MTC's Regional Zero Emission Transition Transit Study

Executive Summary
Metropolitan Transportation Commission
Programming and Allocations Committee
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Executive Summary

Background to this Study

The California Air Resources Board (CARB) Innovative Clean Transit (ICT) rule and Commercial Harbor Craft (CHC) regulation set out aggressive targets for the transition of the state's transit vehicles to zero-emission. The ICT rule requires public transit agencies to plan a transition to a fully zero-emission vehicle (ZEV) fleet and to complete that transition by 2040. The CHC regulation requires operators of ferries and other harbor craft to reduce their emissions, and the optional Alternative Control of Emissions (ACE) strategy provides an assortment of alternative strategies for achieving the reductions.

Due to the impact of these regulations on bus and ferry fleet operators in the San Franscisco Bay Area (hereafter Bay Area), the Metropolitan Transportation Commission (MTC) commissioned this study to help the region and its transit agencies successfully transition to zero emission fleets and implement the CARB regulations.

This final report is the result of a year-long study working with transit agencies in the Bay Area to assess the number of ZEVs within the Bay Area's transit fleet, the projections for future ZEVs through 2040, and challenges, opportunities, and recommendations to help agencies transition, with an emphasis on how agencies can collaborate at the regional level to overcome potential challenges. It is important to note that this report captures the situation as of March 2024, and the pace of progress towards the transition is constantly evolving due to technological changes, changing suppliers and financial budgets. This report can be used by agencies as a framework and reference document in order to help navigate the transition.

Existing Situation

All large transit agencies operating in the Bay Area have had their ZEV Rollout Plans approved by CARB. The majority of small transit agencies in the Bay Area have submitted a ZEV Rollout Plan, but not all have had their Plans approved (as of September 2024). Ferry operators are yet to complete their Alternative Control of Emissions Plans. There are currently 449 ZEVs in the transit agencies fleets, which consists of 278 electric trolleys operated by SFMTA, 40 fuel cell electric buses (FCEBs) operated by AC Transit and SamTrans and 131 battery electric buses (BEBs) operated by various agencies. WETA plans to transition two-thirds of its ferry fleet to battery electric by 2035, whereas Golden Gate Ferry is planning on implementing low-emission vessels.

Transit agencies have been actively working towards increasing the number of ZEVs in their fleets and providing supporting equipment, as part of their commitment to meet their transition goals. To achieve the CARB requirements, transit agencies plan to procure 2,434 ZEVs by 2040 as part of regular fleet replacement plans. Seventeen out of 18 bus agencies propose to install BEB charging infrastructure. BEB charging locations will include on-route charging and depot charging. At the moment, seven out of 18 bus agencies are proposing to install hydrogen fueling stations. Six agencies plan to operate a mixed BEB and FCEB fleet. While some agencies are firmly embracing a specific technology approach, other agencies are taking a "wait and see" approach that preserves flexibility to shift their technology choices based on future experience.

Projected Capital Cost of the Transition

It is important for transit agencies to understand the likely cost of the ZEV transition and the available sources of funding to support it. This analysis specifically focuses on the capital costs of the transition, though agencies should also plan for operating costs such as such as maintenance, electricity, and hydrogen fuel. There are many variables in ZEV cost projections, which makes it difficult to accurately

predict future transition costs. Despite this, the study has taken figures provided by transit agencies and applied a reasonable amount for inflation to understand the cost for transition. With anticipated capital costs expected to be approximately $6.8B or $7.6B – with the difference being facility projects that include both ZEV and non-ZEV elements -- and current funding projected to be approximately $2.7B, this leaves a funding shortfall of approximately $4.1B or $4.9B across the region.

Please note that these estimates include a significant level of uncertainty due to the changing nature of the zero-emission technology market and the different cost inputs used by different agencies. It may be appropriate to update these cost projections over time as the ZEV market matures and agencies refine their transition programs.

Part of the reason for this funding gap is that large sources of funding are not committed and/or are discretionary and, therefore, application-based. Increases to available funding can help fill the gap, as occurred when the Bipartisan Infrastructure Law (BIL) increased funding to the Federal Transit Administration (FTA) Low and No Emission Grant Program and the Grants for Buses and Bus Facilities.

Risks and Challenges Agencies Face with the Transition

This study identifies and categorizes risks to the transition of ZEVs. Risks have been categorized as high, medium, and low-level risks at both an agency level and regional level. Schedule risks include timeline of facility infrastructure upgrades and delayed or insufficient grid power on the required time frame. Budgetary risks include insufficient funding and costs growing beyond projections. Notable regional risks include limited coordination between agencies and the grid not being able to support planned BEB deployments in the required time frame. Appendix A of this report provides a full list of risks identified as part of this study.

There are many challenges that transit operators face with the transition. These include challenges around financing the transition as prices for vehicles, charging infrastructure, and associated components increase over time. In particular, costs for ZEVs have increased substantially in recent years, in contrast to previous projections that ZEV costs would decrease over time due to scaling of ZEV production. These increased costs are related to increasing demand and a shrinking number of bus original equipment manufacturers (OEMs). In 2023 alone, Nova Bus announced plans to exit the US market and Proterra filed for bankruptcy protection. In 2024, bus manufacturer ENC also announced plans to cease production. Price increases for all types of buses seem likely to continue over the next two to three years.

ZEV supply is also constrained by Buy America regulations, which mandate that a certain percentage of the components and materials used in federally funded projects must be sourced from U.S. manufacturers. Domestic manufacturing requirements can limit options and potentially increase costs if suitable domestic suppliers are limited or more expensive. Additional policy changes in 2020 blocked the use of new federal funds to purchase buses from manufacturer BYD due to its ties to the Chinese government.

Implementing a comprehensive ZEV transition plan often requires coordination among multiple parties, including manufacturers, infrastructure providers, utility companies, and government agencies. Potential challenges include availability of sufficient funding, availability of power and restrictions on where and how new infrastructure can be built.

Best Practices

This project recommends continued collaboration at the regional level through a zero-emission vehicle best practices working group, convened and supported by MTC, focusing on zero-emission knowledge sharing and best practices, funding and grant strategies to maximize zero-emission investments in the region from both existing and new fund sources, and coordinated advocacy efforts to work with federal and state partners to reduce greenhouse gas emissions while increasing transit ridership.

Appendix B of this report summarizes the current state of best practices for the following key topics identified during interviews with transit operators:

- Zero-emission Bus (ZEB) technology choices: Battery Electric Buses (BEBs) and Fuel Cell Electric Buses (FCEBs)
- Facility modifications and fueling infrastructure for hydrogen FCEBs
- Energy considerations (including charging needs)
- Engaging utility providers
- Paratransit
- Workforce development
- Shared procurement
- Emergency response planning

Recommendations for Agency Collaboration

Recommendations have been identified that emphasize the importance of regional collaboration as part of this study to help overcome challenges faced by agencies. Appendix C of this report presents a summary of the recommendations noted in this study and references where to find them in the document. A high-level summary is as follows:

- Energy Supply
    - Coordinate early with utilities
    - Seek out incentives
- Shared On-route Charging
    - Opportunities at key transit hubs (e.g., Bay Area Rapid Transit stations)
- Joint Procurements
    - Leverage joint procurements to improve pricing
    - Joint procurements will help simplify orders for OEM fulfillment
- Workforce Development
    - Identifying skill requirements and resourcing
    - Collaboration with AC Transit on Zero Emission Bus University (ZEBU)
- Emergency Response
    - Regional response planning
    - Retain back-up vehicles
- Ferries
    - Collaborate on charging infrastructure
    - Explore the potential for hydrogen microgrids

An overarching outcome and next step of this study is to set up a ZEV Best Practices Working Group, coordinated by MTC and consisting of transit agency representatives and other relevant stakeholders when appropriate (such as a Pacific Gas & Electric representative). The recommendations presented in this report can form the basis of focus areas for the ZEV Best Practices Working Group.