



EPA CLEAN SCHOOL BUS PROGRAM

The Transition to Electric School Buses: Considerations and Resources

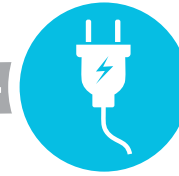
Choosing Your Fleet Composition



Selecting Electric Vehicle Supply Equipment (EVSE)



Infrastructure Planning with Your Local Utility



Calculating Up-Front Installation and Operating Costs With Your Local Utility



Finalizing Your Fleet Composition

Congratulations on your transition to electric school buses (ESBs)! As you begin to procure your new ESBs and eligible charging infrastructure, you will want to conduct several concurrent discussions with your local utility and the manufacturers of your vehicles and charging infrastructure. The topics and resources in this document will facilitate the successful purchase and timely deployment of your ESBs and charging infrastructure.



Please contact cleanschoolbusTA@NREL.gov if you have any questions and visit epa.gov/cleanschoolbus to learn more about technical assistance (TA). TA for ESB **planning and deployment** is available to school districts participating in the EPA Clean School Bus Program.

Choosing Your Fleet Composition

It is important to select an ESB that meets your district's transportation needs. A route analysis will allow you to understand your ESB energy requirements and will help vehicle manufacturers or dealers identify which ESB is appropriate for your district. The following are the necessary inputs to conduct a route analysis:

- Duty Cycle—route length, topography, and number of stops
- Ambient temperature—HVAC affects efficiency
- Bus Load (number of passengers)

Route Analysis Resources: An instructional video on how to conduct an [ESB route analysis](#)* is available from The Department of Energy's Alternative Fuel Data Center. Alternatively, school districts participating in the Clean School Bus Program can contact the Joint Office of Energy and Transportation (JOET) helpline for assistance conducting a route analysis (cleanschoolbusTA@NREL.gov). You can then bring your route analysis to discussions with your bus manufacturer and/or dealer.



Selecting Electric Vehicle Supply Equipment (EVSE)

The type of charger selected depends on route demands and hours available for recharging. When selecting EVSE:

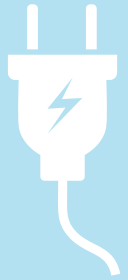
- Determine which charger type, Level 2 vs DC fast charging infrastructure, will support your ESB fleet.
- All Level 2 chargers purchased under the Clean School Bus Program must be **EPA ENERGY STAR® certified**.*
- EPA recommends that DC Fast Charging infrastructure funded by the Clean School Bus Program be listed by a Nationally Recognized Testing Laboratory (NRTL). Ask the manufacturer if their EVSE is NRTL certified.
- Consider how local climate will impact daily energy needs and ESB charging power requirements (e.g., colder climates may require more frequent charging).
- Assess if **networked chargers*** or use of charge management software would optimize your fleet's electricity consumption.
- Secure a certified electrical technician or contractor for proper EVSE installation, and identify the timeline in which the installation can be completed.

EVSE Resources: The Alternative Fuel Data Center has a tutorial on how to [determine your charging needs and select a charger](#).* Assistance with infrastructure planning and filling out the detailed ESB [Charging Station Planning Form](#) is available to school districts participating in the Clean School Bus Program via the JOET TA helpline (cleanschoolbusTA@NREL.gov).



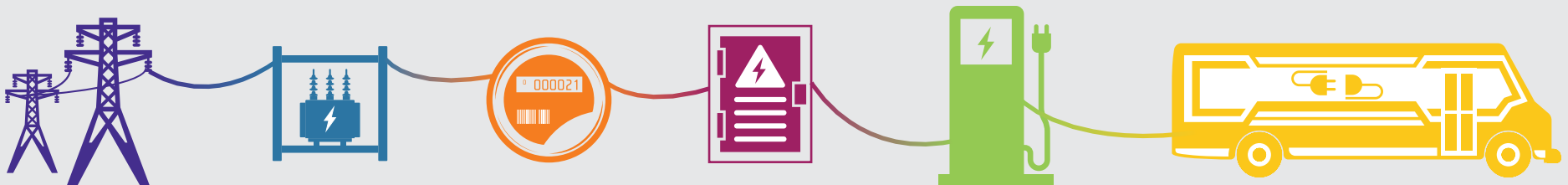
Infrastructure Planning with Your Local Utility

In parallel with identifying your ESB and EVSE, reach out to your local electric utility to discuss the charging infrastructure deployment and utility interconnection process. It is necessary to evaluate the existing power supply, identify appropriate charging infrastructure, and determine if any electrical upgrades are required to support your electric fleet. Conduct a depot assessment with the utility company to discuss:



- Type(s) of charging infrastructure that needs to be supported (**Level 2 vs DC fast charging equipment**).*
- Who will own, operate, and maintain the electric vehicle supply equipment.
- Required permits and inspections.
- Number, placement, and accessibility (e.g., charging cord length) of charging ports.
- Ability to use existing service panels and wiring.
- Choice of wall mount vs. pedestals for charging.
- Potential for deployment of a vehicle-to-grid (V2G) or vehicle-to-building (V2B) program.
- Ability to accommodate future expansion of the electric fleet.
- Timeline for any necessary electrical upgrades and requirements for utility interconnection between the charging infrastructure and the grid. Upgrades can take considerable time (e.g., six or more months).
- Current and future capacity of the local grid infrastructure.

Utility Resources: Edison Electric Institute (EEI) and Beneficial Electrification League (BEL) have partnered with EPA and **pledged to proactively support school bus electrification**. Additionally, the Joint Office of Energy and Transportation **NEVI U-Finder*** identifies local utility incentives supporting EVSE installation and **technical assistance**.* The World Resources Institute has a detailed ESB **Power Planner*** for working with your electric utility and information about **V2G pilot programs**.* The U.S. Department of Transportation's (DOT's) Rural EV Toolkit "Decide on Ownership Model" page identifies four **EVSE ownership arrangements*** to consider. The Vermont Energy Investment Corporation has an informative **Electric School Bus Charging Equipment Installation Guide**.*



Calculating Up-Front Installation and Operating Costs With Your Local Utility



Work with your local utility to calculate the cost of installing charging infrastructure, and if needed, any necessary electrical service upgrades. Additionally, consider obtaining a copy of your current electric bill for reference when determining how electrifying your fleet will affect your electricity costs. You will want to:

- Estimate peak, off-peak, and total electrical demand. Note that electrical demand for charging may differ during the winter and summer months.
- Estimate cost of charging based on pricing for peak and total electrical demand.
- Determine if you are subject to **peak demand charges**.*
- Ask if your utility service offers managed charging support, time-of-use charge rates, or other options to avoid or reduce demand charges.
- Ask about cost-sharing, rebates, or other available **incentives**.*

Utility Cost Resources: A review of **utility rate structures*** is provided by the DOE's Alternative Fuels Data Center. Suggestions for lowering the costs of charging through load reduction (or "peak shaving") are highlighted in the DOT's Rural EV Toolkit – **Assess EV Charging Needs**.*

Finalizing Your Fleet Composition



Refer to your route analysis to confirm your ESB technical specifications (i.e., battery size, number of seats, cabin heating system, etc.). Before purchasing you will also want to:

- Confirm your ESB meets **Clean School Bus Program eligibility requirements**.
- Compare warranties, including those for electric batteries, and review terms that would render a warranty null and void.
- Determine if the manufacturer offers data collection software to monitor your ESB fleet and/or software that supports managed charging by EVSE.
- Ask manufacturers about **training opportunities** for drivers, maintenance workers, and other staff.
- Establish an end-of-life plan for the electric batteries.

Electric School Bus Resources: The World Resources Institute has a comprehensive **ESB market study and buyers guide**.* The "**Flipping the Switch on Electric School Buses**"* series includes segments on **currently available ESB models and vehicle cost factors*** and using **telematics to track ESB performance**.*

* **Please note:** This resource was not developed by EPA. EPA is not responsible for updating or verifying accuracy of the information on the linked page.



Technical assistance for **ESB planning and deployment** is available to school districts participating in the EPA Clean School Bus Program.

Email cleanschoolbusTA@NREL.gov or visit epa.gov/cleanschoolbus to learn more.



Publication Number: EPA-420-F-23-006

October 2023