual Conv. Bus Purchases	Type(s) of Conv. Buses	Fuel Type(s) of Conv. Buses

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3. A signed written lease agreement between a transit agency and a bus manufacturer or sales representative for a new bus to be placed in revenue service for a contract term of five years or more.

3. Following the same bus purchase schedule as identified in the Table 2, please identify in the 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. (Optional)

Table 3: Range and Estimated Costs of Future ZEB Purchases (Optional)

Timeline (Year) (Same as in Table 2)	Number of ZEBs	Bus Type(s)	Required BEB⁷ Range/ On-Board H₂ Storage	Estimated Cost of Each Bus

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))? (Yes/No) (required)
- If yes, please complete Table 4a with your transit agency’s schedule to convert the conventional buses to zero-emission technologies. (13 CCR § 2023.1(d)(1)(E)) (required)
 - Please identify the estimated cost of converting each bus, the required battery capacity or on-board hydrogen storage, and the estimated range in Table 4b. (optional)

Table 4a: Schedule of Converting Conventional Buses to Zero-Emission Buses (required)

Timeline (Year)	Number of Buses	Bus Type(s)	Removed Propulsion System	New Propulsion System

⁷ Battery electric bus

Table 4b: Range and Estimated Costs for Converting Conventional Buses to Zero-Emission Buses (optional)

Estimated Cost per Bus	Battery Capacity/ H₂ Storage	Range

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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. on-route high-power charging system) to deploy 20 BEB in 2025). (13 CCR § 2023.1(d)(1)(C)). (required)

Table 5: Facilities Information and Construction Timeline (Required)

Division/ Facility Name	Address	Main Function(s)	Type(s) of Infrastructure	Service Capacity	Needs Upgrade? (Yes/No)	Estimated Construction Timeline

2. Regarding the information provided in Table 5, please explain the types of necessary upgrades or infrastructure modifications each facility or division need 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. For example, Division Blue Sky has a parking capacity of 150 buses in 2020. In 2025, after parking rearrangement and installation of 30 depot fast chargers with power of 150 kW, this facility is expected to accommodate 120 buses; or Division Enchanting Waterfalls will deploy 20 fuel cell electric buses (FCEBs) in 2025 with trucked-in liquid hydrogen for 1,500 kg of storage capacity and will expand to 120 FCEBs in 2035 with trucked-in liquid hydrogen for 9,000 kg of storage capacity; or Division Evergreen will deploy 20 BEBs in 2025 using an on-route high-power charging system (500 kW) with 10 chargers and will expand to 200 BEBs in 2040 using the same charging method with 15 MW of on-site power. (Optional)

3. Do you expect to make any modifications to your bus parking arrangements? Explain the modifications and why they are needed. (Optional)
4. Do you expect to need additional parking spaces for completing the transition to zero-emission technologies? Explain why. (Optional)
5. In the Table 6, please identify the propulsion system (e.g. diesel, CNG, battery electric, fuel cell) of all buses that will be dispatched from the facilities identified on the Table 5. Are any of these facilities located in NOx-exempt areas?⁸ (optional)

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

Division's Name (Same as in Table 5)	Type(s) of Bus Propulsion System	Located in NOx-Exempt Area? (Yes/No)

6. Please identify the electric utilities in your transit agency's service area. (Optional)

⁸ 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 Yuba.

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?⁹
Yes/ No (required)
 - 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)). (required)
 - 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.

Table 7: Service in Disadvantaged Communities (Optional)

Timeline (Year)	Number of ZEBs	Location of Disadvantaged Community

⁹ 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)). (required)
2. Please complete Table 8. (optional)

Table 8: Workforce Training Schedule (Optional)

Timeline (Year)	Training Program/ Class	Purpose of Training	Name of Provider	Number of Trainees	Trainees’ Positions¹⁰	Training Hours	Training Frequency	Estimated Costs Per Class

¹⁰ Example: bus operators, maintenance and repair technicians, etc.

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)). (required)
2. In Table 9, please describe how the identified potential funding sources could support your transit agency to execute the Rollout Plan as currently designed by describing how each fund is planned to be used over time (e.g. to purchase a zero-emission bus, maintain a zero-emission bus, upgrade the charging/fueling infrastructure, construct or upgrade a maintenance facility). Please also identify how many zero-emission buses and/or which type(s) of infrastructure might be purchased, installed, or maintained with each funding source. (optional)

Table 9: Potential Funding Sources (Optional)

Timeline (Year)	Name of Funding Source	How Each Fund is Planned to be Used	Estimated Amount(s) of Each Funding Source (\$)	Number of ZEBs to Purchase or Maintain, or Type(s) of Infrastructure to Install or Upgrade

Section I: Start-up and Scale-up Challenges

1. Please describe any major challenges your transit agency is currently facing in small scale zero-emission bus deployment. (Optional).
 - a. How might CARB assist you to overcome these challenges? Please share your recommendations. (Optional)
2. Please describe any challenges your transit agency may face in scaling up zero-emission bus deployment. (Optional)
 - a. How might CARB assist you to overcome these challenges? Please share your recommendations. (Optional)