David Warren
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NEW FLYER OF AMERICA

6200 Glenn Carlson Drive
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California Air Resources Board
1001 I Street
Sacramento, CA 95814

Dear Members of the California Air Resources Board,

New Flyer is North America's heavy-duty transit bus leader, and actively supports over 44,000 heavy-duty transit buses currently in service, of which 7,300 are powered by electric motors and battery propulsion and 1,600 are zero-emission. New Flyer incorporates the widest range of drive systems available including: clean diesel, near-zero NOx emission natural gas, diesel-electric hybrids, and zero-emission electric trolley, battery, and fuel cell buses. The New Flyer Group, which includes Motor Coach Industries (MCI), operates four California facilities in Ontario, Los Alamitos, Fresno and Hayward.

New Flyer is fully committed to support the objectives and goals of the forthcoming Innovative Clean Transit Regulation to achieve air quality and climate mitigation targets, the associated environmental benefits, energy savings and the reduction of petroleum fuel dependence.

From the perspective of the leading original equipment manufacturer (OEM) of zero-emission buses (ZEBs) in the transit industry, New Flyer offers the following comments on the current state of zero-emission bus technology and the associated infrastructure to implement large fleet ZEB deployments.

Comment 1 (Range)
The range of zero emission buses is highly variable. New Flyer engineering analysis shows the current state-of-the art battery electric bus range, from any manufacturer including New Flyer, is capped at 175-225 miles in severe conditions extreme heat (115 degrees), steep terrain and aged batteries. This falls short of the typical 350 mile range capability of a CNG or diesel bus. While battery technology will improve, the range gap must be considered in a one-for-one bus replacement plan with a CNG or diesel transit bus.

Comment 2 (Initial Cost)
New Flyer does not expect the premium, or incremental capital cost of zero emission buses to diminish in the foreseeable future. For long range buses, batteries can equate to over 35% of the material cost of a bus. Industry experts forecast battery technology and higher manufacturing volumes will drive cost improvement. However, cost improvement will likely be offset by OEMs adding additional battery capacity to meet transit's extended range requirements. The market volatility of cell chemicals, potentially unstable trade policies, and the impact both factors may weigh on the Federal Transit Administration Buy America procurement requirements are also not predictable, nor long-term forecastable.

Comment 3 (Weight)
The weight of the best available, state of the lithium-ion batteries, from any bus manufacturer is substantial; a key factor limiting range.

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For a long range bus, battery weight equates to the combined total weight of not 1, not 2 but 3 cars such as the Honda Fit. The significant weight of batteries for electric propulsion limits the total passengers a transit bus may legally carry. New Flyer strongly encourages ARB staff to review all Federal Transit Administration bus test reports, including the most recently published from all manufacturers, to note warnings of axle and gross vehicle weight overload on certain ZEBs.

Comment 4 (Fuel Cell Electric Buses)
New Flyer is commercializing hydrogen fuel cell electric buses as an effective option for transit agencies. Fuel cells are used as range extenders for a battery-electric bus, performing as on-board battery charger, to provide range comparable to diesel and CNG buses and the ability to refuel quickly. During 2018 and 2019, New Flyer will deliver 27 fuel cell buses to California for commercial deployment. For fuel cell buses to become widely accepted, continued hydrogen market expansion with public and private infrastructure investment will yield growth through manufacturing volume cost reduction with this type of ZEB.

Comment 5 (Interoperable Charging Equipment)
New Flyer has strongly advocated for industry interoperable charging equipment, and we have forgone proprietary charging equipment. Industry charging standards comprised of SAE-J1772, SAE-J3105, SAE-J2954, and SAE-J3068 remain under development and are expected to be in place by fourth quarter 2019. New Flyer strongly encourages the State of California to require all battery-electric buses purchased using California State funding to adhere to the accepted charging interoperability standards.

Comment 6 (Infrastructure)
Charging supply equipment and the installation and integration is a major consideration in the deployment of zero-emission buses. New Flyer has invested significant resources to support the complex infrastructure integration efforts with the zero-emission buses. On-route high-power charging systems, in particular, may involve up to 25 industry stakeholders and 2-3 years from planning to commissioning. Grid integration and power management will inevitably be the most challenging aspect of ZEB fleet conversion for the Innovative Clean Transit Regulation.

In summary, we thank the Air Resources Board for consideration of these comments and New Flyer's opportunity to actively participate with ARB Staff throughout this rule making process.

Respectfully,

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