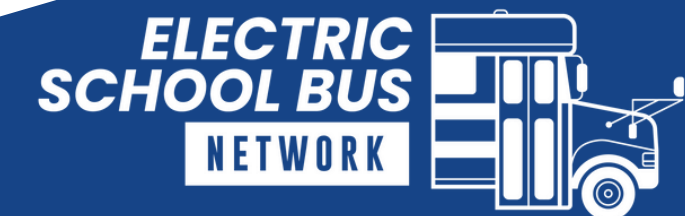


# **ELECTRIC SCHOOL BUS NETWORK NATIONAL FORUM**

**The Utility in Driving Electric  
School Bus Adoption**

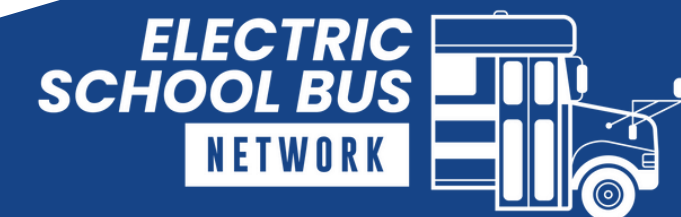
**December 11, 2024**



**December 11, 2024**

# Forum Agenda

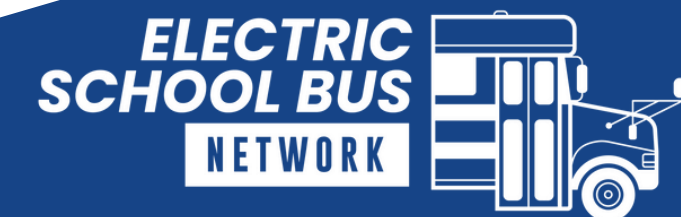
- 01.** Intro to the Electric School Bus Network
- 02.** Utility Fleet Electrification Programs with PG&E and National Grid
- 03.** Q&A
- 04.** Summary and Closing





# Electric School Bus Network

The Electric School Bus Network accelerates nationwide school bus fleet electrification through peer-to-peer networking and dialogue-driven forum meetings for school districts, advocacy organizations, government organizations, and industry representatives. The ESB Network provides access to educational tools, resources, and subject matter experts to help **support the electric school bus fleet transition.**





# Meet the ESB Team



**Rachel Chard**  
Deputy Director



**Michelle Hanson**  
Program Manager



**Ian Fried**  
Lead Project Manager



**Alise Crippen**  
Lead Project Manager



**Chrystal Ales**  
Lead Project Manager



**Emily Gasca**  
Lead Project Manager



**Sarah Stalcup-Jones**  
Project Manager



**Alberto Santos-Davidson**  
Project Manager



**Liza Walsh**  
Project Manager



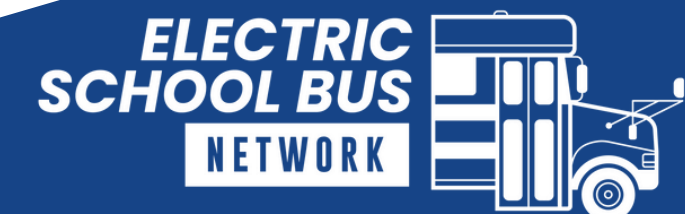
**Katelyn Tomaszewski**  
Project Manager



**Skyler Potocek**  
Project Manager



**Ibraheem Ameer**  
Project Manager





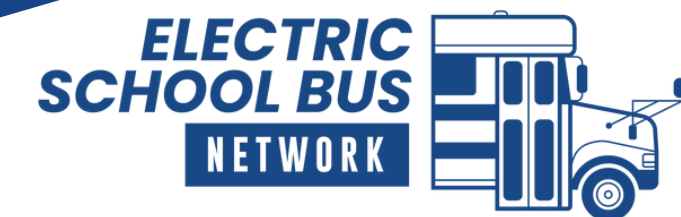
# National Forum Goals for 2024-2025

Creating a space where stakeholders can come together to discuss advancing the ESB industry by:

- **Bringing together** stakeholders in ESB adoption from
  - Industry, agencies, operators, school districts, advocates, and more
- Presenting topics that **encourage discussion** on advancing the ESB industry



# Utility Fleet Electrification Programs: PG&E







**EV Fleet Program**





# What is the EV Fleet Program?

EV Fleet is a ratepayer-sponsored program that is designed to accelerate EV adoption for medium duty, heavy duty (MDHD EVs) and off-road vehicles

## GOAL:

Support the deployment of  
**>6,500 MDHD EVs**



## BUDGET:

**\$236** million



## TIMEFRAME:

Enrolling sites through  
2026 or until funding is  
fully subscribed





# What vehicles are eligible?



## Medium duty

Class 2–6

(>6,000 lbs GVWR)

School buses, cargo vans,  
box trucks, cutaways,  
work trucks, etc.



## Heavy duty

Class 7–8

Heavy duty trucks,  
transit buses,  
drayage, etc.



## Off road

Class 1 forklifts, tractors,  
construction equipment,  
TRUs, ground support  
equipment, cargo  
handling equipment, etc.

# What benefits does EV Fleet provide?

## PG&E simplifies fleet electrification by offering:



Installation of electrical infrastructure up to the customer's meter **at no cost**



**Incentives and rebates** to offset out-of-pocket costs for construction and chargers



**Comprehensive support** throughout the completion of the EV charging project

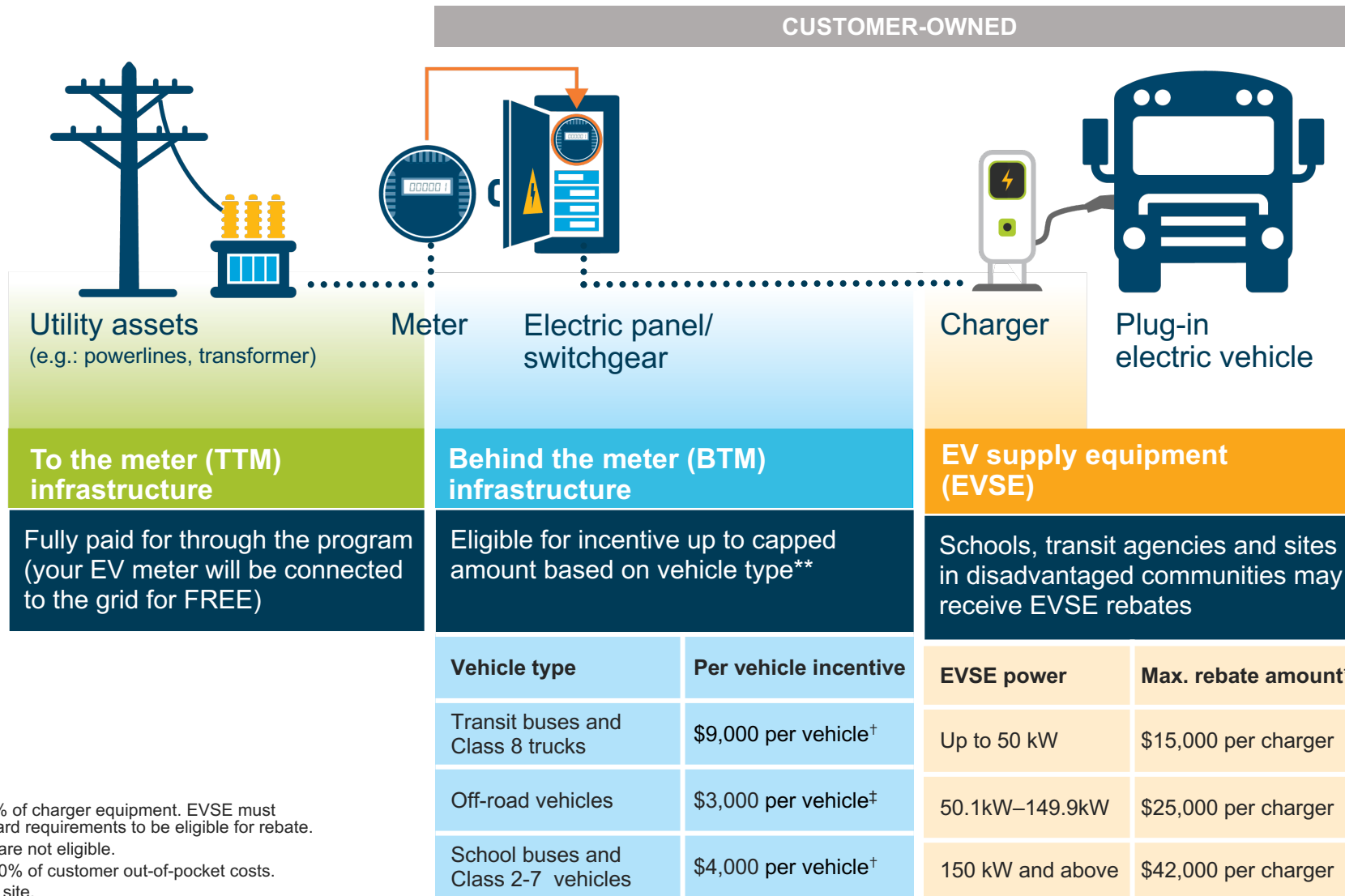


# EV charging project breakdown



	Utility assets (e.g.: powerlines, transformer)	Meter	Electric panel/ switchgear	Charger	Plug-in electric vehicle
	To the meter (TTM) infrastructure	Behind the meter (BTM) infrastructure or make-ready		EV supply equipment (EVSE)	
<b>Who constructs, owns, and maintains?</b>	PG&E	The customer		The customer	
<b>Who pays for?</b>	PG&E	The customer		The customer	
<b>Available rebates/incentives?</b>	N/A—fully paid for by PG&E	Incentives may be available to offset your out-of-pocket costs		Charger rebates available for transit agencies, schools, and some sites located in disadvantaged communities	

# Available incentives and rebates



\*Rebate not to exceed 50% of charger equipment. EVSE must meet minimum and standard requirements to be eligible for rebate. Fortune 1000 companies are not eligible.

\*\*Incentive not to exceed 80% of customer out-of-pocket costs.

<sup>†</sup>Limited to 25 vehicles per site.

<sup>‡</sup>Limited to 50 vehicles per site.



# Eligibility requirements

1

## Be a PG&E electric customer

This includes Direct Access and retail customers, as well as customers receiving power from a Community Choice Aggregator.



3

## Acquire at least 2 eligible EVs

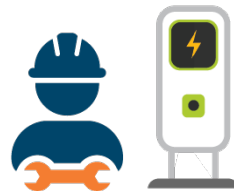
Customers must plan to put into operation a minimum of two medium duty, heavy duty or off-road electric vehicles over the next 5 years.



2

## Own or lease the property

Applicants must have authority to install charging infrastructure on their site.



4


## Agree to all requirements

Customers must make a 10-year commitment to operate and maintain equipment, a 5-year commitment to provide EV usage data and agree to all terms and conditions.

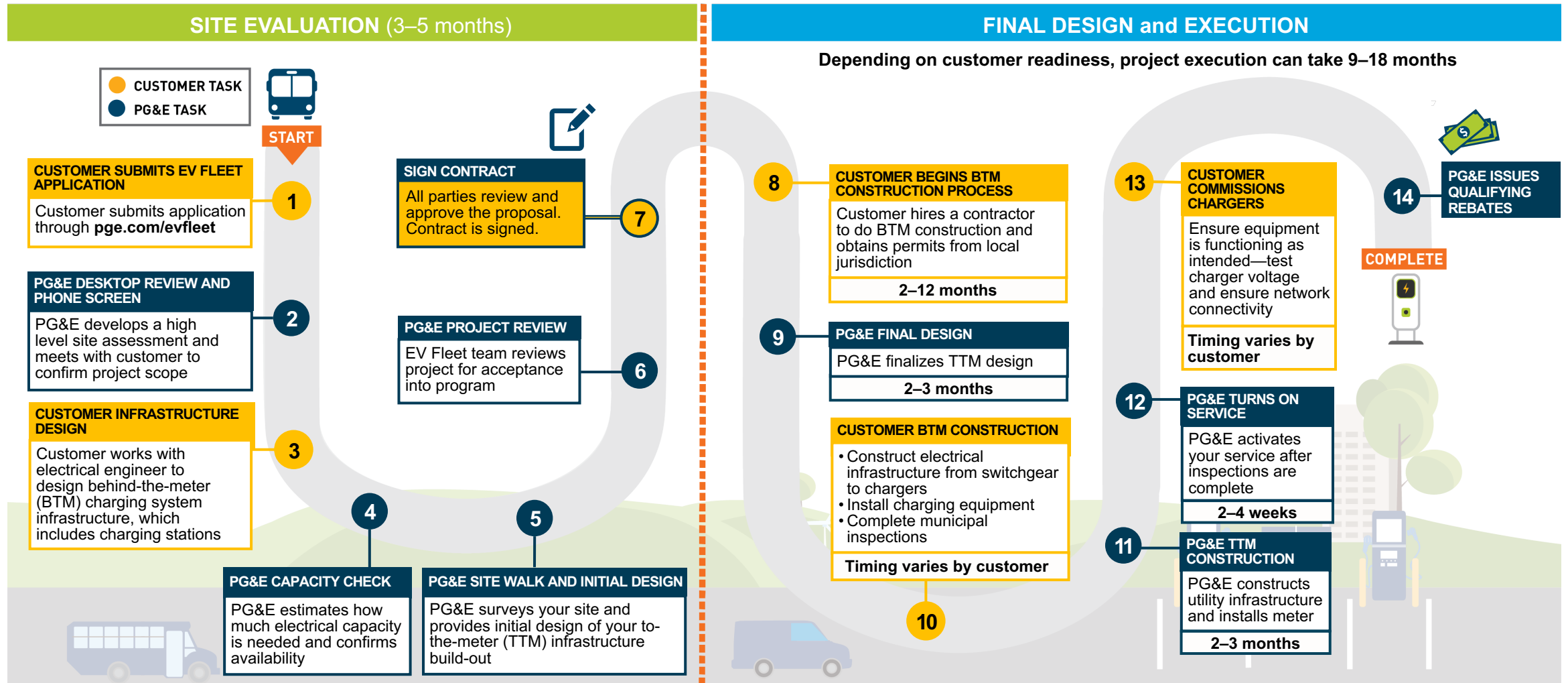


# Ready to apply



1	<b>Vehicle deployment plan</b>	Quantity, make and model of EVs that you plan to deploy over the next 5 years
2	<b>EV charger deployment plan</b>	Quantity, make, model, power level and datasheet for each EV charger that you plan to deploy  <b>Approved Product List</b> (hosted by Southern California Edison)
3	<b>Map of EV charger location</b>	Map screenshot indicating the location where you plan to install your EV chargers
4	<b>Secured funding for out-of-pocket costs</b>	Grants or approved budget to cover cost of BTM infrastructure, vehicles and chargers
5	<b>Leadership approval</b>	Must have internal readiness to sign a contract to commit to the EV Fleet Program
6	<b>Proof of vehicle procurement</b>	Paid vehicle invoice, approved vehicle grant or a letter from board/owner/city council/etc
7	<b>Permission from property owner</b>	Property owner must be willing to sign an easement with PG&E for infrastructure installation

# EV Fleet electrification process





# Grid capacity for EV projects



**Does PG&E have enough grid capacity to serve my EV chargers?**

**Good news!** Only about 15% of EV Fleet projects face capacity challenges, and we have different strategies for providing power for these sites.

**Interested in learning more about capacity at your site?**




Check out PG&E's Integration Capacity Analysis (ICA) maps

# Frequently asked questions



**EVs are expensive—are there grants that can help me pay for them?**

**Yes**, check out our list of available grants at [fleets.pge.com/grants](https://fleets.pge.com/grants) 



**How do I plan for the future when I'm not sure how many EVs I'll get?**

It's good to plan for the number of vehicles and chargers that you are fairly certain you'll need over the next 5 years. You can only apply to the program once per site, so future upgrades to your electrical service will be at your own expense. The program also allows you to futureproof your site by installing a larger switchgear. **Talk to your Onboarding Specialist to learn more.**



**How can I address concerns around power reliability?**

Events that lead to power outages are **usually known in advance**, which means you can make sure all of your vehicles are fully charged before they happen. Additionally, backup battery storage systems can be useful for emergency situations.



**Can I install solar panels on my EV meter?**

**Yes, as long as all of your chargers are smart chargers** so that you can meet data reporting requirements. Generally off-road vehicles like forklifts and TRUs do not use smart chargers, so these projects cannot install solar.

# Business EV rate structure

1

Customers choose subscription level, based on charging needs

High Use EV Rate:

**\$95.56** / 50kW block over 100kW\*


Low Use EV Rate:

**\$12.41** / 10kW block up to 100kW

Customers that want to **manage charging loads** can opt for a lower subscription level.

2

Subscription remains consistent month-to-month

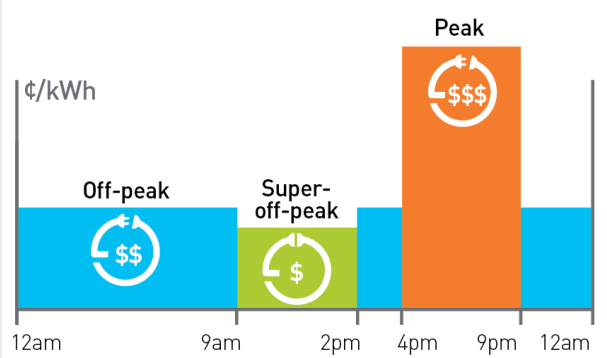
 If site charging power exceeds subscription, several customer communications are triggered, and overage fees may apply.

Customers **can change subscription level** to suit their charging needs.

3

Energy usage is billed based on time-of-use pricing

Energy Charge:



**~\$1.91** per e-gallon

Depends on vehicle type, season, and time of day for charging

 Compare e-gallon rate savings to gas/diesel

 Visit the **Business EV Rate website** for more information

\* Values for Business High Use EV Rate Secondary (BEV2-S) voltage. For Business High Use EV Rate Primary (BEV2-P) voltage, the price of each 50kW block is \$85.98. Please refer to the [Business EV Tariff](#) for exact values.



# EV Fleet Savings Calculator

PG&E

## Electrify Your Fleet: Drive Change

Learn how you can start saving money and the planet.

Calculate Fuel Savings    Total Cost of Ownership

INFORMATION ▾    CALCULATORS ▾

- Planning
- Grants
- Vehicles
- Fuel Savings
- Total Costs
- BEV Rate
- Rate Comparison
- LCFS

Feedback

### Build a plan with PG&E

- 1  
Check Your Eligibility
- 2  
Review Available Funding
- 3  
Calculate Fuel Savings
- 4  
Collaborate with PG&E

Together, let's drive savings, sustainability, and change. We've compiled the resources you need to understand the entire process and make an informed decision.

Build A Plan

Note: Values shown for illustrative purposes. Please refer to the [EV Fleet Savings Calculator](https://fleets.pge.com) at [Fleets.pge.com](https://fleets.pge.com) for exact values.





# EV Fleet Savings Calculator



Annual Fuel Savings

**\$299,000**

Savings Per Mile

**\$0.64**



Annual LCFS Credits

**\$143,000**

Revenue Per Mile

**\$0.31**



Annual GHG Emissions Saved

**866 Tons**

## VEHICLES

### 3x Tesla Semi



Miles per vehicle 300  
Days Operating Weekdays  
Charging: 9pm - 5am

### 6x Kenworth K370e



Miles per vehicle 100  
Days Operating Weekdays  
Charging: 9pm - 5am, 2pm - 4pm

### 1x Ford E-transit



Miles per vehicle 100  
Days Operating Weekdays  
Charging: 9pm - 5am

### 3x Rivian R1t



Miles per vehicle 60  
Days Operating Weekdays  
Charging: 9pm - 5am

## FINANCIAL

## ELECTRICITY

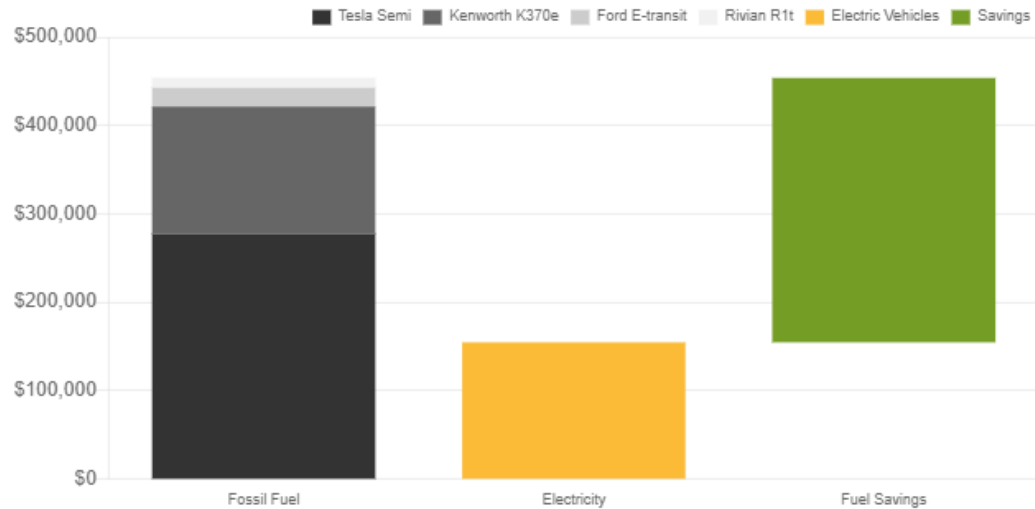
## VEHICLES

## CHARGERS

## EMISSIONS

Based on your selections, using electricity instead of fossil fuel saves **\$299,000** per year.

### ANNUAL FUEL COSTS





# EV Fleet Savings Calculator



Annual Fuel Savings

\$299,000

Savings Per Mile

\$0.64



Annual LCFS Credits

\$143,000

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FINANCIAL

ELECTRICITY

VEHICLES

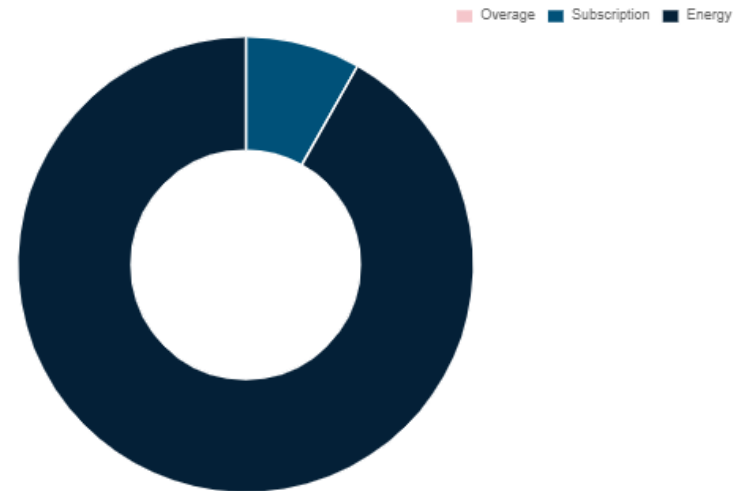
CHARGERS

EMISSIONS

To maximize BEV rate inputs, we have set your rate to **Business High Use EV**, with a subscription level of **11 blocks**. Check out the [Business EV Rate Calculator](#) to explore your options.

The total monthly cost would be **\$12,874**, which includes the cost to recharge to full and the subscription charges.

## BEV COST COMPONENTS



Note: Values shown for illustrative purposes. Please refer to the [EV Fleet Savings Calculator](#) at [Fleets.pge.com](#) for exact values.



# EV Fleet Savings Calculator

## LCFS Calculator

*The Low Carbon Fuel Standard is designed to decrease the carbon intensity of California's transportation fuel pool and provide an increasing range of low-carbon and renewable alternatives, which reduce petroleum dependency and achieve air quality benefits.*

— Low Carbon Fuel Standard Homepage

The Low Carbon Fuel Standard (LCFS) is administered by the [California Air Resources Board \(CARB\)](#). Participation requires registration, which entities can do so [here](#). The LCFS program is set to continue through at least 2030.

The calculation below is based on the methodology provided by CARB, which assumes a decreasing carbon intensity of fossil fuels. This tool makes no assumptions about a similar decreasing carbon intensity of the California Grid, therefore it is recommended to use the results of 2021 for a typical year.

The calculation below also assumes a flat LCFS credit price of \$150. This value is not guaranteed going forward and can change at any time. See the latest LCFS credit prices [here](#). A single LCFS credit represents 1 metric ton of carbon, and credit prices are often referred to as \$ \_\_\_/MT (dollars per metric ton).

### LOW CARBON FUEL STANDARD

ENERGY DISPLACED PER YEAR

730,000



10,000

10,000,000

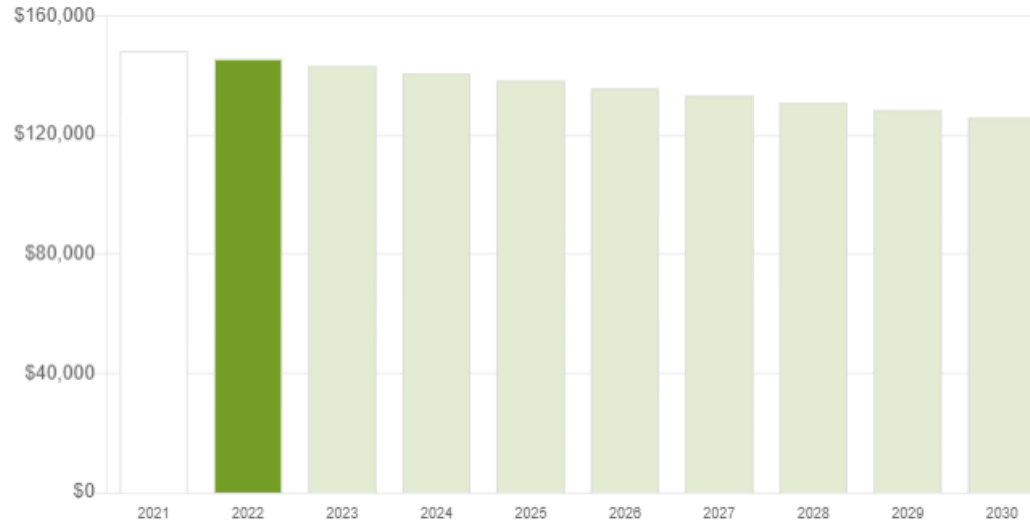
730,000 kWh; equivalent of 19,543 gallons of diesel

ELECTRICITY SOURCE

California Grid

Carbon neutral generation creates more LCFS credits. Carbon neutrality can be achieved with clean on-site generation or Renewable Energy Credits (RECs).

### ESTIMATED LCFS REVENUES



Note: Values shown for illustrative purposes. Please refer to the [EV Fleet Savings Calculator](#) at [Fleets.pge.com](#) for exact values.



# EV Fleet Savings Calculator



Payback Period ⓘ

1.3 years

EV Savings

\$4,225,000



EV Total Costs

\$3,349,000

Fossil Total Costs

\$7,574,000

## VEHICLES

### 3x Tesla Semi



Miles per vehicle 300  
Days Operating Weekdays  
Charging: 9pm - 5am

### 6x Kenworth K370e



Miles per vehicle 100  
Days Operating Weekdays  
Charging: 9pm - 5am, 2pm - 4pm

### 1x Ford E-transit



Miles per vehicle 100  
Days Operating Weekdays  
Charging: 9pm - 5am

### 3x Rivian R1t



Miles per vehicle 60  
Days Operating Weekdays  
Charging: 9pm - 5am

## OVERVIEW

FUEL

VEHICLES

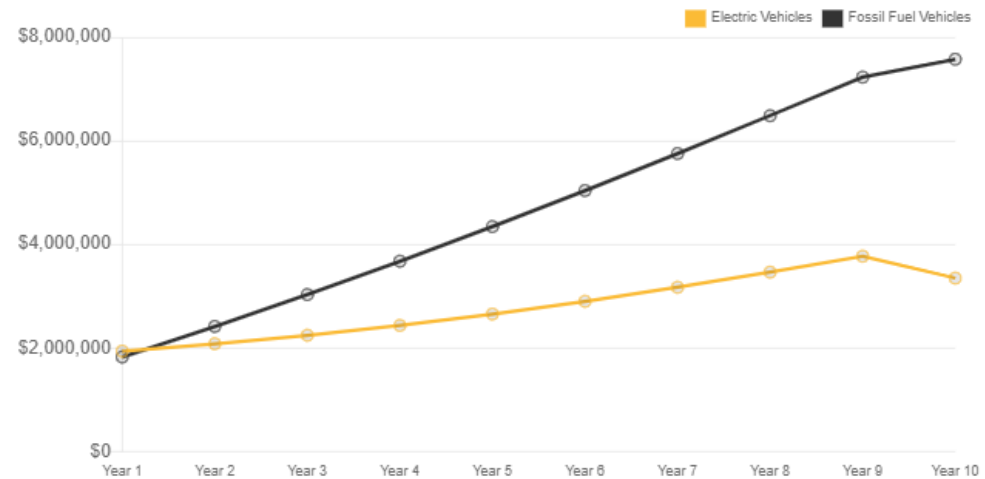
OPERATIONS

GRANTS

LCFS

After **1.3 years**, the cumulative cost of electric vehicles becomes cheaper than the cost of an equivalent fossil fuel fleet.

## TOTAL COSTS OVER TIME



Note: Values shown for illustrative purposes. Please refer to the [EV Fleet Savings Calculator](https://fleets.pge.com) at [Fleets.pge.com](https://fleets.pge.com) for exact values.



# EV Fleet Savings Calculator

### SELECT AN ESTIMATION APPROACH


BASE CALCULATIONS UPON

Vehicles

Vehicles are known and chargers are assigned on a 1:1 to each vehicle.


### VEHICLES

**3x Tesla Semi**




Miles per vehicle: 300  
Days Operating: Weekdays  
Charging: 9pm - 5am

**6x Kenworth K370e**




Miles per vehicle: 100  
Days Operating: Weekdays  
Charging: 9pm - 5am, 2pm - 4pm

**1x Ford E-transit**



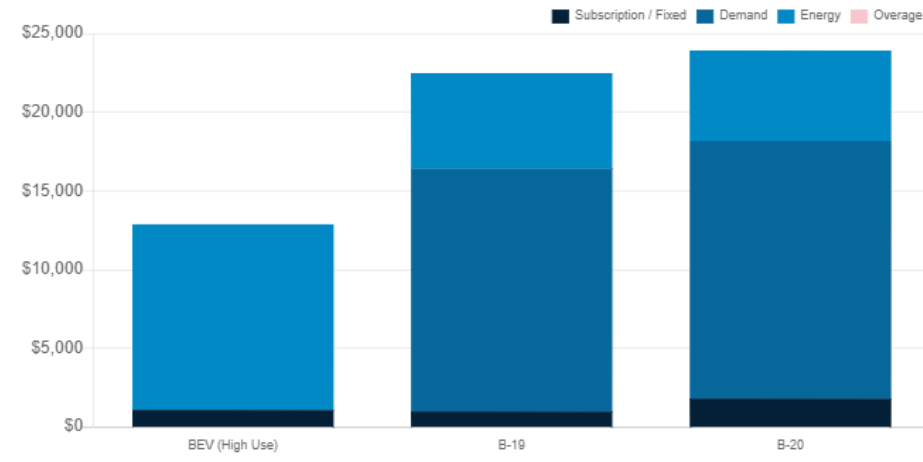
Miles per vehicle: 100  
Days Operating: Weekdays  
Charging: 9pm - 5am

**3x Rivian R1t**



Miles per vehicle: 60  
Days Operating: Weekdays  
Charging: 9pm - 5am

### RATE COMPARISON - BEV AND COMMERCIAL RATES



Rate	Subscription / Fixed	Demand	Energy	Overage
BEV (High Use)	~\$1,000	~\$11,000	~\$1,000	~\$1,000
B-19	~\$1,000	~\$15,000	~\$6,000	~\$1,000
B-20	~\$1,000	~\$16,000	~\$6,000	~\$1,000

### RATE ELEMENTS

RATE SELECTED: BEV

Rate Element	Charge	Units	Cost
Energy (\$ per kWh)	\$0.20	60,578	\$11,823
Subscription (\$ per block)	\$95.56	11	\$1,051
Overage (\$ per kW)	\$3.82	0	\$0
<b>Total</b>			<b>\$12,874</b>

Note: Values shown for illustrative purposes. Please refer to the [EV Fleet Savings Calculator](#) at [Fleets.pge.com](#) for exact values.





- [EV Fleet Website](#)
- [PG&E Integration Capacity Analysis \(ICA\) Map](#)
- [EV Fleet Application](#)
- [Approved List of Chargers](#)
- [Request to add Chargers to APL](#)
- [Requesting Letter of Support](#)
- [3<sup>rd</sup> Party Authorization Form](#)
- [EV Permit Streamlining Map](#)
- [EV Fleet Terms and Conditions](#)
- [EV Fleet Easement](#)
- [PG&E Service Territory Map](#)
- [PSPS Map and Outage History](#)
- [PG&E Power Mix](#)
- [Generating Revenue with Low Carbon Fuel Standard \(LCFS\)](#)



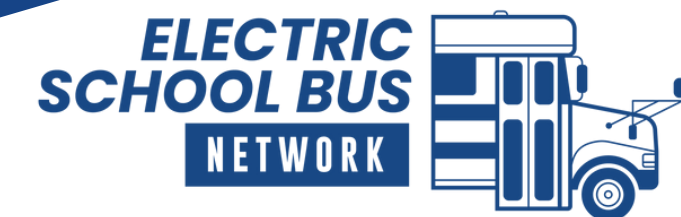
Thank you!

**Tim O'Neill**

tko2@pge.com

209-401-8189

# Utility Fleet Electrification Programs: National Grid





# Addressing Electric School Bus Challenges with Utility Fleet Electrification Programs

## CALSTART National Electric School Bus Network Forum

Ryan Wheeler, Fleet Electrification Product Owner  
December 11, 2024

**nationalgrid**



# It Comes Down to Clean Air and Climate Change

## Our Vision

A future where clean transportation is universal and the environmental and public health benefits are shared by all our customers and communities.

## Our Guiding Principles

- Our programs support a cleaner environment and reduce GHG emissions
- Our customers and communities have equitable and affordable access to clean transportation
- Smart integration for grid optimization, customer savings, and a clean energy future

Transportation is  
>45% of GHG  
emissions in the  
Northeast and a  
leading cause of air  
pollution.

# National Grid EV Programs: >\$360M of support for EV customers in MA and NY

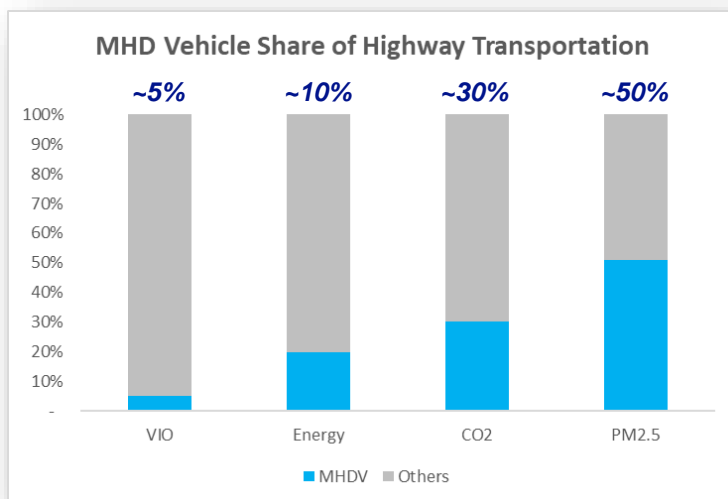
<u>Customer</u>	<u>Offerings</u>	 <u>Plans</u>	 <u>Infra.</u>	 <u>EVSE</u>	 <u>O&amp;M</u>
<b>Residential</b> 	<ul style="list-style-type: none"> <li>• 240V and Wiring Upgrade incentives for all customers</li> <li>• EVSE rebates and installation for eligible/EJC households</li> <li>• Ongoing incentives to manage EV charging</li> </ul>		✓	✓	✓
<b>Multi-Unit Dwellings</b> 	<ul style="list-style-type: none"> <li>• Infrastructure, EVSE and Networking Incentives</li> <li>• EV Ready Site Plans</li> <li>• Demand Charge Rebates and Alternatives</li> </ul>	✓	✓	✓	✓
<b>Public / Workplace</b> 	<ul style="list-style-type: none"> <li>• Infrastructure, EVSE, and Networking Incentives</li> <li>• Demand Charge Rebates and Alternatives</li> </ul>		✓	✓	✓
<b>Fleets</b> 	<ul style="list-style-type: none"> <li>• Fleet Advisory Services</li> <li>• Infrastructure and EVSE Incentives</li> <li>• Demand Charge Rebates and Alternatives</li> <li>• Off-peak Charging Rebates</li> </ul>	✓ for Public MA fleets, All fleets in NY	✓	for Public MA fleets only	✓



# MHDV electrification has many tailwinds

## Large Vehicles are Half of Highway Vehicle Pollution

### MHD Vehicle Share of Highway Transportation<sup>1</sup>



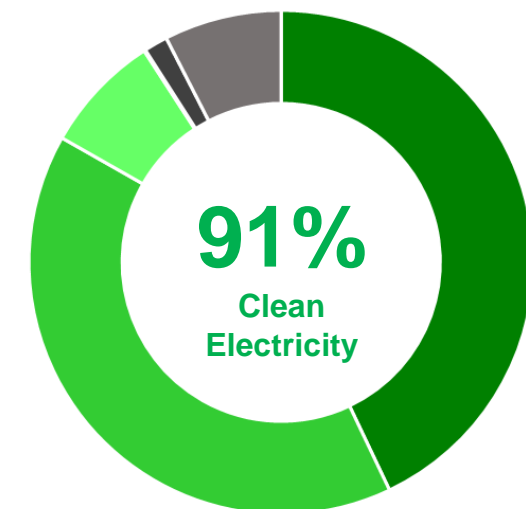
## Aggressive Clean Transportation Goals<sup>2</sup>



*New York's ~50k electric buses to be zero emission by 2035*

## Electricity Generation is Increasingly Clean

### 2023 Electricity Generation<sup>3</sup> Upstate NY, %



■ Nuclear ■ Hydro ■ Wind ■ Solar ■ Other Ren. ■ Gas & Oil

**Heavy-duty electrification is an efficient way to meet CO<sub>2</sub> & pollution goals... utilities support the whole journey**

#### National Grid

Sources: 1) US Transportation Energy Data Book, 2022. 2) ny.gov, "Governor Hochul Announces Adoption of Regulation to Transition to Zero-Emission Trucks", December 30, 2021. Executive Order 22 also directed state agencies to make 100% of LDVs Zero-Emission by 2035, and 100% of MHDV by 2040. 3) 2024 Power Trends, NYISO, June 2024



## Accelerating School Bus Electrification:

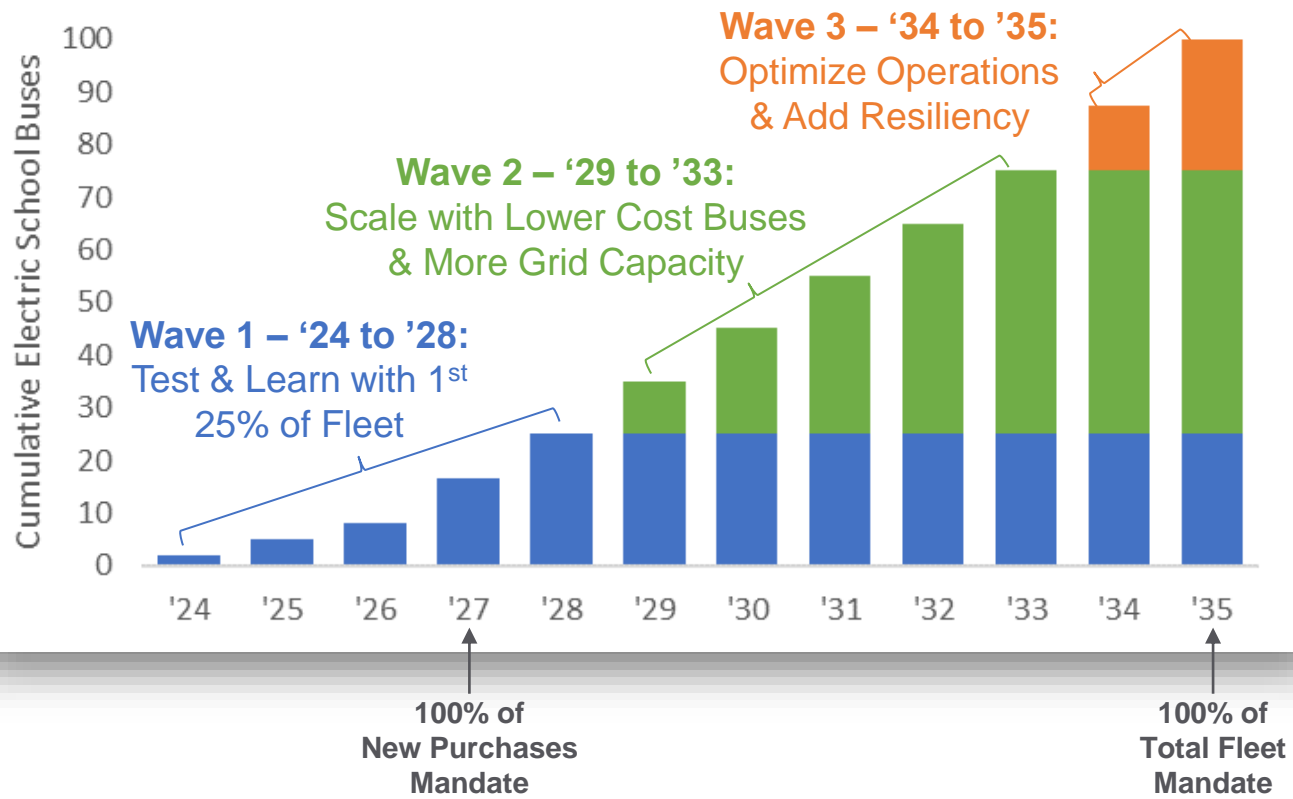
- **>200 School districts engaged to date:**  
Fleet assessments, plans and upgrade timing, EPA CSB support
- **>9,000 buses considered (so far) for electrification:**  
Determine short-term and long-term infrastructure needs
- **Proactive grid upgrades and load forecasting:**  
Proactive planning filing and load forecasts for school districts
- **Addressing school bus barriers:**  
Capacity planning, site selection, EVSE “right sizing”, operational savings, early quick wins, and maximizing incentives
- **Partnering with NY State and stakeholders:**  
Simplify school’s experience by collaborating with NYSERDA



***Utilities have a crucial role to alleviate anxiety, reduce project costs, and accelerate timelines***

# Electric School Buses (ESBs): What are the 3 Waves of transition to 100% electric?

100 Bus Example Fleet:  
Cumulative Electric School Buses



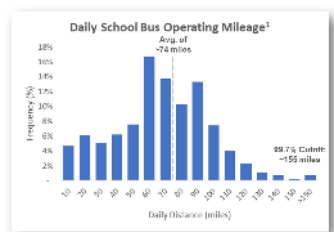
## 100 Bus Fleet Example:

- **Wave 1 – '24 to '28:**  
2-3 buses / year until '27, then 8-9 buses / year (12-year bus life = ~8.5 buses / year)
- **Wave 2 – '29 to '33:**  
10 buses / year; battery cost declines, and scale along with new grid capacity
- **Wave 3 – '34 to '35:**  
12-13 buses / year to reach 100% by '35. On-site power and battery storage cost declines make resiliency cheaper

Through '33, the fleet still has >25% diesel buses for the longest routes, emergencies, and field trips

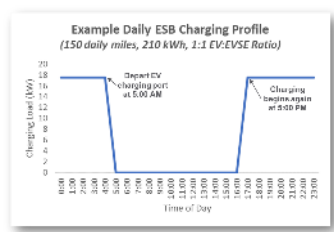
# Electric School Buses (ESBs): Addressing key questions

**1 Can buses today handle my daily operations?**



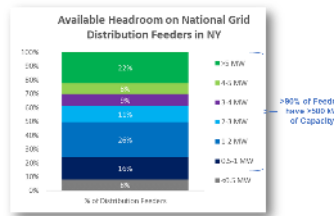
**~90% of daily operations are <100 miles, and nearly all <155 miles**

**2 What charging do I need for most of my routes?**



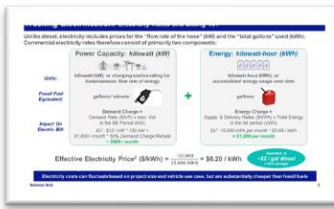
**19 kW or 30 kW chargers for 10-12 hours deliver >200 kWh needed for 100-150 miles**

**3 Can the grid handle the 1st wave of my buses?**



**>90% of our grid today can handle >500 kW, enough for >15 buses**

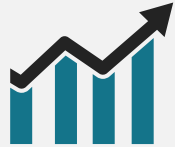
**4 What are my fuel costs vs. diesel?**



**With NY rebates, \$0.10-\$0.20 per kWh, or >40% less than diesel per mile**

# National Grid's Programs Help Every Step of the Way

## A Planning



### **Zero-Cost Fleet Assessments:**

- Site Feasibility / Capacity Review
- Rate Analysis
- Online tool coming soon (January)

### **Flexible Connections (new!):**

- Power capacity boost for some pilot constrained sites...  
*over-size EV charging while grid is being upgraded*

## B Infrastructure



### **MHD Pilot Incentives:**

- 90% of grid-side costs covered
- Up to \$220 / kW for eligible DAC or Public projects... *hundreds of thousands of \$ for MW-scale projects*

### **Load Management Technology:**

- Covers portions of costs to lower demand (e.g. battery storage, load management software)

## C Operational Savings



### **Demand Charge Rebate:**

- Simply 50% off demand charges... up to \$741 / month for a 120 kW charger!

### **EV Phase-in-Rate (Oct. '25):**

- Demand charges scale w/ utilization... up to 100% discount as fleet scales

### **Commercial Managed Charging Program (Coming Soon):**

- Discounts for avoiding peak times

### **Vehicle-to-Grid (V2G):**

- Advanced E-Bus operators can earn revenue during warm months

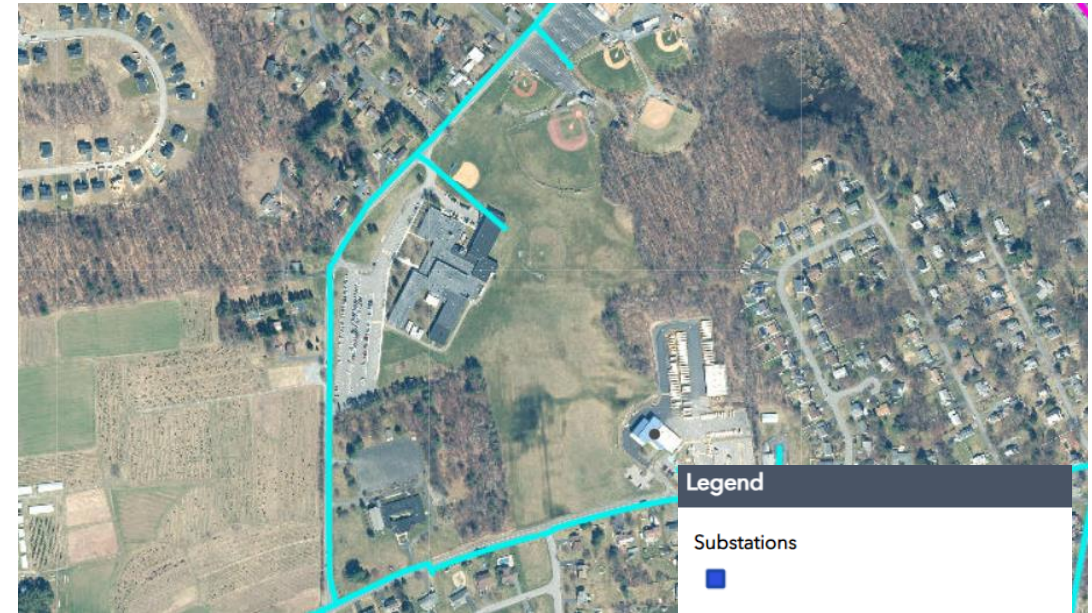




## Fleet Assessments

- No-cost assessment for light, medium, and heavy-duty fleets
- Feasibility and capacity review of site for EV charging
- Rate analysis for estimated billing impacts
- Pre-screen projects for charging infrastructure incentives
- New York Fleet Assessment Program- apply [here](#)

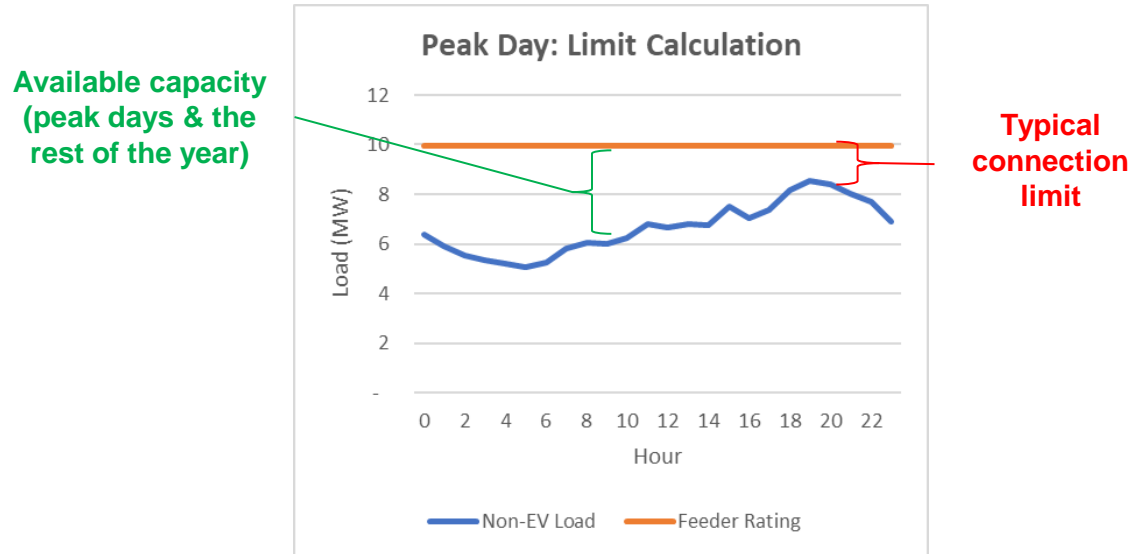
National Grid's NY System Data Portal



<https://systemdataportal.nationalgrid.com/NY/>



Today... Load studies limit new EV customers to the annual peak<sup>1</sup>



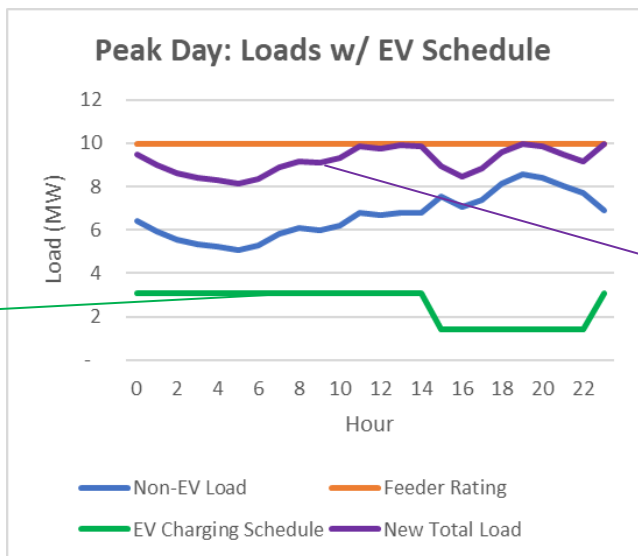
- Feeder Rating: ~10 MW
- Peak Load (July): ~8.5 MW
- Typical Connection Limit:  $10 - 8.5 = \sim 1.5$  MW

Flexible connections allow fleets to over-size chargers today... saving money, time, and more CO<sub>2</sub>



## With Flexible Connections... Customers can maximize existing grid capacity

Optimal EV Charging Limits



The combined EV + non-EV load now maximizes the feeder

- Feeder Rating: ~10 MW
- Peak Load (July): ~8.5 MW
- Typical Connection Limit:  $10 - 8.5 = \sim 1.5$  MW
- **Flexible Connection Limit:**  $10 - 7 = \sim 3$  MW

## Fleet EV Projects Become...

**Bigger**

- Boost EV charging capacity within existing grid: Vehicles can charge above typical limit >90% of the year

**Faster**

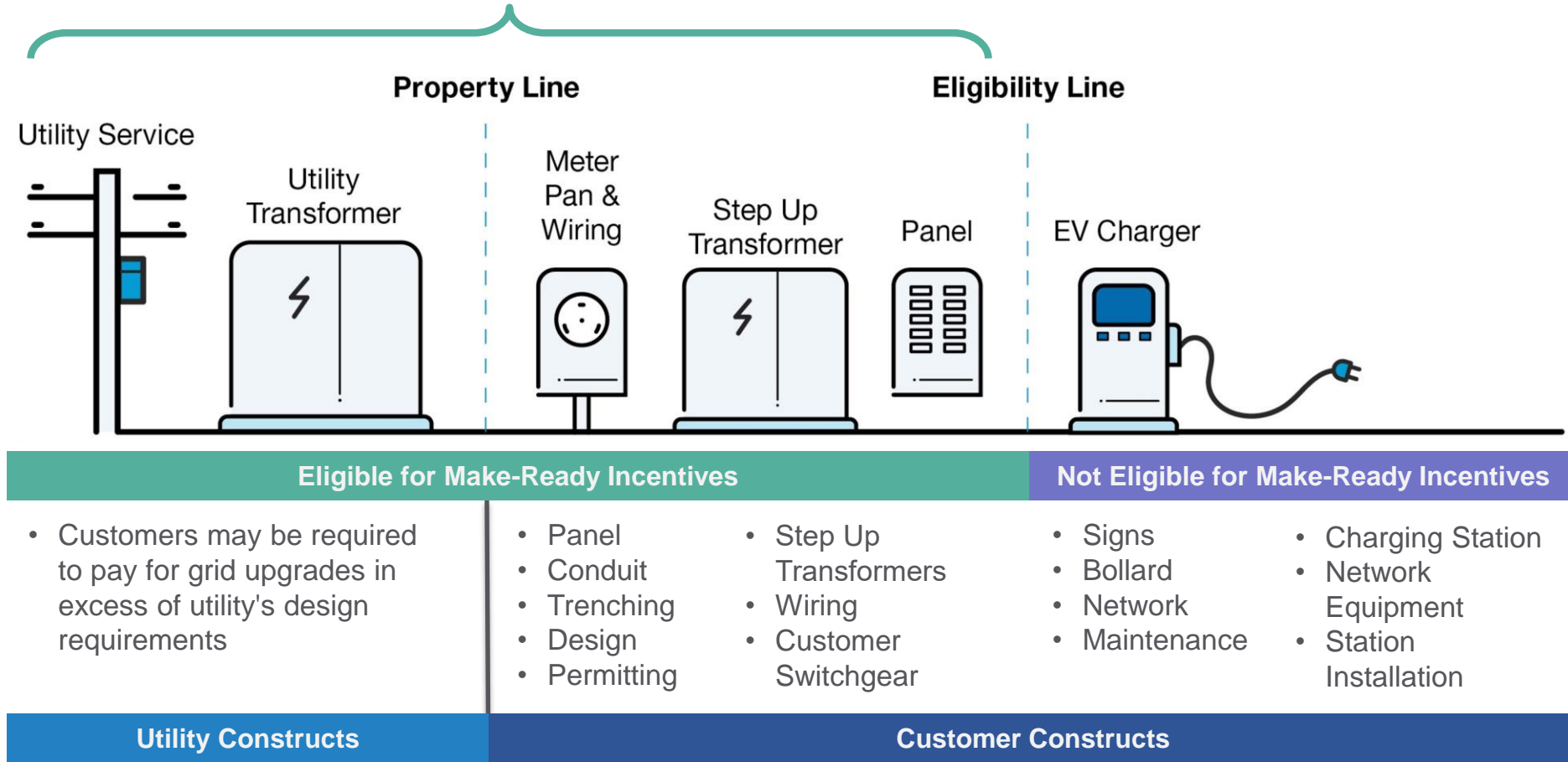
- Meet goals as fast as vehicle procurement: 1-2+ years faster projects lead to lower CO<sub>2</sub> and hitting mandate

**Cheaper**

- Potentially large (\$000's) cost savings for tax & ratepayers: Avoid or defer large utility-side feeder & transformer upgrades

Flexible connections allow fleets to over-size chargers today... saving money, time, and more CO<sub>2</sub>

**Eligible for incentive payments  
at 50% - 100% level\***



\* Eligibility and incentive levels vary by vehicle type, charger accessibility, and location. Medium and Heavy Duty Private Fleet charging has vehicle purchase requirements.

## MHDV Infrastructure for PRIVATE FLEET DEPOT CHARGING

- Expanded in Nov. 2023 - now *~4x funding through 2025*
- Supports all MHDV fleet types

### Eligibility:

- **Private/ Fleet Depot Charging for Vehicle Purchase Incentive recipients:**

Applicants must participate in federal or state vehicle incentive programs<sup>1</sup>, with a DAC prioritization:

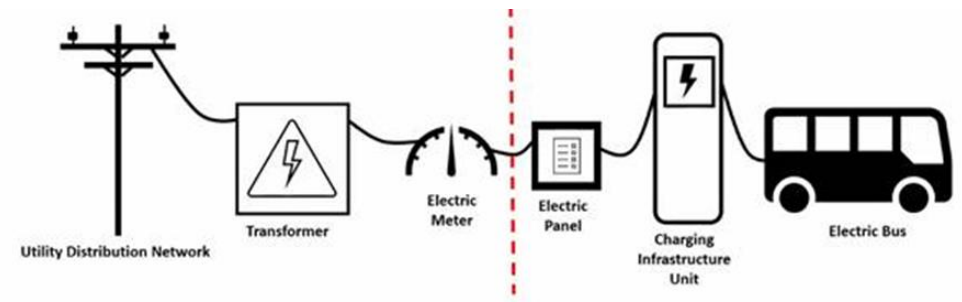
- Projects in a DAC: Eligible for 90% grid- and 50% customer-side incentives  
*(customer-side caps are up to \$220 / kW for DCFC; up to \$3,500 / port for L2)*
- Non-DAC Projects: Eligible for 90% grid-side incentives only

## MHDV Pilot Infrastructure Support:

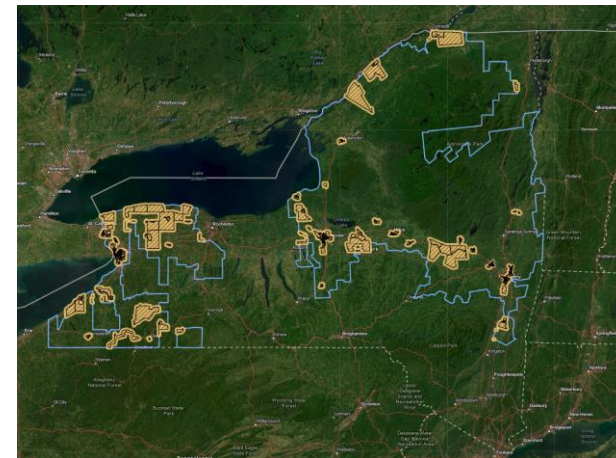
*(Subject to eligibility at left)*

Supported up to 90%

Supported up to 50%, in a DAC



### *Disadvantaged Community (DAC) Map:*



**Note: Yellow striped areas are DAC, Blue outline is National Grid electric territory**



## Incentivizes Installing Load Management Technologies with EV Chargers

### Supported Technologies:

- Energy Storage Systems (e.g., stand-alone batteries or EVSE integrated batteries)
- Load Management Software (ALM and EMS)
- Load Management Hardware

### Incentives and Eligibility:

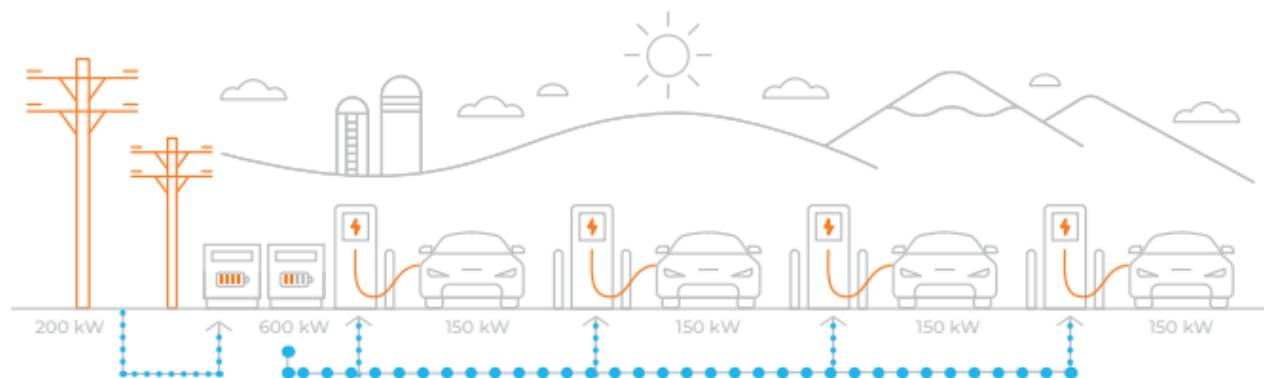
- Up-to-100% costs covered for Equipment, Installation, Design, and Permitting
  - Incentive percentages will vary by technology selected and other project attributes
- Coverage for up to 5 years of Load Management Software contract
- Incentives can be combined with Light-Duty Make-Ready, MHD Pilot, other incentives, and tax credits
  - Can apply during Make-Ready application or as a separate application
- Increased incentives within [Disadvantaged Communities \(map here\)](#)

### Potential Uses:

- Reduce demand charges
- Add flexibility to your EV Chargers
- Increase capacity when you really need it
- Add EVSE capacity ahead of grid upgrades

**Available Now!**

- Applications open in November 2024
- Same application as the EV make-ready programs



Provides EV Charging customers with a 50% rebate on their billed demand charge

## Eligibility:

- Commercial EV Customer on a demand rate (SC2D, SC3, SC3A, or SC4)
- Can be Level 2 or DCFC or mixed
- Customers will receive their rebates approximately every 6 months, with the total of their rebates from the previous 6 billing months.
- The Demand Charge Rebate Program is a temporary offering that will continue enrolling and supporting customers until the forthcoming EV Phase-In Rate is implemented.

### 150 kW Example:

- **Rate Class:** SC-3 Secondary  
*(assume demand >100 kW)*
- **EVSE:** 120 kW
- **Demand Charge:** \$466.40 for the first 40 kW, \$11.66 / kW above 40 kW
- **Monthly Demand Charge:** \$1,482

**Up to ~\$741 /  
month rebate for  
a 120 kW  
charger!\***

\* Example calculation only. Assumes a Charging Ratio of 1 (i.e. Separately Metered). Individual customers may have a lower rebate.

**Program open now!**

<https://www.nationalgridus.com/Upstate-NY-Business/Energy-Alternatives/Commercial-and-Fleet-EV-Charging-Programs>

- **Launched:** First EV participating via V2G (an e-bus in Beverly, MA) was deployed in Oct 2020
- **Customers:** 5 school buses operating currently, 3 bi-directional
- **Design:** Demand Response incentives up to \$200 per kW per summer. (Each V2G charger in Beverly is 60kW → Up to \$12K/summer)
- **Implementation:**
  - National Grid provided “make-ready” support, part of its \$30M MA fleet program
  - School bus operators also eligible for fleet advisory services
  - Highland supports bus and charging, EnergyHub provides day-ahead notification before DR events



***“We’re removing some of the worst [diesel] emissions from communities immediately, and National Grid helped us throughout the entire process.”***  
***- Highland Electric***

# New York utilities have >\$1B to enable EV infrastructure, and more to come



July 2020 through December 2025

~9 months; Q3 2024 - Q1 2025 (expected)

2025 (expected)

## \$1.2B state-wide program expands EV infrastructure:

- ~\$1B LDV Make-Ready program
- **\$67M MHD Pilot Program**
- \$9M for Transit Authorities
- No-Cost Fleet Assessments

## 3<sup>rd</sup> parties assessing the current & future MHD market:

- Market Overview
- **Adoption & Charging Scenarios**
- Benefit-Cost Analysis (BCA)
- **Proactive Planning Support**

## Active proceeding to prioritize MHD infrastructure:

- **>\$2B proposed *anticipatory* T&D investment for fleet clusters and highways**
- **“Full Scale” MHD Make-Ready program for all fleets**

**Framework filing on December 13<sup>th</sup>!**  
Case 24-E-0364 in NY’s [Matter Master](#)

**NY State, National Grid and stakeholders are accelerating programs to support our fleets... especially School Buses**

# Proactive Planning: *Enabling New York's Projected Electric Growth*

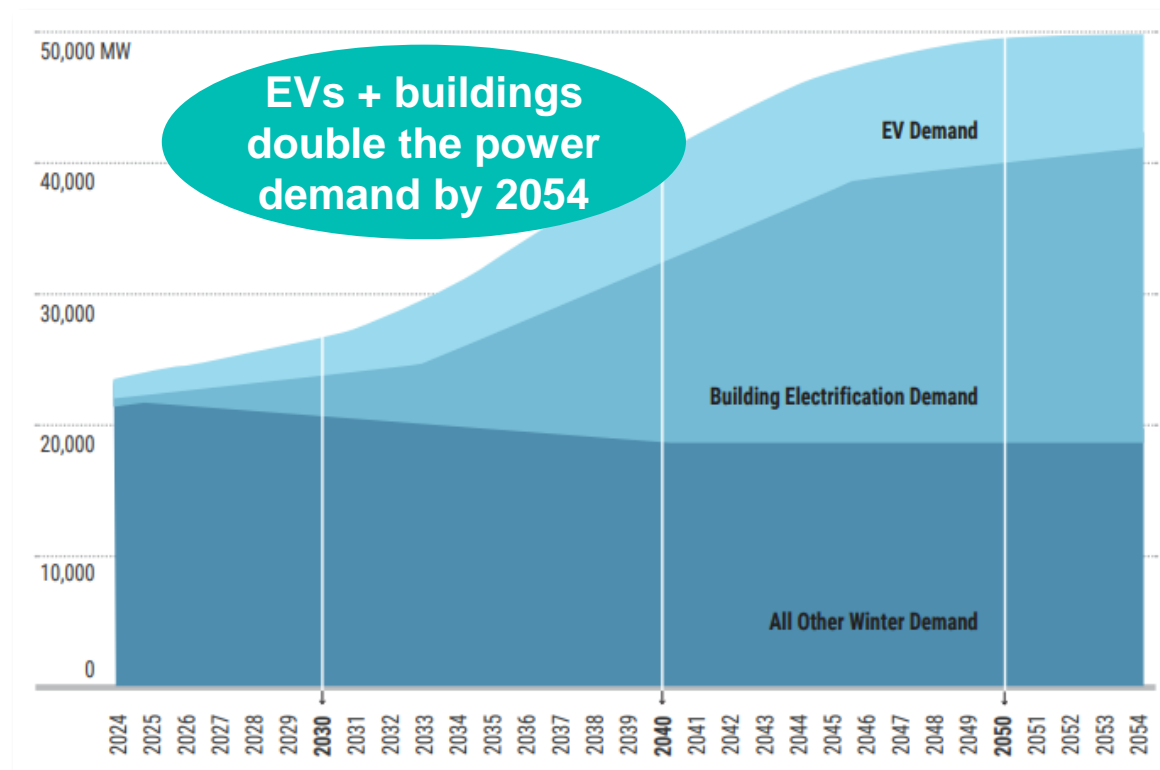
*For the first time, New York Utilities can propose proactive grid investments to enable transportation, building, and industrial electrification*

## Benefits for New York State:

- Support customer needs in a timely manner without adverse impacts
- Support achievement of policy goals
- Cost efficiency
- Flexible planning and authorization
- Complementary with other regulatory processes

**Framework filing on December 13<sup>th</sup>!**  
Case 24-E-0364 in NY's Matter Master

Expected New York Peak Demand (MW)<sup>1</sup>  
2024-2054



Proactive planning effort required many stakeholders and effort, but will drastically shorten infrastructure timelines

# National Grid Fleet EV Programs: *Program Resources*

## Websites:

- EV Drivers Hub: [ngrid.com/evhub](https://ngrid.com/evhub)
- Fleet EV Hub: [ngrid.com/evfleethub](https://ngrid.com/evfleethub)

## NY Additional Resources:

- Commercial Program site: [ngrid.com/uny-evcharging](https://ngrid.com/uny-evcharging)
- [Program Materials \(Brochures, Flyers, etc.\)](#)
- [Approved Contractor List](#)
- [EVSE Charging Station List](#)
- [Disadvantaged Community Map](#)
- [EV Load-Serving Capacity Map](#)

## MA Additional Resources:

- Commercial and Fleet EV Charging Program: [ngrid.com/ma-evcharging](https://ngrid.com/ma-evcharging)
- Fleet Advisory Services Program:  
<https://fleetadvisoryma.nationalgrid.com/>
- Residential EV Charging Program:  
<https://www.nationalgridus.com/Residential-EV-Charging-Infrastructure-Program>



**Complete an EV Fleet Program Interest Form**

## Contact Us:

Massachusetts: [EVNationalGrid@nationalgrid.com](mailto:EVNationalGrid@nationalgrid.com)

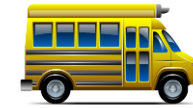
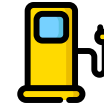
New York: [NGFleetProgram@nationalgrid.com](mailto:NGFleetProgram@nationalgrid.com)


Ryan Wheeler: [Ryan.Wheeler@nationalgrid.com](mailto:Ryan.Wheeler@nationalgrid.com)



nationalgrid

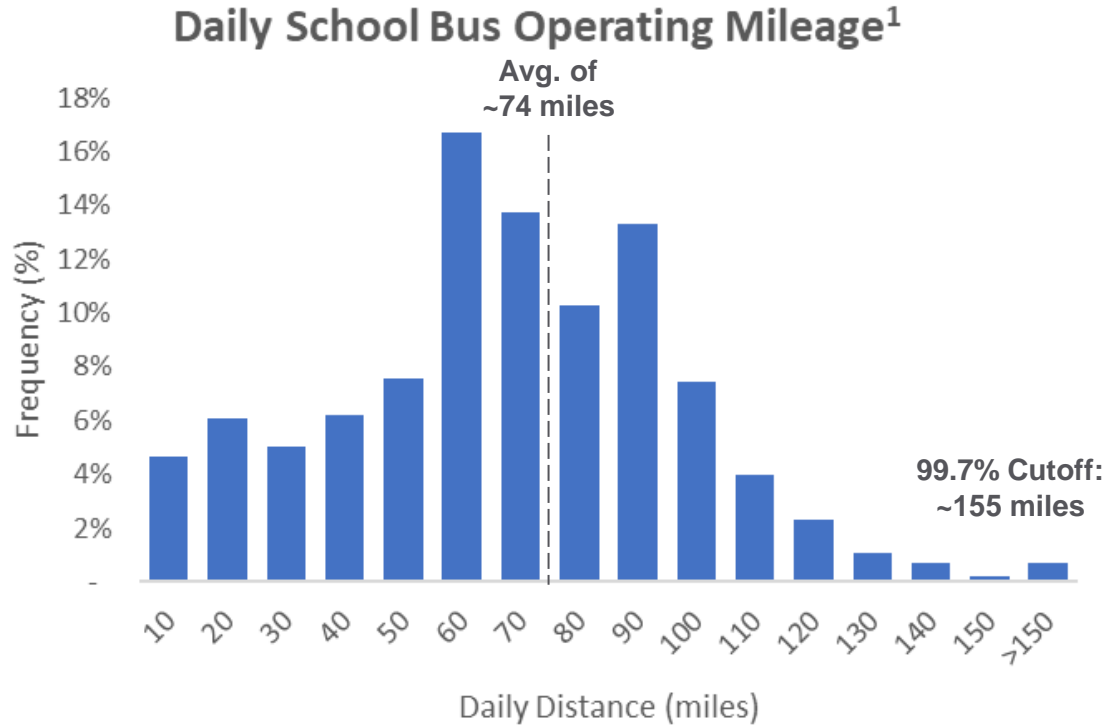
# Customer Support: *Utilities Support the Fleet Electrification Journey*



NAVIGATING THE UTILITY	PLANNING EV / EVSE ADOPTION	UTILITY INFRA.	CUSTOMER INFRA.	EV CHARGER (EVSE)	VEHICLE COSTS	OTHER SOFT COSTS	ONGOING OPERATIONS
Single Points of Contact for Fleets	Fleet Advisory Services	Infrastructure Make-Ready Programs		EVSE Rebates	State and Federal Rebates available	Fleet Operator Responsible	Fleet Operator Responsible, Utility Advises, Reduces Fuel Cost, Enables Resiliency
 <ul style="list-style-type: none"> <li>Jacob Beeman, Lead Project Manager</li> </ul>	<ul style="list-style-type: none"> <li>All fleets eligible for site feasibility assessments &amp; rate analysis</li> </ul>	<ul style="list-style-type: none"> <li>Light-Duty: Funding up to 100% for L2 &amp; DCFC</li> <li>Medium- and Heavy-Duty: Funding up to 90% for L2 &amp; DCFC charging</li> </ul>	<ul style="list-style-type: none"> <li>Light-Duty: Funding up to 100% for L2 &amp; DCFC</li> <li>Medium- and Heavy-Duty: Funding up to 50% for DAC &amp; public access sites</li> </ul>	<ul style="list-style-type: none"> <li>State and Federal Rebates available</li> </ul>	<ul style="list-style-type: none"> <li>State and Federal Rebates available</li> </ul>	<ul style="list-style-type: none"> <li>Fleet Operator Responsible</li> </ul>	<ul style="list-style-type: none"> <li>EV Phase-in-Rate</li> <li>50% Demand Charge Rebate</li> <li>V2G</li> <li>Coming soon: Commercial Managed Charging Program</li> </ul>

**National Grid working with >200 NY fleets to date**

# Electric School Buses (ESBs): *Can buses today handle my daily operations?*



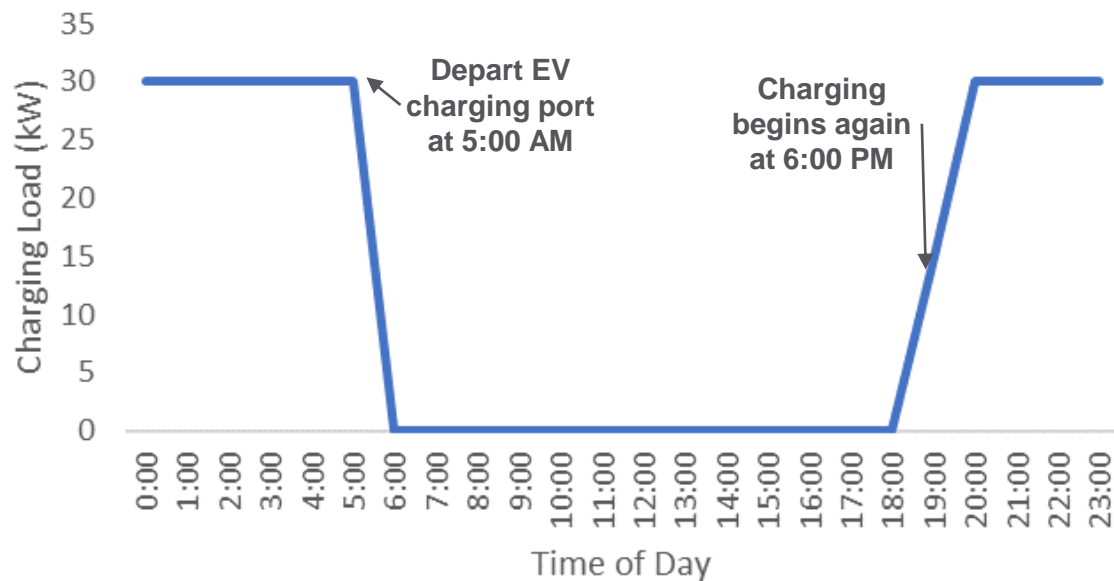
## Typical routes can be electrified:

- **~90% of daily distance <100 miles**  
NREL study covered >1,500 operating shifts in Washington, New York, and Colorado
- **Nearly all distances <155 miles**  
99.7% of driving distances below operational capabilities of existing ESBs
- **6 ESB models today with >150 mile range<sup>2</sup>**  
BYD, Greenpower, IC, Lion Electric, Phoenix, and UES all have models.  
This is **~2x range buffer above ~74 mile avg.** (buffer for cold weather, hilly routes, etc.)

**Buses today meet the demands of Wave 1 bus operations (at a minimum), while tech. improves for Wave 2 and Wave 3**

# Electric School Buses (ESBs): What charging do I need for most of my routes?

**Example Daily ESB Charging Profile**  
(150 daily miles, 315 kWh, 1:1 EV:EVSE Ratio)



Note: This conservatively assumes buses are not available to charge mid-day. Many routes are likely able to charge mid-day, increasing available time for charging (and therefore lower charger capacity). For buses traveling >150 miles per day, higher level DCFC charging may be required (e.g. above 30 kW). Customers may also want to supplement with DCFC for quick turnaround routes or additional flexibility

**ESBs need 210 kWh for 150 daily miles:**

150 miles / day  $\times$  2.1 kWh / mile = 315 kWh batteries

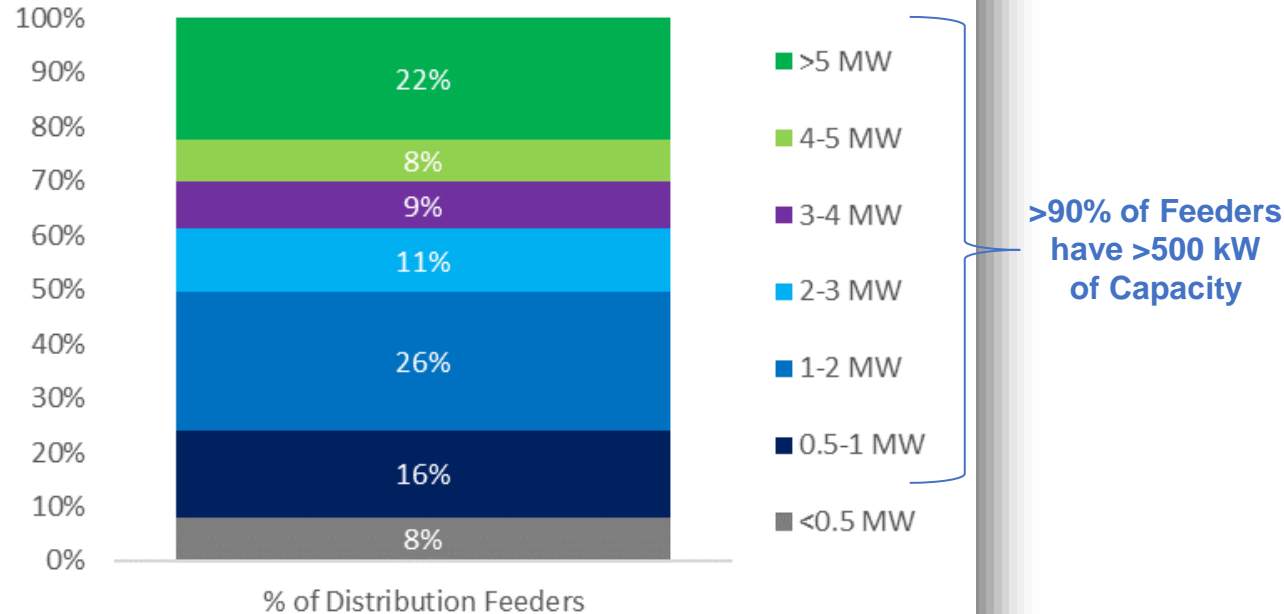
**30 kW Chargers can charge >330 kWh:**

30 kW "DC Slow" Chargers  $\times$  11 hr. Dwell Time = ~330 kWh available charging

**Level 2 or 30 kW "DC Slow" chargers meet the needs of even the longest bus routes**

# Electric School Buses (ESBs): Can the grid handle the 1st 25% of my buses?

Available Headroom on National Grid Distribution Feeders in NY



## National Grid's Distribution Feeders:

- >90% of Feeders have >500 kW of capacity today, able to charge 25 ESBs @ 20 kW (Wave 1 example is 25 ESBs by '28)

## MHDV Proceeding enables investment:

- Proactive grid investments to prepare the grid for large loads in Wave 2 & 3
- More incentives for both grid-side and customer-side infrastructure

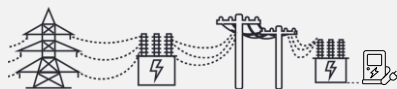
**National Grid investing in grid infrastructure now to scale for the future...  
in the interim, >90% of feeders can charge up to 25 ESBs**



# School Bus Electrification: Electricity Rates and Billing 101

Unlike diesel, electricity includes prices for the “flow rate of the hose” (kW) and the “total gallons” used (kWh). Commercial electricity rates therefore consist of primarily two components:

## Power Capacity: kilowatt (kW)



kilowatt (kW), or charging station rating for instantaneous flow rate of energy

**Units:**

**Fossil Fuel Equivalent:**

gallons / minute:



**Impact On Electric Bill:**

**Demand Charge =**  
Demand Rate (\$/kW) x max. kW  
in the Bill Period (kW)

Ex<sup>1</sup>: ~\$12.4 / kW \* 120 kW =  
~\$1,500 / month \* **50% Demand Charge Rebate**  
= **~\$750 / month**



## Energy: kilowatt-hour (kWh)



kilowatt-hour (kWh), or accumulated energy usage over time

gallons:



**Energy Charge =**  
Supply & Delivery Rates (\$/kWh) x Total Energy  
in the bill period (kWh)

Ex<sup>1</sup>: ~15,000 kWh per month \* \$0.053 / kWh  
= **~\$800 per month**

$$\text{Effective Electricity Price}^2 (\$/kWh) = \frac{\sim\$2,500}{15,000 \text{ kWh}} = \mathbf{\$0.17 / kWh}$$

Equivalent to  
**<\$2.50 / gal diesel**  
(>40% savings)

Electricity costs can fluctuate based on project size and vehicle use case, but are substantially cheaper than fossil fuels

# School Bus Electrification: Wait... <\$2.50 / Gallon, is that right?



Power Capacity (Demand) Charges	
# of Buses	4
EV Charger Output	30 kW
Peak Demand	120 kW
Demand Charge	\$0.124 / kW
Monthly Demand Charge	\$1,482
50% Demand Charge Rebate	<b>\$741</b>

Energy Charges	
Miles per bus	100 miles / day
E-Bus Efficiency	2.1 kWh / mile
Energy per bus, per day (kWh)	210 kWh
Daily Energy (4 buses)	840 kWh
Operating days per month	18
Monthly Energy, 4 buses	15,120 kWh
Electricity Supply Rate	\$0.053 / kWh
Monthly Supply Costs	<b>\$798</b>

Other Charges	
Monthly Customer Charge	\$675
Other Charges	\$232
<b>Total Other Monthly Costs</b>	<b>\$907</b>

## Effective Electricity Price<sup>2</sup> (\$ / kWh) =

$$\frac{\$741 + \$798 + \$907}{15,120 \text{ kWh}} = \frac{\$2,445}{15,120 \text{ kWh}} = \mathbf{\$0.162 / kWh}$$

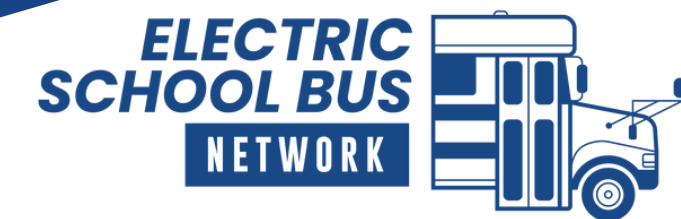
## Converting to Diesel Prices:

$$\frac{\$}{\cancel{\text{kWh}}} * \frac{\cancel{\text{kWh}}}{\cancel{\text{Mile}}} * \frac{\cancel{\text{Miles}}}{\text{Gallon}} = \frac{\$}{\text{Gallon}}$$

$$\frac{\mathbf{\$0.162}}{\text{kWh}} * \frac{2.1 \text{ kWh}}{\text{Mile}} * \frac{7 \text{ Miles}}{\text{Gallon}} = \mathbf{\frac{\$2.38}{\text{Gallon}}}$$

**Electricity as a fuel, while potentially variable, can save 40-50% or more on fuel costs**

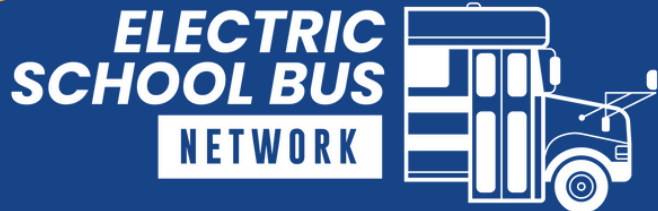
# Q&A and Closing





# Any Questions?

Please raise your hand or type your questions for our speakers in the chat!





# 2024 EPA Clean School Bus Rebate Program

Funding levels include combined bus and EV charging infrastructure!

- Flexibility to determine the split between funding for the bus and supporting infrastructure
- Electric chargers and supporting equipment are subject to Build America, Buy America Requirements

For more info visit: [epa.gov/cleanschoolbus](https://epa.gov/cleanschoolbus)

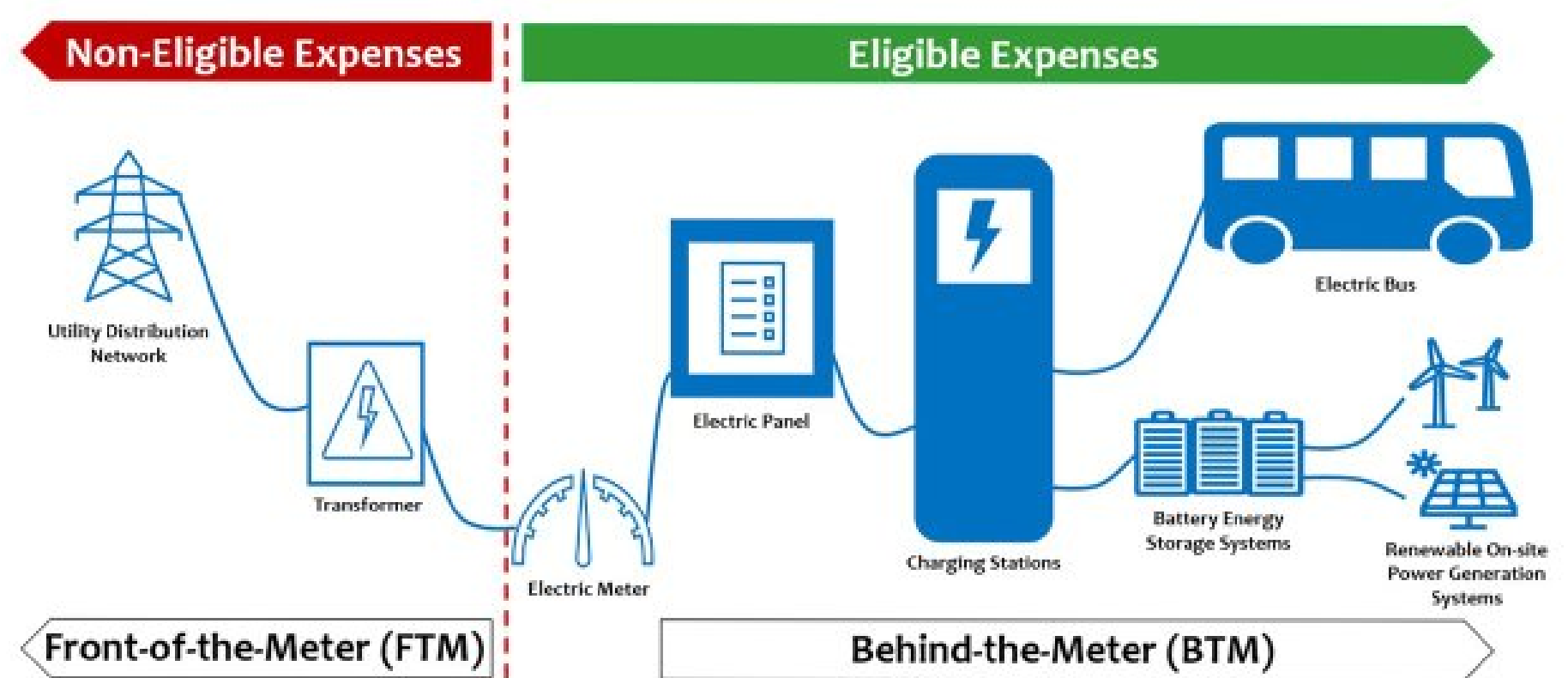


Image Source: EPA Clean School Bus Program

Applications due January 9th ,  
2025 at 4:00pm ET





# Save the Date!

- A follow-up email will be sent on **Friday, December 13** with the following:
  - Recording of the meeting
  - Copy of the slide deck
- This month's ESB Network Newsletter was sent on **December 10**
- Mark your calendars for the next National Forum:
  - **February 12, from 1:00–2:00 p.m. ET**
- Please email [schoolbusteam@calstart.org](mailto:schoolbusteam@calstart.org) with questions

