

DOCKETED

Docket Number:	18-MISC-02
Project Title:	Program Concept Workshop for Bus Replacement, ECAA-ED & Prop 39
TN #:	222850
Document Title:	Stephen H. Crolius Comments Suggestion for Evaluation Criterion for School Bus Replacement Program
Description:	N/A
Filer:	System
Organization:	Stephen H. Crolius
Submitter Role:	Public
Submission Date:	3/5/2018 11:51:22 AM
Docketed Date:	3/5/2018

Comment Received From: Stephen H. Crolius

Submitted On: 3/5/2018

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Suggestion for Evaluation Criterion for School Bus Replacement Program

Additional submitted attachment is included below.

COMMENT

Submitted to the California Energy Commission

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Submitted by the Vehicle-to-Grid Electric School Bus Initiative

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March 5, 2018

The Vehicle-to-Grid Electric School Bus Initiative recommends that the Energy Commission assign strong priority within the School Bus Replacement Program to the near-term development of an economically competitive zero-emission bus. For the last four years, the Vehicle-to-Grid Electric School Bus Initiative has worked to establish the case that vehicle-to-grid (V2G)-enabled school buses are the shortest and best path to total-cost-of-ownership parity between ZE school buses and fossil-powered school buses. Under Energy Commission contract ARV 13-011, the Initiative built and deployed the world's first V2G school buses, and successfully worked with Southern California Edison to interconnect the buses within the Los Angeles electric grid. Building on these accomplishments, the Initiative partnered with the Blue Bird Corporation in 2016 to win funding from the U.S. Department of Energy and the South Coast Air Quality Management District for the "next-generation" Vehicle-to-Grid Electric School Bus Commercialization Project. This project will result in the deployment of eight original equipment V2G school buses at the Rialto Unified School District and the revenue-generating participation of these buses in the ancillary service markets managed by the California Independent System Operator (CAISO).

The Initiative's argument from its inception is that battery-electric ZE school buses will not be able to compete on total cost of ownership with fossil-powered buses for the foreseeable future. While operating costs for an electric school bus are lower than for a fossil bus, the initial purchase price is so much higher that the disadvantage will not be offset over the life of the bus. This perspective was validated when the first electric type C school bus entered the market in 2015 at a price of \$355,000 (100-mile range, no air conditioning) vs. ~\$120,000 for a basic fossil bus. Depending on the assumptions used to model bus economics, these prices would leave a TCO gap of \$100,000-\$150,000. Absent an out-of-the-box solution, this gap would need to be filled with public money from higher levels of government on an indefinite basis since school districts do not have any spare capacity in their budgets. Fortunately, vehicle-grid integration appeared as a potential expedient that, together with volume-driven decreases in electric bus prices, could overcome the TCO gap. The latter point has been validated by the Initiative's current modeling of cash flows from participation by a properly configured V2G school bus in CAISO's frequency regulation market.

The Initiative's specific recommendation is to explicitly include in the School Bus Replacement Program a proposal evaluation criterion that pertains to grid integration. If such a criterion were assigned, for example, 20 points (out of 100), a power export capability by itself might earn five points; an on-board bi-directional inverter might earn ten points; a complete bidirectional charging path, including an appropriately configured landside connection device might earn 15 points; and an optimized V2G

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architecture, including a control system that is ready to interface with CASIO, might earn the full 20 points. Such a criterion could be included regardless of which stakeholders are selected as the applicant population. If school districts were selected for this role, for example, the V2G-readiness criterion would incent them to look at the offerings of ZE buses through a V2G lens. (It should be noted that including this criterion would not “stack the deck” in favor of a single OEM. A variety of school bus manufacturers beyond Blue Bird are working on V2G systems or have expressed intentions to do so.)

Including a VGI evaluation criterion would ensure that the program’s \$75 million investment becomes a giant step toward a future in which school districts buy ZE buses because they are less expensive on a TCO basis than fossil buses. In this situation, there would be no further need for state or air district programs to fund the price premium for alternative technology school buses. This would be good for school children, good for taxpayers, and would be a near-term validation of the state’s strategy to financially support development and commercialization of beneficial technologies until they can succeed in the marketplace based on their own unsubsidized economics.