



## GET THE FACTS: REFUELING VS RECHARGING

### INSIDE LOOK: PROPANE AUTOGAS VERSUS ELECTRIC INFRASTRUCTURE

If your district operates — or is considering purchasing — electric school buses, charging up for the day could also mean draining budgets due to inefficient infrastructure. With its quick refueling and transparent costs, propane autogas provides a simpler and more convenient solution to the headaches of electric charging.

#### THE PITFALLS OF ELECTRIC

- INSTALLATION:** Even getting started with electric buses can hit your budget hard. The power requirements needed for multiple charging stations dramatically increase site preparation costs, on top of the trenching, conduits, cables, and repaving required to run a power line to the charging center. With propane autogas, you have options for infrastructure setups that keep your costs in check.
- DOWNTIME:** Charging electric fleets around the clock means keeping those buses off the road for long periods of time — up to five hours, in some cases. Refueling a propane autogas bus is safe and quick, taking a similar amount of time as fueling with gasoline or diesel.
- RANGE:** Because electric buses rely on frequent battery charging to stay mobile, their full driving range is limited (only up to about 120 miles on one charge) and often makes drivers anxious. Propane autogas buses can provide a range of more than 400 miles on a single refueling.
- POST-INSTALLATION:** In the long term, electric fleets also have to install and pay for charging management software to adequately maintain charging schedules for multiple vehicles. Outside of routine maintenance, propane autogas infrastructure doesn't require additional costs after installation.



## SEE THE NUMBERS FOR YOURSELF

The affordability and scalability of propane autogas refueling options are unmatched compared with electric. These examples compare the typical expected costs of propane autogas refueling infrastructure with comparable recharging infrastructure for electric school bus fleets. To see what's included in electric infrastructure and site prep, see the table on page 3.

▶ INFRASTRUCTURE COMPARISON	PROPANE AUTOGAS	ELECTRIC*
Buses Serviced	10	10
Site Prep + Infrastructure Maximum Total	\$45,000 - \$60,000	\$80,000 - \$480,000
Installation	\$18,000 - \$24,000*	\$30,000 - \$280,000**
Site Prep + Equipment	\$27,000 - \$36,000*	\$50,000 - \$200,000***
Station Setup	One 1,000 - 2,000 gallon tank	Five level 3 fast EV chargers
Additional Costs	No	Most Likely — Electric sub-panels, added amperage to power multiple stations, upgrading and replacing incoming power line
Scalable to Growing Fleet	Yes	No

\*Argonne National Laboratory, Center for Transportation Research, AFLEET Tool 2017.

\*\*U.S. Dept. of Energy, Vehicle Technologies Office, Nov. 2015.

\*\*\*Rocky Mountain Institute, April 2014.

## PROPANE AUTOGAS INFRASTRUCTURE OPTIONS

Choose between a standard or advanced private station. You can own your infrastructure or lease it from your propane autogas supplier.

STANDARD PRIVATE STATION (50 VEHICLES OR FEWER)		ADVANCED PRIVATE STATION (50 VEHICLES OR MORE)	
FLEET OWNED	SUPPLIER OWNED	FLEET OWNED	SUPPLIER OWNED
<b>\$21,500 - \$75,000</b>	<b>\$1,500 - \$15,000</b>	<b>\$65,000 - \$300,000</b>	<b>\$5,000 - \$75,000</b>
[Infrastructure + Site Prep]	[Site Prep]	[Infrastructure + Site Prep]	[Site Prep]

## THE COSTS AND LIMITATIONS OF ELECTRIC

Propane autogas refueling stations can easily and inexpensively accommodate increasing fleet size with more tanks, or larger ones. But electric charging stations require additional, expensive charging station installations and eventually need upgrades to their electrical service.

	ONE ELECTRIC BUS + ONE STANDARD CHARGER	10 ELECTRIC BUSES + 10 STANDARD CHARGERS	ONE ELECTRIC BUS + ONE EXPRESS CHARGER	10 ELECTRIC BUSES + FIVE EXPRESS CHARGERS
Charger(s)	\$4,500	\$45,000	\$35,800	\$179,000
Site prep: Concrete mounting base and crash bollards	\$3,000	\$10,000	\$3,000	\$10,000
Electric upgrades and installation costs (assumes 100 feet from power source)	\$8,000	\$50,000 - \$60,000	\$15,000	\$70,000 - \$80,000
Total	\$15,500	\$105,000 - \$115,000	\$53,800	\$259,000 - \$269,000
Scalability Expenses	<ul style="list-style-type: none"> <li>Fleet must pay to upgrade existing panel to accommodate additional amperage.</li> </ul>	<ul style="list-style-type: none"> <li>Power load is too large for existing electrical panel.</li> <li>Fleet must pay to install additional panel.</li> </ul>	<ul style="list-style-type: none"> <li>Fleet required to add subpanel for additional amperage and add ventilation if charging in a covered area.</li> </ul>	<ul style="list-style-type: none"> <li>Significantly higher amperage requirements necessary.</li> <li>Fleet must pay for a new panel and power drop.*</li> <li>Fleet will likely need to upgrade grid transformer for electric company to supply power necessary for the site.</li> <li>Additional ventilation required if charging in a covered area.</li> </ul>
Estimated Charging Time For a Full Charge	6 hours (level 2 charger)	8 - 10 hours (level 2 charger)	Six hours to charge 10 EV buses at 100%	1.6 hours: Five level 3 chargers operating simultaneously.

\*Power drop: An overhead electrical line running from a utility pole to a customer's building.

## GO PROPANE FOR THE LOWEST TOTAL COST-OF-OWNERSHIP

Beyond affordable infrastructure, fleets are choosing propane autogas for its high-performance vehicles, cleaner operation, and unmatched savings. To learn more about what propane autogas can do for your fleet, visit [propane.com](http://propane.com).

### FOR MORE INFORMATION

To learn about propane autogas vehicles and the fleets that use them, visit [propane.com](http://propane.com).

THE PROPANE EDUCATION & RESEARCH COUNCIL was authorized by the U.S. Congress with the passage of Public Law 104-284, the Propane Education and Research Act (PERA), signed into law on October 11, 1996. The mission of the Propane Education & Research Council is to promote the safe, efficient use of odorized propane gas as a preferred energy source.

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