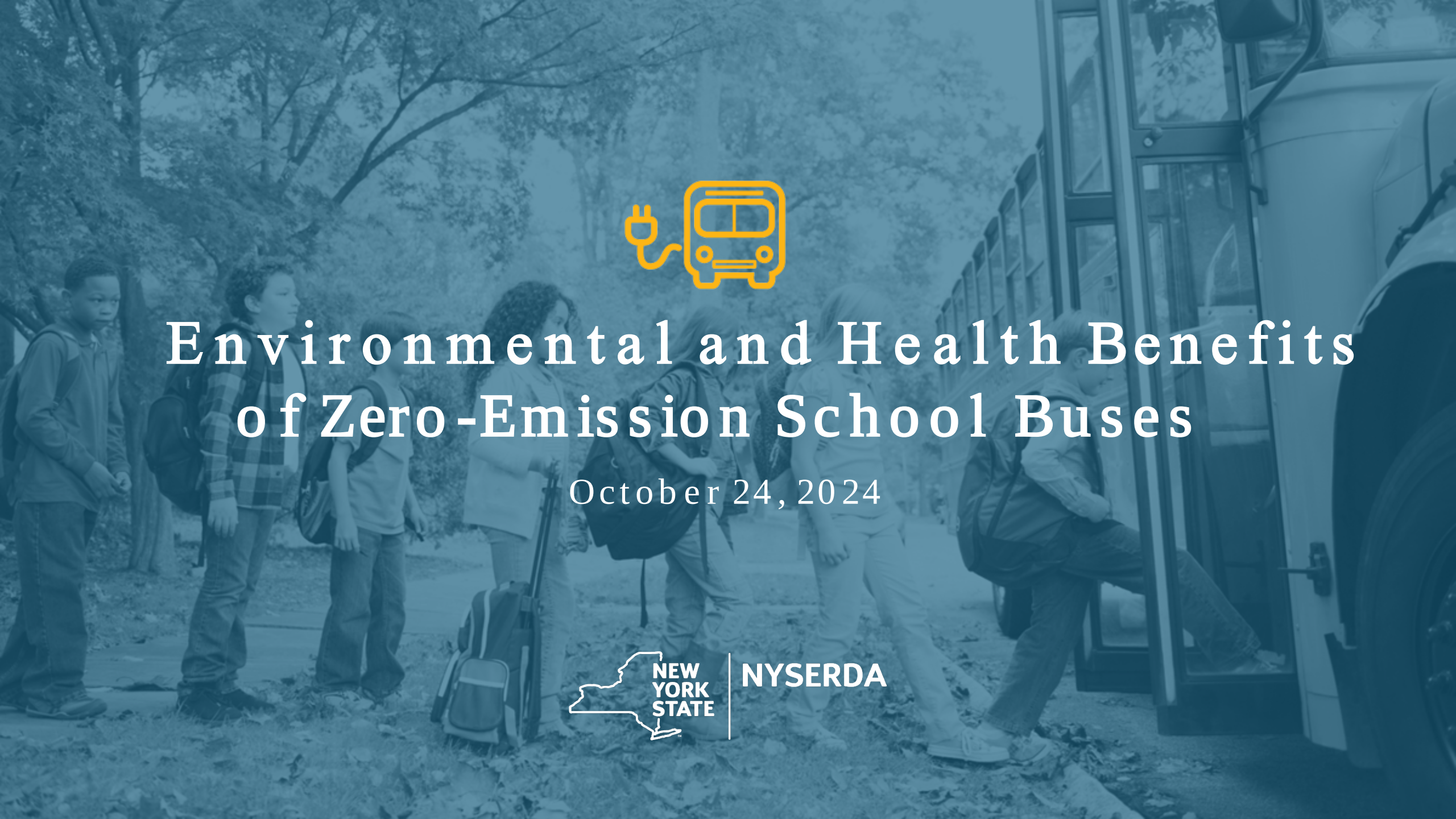


Environmental and Health Benefits of Zero-Emission School Buses

October 24, 2024

NEW YORK STATE | NYSERDA

Presentation Agenda

ESBs in New York State

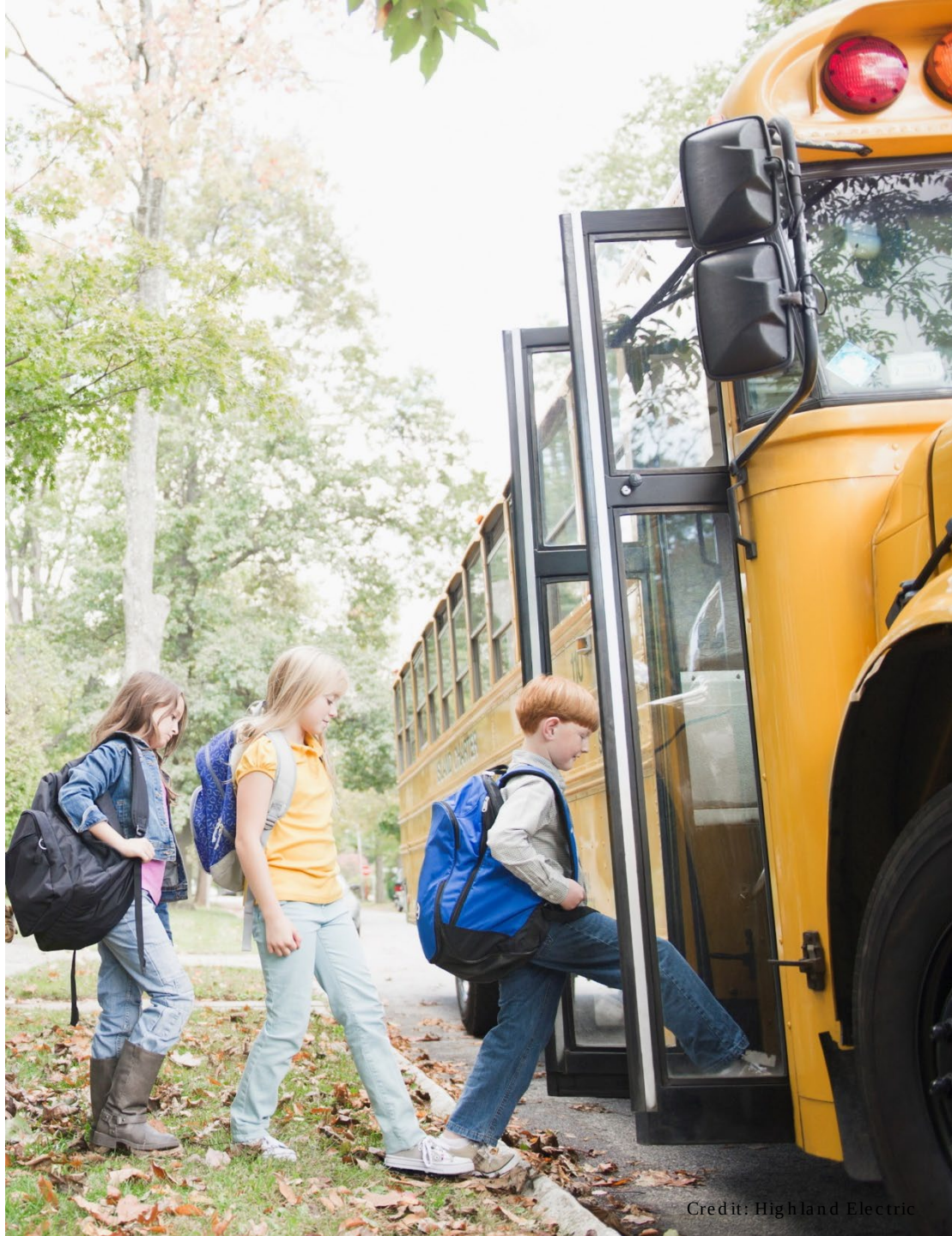
- Current Requirements
- Where we started
- Recent progress in fleet electrification

Benefits of ESBs

- Air Pollution Reduction
  - Effect on disadvantaged communities
- Noise Pollution Reduction
- Student & Driver Health

How can you get started?

- Fleet electrification planning
- Funding sources
- Next Steps



Credit: Highland Electric

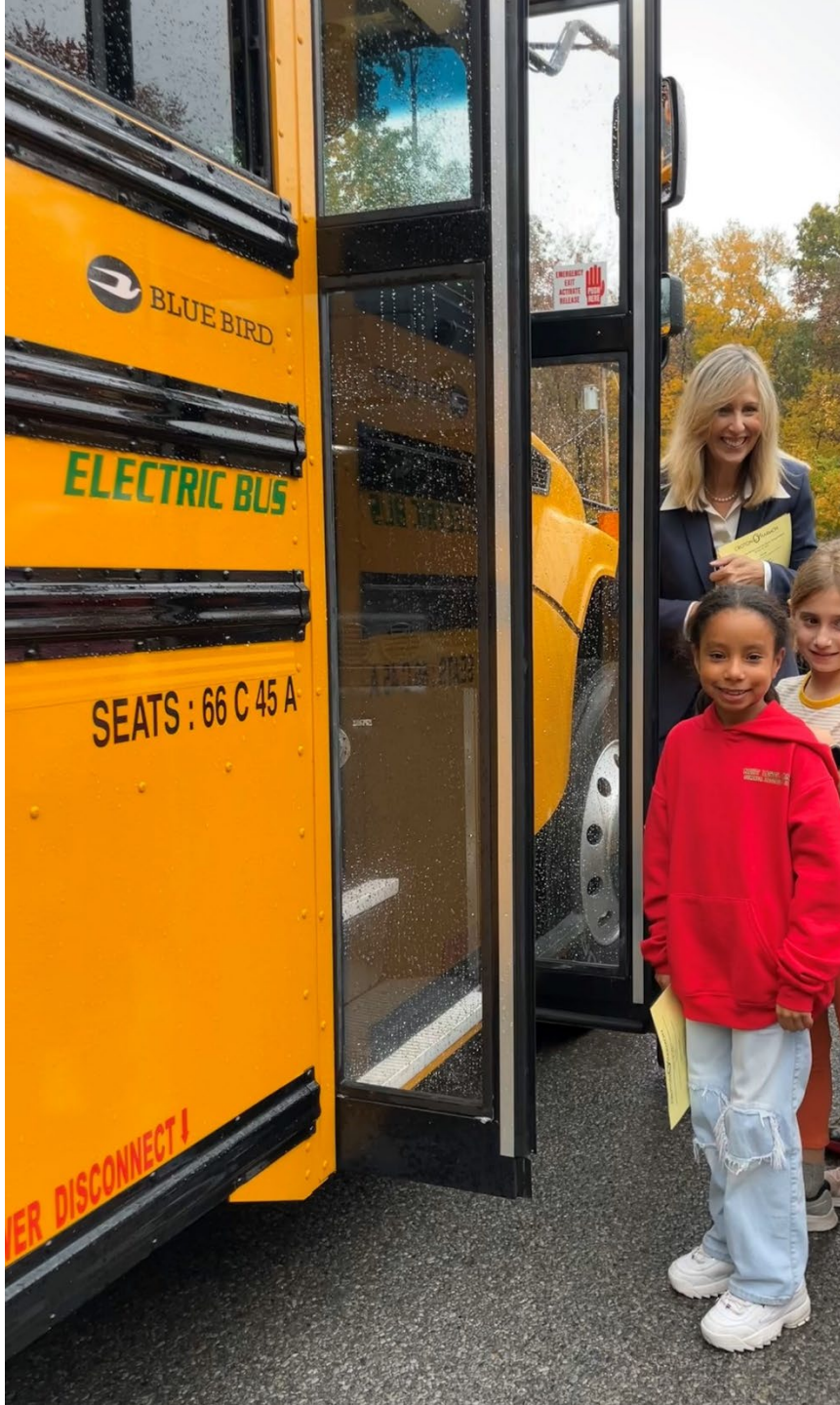
Current New York State Requirements for School Buses

2027

All school buses purchased after July 1, 2027, must be zero-emission.

2035

All school buses in operation after July 1, 2035, must be zero-emission.



*NY School Bus Incentive Program & NY Truck Voucher Incentive Program

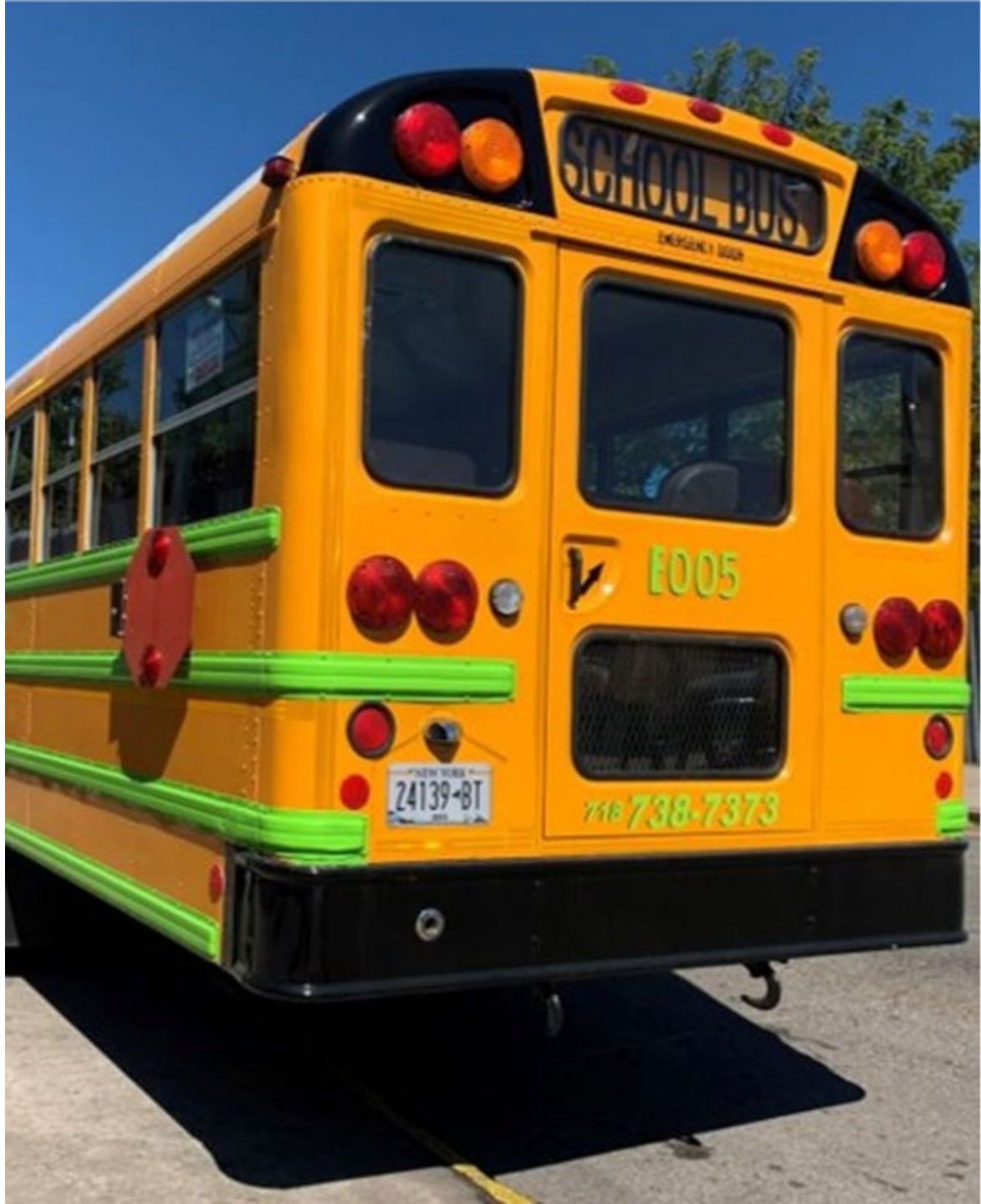
ESBs in New York State

Where We Started

- There are **~700** school districts in New York State, with more than **45,000** school buses on the road
- More than half of all buses are contractor-operated

Recent Progress

- There are currently approximately **100** ESBs on the road in NY State, with up to **1000** projected to be on the road within the next year
- Currently, over **300** school districts are actively in the process of planning their fleet transition with NYSERDA
- The average NY State school bus travels **80** miles per day
    - Most electric buses have a range of **150** miles or more.



Health Effects of Air Pollution

Research on Air Pollution

- Diesel and gasoline school buses emit harmful air pollutants like **particulate matter (PM)**, **carbon monoxide (CO)**, and **nitrogen oxide (NOx)**

Adverse Health Effects from Exposure to Air Pollution

- Heart attacks, stroke, and other cardiovascular effects
- Asthma attacks, respiratory infections, and other respiratory effects
- Increased risk of cognitive impairment, neurodegeneration, and other nervous system effects
- Increased risk of lung and other cancers
- Premature mortality

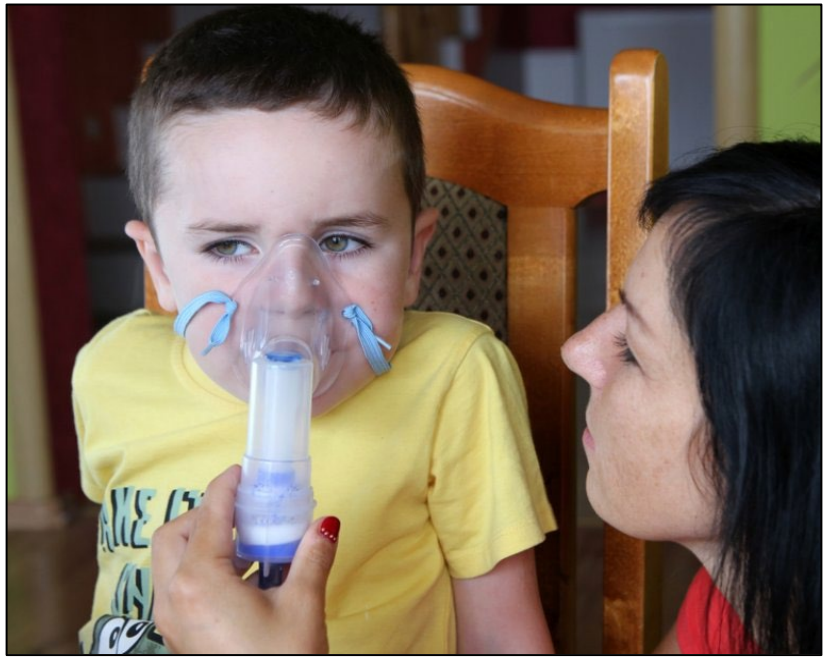


Image credit: https://www.epa.gov/air-research/research-health-effects-air-pollution

Sources

WRI https://www.wri.org/insights/electric-school-buses-equity-us

https://www.epa.gov/air-research/research-health-effects-air-pollution

https://www.epa.gov/report-environment/air

U.S. EPA. Integrated Science Assessment (ISA) for Particulate Matter (Final Report, Dec 2019). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-19/188, 2019. https://assessments.epa.gov/isa/document/&deid=347534

Kampa, M., & Castanas, E. (2008). Human health effects of air pollution. Environmental pollution, 151(2), 362-367. https://climatenexus.org/wp-content/uploads/2015/09/HumanHealthEffectsofAirPollutionKampaandCastanas.pdf

Folinsbee, L. J. (1993). Human health effects of air pollution. Environmental health perspectives, 100, 45-56. https://ehp.niehs.nih.gov/doi/pdf/10.1289/ehp.9310045

Disproportionate Impacts of Air Pollution

Who is Most Impacted by Air Pollution?

- Children, pregnant women, older adults, and individuals with pre-existing heart and lung disease are more susceptible than others to air pollutants.
- People in low-income neighborhoods and communities are often exposed to higher levels of air pollution due to historically inequitable land use planning
    - We see this especially with schoolbus depots and fueling located in DACs

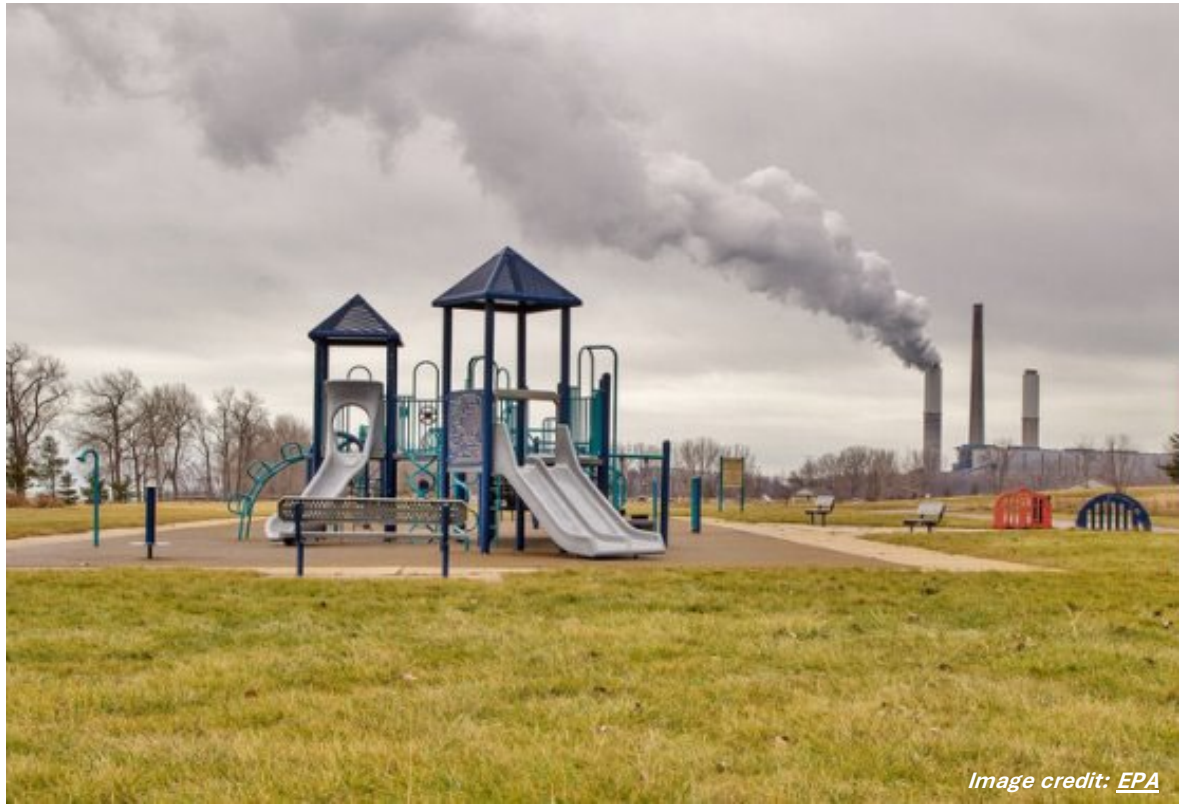


Image credit: EPA

Sources:

https://www.epa.gov/air-research/research-health-effects-air-pollution

U.S. EPA. Integrated Science Assessment (ISA) for Particulate Matter (Final Report, Dec 2019). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-19/188, 2019. https://assessments.epa.gov/isa/document/&deid=347534

Jbaily, Abdulrahman, Xiaodan Zhou, Jie Liu, Ting-Hwan Lee, Leila Kamareddine, Stéphane Verguet, and Francesca Dominici. "Air pollution exposure disparities across US population and income groups." Nature 601, no. 7892 (2022): 228-233. https://www.nature.com/articles/s41586-021-04190-y

Benefits of ESBs

Noise Pollution

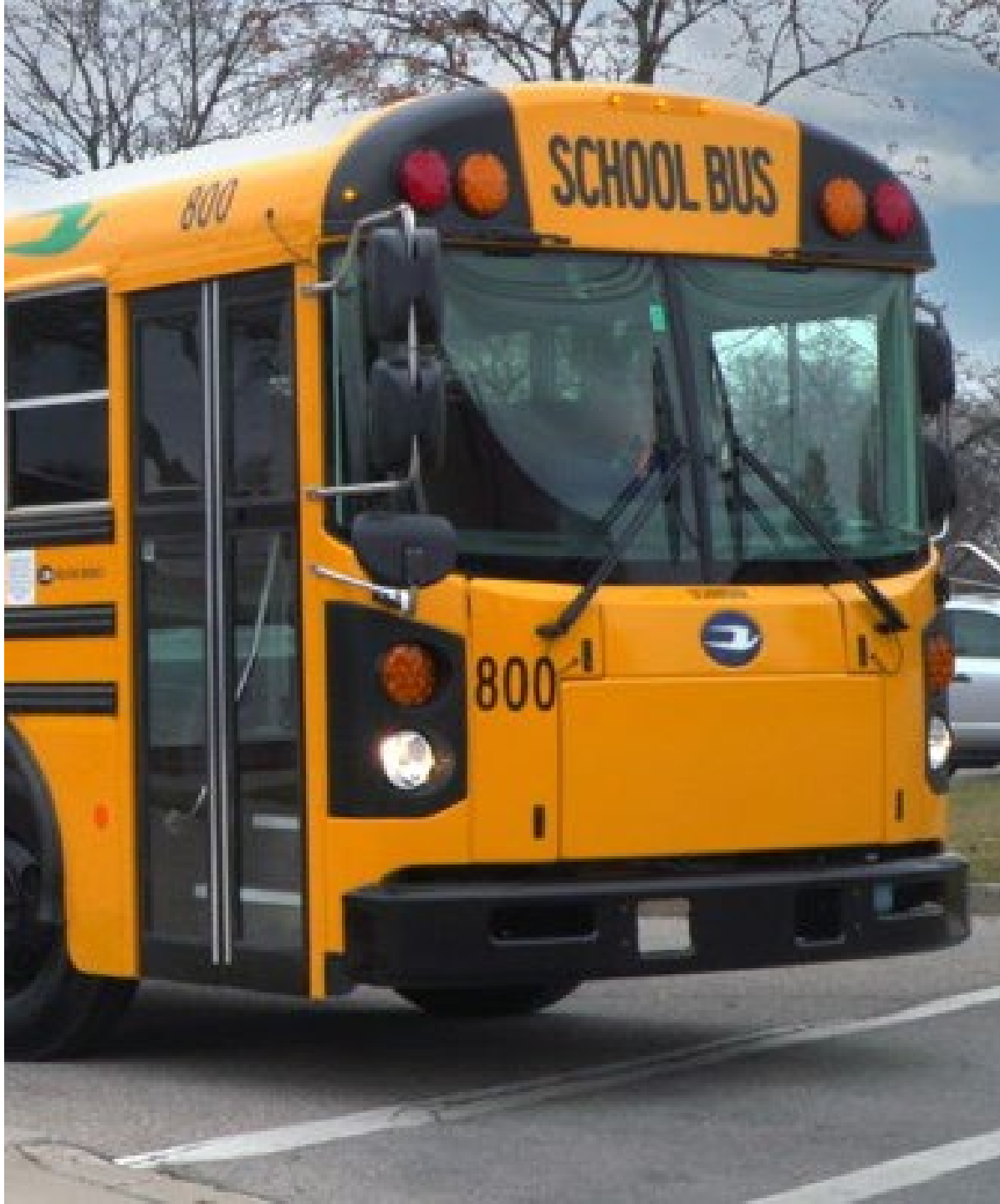
- School buses running on **diesel engines produce noise levels at or above 85 decibels.** The EPA recommended noise exposure **limit for children is 80 decibels**
- Children are more vulnerable to noise pollution due to their rapid brain development

Student and Driver Health

- Fewer bus vibrations result in smaller impacts on passengers and therefore less passenger body fatigue for students and drivers
- Drivers have reported improved student behavior, leading to increased safety, on ESBs
- Drivers have also reported significantly less muscle fatigue at the end of a workday when driving ESBs

Student and Driver Health

- Zero-emission buses are just part of the way New York State is working to ensure a healthy environment for the next generation



Sources:
WRI- World Research Institute
WHO Make Listening Safe https://cdn.who.int/media/docs/default-source/documents/health-topics/deafness-and-hearing-

ESBs are part of New York State's commitment to improving air quality

- 45% of the climate act benefits projected by 2035 are associated with reduced emissions from on-road transportation

By 2035, air quality improvements can provide significant **annual** health benefits, including **avoiding** up to –

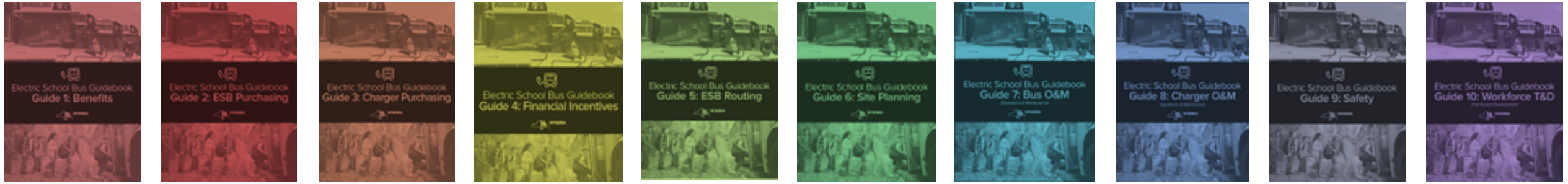
Health Effect	Avoided Cases Per Year	Fraction in Disadvantaged Communities
Population of Disadvantaged Communities in New York:		36%
Premature Mortality	1,500	45%
Nonfatal Heart Attacks	620	52%
Hospitalizations	440	45%
Acute Bronchitis	670	45%
Respiratory Symptoms	20,800	52%
Emergency Room Visits, Asthma	1,800	71%
Asthma Exacerbation	12,700	45%
Minor Restricted Activity Days	410,000	44%
Work Loss Days	70,500	44%

The fraction of each health benefit accrued within Disadvantaged Communities is larger than the Disadvantaged Communities share of the population

Source: Preliminary analysis of New York Cap and Invest. https://capandinvest.ny.gov/Resources

How can you get started?

- Electric School Bus Guidebook - provides living resources to help fleet owners and key partners get familiar with key terms, concepts, and near-term actions to take.



- Fleet Electrification Planning **(FEP)** – helps chart your path to 2035 including bus and charger purchases, prioritization of routes, site planning, and utility coordination.

- The New York School Bus Incentive Program **(NYSBIP)** – Ready to purchase your first several ESBs? NYSBIP can cover up to 100% of the cost difference between an electric and gas/diesel bus and provide funding for bus charging.

What are the benefits of a FEP?

A well-developed FEP provides:

- **Identification of roles** and workforce needs
- **Relationship-building with key external partners** (utilities, dealers, engineers, operators, funders, AHJs)
- A **customized, tangible plan** for meeting NYS's electrification requirements with prioritized actions
- A **living resource** that can easily be updated to account for new technologies or route changes
- A **reference document for annual Education Law 3638** reporting requirements

Completing the FEP unlocks:

- $30,000 in additional NYSBIP Charging Voucher Funds per bus
- Increased vehicle caps for the NYSBIP School Bus Voucher

What is New York School Bus Incentive Program (NYSBIP)?

The Environmental Bond Act allocated **$500 million** to help school districts transition to zero-emission buses.

These funds help districts and contractors:

- **Purchase buses and chargers**
- **Install charging infrastructure**
- **Complete Fleet Electrification Plans (FEPs).**

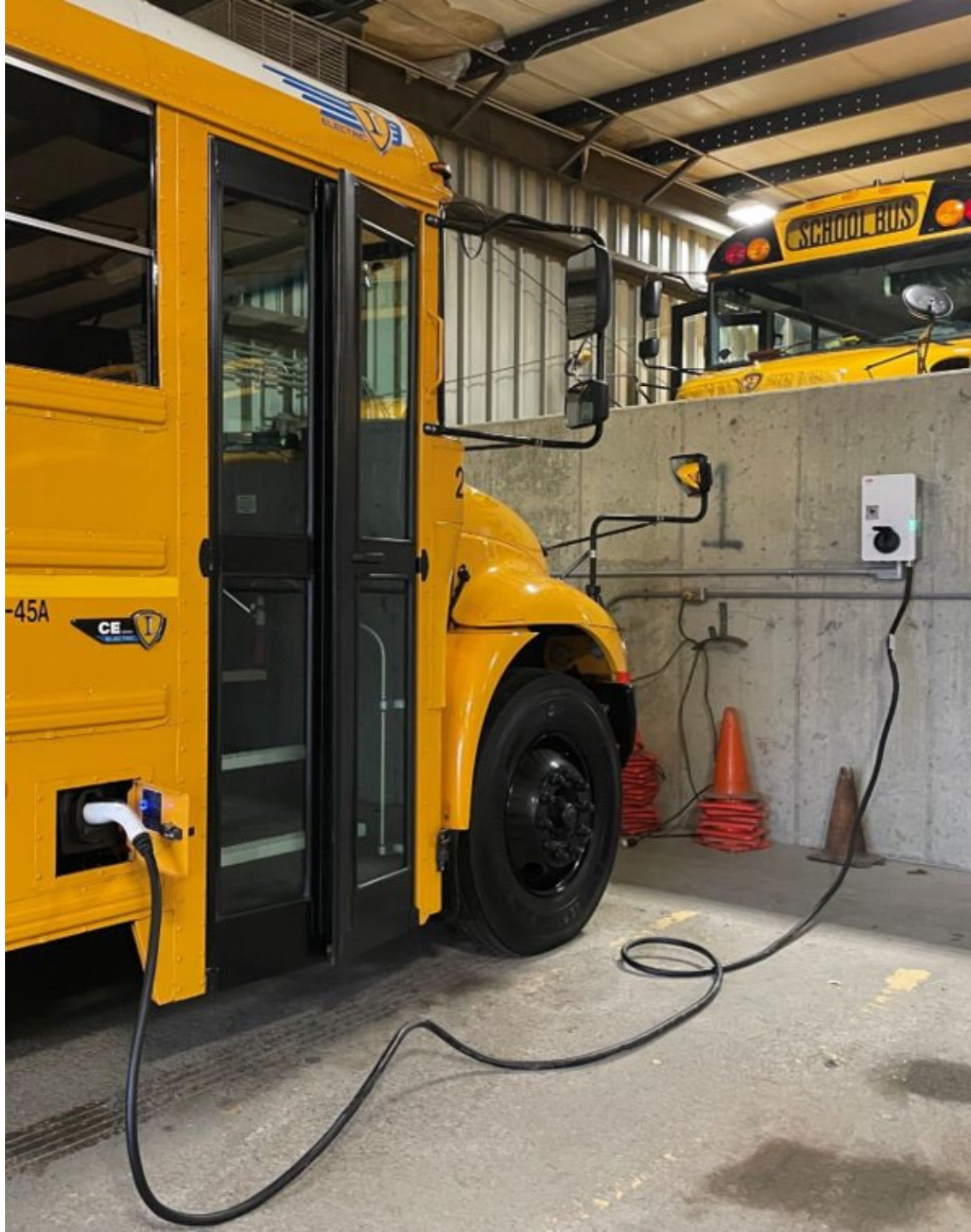
NY School Bus Incentive Program Voucher Amounts

Electric School Bus (ESB) Vouchers:

- $114,000-$281,000 per bus depending on the type of bus and the school district
- Designed to cover 100% of the difference in cost between a diesel- and electric-powered bus
- Cost benefit is at point of purchase

Charger Vouchers

- Value ranges from $25,000-$65,000 per charger depending on the school district
- Covers hardware costs, installation costs, customer-side electrical upgrades, and battery storage equipment that is directly connected to chargers
- Cost benefit is a reimbursement after chargers are installed and running



What about other funding sources?

The Federal Government provides billions of dollars in funding for ESBs and chargers through the **EPA Clean School Bus Program**. Round 3 grant recipients were announced in May, and a **Clean Heavy Duty Vehicle Program** was also recently closed. A **new EPA Clean School Bus Rebate round** opened on September 26th and will remain open for applications until January 5, 2025.

The IRS provides funding through the **Commercial Clean Vehicle Credit** and the **Alternative Fuel Vehicle Refueling Property Credit**.

Most utility-providers in NYS also offer funding through **Make-Ready Pilot Programs**.

NYSBIP funding can be stacked with other funding sources.

NYSBIP Webinar Series

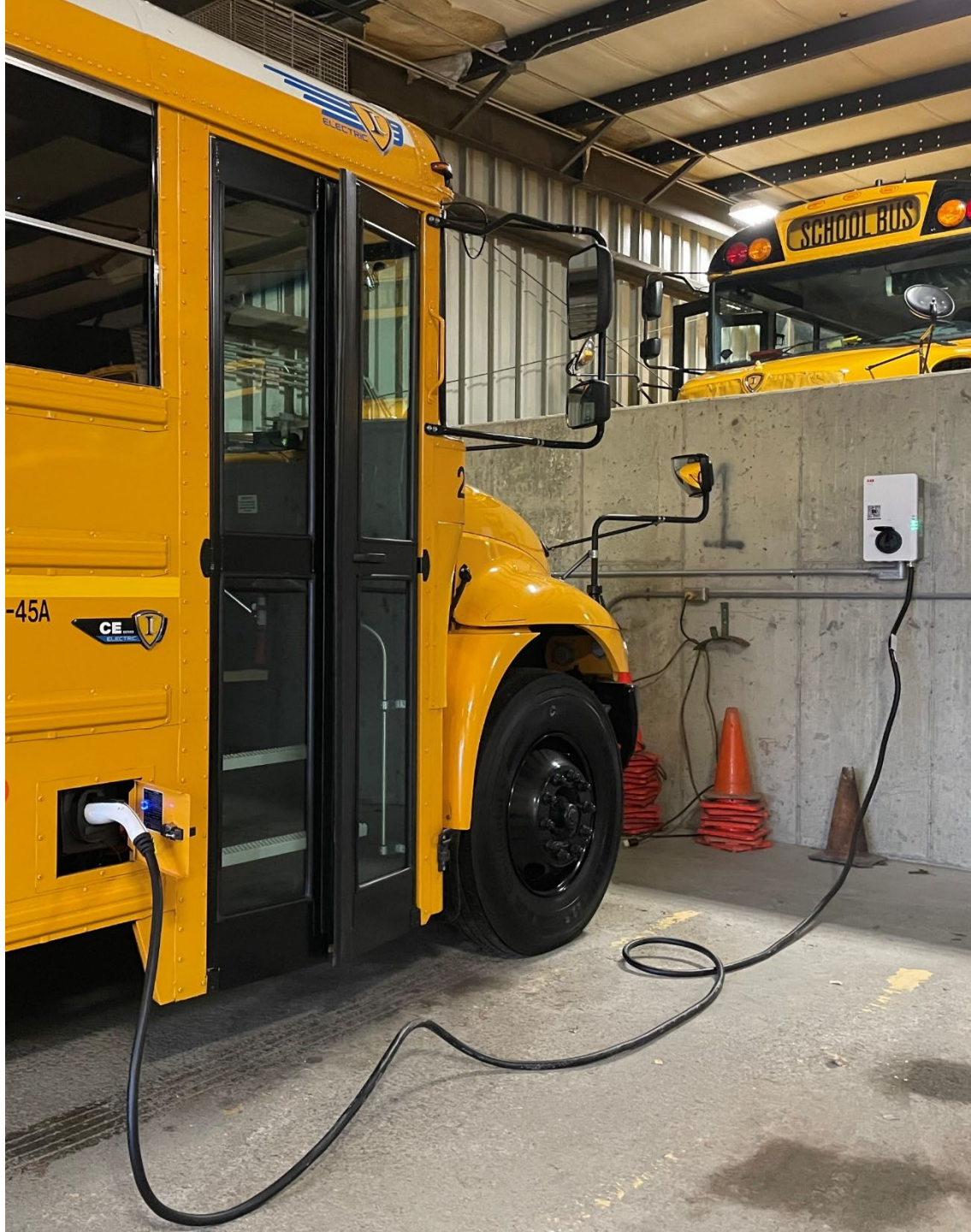
What do these webinars cover?

Various topics related to schoolbus electrification and NYSBIP, providing districts with regular opportunities to learn, engage, and ask questions directly to the program team.

Past Webinars (Recordings can be found on the NYSERDA Website)

- May 14: Combining NYSBIP with Other Funding Sources
- June 11: Charging Voucher Redemption Training
- July 9: Site Planning for ESB Charging
- August 20: Charging Rates

Additional webinars to come!

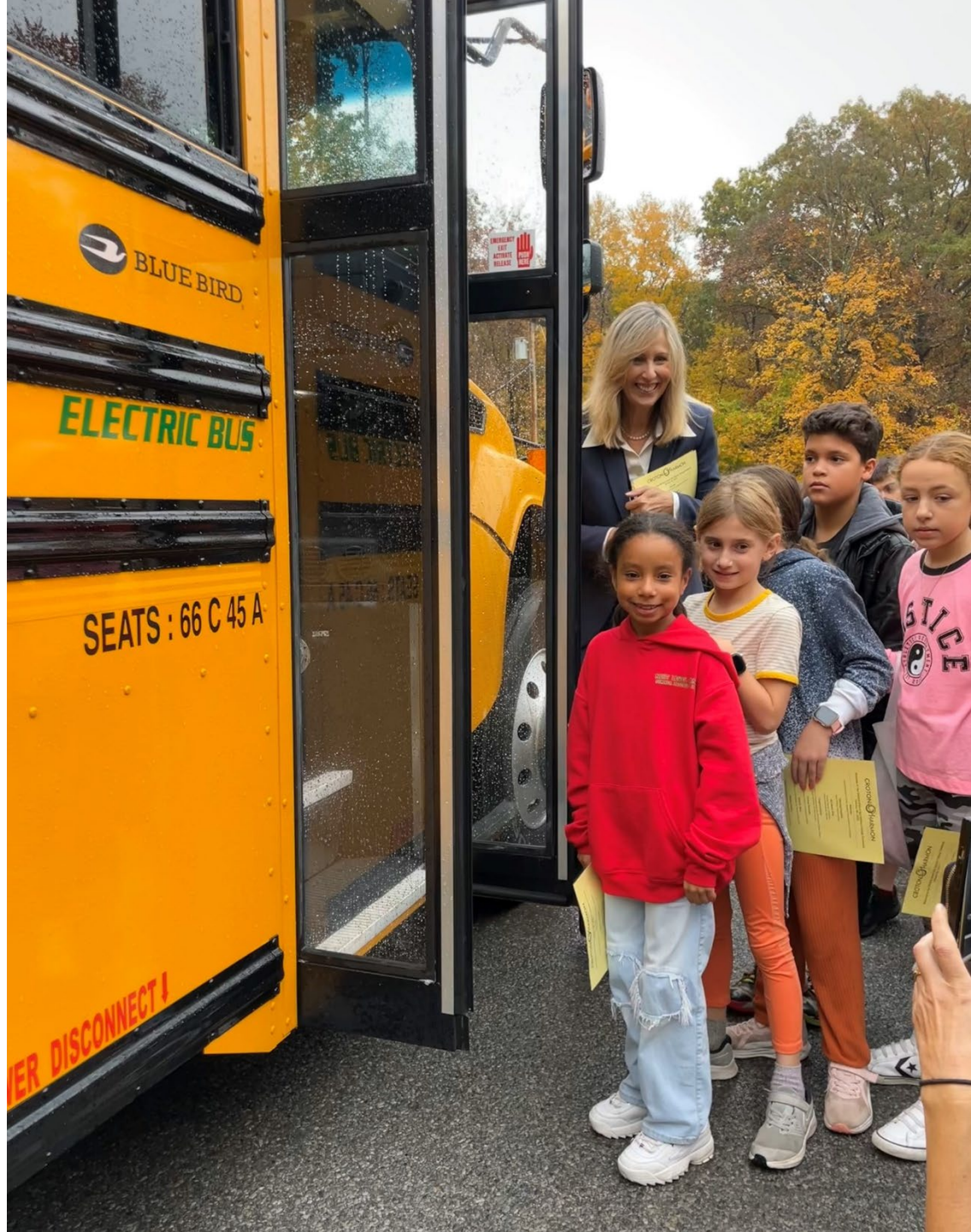


Next Steps & Resources

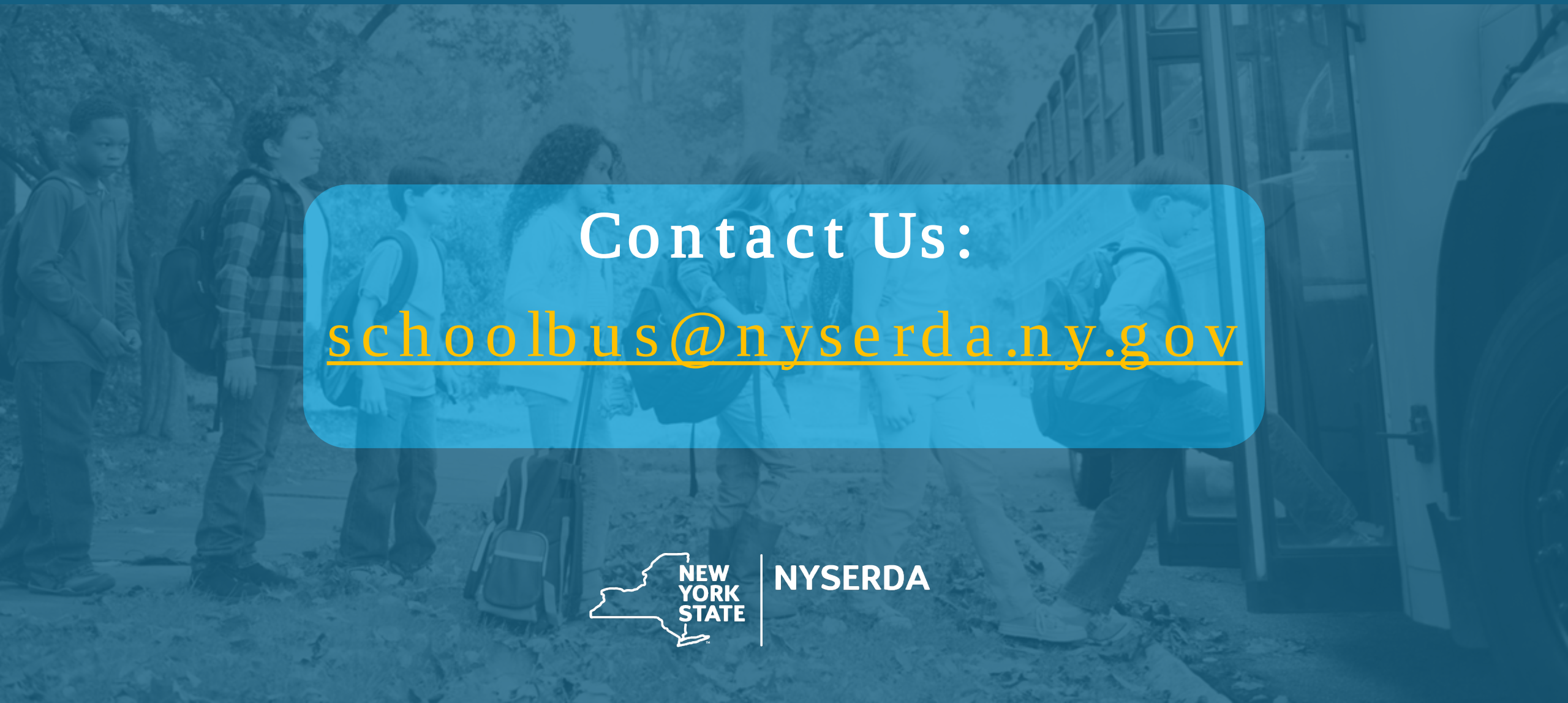
Get started now!

- **DOWNLOAD** and read the ESB Guidebooks. Develop a list of questions.
- **DEVELOP** a fleet electrification plan.
- **CONTACT** your utility. Regular and frequent contact is recommended throughout the transition process.
- **LEARN** about financial resources.
- **REACH OUT** to bus manufacturers.
- **TALK** to your fire department & EMS teams.
- **START SMALL** with one bus (or two).

REACH OUT TO NYSERDA!



Thank You!



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