Appendix E:

2020 SB 1403 State School Bus Incentive Programs Report (Health & Safety Code Section 39719.2)

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Introduction

The California Air Resources Board (CARB) and the California Energy Commission (CEC) continue to make steady progress toward cleaning up the State school bus fleet and improving air quality, not only for K-12 students riding school buses for home to school transportation, but the surrounding communities as well. Starting in 2019, Senate Bill (SB) 1403 (Lara, Chapter 370, Statues of 2018) mandates that CARB, in consultation with the CEC, provide a report annually on the State's school bus incentive programs as part of the Heavy-Duty Investment Strategy.

This year's report provides an update on the milestones achieved by the State school bus incentive programs and a projected need for funding taking into account the statewide school bus inventory, turnover, and useful life. This report also includes discussion of zero-emission school buses moving forward and their role in the ongoing transformation of the transportation sector to meet California's air quality goals. Finally, this report includes multiple case studies of school districts that have already incorporated zero-emission school buses into their fleet.

Because of the global pandemic and how it has affected classroom instruction, there are no definitive answers on what the future of K-12 schooling will look like and how it will affect home to school transportation. When classroom instruction resumes to a "new normal", safe, clean transportation will be more important than ever to continue to protect the health of the State's sensitive populations, especially our children.

School Bus Funding Update

There is no single dedicated source of funding for school bus replacement, instead there are various sources of funding that are pieced together to fund school bus cleanup and the transition of the school bus fleet to electric. Funding is rarely recurring or dedicated exclusively to school buses and public school districts often do not have the funding to replace their aging school bus fleet. The Legislative Analyst's Office conducted a comprehensive assessment of funding for home-to-school transportation in 2014.[1] The primary responsibility for school transportation funding lies with public school districts through the State legislative process. As stated in last year's report, it is a collective effort to invest in California's school bus fleet amongst agencies on the local, state, and federal level. CARB and the CEC have led the effort in dedicating funding and resources to turning over old, dirty school buses and investing in new technologies. For more background on California's school bus funding history please refer to the 2019 SB 1403 State School Bus Incentive Programs Report. Approximately $76.4 million has been allocated to school bus cleanup since the update last year.

[1] Legislative Analyst's Office (2014), Review of School Transportation in California, retrieved from https://lao.ca.gov/reports/2014/education/school-transportation/school-transportation-022514.pdf

Table E-1 highlights past and current State funding that has gone to school bus cleanup to support exhaust retrofits, full vehicle replacements, and supporting infrastructure followed by short updates of the key programs over the past year.

Table E-1: Summary of Past and Ongoing State School Bus Incentives – July 2020

Funding Source	Amount Spent or Allocated	Projects	Dedicated to School Bus
Lower-Emission School Bus Program *since 2001*	$310 million	7,456 retrofits, 1,642 school buses	X
Carl Moyer Program & Carl Moyer State Reserve* *since 1998*	$12.5 million	102 school buses, 14 infrastructure projects	
Assembly Bill 923* *since 2008*	$213 million	Retrofits, school buses, compressed natural gas (CNG) tanks, & infrastructure	
Community Air Protection Incentives* *since 2017*	$37.3 million	175 school buses, 9 infrastructure projects	
School Bus Replacement Program (CEC)* *since 2019*	$75 million	235 school buses	X
Clean Transportation Program (CEC) *since 2012*	$21 million	25 CNG school buses, 61 electric & 5 CNG infrastructure projects, & workforce training	
Volkswagen Mitigation Trust *since 2018*	Up to $65 million	~80-90 school buses for first installment	
Sacramento Regional Zero-Emission School Bus Deployment Project* *since 2017*	$14.5 million (State plus match contribution)	28 school buses & infrastructure	
Clean Truck and Bus Vouchers (HVIP)* *since 2010*	$22 million	125 school buses	
Rural School Bus Pilot Project* *since 2016*	$62 million	~200 school buses & infrastructure	X
Clean Mobility in Schools Pilot Project* *since 2018*	$24.6 million	~27 school buses & infrastructure, in addition to other eligible projects	
Diesel Emissions Reduction Act* *since 2008*	$14.6 million (Federal plus State Contribution)	549 retrofits, 103 school buses	

Funding Source	Amount Spent or Allocated	Projects	Dedicated to School Bus
Supplemental Environmental Projects for School Buses *since 2012*	$5.1 million	11 retrofits, 20 school buses, 297 recalled filter replacements	X

** Represents funding sources and figures that have been updated since the 2019 SB 1403 State School Bus Incentive Programs Report*

Community Air Protection Funds

Community Air Protection incentives, funded by Cap-and-Trade auction proceeds since FY 2017-18, are community-focused and community-driven. Local air districts select projects according to guidance from community members and work to reduce emissions exposure in communities most affected by air pollution. In the first three years of the program, the Legislature appropriated over $700 million to reducing criteria pollutant, toxic air contaminant, and greenhouse gas emissions with a priority towards disadvantaged and low-income communities, particularly those communities selected for air monitoring plans or emissions reduction programs pursuant to AB 617. School bus replacements are eligible projects for these funds and community groups have voiced priority for school bus projects when describing community needs. This program has funded 175 school buses, 91 of which are zero-emission. Overall, $37.3 million of the first year of CAP incentives have gone toward school bus replacement and infrastructure to date in the state's most impacted, low-income, and disadvantaged communities.

California Energy Commission School Bus Replacement Program

Senate Bill 110 (SB 110), (Chapter 55, Statutes of 2017) appropriated funds to establish the School Bus Replacement Program at the CEC. SB 110 provides one-time funding of $75 million from Proposition 39, for the replacement of old diesel school buses in disadvantaged and low-income communities throughout California. The CEC chose to prioritize battery-electric school buses that are ready for vehicle-to-grid integration with this funding. The CEC received applications from over 200 school districts to replace more than 1,500 diesel school buses.

CEC is distributing the funding among four areas in California: Northern, Central, Southern, and Los Angeles County. In addition, approximately $14 million in Clean Transportation Program funds (formerly known as the Alternative and Renewable Fuel and Vehicle Technology Program) will provide the necessary charging infrastructure to operate the school buses. The CEC is also providing $1 million in Clean Transportation Program funds for workforce training and development, collaborating with Cerritos Community College to develop curriculum for school districts that were awarded electric school buses through the School Bus Replacement Program. By December 2019, school districts throughout California received five percent of the 235 electric school buses funded. The CEC expects school districts to receive 25 percent of the

total school buses funded by December 2020. School districts will receive all School Bus Replacement Program buses by September 2022.

California Energy Commission Clean Transportation Program

The CEC has allocated over $6 million from Clean Transportation Program funds for CNG school bus replacements and supporting fueling infrastructure when electric school bus replacements were not feasible for school districts. The CEC received applications for over 200 school buses and was able to provide funding for 25 CNG school buses. Seventeen school buses were delivered as of October 2020, and the remaining eight school buses are expected to be delivered by December 2020.

Volkswagen (VW) Environmental Mitigation Trust

VW's settlement allocates $423 million to California to offset the excess oxides of nitrogen emissions caused by VW's illegal actions. California's Beneficiary Mitigation Plan designates $130 million of the State's allocation for zero-emission bus replacements including shuttle, transit, and school buses, with a 50 percent cap for any one of the three categories. The San Joaquin Valley Air Pollution Control District (SJVAPCD) is administering the bus replacements Statewide on a first-come, first-serve basis. SJVAPCD accepted applications for the first installment of funds, $65 million, in fall 2019 and received 495 school bus applications requesting approximately $198 million. The first installment will replace approximately 80-90 school buses. School bus applications quickly exceeded the available 50 percent funding cap for this installment, exemplifying the importance of these efforts in California's most impacted communities. SJVAPCD will accept applications for school buses again when they release the second installment of funding in 2021.

Rural School Bus Pilot Project (RSBPP)

Funded by CARB's Low Carbon Transportation Investments and administered by the North Coast Unified Air Quality Management District, the RSBPP has contributed $61.6 million to school bus replacements. The program gives preference to school districts located in small air districts and funds both zero-emission and conventional engines using renewable fuel. The last solicitation in 2018 garnered nearly 600 applicants. An allocation of $3 million was approved for Fiscal Year (FY) 2019-20. This project will fund the replacement of over 200 cleaner school buses. The legislature has deferred action on Cap-and-Trade auction proceeds for FY 2020-21; therefore, no additional funds have been allocated to the program at this time, though there is a clear demand and need in communities to meet our air quality and equity goals.

Clean Mobility in Schools Pilot Project

In 2018, the CARB Board approved Low Carbon Transportation Incentives funds for the Clean Mobility in Schools Pilot Project. The goal of the program is to increase the visibility of, and accessibility to, zero-emission transportation options by placing various commercially available zero-emission technologies, along with the supporting

charging/fueling infrastructure, in one or more schools located in disadvantaged communities in California. CARB held a grant solicitation in August 2019 and received seven applications from eligible school districts requesting over $55 million to implement their projects. Because of the broad-reaching potential for benefits from these worthwhile projects, staff were able to re-allocate funds to fund the three top-scoring applications. Thus in early 2020, grant agreements were finalized with the winning grantees: El Monte Union High School District, San Diego Unified School District, and Stockton Unified School District for a total of $24.6 million. The program will fund approximately 27 battery-electric school buses amongst the three grantees, in addition to other eligible projects.

Local, state, and federal agencies have spent millions of dollars on school bus cleanup, but there is still more work to do. Funding for school bus replacement and supporting zero-emission charging infrastructure remains a critical, on-going need throughout the State. Understanding the Statewide school bus population is critical in determining which school buses are priority for replacement and the need for more funding to clean up the school bus fleet. The next section will discuss the characteristics of the California school bus fleet in more detail.

California School Bus Fleet Update

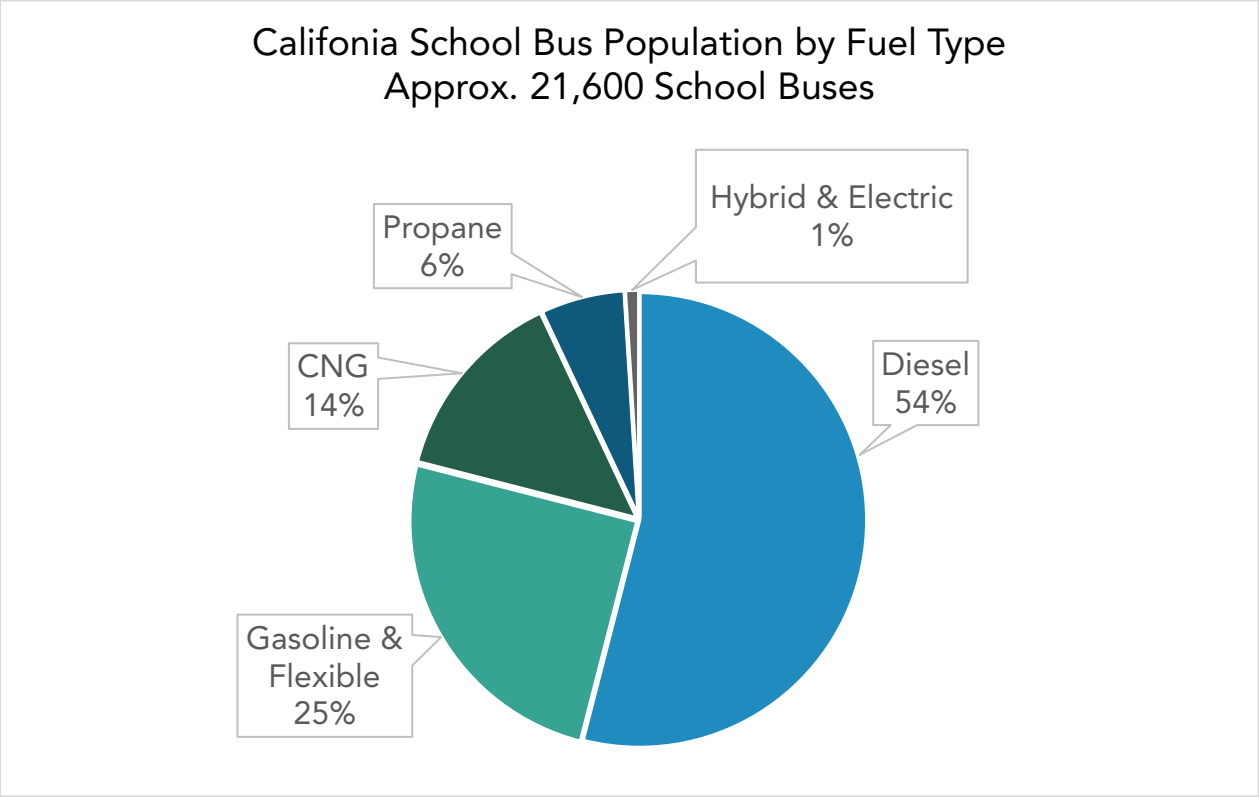
Defining the California School Bus Fleet has been critical to understanding the landscape and long-term need. No single data source gives a complete picture of the state's school bus population. To provide this update and further understand the inventory, staff compiled data from the California Highway Patrol (CHP) School Bus Inspection Program, the current Department of Motor Vehicles (DMV) Vehicle registration database, and data from the various State funding programs that have replaced or plan to replace school buses. The 2019 CHP school bus inspection data served as a primary data source for determining the school bus population because CHP requires an inspection every 13 months for a school bus to legally transport children.[2] To supplement the data, staff also compiled compliance information from the Truck and Bus Regulation Reporting system called the Truck Regulation Upload Compliance and Reporting System (TRUCRS). School districts are not required to report in this database but some funding programs require fleets to report in TRUCRS to demonstrate compliance to be eligible for grant funding.

Staff estimates there are approximately 21,600 school buses operating in California. When staff presented the school bus inventory at a Board meeting in December 2016, they estimated that approximately 24,500 buses operated in California. Since that time, staff has worked extensively on quality checking the inventory. This includes removing duplicate school bus records, removing vehicles found through research not meeting the California Vehicle Code definition of "school bus," and removing records of school

[2] California Vehicle Code, Section 2807

buses that are not currently registered in DMV or did not have a CHP School Bus Inspection within the past two years.

Figure E-1: California School Bus Population



The drop in the relative number of school buses is likely due to the quality checking CARB staff performed on the database. Figure E-1 depicts the California School Bus Population by fuel type. Approximately 54 percent of the fleet is diesel, which is CARB's main area of focus. The rest of the school bus fleet is gasoline and flexible fuel (a gasoline blend with up to 85 percent ethanol), CNG, propane, and hybrid and electric. The gasoline and flexible fuel category is larger than in 2016. Nearly all of the flexible fuel school buses have been added to the inventory since that time and over 80 percent of these school buses have a model year of 2015 or newer. The percentage of CNG school buses, a cleaner alternative to diesel fuel, has increased by one percent. Hybrid and electric school buses currently make up approximately one percent of the inventory, which is great progress from the last inventory update staff gave to the CARB board in 2016.

Need for Turnover

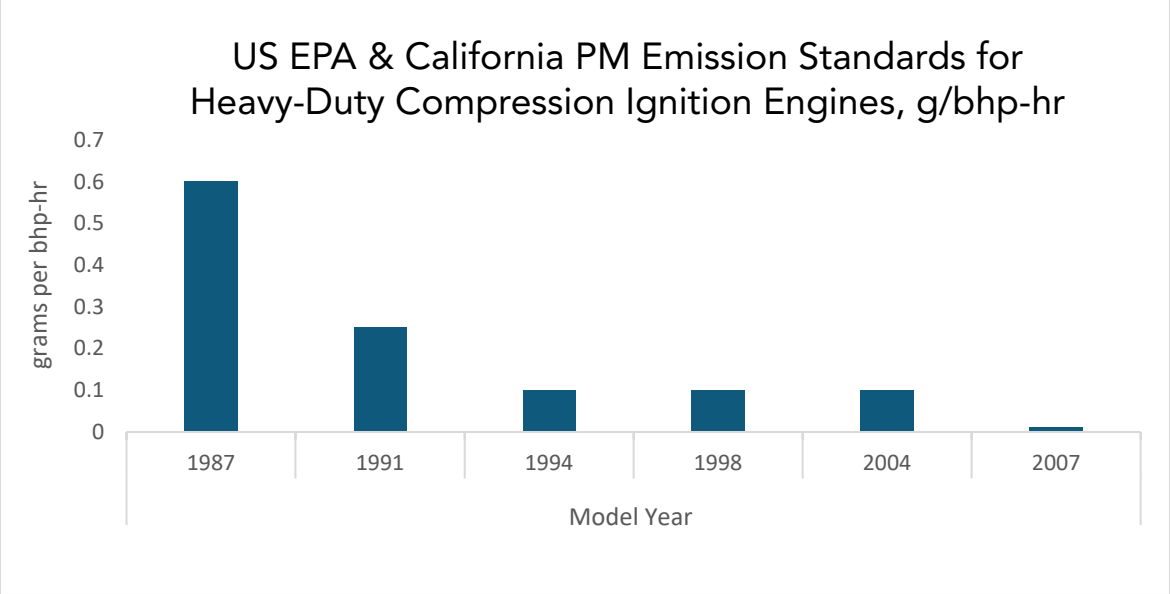
Amongst California school buses, the diesel-fueled vehicles are CARB's main area of focus because diesel particulate matter (PM) is a toxic air contaminant. Any amount of toxic air contaminants may have health impacts, but exposure to sensitive populations

such as children is especially problematic. Therefore, reducing diesel PM exposure is a major focus of efforts to clean up the school bus fleet.

Several actions have been taken specially to reduce children's exposure to vehicle-related pollutants during their school bus trips, including smoke testing, idling restrictions, and in-use regulations such as the Truck and Bus Regulation. School bus fleets must test regularly for excessive smoke. School buses of any type are restricted from idling at or near public or private schools. Drivers must turn off engines immediately after arriving at a school and restart no more than 30 seconds before departure.

Engine emissions standards play a major role in reducing harmful exposure to particulate matter from school buses. Figure E-2 illustrates how emission standards have become more stringent over time.

Figure E-2: Heavy-Duty PM Emission Standard



The current PM standard of 0.01 g/bhp-hr has been the standard since 2007. For example, the PM emission standard prior to 1991 of 0.60 g/bhp-hr, which is 60 times the emissions of the current PM standard. This shows why it is most important to turn over the oldest school buses as the emission standards of the past are so much more polluting than school buses meeting the current emission standards. The oldest category of buses in the inventory are 1977 to 1986 model year school buses. School buses in this range have the same basic emission characteristics, so there is no significant emission benefit associated with retiring an older school bus versus a newer school bus in this model year range. The presence of PM exhaust filters reduce particulate matter emissions by at least 85 percent. Most engines that have an engine model year of 2007 or newer come assembled from the manufacturer equipped with a

PM exhaust filter. Under the Truck and Bus Regulation[3] CARB requires diesel-fueled school buses over 14,000 pounds gross vehicle weight rating (GVWR) to be equipped with a particulate matter (PM) exhaust filter (retrofitted or original equipment), or they must operate less than 1,000 miles per calendar year.

Older school buses are more polluting, with higher deterioration of PM filters due to aging. This exposes children, a sensitive population group, to more emissions. Turnover of the oldest and dirtiest school buses is essential for reducing exposure to pollutants. Turning over the oldest school buses also has the added benefits of supporting California's air quality, climate change, equity, and petroleum reduction goals.

Improving Safety Standards – Turnover means Safer Buses on the Road

Besides reducing diesel PM emissions, another reason to turn over the oldest school buses in the inventory is the improvement of school bus safety standards, including seatbelt safety laws and the child safety check. California law requires school buses manufactured on or after July 1, 2005 with a rated seating capacity of 16 or more passengers to be equipped with three-point seat belts and on all other school buses manufactured on or after July 1, 2004.[4] It is not required to retrofit old buses with seat belts, but the updated safety features are a positive outcome of replacing the oldest school buses.

Analysis of Diesel School Buses in California

Since January 1, 2014, diesel school buses with a GVWR of 14,001 pounds or more were required to be equipped with a PM filter, unless the school bus is designated as a low-use school bus traveling less than 1,000 miles per calendar year or reported for a PM filter extension. Staff found 125 school buses in the oldest category with model years of 1978-1988 in the inventory, 108 of which are publicly owned. Of the publicly owned school buses in this category, there are no school buses older than 1978 model year. Note, the model year of a vehicle is typically one year ahead of the engine model year. For example, a school bus with a model year of 1988 will most likely be equipped with a 1987 model year engine. These school buses are the greatest concern because their engines pre-date emission standards. Considering public school buses only, nearly half are located in disadvantaged communities and three are in AB 617 designated communities. Appendix E-1 lists the oldest school buses in the inventory; 1978-1988 publicly owned diesel school buses. This list also includes the school district, model year, and air district in which the school bus based. This list does not

[3] Title 13, California Code of Regulations (CCR), Section 2025(k)

[4] California Vehicle Code (CVC), Section 27316

necessarily indicate whether a school bus is in regular operation, nor its compliance status with the Truck and Bus Regulation. The data is from CHP and DMV records.

On a positive note, at least 90 percent of the entire school bus inventory has a diesel particulate matter filter, or is not diesel-fueled. School bus owners are not required to report their Truck and Bus Regulation compliance status to CARB. CARB staff is conducting research to resolve the status of the remaining school buses.

Projected Need for Funding

School bus turnover requires significant and long-term funding and although the turnover of the State school bus fleet continues to progress, there are still a significant number of school buses that need to be replaced. The need for funding is much the same as outlined in last year's report, the 2019 SB 1403 State School Bus Incentive Programs Report. When it comes to school bus replacement, there are tradeoffs to consider, the lower upfront costs of conventional fueled school buses and immediate short-term emissions benefits, versus the long-term emissions benefits of upgrading to electric school buses. Many school buses that are currently operating throughout the State are very old, some more than 30 years old, so even a diesel-to-diesel replacement represents real, immediate reductions of emissions and PM exposure. However, diesel vehicles have a long operational lifespan, replacing with diesel could prolong eventual turnover to electric school buses. It is going to take a combination of fuel types and technologies before the entire school bus fleet can transition to zero-emission.

California faces very challenging mandates to reduce air pollutants to protect public health and to meet State air quality and climate change targets, including a 40 percent reduction in greenhouse gases by 2030 and an 80 percent reduction in greenhouse gases by 2050. Governor Newsom's recent Executive order N-79-20 states that CARB would develop regulations to mandate that all operations of medium- and heavy-duty vehicles shall be 100 percent zero-emission by 2045 where feasible, with all drayage trucks zero-emission by 2035.[5] In addition, the recently approved Advanced Clean Trucks Regulation requires all new medium- and heavy-duty vehicles sold in California to be zero-emission by 2045. CARB has also set rules to electrify buses used by transit agencies and shuttles at the State's largest airports no later than 2030, and all zero-emission last-mile delivery trucks and vans by 2040. Replacing existing school buses with electric school buses, will further support the transition of the California fleet

[5] Executive Order N-79-20: https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf

overall and move the State closer to its goals.[6] While there is no specific funding source to replace the school buses in the oldest category, the replacement of these buses remain a priority. School bus replacement funding generally prioritizes the replacement of the oldest buses.

There is an ongoing high demand for school bus funding. The largest sources of school bus funding have been oversubscribed including VW Mitigation funding, CEC's School Bus Replacement Program, and HVIP. There is currently not enough money to fund all of the eligible school bus projects. School bus replacement costs range from $130,000 to about $200,000 for conventional school bus replacements including diesel, CNG, low-NOx CNG, and propane. Zero-emission battery-electric school bus costs range from $270,000 to over $400,000 depending on the bus type and options (does not include infrastructure costs). The higher up-front costs of electric school buses means that a fixed amount of funding can buy fewer school buses.

As discussed in the previous section, the school buses that fall in the priority category for replacement are the oldest school buses in the State fleet. There are approximately 108 publicly owned 1978-1988 model year school buses; these school buses have engines that fall into the category of 1977-1987 model year and are listed in Appendix E-1. As explained in the previous section, the engines in these school buses are the dirtiest and highest polluting in the State fleet. Of these school buses, CEC's School Bus Replacement Program and the VW Mitigation Fund will fund replacement of approximately half of them. To fund the replacement of the remaining school buses in this category, it would cost approximately $8 million for new conventional fueled school buses, or approximately $16 million for zero-emission battery-electric school buses. The next emission standard category of 1988-1991 has fewer than 500 combined public and private school buses. These school buses have a lower emission standard than the previous category but are still far from the current emission standards and although they have a higher probability of being filtered, older school buses and PM filters continue to age and deteriorate. CARB staff is working to sort this category further between public and private school buses and those school buses that are already under contract for replacement.

There are approximately 21,600 school buses in the statewide fleet. To align the turnover of school buses with the State mandate that all operations of medium- and heavy-duty vehicles to be zero-emission by 2045, it would take 25 years at a rate of four percent turnover per year, or approximately 860 school buses per year, to turn over all of the school buses operating in the State. To fund replacement of these school buses it would cost annually approximately $172 million for new conventional fueled school buses, or approximately $344 million for zero-emission battery-electric

[6] California Air Resources Board, "California takes bold step to reduce truck pollution": https://ww2.arb.ca.gov/news/california-takes-bold-step-reduce-truck-pollution

(not including infrastructure). Many factors could affect these calculations, such as an increase or decrease of K-12 home to school transportation. It is also important to consider predictions that technology costs will decrease over time.

Of course, no one can predict how the current pandemic will continue to affect classroom instruction of K-12 students and transportation of school pupils. With tight budgets, limited resources, and competing requests for funding, replacing California's school bus fleet continues to occur enthusiastically, but gradually. School buses need ongoing funding to continue progression and turn over the fleet to cleaner options. Dozens of school districts have deployed hundreds of zero-emission school buses and have valuable experience to share. The next section will discuss the expanding presence of electric school buses in California and why more fleets are seeing the technology as a viable option.

Zero-Emission School Buses

Over 75 school districts in the State are operating at least one electric school bus. Based on a survey of manufacturers done by CARB staff in July 2020, approximately 250 zero-emission school buses have been delivered to fleets and are operating in California, with another 250 on order. There are many attractive characteristics of electric school buses including; reduced fuel and maintenance costs, reduced operational noise, and no tailpipe emissions, which ensures cleaner air for the students and the local communities. School transportation has been a promising sector to demonstrate the viability of electric school buses. The Beachhead strategy (found in Appendix D, Long-Term Heavy-Duty Investment Strategy to this Funding Plan) a strategy followed by CARB for technology commercialization, has identified school buses as a secondary market where zero- and near-zero technologies are most likely to succeed and help drive growth in other segments. However, the integration of electric school buses requires more effort than simply replacing conventional fueled school buses with electric school buses. Research, good planning, and a partnership between the school district, manufacturers, and public agencies are necessary to make the transition successful.

The turnover of old school buses and the transformation of the State school bus fleet to electric school buses is an important component in achieving California's longer term 2030 and 2050 clean air and climate change goals and the Governor's new Executive order that mandates all operations of medium- and heavy-duty vehicles to be 100 percent zero-emission by 2045.[7] Electric school buses are available and successfully operating in many school districts in the State. There is a learning curve associated with the new technology and school districts have their own set of hurdles to overcome, such as availability or turnover of transportation directors, shortage of

[7] Executive Order N-79-20: https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf

school bus drivers, and extensive procurement processes. One of the main hurdles is that many school districts do not have the administrative bandwidth to support the deployment of electric school buses on their own. Therefore, it is important to build partnerships with local, state, and federal agencies, manufacturers of school buses and charging equipment, and utilities to make the adoption of electric school buses and infrastructure installation easier and more accessible.

Zero-Emission School Bus Supplier Update

As of 2021, most major school bus manufacturers will have a commercially available electric school bus model. The Zero-Emission Technology Inventory (ZETI) tool developed by CALSTART, a clean transportation nonprofit, is an interactive online resource that proves all commercially available offerings of zero-emission medium- and heavy-duty vehicles (MHDVs). According to ZETI, 14 school bus models are currently available in 2020 and 16 models to be available in 2021.[8] Most of these zero-emission school buses can drive between 100-200 miles on a single charge, which is enough for most school bus routes.[9] Expanded battery storage capacity, and therefore miles per recharge, continue to expand. Many school districts do not have the funding to purchase new school buses on their own and while electric school buses can be more cost effective in the long term, the initial investment has proven difficult for school districts to overcome.

To meet the State's air quality goals, described in the previous section, several State and local school bus incentive programs have prioritized funding zero-emission school bus replacements and supporting infrastructure. Electric pilot projects such as the Rural School Bus Pilot Project, the Clean Mobility in Schools Program, and the HVIP are important for both CARB staff and fleets to address key barriers to adoption of the technology. The lessons learned from these programs will help develop best practices moving forward. The projects give fleets a chance to see how integrating a limited number of zero-emission school buses works before making the investment to transitioning large portions of the fleet to electric. In contrast, some utilities have suggested that incorporating more zero-emission school buses at one time could be more efficient for infrastructure installation and development; the CEC School Bus Replacement program funds up to 10 school buses per fleet. Many fleets have already started integrating electric school buses into their fleet with varied challenges and successes. Please refer to the case studies at the end of the Electric School Buses Moving Forward section later in this report.

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[8] Global Drive to Zero, "Zero emission technology inventory": https://globaldrivetozero.org/tools/zero-emission-technology-inventory/

[9] National Renewable Energy Laboratory: https://www.nrel.gov/docs/fy14osti/60068.pdf, page 3

California is not the only market for electric school buses. The Volkswagen (VW) settlement will provide states with a total of $2.9 billion for projects to cut NOx emissions from large vehicles, including school buses. States have the flexibility to choose which projects on the list of eligible mitigation actions are the best options for their citizens. Many states have released either draft or final versions of their beneficiary mitigation plans and it appears that school bus replacement projects will be included in most of the states' plans.

The California VW Mitigation Trust has $130 million in funds to replace older, high-polluting transit, school, and shuttle buses with new battery-electric or fuel-cell buses; up to half of this funding can go to any one of the categories listed. States such as Virginia, Washington, and Illinois are dedicating $20 million, $12 million, and $10.9 million to zero-emission school buses, respectively.

Financial assistance from the VW Mitigation fund is a unique opportunity to fund zero-emission school buses that provides incentives nationwide that are important for both school districts and zero-emission school bus manufacturers. For school districts, it covers the additional costs of purchasing electric school buses providing financial support to replace their older combustion powered school buses with reliable zero-emission school buses. For zero-emission school bus manufacturers, the funding contributes to an increased demand for zero-emission school buses and acceleration of the market for zero-emission technologies.

Dominion Energy, an investor-owned electric utility headquartered in Virginia, has collaborated with local Virginia school districts on the single largest electric school bus deployment in the country to replace diesel school buses in their fleets with electric models. Dominion Energy is covering the incremental cost of purchasing an electric school bus over a diesel school bus and the cost of charging infrastructure and related equipment. The initial phase of the program aims to have 50 electric school buses operational within Dominion Energy's Virginia service territory by the end of 2020. The utilities base rate will cover the cost of the first 50 electric school buses with no increase charge to customers. After 2020, Dominion Energy will add 200 electric school buses per year for the next five years with plans to bring 1,000 electric school buses online by 2025. The goal is to have 50 percent of all diesel school bus replacements be electric by 2025 and 100 percent by 2030.[10] The electric school buses deployed through this program will be equipped with vehicle-to-grid capabilities; read more about vehicle-to-grid later in this section.

[10] Dominion Energy, Electric School Buses: https://www.dominionenergy.com/electricschoolbus

While there are various school bus models available and a strong demand for the technology nationwide, many fleets will need assistance from emerging funding programs from utilities and others to fund associated infrastructure costs.

Zero-Emission School Bus Infrastructure

Infrastructure is one of the most common barriers to electric school bus technology adoption. Successful and cost efficient infrastructure comes from pre-planning, starting with determining both immediate and future infrastructure needs. It is important to align with the servicing utility and to get the utility involved early in the process before electric school buses are ordered. There is no standard approach to infrastructure as each school district and site are unique. The bigger the project the more planning that is required. Due to lack of funding, school districts often do not have much funding to future proof their charging infrastructure for future expansion. CALSTART has developed the School Bus Fleet Infrastructure Planning Tool; this document covers important considerations for school districts planning to install infrastructure, a systematic installation timeline, and an infrastructure-planning checklist.

The CEC is working directly with electric utilities to assist in upgrading the electrical infrastructure required to charge the electric school buses awarded through the CEC School Bus Replacement Program while also emphasizing the need to plan for future electrical capacity needs. In addition to installing charging hardware, use of software and networked charging hardware provides the ability for managed charging, provides remote diagnostics, and allows for remote start of connected vehicles.

The Clean Energy and Pollution Reduction Act requires the California Public Utilities Commission (CPUC) to direct the investor-owned electric utilities to invest in infrastructure or transportation electrification. The CPUC has approved projects that support infrastructure development for school buses. Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas and Electric (SDG&E) have no-cost, make-ready programs that will cover infrastructure costs before the meter if owned by the utility or, provide up to 80 percent rebate if customer-owned before the meter. Eligible school districts may also receive rebates (of up to 50 percent) on approved charging equipment. In addition, the projects include new rate designs for the three utilities designed to lower the cost of electricity as a fuel. Many of California's publicly owned utilities (such as Sacramento Municipal Utility District, Los Angeles Department of Water and Power and other municipal utilities) also have programs to provide low- or no-cost infrastructure and favorable EV rates. Others can provide infrastructure and support services on an ad hoc basis. Limited funding for zero-emission infrastructure is also available to complement vehicle funding through the Carl Moyer Program, the Rural School Bus Pilot Project, and the CEC's Clean Transportation Funding.

Vehicle-to-grid (V2G) and Low Carbon Fuel Standard (LCFS) Credits may be additional incentives to incorporate electric school buses into a fleet. V2G technology is still in

development and has not yet been successfully demonstrated in the field, although there are various projects on the horizon that will aim to do this, such as the Dominion Energy project in Virginia. LCFS credits may help the fleet lower overall costs of operating electric school buses.

Vehicle-to-Grid

V2G capability is the bidirectional flow of energy between an electric vehicle and the grid. V2G enabled battery-electric school buses have the potential added benefit of serving grid operators, including balancing renewable peaks and valleys as well as providing excess capacity and bulk storage when needed which could be utilized as a revenue source by bus operators. V2G enabled battery-electric school buses have the potential to reduce electricity generation related greenhouse gas emissions by 1,420 tons of CO2 equivalence and eliminate $18,300 of air pollution externalities over their lifetime.[11] School buses have been determined to be a good application for V2G because of their large batteries, predictable duty-cycles, and long down times throughout the day when energy demand is greatest. This capability allows the school bus to export power stored in its battery packs to any islanded load and to the grid if an interconnection agreement is in place with the local utility. One benefit is on-site resiliency in the case of an emergency power shut-off by the utility or during a catastrophic event. Schools may also recognize some financial benefits through either on-site power offset using vehicle-to-building (V2B) or participating in the energy market using V2G and selling electricity back to the grid. Pilot projects studying both V2B and V2G are underway in California.[12]

Although V2G adds additional cost to the price of the vehicle and infrastructure, if proven successful, it may be an attractive option to help school districts build a stronger business case for zero-emission school bus adoption. As part of the CEC School Bus Replacement Program, the CEC required awarded school buses to have V2G capabilities. This was required in an effort to both standardize vehicle charging as well as provide added resiliency and emergency capabilities for school bus recipients.

Low Carbon Fuel Standard (LCFS) Credits

LCFS credits are another incentive for an electric fleet to reduce operational costs further. The LCFS regulation is designed to reduce the carbon intensity (CI) associated with the lifecycle of transportation fuels in California. A fleet operating a battery-electric school bus may generate credits for the quantity of electricity charged to the buses. Additional credits are generated by charging with renewable or low-CI

[11] National Renewable Energy Laboratory: https://www.nrel.gov/docs/fy17osti/69017.pdf

[12] National Renewable Energy Laboratory: https://www.nrel.gov/docs/fy17osti/69017.pdf

electricity. At the current credit price of $195, the value of the LCFS for buses is approximately 27 cents/kWh when charging with grid electricity and 33 cents/kWh when charging with zero-CI solar or wind-energy. The amount of credits generated are based on total fuel consumption, therefore the more the vehicles operate the higher the cost savings. The fleet has the option to sell the credits to LCFS' regulated parties directly or sell them using a broker. While the credits cannot be used to generate revenue, the fleet can use the money toward EV purchases, infrastructure, operating costs, or associated LCFS program administration costs.

Workforce Training

Workforce training is an important consideration when incorporating electric school buses into a fleet. As with most new technologies, there is a learning curve and operational adjustments the fleet must make to maximize the benefits of the technology. There are differences in electric school bus maintenance and operation when compared to conventional fueled school buses. For example, electric school buses have fewer parts, do not have an exhaust system or require oil changes, and their braking systems last longer.

Many manufacturers provide mechanic and driver training to new electric school bus owners along with on-going support. Lion Electric has developed an extensive learning center, Lion Academy, dedicated to offering training to support customers through the steps of the purchase process for an electric school bus as well as training programs for both technicians and drivers. A-Z Bus provides driver training and mechanic safety training. A leader in electric school bus integration, Twin Rivers Unified School District, has developed and refined its own in-house training program to familiarize school bus drivers with the new technology.

In 2019, the CEC approved a contract for $1 million with Cerritos Community College to develop and deliver the "Electric School Bus Training Project" to provide grantees the skills required to maintain the electric school buses funded through CEC's School Bus Replacement Program. Training is available for both school district maintenance technicians and school bus operators. Course subjects include high-voltage safety, proper operation, and maintenance of electric school buses.

The West Coast Center of Excellence in Zero-emission Technology hosted by Sunline Transit Agency has developed a workforce-training program focused on maintaining and operating zero-emission buses in public fleets. The program offers various courses related to zero-emission technology, operation, and maintenance. While there are various training opportunities, determining what is necessary for and will work best for the fleet is an important aspect of electric bus incorporation.

Support to community colleges, universities, vocational programs at high schools, and other training institutions can help develop a training curriculum and train technicians on the maintenance and operation of advanced technology vehicles and equipment supported by CARB incentive programs. In addition, recently approved AB 841

requires electrical infrastructure contractors installing electric vehicle charging infrastructure and equipment on the customer side of the electrical meter to hold an Electric Vehicle Infrastructure Training Program certification if the project is funded or authorized by CARB, California Public Utilities Commission, or the CEC.[13]

Electric School Bus and Infrastructure Case Studies

The following case studies provide several real-world experiences of the process of incorporating electric school buses into a fleet and the direct benefits this provides to California's most impacted communities. Each case study is unique and gives insight to the operation of electric school buses. The insight and perspective gained from the growing numbers of electric school bus experiences throughout the State will be a continued benefit to those incorporating electric school buses into their fleet into the future.

[13] California Legislative Information, Assembly Bill No. 841: http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB841

Case Study – Calaveras Unified School District

Calaveras Unified School District (USD) received funding for three zero-emission Blue Bird Type D electric school buses through the Rural School Bus Pilot Project and supporting infrastructure funding from the Calaveras County Air Pollution Control District through the Carl Moyer Program. Calaveras USD applied for funding in early 2017 and received the electric school buses in January 2020. The electric school buses were running daily before the COVID-19 Stay-At-Home Order went into place. In this short operational timeframe, the district had a good experience integrating the electric school buses into the fleet.

Statistics

Total # of Students: 2,800

Daily Transport: 1,000 students per day

Routes: 18 regular, 6 special needs routes per day

Average Route Length: 105 miles

Inventory: 43 total school buses, 3 Blue Bird Electric Type D School Buses

The school district did most of the infrastructure research themselves with some help from the utility, PG&E. They went with a Libra Hydra Reporting Charger to gather the necessary usage data required for the grant-funding program.

While the district has been happy with the electric school buses, they do not think the electric school buses will be a good fit for all of their routes. The routes vary in terrain, climate, and length, with some routes exceeding 150 miles. With 18 regular routes and six special needs routes per day, the transportation supervisor has determined thus far that the electric school buses will work on approximately five of these routes. Tessie Reader, the transportation supervisor, is also interested in testing the electric school buses on a route that has 3,000-foot elevation gain. Based on operational data, the dealer, A-Z Bus, estimates the cost for the school district to operate the electric school bus is between 11-12 cents per mile, compared to approximately 28-35 cents per mile for diesel fuel based on recent fuel bills.

Bluebird Electric School Bus during senior graduation celebratory parade, July 2020

The manufacturer is providing training to mechanics. Although there have been no service or maintenance calls yet, the distributor, A-Z Bus, has been supportive and contacted Tessie to make sure everything was operating smoothly. The drivers love how quiet the electric school buses are, but they do have some range anxiety on longer trips. Tessie's advice to other school districts thinking about adding

electric school buses, “If you have the capability, add them! If range limitations were not an issue, Calaveras Unified would go 100 percent electric. The drivers are happy, the students are happy, and the community is happy. The clean air is a benefit to everyone. I suggest trying to establish a connection with someone at the utility; it will make it easier to have a direct contact to ask questions rather than just doing research online.”

Case Study – Aromas-San Juan Unified School District

Aromas-San Juan Unified School District (USD) received funding for its first electric school bus and charging equipment from the Monterey Bay Air Resources District and the Hybrid and Zero-emissions Truck and Bus Voucher Program (HVIP). The Lion Type C electric school bus was running daily routes before the COVID-19 Stay-at-Home Order went into effect in March 2020. Even in that short timeframe, the district was able to gain valuable experience in integrating an electric school bus into their conventional fleet.

Statistics

Total # of Students: 1,047

Daily Transport: 360 students per day

Routes: 7 regular routes per day

Average Route Length: 80 miles

Inventory: 9 total school buses, 1 Lion Electric Type C School Bus

Aromas-San Juan USD hired their local electrician to install a charger. Since it was just a single unit, they did not need to get the utility involved as there was enough existing power available. No smart charging or Electric Vehicle Supply Equipment monitoring equipment was installed.

The average route length is 80 miles per day. School buses operate three times per day for 1-2 hours, totaling five hours per day on average and leaving ample time for recharging. The electric school bus is plugged in and charging (if needed) whenever it is parked. Lion estimates that this electric school bus will go up to 125 miles on a single charge, meeting the range requirements for all their local routes. Aromas-San Juan USD is happy with Lion's maintenance response times. Some issues needed to be fixed right after delivery (e.g., some batteries needed replacing); Lion sent someone to service the electric school bus within a week. Once past the initial break-in period, the Lion electric school bus has not needed any maintenance.

Aromas-San Juan USD is interested in adding additional electric school buses to their fleet but want to see the range increase, which would allow for greater HVAC usage. The driver really likes the lack of exhaust fumes and the quiet ride, but wishes the heater would heat up a little faster. She also mentioned that if the parking brake were mounted on the left sidewall it would make it easier to get in and out of the driver's seat. The students love the electric school bus because it is quiet, exhaust free, and plays funny music when it goes less than 20 miles per hour.

Case Study – Fontana Unified School District

Fontana Unified School District (FUSD) received funding for two zero-emission electric school buses and supporting infrastructure from the South Coast Air Quality Management District (SCAQMD) and the Hybrid and Zero-emissions Truck and Bus Voucher Program. The district received $536,000 in grant funding that included $496,999 to purchase two electric school buses and $40,000 for charging infrastructure.

Statistics

Total # of Students: 37,369

Daily Transport: 4,924 students per day

Routes: 18 regular, 6 special needs routes per day

Average Route Length: 35 miles

Bus Inventory: 47 total school buses, 2 Blue Bird Type D Electric School Buses

FUSD buses travel approximately 2,340 miles daily to transport students to school. Errol Glenn, the FUSD Director of Grants and Funding Development said, "The electric school buses have been great as far as meeting range expectations." He added, "One of the electric school buses drove approximately 10 miles into the mountains adjacent the school district and as the bus was coming back down the mountains into the valley, the bus was able to capture excess energy and recharge itself." The ability to capture energy from regenerative braking is one of the unique features of EV technology.

FUSD was also selected for funding for 10 additional electric school buses and chargers through the CEC School Bus Replacement Program. FUSD plans to expand their school bus fleet to be 50 percent electric and 50 percent CNG, allowing them flexibility to accommodate for longer field trips and routes. Errol expressed that funding for electric school buses will play a critical role in how quickly they can reach their electrification target.

CALSTART, a clean transportation nonprofit, provided technical assistance and guidance to support the rollout of the electric school buses and installation of charging stations under this program. Technical assistance included resources such as an infrastructure planning checklist, a contact list of experienced contractors, and a matrix of commercially available school buses with charging specifications. Edison International, a parent company of the utility Southern California Edison, funded the technical assistance.

Due to the cost of charging infrastructure, FUSD was required to put the project out to bid. They received bids from multiple electrical engineering firms; the winning

contractor had a professional engineer do the site review, design, and engineer work, which allowed them to match the appropriate infrastructure for the electric school buses. The school district did not need to upgrade their existing electrical panel capacity, therefore, saving time and additional costs. The cost of infrastructure slightly exceeded the funding amount therefore FSUD had to pay a little out of pocket.

The dealership, A-Z Bus, provided driver training and mechanic safety training. The school buses are currently still under warranty and mechanics will need training on how to service the school buses once the warranty expires.

Conclusion

Significant progress has been made in cleaning up the California school bus fleet. This progress is only achieved through cooperative and dedicated funding efforts as school districts have limited funding to put towards school bus cleanup. State, local and federal agencies have allocated approximately $76.4 million to school bus cleanup since last year's update. This progress also serves to highlight that our work is not yet finished and demonstrates the need for continued funding and program support at the local, state, and federal levels to build on past successes. School bus turnover and the transformation of the State school bus fleet to new technology continues to be a priority for not only CARB and partnering state agencies, but also local air districts and surrounding communities.

Turnover of the entire school bus fleet over the next 25 years, at a rate of approximately 4 percent per year, will require investment of $172 to $344 million per year (not including infrastructure costs, total cost of ownership savings, or additional training/support). The amount of funding, $76.4 million, dedicated to school bus clean up over the past year is a significant amount, but California school districts need more funding to make a bigger impact on school bus clean up. To achieve immediate emission reductions and cleanup the school bus fleet a mix of fuel types and technologies will be necessary.

Zero-emission technology is necessary for California to meet State air quality and climate change goals and Governor Newsom's recent Executive order N-79-20 that requires all operations of medium- and heavy-duty vehicles to be 100 percent zero-emission by 2045.[14] Electric school buses continue to prove to be a viable option for school districts when funding and support are available. Options such as vehicle-to-grid technology and the use of LCFS credits will provide additional cost savings options for fleets that incorporate electric school buses to achieve maximum efficiency.

[14] Executive Order N-79-20: https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf

Appendix E-1 to 2020 SB 1403 State School Bus Incentive Programs Report: Oldest Public California School Buses, 1978-1988

The school bus data compiled here represents information from California Highway Patrol safety inspections of publicly owned school buses since 2017, cross-referenced with Department of Motor Vehicles registration information accessed in spring 2020. This list does not necessarily indicate whether a school bus is in regular operation, nor its compliance status with the Truck and Bus Regulation.

An "X" in the Disadvantaged Community (DAC) column indicates the school district boundaries overlap DAC boundaries as identified by the California Environmental Protection Agency (CalEPA) as the top 25% most impacted census tracts in CalEnviroScreen 3.0. An "X" in the AB 617 column indicates the school district boundaries overlap the boundaries of an AB 617 Community defined by the 13 communities from the 2018 and 2019 Community Selection Process. An asterisk next to the bus model year indicates school buses that are planned to be replaced through CEC's School Bus Replacement Program by September 2022.

Air District	School District Name	Bus Model Year	DAC	AB 617
ANTELOPE VALLEY AQMD	ANTELOPE VALLEY SCHOOLS TRANSPORTATION AGENCY	1984*		
ANTELOPE VALLEY AQMD	ANTELOPE VALLEY SCHOOLS TRANSPORTATION AGENCY	1984*		
BAY AREA AQMD	OAK GROVE SCHOOL DISTRICT	1984		
BAY AREA AQMD	OAK GROVE SCHOOL DISTRICT	1987		
BAY AREA AQMD	RAVENSWOOD CITY SCHOOL DISTRICT	1988		
BUTTE COUNTY AQMD	CHICO UNIFIED SCHOOL DISTRICT	1986		
BUTTE COUNTY AQMD	CHICO UNIFIED SCHOOL DISTRICT	1985*		
EASTERN KERN COUNTY APCD	SIERRA SANDS UNIFIED SCHOOL DISTRICT	1987	DAC	
El DORADO COUNTY APCD	LAKE TAHOE UNIFIED	1985*		

Air District	School District Name	Bus Model Year	DAC	AB 617
EL DORADO COUNTY APCD	MOTHER LODE UNION SCHOOL DISTRICT	1985		
GLENN COUNTY APCD	ORLAND UNIFIED SCHOOL DISTRICT	1983		
GLENN COUNTY APCD	ORLAND UNIFIED SCHOOL DISTRICT	1988		
GLENN COUNTY APCD	ORLAND UNIFIED SCHOOL DISTRICT	1988		
MENDOCINO COUNTY AQMD	UKIAH UNIFIED SCHOOL DISTRICT	1987*		
MOJAVE DESERT AQMD	PALO VERDE UNIFIED	1988*		
MOJAVE DESERT AQMD	VICTOR ELEMENTARY SCHOOL DISTRICT	1988	DAC	
MONTEREY BAY UNIFIED APCD	ALISAL UNION SCHOOL DISTRICT	1987*	DAC	
MONTEREY BAY UNIFIED APCD	GONZALES UNIFIED SCHOOL DISTRICT	1986		
MONTEREY BAY UNIFIED APCD	NORTH MONTEREY COUNTY UNIFIED SCHOOL DISTRICT	1988*	DAC	
MONTEREY BAY UNIFIED APCD	NORTH MONTEREY COUNTY UNIFIED SCHOOL DISTRICT	1988*	DAC	
MONTEREY BAY UNIFIED APCD	PAJARO VALLEY UNIFIED SCHOOL DISTRICT	1978*	DAC	
MONTEREY BAY UNIFIED APCD	PAJARO VALLEY UNIFIED SCHOOL DISTRICT	1980*	DAC	
MONTEREY BAY UNIFIED APCD	PAJARO VALLEY UNIFIED SCHOOL DISTRICT	1986*	DAC	
MONTEREY BAY UNIFIED APCD	PAJARO VALLEY UNIFIED SCHOOL DISTRICT	1987*	DAC	
MONTEREY BAY UNIFIED APCD	PAJARO VALLEY UNIFIED SCHOOL DISTRICT	1987*	DAC	
MONTEREY BAY UNIFIED APCD	PAJARO VALLEY UNIFIED SCHOOL DISTRICT	1987*	DAC	
MONTEREY BAY UNIFIED APCD	PAJARO VALLEY UNIFIED SCHOOL DISTRICT	1987*	DAC	
MONTEREY BAY UNIFIED APCD	PAJARO VALLEY UNIFIED SCHOOL DISTRICT	1988*	DAC	
MONTEREY BAY UNIFIED APCD	SALINAS CITY SCHOOL DISTRICT	1988	DAC	

Air District	School District Name	Bus Model Year	DAC	AB 617
MONTEREY BAY UNIFIED APCD	SALINAS CITY SCHOOL DISTRICT	1987*	DAC	
MONTEREY BAY UNIFIED APCD	SALINAS UNION HIGH SCHOOL DISTRICT	1988	DAC	
MONTEREY BAY UNIFIED APCD	SALINAS UNION HIGH SCHOOL DISTRICT	1988	DAC	
MONTEREY BAY UNIFIED APCD	SALINAS UNION HIGH SCHOOL DISTRICT	1987*	DAC	
MONTEREY BAY UNIFIED APCD	SOLEDAD UNIFIED SCHOOL DISTRICT	1987		
MONTEREY BAY UNIFIED APCD	SOLEDAD UNIFIED SCHOOL DISTRICT	1987		
MONTEREY BAY UNIFIED APCD	SOLEDAD UNIFIED SCHOOL DISTRICT	1988		
SACRAMENTO METROPOLITAN AQMD	TWIN RIVERS UNIFIED SCHOOL DISTRICT	1988*	DAC	
SAN DIEGO COUNTY APCD	ESCONDIDO UNION HIGH SCHOOL DISTRICT	1985*		
SAN DIEGO COUNTY APCD	ESCONDIDO UNION HIGH SCHOOL DISTRICT	1987*	DAC	
SAN DIEGO COUNTY APCD	LAKESIDE UNION SCHOOL DISTRICT	1987		
SAN JOAQUIN VALLEY UNIFIED APCD	BUENA VISTA ELEMENTARY SCHOOL	1988		
SAN JOAQUIN VALLEY UNIFIED APCD	BUTTONWILLOW UNION ELEMENTARY	1988	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	CHAWANAKEE UNIFIED SCHOOL DISTRICT	1981*	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	CHAWANAKEE UNIFIED SCHOOL DISTRICT	1987*	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	DELHI UNIFIED SCHOOL DISTRICT	1986	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	ESCALON UNIFIED SCHOOL DISTRICT	1986*	DAC	

Air District	School District Name	Bus Model Year	DAC	AB 617
SAN JOAQUIN VALLEY UNIFIED APCD	ESCALON UNIFIED SCHOOL DISTRICT	1987*	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	GOLDEN VALLEY UNIFIED SCHOOL DISTRICT	1988	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	HANFORD JOINT UNION	1981*		
SAN JOAQUIN VALLEY UNIFIED APCD	LAKESIDE UNION SCHOOL DISTRICT	1988	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	LEMOORE UNION HIGH SCHOOL DISTRICT	1988	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	LEMOORE UNION HIGH SCHOOL DISTRICT	1988	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	LINDEN UNIFIED SCHOOL DISTRICT	1986*	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	LINDEN UNIFIED SCHOOL DISTRICT	1988*	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	LINDSEY UNIFIED SCHOOL DISTRICT	1987*	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	LIVINGSTON UNION SCHOOL DISTRICT	1988	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	MADERA UNIFIED SCHOOL DISTRICT	1980*	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	MADERA UNIFIED SCHOOL DISTRICT	1988*	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	MC FARLAND UNIFIED SCHOOL DISTRICT	1987	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	PIXLEY UNION SCHOOL DISTRICT	1988	DAC	

Air District	School District Name	Bus Model Year	DAC	AB 617
SAN JOAQUIN VALLEY UNIFIED APCD	PLEASANT VIEW ELEMENTARY	1987*	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	PLEASANT VIEW ELEMENTARY	1987*	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	RICHLAND UNION ELEMENTARY	1988	DAC	X
SAN JOAQUIN VALLEY UNIFIED APCD	RIO BRAVO-GREELEY UNION SCHOOL DISTRICT	1988	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	RIPON UNIFIED SCHOOL DISTRICT	1987	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	ROBERTS FERRY UNION ELEMENTARY	1985*		
SAN JOAQUIN VALLEY UNIFIED APCD	STOCKTON UNIFIED SCHOOL DISTRICT	1988*	DAC	X
SAN JOAQUIN VALLEY UNIFIED APCD	STOCKTON UNIFIED SCHOOL DISTRICT	1988*	DAC	X
SAN JOAQUIN VALLEY UNIFIED APCD	SUNDALE UNION ELEMENTARY SCHOOL DISTRICT	1988	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	TAFT CITY SCHOOL DISTRICT	1986*	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	TRACEY JOINT UNION HIGH SCHOOL	1988		
SAN JOAQUIN VALLEY UNIFIED APCD	TRACEY JOINT UNION HIGH SCHOOL	1988		
SAN JOAQUIN VALLEY UNIFIED APCD	TRAVER JOINT ELEMENTARY SCHOOL	1986*	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	TULARE CITY SCHOOL DISTRICT	1987	DAC	

Air District	School District Name	Bus Model Year	DAC	AB 617
SAN JOAQUIN VALLEY UNIFIED APCD	TULARE CITY SCHOOL DISTRICT	1988	DAC	
SAN JOAQUIN VALLEY UNIFIED APCD	TULARE CITY SCHOOL DISTRICT	1988	DAC	
SAN LUIS OBISPO COUNTY APCD	ATASCADERO UNIFIED SCHOOL DISTRICT	1987		
SAN LUIS OBISPO COUNTY APCD	ATASCADERO UNIFIED SCHOOL DISTRICT	1988		
SAN LUIS OBISPO COUNTY APCD	ATASCADERO UNIFIED SCHOOL DISTRICT	1988		
SAN LUIS OBISPO COUNTY APCD	COAST UNIFIED SCHOOL DISTRICT	1987		
SANTA BARBARA COUNTY APCD	GOLETA UNION SCHOOL DISTRICT	1987		
SANTA BARBARA COUNTY APCD	GOLETA UNION SCHOOL DISTRICT	1987		
SANTA BARBARA COUNTY APCD	LOMPOC UNIFIED SCHOOL DISTRICT	1987		
SANTA BARBARA COUNTY APCD	SANTA MARIA JOINT UNION HIGH SCHOOL DISTRICT	1987*	DAC	
SHASTA COUNTY AQMD	PACHECO UNION ELEMENTARY SCHOOL DISTRICT	1988		
SOUTH COAST AQMD	CASTAIC UNION SCHOOL DISTRICT	1979		
SOUTH COAST AQMD	FONTANA UNIFIED SCHOOL DISTRICT	1988*	DAC	
SOUTH COAST AQMD	FONTANA UNIFIED SCHOOL DISTRICT	1988*	DAC	
SOUTH COAST AQMD	FONTANA UNIFIED SCHOOL DISTRICT	1988*	DAC	
SOUTH COAST AQMD	FONTANA UNIFIED SCHOOL DISTRICT	1988*	DAC	

Air District	School District Name	Bus Model Year	DAC	AB 617
SOUTH COAST AQMD	FONTANA UNIFIED SCHOOL DISTRICT	1988*	DAC	
SOUTH COAST AQMD	FONTANA UNIFIED SCHOOL DISTRICT	1988*	DAC	
SOUTH COAST AQMD	HACIENDA LA PUENTE UNIFIED SCHOOL DISTRICT	1988	DAC	
SOUTH COAST AQMD	HEMET UNIFIED SCHOOL DISTRICT	1987	DAC	
SOUTH COAST AQMD	HEMET UNIFIED SCHOOL DISTRICT	1987	DAC	
SOUTH COAST AQMD	HEMET UNIFIED SCHOOL DISTRICT	1986*	DAC	
SOUTH COAST AQMD	HUNTINGTON BEACH UNION HIGH SCHOOL DISTRICT	1987		
SOUTH COAST AQMD	MURRIETA SCHOOL DISTRICT	1988		
SOUTH COAST AQMD	NUVIEW UNION SCHOOL DISTRICT	1982		
SOUTH COAST AQMD	PLACENTIA-YORBA LINDA UNIFIED SCHOOL DISTRICT	1988	DAC	
SOUTH COAST AQMD	ROWLAND UNIFIED SCHOOL DISTRICT	1978	DAC	
SOUTH COAST AQMD	WESTMINSTER SCHOOL DISTRICT	1984	DAC	
TEHAMA COUNTY APCD	CORNING UNION ELEMENTARY SCHOOL DISTRICT	1988	DAC	
VENTURA COUNTY APCD	MOORPARK UNIFIED SCHOOL DISTRICT	1986	DAC	
VENTURA COUNTY APCD	MOORPARK UNIFIED SCHOOL DISTRICT	1988		
VENTURA COUNTY APCD	OCEAN VIEW SCHOOL DISTRICT	1987*	DAC	
VENTURA COUNTY APCD	RIO ELEMENTARY SCHOOL DISTRICT	1988	DAC	
YOLO/SOLANO AQMD	WOODLAND JOINT UNIFIED SCHOOL DISTRICT	1987*		