



MAINE SCHOOL ENERGY PROJECTS GETTING STARTED GUIDE

ELECTRIC BUSES



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Introduction

Diesel school buses are significant contributors to both greenhouse gas emissions and pollutants such as nitrogen oxides (NOx) and particulate matter 2.5 (PM2.5), which can lead to health complications like asthma for children. According to researchers at the [Harvard T.H. Chan School of Public Health](#), replacing one diesel school bus with an electric school bus could net \$40,400 worth of climate benefits and \$43,800 in health benefits.¹ They also have many other benefits for students and schools.

Reduced Fuel Costs and Emissions

Fuel costs are reduced up to [80%](#) and emissions by up to [76%](#).^{2,3}

Less Maintenance

Fewer moving parts means less maintenance and costs reduced by as much as [60%](#).²

Healthier Environment

The elimination of diesel exhaust means students and drivers experience [better air quality](#).⁴

Reduced Noise Pollution

Quieter buses lead to [improved student behavior](#).⁵

The [Maine Clean School Bus Program](#) discusses additional benefits and frequently asked questions.

While electric buses have many benefits over diesel buses, they are a large investment. This guide will help school districts decide if incorporating electric buses is right for them.

Considerations for Districts

There are a myriad of factors at play when deciding if electric buses are a good choice for a school district. Below are several of those factors that should be taken into consideration.

Bus Ownership Structure

A school district's approach to electric buses will depend on whether it owns and operates its own buses or contracts with a vendor. If working with a vendor, districts should ensure that the vendor understands the various considerations for electric buses compared to diesel buses.

Upfront Costs

Upfront costs will vary, but the [World Resources Institute](#) reports new electric buses cost between \$200,000 and \$400,000.⁴ Charging stations add significant additional cost. School districts looking to build an electric bus fleet should seek funding support to reduce the cost of the buses and charging infrastructure. The [Maine Department of Education](#) reports on financial opportunities for electric buses.

SECOND CHANCE

“Re-powered” electric buses are used diesel bus chassis refurbished with the electric motor and battery, and cost \$110,000 - \$180,000, according to the [World Resources Institute](#).⁶

Vehicle Range

Electric buses can drive between 120 to 150 miles between charges. However, that distance shrinks by 25% to as low as 90 miles in cold Maine winters. Rural districts with long routes or large districts where a bus may have multiple routes per day may find it more challenging to transition to electric buses. For districts with a mix of bus types, electric buses should be assigned to routes that are predictable and within the shortest winter range of an electric bus. If needed, buses can “top off” their battery by plugging in during the school day.

Supplemental Heat

To counter range reduction in the winter, supplemental heaters can improve electric battery performance. However, many of these heaters use fossil fuels, so they will reduce the emissions and health savings benefits.

Maintenance and Service

Maintenance personnel need to be trained by the bus manufacturer to operate high-voltage systems and drivers should be trained in electric bus operation. It is important for the manufacturer to be close enough to service the buses for any repairs that are beyond the capabilities of district staff.

Managed Charging

Districts should select buses that display remaining battery charge, energy consumption, mileage, and diagnostic conditions. If a district's utility has demand charges, networked vehicle chargers can be used to manage charging across buses and lower electricity costs by reducing peak demand.

Gradual Transition

When incorporating electric school buses into a fleet, districts should consider initially adding just one or two. Piloting electric buses will give maintenance staff and drivers time to learn and limit risks to wider bus operations. Planning ahead for future charging infrastructure needs when more of the fleet is electric can help save money down the road.

Solar Power for Free Charging

Adding a solar photovoltaic (PV) array can offset some of the cost of electric bus charging.

Request for Proposal (RFP) or Request for Information (RFI) Template

For school districts interested in requesting proposals for electric school buses and charging infrastructure, the [Electric School Bus Initiative of the World Resources Institute](#) offers a template with recommended specifications.

Examples of key provisions from the RFP template for bus manufacturers include:

- ▶ Bus and charging equipment ownership options (owned, leased, lease-to-own, provided as-a-service, etc.).
- ▶ Manufacturer service capacity in Maine. List current local technical assistance available including the address of the two closest maintenance facilities and estimated response times.
- ▶ Range and the range loss at low temperature and high temperature.
- ▶ Charging equipment: provide Electric Vehicle Supply Equipment (EVSE) requirements.
- ▶ Level 2 (L2) AC Chargers must be EPA ENERGY STAR® certified chargers and from a nationally known, reputable manufacturer.
- ▶ Warranty on vehicles, batteries, and charging equipment. Batteries should have a minimum warranty of 8 years with 70% initial nameplate capacity remaining.
- ▶ Training programs should include, at a minimum, mechanic, driver, high-voltage, and first responders training and specify responsibilities.
- ▶ Provide a plan for on-the-ground technical assistance for emergency maintenance, including high voltage system issues and software issues for vehicles and chargers.

The [Environmental Protection Agency \(EPA\)](#) also offers a list of recommended questions for schools to ask potential electric bus manufacturers.

OLD TOWN CASE STUDY

In 2022, [Cyr Bus Line of Old Town](#) became the first private school bus fleet in the state to purchase an electric school bus. They estimate electric buses reduce their bus operational costs from \$0.70 to \$0.25 per mile.⁷

ELECTRIC BUS PROVIDERS

- ▶ [Blue Bird](#)
- ▶ [IC Bus](#)
- ▶ [Thomas Built](#)

BINGHAM-MOSCOW SCHOOL DISTRICT GOES ELECTRIC

The Bingham-Moscow School District adopted electric buses in 2023, and bus drivers are happy with their vehicles, as are the students. In an interview with the [Natural Resources Council of Maine \(NRCM\)](#), MSAD 13 Superintendent Sandra MacArthur said that “Students have been really excited about it. It’s spacious, it’s quiet, they like the music system in it. I think it’s very exciting to see the kids get excited about it.”⁸

Student Engagement

An electric school bus can be used to teach students about electric vehicles, how they're different from diesel vehicles, how long they take to charge, and how they reduce air pollution and greenhouse gas emissions. [Students in Augusta](#) learned about electric school buses on a trip to the Maine State House.



Resources

- ▶ The [Electric School Bus Initiative Dashboard](#) tracks data and trends on electric school bus adoption.
- ▶ The [Electric School Bus Initiative](#) offers a calculator to estimate the total cost of ownership for electric buses.
- ▶ The [World Resources Institute Electric Bus Market Study and Buyer's Guide](#) can help school districts and bus operators decide if electric bus benefits and costs are right for them.
- ▶ [VEIC's Electric School Bus Pilot Project Evaluation](#) is a 2018 report on a pilot project from the Massachusetts Department of Energy Resources (DOER) evaluating the performance of buses at three school districts in nearby Massachusetts and outlines successes (50% greenhouse gas emissions reduction compared to diesel buses) and challenges (customer service, maintenance, and unmanaged charging increasing costs).

Sources

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