1/3/2024

Fleet Partner Study

CORBETT SCHOOL DISTRICT

Executive Summary

Through the Fleet Partner program, PGE provides technical planning services, turnkey design and construction of charging infrastructure, custom cost incentives, and a trusted partner throughout the process. The program consists of two phases: Plan and Build.

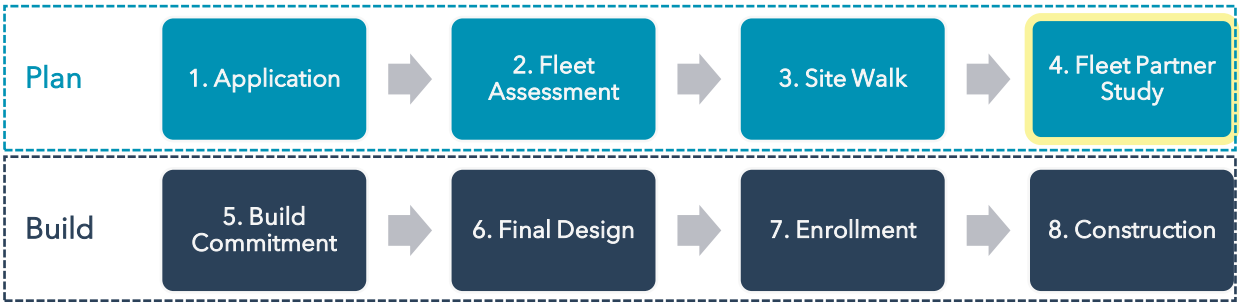


Figure 1

This study concludes the Plan phase and provides the site-specific information needed to understand the scope and costs associated with the Build phase. That information is summarized in Table 1 below.

Table 1

Fleet Partner Project Summary					
Site	Make-Ready Ports	Energy Commitment	Infrastructure Cost	Fleet Partner Incentive	Net Infrastructure Cost
Main Campus	10	1,647,360 kWh	$257,000	-$181,567	$75,433

This study details the preliminary results of the fleet assessment and site walk, based on information provided in the application and discussions with the project team. This includes an electric vehicle feasibility, charging analysis, total cost of ownership analysis, summary of incentives, and a site-specific charging infrastructure design and cost estimate.

Electric Vehicle Feasibility

As a full build out potential, 10 battery electric school buses were considered for this study. Corbett School District requested that PGE consider the Thomas Built electric school bus as the basis for the infrastructure design. Since routes considered for electrification vary between 40 and 120 miles per day, the Thomas Built electric school bus should be adequate considering the stated operating range of 138 miles. However, actual operating range might be less due to conditions such as route conditions such as terrain and weather, vehicle configuration and load, and driver behavior. For longer routes, some options are to do a top up charge during the middle of the day or to switch buses mid-day so that it does a longer route one half of the day and a shorter route the other half. A comment on the top up mid-day, the bus does not need to charge to 100% every time it's plugged in, only enough to complete the next route.

Table 2

Energy Use Analysis					
Vehicle Type	Qty.	Avg. daily mileage	Operating days/year	Est. EV kWh/mile	Annual Energy Usage (kWh/yr)*
Battery Electric School Bus	10	80	208	1.5	274,560
				Total (Annual)	274,560 kWh/yr
				Est. Energy Use Commitment (10-year)	kWh

**Includes an estimated 10% in electrical losses during charging*

Charging Analysis

PGE considered the proposed electric vehicle's battery size, charging capabilities, daily mileage, and available charging time when determining the appropriate charging speed. Because the Thomas Built battery electric bus does not have an onboard level 2 charger, DC chargers will be required. PGE determined that a charger in the 30kW range would be a suitable choice. With an average dwell time of close to 12 hours, there will be no problem refilling the battery overnight. An effective way to achieve this charge rate is with a dual-port all-in-one charger. This provides the flexibility to have a higher charge rate when needed. Each unit can provide up to 60kW if a single vehicle is plugged in, and then splits the charge if two vehicles are plugged in allowing for simultaneous charging. If a vehicle needs to top off in the middle of the day, or before an afterschool event, the 60kW rate will be able to meet those charge scenarios. For the InCharge all-in-one DCFC, the next size up is 120kW. This was considered, however, since the maximum charge rate on the Thomas Built battery bus is 90kW, the extra capacity would be unusable and therefore not worth the added charger or infrastructure costs.

Table 3

Charging Solution	
Model	InCharge ICE-60
Configuration	All-In-One Dual-Port DCFC
Nameplate Power	60 kW (77A at 480V)
Avg. Recharge Time*	@30kW 5-6 hours Full charge est. 10-11 hours @60kW 2.5-4 hours Full charge est. 5-6 hours

**Not a full charge. Estimated time to recover energy consumed by average daily mileage. DC fast charging times vary by state of charge, temperature, and other factors.*

Total Cost of Ownership Analysis

PGE's Fleet Total Cost of Ownership Tool can be used to estimate potential costs and benefits of switching to an electric fleet. The tool uses customer-specific inputs (vehicle type, daily mileage, etc) and assumptions (see Frequently Asked Questions) to compare the total cost of ownership of the fossil-fuel versions and the electric versions of the vehicles. The analysis includes the upfront cost difference of electric vehicles and chargers, as well as fuel and maintenance cost savings, clean fuel credit revenue, incentives, and avoided CO2 emissions.

Electricity costs were estimated based on the charging solution described in the Charging Analysis section and assumes all EVs have been acquired and 100% of charging happens on-site. The analysis also assumes that charge management software is used to spread out the charging load over the entire length of the charging window. This helps to reduce demand charges, and therefore, electricity costs.

Additionally, PGE estimated the expected revenue through the Oregon Clean Fuels Program. This program allows fleets to generate Clean Fuels Credits (CFC) from charging their electric vehicles and sell those credits on the market to earn revenue every year. This is typically done through a broker registered with Oregon DEQ. If the electricity used for charging is offset by onsite renewables or renewable energy credits, additional credits (and therefore revenue) can be generated.

Table 4

Annual Fuel Cost Analysis						
Site	Total Load (kW)	Rate Schedule	Electricity Use (kWh/yr)	Electricity Cost	Standard CFC Revenue	Renewable CFC Revenue
Main Campus	320	85	274,560	$27,000	-$38,732	-$52,005

The chart below shows a comparison of estimated annual fuel costs for the existing fleet (fossil fuel), an electric fleet, an electric fleet with standard CFC revenue, and an electric fleet with CFC revenue using renewables. This represents a savings of $152,005 per year in fuel costs, which can help justify the additional cost of EVs and charging infrastructure.

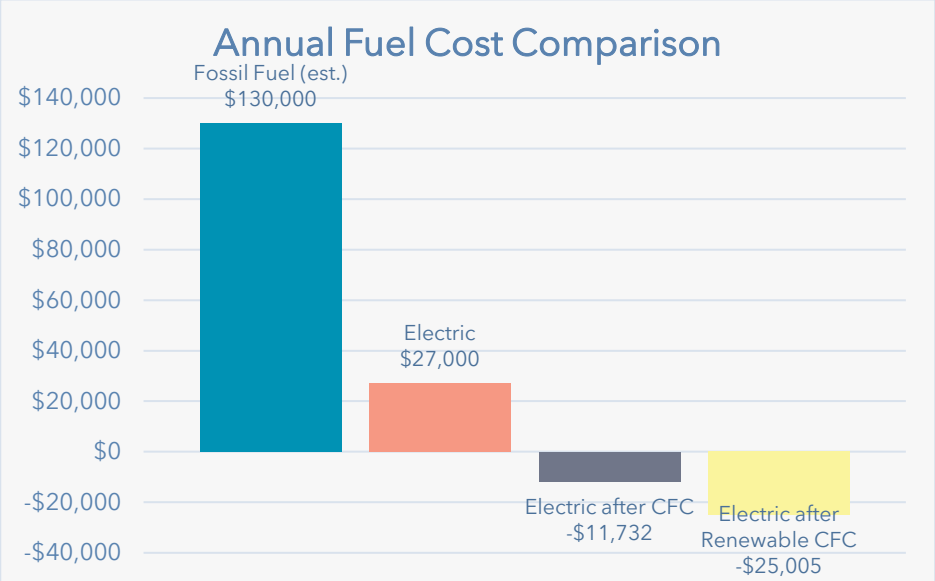


Figure 2

Transitioning the fleet to electric has environmental benefits in addition to financial benefits. Electric Vehicles have zero tailpipe emissions which helps to improve local air quality and reduce the greenhouse gas (GHG) emissions that cause climate change. Even when accounting for the carbon intensity of electricity generation in Oregon, there is still a considerable reduction in emissions.

Table 5

Emissions Reduction				
Site	GHG Emissions Reduction (Standard electricity)		GHG Emissions Reduction (100% renewable)	
	Metric Tons CO_2e/yr	%	Metric Tons CO_2e/yr	%
Main Campus	323	71	456	100

Site Assessment

PGE conducted a site assessment of the facility on 11/27/2023. Using information from the site assessment and the charging analysis, PGE developed a preliminary site design and cost estimate.

The design was based on parking for 10 battery electric school buses along the west fence of the lot. Note that any site improvements are not included in the fleet partner scope and are assumed to happen after, or before, the fleet partner construction. Because the charge port on the Thomas Built is located behind the door, the buses will need to park head in. The buses would be charged by five 60 kW all-in-one dual-port DCFC units. If a single

vehicle is charging at a unit, it could receive up to 60 kW. If two vehicles are charging at a unit, each vehicle could receive 30 kW.

The chargers would be powered from a new strut-mounted 600A 480V three-phase service just to the south of the electric vehicle parking. The service would be fed by underground conduits from a new transformer to the south. Power to the transformer would come from an upgraded utility pole on Historic Columbia River Highway.

Based on the preliminary designs, PGE estimated infrastructure costs including the line extension and make-ready infrastructure costs. In addition, the cost of chargers was estimated based on indicative pricing from vendors (contact the vendor for final pricing).

Table 6

Preliminary Cost Estimate			
Site	Make-Ready Ports	Infrastructure	Chargers + Install*
Main Campus	10	$257,000	$335,000

**Cost for all chargers planned over 10-year term. Only 1 charger is required to be purchased upfront. Customer to purchase chargers directly from charging vendor (not included in Fleet Partner scope)*

The preliminary site design and cost estimate are provided on the following pages.

Incentives

Fleet Partner

PGE's Fleet Partner program can reduce the cost and complexity of installing EV charging infrastructure. PGE would design, install, own, maintain, and help pay for the make-ready infrastructure. Participants must agree to the program terms, including committing to installing the chargers and using a minimum amount of energy over the 10-year term. A summary of the incentive and requirements are shown below.

Table 7

Fleet Partner Incentive Summary				
Site	Energy Commitment	Infrastructure Cost	Fleet Partner Incentive	Net Infrastructure Cost
Main Campus	1,647,360	$257,000	-$181,567	$75,433

To participate in the Build phase, participants must agree that:

- PGE will design and construct the make-ready infrastructure
- PGE will own and maintain the make-ready infrastructure for 10 years
- Participant will pay any make-ready infrastructure costs not covered by the incentive, prior to PGE starting construction

- Participants commits to forecasted energy use of the chargers (shown in table above)
- Participant will purchase and install at least one PGE-qualified charger within 6 months of construction completion
- Participant will pay any charger software fees and maintenance costs to keep chargers operational and sharing data with PGE for 10 years
- Participant will keep the chargers on a cost-of-service (non-Direct Access) rate schedule for 10 years
- Site property owner must sign an easement covering PGE-owned infrastructure
- There is no other active construction occurring at the site (Build phase cannot start until other construction is complete)

Electric Vehicle Incentives

Federal EV Tax Credit – Up to $7,500 tax credit for the purchase of most light-duty electric vehicles and up to $40,000 for medium and heavy-duty EVs. Governmental entities are not directly eligible, but can use third-parties to capture the incentive (learn more here).

Oregon Clean Vehicle Rebate – Up to $2,500 rebate on light-duty electric vehicles with a base MSRP below $50,000. Businesses can receive up to 10 rebates per calendar year.

Oregon Clean Fuels Program: Advance Crediting – Provides up to 6 years' worth of clean fuels credits upfront to transit agencies, school districts, public fleets, and fleets that are contracted with those entities. Credits can be sold upfront to help cover the cost of EVs.

Oregon Diesel Emissions Mitigation Grant Program – A competitive grant program for replacing older diesel vehicles (2009 or older) with new cleaner vehicles, like EVs.

PGE Drive Change Fund – A competitive grant program for transportation electrification projects that benefit the community. Funds can cover the cost of electric vehicles, but preference is given to public or non-profit organizations.

PGE Electric School Bus Fund – Provides funding to school districts (or their transportation contractors) to cover the incremental cost of electric school buses and charging infrastructure. Also provides technical assistance to districts throughout the process.

Next Steps

1. **Select chargers.** Research charging hardware and software options on PGE's qualified chargers list and make a selection. Get a quote from the vendor for your selected chargers.
2. **Confirm the preliminary site design.** Engage internal stakeholders to agree on the layout of chargers, number of ports, and other site design elements. Once confirmed, sign and return the Reservation form along with the quote for your chargers.
3. **Research vehicle incentives.** Research and apply for incentives, rebates, and grants to help with the costs of the electric vehicles.
4. **Order electric vehicles.** Place the order so that the electric vehicles are expected to arrive after the charging site construction is complete. It can take 6-18 months to design, permit, and construct a charging site.

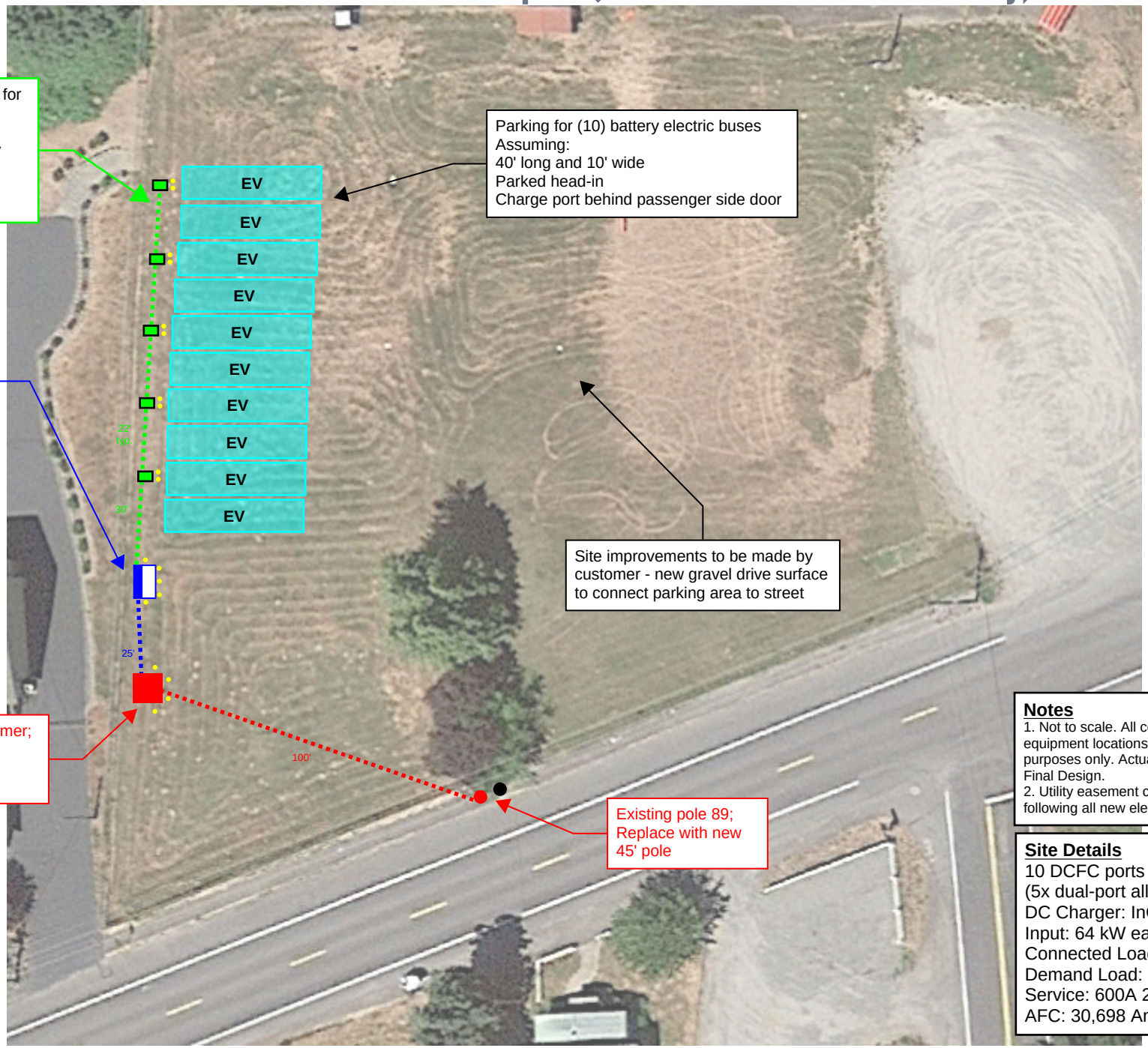
5. **Prepare.** Evaluate any operational impacts of electric vehicles and work collaboratively within your organization to prepare for an electric transition.
6. **Testing, training, and optimization.** Test the new electric vehicles with the chargers and train drivers on charging and driving an EV. Track charging data and optimize charging times to charge off-peak and reduce demand if possible.

Please contact the PGE Fleet Partner team with any questions:
fleetpartner@pgn.com

Disclaimer: This is a preliminary report intended to be used for information purposes only. This preliminary report is an approximation and is subject to change. PGE makes no warranty, representation or undertaking, express or implied, as to the accuracy, reliability, or completeness of the preliminary report. PGE does not endorse any particular manufacturer, contractor, or product.

Preliminary Site Design

Corbett School District – Main Campus (36115 E Historic River Hwy, Corbett)



(5) Large make-ready boxes for customer installed 60kW dual-port all-in-one DCFCs;
Each make-ready box fed by 100A 480V branch circuit;
(2) Heavy duty bollards per make-ready box, (10) total

Parking for (10) battery electric buses
Assuming:
40' long and 10' wide
Parked head-in
Charge port behind passenger side door

Strut-mounted 600A 480V service;
Include 600A portable generator connection;
(5) Heavy duty bollards;
Fed by (2) 3" secondary conduits

Site improvements to be made by customer - new gravel drive surface to connect parking area to street

New 300kVA 480V transformer;
8' x 8' Concrete pad;
Fed by 4" primary conduit;
(4) Heavy duty bollards

Existing pole 89;
Replace with new 45' pole

NORTH

Notes

1. Not to scale. All conduit routing and equipment locations are for illustrative purposes only. Actual locations defined during Final Design.
2. Utility easement covers 10' wide area following all new electrical lines, as built.

Site Details

10 DCFC ports
(5x dual-port all-in-one chargers)
DC Charger: InCharge ICE-60
Input: 64 kW each (77A @ 480V)
Connected Load: 320 kW
Demand Load: 320 kW (100%)
Service: 600A 277/480V
AFC: 30,698 Amps

Nico Varela
Portland General Electric - Transportation Electrification
1/2/2024

PRELIMINARY - NOT FOR CONSTRUCTION

Preliminary Cost Estimate

Project Summary	
Customer:	Corbett School District
Location Name:	Main Campus
Address:	36115 E Historic River Hwy
City:	Corbett
Level 2 Ports:	0
DCFC Ports:	10
Energy Commitment:	1,647,360 kWh

Infrastructure Cost Summary		
Item No.	**Item Description**	**Total**
1	PGE Line Extension Cost	$54,000
2	Make-Ready Cost	$203,000
3	**Total Infrastructure Cost**	**$257,000**
4	PGE Line Extension Allowance	-$21,361
5	Make-Ready Incentive	-$160,206
6	**Total Fleet Partner Incentive**	**-$181,567**
7	**Net Customer Payment**	**$75,433**

Charger Cost Summary		
8	Estimated Charger + Install Cost (10 Ports)*	$335,000
9	PGE Level 2 Charger Rebate ($1,000/port)	N/A
10	**Net Charger Cost**	**$335,000**

**Cost for all chargers planned over 10-year term. Only 1 charger is required to be purchased upfront.*