



Electric School Bus Guidebook

Guide 1: Benefits



NEW
YORK
STATE

NYSERDA



Electric school buses provide numerous environmental benefits compared to diesel and gasoline powered school buses.

This chapter explores many ways in which electric school buses are good for the environment.

This chapter answers the following questions:

- How do electric school buses provide cleaner transportation?
- What emissions reductions do electric school buses offer?
- What makes electric school buses environmentally friendly?

Local Air Quality Improvements

Because electric school buses eliminate tailpipe exhaust, they improve air quality for anyone riding the buses as well as air quality along their routes.

Better Air Quality Inside the Bus

Diesel and gasoline powered school buses emit significant quantities of criteria air pollutants, such as particulate matter (PM), carbon monoxide (CO), and nitrogen oxide (NO_x). Criteria air pollutants are associated with chronic health conditions, including asthma, cancer, and cognitive impairment.¹ By switching to electric school buses and eliminating tailpipe emissions, passengers and drivers will breathe cleaner air. When a diesel or gasoline school bus is in motion, it emits pollutants from its tailpipe, which tend to rise and disperse. However, when a school bus stops at a stoplight or stop sign, is stuck in traffic, or stops to pick up and drop off students, the bus's tailpipe emissions can drift back into the cabin and remain there. The resulting polluted air poses a health risk to all individuals inside the bus—especially children and those with underlying respiratory illnesses such as asthma and bronchitis.²

In addition, studies show that students with disabilities, those who live in rural communities, those from low-income families, and students of color are more likely to travel long distances on school buses and experience greater exposure to harmful pollutants.³ For students, exacerbating these health issues by increased exposure to school bus-related pollution can lead to absenteeism and impact academic performance. The American Lung Association in New York has noted that moving all of the state's vehicles to clean transportation will result in up to 159,000 avoided asthma attacks statewide.⁴

Better Air Quality Outside the Bus

People outside the bus and local communities along bus routes disproportionately experience the effects of school bus exhaust. When a diesel or gasoline school bus picks up or drops off students, it emits harmful pollutants from its tailpipe. These emissions contain chemicals that increase air pollution and contribute to climate change. People most affected by these emissions are those who live near where buses travel and park as well as those who ride the buses—students and drivers. Replacing diesel- and gasoline-powered school buses with electric school buses completely eliminates tailpipe emissions and improves air quality for affected people and communities.

¹ <https://www.wri.org/insights/electric-school-buses-equity-us>

² <https://www.epa.gov/cleanschoolbus>

³ <https://www.wri.org/insights/electric-school-buses-equity-us>

⁴ <https://www.lung.org/clean-air/electric-vehicle-report/zeroing-in-on-healthy-air>

Key Activities

Initial actions you can take after reading this chapter include:

Consider the environmental benefits of replacing diesel buses and share them with those who will be affected most—drivers and technicians, students, and people who live near bus depots and along routes.

Share these benefits with clean air advocates, school boards and parents, and local policy and decisionmakers to provide additional reasons to acquire electric buses.



Healthier Air for Underserved Communities

Electric school buses can deliver important air quality improvements and related public health benefits to historically overburdened communities. For example, by replacing gasoline and diesel school buses with electric units, disadvantaged communities (DACs) located near school bus depots will benefit from reduced exposure to emissions from bus idling. Idling can be a significant source of local air pollution and a public health hazard.





Greenhouse Gas Reductions

Even considering the full life-cycle of a school bus, including vehicle manufacturing, fuel production and delivery, operation, and vehicle retirement/scrappage, fully electric models are responsible for substantially lower emissions of greenhouse gas emissions. This is because electric vehicles are far more efficient at using energy for vehicle movement. Electric vehicles use around 90% of energy toward propulsion while combustion engine vehicles use about 20% toward propulsion.⁵ Electrifying just New York City's 10,000 school buses (roughly 25% of the NYS school bus fleet) alone would be equivalent to removing almost 40,000 passenger vehicles from the road.⁶ Fortunately, New York state has one of the cleanest grids in the nation, see Figure 1, and so electrifying vehicles here has an even larger impact.⁷ Moreover, New York's electricity generation is getting cleaner every day. By 2040, 100 percent of New York's electricity will come from zero-emission, renewable sources.⁸ As electricity produced in New York State continues to become cleaner, using electricity instead of diesel and gasoline to power school buses will further reduce greenhouse gas and other emissions and improve air quality.

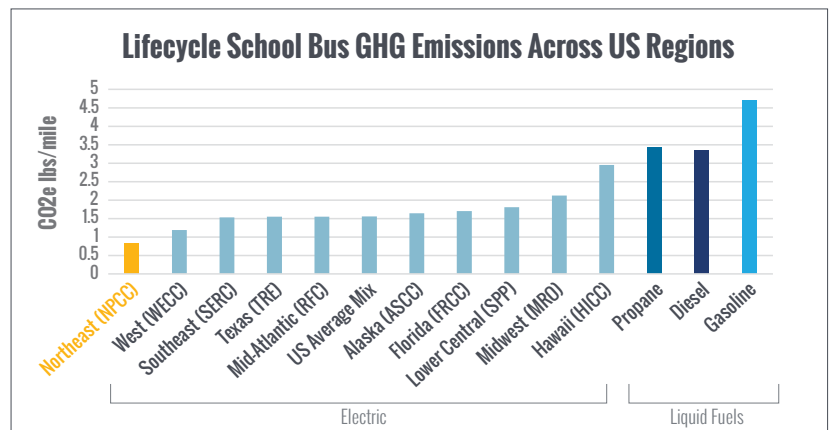


Figure 1: Lifecycle CO₂e emissions per mile – ESBs by North American Electric Reliability Corporation (NERC) region vs. conventional diesel buses.

Fuel and Electricity Production Benefits

The switch to electric school buses reduces demand for oil and gas as well as the environmental impacts associated with extracting, transporting, and burning fossil fuels. As more school buses are plugged into the grid to obtain their power, diesel and gasoline use is replaced by large-scale electricity generation, which is often more environmentally friendly. New York is already one of the cleanest electricity-producing states in the country because it generates a large portion of its electricity from nuclear and hydropower sources. Additionally, new clean energy generation projects, such as solar and wind, are coming online every year.⁹ For example, in 2022, Governor Kathy Hochul announced 22 large-scale renewable energy projects under development.¹⁰ By 2040, 100 percent of New York State's electricity will come from zero-emission, renewable sources.

⁵ <https://www.motortrend.com/news/evs-more-efficient-than-internal-combustion-engines/>

⁶ <https://electricschoolbusinitiative.org/why-we-need-transition-electric-school-buses#:~:text=In%20fact%2C%20electrifying%20the%20full>

⁷ <https://www.eia.gov/state/?sid=NY#tabs-1>

⁸ <https://www.nyserda.ny.gov/About/Publications/Energy-Analysis-Reports-and-Studies/Electric-Power-Transmission-and-Distribution-Reports/Electric-Power-Transmission-and-Distribution-Reports--Archive/New-York-Power-Grid-Study/Story-of-Our-Grid>

⁹ <https://www.eia.gov/state/?sid=NY#tabs-1>

¹⁰ <https://www.nyserda.ny.gov/About/Newsroom/2022-Announcements/2022-06-02-Governor-Hochul-Announces-22-Large-scale-Renewable-Energy-Projects>

Additional Benefits

Noise Reduction

Electric buses do not produce engine noise and are therefore quieter than diesel- or gasoline-powered vehicles.¹¹ One study found electric buses reduced noise levels by 14 db at low speeds compared to internal combustion buses.¹² Electric school buses therefore provide a quieter ride for passengers and lower ambient noise levels in our communities.

Brake Dust Reduction

Electric school buses use a system called regenerative braking in which the wear and tear on brake pads and brake rotors is decreased. Due to this braking system, less brake dust is released into the environment, resulting in cleaner air.

Reduction in Oil Use

Electric school buses do not require oil, transmission fluid, or coolant changes. This reduces waste from vehicle operation and fuel spills during maintenance.

Reducing Emissions from Electric Fueling through Smart Charging

Charging electric vehicles overnight reduces emissions from electricity generation substantially.¹³ Electricity demand is lower overnight when electricity is generated by cleaner “base-load” sources compared to natural gas or oil-powered “peaker” plants that may come online to meet peak demand during the afternoon and evening. Managed charging systems, also known as smart charging, prioritize recharging electric vehicles during off-peak hours, further improving the benefit of electric vehicles in terms of reducing emissions.

Additional Resources

[Environmental Defense Fund - Electric School Bus Fact Sheet](#)

An overview of the environmental benefits of electric school buses.

[EPA Clean School Bus Program](#)

The U.S. EPA's Fiscal Year 2022 Clean School Bus Program Report to Congress.

[EPA Diesel Emissions Reduction Act](#)

The U.S. EPA's “Reducing Diesel Emissions from School Buses” website.

[NYSERDA Electric School Buses](#) – Website for information and programs on electric school buses in New York State.

[Rocky Mountain Institute - More EVs, Fewer Emissions](#)

Reducing emissions through smart charging.

[World Resources Institute](#)

Download and customize a ‘pitch deck’ to share information on the benefits of school bus electrification.

¹¹ <https://hmmh.com/resources/news-insights/blog/will-electric-cars-result-in-quieter-communities/>

¹² <https://www.sciencedirect.com/science/article/pii/S2352146518306227>

¹³ <https://rmi.org/press-release/substantial-emissions-reductions-possible-with-smart-ev-charging/>