The 2022-23 Budget:

Green School Bus Grants

Summary

School Districts Own Many Older Diesel Buses. Districts own nearly 16,000 school buses, nearly two-thirds of which operate on diesel fuel. More than 5,000 of the diesel buses were manufactured prior to 2007, when the latest federal emission standards took effect.

Governor Proposes $1.5 Billion for Electric School Buses. The proposal would provide grants to replace existing school buses with electric buses. Districts that are small, rural, enroll high shares of disadvantaged students, or propose to replace the oldest buses would receive priority. Grant awards would begin at $500,000 and assume districts would use about $450,000 for each bus and its charging station. Districts could use the remaining $50,000 for any other school transportation expenditure. The $1.5 billion Proposition 98 General Fund proposed for this program would fund approximately 3,000 electric buses. The proposal is in addition to a similar state program created in 2021-22 and a large federal program created last November.

Electric Buses Have Several Advantages but a Few Limitations. Districts currently own a couple hundred electric buses statewide. Districts generally describe them as smooth, quiet, and clean. Electric buses release no local pollutants like nitrogen oxides and particulate matter, and they reduce greenhouse gas emissions. Electric buses also reduce fuel costs for districts. The main drawback is their limited range, which can make them unsuitable for long routes and certain strenuous conditions. An electric bus also costs more than twice as much as a diesel bus.

Recommend Adopting Modified Version of Governor's Proposal. The proposal would allow the state to obtain emission reductions and lower operational costs that would benefit students and districts for many years. We recommend adopting it with several modifications:

- ***Prioritize Replacement of the Oldest Buses.*** Focusing grants on replacing the oldest buses (rather than using age as one of several factors) would maximize potential air quality improvements because older buses emit more pollution.
- ***Allow Funding for Other Types of Buses When Electric Buses Are Not Feasible.*** For rural and other districts in which electric buses are not feasible, providing funding to purchase nonelectric buses could achieve notable reductions in air pollution.
- ***Eliminate Proposed Allowance for Other Transportation Expenditures.*** This portion of the proposal does not seem well connected with underlying costs and could discourage districts from pursuing bus replacement funding from other programs.
- ***Provide Smaller Amount Initially and Adjust Future Funding Based on Demand.*** If the state allocated funding over several years, it could adjust future allocations based on district interest and progress toward replacing older buses and reducing pollution.

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BACKGROUND

In this section, we provide background on school transportation in California, various types of school buses, state efforts to reduce greenhouse gas (GHG) emissions, funding for school bus replacement, and the state appropriations limit.

School Transportation

State Law Authorizes School Transportation Programs. State law allows school districts and other local educational agencies to provide home-to-school transportation for their students. (Throughout this post, we refer to all of these agencies as "districts.") Districts generally have the discretion to decide which students qualify for transportation and the organization of their bus routes. State and federal laws require districts to provide transportation in only three cases:

- The federal Individuals with Disabilities Education Act requires a district to transport students with disabilities who require transportation to access their education (such as students with orthopedic impairments).
- The federal McKinney-Vento Homeless Assistance Act requires a district to transport homeless students in certain circumstances, generally related to avoiding disruptions in their education.
- State law requires a district to provide transportation assistance to low-income students who have transferred into the district on interdistrict permits (if requested by their parents/guardians).

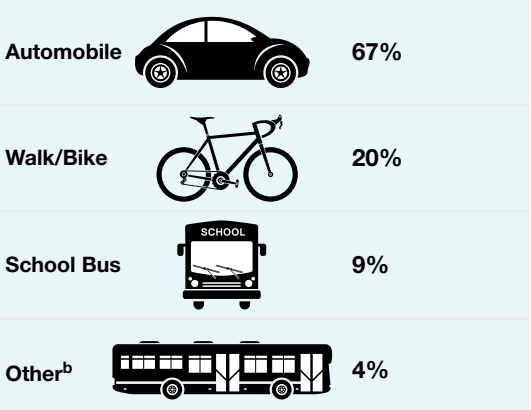
Many districts in California provide home-to-school transportation only for the students in one of the above groups. Districts providing transportation to other students generally condition eligibility on the distance students live from school. A few districts provide transportation to encourage participation in specialized programs (such as magnet schools). In addition to home-to-school transportation, districts regularly transport students for field trips and extracurricular activities.

Districts Can Operate Their Own Programs or Contract for Service. Districts can provide school transportation in various ways. Many districts operate their own transportation departments in which employees work for the district. Some districts contract with other local educational agencies, such as their county offices of education, neighboring districts, or transportation joint powers authorities. Other districts contract with private companies. Districts also can rely upon a mix of these options (operating some services themselves and contracting for the rest).

Approximately One in Ten Students in California Receives Home-to-School Transportation. The federal government periodically collects information about school transportation and other travel information through the National Household Travel Survey. According to the 2017 version of the survey, most students in California travel to school in private automobiles (**Figure 1**). Only about 9 percent of students receive transportation on school buses. A comparison with the previous version of the survey indicates that school bus ridership has declined over time. In 2009, for example, the survey found that nearly 14 percent of California students received school bus transportation.

Figure 1

How California Students Get to School[a]



[a] Data based on most recent U.S. Federal Highway Administration Survey (2017).
[b] Primarily includes public transit.

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Districts Spend About $1.8 Billion Annually on Home-to-School Transportation. Districts reported spending $1.8 billion on home-to-school transportation in 2019-20. Salaries and benefits for transportation personnel, including bus drivers, dispatchers, and mechanics account for most of these expenditures. The next largest cost is fuel, which typically accounts for 10 percent to 20 percent of a district's transportation budget. Other expenses include parts, supplies, insurance, and training materials. Districts pay for most of these costs using their local general purpose funding. A few districts charge fees for home-to-school transportation, but fee revenue generally covers a relatively small share of total transportation costs. (The $1.8 billion includes spending on home-to-school transportation provided by districts or private contractors, but excludes spending related to field trips and extracurricular activities.)

School Buses

School Districts Own Approximately 15,800 School Buses. Districts operating their own transportation programs are responsible for purchasing and maintaining school buses. State law requires districts to ensure their buses are registered and inspected on an annual basis. The available data indicate districts currently own approximately 15,800 school buses. This total includes full-size buses designed to carry more than 50 students as well as smaller buses designed for as few as 10 students. Many of these buses operate on a daily basis, but some are used as spares or in other limited roles. (The total excludes approximately 9,000 school buses owned by contractors.)

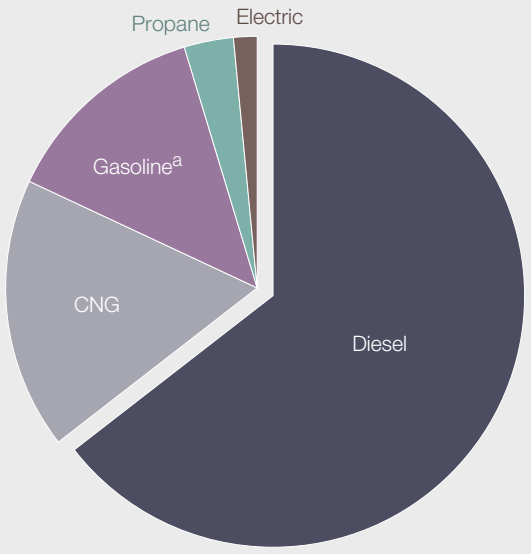
Several Types of School Buses Available. School buses can operate using various types of fuel. For full-size buses, four main options are available: (1) diesel, (2) compressed natural gas (CNG), (3) propane, and (4) electricity stored in batteries on the bus. Smaller buses can use one of these options or regular gasoline. **Figure 2** shows the approximate breakdown of district fleets by fuel type. Districts currently own approximately 10,200 diesel buses, which constitute nearly two-thirds of their fleets. Electric buses are the least common, currently accounting for only a few hundred buses statewide. Below, we provide more information about each of the options available for full-size buses:

- ***Diesel.*** Diesel is produced through the refinement of crude oil, a common fossil fuel extracted from natural underground reservoirs. Diesel buses have provided the primary form of school transportation in California and other states since the 1950s. A full-size diesel bus typically costs up to $200,000.
- ***CNG.*** CNG consists primarily of methane, compressed to less than 1 percent of the volume it occupies at standard atmospheric pressure. Districts began adding CNG buses to their fleets in the late 1990s. A full-size CNG bus typically costs up to $250,000.
- ***Propane.*** Propane is a byproduct of processing natural gas that is compressed and stored as a liquid. Districts began adding propane buses to their fleets in the late 2000s. A full-size propane bus typically costs slightly more than $200,000.

Figure 2

Diesel Buses Account for Nearly Two-Thirds of School District Fleets

Approximately 15,800 School Buses



[a] Includes flexible fuel buses, which can operate on gasoline or a blend of gasoline and ethanol.

CNG = compressed natural gas.

- ***Electric.*** An electric bus relies on the power stored in its batteries, which are charged before the bus begins its route. Districts began adding electric buses to their fleets approximately five years ago. A full-size electric bus typically costs around $400,000.

Diesel Bus Emissions Can Have Harmful Health Effects. Diesel buses emit several pollutants that can have negative effects on human health and the environment. The most concerning pollutants are nitrogen oxides and particulate matter. Nitrogen oxides are a key contributor to smog, which can irritate the human respiratory tract. Prolonged exposure can increase the risk of asthma and other respiratory diseases. Particulate matter refers to tiny solid particles and liquid droplets that can become embedded in the lungs or bloodstream. Sustained exposure can cause breathing problems and lung damage. Research also suggests that particulate matter emitted by diesel engines—known as diesel particulate matter—can increase the risk of cancer. Children are more likely than adults to experience negative health effects from these pollutants because their bodies are still developing. (Nitrogen oxides and particulate matter are known as local pollutants because they mainly affect the areas in which they are emitted. School buses also emit GHGs—described in the next section—which have broader climate effects.)

Newer Diesel Buses Required to Meet Stringent Requirements. Prior to 1977, emissions from school buses and other heavy-duty vehicles were largely unregulated. Since that time, the U.S. Environmental Protection Agency (U.S. EPA) has phased in strict emission requirements. The current emission standards apply to buses with engines built in 2007 or later. As **Figure 3** shows, the emissions allowed for newer engines are a small percentage of earlier limits. The California Air Resources Board (CARB) also has adopted regulations that will require school buses and other heavy-duty vehicles to meet even stricter requirements in the coming years. In addition, many school bus manufacturers already sell diesel buses that emit less pollution than the 2007 standards allow.

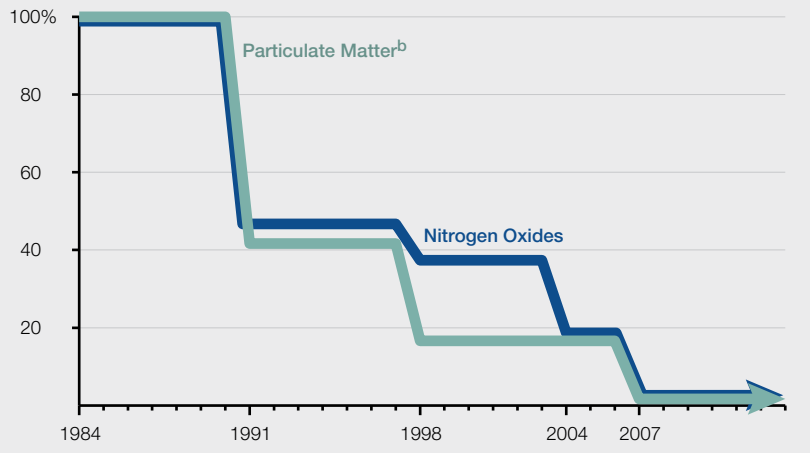
Filters for Older Diesel Buses Address Some Emission Concerns. Regulations adopted by CARB require districts to retrofit older diesel school buses with high-quality filters that trap certain emissions. The requirement applies to all school buses with engines manufactured before 2007 and driven at least 1,000 miles per year. The filters are at least 85 percent effective at reducing particulate matter, provided the engine is well maintained. These filters, however, do not control the higher levels of nitrogen oxide emitted by older buses. In addition, filters degrade over time and must be replaced periodically.

Propane and CNG Buses Have Low Emissions. Propane and CNG naturally combust more cleanly than diesel. Newer buses powered by these fuels tend to have emission levels significantly below the U.S. EPA standards, and older buses also have relatively low emissions. Largely due to these lower emissions, the state historically has encouraged districts to replace diesel buses with CNG and propane buses.

Figure 3

Emission Requirements for Heavy-Duty Vehicles Have Become Much Stricter

U.S. EPA Emission Limits as a Percent of 1984 Limits[a]



[a] Reflects emission requirements for school buses and other heavy-duty vehicles.

[b] Reflects requirements for particulate matter smaller than 2.5 microns in width.

U.S. EPA = United States Environmental Protection Agency.

Notable Differences in Fuel Cost and Price Volatility. Different types of fuel vary in their cost. Figure 4 illustrates these variations by showing the average retail price for diesel, propane, CNG, and electricity in the United States over the past ten years. Diesel and propane exhibited the highest prices and the greatest volatility. By contrast, CNG and electricity exhibited lower and more stable prices. (The prices in the figure reflect calculations by the U.S. Department of Energy, which adjusts for differences in the energy content of each fuel and the greater efficiency of electric engines. The prices paid by large organizations like districts can vary from retail prices. Prices in California also tend to exceed the national average.)

State Law Requires Seat Belts for All School Buses by 2035. In the late 1990s, the state enacted legislation to implement seat belt requirements for school buses. Specifically, the law required seat belts for small school buses manufactured after July 1, 2004 and large buses manufactured after July 1, 2005. The seat belt requirement did not apply to buses manufactured prior to these years. Chapter 206 of 2018 (AB 1798, Chu) ends the exception for older school buses on July 1, 2035. After this date, all school buses transporting students must have seat belts.

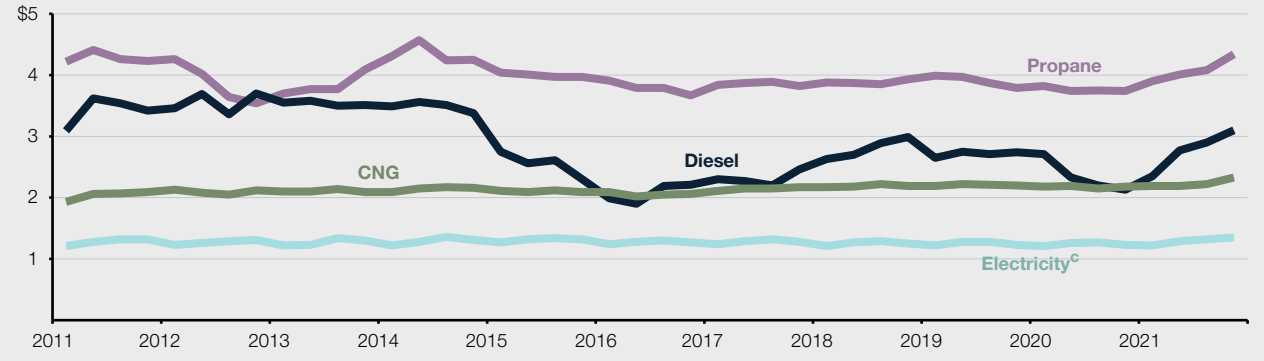
State Goals for GHG Reduction

Transportation Is a Key Source of GHG Emissions. GHGs are gases that trap heat from the sun within the atmosphere, thereby increasing the earth's temperature. Both natural phenomena (mainly the evaporation of water) and human activities (principally burning fossil fuels) produce GHGs. The primary GHG emitted through human activities is carbon dioxide. Carbon dioxide is a relatively stable gas and can remain in the atmosphere for hundreds of years. The state's official statewide GHG inventory shows that human activities in California produce just over 400 million metric tons of GHG emissions per year. The transportation sector is responsible for nearly 40 percent of these emissions (not including emissions related to extracting and refining crude oil). Heavy-duty vehicles, including trucks, buses, and delivery vans, are responsible for about 20 percent of the GHG emissions within the transportation sector. School buses contribute to the GHG emission totals for heavy-duty vehicles, although they account for a relatively small share. Specifically, the latest available data indicate that the school buses owned by districts constitute approximately 2 percent of the heavy-duty vehicles in California.

Figure 4

Average Retail Price of Fuel in the United States[a]

Cost Per Gasoline Gallon Equivalent[b]



[a] Reflects estimates prepared by the U.S. Department of Energy Alternative Fuels Data Center (AFDC).

[b] A gasoline gallon equivalent is the amount of fuel required to match the energy content of a gallon of gasoline.

[c] The AFDC reduces electricity prices by a factor of 3.54 based on its analysis indicating electric motors are 3.54 times more efficient than internal combustion engines.

CNG = compressed natural gas.

State Goals for Reducing GHG Emissions. The Legislature has adopted laws intended to reduce GHG emissions over time. Chapter 488 of 2006 (AB 32, Núñez) initially set a goal of reducing overall GHG emissions in California to 1990 levels by 2020. Chapter 249 of 2016 (SB 32, Pavley) established a statewide GHG limit of 40 percent below 1990 levels by 2030. Although the state met its initial goal ahead of schedule, the newer target is substantially more ambitious. (The Governor also has an executive order establishing a goal of statewide carbon neutrality by 2045, but this target is not in state law.) The state has established a number of regulations to meet these goals. One significant component is a cap-and-trade program that places an aggregate limit on GHG emissions from large emitters. As part of the program, the state auctions the right to emit certain amounts of GHGs. The state generally uses the proceeds of these auctions for activities to reduce GHG emissions. In addition to broader regulations like cap-and-trade, the state has many other requirements, standards, grants, and incentives intended to reduce GHG emissions specifically in the transportation sector.

Funding for School Bus Replacement

Several Programs Have Provided Funding for Bus Replacement. At least 14 programs have provided funding for school bus replacement over the past two decades (**Figure 5**). Some of the programs also provided funding for infrastructure or retrofitting older buses. Together, they have awarded grants totaling more than $1 billion. (Several of the programs also provide funding for other types of vehicles, but the amounts in the table reflect the portion for school buses.) The main sources of funding for these programs include state General Fund, cap-and-trade revenue, and local air district revenue (including vehicle registration fees). Some of these programs received funding on a one-time basis, and others are ongoing. Below, we profile the three programs that have provided the largest amounts of funding for school bus replacement within the past five years:

- ***School Bus Replacement Program.*** This one-time program provided grants to districts to cover the cost of replacing diesel buses with electric buses. The program prioritized the replacement of the oldest buses, with additional consideration for disadvantaged communities and low-income schools. The state provided $75 million in Proposition 39 (2012) funds for the program.
- ***Volkswagen Environmental Mitigation Trust.*** This one-time program provides grants to cover the full cost (districts) or most of the cost (contractors) to replace existing school buses with electric buses. The program awards funding primarily on a first-come, first-serve basis. The program has $130 million available, and the state has allocated the first $65 million already. Program funding comes from a settlement with Volkswagen over allegations that it sold vehicles designed to circumvent emissions testing.
- ***Rural School Bus Pilot Project.*** This program provided funding for districts to replace buses more than 20 years old with electric and other low-emission buses. Grants generally covered the full cost for electric buses and most of the cost for other types of buses. The program prioritized applicants located in small air districts. The state provided nearly $62 million for the program from cap-and-trade revenues between 2016 and 2018.

2021-22 Budget Plan Created New Program to Fund Electric School Buses. The new program has two components. The first component is administered by CARB and will provide $400 million for districts to replace 1,000 older buses with electric buses. The second component is administered by the California Energy Commission and will provide $50 million for charging infrastructure to support these buses. The 2021-22 budget plan provided an initial allocation of $150 million from non-Proposition 98 General Fund ($130 million for buses and nearly $20 million for infrastructure). The state is planning to provide the remaining $300 million (non-Proposition 98 General Fund) over the next two years. This program supersedes the Rural School Bus Pilot Project but will retain some elements of that program, including priority for small and rural areas and the requirement to scrap the buses being replaced.

CARB and the California Energy Commission are currently developing the application procedures and other program guidelines. (The authorizing legislation allows the program to fund any type of zero-emission school bus, but battery powered electric buses are the only technology currently available to meet this requirement.)

Federal Infrastructure Bill Included School Bus Replacement Funding. The federal Infrastructure Investment and Jobs Act, enacted in November 2021, contains $5 billion for school bus replacement grants. The U.S. EPA will allocate the funding in installments of $1 billion per year for the next five years. The law sets aside half of the annual amount for electric school buses. The other

Figure 5

Previous Funding for School Bus Replacement in California

Amounts Through August 2021 (In Millions)

Program[a]	Administrator	Amount Allocated[b]	Period	Projects Funded			
				Electric Buses	Other Buses	Infrastructure	Retrofits
Lower-Emission School Bus Program	Various[c]	$310	Since 2001		X		X
AB 923 (vehicle registration surcharge for emission reductions)	Local air districts	237	Since 2008	X	X	X	X
Clean Truck and Bus Vouchers (HVIP)	CALSTART[d]	89	Since 2010	X	X		
School Bus Replacement Program	CEC	75	Since 2019[e]	X			
Volkswagen Environmental Mitigation Trust	SJVAPCD	65	Since 2018	X			
Small School District and County Office of Education Bus Replacement Program	CDE	64	Since 2000[f]		X		X
Rural School Bus Pilot Project	NCUAQMD	62	Since 2016[e]	X	X	X	
Community Air Protection Incentives	Local air districts	56	Since 2017	X	X	X	
Clean Mobility in Schools Pilot Project	CARB	25	Since 2018	X		X	
Clean Transportation Program	CEC	21	Since 2012		X	X	
Carl Moyer Program and State Reserve	Local air districts	16	Since 1998	X	X	X	
Federal Diesel Emissions Reduction Act	U.S. EPA	15	Since 2008	X	X		X
Sacramento Regional Zero-Emission School Bus Deployment Project	SMAQMD	15	Since 2017[e]	X		X	
Supplemental Environmental Projects for School Buses	CARB	5	Since 2012		X		X
Totals		**$1,054**					

[a] Excludes new state program established by the June 2021 budget plan and new federal program established in November 2021. These programs have not yet allocated any funding.

[b] Amounts reflect estimates by CARB except for Small School District and County Office of Education Bus Replacement Program.

[c] Various iterations of this program have been managed by CARB, local air districts, and SJVAPCD.

[d] CALSTART is a national nonprofit organization focused on clean transportation.

[e] Program funds fully allocated and additional allocations not expected.

[f] Reflects funding allocated from 2000-01 through the end of the program in 2012-13.

HVIP = Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project; CEC = California Energy Commission; SJVAPCD = San Joaquin Valley Air Pollution Control District; CDE = California Department of Education; NCUAQMD = North Coast Unified Air Quality Management District; CARB = California Air Resources Board; U.S. EPA = United States Environmental Protection Agency; and SMAQMD = Sacramento Metropolitan Air Quality Management District.

half is available for any type of bus powered by alternative fuels, including electric, CNG, and propane buses. The U.S. EPA must award grants on a competitive basis, but no state may receive more than 10 percent of the available funding in any year. Districts and contractors are both eligible to apply. The U.S. EPA is still developing the details of the program, including application procedures and the methodology for ranking applications.

Districts Sometimes Use Local Funds to Purchase School Buses. When state grants are unavailable or provide less than the full cost of a school bus, districts turn to local funding sources. Districts can use their local general funds to cover the cost of school buses, including reserves they build up over time. Some districts have been able to work with other local governments to obtain additional revenue. For example, Fresno County has a sales tax for transportation, and the county reserves a small portion of this revenue for school bus replacement. Some districts are able to obtain small grants for bus replacement from their local utilities. The availability of these local revenue sources varies across the state.

State Appropriations Limit

California Constitution Contains Limit on State Spending. Proposition 4 (1979) established the state appropriations limit. Under the measure, the state must compare its limit to the appropriations subject to the limit each year. Appropriations subject to the limit consist of total state tax revenues after subtracting excluded spending, including capital outlay, certain spending on emergencies, and certain subventions to local governments. For the purpose of the limit, capital outlay means spending on assets that cost at least $100,000 and are expected to last at least ten years. If the state exceeds the appropriations limit over any two-year period, it has excess revenues. The Legislature can respond to excess revenues by (1) lowering tax revenues, (2) splitting the excess revenues between taxpayer rebates and one-time payments to schools and community colleges, or (3) spending more money on activities excluded from the limit.

Under Governor's Budget, State Is $2.6 Billion Above the Limit. The Governor's budget reflects revenue estimates that are significantly above the June 2021 estimates. The Governor proposes to spend a large amount of the additional revenue on activities excluded from the limit, including capital outlay. Even accounting for these proposals, however, the administration estimates the state is $2.6 billion above the limit across 2020-21 and 2021-22. If the Legislature were to spend less on capital outlay or other excluded purposes than the Governor proposes, the state would exceed the limit by a larger amount. Prior to finalizing the upcoming budget, the Legislature will need to adopt a plan for responding to the excess revenues.

GOVERNOR'S PROPOSAL

Proposes $1.5 Billion Grant Program to Fund Electric School Buses. The proposal would establish a competitive grant program for districts to replace nonelectric school buses with electric buses. Applicants would receive priority if they (1) have high concentrations of low-income students and English learners, (2) propose replacing the oldest buses, (3) have 2,500 or fewer students, or (4) are located in rural areas. The individual grants would start at $500,000 for the replacement of one bus. The proposal would require recipients to use at least 90 percent of their grant for purchasing the electric bus and related infrastructure (such as charging stations). The remaining 10 percent would be an allowance for any school transportation expenditure, including supplies, hiring incentives, training, administrative costs, infrastructure, and spending on other buses. The proposal also would require recipients to scrap their old buses within a year of receiving their new buses. The California Department of Education (CDE) would administer the program and develop the application procedures, maximum grant amounts, and other details. The Governor's budget proposes $1.5 billion in one-time Proposition 98 General Fund for the program, with the funding attributable

to 2021-22. The administration estimates this funding would allow districts to replace 3,000 older buses with electric buses.

Scores Most of the Proposal as a State Appropriations Limit Exclusion. The budget identifies the amount reserved for purchasing electric school buses and related infrastructure as excludable capital outlay under the state appropriations limit. (Each electric bus and charging station together costs more than $100,000 and has a useful life of more than ten years.) This scoring allows the state to reduce its appropriations subject to the limit by $1.35 billion (90 percent of the proposed grant amount). The budget identifies the remaining $150 million (the portion available for any transportation expenditure) as spending that counts toward the appropriations limit.

ASSESSMENT

In this section, we review the benefits and limitations of electric buses, assess the demand for bus replacement funding, and identify a few fiscal considerations for the state and districts.

Benefits and Limitations of Electric Buses

Districts Generally Report Positive Experience With Electric School Buses. We spoke with a handful of districts that purchased electric buses and asked them about their experiences. Districts indicated the buses provided smooth, clean, and quiet transportation for their students. Districts also appreciated that electric buses reduced their fuel costs. In a few cases, districts were exploring the possibility of obtaining additional financial benefits through "vehicle-to-grid" arrangements with their local utilities. (Under these arrangements, the buses remain connected to the grid when not in use and the utility uses the batteries on the bus to help manage demand for electricity.) Electric bus engines also contain significantly fewer moving parts than traditional engines, potentially allowing districts to obtain savings on maintenance. However, districts expressed less agreement about maintenance savings. Most reported lower maintenance costs, but a few said that a few costly repairs had negated the expected savings. Other districts said their electric buses were so new that they were unsure about future maintenance savings.

Electric Buses Would Reduce Air Pollution, Especially if Replacing Older Buses. Electric buses produce no tailpipe emissions while transporting students because they rely on the power stored in their batteries instead of internal combustion. Replacing another type of bus with an electric bus would eliminate the emission of nitrogen oxides and particulate matter. The lower emissions could benefit students and drivers, as well as people and natural environments located near bus routes. The greatest potential improvements would involve replacing older diesel buses manufactured under the pre-2007 emission standards. Available data suggest that districts own more than 5,000 diesel buses manufactured before these standards took effect, including a couple hundred buses manufactured prior to 1991 (when emission standards were substantially less stringent). Replacing these buses could reduce the emission of nitrogen oxides significantly, as existing filter requirements do not mitigate these emissions.

Electric Buses Would Reduce GHG Emissions. Figure 6 on the next page displays the estimated annual GHG emissions for various types of school buses. The amounts reflect estimates by the Argonne National Laboratory using default assumptions about fuel and other factors for school buses driven 12,000 miles per year in California. The GHG emissions reflect estimates on a "well-to-wheel" basis, meaning they account for emissions produced indirectly. For example, the estimate for electric buses includes GHG emissions attributable to the electricity required to charge the batteries on the bus. As the figure shows, GHG emissions for an electric school bus are

approximately one-third of the amount attributable to a diesel bus. Research by CARB, which accounts for additional California-specific factors (such as state emission standards), suggests an even larger difference. Specifically, CARB estimates that GHG emissions for an electric bus are about 15 percent of the emissions generated by a diesel bus.

Electric Buses Have Limited Range. The main limitation for electric school buses is the limited range they can operate between charges. Early models often had a maximum range between 70 and 90 miles. Recent models have longer ranges, often between 120 and 150 miles. These ranges, however, assume relatively favorable driving conditions. Strenuous conditions—such as driving in mountainous terrain—can reduce the range. Weather conditions are another factor because the heat and air conditioning systems draw additional power from the batteries. Other factors affecting the range include the number of stops along the route and the behavior of the driver. Buses powered by diesel, CNG, or propane all have significantly longer ranges than electric buses.

Costs for Charging Stations and Electrical Connections. In addition to the cost of buses, districts incur a few other costs when they add electric buses to their fleets. Most notably, districts must purchase charging stations. Relatively expensive stations can cost around $50,000, but have the ability to charge a bus completely in a few hours. Other stations cost less, but require six to eight hours to charge a bus. In addition, districts typically must upgrade their connection to the electrical grid. The cost of an upgrade varies depending on the condition of existing infrastructure and the amount of construction and trenching involved. In some cases, utilities may contribute to the cost of the upgrade. Other costs, such as training for drivers and mechanics, tend to be modest compared with the infrastructure costs.

Demand for Electric Buses and Bus Replacement

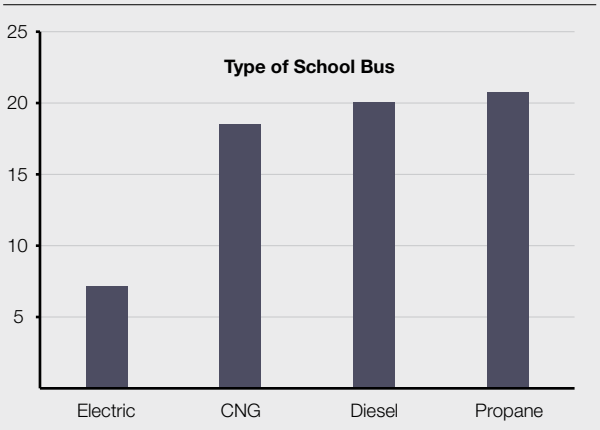
District Will Need to Replace a Significant Number of Buses in Coming Years. Districts own a significant number of buses that they will need to replace in coming years. Available data suggest that more than 4,000 buses (almost one-quarter of all district buses) are more than 20 years old. These buses are already operating beyond the typical lifespan of a school bus. (Industry sources often assume a lifespan of 12 to 15 years for school buses operated on a regular basis.) Even if these older buses are well maintained and used only as spares, districts generally will have to replace them before 2035 to meet the seat belt requirement. Retrofitting an older bus with seat belts generally is not possible because it involves working on the frame of the bus. Bus frames are designed to dissipate strong forces and modifications potentially could affect their performance in a collision.

Recent Programs Funding School Bus Replacement Have Been Oversubscribed… Recent school bus replacement programs have received more applications than they could fund. The School Bus Replacement Program administered by the California Energy Commission received requests for 1,549 electric buses from 196 districts. The $75 million available for the program funded 236 buses for 63 districts. The Volkswagen Environmental Mitigation Trust received requests for nearly 500 electric buses and the $65 million available

Figure 6

Annual GHG Emissions Much Lower for Electric School Buses[a]

Short Tons Per Year



[a] Reflects estimates developed by the Argonne National Laboratory for the Alternative Fuel Life-Cycle Environmental and Economic Transportation Tool for school buses driven 12,000 miles per year in California.

GHG = greenhouse gas and CNG = compressed natural gas.

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for the first round of applications allowed it to fund approximately 80 buses. The Rural School Bus Pilot Project received requests for nearly 600 electric and nonelectric buses and the $62 million available allowed it to fund approximately 180 buses.

…But Interest Specifically in Electric Buses Seems to Vary Notably Across Districts. Although districts will need to replace a significant number of buses in coming years, their interest in electric buses varied. A few urban and suburban districts indicated that electric buses could replace significant portions of their fleets. Rural districts, however, generally indicated that their interest would be limited to obtaining a few electric buses for shorter routes. These districts cited concerns about the length of their routes and strenuous operating conditions as reasons for not adopting electric buses. These districts indicated they likely would retain the diesel buses in their fleets even if the state offered to cover the cost for electric buses.

Governor's Proposal Assumes Very High Demand for Electric Buses. The Governor's proposal is in addition to several other funding sources available to fund electric school buses, including (1) the state program created in the 2021-22 budget plan, which will provide $450 million over the next three years; (2) the new federal program, which potentially could provide a few hundred million dollars for California districts over the next five years; and (3) a few smaller existing programs, which potentially could provide tens of millions of dollars to a more than a hundred million dollars over the next several years. Across all of these programs, the total amount available for electric buses over the next several years likely would range from $2 billion to $2.5 billion—roughly double the amount for all school bus replacement programs combined over the past two decades. It would represent enough funding to cover the full cost of 4,500 to 5,500 full-size electric school buses, including their charging stations. Implicitly, the Governor's proposal assumes that within a few years, the average district would replace roughly one-third of its existing fleet with electric buses.

Fiscal Considerations

Proposal Could Provide Benefits for Students and Districts Over Multiple Years. Using one-time funds for capital outlay and other infrastructure often allows the state to obtain benefits that last for many years after it allocates the funding. The potential benefits from electric buses, including lower pollution, reduced GHG emissions, and decreased operating costs, would last for the lifespan of those buses. Some other potential uses of one-time Proposition 98 funding, by contrast, might produce short-term benefits that would last only until the funds expire. The proposed grants also would provide near-term cost relief for districts by covering bus replacement costs they might otherwise pay from their local operating budgets. For the state, the proposed grants qualify as excluded expenditures under the state appropriations limit.

Assumptions About Buses and Charging Stations Generally Reflect Current Prices. The administration developed its proposal assuming districts could purchase an electric bus for about $400,000. Based on our review of other school bus replacement programs and our interviews with districts that recently purchased electric buses, we think this assumption reasonably reflects the current price of a full-size electric bus. Smaller electric buses typically cost less, but we assume CDE could make some allowance for these differences when it implements the program. The administration also assumes districts would purchase a charging station for each bus at a cost of approximately $50,000. This amount seems to correspond with current prices, assuming districts purchase relatively expensive stations that can charge their buses in a few hours.

Concerns With Proposed Allowance for Other Transportation Expenditures. The 10 percent allowance for other transportation expenditures does not seem well connected with underlying costs. The main costs for an electric bus consist of the bus itself and related electrical infrastructure. Given that the proposed grants generally would cover these costs, we think the state could expect districts to cover other expenses with their local funds. Districts do sometimes express concern about the high ongoing cost of providing home-to-school transportation, but additional one-time funding seems unlikely to address this issue. In addition, the allowance could discourage districts from applying for federal funding and the state program created in the 2021-22 budget plan. Neither of these programs contains an additional allowance, and districts might forego these programs if they believed they would qualify for the grants the Governor proposes.

RECOMMENDATIONS

Adopt Modified Version of Governor's Proposal. The Governor's proposal would allow the state to use one-time funding to support school transportation service that many students and districts find beneficial. The potential benefits of electric buses, including lower levels of pollution, reduced GHG emissions, and decreased operating costs, could last for many years. The up-front costs for an electric bus and its charging station are more than twice the cost of a diesel bus, and state grants likely would accelerate the adoption of electric buses. Some aspects of the proposal, however, could be improved. In the remainder of this section, we recommend several modifications to (1) achieve greater reductions in pollution, (2) allow more districts to use the program, (3) improve fiscal incentives, and (4) adjust funding based on district interest.

Prioritize Replacement of the Oldest Buses. Whereas the Governor proposes four criteria that would give districts priority for funding, we recommend modifying the proposal so that it prioritizes replacing the oldest buses first. This modification would increase the potential reductions in air pollution by focusing the program on replacing buses manufactured under less stringent emission standards. Under this approach, the state could retain other considerations (such as preference for rural schools or schools with high numbers of low-income students) as secondary factors.

Allow Funding for Other Types of Buses When Electric Buses Are Not Feasible. Under the Governor's proposal, some districts might continue to operate older buses emitting higher levels of pollution because electric buses are not viable replacements. We recommend modifying the Governor's proposal to allow funding for nonelectric buses in some cases. One option would be to allow rural districts to receive funding to replace a specified percentage of their fleets with nonelectric school buses. The state could allow additional nonelectric buses for these districts (or urban districts) based on their individual circumstances. One previous program, for example, allowed districts to purchase nonelectric buses if they could provide information about their routes and a consultation with an electric bus dealer demonstrating that electric buses would be infeasible. Funding a nonelectric bus might not reduce GHG emissions significantly, but could provide significant reductions in local pollutants like nitrogen oxides and particulate matter.

Eliminate Proposed Allowance for Other Transportation Expenditures. We recommend the Legislature eliminate the portion of the grant providing funding for costs not directly related to the bus or its infrastructure. Eliminating this allowance would create parity with other bus replacement programs and avoid creating incentives for districts to forego those programs. Given that the proposed grants would cover the entire cost of the bus and charging station, we think the state could expect districts to pay for other costs out of their local budgets.

Provide Smaller Amount Initially and Adjust Future Funding Based on Demand. Whereas the Governor proposes to provide $1.5 billion for the program immediately, we recommend the Legislature plan to allocate funding over multiple years and begin with a smaller amount. This approach would allow the state to adjust future funding based on district interest and the progress the state makes toward its goals for replacing older buses and reducing emissions. One way to implement this recommendation would be to plan for a three-year program and provide an initial allocation of $500 million in year one. To help determine funding amounts for the subsequent two years, the Legislature could require CDE to track and report data on the number of applications received and funded, as well as data on the age of the buses being replaced. Alternatively, if the Legislature decides to provide an immediate allocation closer to the $1.5 billion proposed by the Governor, it might want to expand the program to ensure it can allocate the full amount to interested districts. The nearby box outlines a potential option, focusing on grants for expanding district fleets. To the extent the Legislature makes changes to

the timing or amounts for the Governor's proposal, it would need to account for the changes in capital outlay spending as part of its plan for addressing the state appropriations limit.

Consider Most Appropriate Agency to Administer the Program. CDE has an existing unit dedicated to school transportation, previously administered a bus replacement program for small districts, and regularly distributes other school funding. Based on these factors, CDE likely has the ability to implement the proposed program. On the other hand, CARB is already administering the bus replacement program created in the 2021-22 budget plan. Assigning the new program to CDE would result in different agencies administering two similar programs. Many districts likely would submit funding applications with each agency, and both agencies likely would incur additional workload to coordinate their grant awards and ensure districts receive one grant per bus. If the Legislature wanted to streamline the allocation of funding, it could assign the new program to CARB.

An Option for Fleet Expansion Funding

Some Districts Might Be Interested in Expanding Their Fleets. The Governor's proposal would provide funding specifically for districts to replace buses they already own. Some districts, however, might be interested in expanding the size of their fleets. The federal survey data, for example, suggest many districts in California previously operated larger transportation programs. Some of these districts might be interested in obtaining additional school buses to increase their current home-to-school transportation service, particularly if electric school buses allow for somewhat less costly operations.

Reasons the State Could Consider Funding Fleet Expansion. The Legislature might want to provide funding for fleet expansion if it decides to provide an initial allocation for the program that is closer to the $1.5 billion proposed by the Governor. For example, the Legislature might decide to allocate funding at this level as part of its plan to meet the state appropriations limit. Making funding available for fleet expansion would increase the likelihood the state is able to allocate the entire amount to interested districts. Another reason could be to obtain additional reductions in pollution and greenhouse gas emissions beyond the amounts associated with replacing existing buses. According to the most recent survey data, trips to school in private automobiles—typically powered by gasoline—are the main alternative to district-provided transportation. A full-size school bus can carry more than 50 students, potentially eliminating several dozen trips in private vehicles and the associated emissions.

Structuring a Fleet Expansion Grant. If the Legislature decides to provide funding for fleet expansion, we recommend structuring it as a separate component from the main program. Under this approach, districts could apply for grants to replace their existing buses, grants to expand their fleets, or both types of grants, depending on their local priorities. The fleet expansion grants would not require districts to scrap older buses, but would cover a smaller share of costs. For example, the state could structure the grants to cover half the cost of an electric bus (this proportion roughly corresponds to the additional cost of an electric bus relative to a diesel bus). A cost-sharing approach would increase the likelihood districts apply for fleet expansion grants only for buses they intend to use regularly. The Legislature also could target the fleet expansion grants toward areas where it believes expanded transportation service would be most beneficial. For example, if the Legislature wanted to promote transportation for low-income students, it could prioritize funding for districts with relatively high shares of these students.

LAO PUBLICATIONS

This report was prepared by Kenneth Kapphahn with the assistance of Ross Brown, and reviewed by Edgar Cabral and Anthony Simbol. The Legislative Analyst's Office (LAO) is a nonpartisan office that provides fiscal and policy information and advice to the Legislature.

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