



Washington Office of Superintendent of
PUBLIC INSTRUCTION

REPORT TO THE LEGISLATURE

Zero Emission School Bus Survey

2024

Authorizing Legislation: **House Bill 1368** (2024)

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EXECUTIVE SUMMARY

The 2024 Legislature directed the Office of Superintendent of Public Instruction (OSPI) to collaborate with the Department of Ecology (Ecology) to conduct a survey of Washington's local education agencies (LEAs) to collect information on how to better prepare the state's transition to zero emission school buses. In total, 77 out of 308 LEAs responded to the survey, representing large and small school districts from all areas of the state and districts that contract for transportation services.

Some survey responses provided information on barriers LEAs may experience when transitioning to zero emission school buses, supplied information to aid Ecology with Zero Emission School Bus grant funding, and gave feedback on preliminary zero emission and diesel school bus Total Cost of Ownership (TCO) factors. The results will aid Ecology with future grant opportunities and provide information about the areas of concern that LEAs may have about transitioning to zero emission school buses.

INTRODUCTION

House Bill 1368 (2024) required OSPI, in collaboration with Ecology, to create preliminary guidance on Total Cost of Ownership (TCO) formula factors for zero emission and diesel school buses. Once the TCO of zero emission school buses is at or below the TCO of a diesel school bus, districts must purchase zero emission school buses.

In Section 6 of the legislation, the Legislature charged OSPI, in consultation with Ecology, with surveying LEAs and collecting information to better prepare for transportation decarbonization. The survey included questions on:

- Current zero emission charging capacity and infrastructure;
- If LEAs would apply for funds, if grants were available, to support zero emission school bus and infrastructure purchases;
- If and why LEAs continue to use school buses manufactured before 2007;
- Provide feedback on preliminary Total Cost of Ownership factors; and
- Other information that OSPI and Ecology thought would be useful to transition to zero emission school buses.

To better understand challenges that LEAs may experience when transitioning to zero emission school buses, the following questions were added to the survey:

- Additional bus fleet facility needs beyond infrastructure;
- Barriers to applying for zero emission school bus grants; and
- Costs to replace diesel school buses with zero emission school buses that are not covered by Ecology's existing Zero Emission School Bus Program.

Survey Results

In total, 77 LEAs submitted responses to the survey. The survey was divided into sections by content:

1. Charging infrastructure,
2. LEA Transportation facility needs,
3. Barriers and costs,
4. Use of school buses manufactured before 2007, and
5. Total Cost of Ownership formula factors.

Charging Infrastructure

Information regarding charging infrastructure will help Ecology with future zero emission school bus and infrastructure grants. The status that LEAs provided gives a look into current and future charging capabilities for zero emission school buses.

Table 1: Charging Infrastructure Status

Charging Infrastructure Information	Number of LEAs*
LEAs that currently have on-site charging	14
LEAs that currently do not have on-site charging	60
N/A	3
LEAs that have studied existing infrastructure capacity	32
LEAs that have not studied existing infrastructure capacity	45
Number of district owned buses that can be charged simultaneously with existing infrastructure	14 responses, ranging 1–20 buses at a time
Number of contractor owned buses that can be charged simultaneously with existing infrastructure	0 reported

*Out of the 77 LEAs who responded to the survey.

Source: Zero Emission School Bus Survey, 11/20/2024

Additional School Bus Facility Needs

LEAs have expressed concerns that they are not able to transition to zero emission buses for multiple reasons. Some items that LEAs reported are needed to facilitate the transition are bus sheds, additional facilities, additional school bus parking, and maintenance equipment.

Table 2: Additional School Bus Facility Needs

Items Needed	Number of Responses*
Bus sheds	22
Additional facilities	25
Additional parking	38
Maintenance equipment	47
Other	26

*Out of the 77 LEAs who responded to the survey.

Source: Zero Emission School Bus Survey, 11/20/2024

Other facility needs that were provided in the survey include training, room for a quarantine zone in maintenance areas, emergency services, backup generators, maintenance stock, and shelters to cover the chargers. Also included in this section of the survey were comments about not having the ability to install infrastructure due to electrical grid capability.

Barriers

The survey barrier list was based on the [Transportation Electrification Strategy](#) cited barriers to transition to zero emission vehicles and obstacles voiced by LEAs.

Table 3: Barriers to Transitioning to Zero Emission School Buses

Barriers	Number of Responses*
School Bus Reliability	47
School Bus Trip Range	62
Lack of Access to School Bus Maintenance	48
Limited or Restricted On-Site Maintenance	46
Cost of School Bus Maintenance	39
Charger/Infrastructure Technology	64
Unable to Access Grid Infrastructure	23
Cost of School Bus	66
Cost of Infrastructure	61
Site Preparation Costs	55
School bus facility is not sufficient size to install infrastructure	35
Extended Maintenance Down Time	35
Availability of Off-Site Charging Sites	46
Availability of Specialized Towing Providers	32
None	3
Other	8

*Out of the 77 LEAs who responded to the survey.

Source: Zero Emission School Bus Survey, 11/20/2024

LEAs indicated concerns about facility planning, the ability to and cost of charging school buses when on extracurricular trips, electric school bus safety, hazardous waste upon bus disposal, the community not supporting zero emission school buses, difficult grant processes, and the inability to qualify for a full grant.

Cost Concerns

LEAs may have concerns about the costs of replacing diesel school buses with zero emission school buses that are not covered by grant funding.

Table 4: Costs Not Covered by Grant Funding

Non-funded Costs to Replace Diesel Buses?	Number of Responses*
Yes	27
No	5
No opinion	45

*Out of the 77 LEAs who responded to the survey.

Source: Zero Emission School Bus Survey, 11/20/2024

The inability to determine costs that may not be covered by grant funding due to unknown costs was expressed. Other costs that are not included in grant funding include:

- Potential disposal fees for zero emission school buses after the bus reaches its lifetime,
- Site improvements to facilitate zero emission buses,
- Electrical costs due to high demand,
- Extended downtime of zero emission buses,
- Charging infrastructure repairs,
- Grid infrastructure,
- Cost of back-up buses to use when a zero emission bus is out of service,
- Facilities to accommodate infrastructure,
- Staff training,
- Upgrades to charging infrastructure,
- Enclosed school bus storage facilities, and
- A requirement to destroy buses that are still receiving depreciation payments.

Potential Infrastructure Grants

One question on the survey was whether LEAs would apply for a grant that provides full funding for zero emission buses or infrastructure within specified timelines.

Table 5: Applying for Grants

Grant Availability Timeline	Number of Responses*
Would apply within 2 years	21
Would apply within 5 years	18
Would take longer than 5 years to apply	38

*Out of the 77 LEAs who responded to the survey.

Source: Zero Emission School Bus Survey, 11/20/2024

The responses about the grant timeline will assist Ecology with future grants processes.

School Buses Manufactured Prior to 2007

The U.S. Environmental Protection Agency (EPA), as well as state and local governments, began requiring stricter diesel exhaust emission standards for commercial vehicles produced in 2007 and newer, including school buses. Currently, there are 876 diesel school buses in the state that were manufactured prior to 2007, though OSPI is not aware which of these school buses are regularly in use.

Table 6: Number of School Buses Manufactured Prior to 2007

School Buses That Were Manufactured Prior to 2007?	Number of Responses*
Yes	34
No	41

*Out of the 77 LEAs who responded to the survey.

Source: Zero Emission School Bus Survey, 11/20/2024

Reasons for why LEAs use school buses that were manufactured prior to 2007 vary. The reasons provided include:

- Lack of funds to replace the school buses,
- The school bus replacement plan is based on a 20-year cycle,
- Buses are used as spare buses,
- The buses still run and are more reliable than newer buses,
- The buses offer full, under carriage storage,
- Maintenance and repair costs are low and parts are readily available.

Total Cost of Ownership

OSPI and Ecology developed preliminary TCO formula factors that were included in the survey and as a separate document on OSPI’s Student Transportation webpage. The factors are subject to change due to the relative newness of electric school buses in Washington state and lack of data from the Original Equipment Manufacturers (OEMs). As an example, the propulsion battery replacement costs are currently unknown. Also, input from LEAs will be taken into consideration when developing TCO guidance.

TCO Survey Results

LEAs had difficulty opening the TCO document in the survey, which led to a separate dispersal of only the TCO. Additionally, the survey and TCO document are posted on OSPI’s Student Transportation webpage. Not all responded to the questions regarding TCO due to difficulty opening the document in the original format.

Table 7: Total Cost of Ownership

Use of TCO	Number of Responses*
A TCO formula/process is used to purchase a new school bus	15
A TCO formula/process is not used to purchase a new school bus	60
Would use the preliminary TCO to purchase next school bus	48
Would not use the preliminary TCO to purchase the next school bus	27
Would not remove anything from the TCO factors	50
Do not know if anything should be removed from TCO factors	24

*Out of the 77 LEAs who responded to the survey.

Source: Zero Emission School Bus Survey, 11/20/2024

When asked if any factor should be removed from the TCO document, responses were either “No” or “Unknown.” However, some costs that should be added to the TCO factors are:

- Charger replacement due to projected lifetime,
- Charging infrastructure maintenance,
- Administration coordinating costs to implement transition,
- Downtime due to unreliability and maintenance,
- Spare buses to replace zero emission buses when out of service,
- Training,

- Identifying kilowatt hour costs,
- Cost of using a zero emission bus in adverse weather,
- Insulated buildings to store the zero emission school buses, and
- Charging costs when out of district.

To understand potential factors to include in the TCO guidance, LEAs were asked why they would not use the proposed guidance. They said:

- Time would be better spent on teaching and learning rather than transitioning to zero emission school buses,
- The document is confusing,
- The district is a level three charging area making it impracticable to switch to EV and have purchased propane buses,
- Buses should be replaced based on the end of depreciation lifetime, and
- TCO formulas do not accurately predict future costs.

Additional comments survey respondents submitted regarding TCO factors include:

- The TCO document does not capture the carbon benefit a district could see;
- Clean diesel and propane are great options;
- The state should focus on infrastructure before purchasing zero emission school buses;
- Extend access to diesel buses for another two years;
- Zero emission school buses do not have the range to complete extracurricular trips;
- The school district is experiencing funding shortages for all operations and transitioning to zero emission buses is not feasible;
- Insert a line item below row six, and label EV energy use (kWh/mile);
- A new facility would be needed;
- The LEA would need to double the number of buses in their fleet due to limited zero emission school bus ranges;
- Propane buses are cost effective, low emissions, and are dependable, while reliability is uncertain with EV buses; and
- TCO is skewed toward zero emission school buses and not toward practical applications and needs.

CONCLUSION & NEXT STEPS

About 25% of LEAs responded to the zero emission and TCO factor survey. The responding LEAs provided information on subjects like barriers to transitioning to zero emission school buses, current grant funding, and feedback on preliminary zero emission and diesel school bus Total Cost of Ownership (TCO) factors, which will aid OSPI and Ecology in future endeavors to refine TCO factors. Also, data will assist Ecology with future grants related to zero emission school buses and infrastructure. LEAs have operational knowledge of their school bus programs and consideration should be made to the comments they supplied.

ACKNOWLEDGEMENTS

OSPI would like to acknowledge the Department of Ecology for their support and collaboration in creating the survey and developing the preliminary Total Cost of Ownership formula factors.

APPENDICES

Appendix A

Zero Emission School Bus Total Cost of Ownership Survey

Due November 19, 2024, by 5 pm.

This survey (Survey) of Washington school districts is being conducted by the Office of the Superintendent of Public Instruction (OSPI), in collaboration with the Department of Ecology (Ecology), at the direction of the State Legislature in House Bill 1368. The State Legislature identified a need for OSPI to survey districts in order to better prepare for transportation decarbonization, including the existing capacity of districts to operate zero-emission school buses and to receive feedback on a total cost of ownership (TCO) formula developed by OSPI in collaboration with Ecology. Some questions in the Survey are designed to help Ecology better serve districts with Zero-Emission School Bus grant funding. The Survey will be analyzed to provide a report to the Legislature by December 1st, 2024.

Local Education Agencies (LEAs) that contract for pupil transportation services should work with their contractor to complete the survey.

Contact Information*

List the primary contact email for the information submitted in the survey. This is the individual who OSPI will reach out to if any questions arise.

Local Education Agency*

Select

Physical Address(es) of Fleet Facilities*

Please provide the physical address(es) of your transportation bus fleet facilities in a numeric list **Ex. 1 - 600 WA St. Olympia, WA 98041, 2- fleet address, 3 - fleet address**. This information may be utilized by OSPI to further coordinate resources for districts around fleet activity.

Onsite Charging or Refueling*

Do any of your transportation bus fleet facilities currently have on-site charging or refueling infrastructure for zero-emission school buses?

Yes

No

N/A

Select or enter value

Existing Capacity*

Has your district studied the existing capacity of your electrical infrastructure to install charging or refueling infrastructure for zero-emission school buses?

Select

Additional Transportation*

Has your district identified additional transportation bus fleet facility needs beyond charging or refueling infrastructure needed to operate zero-emission school buses?

Select

Available Grant Funds Timeline*

If grant funds are available to cover the full cost of a zero-emission school bus, would your district apply for funds to purchase a new zero-emission school bus or fueling infrastructure within

2 years

5 years

Longer than 5 years

Barriers*

What barriers exist for your district to apply for zero-emission school bus grants? (Select all that apply.)

School Bus Reliability

School Bus Trip Range

Lack of Access to School Bus Maintenance

Limited or Restricted On-Site Maintenance

Cost of School Bus Maintenance

Charger/Infrastructure Technology

Unable to Access Grid Infrastructure

Cost of School Bus

Cost of Infrastructure

Site Preparation Costs

School bus facility is not sufficient size to install infrastructure

Extended Maintenance Down Time

Availability of Off-Site Charging Sites

Availability of Specialized Towing Providers

None

Other

Associated Cost*

Are there costs associated with replacing diesel school buses with zero-emission school buses that are not covered by Ecology's existing Zero-Emission School Bus Program ([link to guidelines](#))?

Select

Does your district use a school bus manufactured before 2007?*

Select

Determining Preliminary Total Cost of Ownership

Please review the provided preliminary total cost of ownership formula/spreadsheet before

answering the following questions. Note you may leave comments on the spreadsheet as well and submit those via email to OSPI (patti.enbody@k12.wa.us), but OSPI is only committed to reviewing comments received via this survey.

a. Identify any costs missing from the proposed TCO formula/spreadsheet.*

b. Would you remove any of the costs currently in the proposed TCO formula/spreadsheet? If so, why?*

c. Do you currently use a TCO formula or process to determine whether to purchase a new school bus?*

Select

d. Would you use the proposed TCO formula/spreadsheet when determining your district's next bus purchase?*

Select

e. Do you have any additional comments on the proposed TCO formula/spreadsheet

Appendix B

Preliminary Total Cost of Ownership

This Total Cost of Ownership (TCO) workbook is preliminary guidance and includes cost factors believed necessary to develop a TCO formula. Please review each cost factor and if you believe any are missing, please reach out to Patti Enbody via email at patti.enbody@k12.wa.us.

The TCO preliminary guidance is part of the Survey being conducted by the Office of Superintendent of Public Instruction (OSPI), in collaboration with the Department of Ecology (Ecology), at the direction of the State Legislature in House Bill 1368. The State Legislature identified a need for OSPI to survey districts in order to better prepare for transportation decarbonization, including the existing capacity of districts to operate zero-emission school buses and to receive feedback on a total cost of ownership (TCO) formula developed by OSPI in collaboration with Ecology.

The Survey will be analyzed to provide a report to the Legislature by December 1st, 2024. The TCO formula will be developed and updated using multiple data sources, including information gained from the Survey and feedback on the cost factors in this workbook.

Preliminary Costs of Ownership: Vehicle Costs

Cost Factors	How is the factor used?
Expected Vehicle Lifetime	Vehicle lifetime is based on depreciation lifetime. This factor is multiplied by annual costs to get lifetime costs. See the 2024-25 School Bus Categories and Reimbursement Prices
Annual vehicle mileage	Used to calculate mileage-based costs - fueling, maintenance, etc.
Cost of Bus (2024 cost per vehicle)	One-time vehicle purchase cost. See the 2024-25 State Quote Specifications
Overall fuel economy (MPGe)	Used to calculate annual fueling costs
Fuel cost	Calculated from fuel efficiency (MPGe), annual miles, and fuel price per gallon
Overall maintenance and repair costs (cost per mile)	Multiplied by annual vehicle mileage. See the U.S. Department of Transportation's Bus Lifecycle Cost Model for Federal Land Management Agencies (pg. 15)
Year 1-5 maintenance and repair costs (cost per mile)	See the Bus Lifecycle Cost Model
Year 5+ maintenance and repair costs (cost per mile)	See the Bus Lifecycle Cost Model
Diesel exhaust fluid (cost per gallon)	Price per gallon multiplied by estimated fuel consumption per year
Year 8 battery replacement cost (2023 cost)	One-time cost for battery replacement

Cost Factors	How is the factor used?
Full coverage cost to insure vehicles (cost per year)	Average vehicle insurance cost

Preliminary Costs of Ownership: Infrastructure Costs

Cost Factors	How is the factor used?
Number of Ports	Number of charge plugs by charging type - level 2 or DC fast charge
Charging level (in kWh)	Estimated charging capacity by charger type - level 2 or DC fast charge
Avg EVSE cost (cost per charger)	One-time cost of charger station
Maintenance cost (cost per year)	Annual maintenance costs (warranty or included maintenance should be factored in)
Network software (cost per charger)	Annual cost for smart charging capability - smart charging may or may not be required and this cost is dependent on district charging needs and future guidance
Customer-side construction and equipment installation cost (cost per station)	Construction costs such as trenching, running conduit, and other site-prep required for charging station installation
Average infrastructure cost	Average infrastructure costs per bus including equipment, installation, and ongoing costs such as maintenance - expressed as per year cost
Site improvements	Any other one-time site improvement costs not captured above - signage, expanded paved areas, fences, etc.

Preliminary Costs of Ownership: Other Costs

Cost Factors	How is the factor used?
Property insurance	This factor captures any increase in risk insurance pool due to property and infrastructure values
Training	EV School Bus Level I & II training is provided by the OEM at no cost to the customer. Level III training only available on limited basis
Maintenance bay improvements	Used to calculate one-time improvements to ensure electric bus maintenance can be performed
Towing	Costs incurred at an hourly rate
Heating costs/installation/fuel (Webasto)	Expressed as annual cost

Appendix C

[Results of the Zero Emission and Total Cost of Ownership Formula Factors Survey](#)

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