



September 24, 2018

Clerk of the Board
California Air Resources Board
1001 I Street
Sacramento, California 95814

Re: Innovative Clean Transit (ICT) Regulation and Draft Environmental Analysis

Dear Sir/Madame:

Please accept the attached comments from Allison Transmission, Inc. ("Allison") with regard to the above-referenced rulemaking concerning zero emission bus ("ZEB") purchase requirements and the California Air Resources Board ("CARB") consideration of amendments to California Code of Regulations ("CCR") §2023.

Allison is the world's largest manufacturer of fully automatic transmissions for medium- and heavy-duty commercial vehicles and is a leader in hybrid propulsion systems for city buses. Allison also supplies the vast majority of transmissions for the school bus market. Allison is headquartered in Indianapolis, Indiana and has a broad global presence, including over 1,000 dealer and distributor locations in the United States.

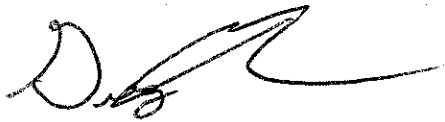
Allison appreciates that CARB has several important goals in mind in proposing to make changes to its current ZEB program, including efforts to meet strict air quality standards and addressing greenhouse gas ("GHG") emissions from the transportation sector. Allison, however, would request that CARB carefully consider whether its proposed regulatory order is sufficiently supported by its accompanying technical and economic analysis, provides sufficient near-term and longer-term cost-effective options for local agencies and maintains adequate flexibility in implementation. Allison would also ask that CARB clarify new definitions proposed as part of 13 CCR §2023 with respect to hybrid systems and to take into account the overall performance characteristics of hybrid engine/powertrain combinations with reference to required NOx emission performance.

As a major supplier to bus-manufacturing companies, Allison has historically strived to meet the needs of customers, including transit agencies across the country, through developing a diverse product line that allows customers to select the type of transmission best suited to their needs. Allison similarly seeks to work with CARB, within the structure of the pending regulation, to make improvements to the final rule that will reflect market realities and improve the opportunity for overall success of the program.

Allison Transmission Inc. | One Allison Way | Indianapolis, IN 46222-3271

In this regard, Allison is available to assist CARB with respect to automatic transmissions and hybrid systems, as well with regard to specific transit and school bus applications as the final regulation is considered. We appreciate your consideration of our comments and would be happy to provide any additional or follow-on information that may be beneficial to your deliberations.

Sincerely,

A handwritten signature in black ink, appearing to read 'Greg Mann', with a long horizontal flourish extending to the right.

Greg Mann, Director
Mobile Source Emissions Regulatory Activities
Allison Transmission, Inc.

Allison Transmission Inc. | One Allison Way | Indianapolis, IN 46222-3271

**Comments of Allison Transmission, Inc.
Innovative Clean Transit Regulation
Proposed Regulation Order
September 27, 2018**

As the Initial Statement of Reasons (“ISOR”) for the proposed regulation notes, a 15 percent ZEB purchase requirement for larger transit agencies has existed in California since 2006, but this requirement has not, to date, been met. The ISOR indicates that there were 132 ZEBs in operation by transit agencies in May 2018. While the ISOR does not provide an explicit percentage of the number of ZEBs in the current fleet, such can be calculated by reference to other data and text provided in the ISOR. Using this information, it would appear that ZEBs (as a percentage of all transit buses in California) currently represent a little over 1% of the fleet.¹

Thus, despite long-standing ZEB purchase requirements there have been a number of substantial barriers to the deployment of this technology within transit fleets. As a result, Allison believes that CARB must consider the full range of factors that have resulted in the inability of past “zero emission” mandates to meet regulatory targets. Central to this analysis is a “year-over-year” estimation of ZEB mandate costs and the availability of resources to meet the mandate. While Allison recognizes that the ZEB program is integral to important policy goals being pursued by California and CARB, the opportunity for successful implementation of the program would be enhanced by more robust regulatory analysis. One outcome of such an effort could be the identification of other alternatives to obtaining the desired policy goals.

In any final rule that results from the pending process, CARB should maintain proposed flexibility options and explore whether other compliance flexibility is feasible. CARB should also clarify the scope of its regulations, which include multiple new regulatory definitions that could cause confusion in the existing hybrid market.

I. CARB Should Improve the Supporting Analysis for its Proposed Regulation

CARB has already responded to comments that transit bus fleets face competition from other resources, including private companies, and that the increased cost of ZEBs could undercut estimated benefits or result in changes in service or fare increases.² CARB indicates, however, that the State is committed to providing incentives for the purchase of ZEBs and cites the existence of the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (“HVIP”) as being sufficient to “reduce or eliminate most of the initial incremental capital costs of the proposed regulation.”³

¹ The ISOR indicates that 5,200 buses amount to about 40 percent of “all buses in California.” ISOR at 1-15. Thus, from this figure a total number of buses in California would be approximately 13,000. $132/13,000 = 1.01\%$. Table VII-7 indicates that total fleet size in 2016 was 12,664 (ISOR at Table VIII-7), yielding a percentage of 1.04%.

² Appendix B-2, DOF Comments to the ICT SRIA and CARB Responses at 5-6.

³ *Id.*

These initial capital costs of BEBs in the early years of the expanded purchase mandate, however, appear to be very substantial for local transit agencies (with increased costs of over \$300,000 per unit when compared with a conventional diesel).⁴ And while CARB projects that the price differential as between BEB vehicles and conventional diesel buses will narrow as between the present and the year 2030, this substantial cost difference does not disappear altogether, but remains at about \$200,000 per unit through 2030.⁵ On an aggregate level, CARB analysis indicates that the ZEB mandate will cost about \$8.48 million in 2021 before rapidly rising to an annual cost of \$142.7 million in 2026 and \$229.6 million in 2030.⁶

It is notable, then, that the existing set-aside for ZEBs is \$35 million in FY 2017-2018, an amount that by itself would appear to be wholly insufficient to address the scope of the mandate, depending on the level of vehicle turnover.⁷ CARB cites other possible sources of funding for ZEB purchases, but the availability of such amounts is less clear and is not projected on a yearly basis to conform to the annual implementation of the mandate. For example, resources contained in the HVIP that are not specifically directed towards ZEB purchases are described as being available on a “first-come, first-served basis for all eligible technologies.”⁸

The ISOR describes other possible funding sources as the “Low or No Emission Vehicle Program” funded by the Federal Transit Administration. But this is a competitive, discretionary program.⁹ The California Low-Carbon Transit Operations Program and the Transit and Intercity Rail Capital Program are also cited as possible funding sources, but these programs do not appear to have a dedicated funding stream for ZEB purchases from 2023 onward when the mandate phases-in.¹⁰ Finally, CARB points to Volkswagen Environmental Mitigation Trust funding of \$423 million, along with other existing California programs targeted on transportation and air quality.¹¹ But while California has indicated that it will allocate funding from these sources towards ZEB acquisition,¹² we did not uncover a more refined analysis of whether a “gap” could occur as between such funding and actual projected needs during the years that California projects that costs will be incurred (2021 to 2038).

In sum, the ISOR does not provide an overall projection where funding for the proposed zero-emission bus requirements will come from – and what funding gaps may reasonably be projected -- especially within the first years of the program. ZEB purchase requirements begin in January

⁴ Appendix F-2, Bus Price Projections, Figure 2 at 3.

⁵ *Id.*

⁶ Statewide cost analysis spreadsheet.

⁷ ISOR at III-8.

⁸ *Id.* at III-9.

⁹ *Id.* at III-10-15.

¹⁰ *Id.* at III-11-13.

¹¹ *Id.*

¹² California has indicated that it will allocate \$130 million to replace eligible Class 4-8 school, transit, and shuttle buses with zero-emission technology. The maximum incentive would be up to \$400,000 for a battery electric school bus, up to \$180,000 for a new battery electric transit bus and up to \$400,000 for a new fuel cell electric transit bus. CARB estimates that this will amount to 95% of cost of a qualified school bus and that these funds will supplement FTA funding for a “large portion” of incremental costs for shuttle buses. Beneficiary Mitigation Plan, CARB, June 2018 at 20. This source of funding, however, is transitory; funds will be available over three years and expenditures can occur over ten years. *Id.* at 8-9.

2023 for large transit agencies (with a requirement for 25% of the total number of new bus purchases) rising to a 100% purchase requirement in just six years.¹³ And while CARB has calculated projected costs versus both “baseline” and “current conditions” there is not an attempt to align projected costs of both fleet acquisition and related infrastructure with resources on a year-over-year basis to better inform the public discourse as to how the program will be implemented over time.

This is not a simple matter of regulatory cost accounting. As CARB notes – and as Allison has experienced multiple times in the marketplace – the issue of incremental cost is a major barrier to the adoption of new technologies. Thus, we believe it would be beneficial to the consideration of the final requirements if an estimate of the amount of new bus purchases (and projected costs) could be aligned with a projection of reasonably available resources on a year-by-year basis, starting with initial implementation in 2023. This would better reveal the extent of available resources with the timeframe in which transit agencies will need to make actual purchasing decisions, as well as any inherent “trade-offs” that will be necessary when the ZEB mandate is funded in lieu of other transportation projects. Apart from any benefit to the transit agencies themselves in planning future operations, this information would also be valuable to equipment manufacturers and vendors who will need to assess and plan for the new requirements.

We recognize that this task may not be entirely straightforward. Some resources (such as the Volkswagen Environmental Mitigation Trust) are transitory and finite while other resources (such as state programs) are subject to legislative approval and funding. Thus, some level of uncertainty would be inherent in developing such a year-over-year analysis. But simply citing a net cost savings of \$1.5 billion from 2020 to 2050 in the ISOR¹⁴ provides little direction to either the public or private sector in assessing near-term economic feasibility and investment incentives.

II. CARB Should Maintain Flexibility Options and Consider Additional Options

The proposed regulation would allow waiver of 2023 and 2024 purchase requirements if large numbers of ZEBs are purchased early (*i.e.*, 1,000 or more ZEBs by December 31, 2020; 1,150 or more ZEBs by December 31, 2021).¹⁵ The proposed regulation also provides an option to implement zero-emission mobility programs in lieu of purchasing ZEBs.¹⁶ Under this option, bicycles, zero-emission cars or other zero-emission vehicles less than 14,000 GVWR (operated directly or through contract with a transit agency) can offset ZEB purchase requirements using a zero-emission passenger mile metric.¹⁷ Requests for delays and extensions may also be available.¹⁸

Allison encourages CARB to retain these flexibilities in the final rule and to consider whether additional options may be available to ZEB purchase mandates. While CARB did consider

¹³ Proposed §2023.1(a).

¹⁴ ISOR at ES-6, VIII-24

¹⁵ Bus Price Projections at 24.

¹⁶ Proposed §2023.3.

¹⁷ III-3; 2023.5.

¹⁸ Proposed §2023.4.

alternative concepts to the ZEB mandate, including less-stringent ZEB purchase requirements and performance targets,¹⁹ the proposed regulation does not include these concepts or provide for additional discretion in local transit agency purchasing decisions.

Specifically, with reference to a less-stringent zero-emission bus purchase requirement, staff indicated that “it is expected that large-scale ZEB deployments can accelerate the cost reductions in ZEBs due to the economies of scale and the maturity of the ZEB supply chain.”²⁰ But while such an observation could be correct on a macro-economic level, there does not appear to be anything within the supporting record which documents the extent and timing of these cost reductions. Instead, the discussion of alternative concepts is largely conclusory and non-specific.

CARB’s rulemaking process would be assisted by a more fulsome discussion of its underlying rationale for rejecting regulatory alternatives and solicitation of additional comment. Realizing that CARB may want to proceed in the near-term on the proposed regulation, additional comment could be solicited after CARB moves to a final order, allowing for subsequent reopening of the final regulation. Alternatively, CARB could provide for a future review of the program occurring prior to imposition of the “second phase” of the ZEB purchase mandate in 2026.

III. Additional Analysis of Overall Program Costs and Market Response is Necessary

As referenced above, it is evident that a major factor in the transition to ZEBs (or other new technologies) is the overall cost of moving from “conventionally-fueled” vehicle to a ZEB. The ISOR indicates that incremental costs for a battery electric bus (“BEB”) at \$205,000 (versus a conventionally-fueled bus) in 2026. Capital costs alone for a FCEB are projected to be \$900,000 per bus in 2020, or over two times the cost of a comparable diesel-fueled vehicle.²¹

Added to capital costs of ZEBs are the cost to deploy related infrastructure, with charger installations estimated at \$25,000 each.²² Midlife costs for battery or fuel cell system replacement are also considerably higher when compared with conventional engine rebuilds, costing \$75,000 to \$200,000 versus \$35,000.²³ “Cost per mile” related to fuel efficiency also favors conventional diesel buses.²⁴

Altogether, the ISOR projects that total costs of the program will increase each year through 2030 before starting to decline in the years thereafter (while still representing costs that are additional to current conditions).²⁵ Any cost “savings” from the ZEB mandate will not be experienced until 2038. At that point in time, the relative reduction in cost from the ZEB mandate steadily increases from 2039 through 2050 when a total savings of \$1.5 billion is projected to be achieved over 30 years of program implementation (2020 to 2050).

¹⁹ ISOR at IX-1-IX-8

²⁰ *Id.* at IX-2.

²¹ ISOR at VIII-6.

²² *Id.* at VIII-8.

²³ *Id.* at Table VIII-1. Related maintenance costs, however, are estimated to roughly comparable or perhaps less for some technologies. *Id.* at VII-9-10, Table VIII-2.

²⁴ *Id.* at Table VIII-4.

²⁵ *Id.* at Table VIII-2.

Allison's long experience in the commercial truck market indicates that private companies and governmental fleets are willing to expend resources if there is a palpable benefit through enhanced operation and utilization of a vehicle. Our automatic transmissions may initially cost more when compared with other technologies, but savings can be achieved through greater productivity of the vehicle. Within the private sector, the market values "payback" in much shorter timeframes than contemplated by the ZEB mandate.

Allison realizes that the ZEB mandate is in the area of governmental policy versus the competitive marketplace and thus, the "willingness to pay" issue is addressed differently. However, CARB should more fully consider the implications of a mandate which carries with it negative costs for the first 15 years of implementation and whether additional flexibilities could assist in mitigating such costs and improving the opportunities for long-term success.

IV. CARB Should Further Clarify Regulatory Definitions Regarding Hybrid Technology

The proposed regulation makes a number of definitional changes to 13 CCR §2023, specifically with reference to bus types. Previously, CARB regulations utilized the terms "transit fleet," "transit fleet vehicle"²⁶ and "urban bus."²⁷ These definitions were inherently broad. An "urban bus" was defined as a "passenger carrying vehicle powered by a heavy duty diesel engine *or of a type normally powered by a heavy heavy duty engine.*"²⁸ CARB has interpreted this definition to include hybrid vehicles, specifically those powered by Allison H 40 EP and H 50 EP hybrid transmissions.

In addition, the proposed regulatory text concerning Low-NOx engines (proposed §2023.6) imposes a requirement for transit agencies to purchase buses with "Lox-NOx engines" if certain criteria are met. Among the criteria is a requirement that the engine "be certified to the lowest level of NOx emissions at the time of purchase that is suitable for the bus and fuel type for the engine being purchased." *Id.* at §2023.6(a)(1).

It would be helpful for CARB to further clarify the effect of these changes with respect to current hybrid vehicles and affirm that either standing alone, or in combination with each other, the definitions continue to encompass hybrid vehicles utilizing Allison H 40 EP and H 50 EP hybrid transmissions. Such an interpretation is fully consistent with the regulatory language that has been proposed, but further elucidation by CARB could help avoid any uncertainty.

Specifically, the Proposed Regulation Order includes a new term "conventional internal combustion engine bus" to mean "a bus with an internal combustion engine (ICE) propulsion system or a combination of an internal combustion engine with an electric propulsion system commonly referred to as a hybrid powertrain."²⁹ A plain reading of this definition is that it is more encompassing of the types of vehicles that can currently be considered to be an "urban

²⁶ Transit fleets included both "urban buses" and "transit fleet vehicles," defined to include on-road vehicles greater than 8,500 GVWR. 13 CCR §2023(a)(11)-(13).

²⁷ 13 CCR §2023(a)(13).

²⁸ *Id.* at (a)(11). (emphasis added).

²⁹ Proposed 13 CCR §2023(a)(12).

bus.”³⁰ This is largely due to the fact that the criteria of a “heavy duty diesel engine” or a “heavy heavy duty engine” in the current definition is absent in the new definition. Therefore, utilization of this inherently broader definition would not preclude H 40 EP and H 50 EP transmissions that have been allowable under the previous definition.³¹ Moreover, under the new definition, systems “commonly referred to as a hybrid powertrain” are included (and thus would encompass Allison H 40/50 series transmissions).³²

With regard to requirements to utilize Low-NOx engines, hybrid vehicles may require that certain types of engines be used (due to the integrated nature of the engines used in these vehicles and the hybrid powertrain). Engines that are compatible with different hybrid technologies may not be fully compatible or available on a “drop in” basis with other vehicles even in a similar weight category or use.

It appears that CARB has recognized this issue and developed a regulation that will allow continuation of existing practices in this area. Specifically, CARB’s use of the word “suitable” in proposed 2023.6(a)(3) recognizes that use of engines certified to the “lowest level of NOx emissions” is contingent on whether such engines can reasonably be used in a specific vehicle application, like hybrids. In the final rule or accompanying explanation, it would be helpful for CARB to recognize that engine selection for hybrid vehicles is not the same as in the conventional vehicle sector and thus such needs are encompassed by the “suitable” criterion. Since certain engine types were “suitable” with Allison H 40 HP and H 50 HP transmissions, they would continue to remain so under the revised definitions.

³⁰ A “bus” is defined with respect to a “rubber-tire vehicle designed to transport passengers by road with a gross vehicle weight rating (GVWR) greater than 14,000 pounds [excepting trolleybuses].” A “bus” is defined with respect to a “rubber-tire vehicle designed to transport passengers by road with a gross vehicle weight rating (GVWR) greater than 14,000 pounds [excepting trolleybuses].” *Id.* at (a)(5).

³¹ The proposed definition would encompass vehicles utilizing Allison 40/50 series transmissions in different vehicle applications regardless of whether a heavy duty or heavy heavy duty engine were utilized.

³² CARB’s stated “purpose and rationale” for the change does not indicate any different intent or purpose for the new definitions versus the previous definitions that would exclude “incumbent” hybrid systems. Appendix X, The Specific Purpose and Rationale of Each Adoption, Amendment or Repeal. CARB only indicates that it “defines terms with particular meaning under the ICT regulations in order to provide clarity.” *Id.* at X-2.