

*Santa Cruz Metropolitan
Transit District*

January 19, 2018



California Air Resources Board Members
1001 I Street
Sacramento, CA 95814

Dear Chair Nichols and Members of the California Air Resources Board:

Santa Cruz Metropolitan Transit District (METRO) is responding with comments to the Draft Innovative Clean Transit Regulation Discussion Document (ICT) published December 15, 2017.

In general, and subject to the comments contained in this letter, METRO is supportive of CARB's goal to achieve zero-emissions transit fleets. In fact, as identified on page 5 of the ICT, METRO's Board adopted a resolution in May 2017 setting a goal to achieve a Zero Emissions Bus (ZEB) fleet by 2040. **However**, we should be clear that the METRO Board has adopted this as a **goal** and **not a mandate**.

As discussed in this letter, achieving METRO's ZEB goal is subject to resolution of a number of challenges in the years to come. Those challenges include areas of funding, technology, horsepower, axle-weight, and battery density innovation, just to name a few. **These challenges are significant** and cannot be overcome today. In contrast, the ICT establishes prescriptive milestones that must be met in order to achieve mandatory 100% ZEB purchases by 2029 and with only four qualifying scenarios in which "temporary delays" can be considered. On page 14 of the ICT, CARB staff goes on to say "At this time we do not believe off-ramp provisions are needed..." METRO believes that CARB staff is mistaken in their perception of the current state of ZEB evolution. METRO's response today will shed some light on our concerns in this respect.

METRO Comments about the ICT

Fleet Size and Paratransit

- a. As currently drafted, it may be difficult for a transit agency to determine their fleet size.
 - i. Are cutaway buses that are used for paratransit service and weigh more than 14,000 pounds considered heavy duty vehicles for the purposes of determining fleet size?
 - ii. Are buses used temporarily in demonstration or pilot projects included in the fleet size?
 - iii. If an agency leases buses, regardless of the lease duration, are those buses included in the fleet size?

- b. METRO requests that cutaways used for **paratransit vehicles be excluded from the zero emission regulation** and not counted towards fleet size due to the unknown availability, lack of field testing and the unknown performance of such electric vehicles for ADA paratransit service. As the paratransit community is heavily reliant on this service, and the most vulnerable population, ZEB's in paratransit must be proven before implementing. Consider the following complications:
- i. Opportunity charging (mid-day or in-route recharging) is not an efficient way to run paratransit service: Lifts and ramps needed to board mobility devices use battery power which is needed for propulsion, thereby limiting the vehicle range between recharges. METRO does not wish to build an ADA paratransit operating model that requires mid-day recharging. Such mid-day recharging will result in higher electricity cost (peak-hour recharging); a need to purchase more vehicles; and a need to add additional driver personnel.
 - ii. Expected range limitations: Paratransit cutaways are much smaller than fixed-route buses and therefore have physical limitations on how many batteries they will hold. Increasing the number of batteries (battery volume) on paratransit vehicles to eliminate in-service recharging is not a viable solution with today's technological limitations. Greater battery volume will also diminish the passenger capacity of the vehicle and require more vehicles to carry the same number of passengers. **ADA paratransit vehicles should be excluded from the Regulation until such time as battery density technology improves significantly.**
 - iii. METRO has had to use paratransit vehicles for formally declared emergency evacuations due to topographical constraints in rural areas. Disruption of power in these situations could limit METRO's ability to adequately respond.
 - iv. METRO is aware of only one zero emissions paratransit vehicle manufacturer. The market is simply not sufficiently developed to provide suitable vehicles and a variety of models which will meet the range of differing paratransit operating parameters across the state.

Infrastructure Assistance

- a. CARB must work collaboratively with the PUC to establish mandatory and streamlined processes with electric utilities to mitigate the high cost of yard recharging facilities.
- b. Currently, utility companies impose minimum electricity usage to recapture the capital cost of new transformers and they are not inclined to provide larger transformers up front for fleets that are phasing-in ZEBs over time. Instead, they will require the transit agency to upgrade transformers multiple times throughout the phase-in of ZEBs.
- c. The Regulation is silent on the costs associated with **opportunity recharging (in-route recharging)**. Transit agencies may have to fund additional significant capital costs for in-route recharging equipment and facilities, and it may be difficult to locate such facilities within the public right-of-way.

Potential Funding and Incentive Opportunities

CARB staff lists a number of funding sources that they view will enable transit agencies to purchase ZEBs at nearly the cost of a non-ZEB vehicle. The discussion on funding is misleading.

- a. A vast majority of funding sources cited in Potential Funding and Incentive Opportunities are **competitive grant programs** which do not offer any funding certainty or predictability for an agency to use in their ZEB funding analysis, yet the ICT is prescriptive, date-certain and structured without a funding “*off-ramp*.”
- b. Smaller agencies are at a disadvantage in competitive programs because a large transit agency in a dense urban area typically scores higher on a cost/benefit basis because the emission reductions are greater, especially if they are located in a federal air quality non-attainment district. In contrast, Santa Cruz METRO is located in a federal attainment district. Therefore, **a proposed Regulation should provide additional time to phase-in ZEBs when the transit agency is located in a federal attainment district.**
- c. The Volkswagen Environmental Mitigation Trust Fund should be used to support deployment of zero-emission buses. This fund can help stabilize funding to achieve our collective goal.
- d. CARB itself does not provide any unique **formula funding** to help offset the incremental additional cost of ZEBs.
- e. The Potential Funding section does not include funding assumptions for certain infrastructure costs. Electric infrastructure costs are not limited to the yard recharger, as implied on page 9 of the ICT, Table 4. Electric infrastructure cost assumptions must include all capital costs associated with taking the power from the pole through a transformer, switching and distribution networks throughout the bus yard. At times when these concerns have been raised, CARB staff have dismissed them citing the ongoing SB 350 Transportation Electrification proceedings at PUC. Let us be clear: the funding for infrastructure that PUC is considering has not yet been approved, and the funding is not specific to public transit electrification.
- f. Page 14 of the ICT states “...*concerns about space constraints for charging infrastructure in the depot may not be an issue for smaller or larger deployments because of overhead charging solutions that have minimal impact on congested yards.*” This statement is in gross error as it relates to METRO. Regardless of choosing underground or overhead approaches, an electrical distribution network being added to METRO’s bus yard will be both complicated and expensive and there is no simple and inexpensive overhead solution, as implied in the ICT.
- g. The ICT does not include any assumptions for the capital costs associated with in-route recharging facilities (Opportunity recharging).
- h. Cap and Trade sourced funding comes with requirements that there be minimum expenditures in Disadvantaged Communities (DAC). Some communities do not have DACs and others, like Santa Cruz County, may have only one DAC. **The ICT should**

not include any additional mandates related to DACs and CARB should work with the legislature to develop legislation that will provide much needed relief from Cap and Trade DAC requirements.

- i. HVIP early emissions benefit: See ICT page 12, second bullet - The phasing out of HVIP qualification when a transit agency purchases the number of ZEBs required in a particular milestone year as opposed to “early” is unreasonable. **HVIP funding must be available at all times** for agencies purchasing ZEBs, irrespective of the purchases being made ahead of mandated milestones or on-time.
- j. Today, HVIP funding is only accessible if there is funding available at the time the ZEB order is placed, and the ZEB manufacturer must apply for the HVIP money. CARB needs to appreciate that well in advance of placing a ZEB order, a transit agency will have struggled mightily to identify the dollars with which to fund the ZEB order, especially small transit agencies such as METRO. **The HVIP program must change.** A transit agency needs to be **guaranteed** the HVIP dollars when cobbling together the capital funding for the ZEB order. To that end, CARB needs to modify the program such that an agency can obtain a **firm commitment** for the HVIP dollars in advance of placing the ZEB order. This **simple change** will significantly enhance a small transit agency’s ability to identify the funding resources for their ZEB purchase.

The 2029 mandate is far too aggressive given the current state of ZEB technology.

- a. Contrary to information contained in the ICT, battery capacity (energy density) industry-wide has not advanced much beyond 200 miles except in test track controlled conditions and what appears to be limited to one manufacturer. As discussed earlier, METRO does not wish for its ZEB operating model to include opportunity recharging. Instead, METRO’s operating model seeks to run ZEBs all day on an overnight charge. With numerous routes that exceed 200 miles/day, ranging up to 282 miles/day, and based on current ZEB non-test track range, METRO may not be able to run ZEBs purchased today on all routes. METRO believes that the stated or manufacturer marketed ZEB vehicle range is potentially far higher than the actual vehicle range. This is due to a number of obvious factors that impact how rapidly the battery power is drawn-down. **This is a significant problem.** When all buses in the fleet cannot run on all routes, the result is a dedicated fleet. Dedicated fleets are difficult to manage and to make morning rollout, especially in space-constrained yards such as the one METRO operates. **Dedicated fleets are not cost efficient or operationally effective.**
- b. METRO operates buses on Highway 17 from Santa Cruz to San Jose. Based on METRO’s recent experience, the current ZEB over-the-road buses or commuter bus ZEB technology is underdeveloped. Therefore, ZEB replacements on commuter bus routes would likely not be a 1:1 replacement. METRO’s best modeling indicates that three commuter ZEBs will be required to perform the work of two conventional CNG buses on its Highway 17 Commuter Express service due to the incline of the roadway and traffic conditions. The BYD over-the-road ZEB prototype recently tested by METRO performed poorly and could not provide enough horsepower to keep up with traffic,

topping out at 30 – 35 mph on some stretches of the highway. Any ICT Regulation crafted should **specifically exclude from the ZEB mandate commuter bus services** operating on mountain roads such as Highway 17.

- c. The ICT must be inseparably linked with a **PUC Regulation requiring that public transit agencies operating ZEBs receive a much lower electricity rate** from the utilities. With the current rate structure and infrastructure costs, propulsion costs may be much higher than the equivalent Compressed Natural Gas costs, especially if opportunity recharging is required. Such will likely negate the operating cost savings projected in Table 4 on page 9 of the ICT.
- d. Contrary to assertions made in the ICT, there is no evidence that ZEB prices are falling as the technology advances and demand increases.
- e. CARB staff states on page 4 of the ICT that “*nearly 1,000 transit buses are purchased in California annually.*” CARB staff includes in the assumption three ZEBs for Santa Cruz METRO. At this time, METRO has not placed an order for three ZEBs due to the challenges noted in ‘b’ above.
- f. Using the numbers contained on page 5 of the ICT, and extrapolating the bus assumptions, California alone will need to purchase 13,600 ZEBs to become a state with 100% ZEB fleets. Assuming that it will take through 2040 to fully retire non-ZEBs, this will equate to approximately 618 ZEBs/year. Surely CARB is aware that one particular major ZEB manufacturer has been struggling to fulfill its current contract commitments and transit agencies across America are reporting delayed deliveries from all ZEB manufacturers. **The ZEB manufacturers are not yet ready for an aggressive ZEB mandate.**
- g. California transit agencies are not the only transit agencies in America purchasing ZEBs.
- h. **Battery degradation** and the consequent decline in full-charge capacity are currently unknown. Neither of the two major ZEB manufacturers’ have provided anything more than battery degradation **estimates** and both are struggling with how to measure battery degradation. Some manufacturers claim 80% remaining capacity at twelve years, but no California agency has operated a ZEB for twelve years. Some manufacturers are guaranteeing the batteries for twelve years and others are not. Also, under the new federal Transit Asset Management program, the life expectancy of buses should now be upgraded to fourteen years.
- i. Batteries constitute one-fourth to one-third of a ZEB’s cost, which is not included in the lifecycle cost comparison in Table 4 on page 9 of the ICT. How many batteries will need to be replaced over the fourteen year life of the ZEB? What is the environmental impact of disposing these batteries?
- j. A ZEB purchased to run on a 200 miles/day route will not be able to run all-day without recharging when the batteries degrade to 80%. How soon will the batteries degrade to 80%? No one knows the answer today. There has not been sufficient ZEB experience with which to answer this question, and to make matters more complicated, different ZEB manufacturers are each using different battery technology. Further, if the answer is to replace the batteries when they degrade to a certain percentage, where will that money

come from and why aren't such costs incorporated into the ICT ZEB lifecycle cost analysis?

- k. Current longer range ZEBs, like the Proterra E2, may be able to cover all METRO routes today, however, the E2 appears to not meet the California axle-weight restrictions, as set forth in AB 1250 (ZEBs – 25K lbs. down to 22K lbs. by 2022). Proterra's website shows the curb weight of the E2 as 29,849 – 33,061 lbs. **No ICT Regulation should be implemented until such time as the ZEB manufacturers can certify all of their ZEBs as AB 1250 compliant.**

This letter raises serious and substantial concerns about the Innovative Clean Transit Regulation. It appears that in crafting this draft Regulation, CARB staff has not fully considered a host of concerns generated by transit agencies earlier with the Advanced Clean Transit Regulation. ZEB technology has not yet matured to a point where it is practical to implement an aggressive ZEB purchase mandate. Furthermore, CARB staff's schedule for adopting the ICT does not provide adequate time for transit agencies to respond. Comments communicated by METRO to CARB via this letter are representative of only a small number of concerns METRO has identified with the ZEB mandate.

METRO recommends that the ICT Regulation be placed on hold and a new review date be established, and that CARB work with transit agencies across California to debate and discuss the many ZEB challenges. METRO believes that transit agencies working collaboratively with CARB on the timing and composition of a ZEB mandate to identify a better approach than the one identified in the current proposed ICT Regulation will benefit all.

Sincerely,



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