Appendix E

SB 1403 STATE SCHOOL BUS INCENTIVE PROGRAMS REPORT

(Health & Safety Code Section 39719.2)

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California School Bus Incentive Programs Update

Introduction

The California Air Resources Board (CARB) has a long history of funding school bus clean-up projects and implementing pollution-reducing laws for school buses to reduce schoolchildren's exposure to both cancer-causing and smog-forming pollution. In December 2016, CARB updated the Board on the school bus population and associated funding resources in California available for school bus cleanup, followed by a memo to the Board in early 2019.

This report provides an update, as mandated by Senate Bill (SB) 1403 (Lara, Chapter 370, Statutes of 2018), on the State's school bus incentive programs. This new law requires CARB, in consultation with the California Energy Commission (CEC), to annually report "milestones achieved by the State's school bus incentive programs and the projected need for funding taking into consideration the State's school bus inventory, turnover, and useful life," as part of the Heavy-Duty Investment Strategy, starting in 2019.

Background

Replacing older, more polluting school buses with newer, cleaner school buses in California is an important action to improve air quality overall and especially to protect the health of sensitive populations, like our children. The Children's Health Study[1], initiated in 1992, confirmed that exposure to high concentrations of particulate matter (PM) reduces lung development, has immediate adverse health effects, and with continued exposure, has lasting adverse health effects later in life. Continued research, such as the Children's School Bus Exposure Study[2], conducted in 2003, demonstrated that the school bus's own exhaust greatly increases children's exposure and the oldest dirtiest buses have the highest rates of in-vehicle exposure. CARB has also sponsored mitigation studies to research additional ways to reduce in-cabin exposure.[3]

Because of these findings, CARB took several regulatory actions to reduce children's exposure to school bus-related pollutants. Under the Truck and Bus regulation[4], CARB requires diesel-fueled school buses over 14,000 pounds gross vehicle weight rating (GVWR) to have a PM exhaust filter (retrofitted or original equipment), or they must operate less than 1,000 miles

[1] Gauderman, W., Avol, E., Gilliland, F., Vora, H., Thomas, D., Berhane, K., McConnell, R., Kuenzli, N., Lurmann, F., Rappaport, E., Margolis, H., Bates, D., and Peters, J. (2004) The Effect of Air Pollution on Lung Development from 10 to 18 Years of Age, New England Journal of Medicine, 351(11), 1057-1067
[2] Fitz, D., Winer, A., Colome, S., Behrentz, E., Sabin, L., Lee, S., Wong, K., Kozawa, K., (2003), Characterizing the Range Of Children's Pollutant Exposure During School Bus Commutes. Final report to the California Air Resources Board, contract no. 00-322.
[3] Fitz, D., Winer A., 2006. Evaluation of mechanisms of exhaust intrusion into school buses and feasible mitigation measures. Final report to the California Air Resources Board, contract no. 03-343.
[4] Title 13, California Code of Regulations (CCR), section 2025

per year. School buses of any fuel type are restricted from idling[5] at or near public or private schools. Drivers are required to turn off engines immediately upon arrival at a school and restart no more than 30 seconds before departure. School bus fleets must regularly test for excessive smoke.[6] CARB has also supported school bus emissions reductions through incentive funding for school bus clean-up projects, as discussed in the remainder of this report.

Students join CARB's Executive Officer James Boyd and local officials in demonstrating the soot-free tail pipe of a natural-gas school bus at a press event at Dorris Place Elementary School in downtown Los Angeles in April 1991.

Basic turnover of the oldest, dirtiest school buses is essential for reducing exposure to pollutants, even if the new school buses use conventional fuel. Where possible, CARB's aim in turning over the school bus fleet to newer, cleaner technologies goes beyond simply protecting children's health. School bus replacement with zero-emission vehicles has the added benefits of supporting California's air quality, climate change, and petroleum reduction goals. Currently every major school bus manufacturer has at least one zero-emission offering in the commercial space and this helps support a supply chain that is part of a much larger heavy-duty application pool.

Cleaning up the school bus fleet is an opportunity to reduce children's direct exposure to pollutants while also educating them with their first experience of public transportation on their daily commute to school. As children ride zero-emission school buses, they become accustomed to these cleaner options, inspiring the next generation of vehicle buyers to choose zero-emission vehicles.

California School Bus Fleet

School districts provide transportation for a variety of reasons, such as to improve attendance and to meet federal requirements for transporting certain groups of students. Of the nearly 1,000 school districts in California, staff estimate that a little over half own their school buses, and others provide transit passes or contract with private transportation companies to transport students to and from school.

The Board requested staff give an update in December 2016 on the school bus population in California, a plan for addressing the dirty buses in the state, and a summary of funding resources that are available.

In order to determine how many school buses still needed to be cleaned up, staff had to account for a variety of factors, including the age or model year of the school buses. Because

[5] Title 13, CCR, section 2480
[6] Title 13, CCR, sections 2190, 2191, and 2194

engine emission standards continue to require cleaner technology as time goes by, newer school buses emit less PM than older school buses. Staff needed to know if the school buses had PM exhaust filters, as they reduce PM emissions by at least 85 percent.[7] Staff also considered annual mileage, because school buses operating fewer miles on an annual basis emit less PM overall. Low-use school buses often serve as backups and are most commonly the oldest school buses in the fleet.

No one source gives a clear answer of what needs to be done to clean up the school bus fleet. To fully understand the inventory, staff aggregated multiple data sources to define the California school bus population. The 2014 California Highway Patrol (CHP) school bus inspection data served as the primary data source for determining school bus population because school buses are required to be inspected once every 13 months to legally transport children. This inspection data was the most complete data source available, but staff needed more key information on retrofit PM filters and annual mileage.

To supplement the CHP inspection data, staff compiled information from other sources, such as lists of State funded school buses, school buses funded through local air districts, information from the Truck and Bus Regulation reporting system, and DMV registration data. Staff also attempted to get information directly from the school districts via a school bus fleet survey. In August 2016, CARB, the California Association of School Transportation Officials (CASTO), and the School Transportation Coalition put together a school bus fleet survey for fleet and maintenance supervisors and distributed it to over 600 fleet supervisor contacts, announced I through the CASTO monthly newsletter, and through the California Department of Education transportation officials' contact list. Staff followed up with phone calls to the transportation managers and emails to district superintendents. Approximately 250 school districts replied to the survey, giving information on approximately 7,200 school buses.

Staff presented their findings to the Board at the December 2016 Board meeting, estimating that approximately 24,500 school buses operate in California, and identified the school buses most in need of clean-up. Approximately 65 percent of the school bus fleet was diesel-fueled, and the rest were fueled by gasoline, compressed natural gas (CNG), or propane. A very small number were hybrid or battery-electric. A significant number of school buses exceeded 30 years of age, meaning their engines pre-date today's strictest emissions standards. The oldest, diesel-fueled school buses were and are CARB's primary focus and concern.

Milestones Achieved

At the December 2016 Board meeting, staff characterized two categories of school buses that emerged as critical-to-address from an emissions exposure perspective, referring to them as "immediate concern" and "upcoming concern".

Approximately five percent (or about 1,200 school buses) of the 2016 school bus fleet was of "immediate concern" because the school buses were diesel-fueled and did not have PM

[7] Title 13, CCR, Section 2700

filters. These school buses were the most dangerous in terms of schoolchildren's exposure to diesel emissions. As of today, CARB, other agencies, and school districts have effectively achieved the milestone of replacing nearly all of the school buses of "immediate concern." Staff now estimate that very few of these school buses operate regularly in the California school bus fleet.

Approximately 15 percent (or about 3,700 school buses) of the 2016 school bus fleet was of "upcoming concern" because the school buses were approaching the end of their useful life. While these school buses do have PM filters, or operate low-use (less than 1,000 miles annually), they still require replacement in the near future due to their age and increasing maintenance costs. Replacing school buses in this category is less of a milestone and more of a moving target because even as these school buses are replaced, others in the fleet age further and take their place in this category of upcoming concern. Staff continues to monitor this category and explore funding opportunities to support turnover of the school bus fleet to cleaner models.

Table E-1: Summary of Past and Future State School Bus Incentives shows almost $800 million in funding spent or allocated for school bus clean-up projects since the early 2000's, which includes nearly $300 million more than the figures staff presented at the December 2016 Board meeting. The additional funds spent or allocated toward school buses since 2016 have cleaned up or will clean up more than 1,000 school buses with retrofits, conventional-fueled school bus replacements, and zero-emission school bus replacements, bringing the total to over 11,000 school buses positively affected by State, local, and Federal incentive funds.

The necessary funding to facilitate these achievements has come from several sources. Since the December 2016 Board meeting, the State and local air districts have implemented several new projects that augment the traditional programs. Some examples of this include projects under CARB's Low Carbon Transportation Investments (one of CARB's appropriations of Cap-and-Trade Auction Proceeds from the Greenhouse Gas Reduction Fund) and the CEC's School Bus Replacement program, both of which are described later in this report.

Steady, sustained funding is required to replace the aging school bus fleet with cleaner technology. Even with the promising new programs and pilots underway and soon to be available, California's school districts still do not have the support they need to completely clean up California's school buses as they continue to age and deteriorate.

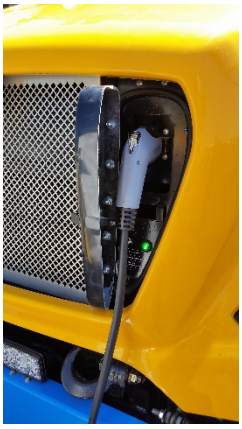
Costs of School Bus Technology

Project options for school bus clean-up vary widely in cost and have varying impacts on emission reductions, depending on vehicle size and method of propulsion. While cleaner combustion engines are less expensive, they still have tailpipe emissions. Conversely, zero-emission technologies come at a higher cost, with no tailpipe emissions, but with some additional barriers such as infrastructure.

The least expensive method for cleaning up diesel school bus emissions is a retrofit PM filter. At a cost of about $20,000, retrofit PM filters were the preferred clean-up solution for diesel school buses for many years because they were very cost-effective at controlling toxic diesel PM emissions. As a result of CARB's efforts and those of the local air districts and school districts, staff estimate that most older diesel-fueled school buses have retrofit PM filters installed. Diesel PM filters became standard equipment from the manufacturer starting with approximately the 2006 school bus model year (2007 engine model year), so newer diesel buses already control a significant portion of their PM emissions without retrofit devices. Because most of the diesel school bus fleet is already equipped with PM filters, retrofits are no longer a priority for funding. Instead, funding must focus on school bus replacement.

School buses are available in a range of sizes and are classified by their GVWR and the location of the engine and location of the entrance door. The smallest school bus, a Type A, seats about 10 passengers. The largest school buses, Type D, or transit-style, carry up to 72 passengers. School districts have many options today for school bus customization to suit their needs, including wheelchair configurations and lifts, air conditioning, and safety features like automatic snow chains or fog lights. Options for battery-electric zero-emission school buses include battery charging efficiency and driving distance upgrades. Like with passenger cars, variations in size and option choices to suit school district operations result in a range of prices for the final vehicles.

School bus replacement costs range from $130,000 to about $200,000 for conventional (including diesel, CNG, low-NOx CNG, and propane) school bus replacements. Zero-emission school buses are now commercially available, and several funding efforts focus incentives on these models. Zero-emission battery-electric school bus costs range from $270,000 to over $400,000, depending on the bus type and options. CARB expects the return on investment of owning a zero-emission battery-electric school bus to be beneficial to the owners' bottom line primarily due to fuel cost and maintenance savings. Fuel cell technology, should that become available for school buses, is likely to cost more. Some routes, such as field trips and sporting event transportation, may exceed the current mileage range of zero-emission battery-electric vehicles, and school transportation officials may face uncertainty about charging availability outside their own district, especially during the early stages of zero-emission vehicle adoption. As with other zero-emission vehicle applications, manufacturers, utilities, and state and local governments are working towards addressing these types of barriers to adoption of zero-emission technology.



The estimated zero-emission school bus replacement costs above do not include infrastructure costs, which are an important part of the conversation because school bus owners need charging or fueling infrastructure to power the cleanest technology. Infrastructure costs vary widely from site to site, depending on the state of the existing bus yard and upgrades needed to equip the site with required infrastructure.

Based on the several dozen electric school bus deployments in California so far, it appears that only a small percentage of school districts can accommodate a small number of electric charging stations (perhaps one to three), with investment of about $10,000 to $20,000 per station. More likely, infrastructure needs require additional electrical capacity and construction to make even a small number of electric school buses feasible, at a cost of tens-to-hundreds of thousands of dollars, depending on the details of the project. School districts often need technical support, in addition to funding support, to successfully implement infrastructure projects to complement investments in zero-emission vehicles.

School Bus Funding

There is currently no single, dedicated funding source to replace school buses and instead it is a collective effort involving multiple agencies and funding programs. The Legislative Analyst's Office conducted a comprehensive assessment of funding for home-to-school transportation in 2014.[8] While the primary responsibility for school transportation funding lies with public school districts through the State legislative process, several State and local incentive programs have been instrumental in supporting school bus clean-up and replacement. Table E-1 highlights major past and current funding that has gone to school bus clean-up, followed by short descriptions of these programs.

Historically, CARB has supported school bus emissions reductions (PM filter installation and school bus replacement) through the Lower-Emission School Bus Program (LESBP) and Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program). In recent years, CARB and other public agencies have implemented new funding projects to further the goal of a cleaner California school bus fleet. Most of these sources can fund projects other than school buses, so school bus projects must often compete for funding. Each of these funding sources has its own set of stipulations based on the overarching goals of each program and enabling legislation.

[8] 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

For example, Low Carbon Transportation funding promotes clean transportation and reduces greenhouse gas emissions by targeting strategic investments at pre- and early-commercial zero- and near zero-emission technology development. Community Air Protection Incentives, a community-based incentives program that promotes zero-emission technology, while focusing on communities in the state that are disproportionately impacted by air pollution, also reduces greenhouse gas emissions and funds school bus clean-up projects. In contrast, the Carl Moyer Program funds established, commercialized technologies that create emission reductions that are surplus — early and/or in excess of emission reductions required by regulation — and requires meeting a cost effectiveness limit.

Some of the available school bus incentives offer some infrastructure funding to complement vehicle funding. For example, infrastructure funding is available through the Carl Moyer Program, the Rural School Bus Pilot Project (RSBPP), and the CEC's Clean Transportation Program. Recent changes to the Carl Moyer Program have allowed air districts to fund infrastructure projects, providing up to 100 percent for electric charging stations and alternative fueling stations for school buses. The RSBPP offers infrastructure funding of up to $5,000 per zero-emission school bus. The CEC is offering infrastructure funding of up to $60,000 per zero-emission school bus replacement.

Infrastructure funding is also available through investor-owned electric utilities in the state. The Clean Energy and Pollution Reduction Act[9] requires the California Public Utilities Commission (CPUC) to direct the six investor-owned electric utilities in the state to file applications for programs that "accelerate widespread transportation electrification." The CPUC has approved projects that support infrastructure development for school buses including make-ready infrastructure to serve two to five school buses (Pacific Gas and Electric) and rebates of up to 50 percent of the cost of the electric vehicle service equipment for sites that will support school buses (Pacific Gas and Electric and Southern California Edison).[10]

Despite the many millions of dollars represented by the projects, the current funding levels will replace only a small percent of California's school bus population. As such, school bus replacement and supporting zero-emission charging infrastructure funding remains a critical, on-going need throughout the state. See Table E-1 for a summary of dollars spent or allocated and vehicles affected. The rest of this section briefly describes the major sources of

[9] SB 350 (De León and Leno, Chapter 547, Statutes of 2015)
[10] https://www.cpuc.ca.gov/sb350te/

school bus clean-up funds implemented by California State and local agencies over the past two decades.

Table E-1: Summary of Past and Future State School Bus Incentives

Funding Source	Amount Spent or Allocated	Projects	Dedicated School Bus Funding
Lower-Emission School Bus Program	$310 million	7,456 retrofits 1,642 school buses	X
Carl Moyer Program	$4.9 million	36 school buses 12 infrastructure projects	
2017 Carl Moyer State Reserve	$5.8 million	58 school buses	X
Assembly Bill 923	$193 million	Retrofits, school buses, CNG tanks and infrastructure	
Community Air Protection Incentives	$10 million to date	99 school buses	
School Bus Replacement Program (CEC)	$75 million	233 school buses	X
Clean Transportation Program (CEC)	$21 million	25 school buses, infrastructure, workforce training	
Volkswagen Mitigation Trust (launch Fall 2019)	Up to $65 million	Up to ~163 school buses	
Sacramento Regional Zero-Emission School Bus Deployment Project	$14.5 million (State plus match contribution)	29 school buses and infrastructure	X
Clean Truck and Bus Vouchers (HVIP)	$23 million	153 school buses	
Rural School Bus Pilot Project	$55 million	~160 school buses and infrastructure	X
Clean Mobility in Schools Pilot Project	$10 million	TBD	
Diesel Emissions Reduction Act	$14.1 million (Federal plus State contribution)	549 retrofits, 98 school buses	
Supplemental Environment Projects for School Buses	$5.1 million	11 retrofits, 20 school buses, 297 recalled filter replacement	X

Lower-Emission School Bus Program

Established in 2001, LESBP has received $310 million in funding through CARB budget allocations; voter-approved Proposition 40: The California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002; and voter-approved Proposition 1B:

Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006. While LESBP has been one of the largest single sources of school bus clean-up funding, no State funds have been allocated to LESBP since Proposition 1B in 2006. School bus replacement projects, including advanced technologies, could immediately be implemented through LESBP if funds are allocated in the future.

Carl Moyer Program

The Carl Moyer Program provides grant funding for the incremental cost of cleaner-than-required engines, equipment, and emission reduction technologies. The Carl Moyer Program complements California's regulatory program by funding emission reductions that are surplus - early and/or in excess of emission reductions required by regulation. Local air districts implement these programs and may choose to designate funds toward school buses, amongst a menu of project types, depending on local emissions priorities. Air districts are funding more school bus projects due to recent changes to the program. Prior to 2017, the Carl Moyer Program funded 17 school buses. Since then, the program has funded another 19 school buses. Overall, about $4 million of air districts' Carl Moyer Program funds have gone toward school bus replacements. An additional $1 million of Carl Moyer Program funds have gone toward school bus CNG and zero-emission infrastructure projects.

Additionally, CARB may direct up to ten percent of Carl Moyer Program funds available each fiscal year to eligible projects selected in accordance with Health and Safety Code provisions, and in 2017, CARB directed nearly $6 million of State Reserve funds to replace 58 of the oldest school buses that could not be properly retrofitted with a diesel particulate filter.

Assembly Bill (AB) 923 and Other Local Funds

Twenty of the thirty-five local air districts in California collect AB 923 vehicle registration fees, which can be spent on school bus projects or for CNG tank replacements on school buses according to LESBP or Carl Moyer Program guidelines. Other local funds may also be available for school bus replacement, typically through the local air districts. Generally, these funds are more abundant in larger air districts because of the greater population and population density in these districts. California's air districts have collectively funded nearly $200 million worth of school bus clean-up projects since 2008.

Community Air Protection Incentives (CAP)

Community Air Protection Incentives, funded by Cap-and-Trade auction proceeds since FY 2017-18, is a community-focused and community-driven incentives program in which CARB, with local air districts, work to reduce emissions exposure in communities most affected by air pollution. In the first two years of the program, the Legislature appropriated $495 million to reducing criteria pollutant, toxic air contaminant, and greenhouse gas emissions, with a priority towards disadvantaged and low-income communities. School bus replacements are eligible projects for these funds and community groups have voiced priority for school bus projects when describing community needs. At the May 2019 Board meeting, staff reported that this program had funded 44 school buses to date, 18 of which are zero-emission. Since that update, another 55 school buses, 35 of which are zero-emission, have committed funding

from this program. Overall, $10 million of the first year of CAP incentives have gone toward school bus replacement to date.

California Energy Commission School Bus Replacement Program

CEC is currently administering the $75 million School Bus Replacement Program. This one-time allocation, part of the California Clean Energy Jobs Act[11], is the largest single allocation of state funding toward school buses outside of home-to-school funding since 2006. This statewide project will replace some of the oldest public diesel-fueled school buses with zero-emission replacements in disadvantaged communities and school districts in which a majority of students are eligible for free or reduced-price meals. CEC approved awards for over 230 zero-emission battery-electric school buses with supporting charging infrastructure earlier this year. These buses will be delivered and on the road over the next several years, with the first five percent being delivered by the end of 2019. CARB is working closely with CEC as they administer these funds by sharing information based on our decades of experience implementing school bus funding.

California Energy Commission Clean Transportation Program

CEC is also allocating over $21 million of their Clean Transportation Program funds to complement School Bus Replacement Program vehicle purchases with electric vehicle infrastructure, fund 25 CNG school bus replacements with supporting fueling infrastructure (where zero-emissions replacements are not currently feasible), and workforce development and training.

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, which include shuttle, transit, and school buses, with a $65 million cap per bus type. The San Joaquin Valley Air Pollution Control District (SJVAPCD) will administer the bus replacements statewide on a first-come, first-served basis, and staff expects the first installment of funds to be available to public school bus fleets in fall 2019.

Sacramento Regional Zero-Emission School Bus Deployment Project

Funded by CARB's Low Carbon Transportation funding and administered by Sacramento Metropolitan Air Quality Management District (SMAQMD), the Sacramento Regional Zero-Emission School Bus Deployment Project has purchased approximately 30 zero-emission school buses in three school districts in the Sacramento area. The air district designed this

[11] Proposition 39, an initiative that voters approved in 2012, and SB 110 (Committee on Budget and Fiscal Review, Chapter 55, Statutes of 2017)

large-scale deployment of zero-emission school buses to demonstrate the commercial viability of zero-emission school buses including their beneficial total cost of ownership, the substantially improved maintenance and performance, and that they optimally serve the needs of school districts to sustainably transport California's children to and from school. Funds for this project total $14.5 million, which includes a little over $7 million of Low Carbon Transportation funds.

State and local officials celebrated with students from the Twin Rivers Unified School District on delivery of several zero-emission battery-electric school buses at a June 2017 press event.

Clean Truck and Bus Vouchers (HVIP)

Also funded by Cap-and-Trade auction proceeds through Low Carbon Transportation funds, Clean Truck and Bus Vouchers are available to assist with the incremental cost of zero-emission school bus purchases. The program is first-come, first-served; available statewide; and administered by CALSTART. In several cases, school districts have successfully paired HVIP funding with local air district funding for zero-emission school bus replacements. Since inception in 2010, approximately $210 million worth of HVIP vouchers have been reserved for 149 school buses (136 zero-emission battery-electric and 13 hybrid).

Rural School Bus Pilot Project (RSBPP)

Wilsona School District students show off their new zero-emission battery-electric school bus at a press event in June 2018.

Funded by CARB's Low Carbon Transportation investments, and administered by North Coast Unified Air Quality Management District (NCUAQMD), the RSBPP has dedicated $55 million to school bus replacements (zero-emission or those that use renewable fuel) in FY 2016-17 through FY 2018-19. An additional $4.45 million is proposed for FY 2019-20 funding. The project prioritizes replacement of the oldest, dirtiest school buses in rural areas (those in small air districts) because they generally have less access to school bus replacement funding. The project has replaced 44 school buses to date, with plans to replace approximately 120 more. The project awards limited funds for zero-emission infrastructure and allows co-funding with other programs, such as those offered by local utilities. NCUAQMD staff received applications to replace over 600 school buses in their 2018 statewide solicitation.

Clean Mobility in Schools Pilot Project

In 2018, the Board approved $10 million of Low Carbon Transportation funds for a Clean Mobility in Schools Pilot, which will help one or two school districts holistically transform the transportation system near and around the recipient school district. School bus replacement

will be one part of this project. An additional $5 million of funding is proposed in the FY 2019-20 Funding Plan. Staff released the solicitation for this project in August 2019.

Diesel Emissions Reduction Act (DERA)

Since 2008, the Federal government has offered clean-up grants through their DERA funds, including clean school bus rebates, national grants, and state allocations. Clean school bus rebates range from $15,000 to $20,000 and go directly to the applicant. The federal government has also offered competitive national grants directly to the applicant[12] and has awarded these to school districts and air districts for replacing school buses.

Since 2011, SJVAPCD has administered over $4 million of California's state allocation of DERA funding to retrofit and replace school buses statewide. Overall, DERA has provided funding for 549 retrofits and 93 school bus replacements, with funding for nearly 20 additional zero-emission school bus replacements since 2016.

Supplemental Environment Projects (SEP)

In 2012, a retrofit manufacturer recalled PM filters installed in school buses and other heavy-duty vehicles, leaving them without complete PM filter systems. CARB worked with SJVAPCD to use over $5 million of environmental SEP funds (a portion of penalties received during settlement of enforcement actions) to replace approximately 300 recalled filters installed in school buses statewide, concluding in early 2018. These funds have also gone toward a handful of school bus retrofit and replacement projects, including co-funding 18 zero-emission school bus replacements with DERA funds (mentioned earlier).

Projected Need for Funding

Given the approximately 24,500 school buses in the California fleet, some as old as 30 years, school bus turnover requires significant funding. With tight budgets and competing request for funds, the turnover to cleaner school buses, especially the transition to advanced technology, is occurring enthusiastically but gradually.

Acknowledging the State's limited financial resources, incentive programs and school districts face tough decisions: turn over large numbers of school buses with cleaner vehicles (cheaper, but still powered by combustion of conventional fuels), or focus on a slower, more resource-intensive roll-out of zero-emission buses and infrastructure. The sheer number of variables surrounding the California school bus fleet makes it impossible to predict the exact need for funding with certainty.

One basic scenario for the projected need for school bus funding assumes a target of five percent turnover, which is approximately 1,200 school buses. To fully fund replacement of these school buses up-front would cost approximately $200 million for new diesel vehicles, or approximately $480 million for zero-emission battery-electric vehicles (not including infrastructure costs or potential savings over the life of the vehicle). If this rate of turnover

[12] https://www.epa.gov/cleandiesel/clean-diesel-national-grants-awarded

occurred annually, it would take 20 years to completely turn over the state's school bus fleet. Faster turnover would require a more aggressive strategy — and more funds per year.

Of course, this simple calculation would be affected by a number of factors. Vehicle costs should decline as zero-emission vehicle markets mature and production expands, achieving economies of scale. Social factors could also affect this scenario in terms of shifts toward clean or shared mobility and active transportation. For example, school districts could offer increased school bus service, which would require more school buses, but could reduce vehicle miles traveled if fewer parents drop off their students using passenger cars. Increased active transportation such as biking and walking would reduce the need for more school buses.

Exactly how the need for school bus funding unfolds will depend on a number of economic, social, and political factors. Regardless, school buses need ongoing funding to continue turning over the fleet to cleaner options.

Conclusion

Reducing PM emissions and near-source exposure is a priority, particularly because studies have shown that PM has immediate and long-lasting adverse human health effects, especially for sensitive populations such as children. The buses' own exhaust exposes children riding in diesel school buses to these PM emissions, and the oldest, dirtiest school buses have the highest rates of in-vehicle exposure. Therefore, school bus replacement rightfully remains a priority to CARB.

In terms of milestones achieved, the collective replacement efforts described in this report have replaced almost all of the school buses of "immediate concern" and many of the school buses of "upcoming concern". Almost $800 million of state, local, and federal funds since 2001 have cleaned up over 11,000 California school buses. Nearly $300 million of that funding has been allocated since staff updated the Board in 2016, reflecting the priorities of the Legislature, the CARB Board, local air districts, and communities. These investments include the popular Rural School Bus Pilot Project funded through Low Carbon Transportation investments, the one-time allotment of $75 million to CEC for school bus replacement, the one-time allocation of Volkswagen Environmental Trust Mitigation funds, Community Air Protection Incentives, and others. These new and existing school bus funding programs promise to continue the progress in the much-needed turnover of the California school bus fleet as well as advancing California's air quality, climate change, petroleum reduction, and advanced technology development goals.

Even with these significant funding commitments, school bus replacement continues to require attention as school buses and PM filters continue to age and deteriorate. To achieve a turnover rate of five percent annually (completely replacing the school bus fleet in 20 years) would require investment of $200 to $480 million per year, in addition to infrastructure and facility support as school districts undergo transformation to zero-emission school buses.