

Oregon Department of **ENERGY**

Electric School Bus
Technical Tools

March 15, 2022



Welcome to the School Bus Electrification Webinar.

Part 2, Technical Tools

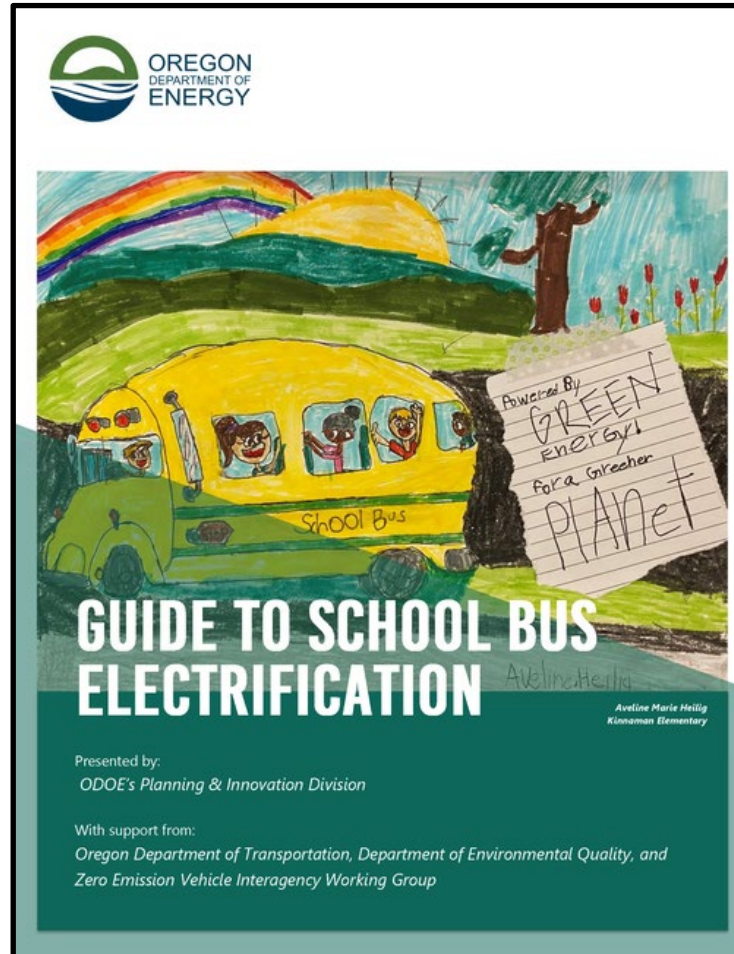
Workshop Section	Topic & Action	Time
Introductions	<ul style="list-style-type: none">▪ Welcome▪ Overview	1:00 – 1:10 pm
Evan Elias <i>Department of Energy</i>	<ul style="list-style-type: none">▪ Overview of the Electric School Bus Guidebook	1:10 – 1:20 pm
	<ul style="list-style-type: none">▪ School Bus Electrification Cost Comparison Tool<ul style="list-style-type: none">○ What it is○ What it is not○ Walkthrough of the tool	1:20 – 1:40 pm
All	<ul style="list-style-type: none">▪ Q & A Time	1:40 – 2:00 pm

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Overview of the Electric School Bus Guidebook



Overview of the Electric School Bus Guidebook

Contents:

- Electric School Buses: An Emerging Technology
- Benefits and Challenges of Electric Buses
- How to Get Started
- Costs
- Funding
- Selecting an Electric Bus Manufacturer
- Selecting and Installing Chargers
- Putting Electric Buses into Operation
- Resources

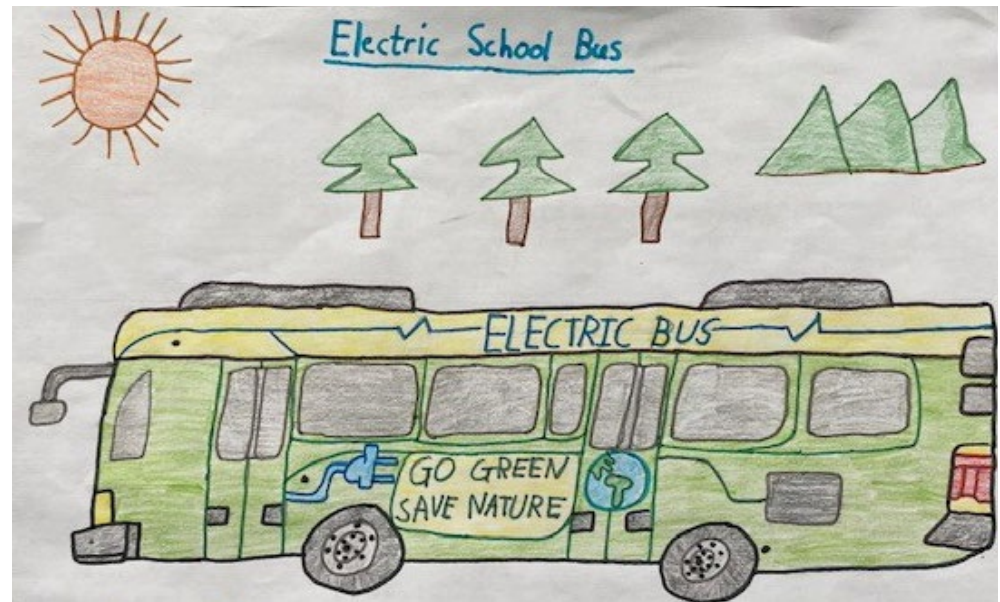


Derek Chen - Hope Charter School

Overview of the Electric School Bus Guidebook

A few of my Favorite Highlights:

- How to begin to evaluate your routes
- Engaging your utility regarding charging
- Choosing a Manufacturer
- Evaluating Warrantees
- Advise from those in Operation
- A Nice Collection of Resources



Shivam Patani - SATO Elementary

School Bus Electrification Cost Comparison Tool



Electric and Alternative Fuel School Bus Lifecycle Cost Analysis Tool

This tab enables users to input all costs associated with bus procurement, operation, maintenance, and fueling infrastructure to compare the costs between petroleum-based diesel and gasoline buses and other alternative fuel bus types. Once bus and fuel types are selected default values will populate in all subsequent entries. If known, the user can also enter their own fleet-specific values into these column B. Similarly, if the user has information on specific costs for the alternative fuel bus and fueling infrastructure needed this can be entered in column E. Default values will remain in columns C and F next to each entry for the user's reference. It is highly recommended that the user start with a fresh, unedited spreadsheet for each analysis to ensure that all calculations are performed correctly.

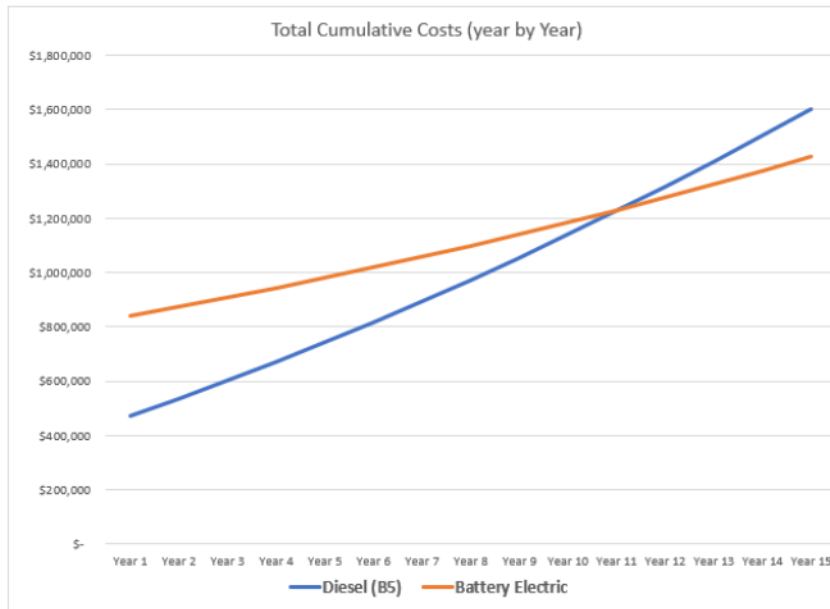
Bus 1 - Type C - Petroleum-Based Diesel or Gasoline Bus				Bus 2 - Type C - Alternative Fuel Bus			
Bus 1 Fuel Type		Diesel (B5)		Bus 2 Fuel Type		Battery Electric	
Select the bus and fuel type you currently use from the pulldown menu				Select the bus and fuel type you currently use from the pulldown menu			
Bus 1 Information				Bus 2 Information			
Type C Bus	Use Default Values or Enter Your Own Values	Default Values NOTE - cells are locked, editing will impact calculations		Type C Bus	Use Default Values or Enter Your Own Values	Default Values NOTE - cells are locked, editing will impact calculations	
Bus Price (per bus)	\$82,500	\$91,250		Bus Price (per bus)	\$ 245,000	\$ 330,000	
DEQ Bus Replacement Program Incentive percentage	No			DEQ Bus Replacement Program Incentive	No		
Bus Price w/DEQ Incentive	\$ 82,500			Bus Price w/DEQ Incentive	\$ 245,000		
Other Incentives or Cost Reductions	\$ -			Other Incentives or Cost Reductions	\$ 105,000		
Total Cost (per bus)	\$ 82,500			Total Cost (per bus)	\$ 140,000		
Number of Buses	5			Number of Buses	5		
Total Cost of Bus Purchases	412,500			Total Cost of Bus Purchases	\$ 700,000		
*For more info go to https://www.oregon.gov/deq/aq/programs/Pages/VW-Diesel-Settlement.aspx							
Bus 1 Fueling Station Cost				Bus 2 Fueling Station Cost			
	Use Default Values or Enter Your Own Values	Default Values NOTE - cells are locked, editing will impact calculations			Use Default Values or Enter Your Own Values	Default Values NOTE - cells are locked, editing will impact calculations	
Fueling Station Cost	\$0	\$0		Fueling Station Cost	\$ 111,250	\$ 111,250	

What the School Bus Electrification Cost Comparison Tool is



Cost Summary

Total Cumulative Costs



Cumulative Total Costs by Year		
	Diesel (B5)	Battery Electric
Year 1	\$ 473,424	\$ 842,611
Year 2	\$ 536,648	\$ 875,053
Year 3	\$ 603,452	\$ 908,672
Year 4	\$ 672,687	\$ 943,612
Year 5	\$ 744,268	\$ 980,360
Year 6	\$ 818,264	\$ 1,018,477
Year 7	\$ 894,736	\$ 1,057,960
Year 8	\$ 973,787	\$ 1,098,851
Year 9	\$ 1,055,244	\$ 1,141,210
Year 10	\$ 1,140,066	\$ 1,184,956
Year 11	\$ 1,227,455	\$ 1,230,225
Year 12	\$ 1,317,528	\$ 1,276,949
Year 13	\$ 1,410,023	\$ 1,325,282
Year 14	\$ 1,504,902	\$ 1,375,156
Year 15	\$ 1,602,262	\$ 1,426,504

What the School Bus Electrification Cost Comparison Tool **is not**



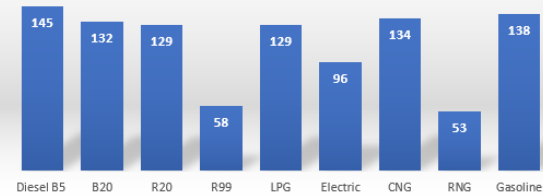
Fleet Carbon Footprint

Annual Fleet Carbon Footprint

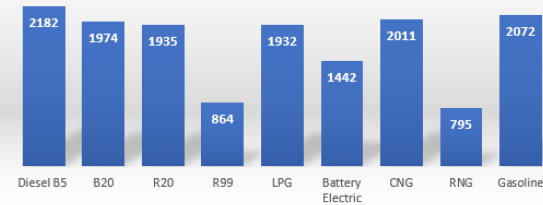
Baseline Reference EMT CO2e	CO2e Emissions Reductions Vs Diesel	
Diesel B5	145 MT	0 MT
B20	132 MT	14 MT
R20	129 MT	16 MT
R99	58 MT	88 MT
LPG	129 MT	17 MT
Electric	96 MT	49 MT
CNG	134 MT	11 MT
RNG	53 MT	92 MT
Gasoline	138 MT	7 MT

15 Year Cumulative Carbon Emissions MT CO2e	CO2e Emissions Reductions	
Diesel B5	2182 MT	0 MT
B20	1974 MT	208 MT
R20	1935 MT	247 MT
R99	864 MT	1318 MT
LPG	1932 MT	250 MT
Battery Electric	1442 MT	740 MT
CNG	2011 MT	171 MT
RNG	795 MT	1387 MT
Gasoline	2072 MT	111 MT

Annual GHG Emissions (MT CO2e) by Fuel Type



15 Year Cumulative GHG Emissions (MT CO2e) by Fuel Type



Break for Questions

Now let's have a moment for any questions that you may have before we switch into the walkthrough of the tool.

2022 UPCOMING EVENTS

Event	Date/Time	Link
School Bus Electrification: Technical Webinar	March 15, 1pm	http://www.oregon.gov/energy/energy-oregon/Pages/Fleets.aspx
Public Purpose Charge (SB 1149) Schools Program - 2022 Outreach webinar (repeat)	April 5, 9 – 10am	https://www.oregon.gov/energy/energy-oregon/Pages/SB1149.aspx
Bonds, Ballots and Buildings Conference *ODOE not attending, but materials available at ETO vendor booth	April 8, 7:30 – 3:30pm	https://www.osba.org/Calendar/Events/Bonds_Ballots_And_Buildings-2022.aspx
OSFMA Conference *ODOE and ETO attending Trade Show with booth(s)	April 14, 9 – 4pm	https://www.osfma.org/Annual-Conference
OASBO Conference *ODOE and ETO attending Trade Show with booth(s)	July 27 – 29	https://oasbo.com/page/events

Future webinars and conferences coming soon!

Oregon Department of **ENERGY**

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Thank you



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