

CityBus Fleet Electrification:

- First Electric Bus Selection
- MSCS Charging Infrastructure

Climate Action Subcommittee Meeting
September 22, 2020



Meeting Goals

- Fleet composition and current funding
- Major considerations in the selection of a Battery Electric Bus
- Electrification infrastructure at MSCS



Fixed-Route Fleet

Year	Vehicle Type	Fuel Type	End federal useful life	# Vehicles
2002	40' Gillig	Diesel	2015	4
2002	29' Gillig	Diesel	2015	1
2008	29' Gillig	Diesel-Hybrid	2020	3
2011	40' New Flyer	Diesel-Hybrid	2023	7
2013	40' New Flyer	Diesel	2026	6
2016	40' New Flyer	Diesel	2028	4
2018	40' Eldorado	Diesel	2031	4
Total Vehicles				29

Funding

- Federal Transit Administration (FTA) awards through 5339(b) Bus & Bus Facilities grant:
 - FY17 Award: \$1,206,518
 - FY18 Award: \$1,780,133
- Local Match Required (15%): \$527,057
 - Using Transit's TDA IV reserve funds ☹️
 - Pursuing VW/HVIP to offset use of reserves
- Total Project Funding: \$3,513,708



Federal Transit
Administration

Innovative Clean Transit (ICT) Rule

- CARB Rule 2018 requires conversion to zero-emission fleet
- ICT timeline for small agencies:
 - 2023: Submit council approved ZEB Rollout Plan
 - 2026: Each bus purchase contains 25%+ ZEB
 - 2029: Each bus purchase is 100% ZEB
 - 2040: Full ZEB Fleet



Electric Bus Purchasing Options

- Federal procurement rules define bus purchase options:
 - Stand-alone
 - Joint
 - Assignment of contract (“piggybacking”)
 - Only allowed under very limited circumstances
- State contracts
 - California Dept. General Services contract open as of December 2019
 - Two manufacturers qualify
 - New Flyer
 - Proterra



Electric Bus Range Considerations



20 of the 25 CityBus daily vehicle “blocks” are between 150-170 miles long



With only overnight charging for initial deployment, buses need 170+ miles per charge to complete all blocks

-Remaining SOC @ end of shift
-Year over degradation 2%



SCP/CADMUS study estimates CityBus’ efficiency at 2.5-3.8 kWh per mile driven

Grades, riders, driver patterns (speed, braking), HVAC, ambient temp have a significant impact on actual vehicle range

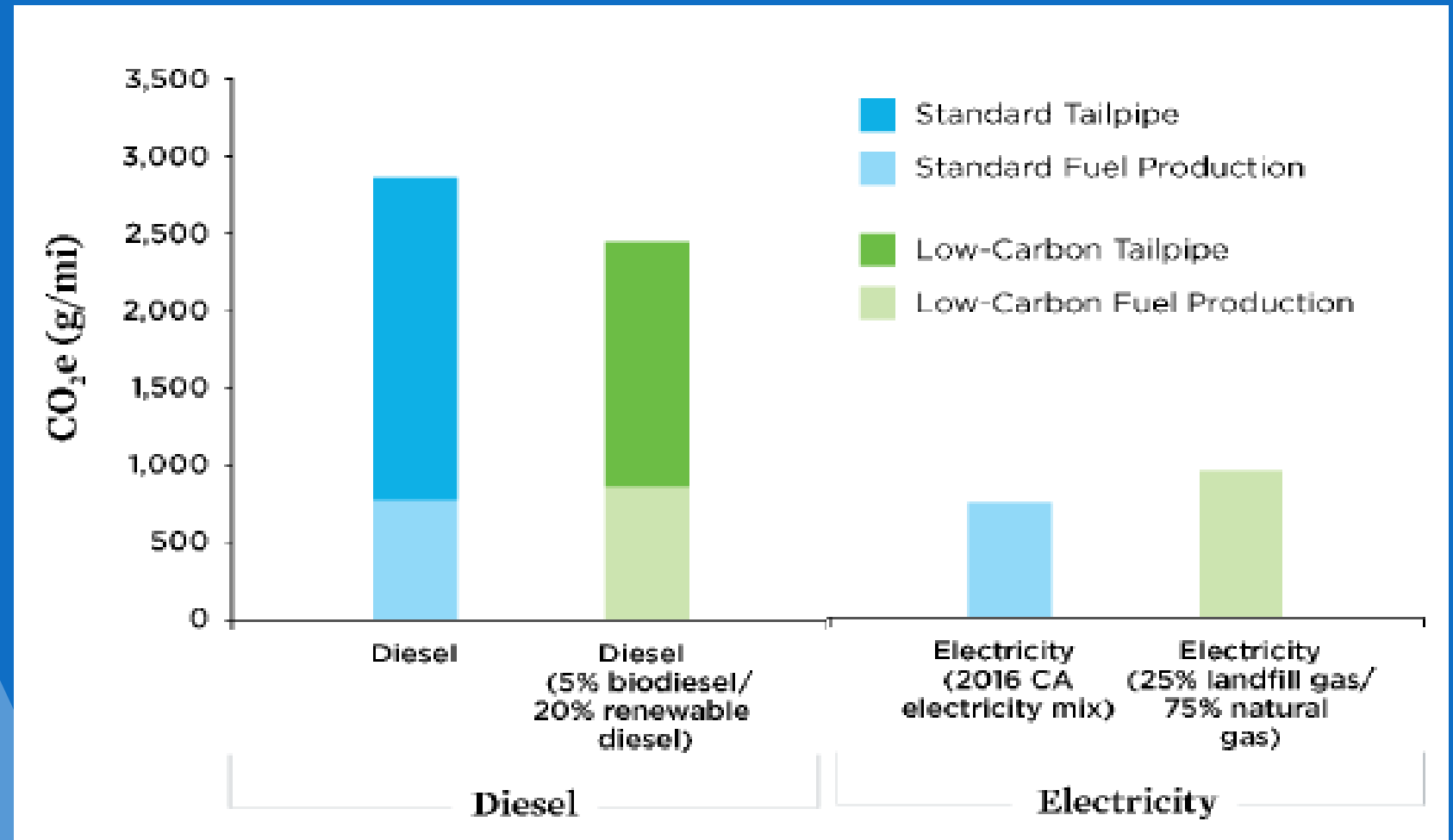


One bus on State Contract meets ability to run all “blocks” and meet estimated efficiency levels

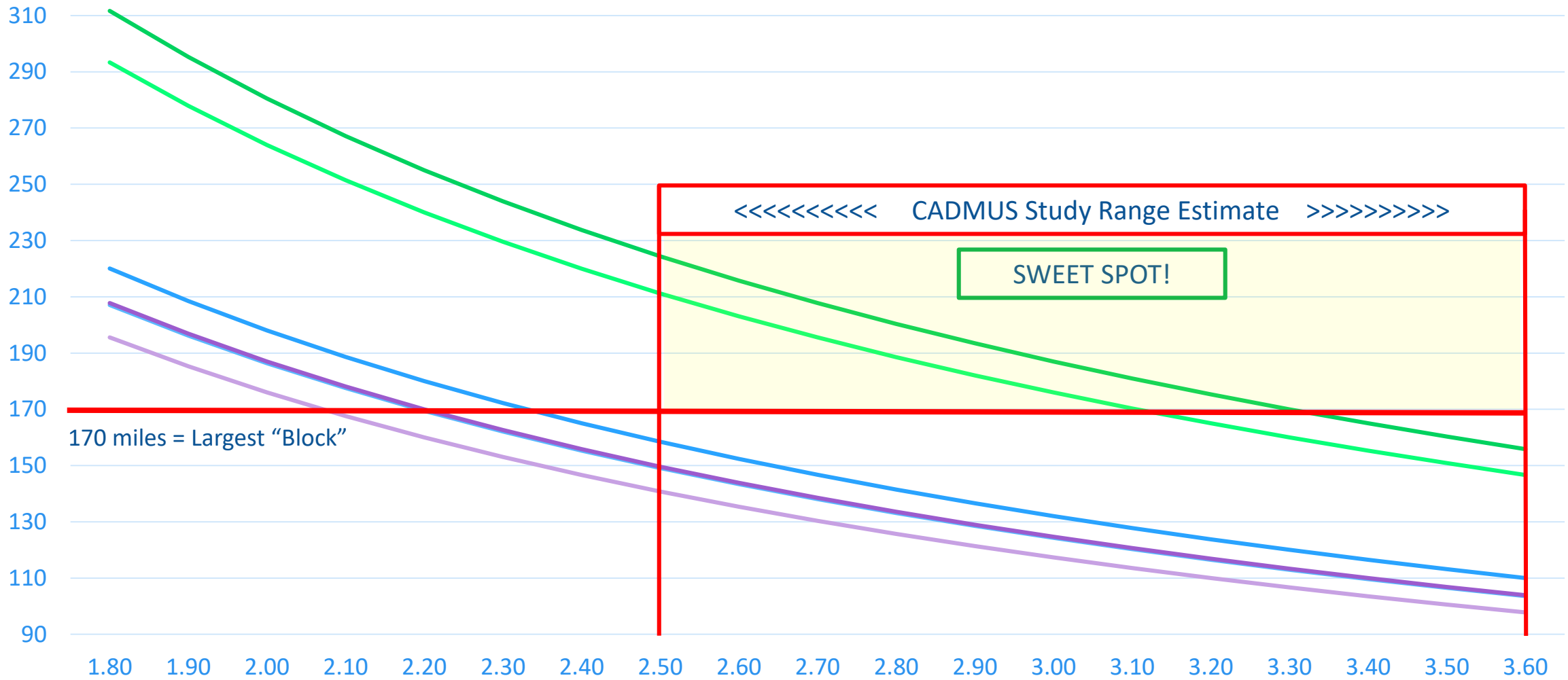
Estimated GHG reductions

• Source:
TCRP Synthesis 130:
Battery Electric Buses
– State of the
Practice (2018)

Available at
[http://www.trb.org/
Main/Blurbs/177400.
aspx](http://www.trb.org/Main/Blurbs/177400.aspx)



Range of bus based on battery size / SOC / Operational Efficiency




- Proterra E2 Max 15% SOC 561
- Proterra E2 Max 20% SOC 528
- New Flyer 15% SOC 396
- New Flyer 20% SOC 373
- Proterra E2 15% SOC 374
- Proterra E2 20% SOC 352

Proterra Catalyst E2 Max
 660 kWh 40' Bus
 Estimated Costs (1-bus)

Purchase Method	Base Cost	Total w/ Options & Extended Warranty	Annual Battery Lease Cost	12-Year Useful Life Lease Cost	Free Battery Replacement @ Yr-6	12-Year Useful Life Capital Cost
Buy Outright	\$900,000	\$1,160,000	-	-	N	\$1,160,000
Battery Lease	\$605,000	\$730,000	\$52,000	\$624,000	Y (\$294,000)	\$1,060,000

Lease vs. Purchase Outright

- Free replacement battery at Year-6
 - Even if SOC is above warranty level
 - May be 2020 technology but likely newer (2026) battery technology
 - Lower up-front capital cost (~\$430K per bus)
 - Able to order four buses instead of only three
 - Savings go towards first few years of battery lease
- 

CityBus' Proposed Bus Plan



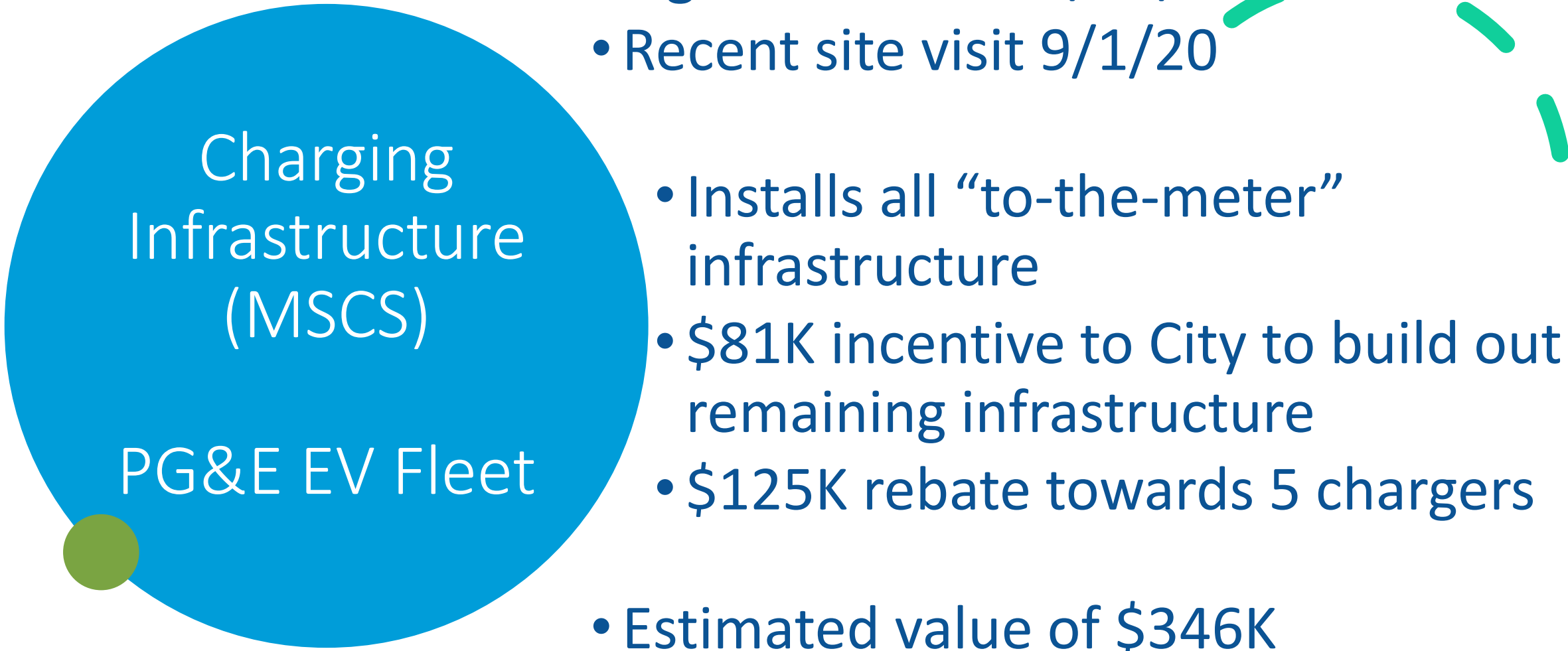
Obtain Quote
for 4 buses



Place order for 4 buses
using battery lease program



Use remaining funding for
first years of battery lease



Charging
Infrastructure
(MSCS)

PG&E EV Fleet

- Signed contract 7/23/20
- Recent site visit 9/1/20
- Installs all “to-the-meter” infrastructure
- \$81K incentive to City to build out remaining infrastructure
- \$125K rebate towards 5 chargers
- Estimated value of \$346K

Charging Infrastructure (MSCS)

PG&E EV Fleet

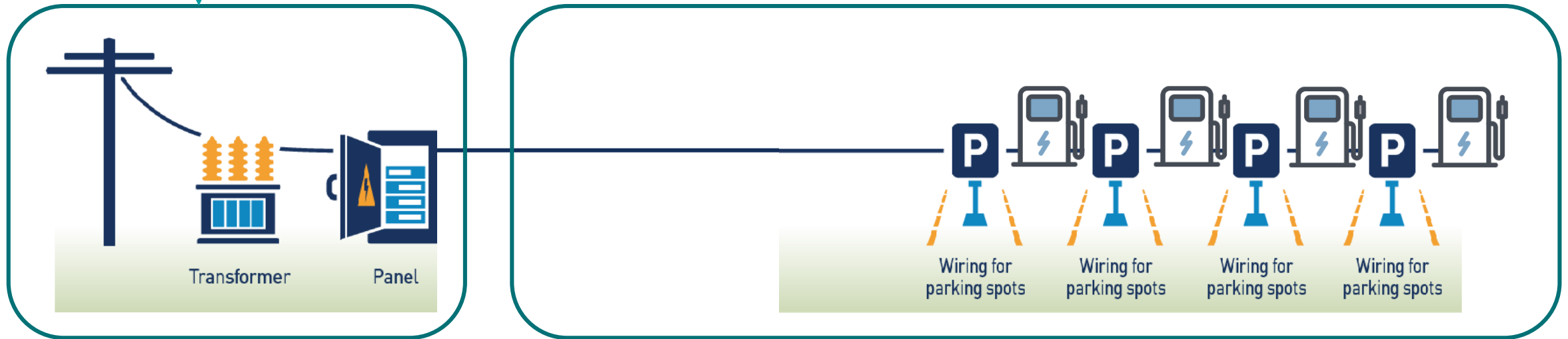
City installs all “after meter” infrastructure:

- Construction May-Dec 2021
- ~\$1M – 1.5M (**unfunded** 😞)

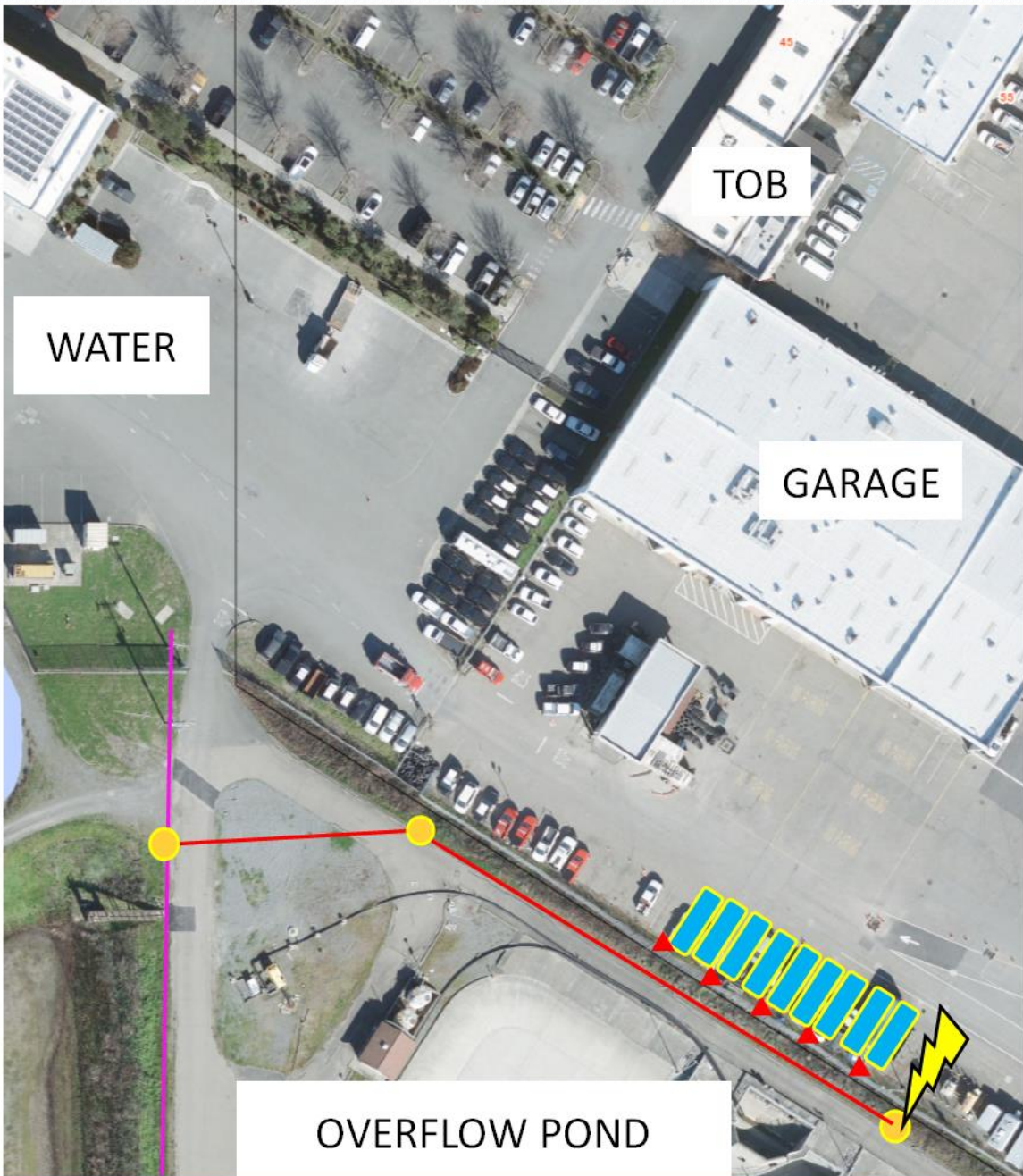
City committing to have by 2025:

- Nine Electric vehicles
 - 4 - funded (in this presentation)
 - 1 - funding underway (AHSC)
 - 4 - **unfunded** 😞
- 5 - 150kW Chargers

PG&E pays for, constructs, owns, and maintains all infrastructure to the City's electric meter



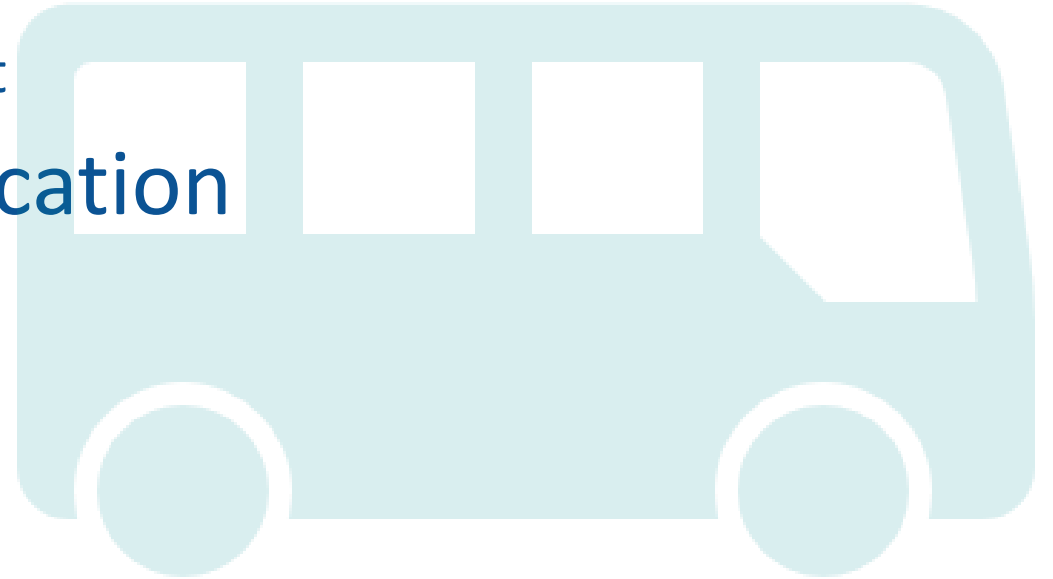
City pays for, constructs, owns, and maintains infrastructure from electric meter to chargers



Cost Recap (current funding = \$3.5M)



- \$3.5M - Lease 4 buses
 - With 3 years battery-lease cost
- \$1.5M – MSCS Electrification Infrastructure
- Total Project = \$5M
- **Shortfall = 1.5M**





Questions and Feedback