

Electric School Buses – Getting Started and Scaling Up

Jennifer Kritzler - CALSTART
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Transitioning to Electric School Buses

- New York State is mandating a full transition of the school bus fleet from combustion engine vehicles (diesel and natural gas) to zero-emission electric school buses (ESBs).
- All new school bus purchases must be zero-emission by 2027, with 100% of school buses in NY zero-emission by 2035.
- Why?
 - School buses are an important part of New York’s commitment to educational equity
 - Over 42,000 buses transport children to school
 - Converting school buses to zero-emission will reduce greenhouse gas (GhG) emissions, improve child health, spur further GhG reduction opportunities, more green jobs to NY – workforce development opportunities
 - Pollution is 5-10 times higher inside the buses than outside the buses
 - Diesel exposure impacts respiratory and cognitive health
 - Potential to reduce asthma and increase school attendance

Electric School Bus Models



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Electric School Buses Meet Most Needs

- Operating ranges are between 100-200 miles (and increasing), comfortably meeting most service requirements
- Winter performance is a challenge due to heating requirements but heating modifications exist, and battery density improvements will extend battery life

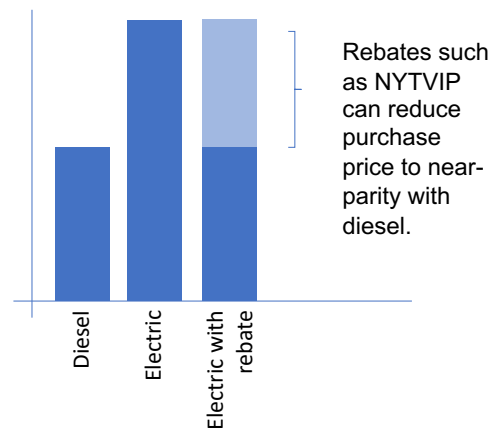
	Passenger Capacity	Bus Range	Manufacturers	Cost Estimate
Type A	16-20	100-150 miles	Lightning eMotors, Lion Electric, Micro Bird, Motiv Power Systems, Phoenix Motor Cars	\$265,000-\$450,000
Type B	20-30	NA	NA	NA
Type C	60-72	100-120 miles	Blue Bird, IC Bus, Lion Electric, Thomas Bull	\$300,000-\$400,000
Type D	72-90	120-155 miles	Blue Bird, BYD, GreenPower Motor Company, Lion Electric	\$345,000-\$410,000

Source: CALSTART

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ESB Costs as compared to Diesel

- Upfront costs are higher. But...
 - Rebate programs reduce costs of ESBs to near cost-parity with gas/diesel buses
 - Fuel/maintenance costs are lower for ESBs
- When combined, incentives and lower operating costs often result in lower total cost of ownership (TCO) for ESBs



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New York Truck Voucher Incentive Program

- \$58.3M incentive pool supporting adoption of clean trucks, transit buses, school buses, and repowers
 - \$6M for electric school buses - \$1.7M still available
- Vouchers reduce the upfront purchase cost and accelerate or eliminate the payback period associated with cleaner vehicles
- Brings together vehicle manufacturers, dealers, and fleets to get cleaner trucks and buses on the road
- Scrappage ensures removal of the oldest, dirtiest diesel engines from New York State roads

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Fleet Eligibility

- NYTVIP is available to any public, private, or non-profit fleet (except for Federal government fleets)
- School bus funding has its own caps:
 - 5 buses per public district
 - 2 per private school
 - 12 per contractor serving multiple districts
 - 20 for NYC Schools
- Vehicles purchased through the Program must be operated for a minimum of five years and meet minimum annual usage requirements
- Fleet Usage Reports are required for three years following voucher payment
- Lease term must be at least five years
 - Leasing company is purchaser of record, responsible for ensuring compliance with all requirements (e.g., reporting)

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Fleet Eligibility and Voucher Incentive Levels

Vehicle Type	Annual In-Service and Term Requirements for New Vehicle	Annual In-Service and Term Requirements for Scrapped Vehicle
School Bus	≥8,000 miles annually on average during the five year-in-service period	≥2,500 miles annually over at least one of the last two years

Vehicle Type	Fuel Type	Incremental Cost %	Voucher Amounts and Caps					
			Vehicle Weight Class (GVWR)					
			3	4	5	6	7	8
School Buses	BEV	100%	\$ -	\$ 100,000	\$ 120,000	\$ 150,000	\$ 200,000	\$ 220,000

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Locational Requirements – Disadvantaged Communities

- All electric transit and school buses must be domiciled in, or operated within 0.5 miles of, a Disadvantaged Community (DAC)
- If a depot is not in a DAC, the fleet must identify proposed route(s) in the application



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Locational Requirements – Non-DACs

- Otherwise, BEV projects may be eligible for less funding if they are in one of 30 counties with poor air quality, even if they are not operating in a DAC



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Vehicle Scrappage Requirements

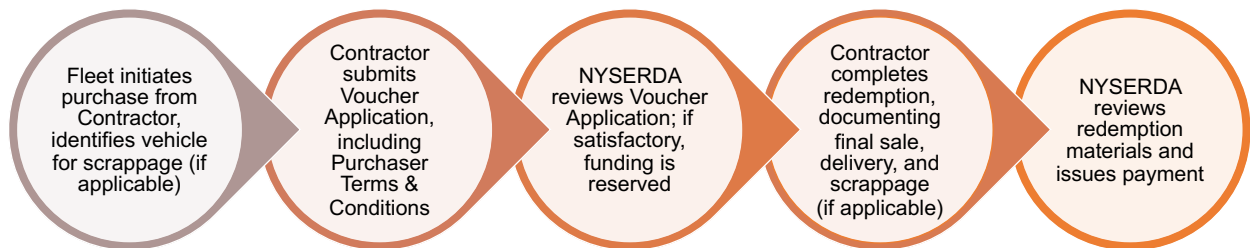
- Goal: Reduce diesel exhaust emissions by replacing older, dirtier diesel buses with new electric buses
- Eligibility: Buses with 1992-2009 model year diesel engines
 - GVWR must be similar to new vehicle
 - Must have been operated at least 2,500 miles annually in 1 of prior 2 school years
- Ownership Flexibility – Fleets may buy a used vehicle to meet scrappage requirements
 - Registered in NY for 24 of the most recent 27 months
 - Registration and mileage requirements may be met by previous owner



Note: scrappage must occur after Voucher Application is approved

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Voucher Process at a Glance



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Voucher Help Center (VHC)

- Operated by the Center for Sustainable Energy (CSE)
 - Manages intake of Vehicle, Contractor, and Voucher Applications
 - Works with NYSERDA to approve/deny and process applications
 - Point of entry for general inquiries
- Contact the Voucher Help Center
 - NYTVIP@energycenter.org
 - 866-595-7917

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EPA Clean School Bus Program

- 5-year program, \$500 billion available funding
 - Round 1 closed August 19, 2022
- Largely oversubscribed
 - ~2,000 applications, nearly \$4 billion, over 12,000 buses
 - More than 90 percent requested were zero-emission buses
 - 9 percent – propane, 1 percent - CNG
- Nearly [doubled funding amount](#) from \$500 million to \$965 million
 - Still will only cover a portion of applications, and likely not get past priority applications
- Round 2: Grant style program ~January/February 2023
 - Possibly different prioritization criteria

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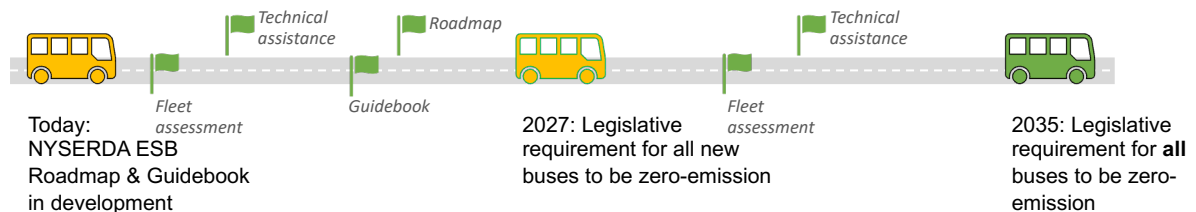
Charging Infrastructure Support

- Electric utilities in NY are implementing a Medium- and Heavy-Duty Make Ready Pilot (MRP)
 - Provides \$15 million for make-ready infrastructure for MHDV fleets receiving vehicle incentives through NYTVIP
- NYTVIP team working with NYS utilities to coordinate processes and create a seamless experience for accessing vehicle + infrastructure incentives for MHD EVs
- Program overview and contacts: <https://jointutilitiesofny.org/ev/make-ready/mhd-pilot-program>

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How else is New York State helping?

- NYSERDA is developing a **Roadmap** and Guidebook to provide guidance on how to begin and go about the fleet conversion process
- Technical assistance will also be available to support districts/operators ready to make the switch
- NYSERDA is exploring different ways to purchase, finance, and operate these buses to reduce risk and administrative burdens.
- Utilities across the state offer Fleet Assessment services to help kick-start the transition process



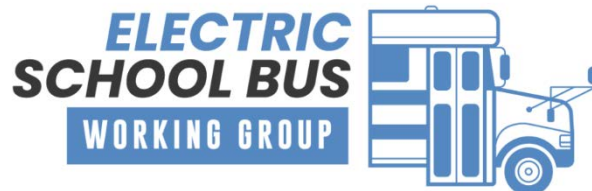
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What is a Guidebook? Roadmap?

- Guidebook - a resource for operators and districts to help with:
 - Navigating the ESB market
 - Comparing bus & charger models
 - Planning purchases
 - Exploring funding options
 - Engaging with utilities
 - Planning site & facility upgrades
 - Incorporating solar and battery upgrades
 - Understanding workforce impacts
 - Developing job (re)training programs
 - Scaling to full fleet conversion
- Roadmap - a resource for policymakers to:
 - Identify challenges, roadblocks, and gaps
 - Develop solutions to support districts, operators and stakeholders to navigate the transition
 - Identify funding needs and resources
 - Propose policy changes

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Working Group



Collaborative working group sessions designed for school bus operators to learn and share about electric school bus (ESB) adoption in the Northeast/Mid-Atlantic region.
Upcoming webinars:

- Nov 23, 2022 01:00 PM
- Jan 25, 2023 01:00 PM
- Mar 22, 2023 01:00 PM
- May 24, 2023 01:00 PM



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Thank you!

For more information on NYTVIP, visit the **website**:

<https://nyserda.ny.gov/truck-voucher-program/>

For more information on expenses eligible for transportation aid, see

<http://www.nysed.gov/pupil-transportation/guide-aidable-non-aidable-transportation-expenses>

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Appendix/Backup

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What about school bus workers?

- Driver training, mechanic retraining, and charger technician training will be a focus
- New York State is working on a plan to help operators and districts through this transition
- Prior to buying ESBs, bus operators must develop a workforce report that:
 - Estimates the number of current positions that would be eliminated or changed and the number of positions that would be created as a result of the switch to electric school buses
 - Identifies gaps in skills needed to operate electric buses for its current workforce
 - Includes a plan to train its workforce to operate and maintain electric buses
 - Contains an estimated budget for workforce development
- Operators must inform collective bargaining units before the procurement of zero-emission buses



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