

**S T A F F   R E P O R T**

SUBJECT: Zero-Emission Bus Study Update  
FROM: Toan Tran, Director of Operations and Innovation  
DATE: June 22, 2020

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**Action Requested**

None – information only

**Background**

In December 2018, the California Air Resources Board (CARB) approved an Innovative Clean Transit Rule requiring the state’s public transit agencies to:

1. Transition to all zero-emission bus purchases by 2030; and
2. Submit a board-approved Zero-Emission Bus (ZEB) Rollout Plan to CARB with specific required components by July 1, 2023.

Under the new regulation, CARB will require LAVTA’s new bus purchases to be a minimum of 25% ZEBs beginning in 2026 and ramping up to 100% of future bus purchases in 2029, with the goal of transitioning the state’s entire transit fleet to 100% ZEBs by 2040.

In July 2019, the Board of Directors authorized the Executive Director to execute a task order with the Center for Transportation and the Environment (CTE) to perform a ZEB study. The goal of the study is to develop a transition plan outlining the capital projects required to fully electrify the fleet in accordance with the CARB Innovative Clean Transit Rule and LAVTA’s local priorities. The study is currently underway and is expected to be completed by the end of 2020.

**Discussion**

The team from CTE will make a presentation to the Committee.

**Recommendation**

None – information only

**Attachments**

1. LAVTA ZEB Transition Study Presentation



# LAVTA ZEB Transition Study

June 22, 2020

**Steve Clermont**, Director of Planning & Deployment

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Managing Consultant

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Associate



# About CTE

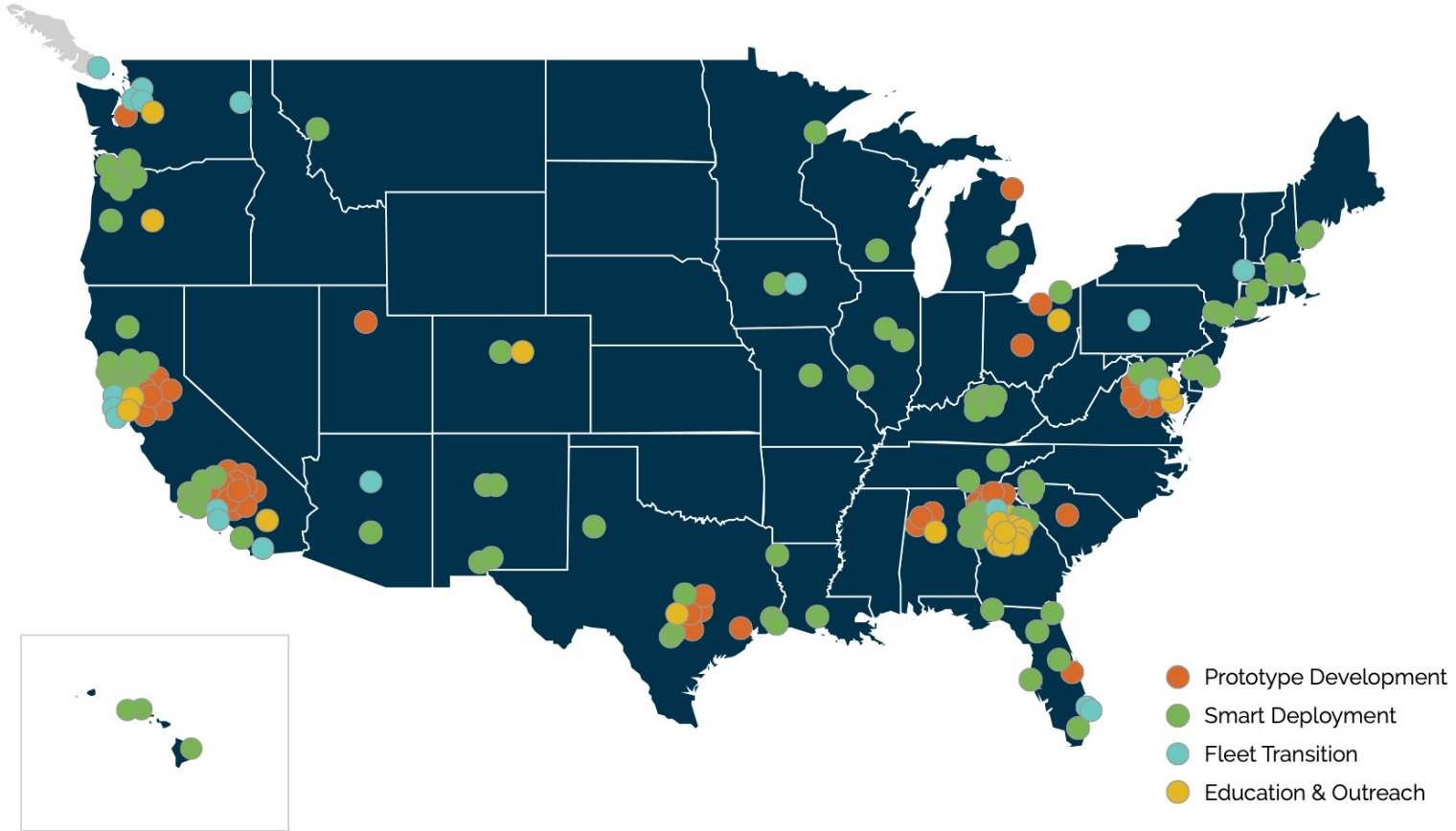
**Mission:** To advance clean, sustainable, innovative transportation and energy technologies

- Non-profit, independent resource for operators and stakeholders
- National presence – Atlanta, Berkley, Los Angeles, St. Paul
- Portfolio: \$450m+ research, demonstration & deployment sponsored by DOT, DOD, DOE, DOI, FRA, EPA, NASA,

## Our ZEB Services

- ZEB Feasibility & Fleet Transition Strategies – 18 ZEB Transition Studies to date & 1 CARB ICT Rollout Plan to be board approved next week
- Requirements Analysis and Technology Assessment
- Grant Writing
- Technical Specifications and Procurement Evaluation
- Production Oversight, Buy America Audits, & QA/QC Inspections
- Deployment Project Management and Technical Assistance
- Performance Monitoring and Benefits Analysis

# CTE Zero Emission Bus (ZEB) Projects





# CTE Project Team



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# Presentation Overview

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- Zero-Emission Bus Technology Overview
- CARB ICT Requirements
- Fleet Transition Assessment
- Define Project Plan and Deliverables

# Battery Electric Buses & Fuel Cell Electric Buses

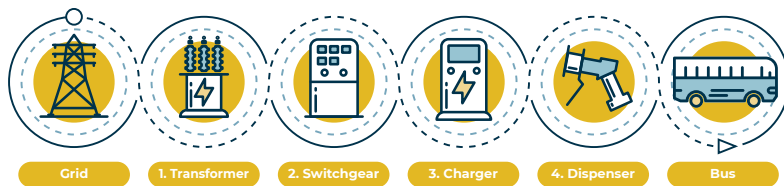
## Battery Electric Buses (BEBs)

- May need to increase fleet size
- Fueling time longer than ICE bus
- Fuel cost highly variable could be higher or lower than fossil fuels
- BEB bus cost approximately 50% higher than ICE bus
- Infrastructure costs increases per bus when scaled up

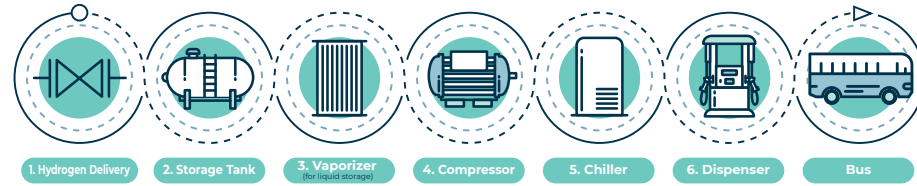
## Fuel Cell Electric Buses (FCEB)

- Comparable range to ICE bus – 1:1 replacement ratio
- Fueling time comparable to ICE bus
- Fuel cost significantly higher than fossil fuel
- Bus cost significantly higher than ICE bus
- Infrastructure costs reduce per bus when scaled up
- Greater resilience

### BEB Fuel Delivery Pathway



### FCEB Fuel Delivery Pathway





# CARB Innovative Clean Transit Regulation

100% ZEB Fleet by 2040 is not a mandate, but a goal

There is only a *purchasing* mandate:

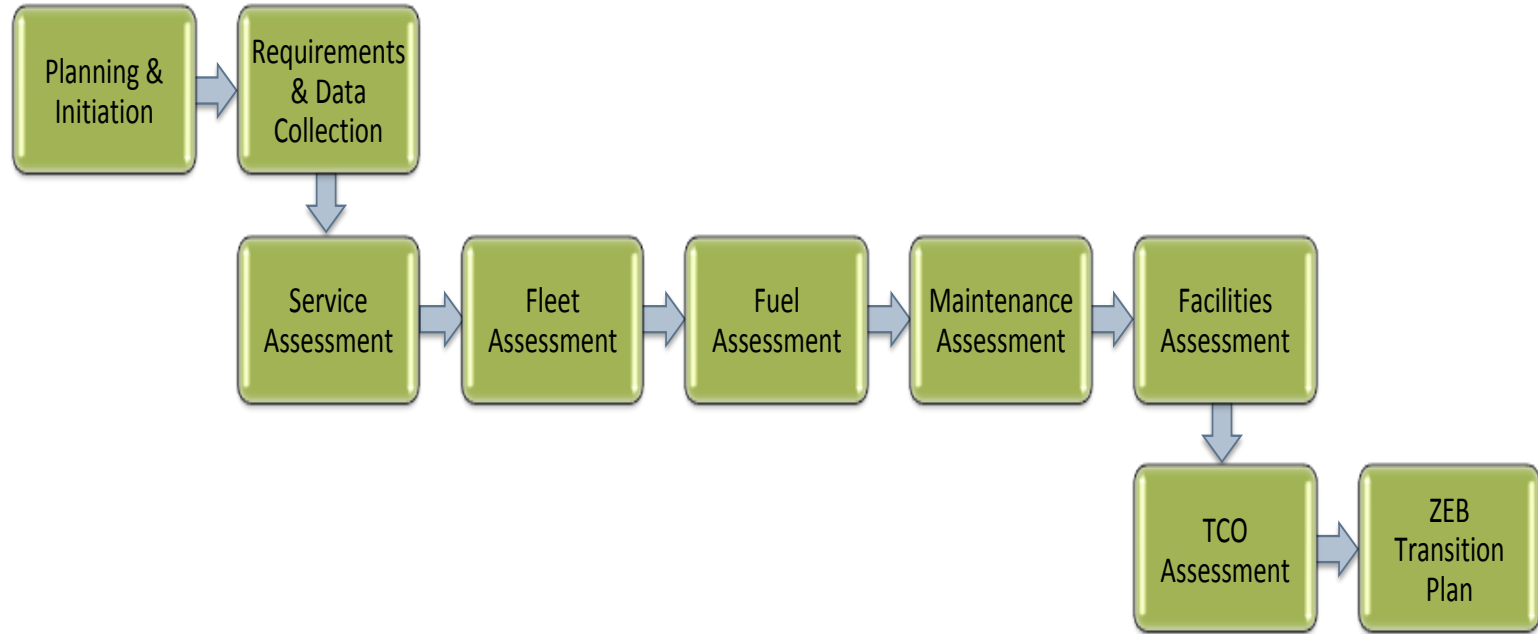
## *ZEB Purchase Requirements*

Starting January 1	ZEB Percentage of Total New Bus Purchases
2026	25%
2027	25%
2028	25%
2029	100%

- Small CA Transit Agencies (<100 buses) are required to submit a board-approved ZEB Rollout Plan by **July 1, 2023**.
- Agencies may request exemption from ZEB purchase requirements
- Cutaway buses, motor coaches, and articulated buses will be excluded until January 1, 2026 or the applicable bus type has passed and obtained a Altoona bus testing report

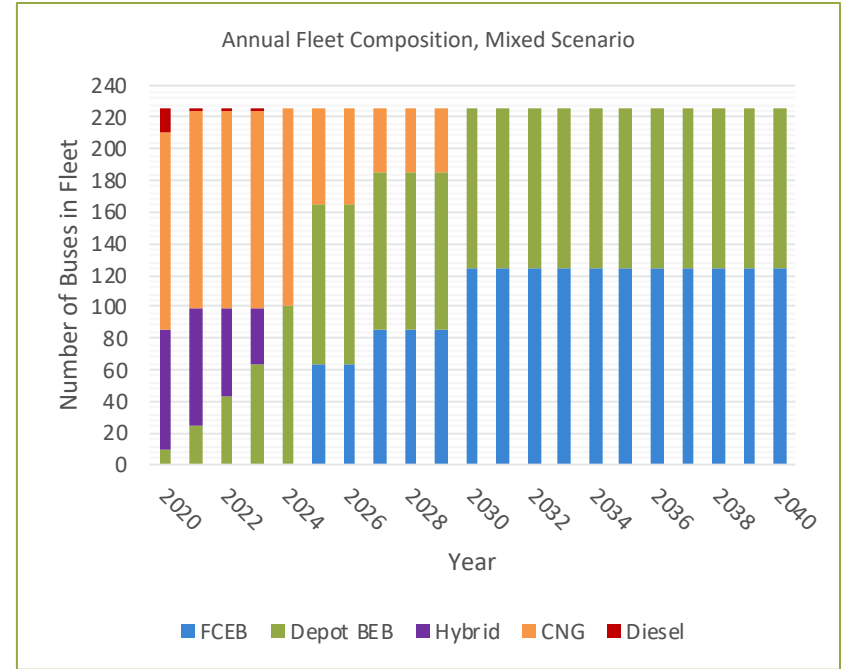


# ZEB Transition Methodology



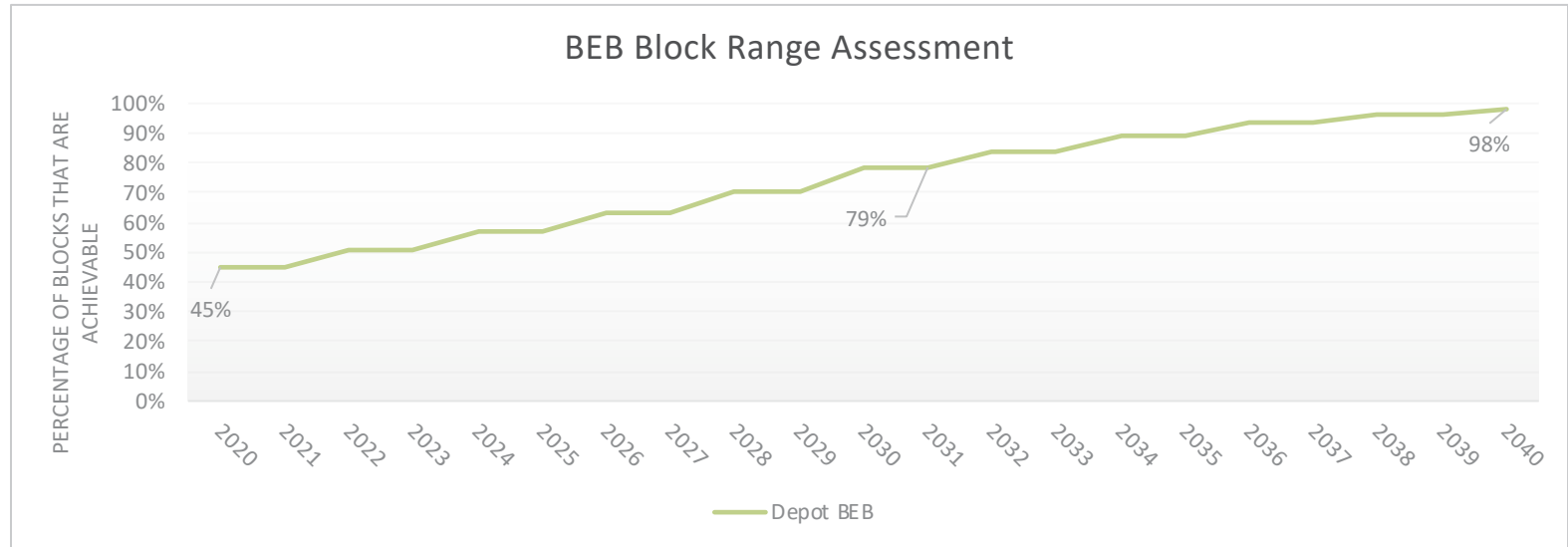
# ZEB Transition Methodology

- Scenarios Modeled
  - Baseline - No ZEB purchasing requirements
  - All BEB Fleet inclusive of on-route and depot charging
  - BEB depot or division charging and FCEB Fleet
  - All FCEB Fleet



# Project Deliverables

- CARB ICT Rollout Plan
  - Indicates high level plan for compliance with ICT regulations
- ZEB Transition Master Plan
  - Describes all considered scenarios in great detail inclusive of methodology and industry assumptions



# CARB ICT Rollout Plan

ZEB Rollout Plans must include:

- A goal of full transition to zero-emission buses by 2040
- Avoids early retirement of conventional ICE buses
- Identification of the types of zero-emission bus technologies
- A purchasing schedule
- A schedule and location details for ZEB facilities and infrastructure operations
- Disadvantaged Communities Service Plan
- Training plan and schedule for ZEB operators, maintenance and repair staff
- Identification of potential funding sources



# Questions

