

DRAFT Statewide Zero-Emission Bus (ZEB) Data Collection

October 2019

Purpose of the Statewide ZEB Data Collection

The California Air Resources Board (CARB) is committed to conducting a Comprehensive Review to identify the status of ZEB technologies in order to help the State improve policies to advance heavy-duty zero-emission technologies, and inform funding strategies related to zero-emission vehicles, buses, and infrastructure, while ensuring transit service or fares are not adversely impacted by the transition. It is also important for the transit community to understand ZEB performance from a long-term perspective. With many transit agencies deploying ZEBs in California now, CARB request assistance from transit agencies to help and support a statewide ZEB data collection effort.

The purpose is to gather detailed information about real-world daily operations of ZEBs from transit agencies that are operating ZEBs, to better understand the costs, performance, and reliability of ZEBs and related infrastructure, the availability and barriers to deployment of zero-emission buses in the various categories. The collected data will help CARB understand how transit agencies could best incorporate zero-emission technologies, including both vehicles and infrastructure. This data collection will also enable the State to better understand individual fleet costs and potential challenges associated with incorporating zero emission buses into the fleet, while maintaining existing service levels and possible opportunities to enhance mobility in both short and long terms. This is a unique opportunity to provide early input to inform the full transition to zero-emission.

Instructions

The data collection includes two parts: (A) the initial transit ZEB fleet information and (B) on-going ZEB operation data collection (monthly basis). Part A is a one-time effort when new ZEBs are added to the fleet. Part B includes long-term data collection on ZEB performance and costs and should be collected on a monthly basis. Needed data items are identified in this document for participating transit fleets. The data collection will start January 2020. A transit fleet can opt-in to this effort at any time.

Interested transit agencies please contact Ms. Jing Guo, Air Resources Engineer, at Jing.Guo@arb.ca.gov. Comments on this draft template should be submitted to Ms. Guo by December 6, 2019 to be incorporated to the final template. Thank you for your assistance in this important statewide ZEB data collection effort. We appreciate your time and support.

Part A: ZEB Fleet Information

This part of the data collection is for specific ZEB fleet information, and only needs to be filled at the beginning of the data collection period.

1. Agency name: _____
2. Agency contact person (name, E-mail, and phone number): _____
3. Number of divisions: _____
4. Please provide the following information for each ZEB fleet operating division in Table 1:

Table 1: ZEB Fleet Operating Division Information

Division Name	Address	Main Functions (i.e. Operations, Maintenance, or Fueling Functions)	Contact Person for Each Division (Name and Email)

5. Please indicate each division and its respective ZEB composition in Table 2:

Table 2: ZEB Composition in Each Division

Division Name	ZEB Type	Total Number of Buses	Number of Standard Buses	Number of Articulated Bus	Number of Cutaway Shuttle Buses	Number of Other Buses (please describe)

6. Please provide the following information for each ZEB in each division in Table 3:

Table 3: ZEB Information in Each Division

Bus Number	ZEB Type (length)	Nominal Range	Bus Manufacturer, Model and Model Year	VIN	Motor	Rated Power	Energy Storage	Bus Purchase Price	Warranty Cost	Warranty Content

7. Are these ZEBs randomly dispatched or are these ZEBs dispatched on specific route/block? _____

8. Which routes/blocks do these ZEBs cover? _____

9. Please complete the following from your latest electricity bill if BEBs are deployed in this division:

(1) Utility provider: _____

(2) Rate schedule: _____

(3) Billing period (dates): From: _____ to: _____

(4) Electricity consumed in period (kWh): _____

(5) Peak power demand (kW): _____

(6) Has your agency opted-in to the Low Carbon Fuel Standard (LCFS) credit program for the ZEBs? _____

(7) If you are using a depot charging strategy, please provide the following information in Table 4:

Table 4: Depot Charging Strategy Information

Charger Name	Charger Cost	Rated Power	Charging Period

(8) If you are using on-route charging strategy, please provide the following information in Table 5:

Table 5: On-Route Charging Strategy Information

Charger Name	Charger Cost	Rated Power	Charger Location	Maximum Capacity	Current Serving Capacity	Charging Period

(9) What is your charging pattern? _____

(10) Do you have the energy storage? If yes, please specify: _____

10. If you are deploying fuel cell electric buses, please provide the following information

(1) H₂ production method (steam methane reforming or electrolysis) and/or delivery method (truck-in, pipeline, tri-gen, or anything else): _____

(2) Station maximum throughput each day : _____

(3) Station current serving capacity each day: _____

(4) H₂ cost per kg on average: _____

(5) How many buses can be fueled in this station each day: _____

(6) Station cost (\$): _____

(7) Specify the major components of the station (compressor, vaporizer, dispenser, storage cubes, etc.): _____

(8) Has your agency opted-in to the Low Carbon Fuel Standard (LCFS) credit program for the ZEBs? _____

(9) Do you have the infrastructure redundancy planning? If yes, please specify. _____

(10) Please complete the following from your latest electricity bill:

i) Utility provider: _____

ii) Rate schedule: _____

iii) Billing period (dates): From: _____ to: _____

iv) Electricity consumed in period (kWh): _____

v) Peak power demand (kW): _____

11. Please provide the following information about each maintenance bay serving ZEBs: _____

(1) Maintenance bay maximum service capacity : _____

(2) Do you need to update the maintenance bay in order to accommodate the ZEBs: _____

(3) If yes, please list all the updated items and cost: _____

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Part B: On-Going ZEB Operation Data Collection (Monthly Basis)

This part is the daily ZEB operation information and it needs to be filled out monthly.

1. Agency name: _____
2. Agency contact person (name and email): _____
3. Division name: _____
4. Data Period: _____
5. Please fill out the monthly bus usage information for each type of ZEB in your fleet for this data period in Table 6:

Table 6: Monthly Bus Usage for Each Type of ZEB

Bus Number	Odometer Reading at the Start of the Data Period	Odometer Reading at the End of the Data Period	Total Mileage of this Month	Accumulated Fuel Cell Hours if Applicable	Total Fuel Usage if Applicable (kWh Electricity Consumed for BEB or Kg H ₂ Dispensed for FCEB)	Operation Range
Fleet totals						
Average						

6. Please fill out monthly maintenance events and costs for each type of ZEB for this data period in Table 7:

Table 7: Monthly Maintenance Events and Costs for Each Type of ZEB

Bus Number	Odometer Reading	Maintenance Event	Maintenance Date	Maintenance Category*	Scheduled or Unscheduled		Labor Hour	Part Cost	Total Event Maintenance Cost

* Categories like propulsion-related cost, brake cost, preventative maintenance inspection (labor for inspections during preventative maintenance) and other maintenance costs.

7. Please fill out monthly maintenance event and cost for ZEB infrastructure of this data period in Table 8:

Table 8: Monthly Maintenance Event and Cost for ZEB Infrastructure

Fueling Station or Charger Name	Maintenance Event	Maintenance Date	Maintenance Category	Scheduled or Unscheduled	Labor Hour	Part Cost	Total Event Maintenance Cost

8. Monthly bus availability, please provide information for each type of ZEB in your fleet for this period in Table 9:

Table 9: Monthly Bus Availability for Each Type of ZEB

Bus Number	Planned Days	Available days	Percent of Availability
Fleet totals			
Average			

9. Please monthly infrastructure availability for each infrastructure type in your fleet for this period in Table 10:

Table 10: Monthly Infrastructure Availability for Each Type of ZEB

Fueling Station or Charger name	Planned Days	Available Days	Percent of Availability
Fleet totals			
Average			

10. Monthly bus Road Calls, please fill in this table for each type of ZEB in your fleet for this period:

Table 11: Monthly Infrastructure Availability for Each Type of ZEB

Bus Number	Road Calls	Miles between Road Calls	Reasons for the Road Calls
Fleet totals			
Average			

11. Please indicate the training course information for this period in Table 12 if available:

Table 12: Training Course Information

Training Course	Course Provider	Cost	Hours	Target Professional (Bus Operator, Maintenance Staff, etc.)	Number of Professional Trained