



Depot Planning for Medium- and Heavy-Duty Clean Zero Emission Vehicle Fleets

December 16th, 2025 @ 2 pm EST

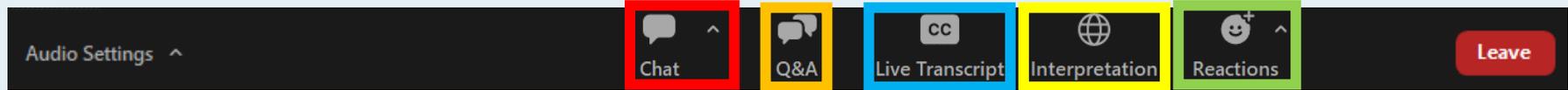
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

Zoom Webinar Logistics



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Logística de seminarios web en Zoom



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English

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Interpretation



Agenda

Overview of the Clean School Bus (CSB) and Clean Heavy-Duty Vehicles (CHDV) Programs

National Laboratory of the Rockies (NLR)
Presentation

Q&A

Next Steps and Resources

Overview of the Clean School Bus (CSB) Program

Infrastructure Investment and Jobs Act

- The Infrastructure Investment and Jobs Act (IIJA) provides **\$5 billion** over five years (fiscal years 2022-2026) for the replacement of existing school buses with zero-emission and clean school buses.

CSB Funding Opportunities

- The EPA has offered several [past funding opportunities](#) under the CSB Program, including grants and rebates.



Overview of the Clean Heavy-Duty Vehicles (CHDV) Program

CHDV Program Details

- Eligible activities include the replacement of existing non-zero-emission Class 6 and/or Class 7 heavy-duty vehicles with zero-emission vehicles, as well as the purchase and installation of associated infrastructure, and workforce development and training.
- There are two sub-programs: one for school bus replacement projects (School Bus Sub-Program) and one for non-school-bus vehicle replacement projects (Vocational Vehicles Sub-Program).
- Per the statute, at least \$400 million is directed toward projects in nonattainment areas.

CHDV Projects

- The EPA has more than 50 active CHDV projects totaling more than \$600 million under the CHDV Program.





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Medium- and Heavy-Duty Vehicle Depot Planning

Ryan Frasier

U.S. EPA CHDV/CSB Webinar

December 16, 2025

FREE Clean School Bus and Clean Heavy-Duty Vehicle Program Technical Assistance

cleanschoolbusta@nrel.gov

cleanhdvehiclesta@nrel.gov

WE PROVIDE

Technical Assistance

Contact Us



About Our Technical Assistance

NLR provides unbiased, free, and customizable technical assistance to help states, communities, Tribal governments, transit agencies, and school districts plan and deploy fueling and charging infrastructure for transit, school buses, and medium- and heavy-duty vehicles.

Email
Q&A

Virtual
Meetings

In-Depth
Assistance

Onsite
Assistance

<https://driveelectric.gov/contact>

Examples of How NLR Can Help

Coordinating
with electric
utilities

Identifying
available
funding and
incentives

Analyzing
charging
infrastructure
needs

Conducting
route analysis
and planning

Conducting
training and
workforce
development

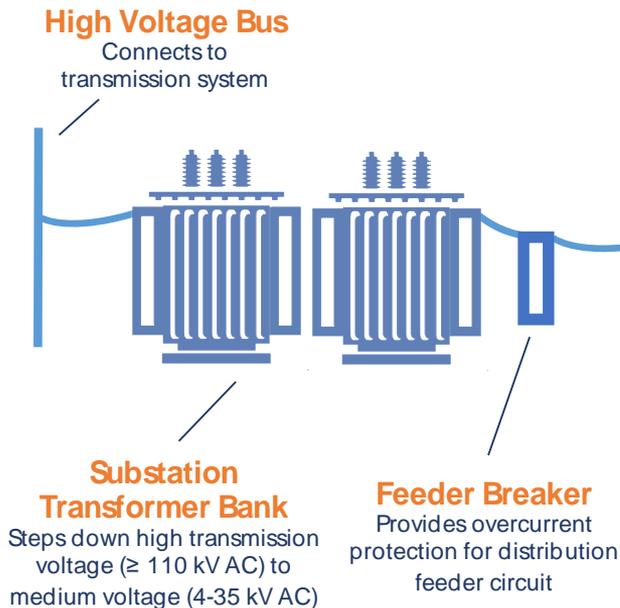
Opportunities
for resiliency
(V2X)

Analyzing
energy needs
and grid
impact

Identifying
future-proofing
opportunities

Distribution Substation

Lowers voltage from transmission lines and protects downstream distribution system



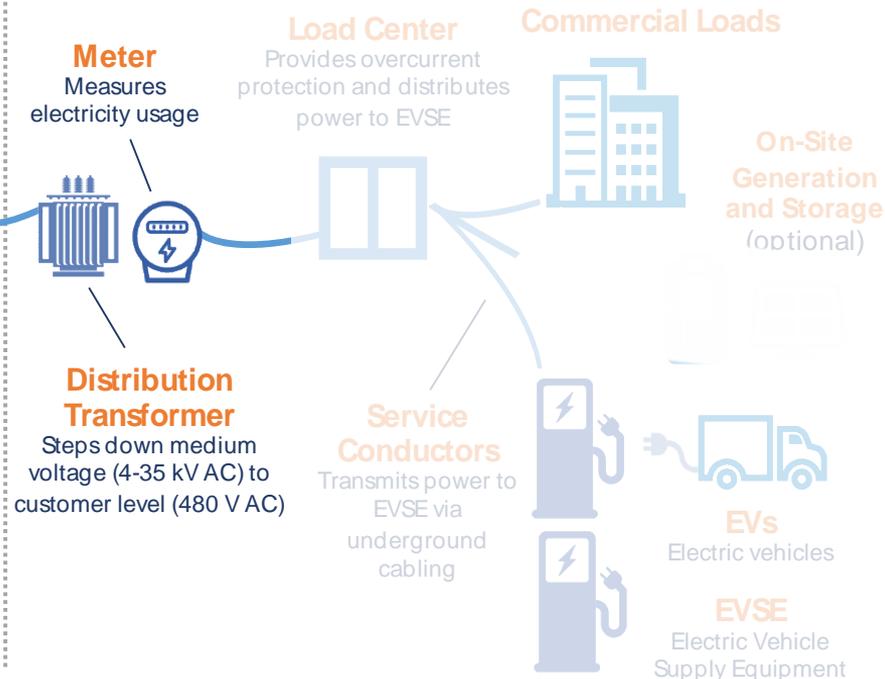
Distribution Feeders

Distributes electricity to end users



On-Site

Lowers voltage to customer level (if secondary service) and distributes electricity throughout property



SOURCE: Borlaug et al., "Heavy-Duty Trucks: Opportunities for Electrification and the Electricity Distribution System Requirements for Depot Charging", Forthcoming.

Grid Charging Infrastructure

Talk With Utility Early and Often



Do you have enough power onsite for your immediate needs?
Future plans?

Do you require grid upgrades? What are the timelines?

Do you require a new service?

What rates are you subject to and how could that influence your charger selection?

The electric utility company is most interested in building the grid infrastructure needed to supply the energy and peak power that will be required by your facilities and new EV chargers.

Distribution Substation

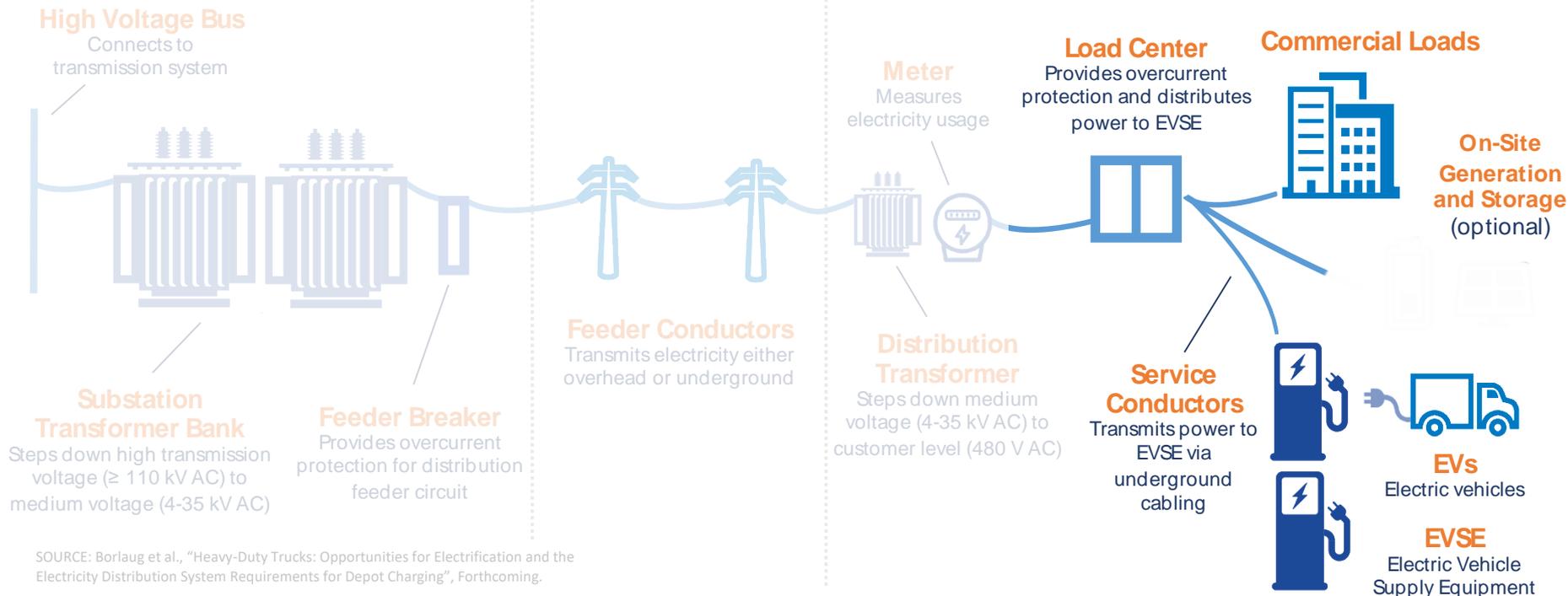
Lowers voltage from transmission lines and protects downstream distribution system

Distribution Feeders

Distributes electricity to end users

On-Site

Lowers voltage to customer level (if secondary service) and distributes electricity throughout property



On-Site Charging Infrastructure

Grid and Facility Considerations

Site Equipment

- **Transformer capacity:** Distribution transformer must be large enough to supply peak load demand.
- **Main breaker:** Must be sized large enough to supply the peak coincident demand from all branch circuits.
- **Panel capacity:** Spare breaker positions must be available.
- **Circuit breaker:** NEC 625.41: overcurrent protection shall be rated for 125% of the maximum EV charger load.



<https://electricsschoolbusinitiative.org/all-about-charging-infrastructure>

Charger Power Levels

Charger power is rated in kilowatts (kW)

- Power (kW) = amps (A) x voltage (V)/1000

Chargers can range from 3 – 350+ kW

- Level 2 AC: 3-19.2 kW
- DC fast chargers: 15–350+ kW

Higher power levels charge vehicles faster

- Charger power (kW) * dwell time (hours) = energy delivered (kWh)
- Example: 15 kW charger * 12 hours (6 p.m.–6 a.m.) = 180 kWh

Your energy costs will most likely depend on your peak power

- More high-powered chargers running at once = larger monthly bill
- Example: 5-60 kW chargers, \$15 demand charge
 - All chargers running at once = \$4,500 monthly cost on top on energy rates
- Consider charge management to minimize demand

Level 2 AC Chargers

Power Levels

- 3–19 kW

Facility Power

- Single or 3-phase

Connector

- J1772

Applicability

- Longer duration charging (typically sufficient for municipal operations)

Vehicle Compatibility

- Confirm with manufacturer

CSB/CHDV Requirements

- Energy Star certified

Grid Impact

- Less infrastructure required

J1772 AC Plug



J1772 AC Port



DC Fast Chargers

Power Levels

- 15–350+ kW

Facility Power

- Typically requires 3-phase power

Connector

- CCS1

Applicability

- Quick top offs, mid-day charging, longer duty cycles

Vehicle Compatibility

- Most medium- and heavy-duty vehicles should be compatible

CSB/CHDV Requirements

- Nationally Recognized Testing Laboratory listed

Grid Impact

- More infrastructure required

CCS DC Plug



CCS DC Port



Power Requirements and Route Analysis

Energy used per route

$$\text{Efficiency (kWh/mile)} \times \text{distance (miles)} = \text{energy (kWh)}$$

Charger power needs

$$\text{Energy (kWh)} / \text{dwell time (hours)} = \text{power (kW)}$$

Energy per charging session

$$\text{Power (kW)} \times \text{dwell time (hours)} = \text{energy (kWh)}$$

*Efficiency, energy usage, and power delivery will all be affected by external factors

[CSB Webinar: Fleet Planning and Route Analysis](#)

The Electric School Bus (ESB) Route Analysis Tool is a spreadsheet tool designed to assist school bus fleets with determining the bus energy usage and charger power needs for their unique routes.

<https://driveelectric.gov/school-districts>

Charger Options

Networked vs. non-networked

- Open Charge Point Protocol compliance is advisable (at least 2.0.1)

Make and models

- Ask your vehicle manufacturer or charge management provider about interoperability

Grant and/or utility requirements

- Energy Star, Nationally Recognized Testing Laboratory, approved equipment list, etc.

Electrical parameters

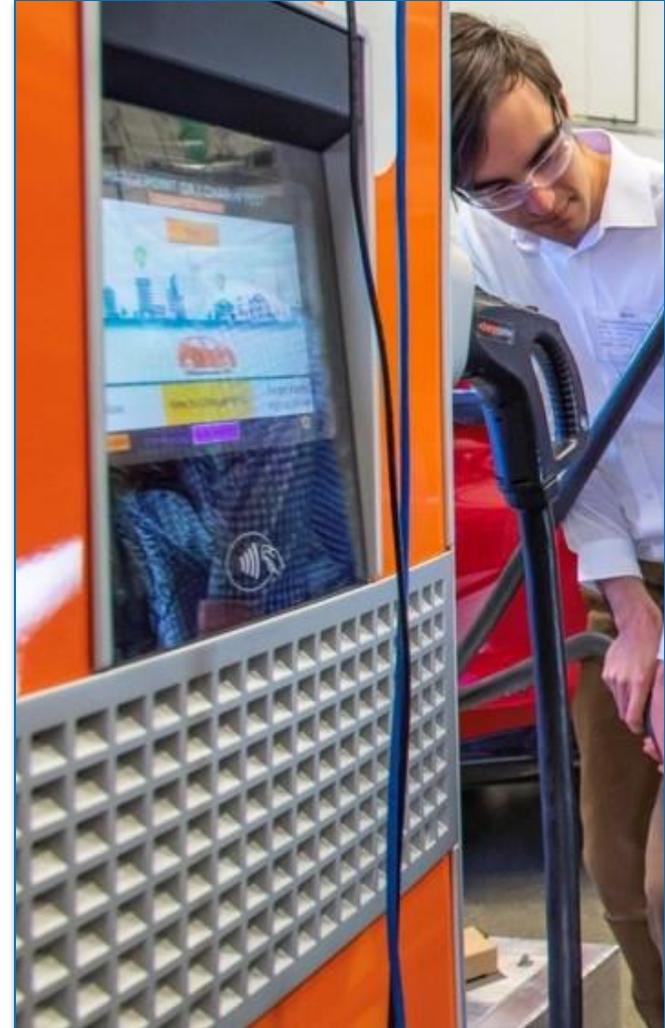
- Amp rating, input current, input voltage, etc.

Single or dual port

Wall mounted or pedestal

Cable length and cord management

Temperature rating



Site Design Options

What is the optimal layout for your full electrification plans?

- Nearby service panel, minimal trenching, and wall-mounted chargers are less costly
- Need to consider future expansion during initial footprint

What vehicle-to-charger ratio works for your fleet?

Are you limited by parking (pull-in/back-out)?

- Do you need to require front or rear charging receptacles?

Do you have space for chargers and bollards in and around parking spaces?

Do you need to consider extreme weather (e.g., shade for extreme heat, cord management during snow events)?



Future-Proofing



Plan for more chargers

- Add conduit, stub ups where possible
- Consider oversizing transformers and panels

Consider standardizing charger sizes or models

- Ensure compatibility, standardize maintenance, expand to new routes, and allow flexible parking

Talk with your utility early about future electrification

- Grid upgrades may take years

Purchase Open Charge Point Protocol compliant chargers

- Will enable future charge management options

Charge Management

Best Practice



Cost savings



Infrastructure reduction



Data and reporting



Remote monitoring



Pre-conditioning



Interoperability



V2X

[4/24/24 EPA CSB Webinar - Incorporating Charge Management](#)

Charging Partners



Procurement Resources

[Electric School Bus Initiative and charger procurement request for proposals template](#)

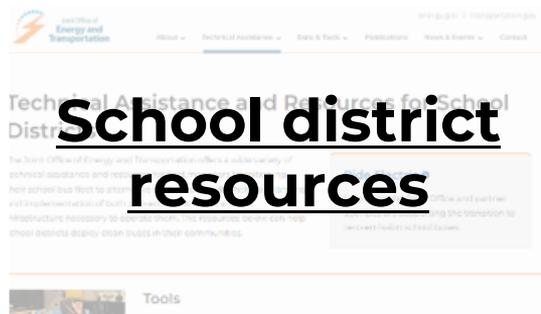
[EPRI vetted product list](#)

[Drive EV Fleets Purchasing Collaborative](#)

[Sourcewell - Electric Vehicle Equipment and Infrastructure](#)

[U.S. Department of Energy Guidance in Procurement of Electric Vehicle Supply Equipment](#)

ESB Resources





Hydrogen-Specific Considerations

- Consult with authorities having jurisdiction and utility early and often.
- Hydrogen can be dispensed at different pressures and types (gaseous and liquid). What are your requirements?
- What is your process for getting hydrogen?
- Is your maintenance facility equipped to handle gaseous fuels?

Hydrogen Resources

[Alternative Fuels Data
Center Hydrogen
section](#)

[H2 Tools](#)

[Southeastern
Pennsylvania
Transportation
Authority FCEV analysis](#)

[California Hydrogen
Station Permitting
Guidebook](#)



Thank You

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Question & Answer Session



Upvote and comment on questions similar to your own.
Type your full thought so we can follow-up with an answer.
Speak slowly and clearly for the captioner/interpreter.

CSB and CHDV Program Website Tools and Resources



Technical Assistance



- [Clean School Bus Technical Assistance](#)

- [Coordinating with Electric Utilities](#)



- [Clean School Bus Case Studies](#)

- [Tax Credits](#)

- [Sustainability Resources for Clean School Buses](#)



Workforce Development



- [Workforce Development and Training Resources](#)



Educational Materials



- [Clean School Bus Reports to Congress](#)



- [Benefits of Clean School Buses](#)

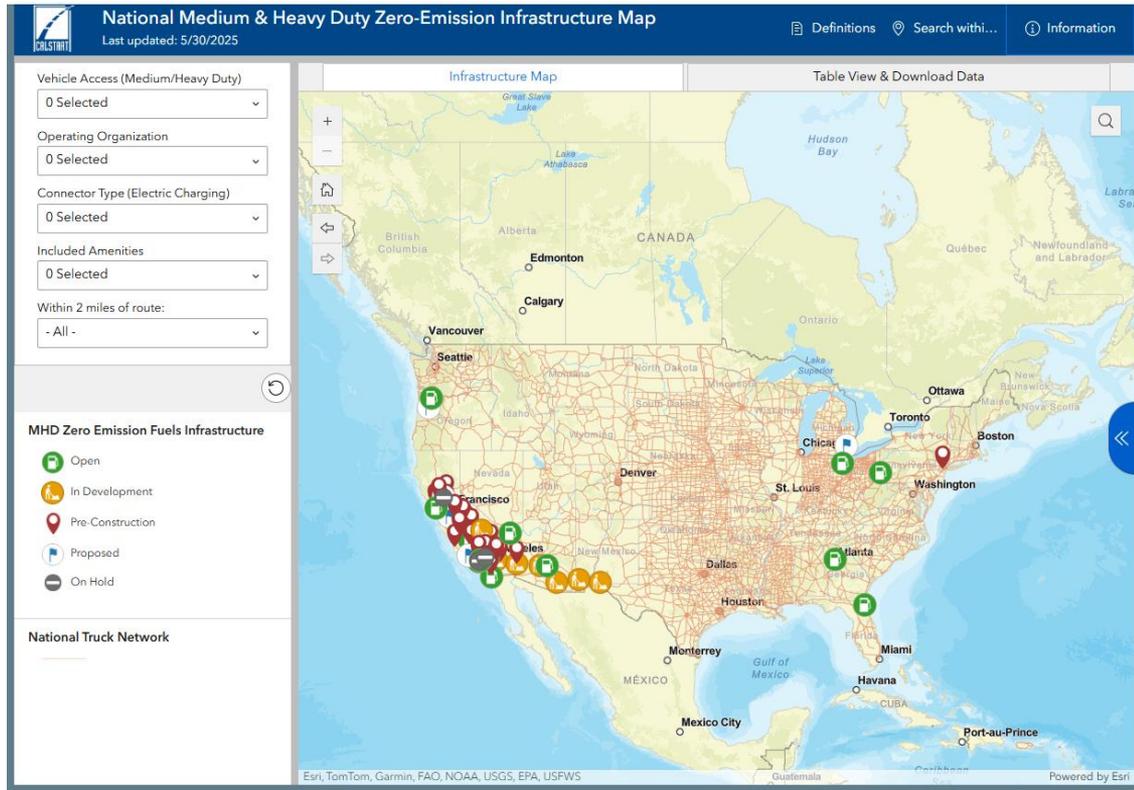
- [Resources to Engage Your Community](#)

All the above links can be found on: [epa.gov/cleanschoolbus](https://www.epa.gov/cleanschoolbus)

More resources can be found on the CHDV Grantee Resources page:
<https://www.epa.gov/clean-heavy-duty-vehicles-program/clean-heavy-duty-vehicles-program-grantee-resources>

National Medium- and Heavy-Duty Zero-Emission Infrastructure Map

- Interactive map by CALSTART showing all public charging and refueling infrastructure for zero-emission trucks nationwide
- Includes planned stations as well as those in construction and already open to the public



This resource can be found at:
<https://calstart.org/mhd-infrastructure-map/>



Stay in Touch

- Submit new CSB questions to cleanschoolbus@epa.gov
 - Note: Existing [CSB Grant Q&A Documents](#) or [CSB Rebate Q&A Documents](#) may have information relevant to your question; please review these first.
- Submit new CHDV questions to cleanhdvehicles@epa.gov
 - Note: Existing [CHDV Q&A Documents](#) may have information relevant to your question; please review these first.
- NLR Technical Assistance Helpline: cleanschoolbusTA@nrel.gov or cleanHDvehiclesTA@nrel.gov
- Don't miss any updates!
 - To sign up for the CSB listserv, please visit epa.gov/cleanschoolbus.
 - To sign up for the CHDV listserv, please visit epa.gov/clean-heavy-duty-vehicles-program.



Thank you!