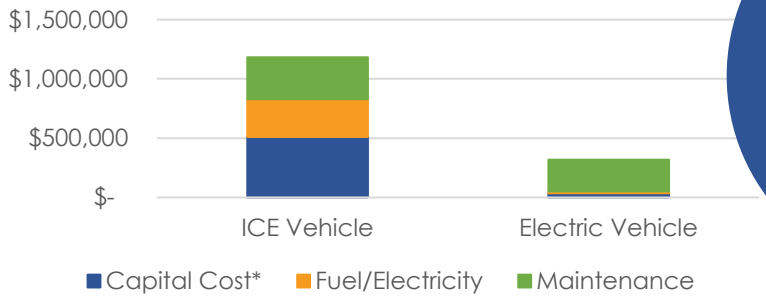
Transit Buses

POTENTIAL FLEET ELECTRIFICATION SAVINGS

Fleet Electrification Opportunities

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 your fleet understand the potential impacts and benefits of shifting your Internal Combustion Engine (ICE) fleet vehicles to EVs.

Below is a high-level estimate of the potential total cost of ownership (TCO) savings and emission reductions associated with converting one of your non-articulated transit buses to electric.



$864,171
TCO savings over the transit bus's lifespan

1,078
Metric Tons Net Green House Gas Emissions Reduced

*EV capital costs include EV charging infrastructure and installation cost estimates, Consumers Energy's PowerMIFleet EVSE and Make-Ready Program incentives, and the Federal Transit Administration (FTA) Low-No Emission Vehicle Grant incentives. TCO calculations are based on a 12-year vehicle life.

Why Switch to Electric Buses?

Battery electric vehicles (BEVs) don't release any tailpipe emissions, which means cleaner air in your community.

Electric buses can help cut down on operations and maintenance costs. That's because they are more efficient, less expensive to fuel, and require less maintenance over time.

EVs have a lower center of gravity which offers better handling and responsiveness. The electric engine provides smooth acceleration and deceleration, and a quiet ride, which all leads to a safer experience.

EVs are broadly incentivized by Consumers Energy's PowerMI EVSE and Make-Ready Program as well as through state and federal agencies. Our experts can connect you with the type of financial assistance that is right for you.

Consumers Energy
Count on Us®

Fleet advisory services provided by ICF

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Types of EV Charging Infrastructure

EVs require access to chargers, also known as 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, which are described further below.

	Level 1	Level 2	Direct Current (DC) Fast
Power Supply (Volts)	120	240 or 208	208/480 three-phase
Range per hour (Miles/hour charging)	2 to 5	10 to 20	150+
Additional Notes	Plugs into the vehicle's SAE J1772 charge port. Slowest category of EVSE	Most common charger for home, public and workplace charging.	May require infrastructure upgrades and cost significantly more than Level 2 chargers. Range depends on vehicle type and power supply.

Our analysis uses a conservative one-to-one vehicle-to-charger ratio, but it may be possible to reduce the number of chargers by:

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

Enviromental Benefits

Converting a transit bus to electric is estimated to produce the following environmental impacts:

1,078
metric tons (MT) of CO_2 eliminated over 12 years

2,380
Pounds (lbs.) of site NOx eliminated over 12 years

Over 12 years, these estimated emission reductions equate to:

switching **40,964** incandescent lamps to LEDs, or:

recycling **367** tons of waste instead of landfilling it, or:

planting **17,787** trees.

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Total Cost of Ownership Assumptions

The following table provides additional context and assumptions around our fleet savings estimates.

Transit Bus TCO Comparison	Diesel Transit Bus	BEV Transit Bus
Capital Cost	$511,500	$420,000
Charging Infrastructure Hardware (DCFC: 50 kW)[1]	N/A	$29,000
Charging Infrastructure Installation	N/A	$28,070
EV and EVSE Incentives/Grants[2]	N/A	($440,510)
Annual Fuel/Electricity Costs[3]	$33,761	$1,468
Annual Maintenance Costs[4]	$35,550	$27,000
12-Year Total Costs[5]	$1,181,409	$317,238
Single EV Transit Bus TCO Savings	**$864,171**	

Transit Bus EV Models

Several BEV model options are available for non-articulated transit buses; some are summarized below.

Manufacturer	Model	Type	EV Range (Miles)*	Battery Size (kWh)*	Seating Capacity*
ARBOC	Equess CHARGE	BEV	210 - 230	350 - 457	25 - 33
BYD	K7M 30' All-Electric	BEV	158 - 196	215 - 313	21 - 23
COBUS Industries LP	e.COBUS 3000	BEV	62	126	77-110
ENC	AXESS EVO-BE	BEV	400	492 - 738	27 - 35
GreenPower Motor Company	EV350 All-Electric	BEV	200	400	40
Lightning eMotors	Lightning Repower	BEV	225	560	70
MCI	D45 CRT CHARGE	BEV	170 - 230	389 - 520	54 - 61
New Flyer	Xcelsior CHARGE NG	BEV	174 - 251	350 - 525	32 - 41
Nova Bus	LFSe+	BEV	211 - 292	487 - 594	27
Proterra	ZX5	BEV	125 - 329	220 - 660	29 - 40
Van Hool	TDX25E Double Decker	BEV	310	676	69

*Where ranges of data are provided, the specifications vary based on the vehicle model configuration

[1] This conservatively assumes a one-to-one charger-to-vehicle ratio and does not account for any existing chargers your fleet may have. Depending on the scheduled duty cycles of the vehicles, it may be possible to reduce the number of chargers.
[2] Assumes Consumers Energy's PowerMIFleet EVSE and Make-Ready Program incentives (up to $35,000 per non-public DCFC and installation costs, with a limit of 10 ports per site) and the FTA Low-No Emission Vehicle Grant (up to 85% of BEV transit bus and equipment costs). EV capital and infrastructure costs shown in the table do not have incentives applied.
[3] Assumes 45,000 miles driven per year, $2.86/gallon diesel (year 1 cost), $0.12/kWh (year 1 cost). Fuel pricing is escalated annually using projections from U.S. Energy Information Administration's 2021 Annual Energy Outlook.
[4] Uses a dollar per mile maintenance cost assumption ($0.79/mile for diesel buses, $0.60/mile for BEV buses), escalated at 2.2% annually.
[5] NPV assumes a 5% discount rate.