



Electric School Bus Guidebook

Guide 10: Workforce T&D

(Training and Development)



NYSERDA
Clean Transportation



Proactive workforce training can help ensure a seamless transition to operating ESBs.

This chapter discusses instruction programs available to current staff as well as workforce development programs focused on bringing new employees into the industry.

This chapter of the *Electric School Bus Guidebook* answers these questions:

- What trainings are available for school districts adopting ESBs?
- What workforce development support efforts are underway?
- What can a school district or private fleet operator do now to begin planning for workforce changes?

Key Activities

Initial actions you can take after reading this chapter include:

- Begin assessing the impacts of ESB adoption on your current workforce.
- Talk with your dealer and/or equipment manufacturer about the training they offer with equipment purchases.
- Learn about current and future training opportunities in New York State.
- Explore additional training options.

Workforce Development Objectives

As more school districts and school bus fleet operators use electric school buses (ESBs) they will need to train their staff in how to use and maintain ESBs as well as charger troubleshooting and diagnostics.

The electric vehicle industry, government agencies, community colleges, and other stakeholders are currently working to address two types of training needs:

- Upskilling existing employees by providing existing staff with the knowledge, tools, and resources they need to properly operate, repair and maintain ESBs and chargers.
- Developing programs to offer credit and certifications for people seeking work in the ESB sector.

Addressing workforce development in these two areas involves collaboration between school districts, private fleet operators, ESB and charger manufacturers and dealers, vocational schools and community colleges, training centers, and State agencies.

New York Workforce Needs Assessment

The Workforce Development Institute (WDI), a non-profit focused on improving access to well-paying employment opportunities in clean energy, conducted a [NYS workforce needs assessment](#) for the implementation of ESBs. The assessment focused on new and existing jobs supporting ESBs, the impact that the technological transition will have on staff across the industry and recommendations to promote a smooth deployment process.

Through research and stakeholder interviews WDI identified skill gaps and training needs for staff operating and maintaining ESBs. Employment data from 2021 showed that over 50,000 workers directly support the school bus industry across the State. WDI identifies five main areas with workforce implications:

- Motor and drive components
- Operations
- Driver training
- Fuel system
- Maintenance needs

Within each category, WDI identifies specific operational and maintenance changes associated with ESBs that operators and mechanics will need to understand and offers recommendations to support a smooth and equitable ESB transition. WDI is also developing training modules on the basics of electrical systems, electric buses, chargers, and safety.





Essential ESB Workforce Trainings

Driver Training

Because electric school buses have operating systems and processes that differ from typical gasoline and diesel buses, driver training is an important component of ESB adoption. Training on how to operate ESBs safely and efficiently is often provided by the dealer or manufacturer ahead of, or at the time of, delivery. The depth and breadth of this training can vary significantly from one dealer or manufacturer to the next, so it is important to communicate your specific needs and expectations upfront regarding number of employees that require training, the duration of training, and specific local concerns such as extremely hilly terrain.

You should develop a plan that identifies not only who will receive the initial training upon delivery but also how ongoing training will occur (classroom, virtual training, or on-road). This could follow a “train the trainer” model conducted by a school district representative or via ongoing training sessions from the manufacturer/dealer. It can also be useful to reach out to nearby school districts or school bus contractors who already operate electric buses and inquire about scheduling a test-drive or ride-along event.

At a minimum, you should ensure that your drivers and fleet managers receive training on the following topics:

- The basic functions of ESBs.
- How to use regenerative braking for maximum efficiency and range.
- Other ways to optimize battery range, especially during cold or inclement weather.
- How to charge the bus and read the battery gauge.
- What to do in an emergency such as a battery leak, vehicle fire, or charge depletion.

ESB Maintenance Training

Currently, the majority of ESB maintenance involves the electric drivetrain, which is managed by the dealer and covered under the bus’s warranty. However, some types of maintenance and repair may require a separate maintenance contract with the dealer. When an ESB requires maintenance attention, a dealer may send a mechanic to your bus depot to evaluate and/or perform the maintenance. When possible, your in-house mechanics should shadow expert ESB mechanics during the maintenance to learn best practices. If the bus is taken offsite for maintenance, you should follow up to better understand the specific maintenance performed.

ESB maintenance not related to the electric drivetrain is similar to that done for traditional gasoline or diesel buses (e.g., brake changes and tire replacement and balancing). The frequency for monitoring and servicing these components may be different for electric vehicles (i.e., more frequent tire replacements but less frequent brake servicing) so it is important to understand the manufacturer’s recommended service guidelines. These can usually be completed by current technicians without additional training.

Charger Maintenance Training

ESB charger repairs are typically handled by contracted vendors. However, there are certain routine maintenance checks that should be carried out by the drivers and/or other facilities staff who interact with the chargers daily to ensure optimal performance and user safety. Check [Guide 8: Charger Operations and Maintenance](#) for details.

Workforce Development Support

Hudson Valley Community College - Electric and Autonomous Vehicles Degree

Hudson Valley Community College (HVCC) in Troy, NY, offers an [Electric and Autonomous Vehicle degree](#) that provides enrolled students with the training necessary to become vehicle technicians to support the transition to ESBs. This program covers general automotive repair, with specific development of the skills necessary to recognize, diagnose, and address hybrid and electric vehicle issues. Required courses include Engines, Automotive Electricity, Fuel Systems, Passenger Car Diagnosis, Advanced Hybrid and Electric Cars, Vehicle Data Security, among others. Full time students can complete the curriculum in four terms at a cost of slightly over \$10,000 for NY residents, based on current per-term costs. Financial aid may be available upon application and HVCC participates in US Veterans Affairs educational programs.

Empire State Development Employee Training Incentive Program

The [Employee Training Incentive Program](#) (ETIP) is a \$5 million per year incentive program available to New York State employers that provides tax credits to businesses that provide employee training or internships.

ETIP provides a tax credit of 50% of eligible training costs, up to \$10,000 per employee receiving eligible training. To qualify for the ETIP tax credit, businesses must make a significant capital investment resulting in a benefit-cost ratio of at least 10:1 in relation to the eligible training project. Businesses must operate predominantly in a strategic industry based upon the following criteria:

- Potential to create jobs in an economically distressed area
- Shortages of workers trained to work in that industry
- Ability and need to relocate to another state to find qualified workers
- Potential to recruit minorities and women to be trained to work in an industry where they are traditionally underrepresented
- Recent technological advances have created disruption in the industry and significant capital investment is needed to remain competitive

The Internship Program provides a tax credit of 50% of the stipend paid to an intern, up to \$3,000 per intern. To qualify, a business must provide training in advanced technology, life sciences, software development or clean energy. Training can be provided to interns who have not previously participated in an eligible internship program, and who are not current or former employees of the business. The business entity must have fewer than 100 employees, and interns cannot displace regular employees. Participation in the internship program cannot last longer than 12 months.

To apply, a business must submit an initial ETIP application to be evaluated and approved by the Empire State Development tax incentive department. If approved, the applicant will receive a conditional certificate of eligibility for training, which allows the applicant to begin the program. Once the training is complete, the applicant submits a final application to receive the tax credit. *Please note that the HVCC Electric and Autonomous Vehicles degree is not eligible for this tax credit.*

Workforce Training Curriculum Development in the Bronx and Beyond

In November 2022, NYSERDA awarded [New York School Bus Umbrella Services \(NYCSBUS\)](#), a non-profit New York City school bus operator, with a New York Clean Transportation Prize grant including funding for the development of an ESB curriculum in partnership with Bronx Community College (BCC). BCC will work with NYCSBUS and their team of consultants to create courses on the operation, safety, and fleet management of ESBs. The proposed project includes the development of 20 hours of curriculum (syllabus, lesson plans, and related materials) consistent with vehicle user manuals and warranty conditions. The online training content will engage current and future bus drivers and technicians and will be available as part of the [New York Center of Excellence's](#) free online repository for other educational institutions to adopt and implement. In addition, interested fleet operators can attend technical training at NYCSBUS's Zerega depot.

Next Steps

As you begin to electrify your fleets, integrate training and workforce development considerations into your transition planning process. The State's zero-emission school bus requirements also call for districts and contractors to analyze workforce impacts in an effort to minimize job losses and identify skill gaps early in the transition process. Start by:

- Assessing the impacts of school bus electrification on their existing workforce
- Identifying the need for knowledge and skills expansion
- Coordinating with local ESB dealers and charging vendors to address these needs

These steps will help you outline an approach to workforce development and training planning. See the following Additional Resources section for examples of fleet transition plans that address workforce development needs.

Additional Resources

[Automotive Service Excellence \(ASE\)](#) – The National Institute for Automotive Service Excellence provides two levels of EV safety certification, one for general awareness and one for technicians. These certifications are encouraged for staff who will work near EVs or technicians who work directly with EVs, respectively. The cost for each certification is under \$50 and these ASE certifications are current for 3 years after issuance.

[MTA Zero-Emission Bus Transition Plan](#) – This document is the first step in a dynamic process, a building block to inform the ongoing effort to convert the MTA fleet to zero-emissions. It lays the groundwork for the transition by identifying the challenges and constraints facing the shift to zero-emissions, outlines a strategic approach to overcome them, and lays out a preliminary plan for implementation. It addresses the topic of workforce development and many other areas impacted by the transition to zero-emissions.

[National Alternative Fuels Training Consortium \(NAFTC\)](#) – This training organization develops curricula and disseminates online and in-person training about alternative fuels, alternative fuel vehicles, and advanced technology vehicle education including specific training for EV automotive technician training and first responder training.

[SAE International](#) – SAE International, previously the Society of Automotive Engineers, has introduced new online courses that address topics including battery systems and a general overview of hybrid and electric vehicles. Prices range from \$345 to \$2,499. Courses can be either accessed on-demand or through live, virtual trainings, which range in length from one day to five days. Certificates are available upon completion.

[Transit Workforce Center ZEB Workforce Transition Resources](#) - The Transit Workforce Center (TWC) offers online courses on battery electric bus maintenance and technology, and it provides access to a webinar series on battery electric buses, which gives an overview of ESB maintenance, high voltage safety, and battery charging strategies.



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