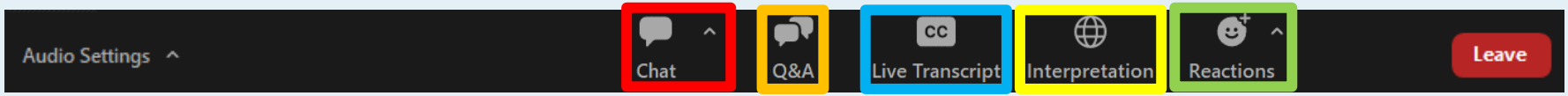
EPA CLEAN SCHOOL BUS

Building the Case for Electric School Buses, Total Cost of Ownership (TCO), Emissions, and Tools

August 28, 2024 @ 1 PM ET

Office of Transportation and Air Quality
U.S. Environmental Protection Agency

Zoom Webinar Logistics



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- **Questions:** Use the Q&A feature to ask questions during the presentation. We will address as many as possible after the presentation. If we are unable to answer your question at this time, we will list all questions and answers in the Q&A document available on our website. You can also submit written questions to the EPA Clean School Bus Program helpline at cleanschoolbus@epa.gov.
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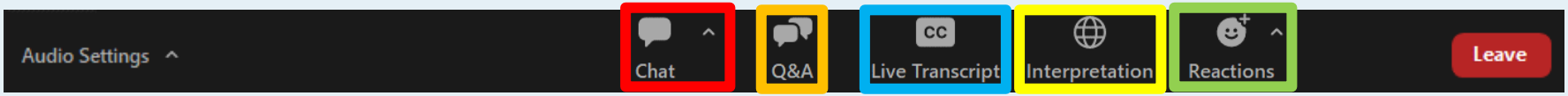

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- **Chat:** Se encuentra inhabilitado el chat, pero los presentadores podrían compartir enlaces a través de la función de chat.
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Live transcript is available

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Live Transcript

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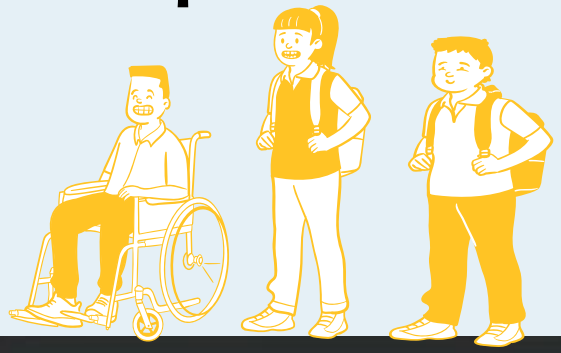

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English

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Interpretation

AGENDA

- Overview of the Clean School Bus (CSB) Program
- CSB Technical Assistance Resources
- Building the Case for ESBs, Total Cost of Ownership, Emissions, and Tools
- Q&A
- Next Steps and Resources

Overview of the Clean School Bus Program

Bipartisan Infrastructure Law

- The Bipartisan Infrastructure Law (BIL) provides **$5 billion** over five years (FY22-26) for the replacement of existing school buses with zero-emission and clean school buses.

Future Funding Opportunities

- The EPA has offered rebates and grants in past funding opportunities.
- The EPA *anticipates* opening another round of CSB rebate funding in Fall 2024.

EPA

EPA CLEAN SCHOOL BUS

Why Clean School Buses?

Reduced Greenhouse Gas Emissions
CSBs emit zero or low tailpipe emissions.

Cleaner Air
CSBs result in cleaner air on the bus, in bus loading areas, and in the communities in which they operate.

Cost Savings
Replacing older diesel school buses with CSBs often reduces maintenance and fuel costs.

Resiliency
Bidirectional charging capable CSBs can provide power to the grid or buildings during power shutdowns.

Improved Student Attendance & Achievement
The transport of students with CSBs has been linked to student attendance and academic achievement improvements.

CSB Program Technical Assistance Resources

Technical Assistance

- Clean School Bus Technical Assistance
- Charging and Fueling Infrastructure Resources
- Clean School Bus Case Studies
- NEW Tax Credits

Workforce Development

- Bus Manufacturer Job Quality and Workforce Development Practices
- Workforce Development and Training Resources

Educational Materials

- Clean School Bus Reports to Congress
- Benefits of Clean School Buses
- Resources to Engage Your Community

EPA

All links can be found on: *epa.gov/cleanschoolbus*

EPA CLEAN SCHOOL BUS

Technical Assistance Webinar Playlist

Technical Assistance via the Joint Office of Energy and Transportation

https://www.epa.gov/cleanschoolbus/clean-school-bus-technical-assistance

Joint Office of
Energy and
Transportation

Building ESB Case, TCO, Emissions, and Other Tools

Clean School Bus Program Webinar
August 28, 2024

driveelectric.gov

Electric School Bus Technical Assistance

NREL and the Joint Office of Energy and Transportation (Joint Office) are partnering with the U.S. Environmental Protection Agency to offer **FREE** clean school bus technical assistance to school districts receiving funds or planning to apply.

Provides school districts with the knowledge, tools, and information needed to successfully plan for and deploy clean school buses.

Clean School Bus Technical Assistance

CleanSchoolBusTA@nrel.gov

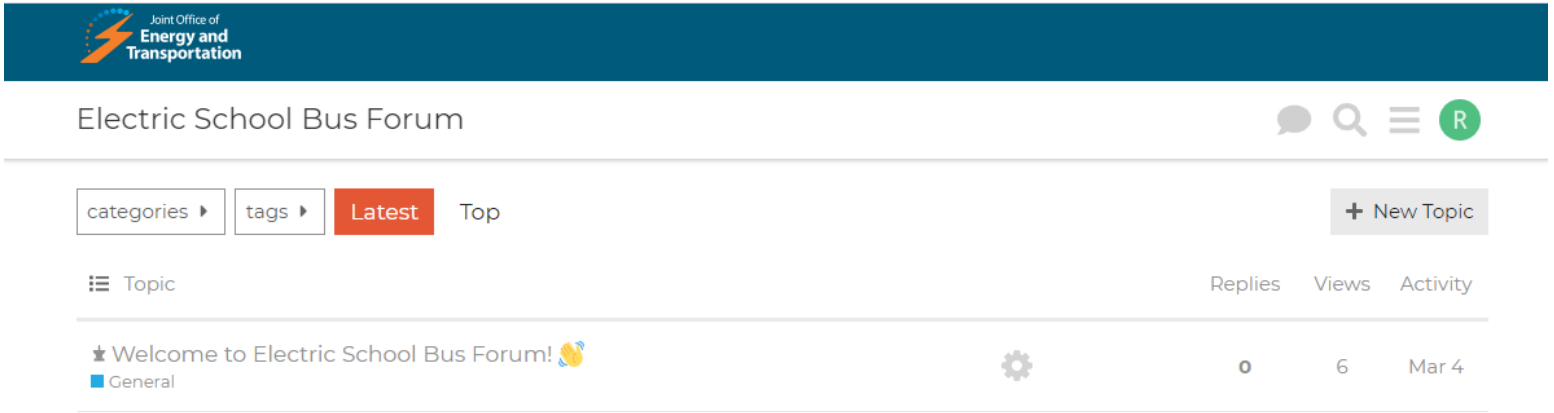
driveelectric.gov/contact

Examples of How We Can Help

- Coordinating with electric utilities
- Identifying available funding and incentives
- Analyzing charging infrastructure needs
- Conducting route analysis and planning
- Conducting training and workforce development
- Opportunities for resiliency (V2X)
- Analyzing energy needs and grid impact
- Identifying solar and battery storage opportunities

Electric School Bus Forum

- Online forum available to school bus operators
- Communicate with peers on all things pertaining to electric school buses



https://electric-school-bus-forum.nrel.gov/

Be the ESB Champion

Develop an elevator pitch

- Why should you do it
- What are the benefits
- Why it can work for you

Be the expert

- Subscribe to newsletters
- Read up on new products
- Attend conferences
- Read new stories

Have a plan

- https://afdc.energy.gov/guides/electric-school-bus
- Understand applicability/operations
- Charging infrastructure
- Workforce development, training, safety, etc.

Gauge Support

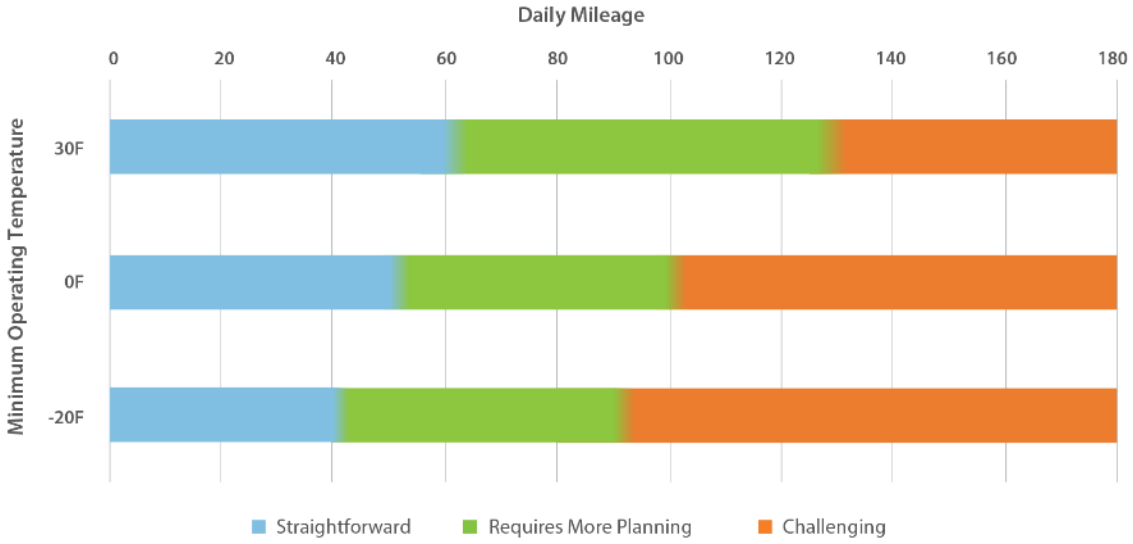
School Board/Leadership	Community	Workforce	Contracted Fleets
			

Understand potential concerns

- Difficult Implementation
- Misinformation
- Job Impacts
- Training
- Safety
- Costs

Implementation/Scoping

1. Do you have routes that can be serviced by ESBs?
   - Start with shorter routes
   - Understand temperature impacts

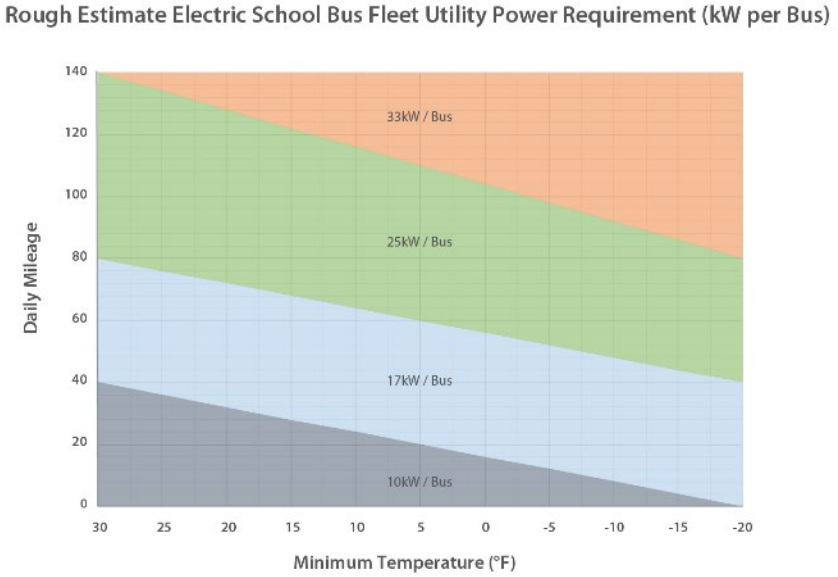


2. What are your potential charging locations?
   - Consolidate in one location
   - Stay close to electrical panels or transformers
   - Minimize trenching

Implementation/Scoping (cont.)

3. Identify your ESB model(s)
   - Consider standard safety, sizing, and other requirements
   - Ensure local service and parts support
   - Consider battery size, range, charging compatibility, and HVAC options
   - School Transportation News Buyer's Guide 2024
   - ESBI U.S. Buyer's Guide
   - CALSTART ZETI Tool
   - AFDC Advanced Vehicle Search Tool

4. Engage your utility
   - What are your rates/incentives?
   - Can they supply the required power?



Misinformation/Myth Busting

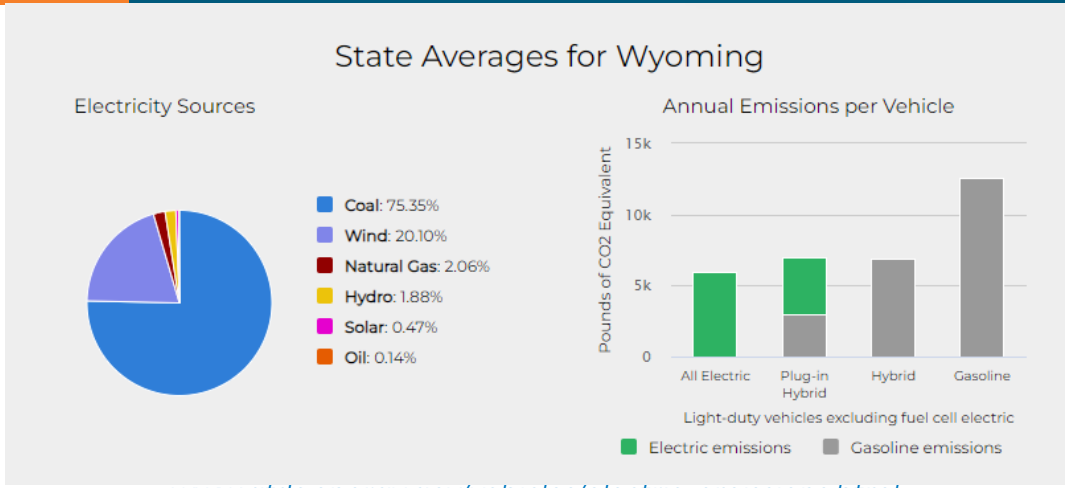
MYTH:

Electric school buses **don't reduce greenhouse gas emissions**

FACT:

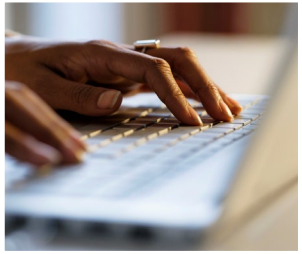
Electric vehicles typically **produce fewer greenhouse gas emissions**, even when accounting for the source of electricity

The greenhouse gas emissions associated with an electric bus **over its lifetime are typically lower** even when accounting for emissions from manufacturing and electricity generation.



www.afdc.energy.gov/vehicles/electric_emissions.html

Misinformation/Myth Busting – ESB Resources



cleanschoolbusta@nrel.gov

Joint Office of Energy and Transportation

Joint Office Resources

ESB Forum

EPA United States Environmental Protection Agency

EPA CSB Technical Assistance

Electric School Bus Initiative

Electric School Bus Initiative

U.S. DEPARTMENT OF ENERGY

AFDC (DOE)

ELECTRIC SCHOOL BUS NETWORK

Electric School Bus Network

ALLIANCE FOR ELECTRIC SCHOOL BUSES

Alliance for Electric School Buses

Training/Job Impacts

Drivers

- Minimal training is required
  - Efficiency
  - Regenerative braking
  - Cluster/Icons
  - How to charge
- Driver comfort is improved
  - Reduced noise
  - No diesel exhaust
  - Smoother ride

Technicians

- ESBs share most chassis and body components with conventional buses
- Tires, power steering, brakes, etc.
- ESBs still have maintenance schedules
  - Motor, cable, other inspections
  - Compressor maintenance

EPA CSB Webinar: Training & Workforce Development

ESB Familiarization Training Series

Part 2 – Technology Overview for Technicians August 7, 1pm EST

Register at:
https://driveelectric.gov/webinars/esb-webinar-series-episode-2

Brought to you by:

- Joint Office
- NREL
- International Transportation Learning Center (ITLC)
- School bus manufacturers

- Four-part module-based series for operators, technicians, and other school bus fleet members.
- Learn fundamentals of electric school bus technology.
- Live Q&A during each session.
- Recordings with testing materials for internal training programs.

Safety

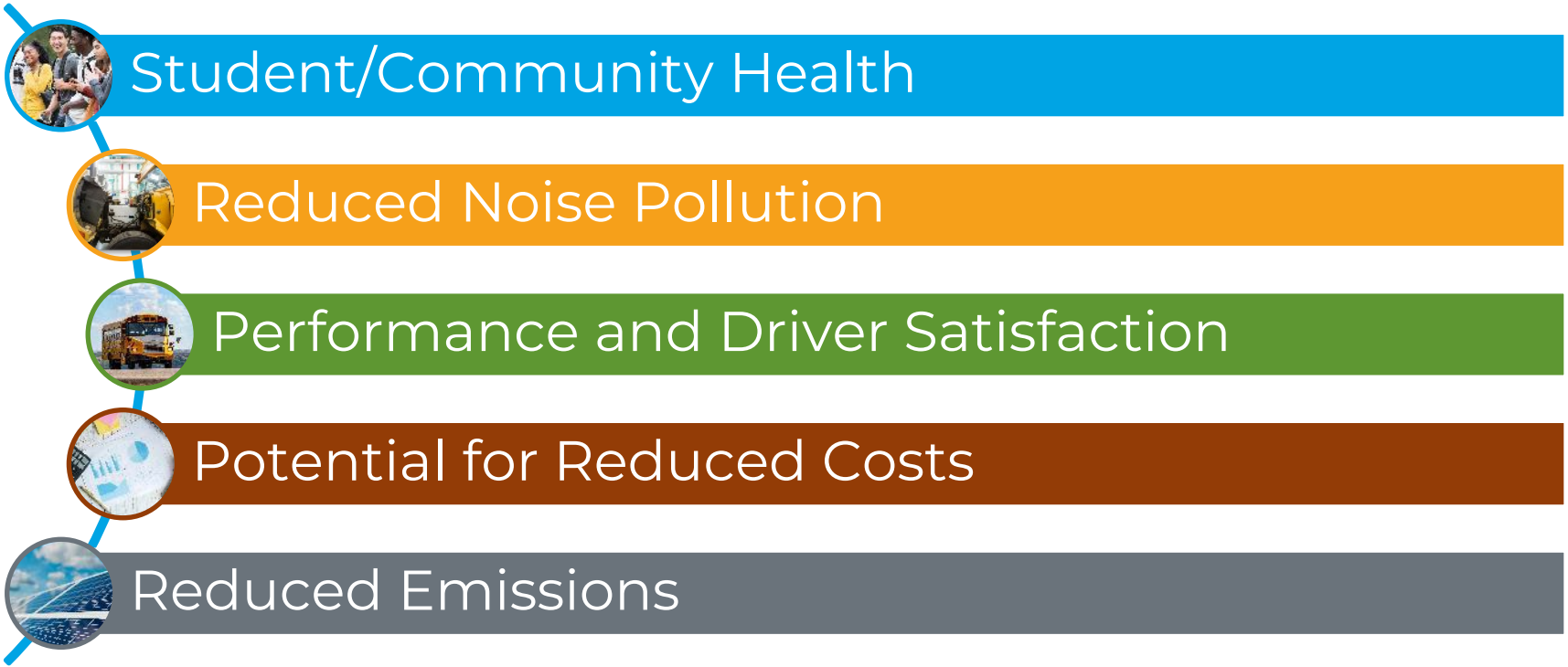
- **Drivers and riders are protected**
  - High-Voltage Interlock Loop (HVIL) monitors the HV system and can shut down during incidents

- **EV fires are rare**
  - Battery Management System (BMS) and Battery Thermal Management System (BTMS) monitor state of health and maintain parameters and temperature of the battery

- **Emergency Response Guides**
  - Identify HV components/ cables, describe shut down procedures
  - NFPA, ESA

- **Involve First Responders**
  - Communicate before acquiring ESBs
  - Offer training
  - EV Safety Training Resources for First and Second Responders

ESB Program Benefits



Estimate/Understand Costs

Identify Funding

- ESBs
- Infrastructure
- Utility Programs
- Tax Credits

Capital Costs

- ESB (ESBI Price Tracker)
- Charger costs including chargers, labor, install, utility upgrades (*EVI-Locate Tool coming soon)

Operational Costs

- Fuel/Electricity (including demand charges!)
- Maintenance

Funding Resources

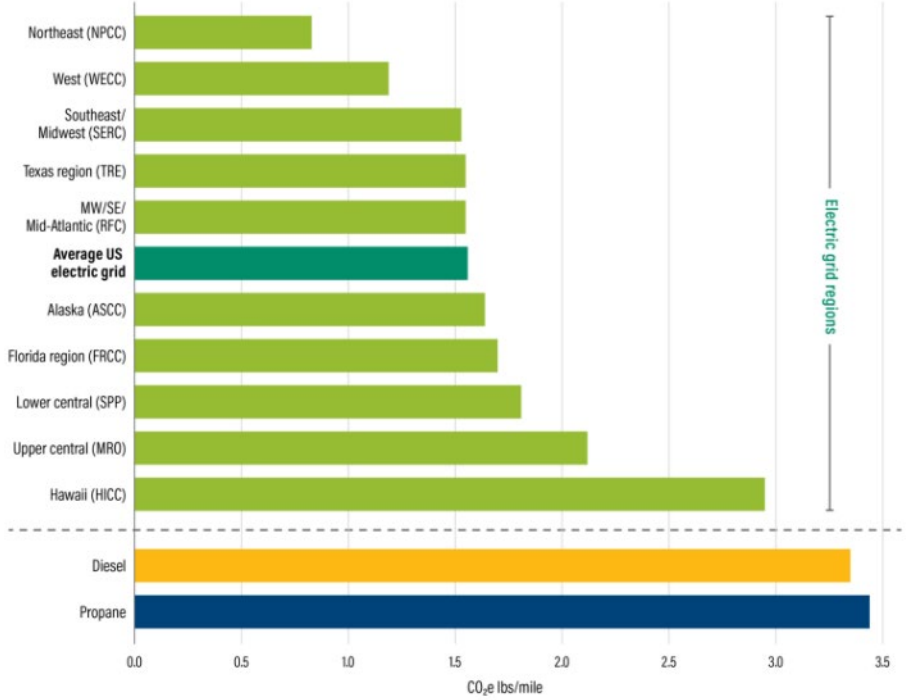
- EPA Clean School Bus Program
- AFDC Laws & Incentives and AFDC School Bus
- AFDC U-Finder
- ESBI Clearinghouse: ESB Funding and Financing Opportunities
- DSIRE

Emissions Reductions

- Zero Tailpipe Emissions
- Reduced local emissions on route, at bus stops, at and around bus depots, and in front of schools
- Reduced GHG emissions regardless of grid region
- The grid is becoming cleaner

Lifecycle greenhouse gas emissions from electric school buses are lower than diesel and propane across all regions

Carbon dioxide equivalent, per mile. Lifecycle electric school bus emissions are above the dotted line according to electric grid region.



Source: AFLEET 2020, using EIA NERC Electricity Regions with descriptions of approximate areas added in graph labels.

22.08.22

WORLD RESOURCES INSTITUTE

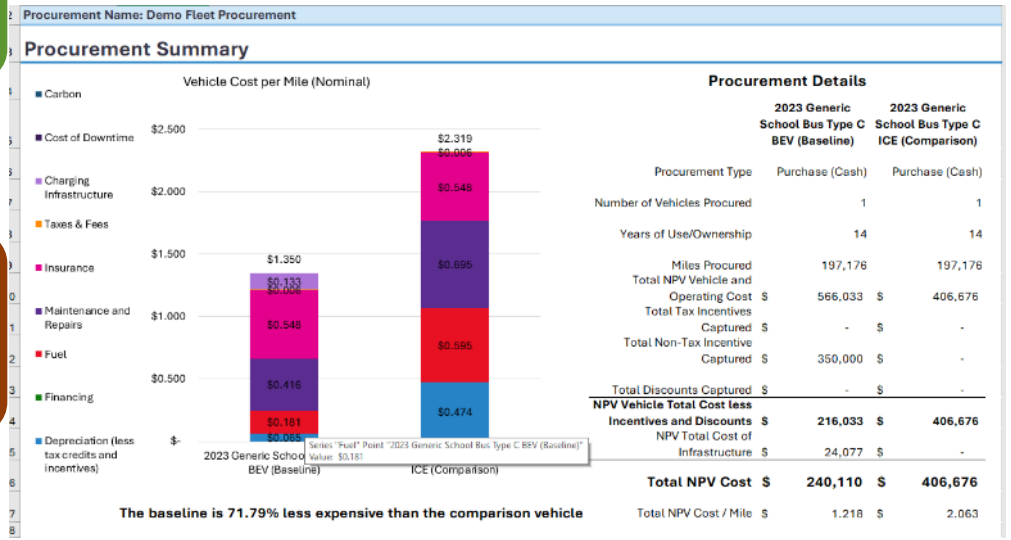
Total Cost of Ownership (TCO) and Emissions Resources

Estimates/Minimal Inputs

- ANL Afleet Online
- ESBI TCO Calculator

Spreadsheet Based Tools

- ESBI Fleet Procurement Analysis Tool
- Atlas Public Policy DRVE Tool



Procurement summary from the ESBI Fleet Procurement Analysis Tool

General Best Practices/Advice

Be the ESB Champion!

Don’t be afraid to start a pilot.

Take advantage of unprecedented funding.

Join the ESB Forum and connect with peers https://electric-school-bus-forum.nrel.gov/ .

Reach out to cleanschoolbusTA@nrel.gov

Joint Office of
Energy and Transportation

Thank you

August 28, 2024

CleanSchoolBusTA@nrel.gov

driveelectric.gov

Question & Answer Session

Upvote and comment on questions similar to your own.
Type your full thought so we can follow-up with an answer.
Speak slowly and clearly for the captioner/interpreter.

cleanschoolbus@epa.gov epa.gov/cleanschoolbus

Upcoming JOET TA Webinars

September 25, 2024	Electrification Process including a Step-by-Step Guide for New Adopters
TBD	TBD

To view the most up-to-date list of CSB webinars and register, please visit:
www.epa.gov/cleanschoolbus/events-related-clean-school-bus-program

EPA

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Clean Bus Planning Awards (CBPA) Program

- In addition to the free technical assistance provided by NREL for CSB applicants and selectees, **the $5M Clean Bus Planning Awards Program provides FREE technical assistance** to create comprehensive and customized bus electrification plans for fleets across the United States.
- **Applications for assistance are open on a rolling basis through Sept. 30, 2024**, giving fleets an opportunity to fully understand their needs before applying for support. **This new program will reduce the burden of electrification by helping fleet managers create a step-by-step plan to transition their bus fleet**.
- Learn more at https://driveelectric.gov/clean-bus-planning-awards and https://www.nrel.gov/news/program/2024/clean-bus-planning-awards-support-fleet-electrification-with-custom-transition-plans.html

Summary

Current Funding Opportunities

- The EPA has begun announcing 2023 Rebate selections.
- The CHDV grant program application period closed on July 25, 2024, at 11:59 PM ET.

Future Funding Opportunities

- The EPA encourages school districts to consider which competition structure (grants or rebates) best suits their needs.
- The EPA *anticipates* opening another round of CSB rebate funding in Fall 2024.

Resources

- The Joint Office of Energy and Transportation (cleanschoolbusTA@nrel.gov)
- The CSB helpline (cleanschoolbus@epa.gov)

Stay in Touch

- Learn more about the EPA Clean School Bus Program at epa.gov/cleanschoolbus
- Learn more about the JOET Clean Bus Planning Awards Program at driveelectric.gov/clean-bus-planning-awards
- Sign up for the CSB listserv at https://lp.constantcontactpages.com/su/dgrhRed/cleanschoolbus

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