PUBLIC SCHOOL CUSTOMER
Fleet Electrification Assessment

Fleet advisory services provided by ICF

Consumers Energy
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Glossary of Terms

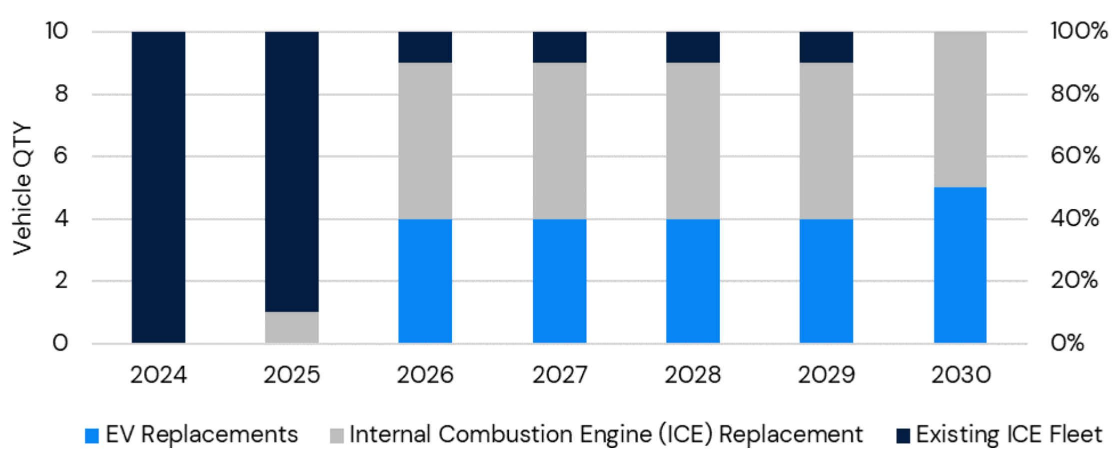
BEV: Battery Electric Vehicle
DCFC: Direct Current Fast Charger
EV: Electric Vehicle
EVSE: Electric Vehicle Supply Equipment
L2 Charger: Level Two Charger
PHEV: Plug-In Hybrid Electric Vehicle
TCO: Total Cost of Ownership

Executive Summary

ICF, on behalf of Consumers Energy, provides fleet electrification recommendations and objective guidance from our team of electric vehicle (EV) experts. We are here to help you, CUSTOMER NAME (CUSTOMER), understand the impacts of shifting your fleet to EVs and support you every step of the way. This custom report identifies the vehicles that would be most cost-effective to convert to electric and summarizes the associated financial and environmental benefits.

The timeframe identified for the vehicle replacements is 2025 to 2030. However, the fleet total cost of ownership (TCO) analysis extends to 2044 to account for the ongoing fuel and maintenance costs from the vehicles acquired in 2030. We assessed the economic feasibility of 12 vehicles in the CUSTOMER fleet including 10 on-road vehicles and 2 non-road vehicles.[1] We identified 10 on- road vehicles that have EV options available and 5 of those that would be beneficial to convert over the 6-*year* replacement timeframe. Chart A illustrates the phasing in of these electric vehicles as you replace your existing fleet vehicles. These 5 vehicles would result in a net present value (NPV) TCO savings of $109,630 over 20 years, which accounts for the savings across the vehicles' full lifespans**.**

Chart A: Recommended EV Replacement Timeline: Fuel Types[2]



[1] There are 2 non-road vehicles included in the total vehicle counts that are excluded from the Electric Vehicle Acquisition Recommendations and Fleet Environmental Impact Analysis sections of this report. Non-road vehicles are discussed separately in the Non-Road Equipment Section.
[2] There are no vehicles up for replacement until 2025 according to the fleet-provided retirement schedule.

The report also details the analysis assumptions, specific vehicle recommendations, financial and environmental impacts, and next steps. Please review this report and reach out to ICF or powermifleet@cmsenergy.com with any questions.

Based on our analysis, converting 5 on-road vehicles to EVs is estimated to produce the following impacts:

$109,630
TCO savings over 20 years*

$169,435
fuel cost savings over 20 years*

$40,539
maintenance savings over 20 years*

344
metric tons (MT) of CO2 eliminated over 20 years

*NPV assumes a 5% discount rate

Over 20 years, those estimated CO_2 reductions equate to:

eliminating **40** homes' energy use for one year, or:

switching **13,081** incandescent lamps to LEDs, or:

recycling **117** tons of waste instead of landfilling it, or:

planting **5,680** trees.

Project Information

On July 11, 2022, representatives from CUSTOMER, met with the ICF Account Manager and other program staff for an initial intake call. The discussion covered topics including an overview of the Consumers PowerMIFleet Program, fleet data availability, fleet usage characteristics, and the fleet's motivation for exploring EV options. A key takeaway of the intake call was the main barrier to electrification for CUSTOMER is cost. To address this, we incorporated available grants and incentives in our TCO analysis and recommended an adjusted retirement schedule that fits within current incentive timeframes.

CUSTOMER provided an initial fleet dataset on June 23, 2022. The Account Manager provided follow up questions on July 11, 2022. CUSTOMER indicated they were comfortable with us moving forward with the assumptions we outlined, and the fleet dataset was used to establish a fleet baseline in the model. The initial fleet baseline did not result in any cost-effective recommendations, so the retirement schedule was adjusted to fit within the current EPA Clean School Bus funding window. The TCO threshold was also adjusted to 10%, to allow for EV recommendations when their TCO was within 10% of the comparable ICE vehicle's TCO. We presented the initial results for feedback on September 13, 2022, and CUSTOMER asked that we finalize the analysis using the adjusted retirement schedule and TCO threshold.

There are 12 vehicles in CUSTOMER's current fleet, 10 on-road vehicles and 2 pieces of non-road equipment. Of the 10 on-road vehicles, 10 have EV equivalents commercially available, and 5 would be beneficial to convert to EVs at this time. This breakdown is illustrated in Chart B This breakdown is illustrated in Chart B. Note that non-road vehicles are included in the total vehicle counts but are excluded from the Electric Vehicle Acquisition Recommendations and Fleet Environmental Impact Analysis sections of this report. Non-road vehicles are discussed separately in the Non-Road Equipment section.

Chart B: Fleet Assessment Vehicle Breakdown

Existing On-Road Fleet Makeup

There are 10 on-road vehicles in CUSTOMER current fleet, most of which are diesel-powered as shown in Table A. Heavy-duty school buses make up 90% of the fleet, which is illustrated in Chart C below. The existing retirement schedule, as provided by CUSTOMER, is represented in Chart D. After discussing with CUSTOMER, we adjusted this retirement schedule to shift all school bus retirements to before 2027 to fit within current timeframes for EPA Clean School Bus Funding. This revised retirement schedule is shown in Chart E. There are a high number of vehicles estimated for retirement in 2026 due to the high number of vehicles originally scheduled to retire in 2027 or after (78% of the buses were scheduled to retire between 2027 and 2030), and the current timeframe of EPA Clean School Bus funding. Due to this methodology, we estimate that 8 vehicles may be up for retirement in 2026, but we are only recommending 4 of these vehicles for conversion in 2026. This schedule informs the recommended EV replacement schedule, which is shown later in Chart H.

Table A: Existing Fleet Fuel Type Distribution

Vehicle Type	Gasoline	Diesel
Medium-Duty Pickup	3	55
School Bus	0	10
TOTAL	**118**	**216**

Chart C: Existing Fleet – Vehicle Types

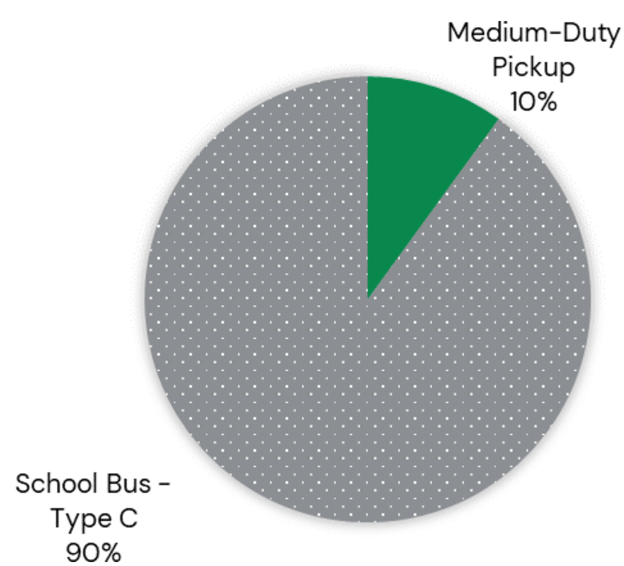
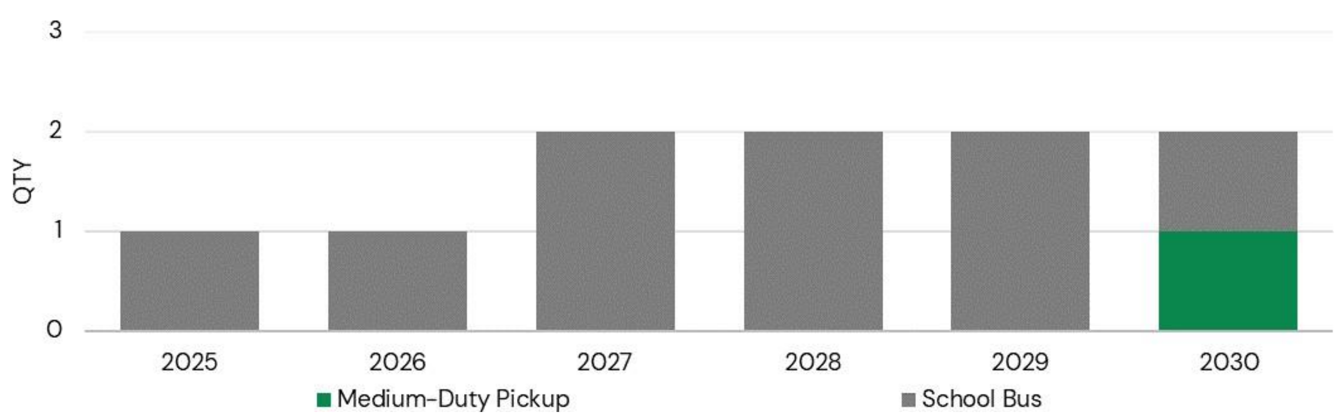


Chart D: Existing Fleet - Retirement Schedule



The 2 pieces of non-road equipment are summarized in Table B below and were excluded from this analysis and the Electric Vehicle Acquisition Recommendations section of this report (see the Non-Road Equipment Section for more information).

Table B: Vehicle Types Excluded from Analysis

Vehicle Type	Quantity	Reason for Exclusion
Non-Road Equipment	2	Non-road equipment (See Non-Road Equipment Section)
TOTAL	**2**	

Key Assumptions

Key assumptions and data sources that were used in this analysis include the following. The Electric Vehicle Acquisition Recommendations section below provides additional detail on the financial assumptions in the model.

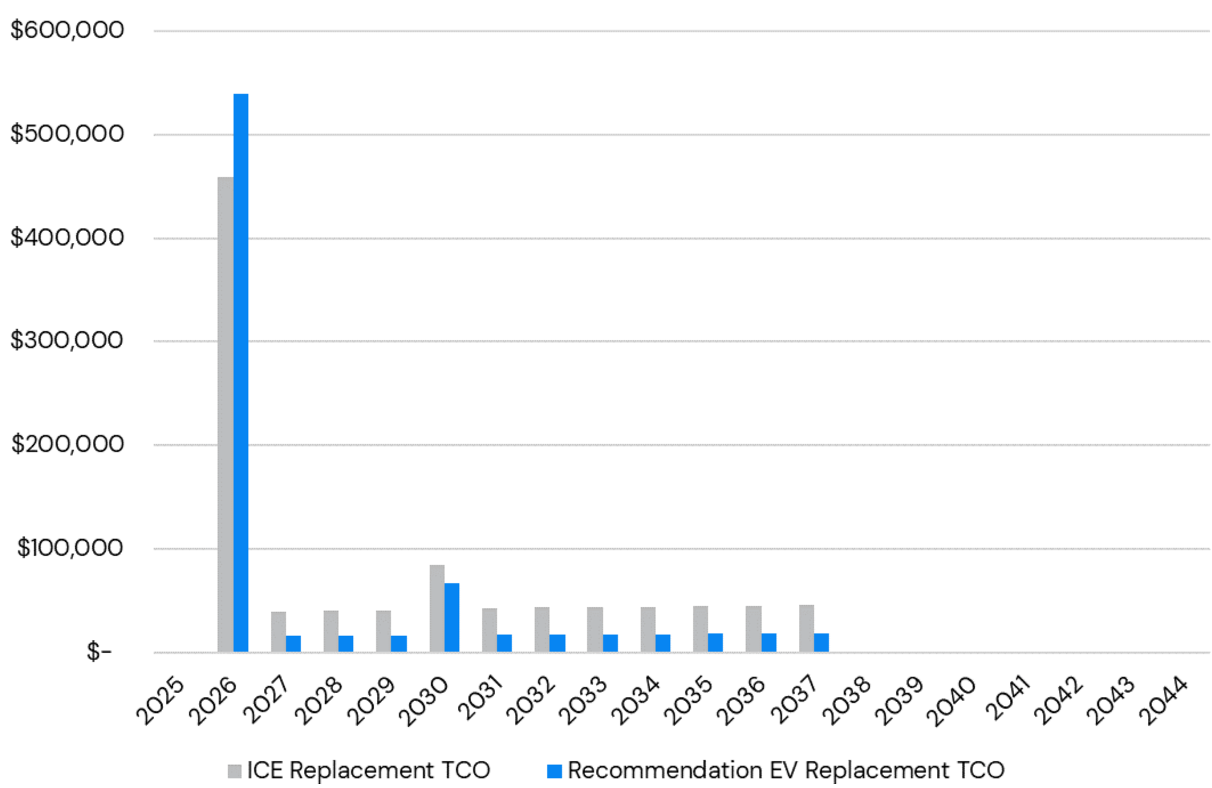
- **Recommendation Threshold**: EVs are recommended only when the EV TCO is less than the TCO of the comparable internal combustion engine (ICE) vehicle. See Appendix A for an alternate analysis with a higher EV TCO threshold, where EVs are recommended only when the EV TCO is less than the TCO of the comparable ICE vehicle.
- **Vehicle Pricing**: The model uses manufacturer suggested retail prices (MSRPs) for EVs where available. When MSRP pricing is unavailable, the model uses average pricing based on vehicle and fuel type based on Argonne National Laboratory's Alternative Fuel Life Cycle Environmental and Economic Transportation (AFLEET) Tool and ICF's *Comparison of Medium- and Heavy-Duty Technologies in California* report for the California Electric Transportation Coalition (CalETC report). Vehicle pricing was escalated annually using the U.S. Energy Information Administration's (EIA) 2022 Annual Energy Outlook (AEO) and ICF's CaleETC report for the California Electric Transportation Coalition. The model assumed all vehicles are owned and not leased.
- **Fuel**: Annual fuel costs were provided for 9 vehicles by CUSTOMER . The remaining vehicle's fuel costs were pulled from our assumptions. The model uses the U.S. EIA's average gasoline and diesel prices in Michigan for the past five years, which is $2.86 per gallon of diesel and $2.53 per gallon of gasoline. The model determines the average annual fuel use for each vehicle based on its average annual mileage and average fuel economy (miles per gallon), and then multiplies the fuel use value by the price per gallon of fuel. ICF uses annual mileage and fuel efficiency assumptions by vehicle and fuel type from the AFLEET Tool and ICF's *CalETC report*.

- **Maintenance**: ICF uses dollar per mile maintenance cost assumptions by vehicle type and fuel type from Argonne National Laboratory's AFLEET Tool and ICF's *CalETC Report*. Maintenance costs were escalated 2.2% annually.
- **Electricity Pricing**: The model uses Consumers Energy's General Service Secondary Time of Use Rates (which is an average of $0.12/kWh) for electricity pricing, escalated annually using projections from the U.S. EIA's 2022 AEO Reference Case for Transportation: Electricity. See the Rate Analysis Section for a comparison of other electric rate options.
- **Vehicle Replacements**: CUSTOMER existing retirement schedule identified the vehicles for replacement in each year from 2025 through 2030. We used CUSTOMER retirement schedule to assess which vehicles would be retired each year before 2027. However, based on feedback from CUSTOMER, 7 school buses originally scheduled to retire between 2027 and 2030 were adjusted to retire by 2026 to fit within current timeframes for EPA Clean School Bus Funding.
- **Timeframe**: This analysis focuses on vehicle replacements for 2025 through 2030, with TCO calculations extending out across the vehicle lifespans to 2044.
- **Discount Rate**: 5% was used for NPV calculations.
- **Vehicle Ranges**: The EV mileage ranges per charge were accounted for when recommending vehicle replacements. The analysis used an average temperature range of 17 to 82°F to assess the potential impact temperatures can have on EV ranges; this reduced EV model ranges to 80% of their maximum mileage range. Annual mileage was provided by CUSTOMER for 1 medium-duty pickup. For the remaining 9 school buses, annual mileage was estimated by deducting 24,000 purchase miles from the current mileage and dividing that total by the number of years in-service. The model estimates the range required each day for CUSTOMER vehicles by dividing annual mileage by 190 operational days per year. Additional range requirements of between 75 miles and 100 miles were also incorporated for 4 vehicles, with total daily range requirements varying from 42 to 146 miles per day depending on the vehicle.
- **Electric Vehicle Supply Equipment (EVSE) Pricing and Incentives**: The EVSE pricing assumptions and incentive program amounts applied in the analysis are detailed further in the Incentives and Funding Source Assumptions Applied section below.

Electric Vehicle Acquisition Recommendations

There are 10 CUSTOMER on-road vehicles scheduled for retirement between 2025 and 2030, and 5 of them are recommended to convert to battery electric vehicles (BEVs) or plug-in hybrid electric vehicles (PHEVs). Chart E below shows the TCO for the 5 recommended vehicles each year if they were replaced with conventional, ICE vehicles versus with the recommended EVs. This timeline is based on the adjusted fleet retirement schedule outlined in Chart E above. Based on these estimates, you may see a financial payback as early as 2030. While initial annual EV costs are higher than ICE costs, the overall cumulative EV TCO is lower due to available incentives and reduced operational costs, as shown in Chart F.

Chart E: Fleet Recommended Replacements TCO Comparison – Annual[3]



[3] The annual cost of ICE replacements in years 2038 through 2044 is between $756 and $827. The annual cost of the recommended EV replacements in years 2038 through 2044 is between $327 and $361.

Chart F: Fleet Recommended Replacements TCO Comparison - Cumulative

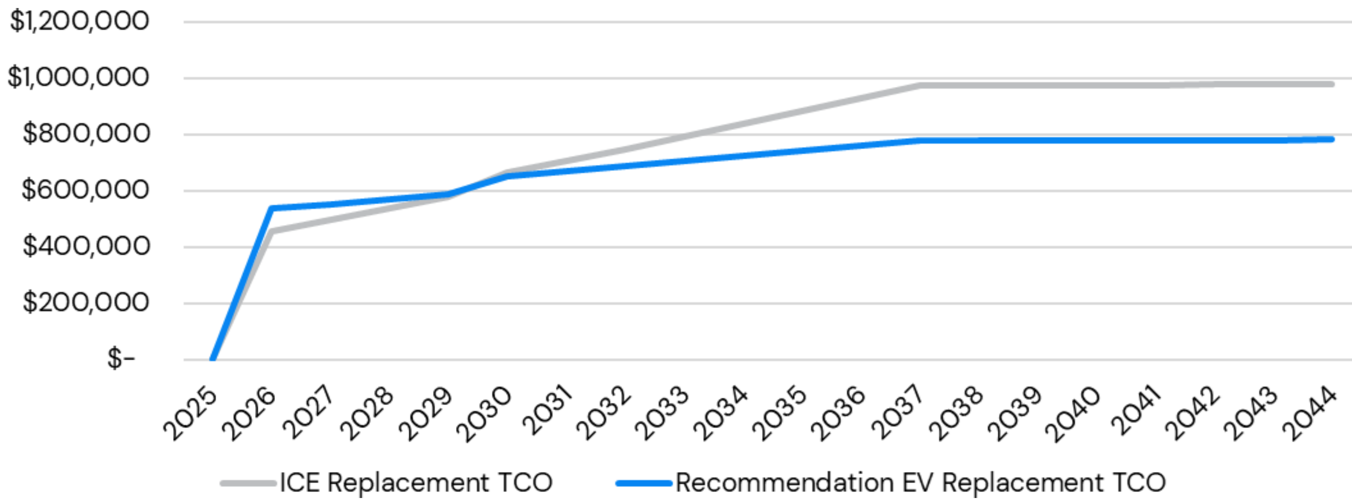


Table C on the next page identifies the vehicles that will be cost effective to convert to electric within the next 6 years. Chart G illustrates the recommended replacement timeline for these vehicles. Each vehicle within your fleet has been assessed to identify the lowest cost option, while also accounting for potential mileage and charging time restrictions.

The financial savings and GHG emission reductions represent the difference between replacing the recommended vehicles with EVs compared to replacing them with ICE vehicles. The TCO used in the financial savings accounts for the following, as applicable:

- Capital costs
- Charging infrastructure hardware costs
- Charging infrastructure installation costs
- Annual fuel costs
- Annual maintenance costs
- Potential EV or EVSE incentives or grants

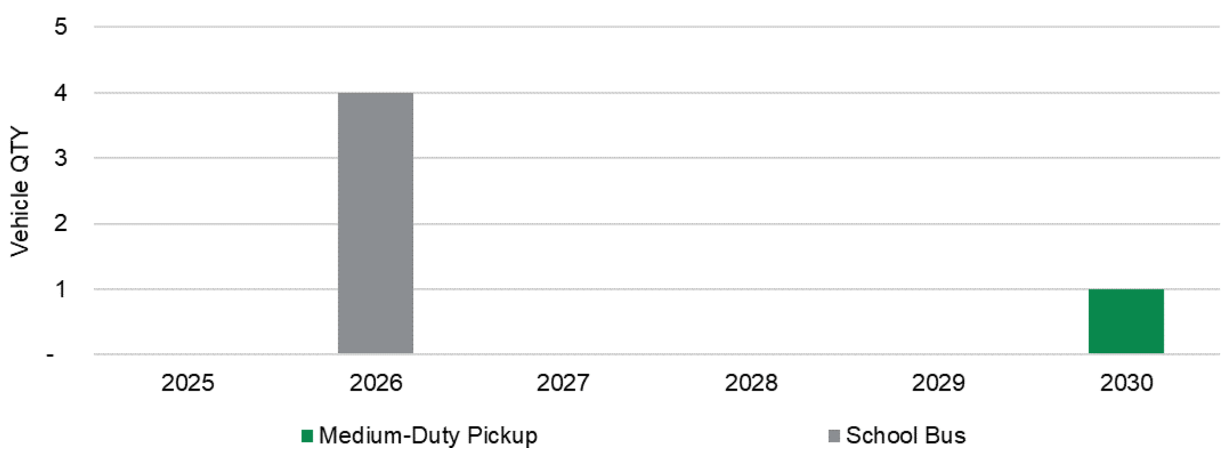
There are 5 vehicles with EV equivalents that are not recommended for conversion, the currently available EV model mileage ranges being too low, or the TCO for the ICE vehicle being lower than any of the EV options' TCO. Future EV model options or incentive program availability may open opportunities for these to be converted. Future EV model options or incentive program availability may open opportunities for these to be converted.

Table C: 6-Year Electrification Recommendations

Vehicle Type	Quantity Up for Retirement (in 6 Years)	Quantity Recommended to Convert to Electric	Recommended Make/ Model/ EV Type	Financial Savings (across 20 years)	GHG Emission Reductions (across 20 years, MT)	EVSE	
						L2	DCFC
Medium-Duty Pickups	1	1	Atlis/ XT (300 mi)/ BEV	-$2,945	15	1	0
School Bus	9	2	IC Bus/ chargE Type C CE Series/ BEV	$102,682	221	2	0
		2	Thomas Built/ Saf-T-Liner eC2 Jouley/ BEV	$9,892	109	0	2
TOTAL	**10**	**5**		**$109,630**	**344**	**3**	**2**

Three (3) school buses are excluded from CUSTOMER electrification recommendations because the analysis determined they are not cost effective to purchase at this time. However, other acquisition models, such as leases or subscription services, offer cost-effective alternatives to traditional school bus ownership. For example, Highland Electric Fleets offers a mileage-based electric school bus subscription service that includes the necessary buses, charging infrastructure, and training for technicians and operators. Highland also plans to leverage their electric buses to support the grid through vehicle-to-grid (V2G) charging, earn supplemental income, and lower the price of their service. CUSTOMER may want to consider leases and subscription services that could enable the town to avoid the high upfront costs of electric school buses while capturing significant emissions benefits.

Chart G: Recommended EV Replacement Timeline: Vehicle Types



EV Charging Infrastructure Assumptions Applied

About EV Charging Infrastructure

EVs require access to chargers, also known as Electric Vehicle Supply Equipment (EVSE). In a fleet application, the majority of charging is typically done at the fleet facility – overnight or between shifts. Facility-based charging can be supplemented with periodic charging at workplaces, idle locations, and public destinations as needed.

There are three types of EV chargers: Level 1, Level 2, and Direct Current (DC) Fast.

> **Level 1** chargers provide charging through a 120-volt (V) AC plug. A Level 1 charger plugs directly into a household outlet on one end, and into the vehicle's SAE J1772 charge port on the other end. Level 1 chargers are the slowest category of EVSE and provide 2 to 5 miles of range per hour of charging.
>
> **Level 2** chargers provide charging through 240 V or 208 V electrical service. Level 2 charging equipment is common for home, public, and workplace charging. The large majority of public chargers in the United States are Level 2. Level 2 chargers can operate at up to 80 Amperes (Amps) and 19.2 kilowatts (kW) and provide faster charging than Level 1 EVSE. Typically, a Level 2 charger provides 10 to 20 miles of range per hour of charging.
>
> **DC Fast** chargers enable rapid charging through 208/480 V three-phase input. Installing DC Fast chargers may require infrastructure upgrades and these high-powered chargers cost significantly more than a Level 2 charger. DC Fast chargers will typically add 75-150 miles of range for every 30 minutes spent charging. The range of miles added depends on various factors, such the vehicle type and the DC Fast charger capacity. For example, the Chevrolet Bolt can add about 85 miles per 30 minutes charging and the Nissan LEAF PLUS can add about 150 miles per 30 minutes charging. A transit bus or heavy truck will be able to add 60-125 miles for every 30 minutes spent charging, depending on the capacity of the DC Fast charger.

Vehicle-to-Grid (V2G) Charging

Vehicle-to-grid (V2G) charging is the bi-directional flow of energy and data between an EV and the grid. V2G strengthens resilience by enabling EVs to be used as energy storage assets that provide on-demand back-up power to a building or to the grid. V2G can also help users optimize energy consumption by charging only when energy rates are low and exporting stored power back to the grid only when energy rates are high. A bidirectional charger is required for V2G capability. It relies on the presence of an AC current in the vehicle's battery to reverse the direction of charge. Only CHAdeMO charger adapters currently support bi-directional charging, but V2G-capable CCS charger adapters are in development now and expected to be available to consumers by 2025.

Most V2G projects are still in pilot stages, such as the school bus pilot in Beverly, MA. School buses are particularly well-suited for V2G because they have large batteries and remain parked for many hours at a time. Available battery electric vehicles that are capable of V2G charging include:

- Blue Bird Vision Electric Type C School Bus
- Micro Bird G5 Electric Type A School Bus
- Nissan Leaf S/SL/SV
- Phoenix Zeus Medium-Duty Shuttle/School Bus
- Thomas Built Buses Saf-T Liner C2 Jouley Type C School Bus

V2X refers to the applications that EVs batteries can support for purposes other than powering the car. It is a collective term for referring to capabilities such as V2G, vehicle-to-home, and vehicle-to-vehicle. As an example of vehicle-to-vehicle capabilities, the Hyundai Ioniq 5 EV can charge other EVs using its battery. If you are interested in learning more about V2G and V2X, refer to a recent report from the U.S. Department of Transportation Federal Highway Administration and reach out to your Account Manager to discuss opportunities for your fleet.

EV Charging Infrastructure Assumptions in Your Analysis

CUSTOMER will need a maximum of 2 DCFC and 3 Level 2 chargers to support the recommended 5 EVs. This conservatively assumes a one-to-one charger-to-vehicle ratio and does not account for any existing chargers at CUSTOMER fleet facilities. The determination of charger type (Level 2 versus DC Fast) is made based on battery size, range, mileage, number of shifts per day, and time charge between shifts and at night.

It may be possible to reduce the number of chargers, including the number of DC Fast chargers, by:

- Manipulating the duty cycles of the vehicles to allow for successive (non-overlapping) charging schedules;
- Identifying managed charging solutions to optimize charger use; and
- Garaging EVs together to allow for shared chargers.
- Leveraging publicly available EVSE, where appropriate

The charger equipment and installation cost assumptions used for your analysis are summarized in Table D below.

Table D: EVSE Equipment and Installation Cost Assumptions

Vehicle Type	L2 Charger Cost Assumptions		DC Fast Charger Cost Assumptions	
	Equipment Cost	Installation Cost	Equipment Cost	Installation Cost
Medium-Duty Pickup	$3,450	$6,650	$24,000	$27,500
School Bus	$5,000	$20,000	$29,000	$37,500

Note that these are estimates and do not consider any incentives (see below for more information). We strongly encourage CUSTOMER to reach out to Consumers Energy before installing any new charging infrastructure. Your Account Manager can also answer questions on charging best practices.

Site Assessment

The recommended 2 DCFC and 3 Level 2 chargers will result in an estimated incremental 98 kW total power demand and 32,809 annual kWh at CUSTOMER's main office to support 5 EVs, summarized in Table E below. Depending on the scheduled duty cycles of the vehicles, it may be possible to reduce the number of chargers at CUSTOMER fleet facilities.

Table E: Site Load Impact Study

Charge Type	Number Recommended	Total Equipment Cost	Total Installation Cost	Estimated Total Power Demand (kW)
Level 2	3	$11,645	$41,244	14
DC Fast	2	$52,608	$68,027	83
TOTAL	**5**	**$64,252**	**$109,271**	**98**

Electric Rate Analysis

The ICE and EV TCO comparison used Consumers Energy's General Service Secondary Time of Use rate to calculate incremental electricity bills. The electric rate analysis identified this rate as the most cost-effective rate option to support the recommended 5 EVs at CUSTOMER sites. The rate analysis also compared this rate against Consumers Energy's General Service Secondary rate. Chart H below summarizes the fleet annual fuel costs across each rate, and Chart I summarizes the cumulative fuel costs across each scenario over time.

Chart H: Rate Analysis Fleet Annual Fuel Cost Comparison

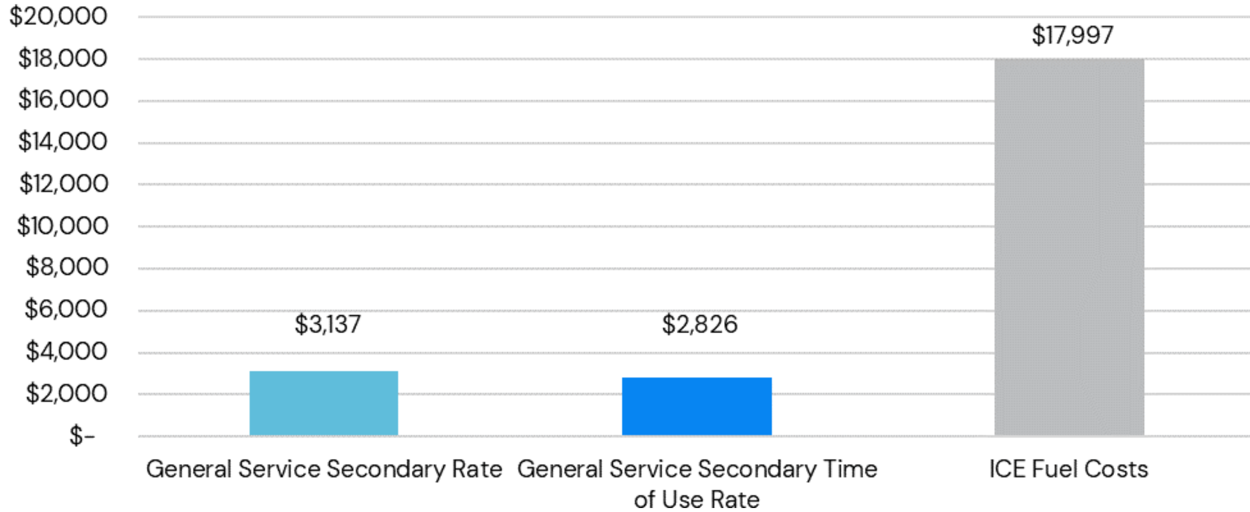
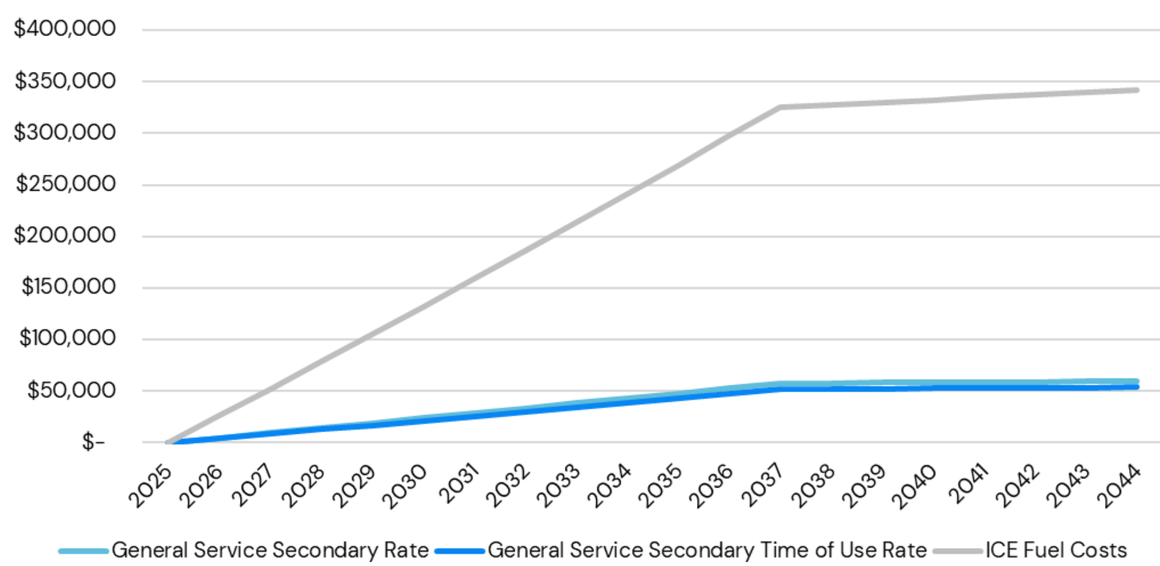


Chart I. Rate Analysis Fleet Cumulative Fuel Cost Comparison



Incentives and Funding Source Assumptions Applied

Incentives are available for the purchase of EVs and EVSE. Table F summarizes the incentives included in your fleet analysis, as well as additional information about how to capitalize on these incentives. Incentives in the analysis are capped at 100% of the vehicle capital and EVSE costs, so the table identifies how the incentives were prioritized and specifically applied through the TCO analysis.

CUSTOMER may also want to reach out to their local planning agency to discuss Congestion Mitigation and Air Quality Improvement (CMAQ) and other funding opportunities. The local transportation planning agencies may be able to assist cities and transit agencies with grants that reduce emissions.

Table F: Incentive and Funding Sources

Program	Light Duty	Medium Duty	Heavy Duty	Administrator	Vehicle Costs	EVSE	EVSE Hardware	Program Offerings	Upcoming Deadlines	TCO Funding Assumptions
Medium- and Heavy-Duty Grant Program		✓	✓	Michigan Department of Environment, Great Lakes, and Energy	✓		✓	Up to 50% of incremental capital costs, must replace a pre-2009 diesel vehicle with 3,000+ annual miles	Round 3: October 19, 2021 to December 17, 2021	50% capital costs with 3000+ annual miles and model pre-2009.
PowerMIFleet Program: Commercial Electric Supply Equipment (EVSE) Rebates	✓	✓	✓	Consumers Energy			✓	Up to $5,000 per Level 2 Charge Port (limit 10 per site); Up to $35,000 per non-public DC Fast Charger; Up to $70,000 per public use DC Fast Charger	3-year voluntary pilot	$5,000 for L2 chargers, $35,000 per DCFCs installed before 2025
PowerMIFleet Program: Make Ready Upgrades	✓	✓	✓	Consumers Energy		✓		Funding of "reasonable costs" for the construction of infrastructure to power charging stations purchased through the PowerMIFleet Program	3-year voluntary pilot	EVSE installation costs for vehicles replaced before 2025
Diesel Emission Reduction Act (National)		✓	✓	EPA	✓			Up to 45% of EV and EVSE costs, must replace a diesel vehicle with 7,000+ annual miles	TBD[4]	45% of capital costs with 7,000+ annual miles

[4] Most recent deadline was 3/16/2021, but the Consolidated Appropriations Act passed on 12/22/2020 included reauthorization of the DERA Program through 2024.

Clean School Bus Program			✓	EPA	✓	✓	✓	Up to $190,000 vehicle funding per replaced school bus used to transport preprimary, primary, and secondary school students. Up to $13,000 infrastructure funding per replaced bus.[5]	Application open 5/20/2022 until 8/19/2022	Up to $190,000 vehicle funding and $13,000 infrastructure funding per replaced school bus

EV Model Comparison

There are over 500 EV models in our EV library that were assessed across your fleet's vehicle types and range requirements to compare TCOs and recommend replacement models. While our EV acquisition recommendations are based on the model with the lowest TCO available that fits your fleet's needs, there may be additional EV models within the same price range. Chart J and Chart K highlight the lowest TCOs for each vehicle type within your fleet. This analysis is uses the CUSTOMER average annual mileage and miles driven per day by vehicle type, and assumes a 12-year vehicle life. This simple comparison across EV model types does not include any charging infrastructure costs or apply any potential grants or incentives for EVs, however that level of detail is included in the sample financial analysis on the following pages.

[5] This analysis assumes that CUSTOMER school buses are class 7+ vehicles. Class 3-6 school bus replacements only qualify for $190,000 of EPA Clean School Bus funding.

Chart J: Medium-Duty Pickup EV Model TCO Comparison

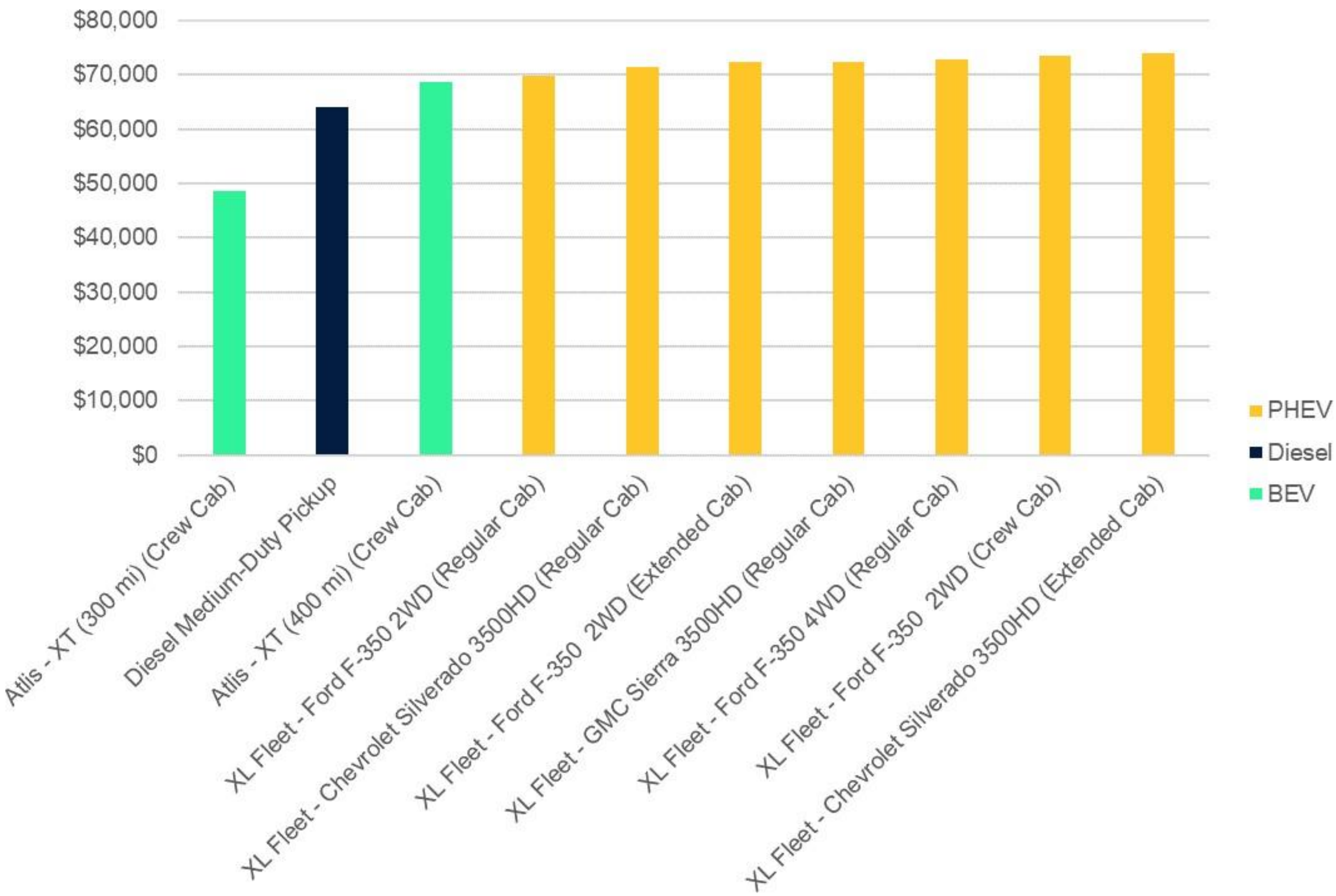
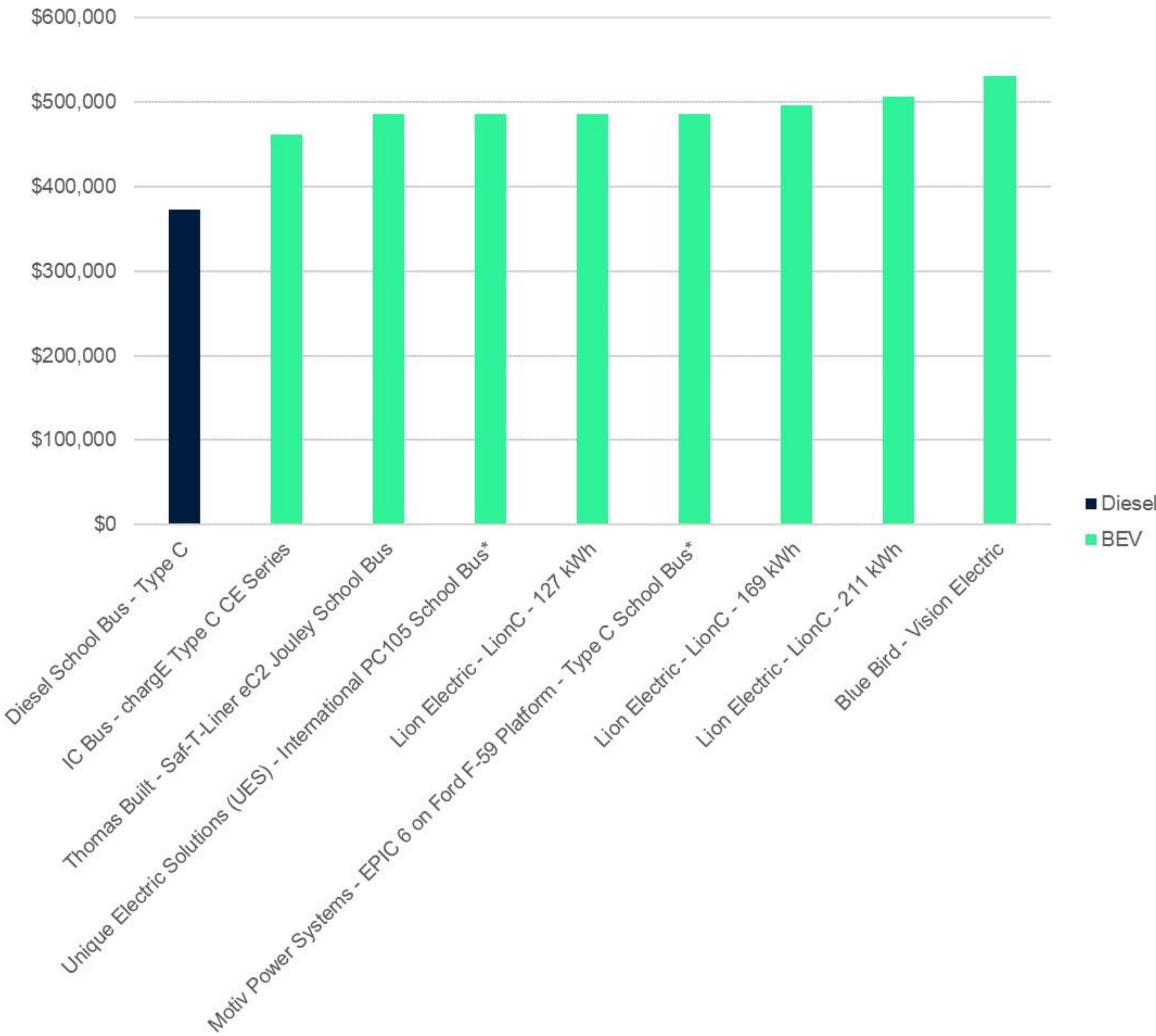


Chart K: School Bus – Type C EV Model TCO Comparison



*Actual MSRP information unavailable. Price assumptions are outlined in the Key Assumptions section of this report.

Electric Snowplows

There are no commercially available electric vehicles that are compatible with snowplows.[6] However, several plug-in hybrid electric vehicle aftermarket conversions are capable of plowing. These PHEVs are equipped with more torque and longer range than their ICE counterparts, making them especially capable of pushing heavy loads for many hours at a time. Available plug-in hybrid electric vehicles that are compatible with snowplows are:

- XL Fleet Ford F-Series
- XL Fleet GM 2500/3500 HD
- XL Fleet GMC 3500/4500 Cutaway

Sample School Bus (Type C) Financial Analysis

Table G provides a sample TCO comparison for a single, purchased type C school bus. This analysis uses a 12-year vehicle life and 16,958 annual miles assumption, based on the average annual mileage for school buses within your fleet.

Table G: School Bus (Type C) TCO Comparison

	Diesel	**BEV** (IC Bus – chargE Type C CE Series)
Capital Cost	$100,000	$325,000
Charging Infrastructure Hardware (L2)	N/A	$5,000
Charging Infrastructure Installation	N/A	$20,000
Incentives[7]	N/A	($350,000)
Annual Fuel/Energy Costs	$6,827	$297
Annual Maintenance Costs	$15,941	$11,023
15-Year Total Costs[8]	$297,031	$100,329

Charts L and M provide a visual representation of the annual and cumulative cost comparisons across a diesel and BEV type C school bus. Incentives and lower operational costs result in lower annual and overall TCO costs for BEV options.

[6] According to Atlis Motor Vehicles, the Atlis XT with be compatible with snowplows and will be available in 2023.
[7] Assumes Diesel Emissions Reduction Act, EPA Clean School Bus Program, and Consumers Energy PowerMIFleet EVSE and Make-Ready Program incentives. EV capital and infrastructure costs shown in table does not have incentives applied.
[8] NPV assumes a 5% discount rate.

Chart L: School Bus (Type C) 12-Year Annual Cost Comparison

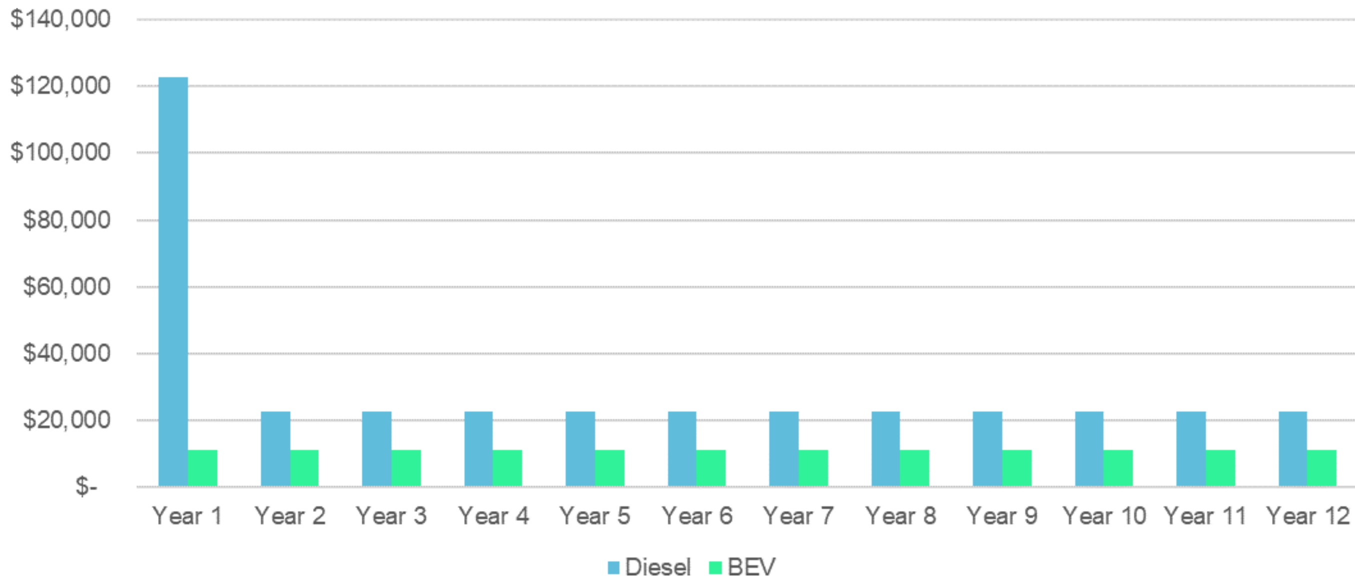
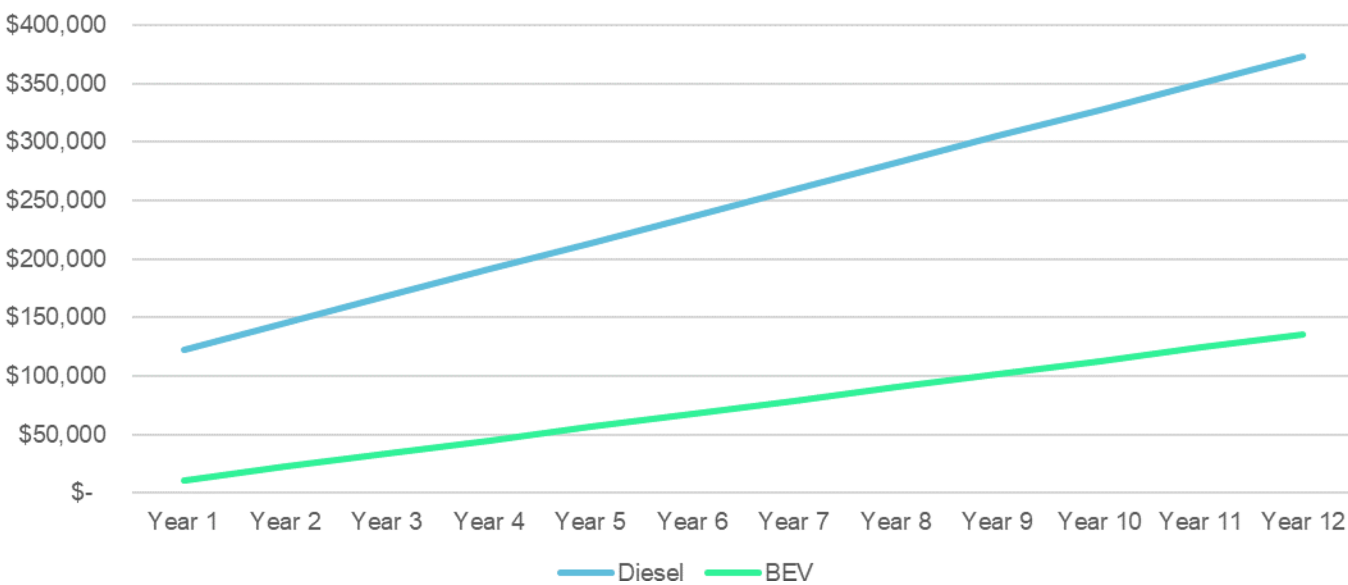


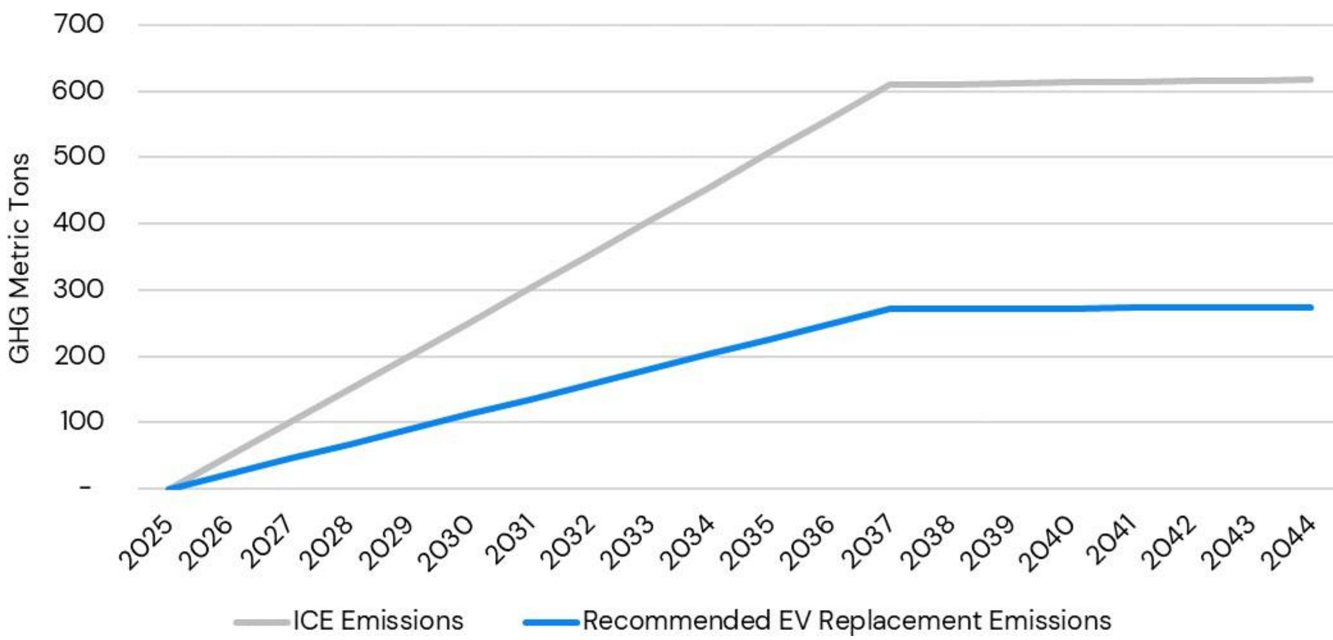
Chart M: School Bus (Type C) 12-Year Cumulative Cost Comparison



Fleet Environmental Impact Analysis

By converting the 5 recommended vehicles to EVs, you could reduce GHG emissions by 344 MT and NOx emissions by 1,737 pounds (lbs) over 20 years. Chart N below illustrates the cumulative GHG emissions for ICE replacements compared to EV replacements. The GHG emissions included in this analysis account for both tailpipe and source (fuel production) emissions, while the NOx emissions account for only tailpipe emission reductions.

Chart N: Cumulative Fleet Green House Gas Emissions



344 GHG Emission Reductions (MT over 20 years)

74 Equivalent to removing passenger vehicles from the road for one year

1,737 NOx Emission Reductions (Lbs. over 20 years)

5,680 Equivalent to tree seedlings grown for 10 years

Non-Road Equipment

There are 2 vehicles in CUSTOMER fleet identified as non-road equipment, summarized in Table H below. Of these 2 vehicles, both were identified as having electric equivalents options available Electric non-road equipment could help CUSTOMER further reduce fuel costs, maintenance costs, and site emissions.

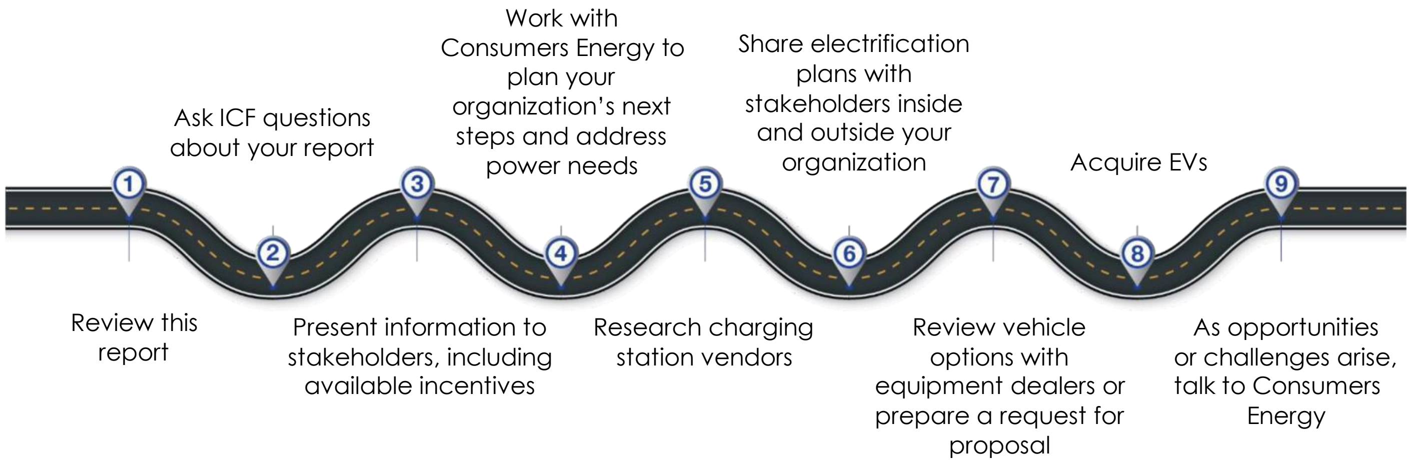
Table H: Non-Road Equipment

Vehicle Type	Fleet Total Quantity	Quantity already Electric	Quantity Recommended to Convert to Electric	Financial Savings (across equipment lifespan)	GHG Emission Reductions (MT, across equipment lifespan)
Mowers	2	0	2	$9,817	22
TOTAL	**2**	**0**	**2**	**$9,817**	**22**

Mowers

CUSTOMER currently owns two (2) mowers. A high-user commercial lawn mower can consume more fuel than a typical car. Electric mowers are quiet, require little maintenance, and produce no site emissions. Some electric mower examples include Weibang's E-Rider (MRSP $3,250), Ryobi's Zero-Turn Rider (MSRP $4,399) and Cub Cadet's Ultima (MSRP $4,999). These brands, in addition to Turf One and Ariens, produce a range of electric battery models including rear engine riders and zero turn mowers.

Next Steps: Your Roadmap to Fleet Electrification



We're here to help.

Contact us for help with your report, support navigating next steps, or just to speak with an expert.

WEB: PowerMIFleet™ | Consumers Energy

EMAIL: PowerMIFleet@cmsenergy.com

Frequently Asked Questions

Will additional training be needed for our drivers or maintenance staff?

Driving an EV is very similar to an ICE, but there are a few differences that your team may need help with, such as charging the vehicle and how to shift it into "drive." The level of training needed may vary depending on the vehicle type.

What is the impact of cold weather on electric vehicle (EV) operation?

This assessment accounts for potential regional temperature impacts on range prior to identifying recommended vehicle replacements. Extreme outside temperatures do reduce range, because more energy must be used to heat or cool the cabin. In Michigan, this can equate to small range reductions in the fall and spring, and up to 30-50% in the winter. The higher end of that spectrum would be during extreme cold.

How long do EVs last?

A manufacturer's warranty of a light-duty EV typically covers 8 years or 100,000 miles, and the expected battery lifetime is 10 to 12 years. Batteries in newer EV models should be capable of longer miles and lifetimes. On average, EV battery degradation is about 2% per year. An EV reaches the end of its useful life when the battery has less than 80% of its initial capacity remaining.

What electrical infrastructure upgrades will be needed to install chargers for my fleet? What are the associated costs?

While the specifics around electrical upgrades are not the focus of this analysis, Consumers Energy can help connect you with vetted charging station installers to better understand the costs of upgrades. We will also estimate the cost of charging infrastructure in the TCO calculation in this report.

If my fleet doesn't have the budget to purchase vehicles right now, how should we proceed?

This report provides 6-year recommendations for EV purchases. It also identifies applicable incentives and funding that may help cover some of the costs. Future EV models, pricing reductions, and grant programs may open up additional opportunities for electrification.

Appendix A: Cost-Effective Scenario Comparison

The comparison below highlights the potential impacts of looking at cost-effective vehicle replacements only, where EVs are recommended when their TCO is lower than the TCO of the comparable ICE vehicle. Both scenarios are outlined in more detail in the excel recommendations file. Your Account Manager is here to help you navigate these two scenarios and connect you to helpful resources to explore your options.

Recommendation impacts using a 10% TCO threshold, where EVs are recommended only when their TCO is no more than 10% higher than the TCO of the equivalent ICE vehicle. This scenario also reflects the adjusted retirement schedule (see Chart E) as outlined in the Key Assumptions section.

5
vehicles recommended

$109,630
TCO savings over 20 years*

$169,435
fuel cost savings over 20 years*

$40,539
maintenance savings over 20 years*

344
metric tons (MT) of CO_2 eliminated over 20 years

Recommendation impacts using a 0% TCO threshold, where EVs are recommended only when their TCO is lower than the TCO of the equivalent ICE vehicle. This scenario makes no adjustments to the fleet-provided retirement schedule (see Chart D):

0
vehicles recommended

$0
TCO savings over 6 years*

$0
fuel cost savings over 6 years*

$0
maintenance savings over 6 years*

0
metric tons (MT) of CO_2 eliminated over 6 years

* NPV assumes a 5% discount rate