City of Pittsburg
California

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AGENDA

INFRASTRUCTURE AND TRANSPORTATION SUBCOMMITTEE

Friday, February 16, 2024
1:30 PM

Pittsburg City Hall
First Floor Conference Room, 4B
65 Civic Avenue
Pittsburg, CA 94565

Subcommittee Members

Dionne Adams, Council Member
Shanelle Scales-Preston, Council Member

1. **Public Comment**

2. **Pittsburg Fleet Electrification Master Plan:** ICF will present the draft Pittsburg Fleet Electrification Master Plan. *Subcommittee feedback is requested.*

3. **Public Infrastructure-Aligned Goal FY 23/24:** Staff will provide an update on progress towards Public Works #2 – Improve Pavement Condition Index by 5 Points.

4. **FY 24/25 Goals:** Staff will present on the FY 24/25 goal-setting process and share a draft of public infrastructure-aligned goals for the next fiscal year. *Subcommittee feedback is requested.*

5. **Capital Improvement Program Project Status & Timeline:** Public Works staff will provide a status update on active projects.

6. **Subcommittee and Staff Reports or Remarks**

7. **Adjournment**

City of Pittsburg’s Fleet Electrification Plan

City of Pittsburg

Sam Pournazeri
Senior Director, Transportation & Energy

February 2024

Meeting Agenda

- Background & Objectives
- Fleet Composition
- Fleet Transition Planning
- Recommended Replacements by Availability
- Electric Vehicle Charging Infrastructure Rollout Plan
- Cost
- Barriers to Electrification

Fleet Electrification Plan Objectives

1. Transition City Fleet to Electric Vehicles
2. Compliance with CARB’s Advanced Clean Fleet Regulations
3. Develop a sustainable EV charging infrastructure plan for City fleet vehicles
4. Evaluate the cost of transition to EVs and deployment of EVSEs
5. Identify potential funding sources and procurement strategies
6. Evaluate staffing needs and best practices for operation of an EV fleet

California's Ambitious Zero Emission Vehicle Goals

Executive Order N-79-20

(September 2020)

100% ZEV sales by 2035

Full transition to

ZEV short-haul/drayage trucks

by 2035

Full transition to **ZEV buses** &

heavy-duty long-haul trucks

by 2045*

Full transition to

ZE off-road equipment

by 2035*

*where feasible

Current State ZEV Regulations

Advanced Clean Trucks (ACT)

Manufacturer Sales Requirement

Increasing percentage of trucks sales in California should be zero emission

Advanced Clean Cars 2.0

Manufacturer Sales Requirement

Full Transition to Light Duty ZEV & PHEV by 2035

Post 2035 only ZEVs will be available for purchase

Advanced Clean Fleet (ACF)

Zero-Emission Truck Purchase

(Public Fleet >8,500 lbs.)

Starting 2024, 50% of new purchases to be ZEV ramping up to 100% by 2027

Affects the City's Medium & Heavy-Duty Fleet Starting in 2024

Innovative Clean Transit (ICT)

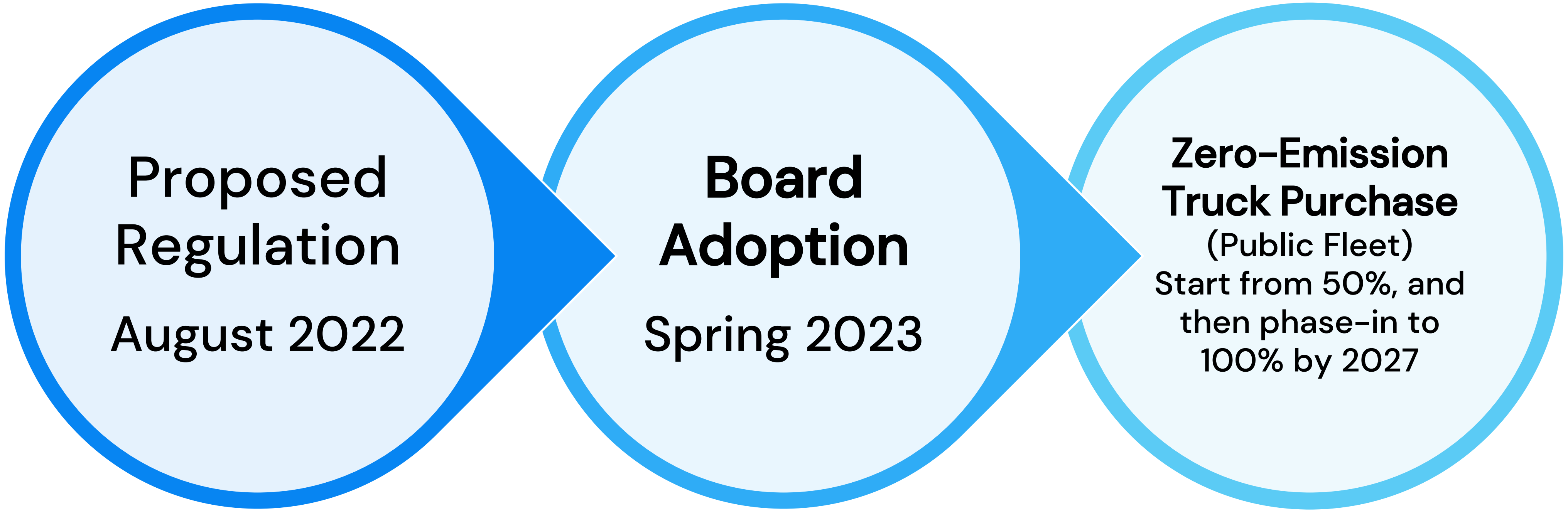
Zero-Emission Transit Purchase

Full transition of public transit fleet to ZEVs by 2040

Advanced Clean Fleet Regulation

- Beginning in 2024, at least 50% of newly added medium and heavy-duty vehicles must be zero-emission, with 100% of such vehicles required to be zero-emission starting from 2027 and beyond.

Advanced Clean Fleet (ACF)



Proposed Regulation

August 2022

Board Adoption

Spring 2023

Zero-Emission Truck Purchase
(Public Fleet)
Start from 50%, and then phase-in to 100% by 2027

Examples of Exemptions

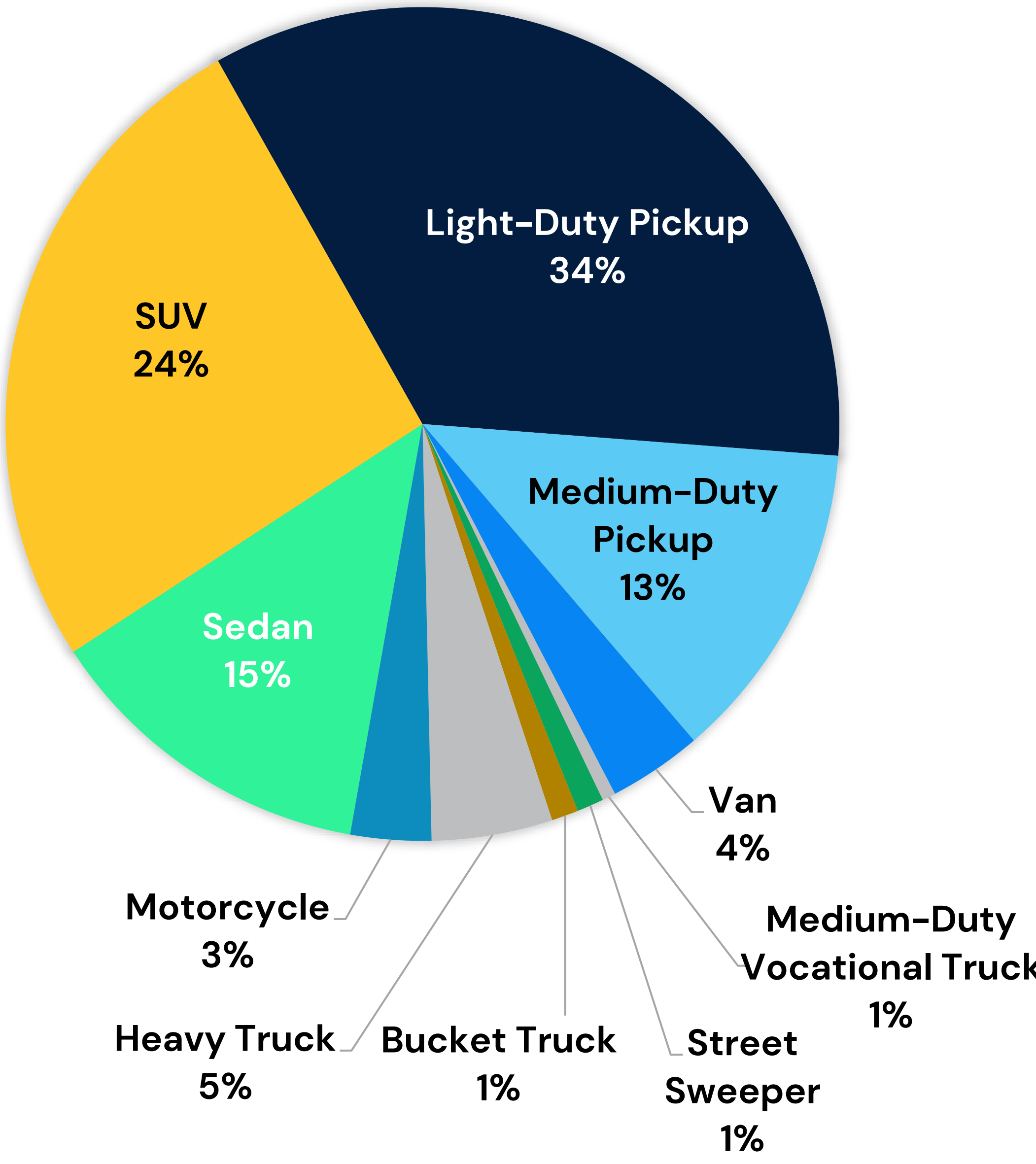
- *Emergency vehicles as defined in CVC section 165*
- *Transit vehicles subject to the Innovative Clean Transit regulation*

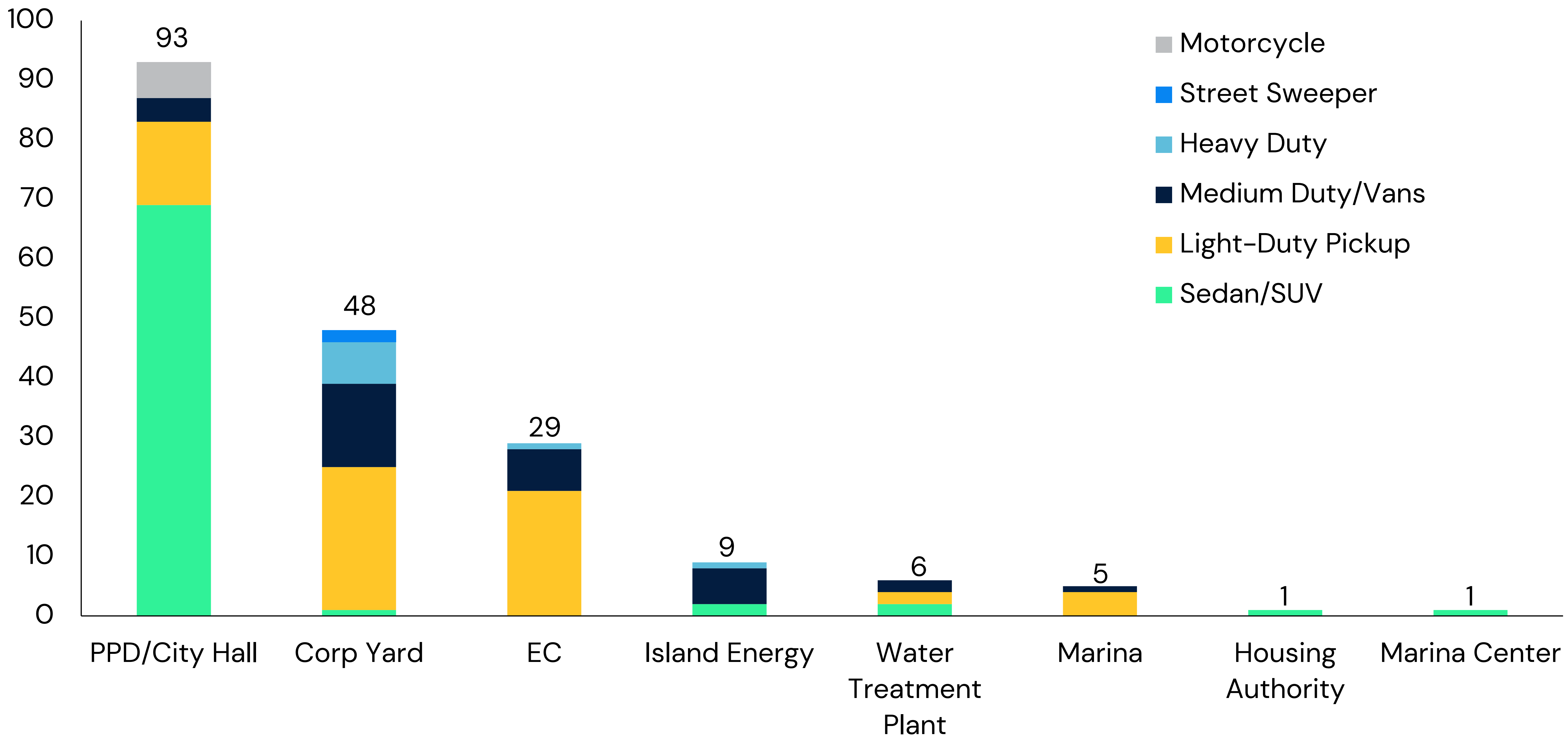
Compliance Exceptions

- *ZEV Unavailability.*
- *Mutual Aid Assistance.*
- *Infrastructure Construction Delay Extension*

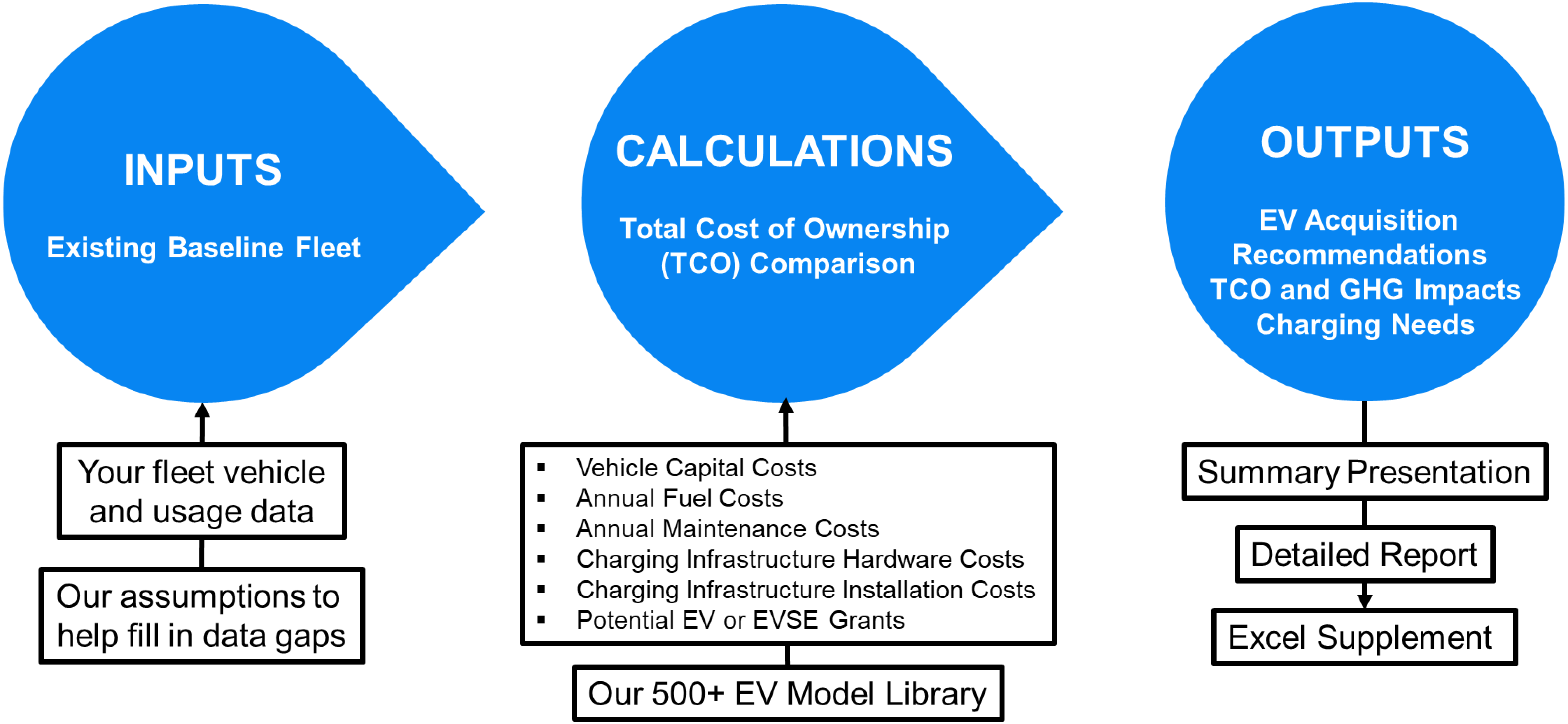
Summary of City of Pittsburg Fleet Composition

- The City of Pittsburg has a total of 192 vehicles, of which:
  - 76 are subject to ACF (Above 8,500 lbs. GVWR)
  - 116 vehicles are not subject to ACF
    - 49 are pursuit rated police vehicles (including 4 motorcycles)
    - 5 are already electric (battery & plug-in hybrid)





Summary of City Fleet Composition



INPUTS

Existing Baseline Fleet

Your fleet vehicle and usage data

Our assumptions to help fill in data gaps

CALCULATIONS

Total Cost of Ownership (TCO) Comparison

- Vehicle Capital Costs
- Annual Fuel Costs
- Annual Maintenance Costs
- Charging Infrastructure Hardware Costs
- Charging Infrastructure Installation Costs
- Potential EV or EVSE Grants

Our 500+ EV Model Library

OUTPUTS

EV Acquisition Recommendations
TCO and GHG Impacts
Charging Needs

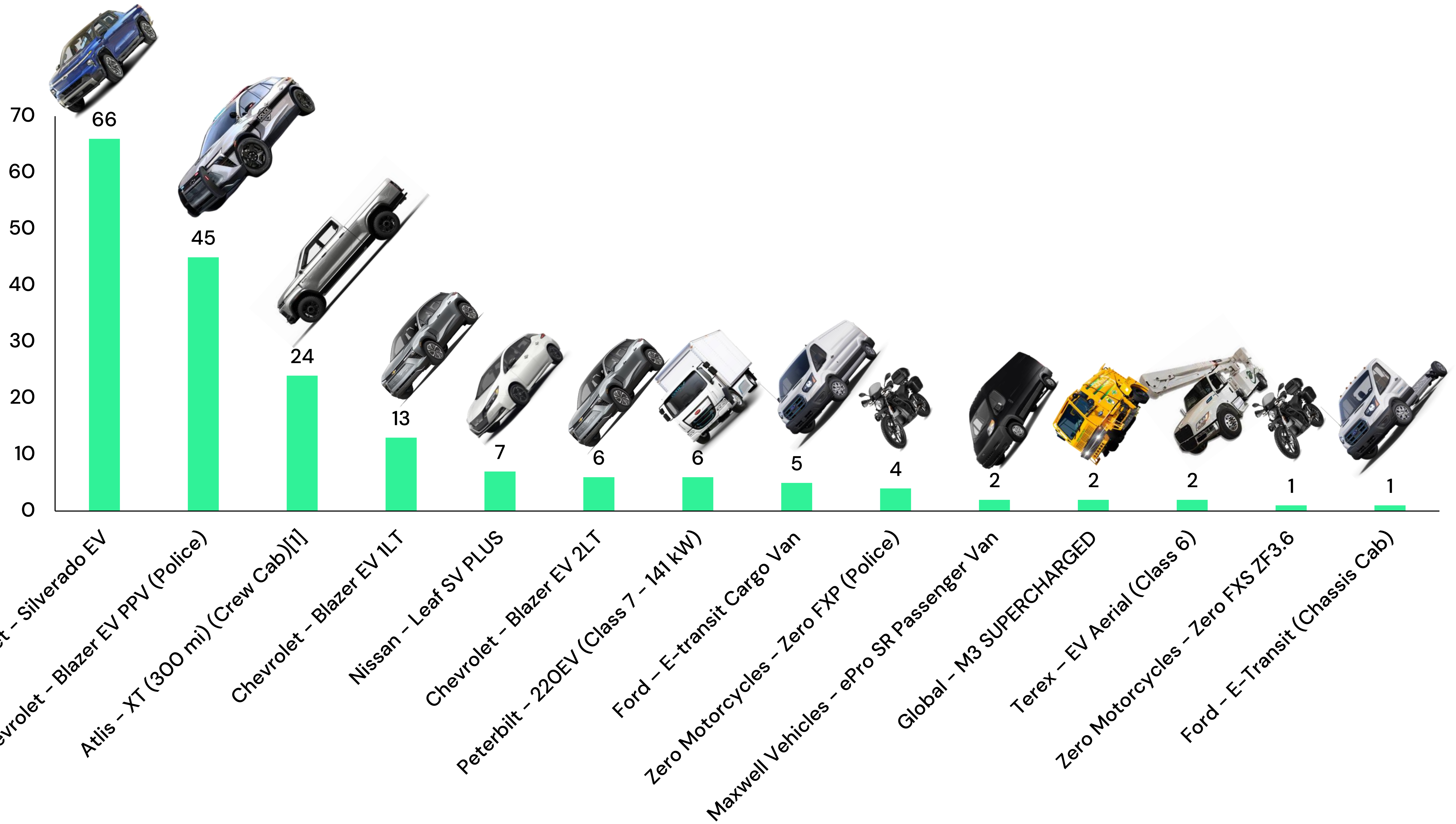
Summary Presentation

Detailed Report

Excel Supplement

ICF Fleet Assessment Model

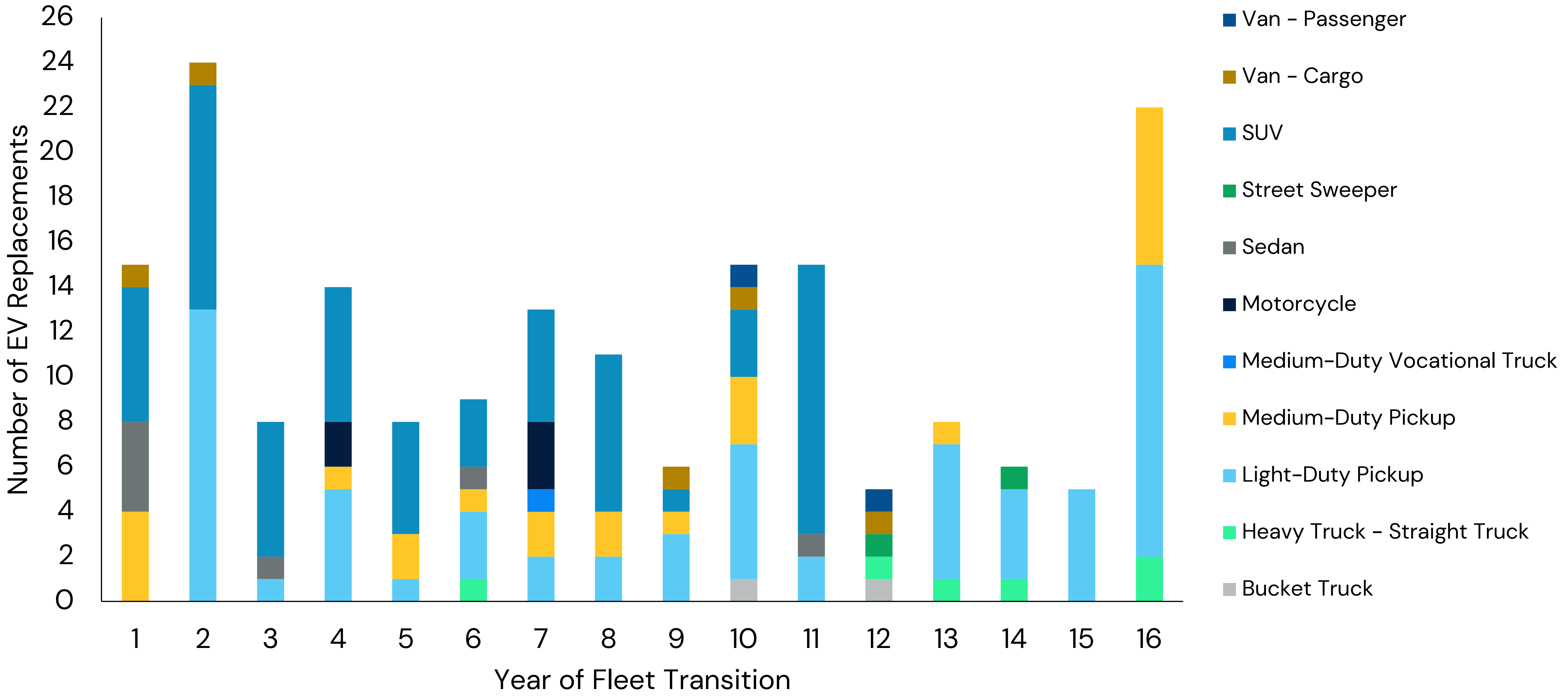
Vehicle Replacement Recommendations



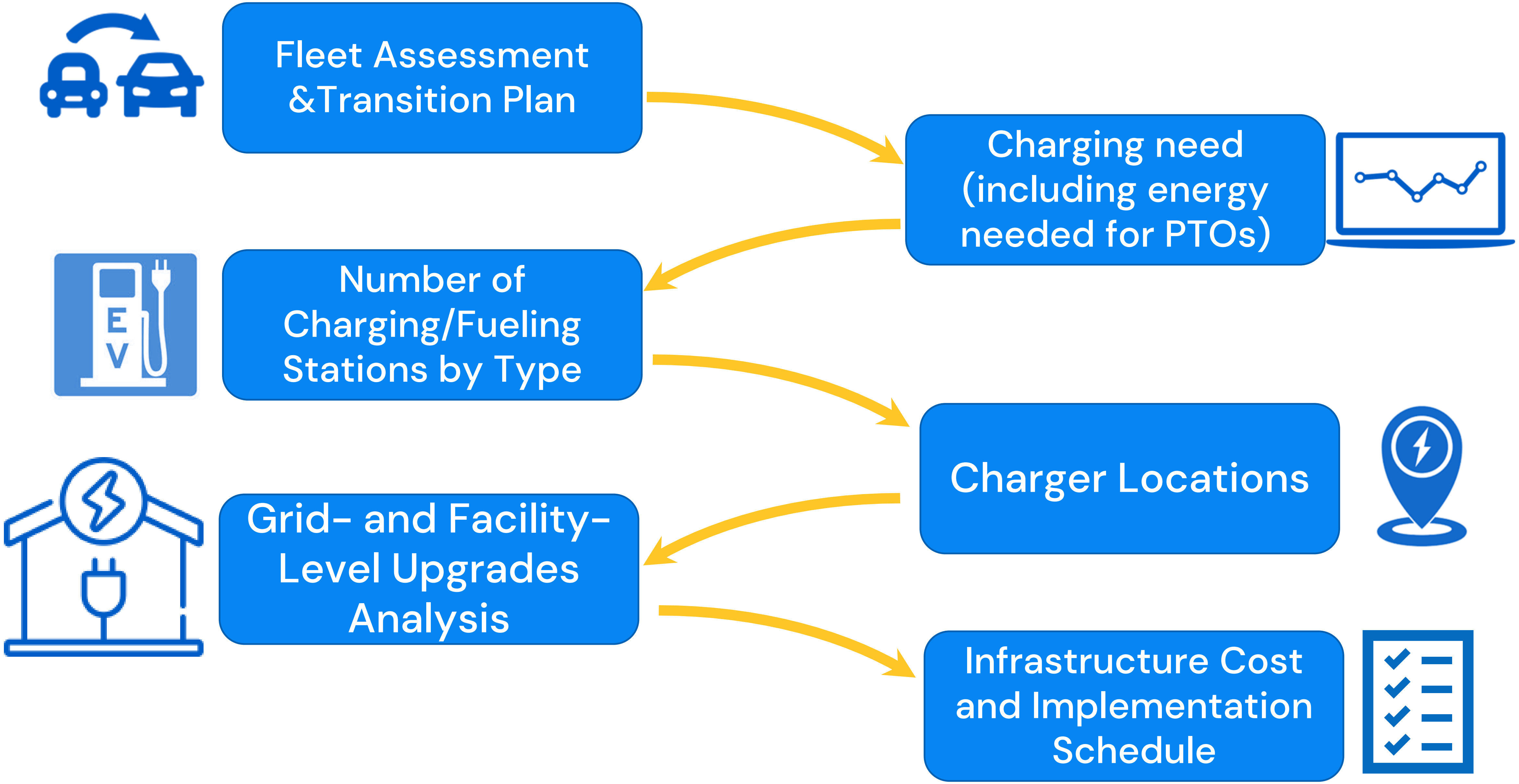
Alternative EV Options

Vehicle Type	Primary Recommended Make/Model/EV Type	Secondary Recommended Make/Model/EV Type	Tertiary Recommended Make/Model/EV Type
Sedan	Nissan - Leaf SV PLUS	Tesla Model 3	Hyundai Ioniq 6 SE AWD
SUV	Chevrolet - Blazer EV 1LT	Mustang Mach-E Select AWD Standard Range	Hyundai Ioniq 5 SEL AWD
	Chevrolet - Blazer EV 2LT	Mustang Mach-E Select AWD Extended Range	Hyundai Ioniq 5 SE LR AWD
	Chevrolet - Blazer EV PPV (Police)	Mustang Mach-E Select AWD Standard Range (Police)	Tesla Model Y (Police)
Light-Duty Pickup	Chevrolet - Silverado EV	Ford F-150 Lightning Pro	Rivian R1T
Motorcycle	Zero Motorcycles - Zero FXS ZF3.6	Lightning Motorcycles Strike R	Harley Davidson LiveWire One
	Zero Motorcycles - Zero FXP (Police)	Energica EVA EsseEsse9+	
Medium-Duty Pickup	Atlis - XT (300 mi) (Crew Cab)	Retrofit F-450	Retrofit F-350
Van-Cargo	Ford – E-transit Cargo Van	Maxwell Vehicles - ePro SR Cargo Van	GreenPower Motor Company EV Star Cargo
Van-Passenger	Maxwell Vehicles - ePro SR Passenger Van	Sunset Vans RP Minibus	Retrofit Ford F-350
Medium-Duty Vocational Truck	Ford - E-Transit (Chassis Cab)	Lion Electric Lion6 Chassis Cab	Isuzu NRR EV Chassis Cab - 100 kWh
Street Sweeper	Global - M3 SUPERCHARGED	Lion Electric Lion6 Street Sweeper	Elgin Broom Bear
Bucket Truck	Terex – EV Aerial (Class 6)	Navistar eMV	Lion Electric Lion6 Bucket Truck
Heavy Truck – Straight Truck	Peterbilt - 220EV (Class 7 - 141 kW)	Freightliner eCascadia 4x2 SR	Kenworth K370E - 100 mile

EV Replacements Schedule



Infrastructure Requirements Assessment



Fleet Assessment &Transition Plan

Charging need (including energy needed for PTOs)

Number of Charging/Fueling Stations by Type

Charger Locations

Grid- and Facility-Level Upgrades Analysis

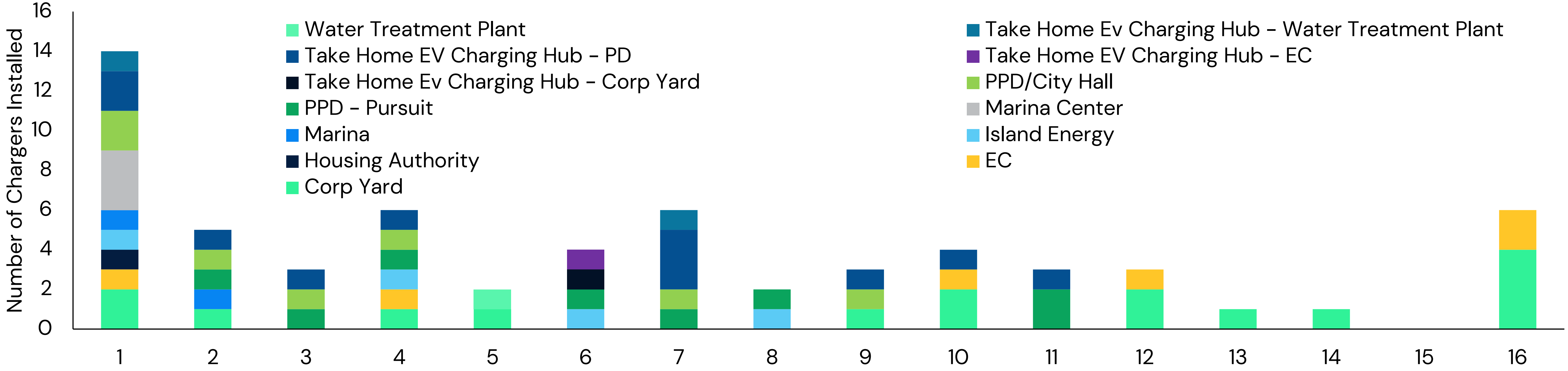
Infrastructure Cost and Implementation Schedule

1:1 Vehicle to
Charging Port Ratio
(A dedicated charging port per EV)

Multiple Vehicle to
Charging Port Ratio
(Multiple vehicles share a charger)

→ **Multiple EV Infrastructure Scenarios were Analyzed**

Charging Infrastrcture Plan

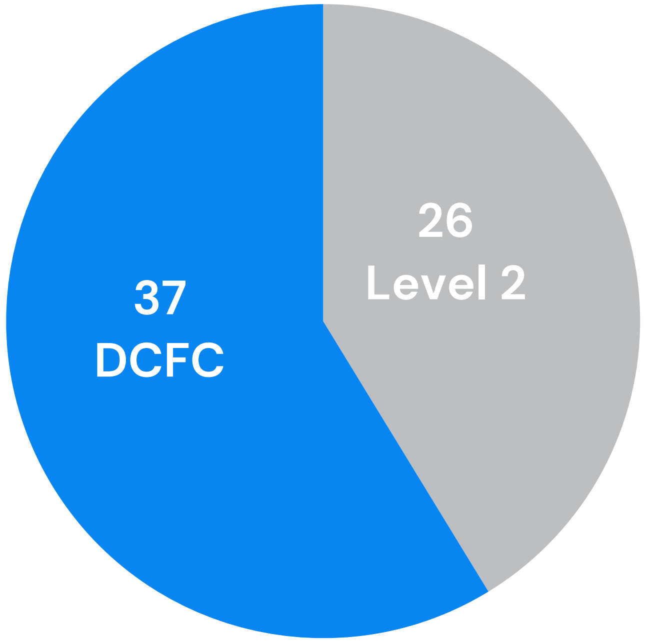


63

Chargers

3,216 kW

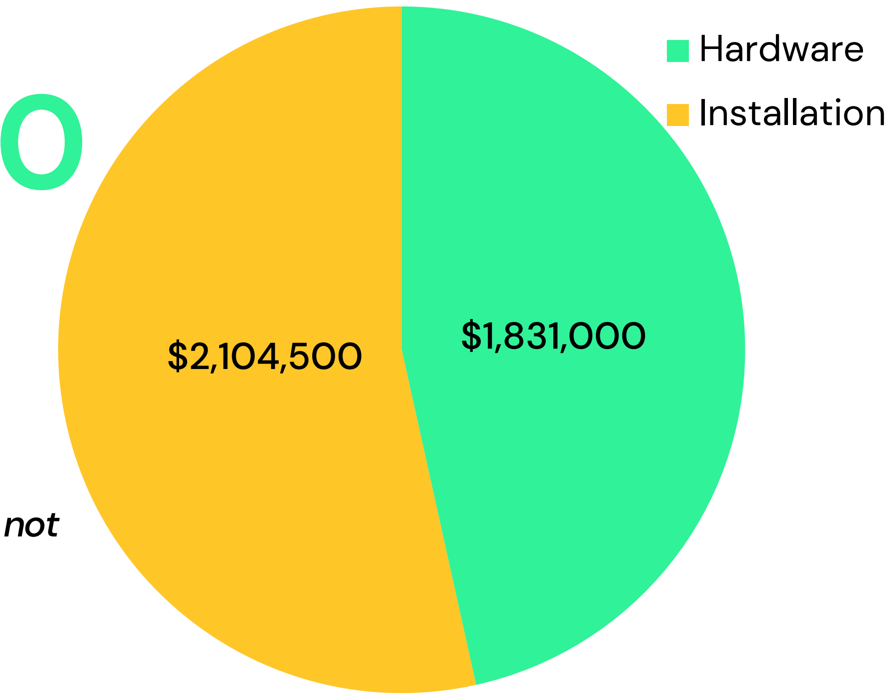
Extra load



$3,935,500

Total EVSE Installed Cost (Capital and Installation Costs)

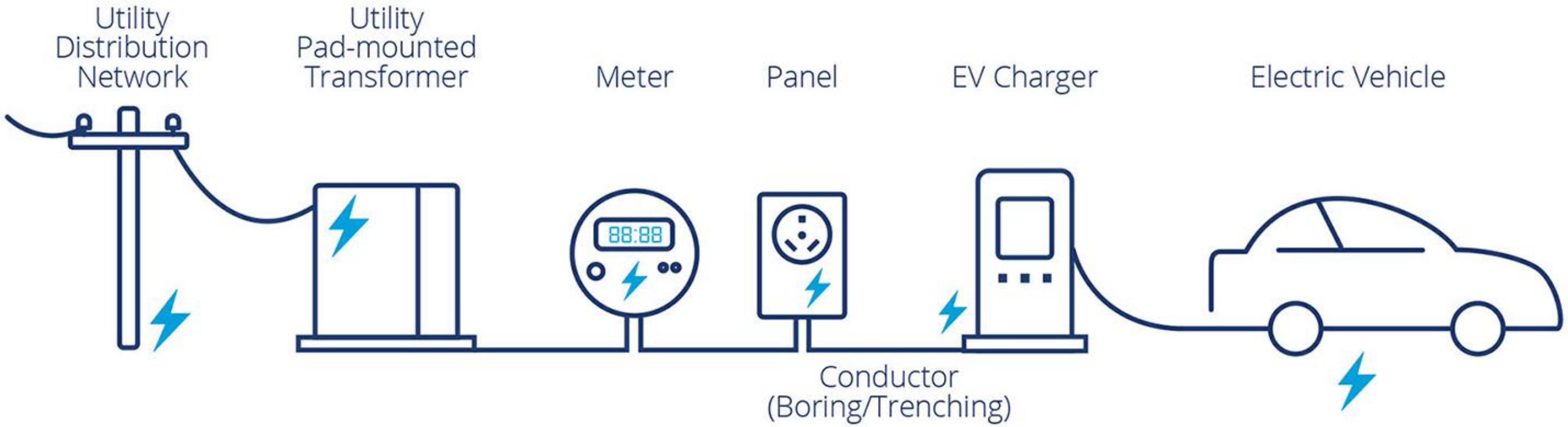
** This is just cumulative over years and not in Net Present Value*

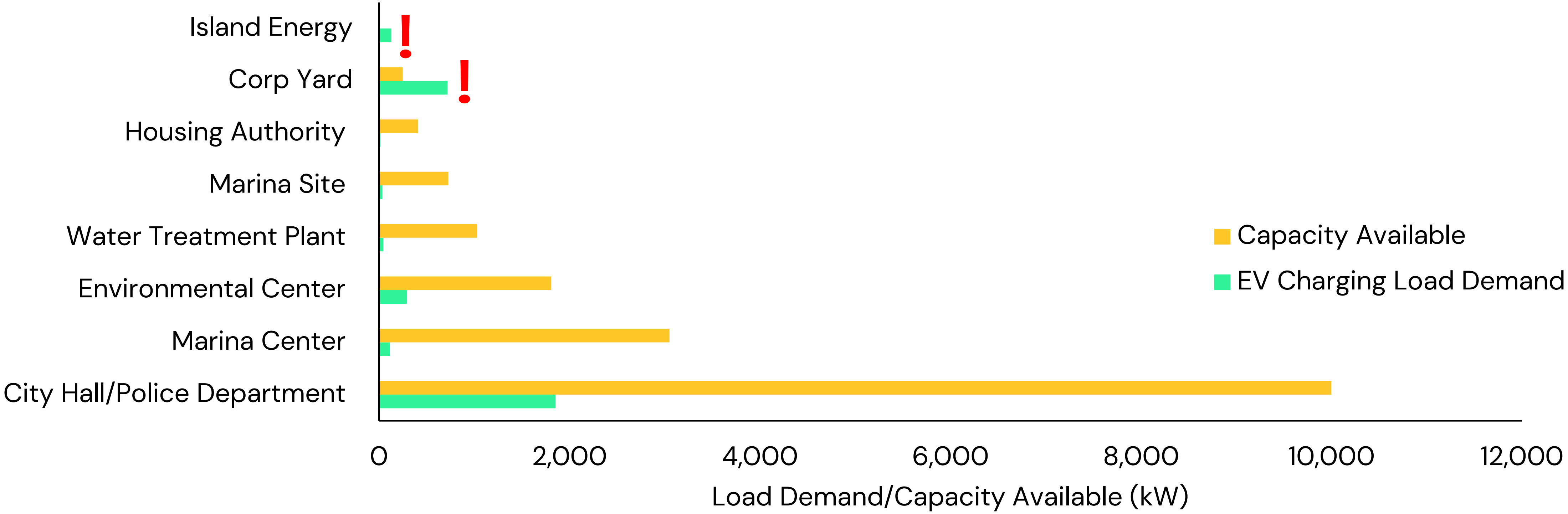


Take Home Vehicles

- Out of 192 vehicles, 50 vehicles are take-home vehicles
- Take home charging hubs at four of the City facilities
- These hubs will have DC Fast Chargers that allow the take home vehicles to be charged within 2 hours

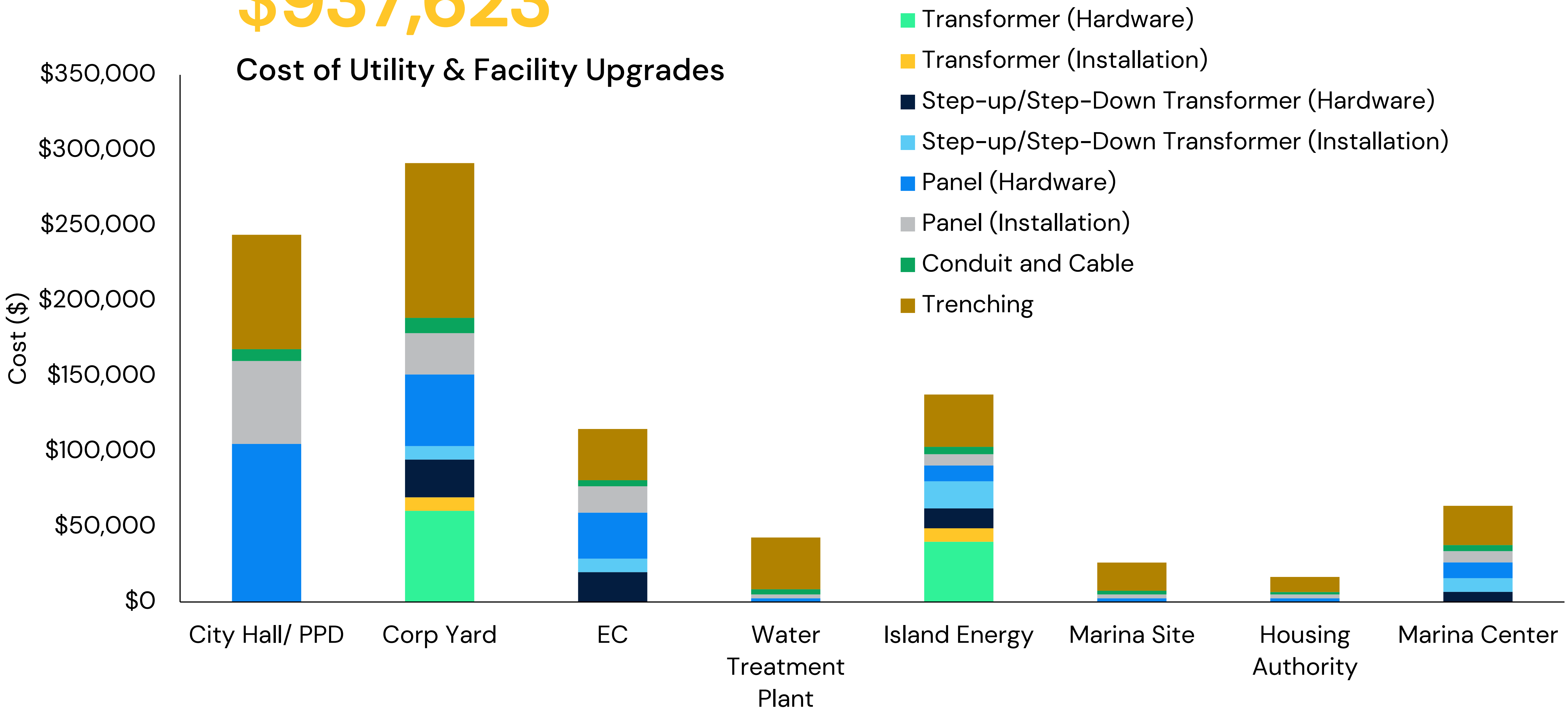
Electrical Infrastructure Upgrades Needs





Electrical Infrastructure Upgrades Cost

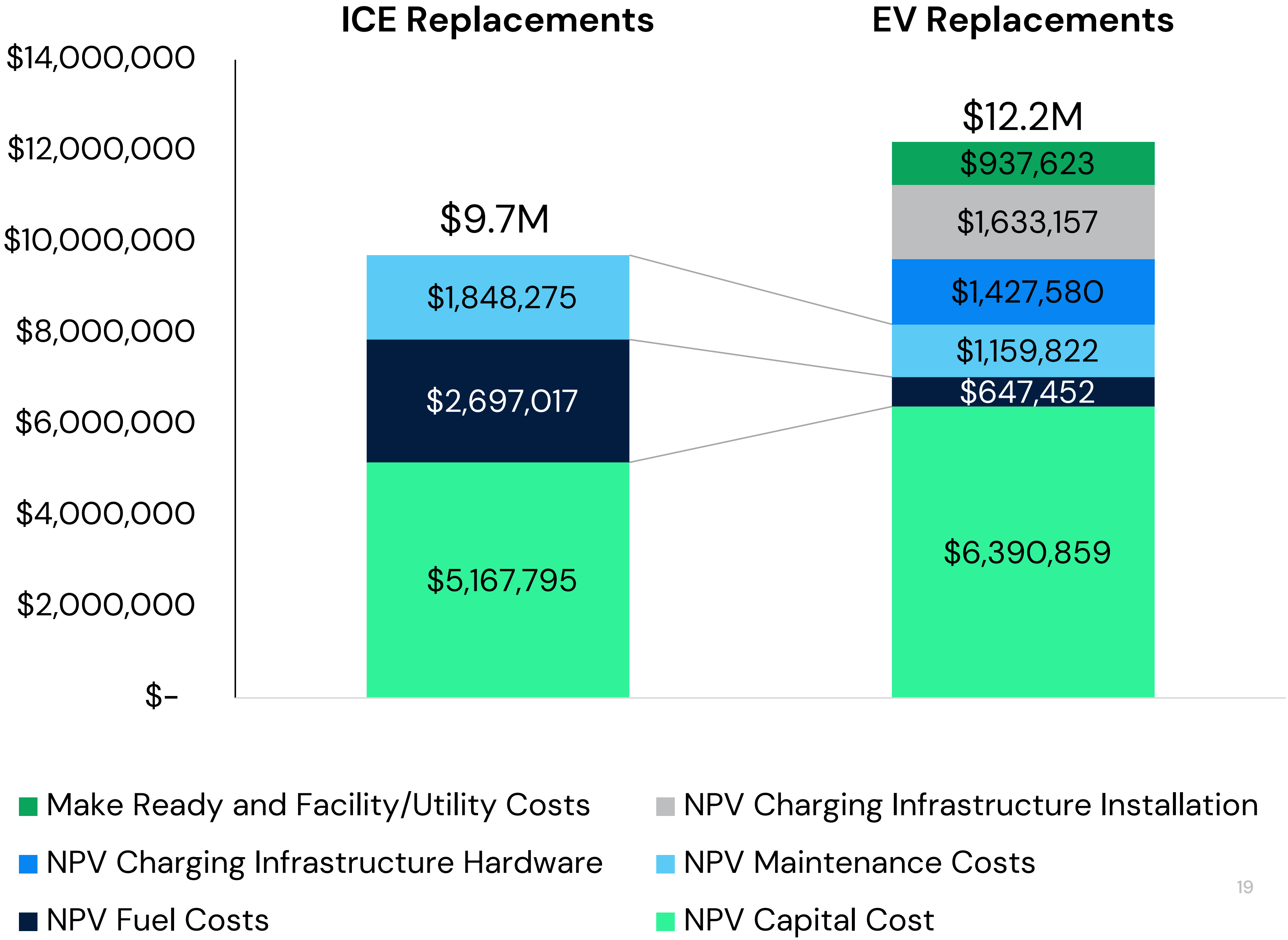
$937,623



Total Cost of Ownership

- Fleet TCO Comparison of fleet electrification master plan vs. business-as-usual ICE fleet
  - Net Present Value (NPV) costs
- Major savings
  - 76% reduced fuel costs
  - 37% reduced maintenance costs
    - This excludes additional expenses such as staff training, upgrades, or supplementary equipment for the fleet shop.

All Costs are presented in Net Present Value (5% discount rate)



Suite of Incentives Programs

eV fleet


Inflation Reduction Act

CALIFORNIA HVIP

California VW Mitigation Trust

CARL MOYER PROGRAM

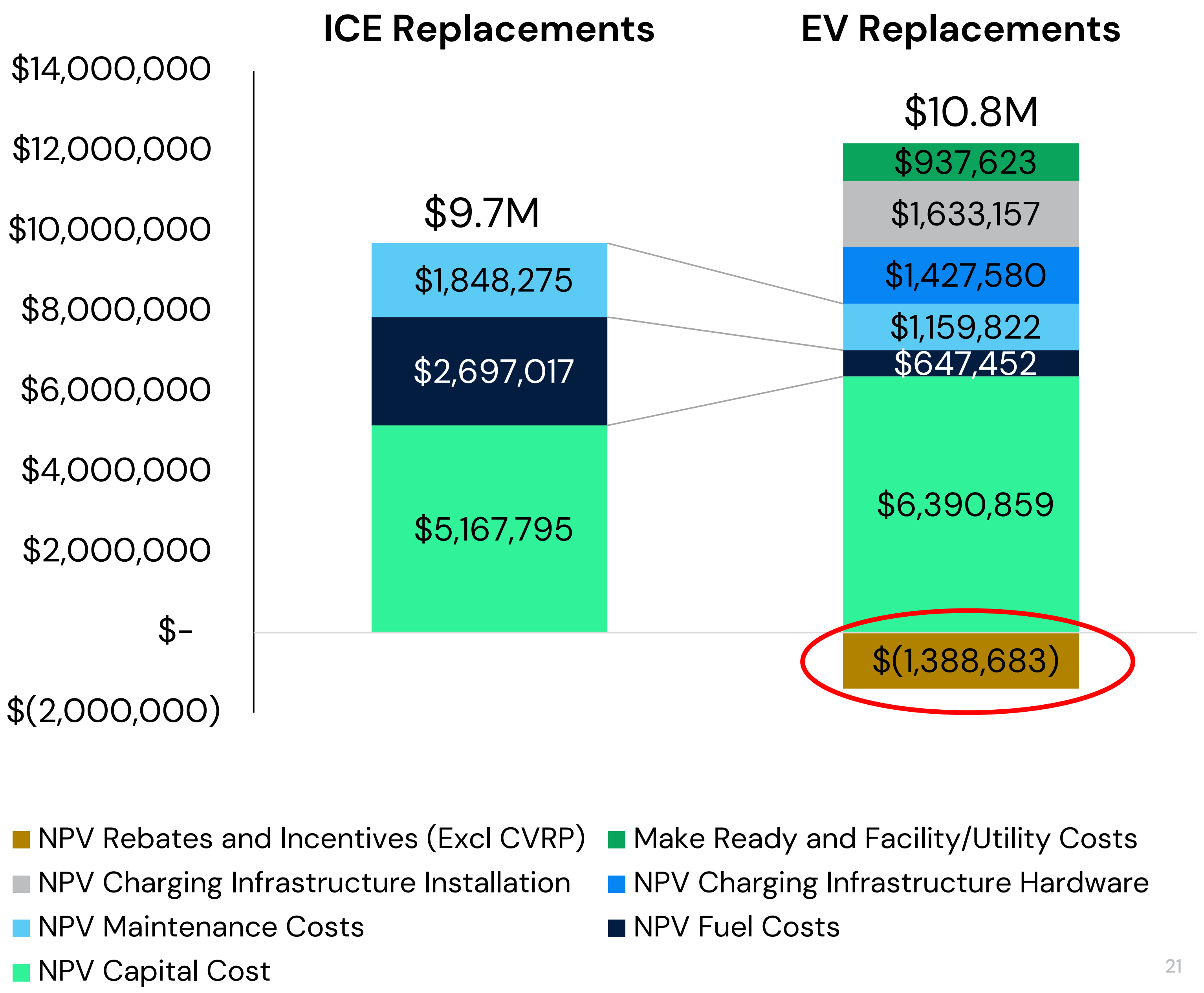
CHARGE!


Clean Transportation Program

Incentives Could Bring Significant Cost Benefits

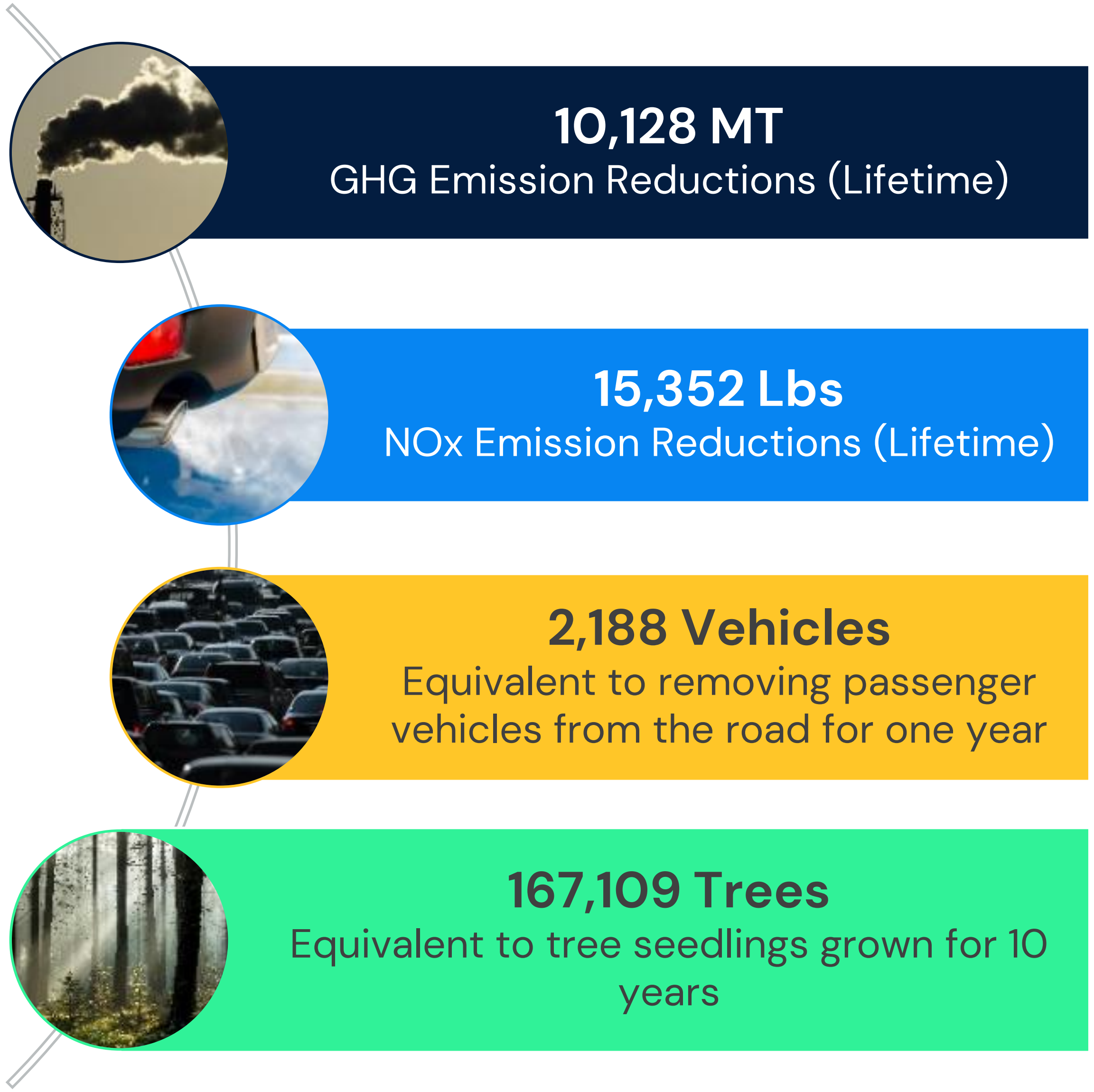
- Federal, State, and Utility incentive programs are expected to reduce the cost by approximately **$1.4M**
  - **Federal Tax Credit:** $820,000
  - **California HVIP:** $325,000
  - **PG&E EV Fleet:** $280,000

All Costs are presented in Net Present Value (5% discount rate)



Environmental Benefit of the Transition

- **Emission Reductions:** Over 10,000 MT of GHG emissions reduced, equivalent to removing 2,200 passenger vehicles for a year or planting 167,000 trees.
- **NOx Emissions Eliminated:** Over 15,000 pounds of nitrogen oxide emissions prevented.
- **Sustainable Transportation:** Significant contribution to reducing carbon footprint and combating climate change.



10,128 MT
GHG Emission Reductions (Lifetime)

15,352 Lbs
NOx Emission Reductions (Lifetime)

2,188 Vehicles
Equivalent to removing passenger vehicles from the road for one year

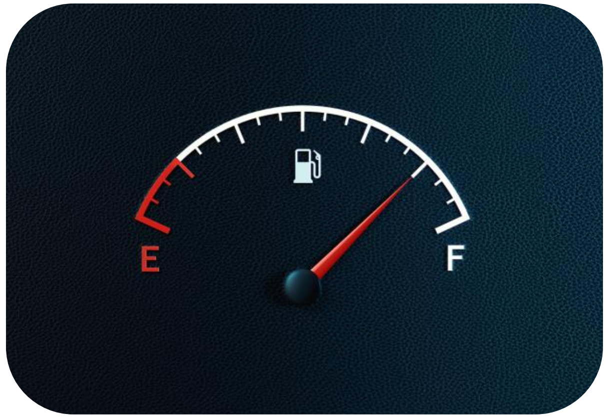
167,109 Trees
Equivalent to tree seedlings grown for 10 years

Barriers to Transition

Upfront costs

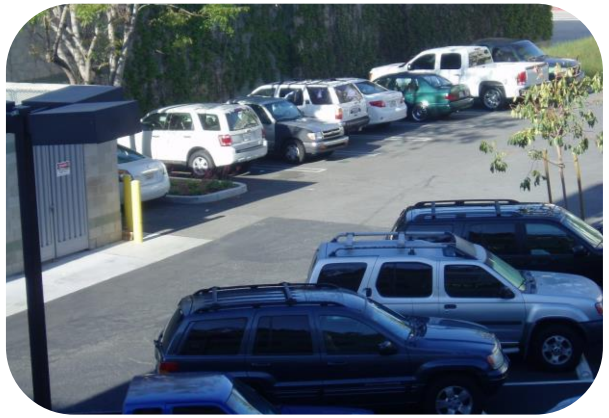
Limited availability of EV models and production capacity

Limited dealership networks



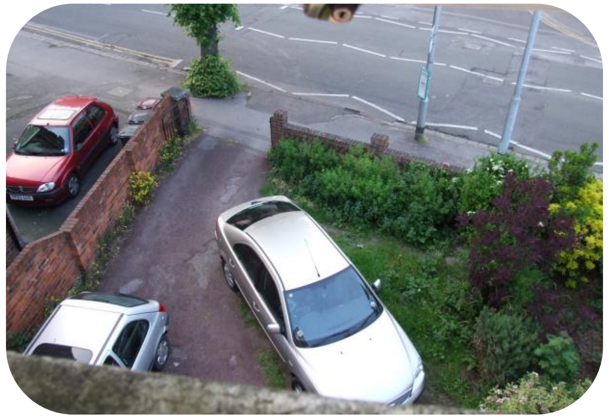
Range anxiety and uncertainty in charging time

Dependence on the power grid



Parking space availability for chargers

Workforce training



Take-home vehicles

Questions?

Thank you!

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City of Pittsburg

Fleet Electrification Master Plan

January 2024

Prepared by: ICF Incorporated L.L.C

Table of Contents

Executive Summary

Transportation is a major contributor to air pollution and plays a significant role in climate change. The emissions from vehicles, especially those running on traditional fossil fuels, release large amounts of greenhouse gas (GHG) emissions and pollutants into the atmosphere. In response to this environmental challenge, municipalities across the nation are actively considering the transition of their vehicle fleets to electric vehicles (EVs). This shift towards EVs offers numerous benefits. EVs produce zero emissions at the tailpipe, and significantly reduce air pollution. They are also more energy-efficient than internal combustion engine (ICE) vehicles, leading to lower operational costs over time. Additionally, EVs contribute to a decrease in noise pollution, providing a quieter and more pleasant urban environment. Beyond these environmental and economic advantages, there is also a regulatory push towards EV adoption. In California, for instance, the Advanced Clean Fleets (ACF) regulation mandates the transition of public fleets including municipalities such as City of Pittsburg from ICE vehicles to EVs. By adopting EVs, municipalities are not only complying with these regulations but also taking a proactive step towards sustainable and cost-effective transportation solutions.

Although transitioning to EVs can yield long-term cost savings for the City due to demonstrably lower operating expenses, it is crucial to acknowledge the considerable upfront costs as well as operational and logistical challenges that must be addressed. Moreover, lack of technology availability, especially for specialty vehicles could pose significant challenges to the City as it strives to achieve compliance. Aside from the challenges related to cost and technology readiness of EV, the deployment of appropriate and resilient charging infrastructure is also crucial for a successful transition to EVs. These potential challenges require careful planning and strategic investment to successfully achieve a full EV fleet. The City’s fleet currently consists of approximately 192 vehicles: 174 are gasoline-powered, 13 are diesel-powered, 3 are plug-in hybrid, and 2 are battery-electric.

To this end, the City has initiated a comprehensive study to develop a Fleet Electrification Master Plan. The plan aims to assess the City's current fleet and provide recommendations for cost effective transition to clean transportation alternatives, along with installing EV charging stations for City fleet vehicles. Furthermore, the plan offers guidance on the potential funding and financing sources available to facilitate the transition to an all-electric fleet.

The assessment carried out during this project revealed that out of the 192 vehicles currently in the City's fleet, a total of 184 could potentially be transitioned to battery-electric vehicles. This transition would require the installation of a robust charging infrastructure, consisting of 63 dual-port chargers (DPCs) with power levels ranging from 6.6 kW to 150 kW. This charging infrastructure will be critical to ensure that the City's electric fleet can be efficiently charged and operated without disruption.

Based on the findings of the project team's assessment, transitioning the City's fleet to EVs will require a capital investment of $6.4 million for vehicle procurement and $3.1 million for charging infrastructure (in net present value). In addition to the charging infrastructure cost, the project team also estimated that the City of Pittsburg will require approximately $938,000 for electrical infrastructure upgrades (e.g., transformers, panels, conduit) to accommodate the need for the proposed fleet electrification master plan.

Based on the project team's estimates, the total cost of ownership for an EV fleet over its lifetime would be approximately $2.5 million more than operating a fleet with ICEs. However, the cost differential can be Improved by pursuing and obtaining various vehicle incentives and tax credits provided by state and federal governments. The City can apply non-competitive rebates and incentives to reduce the cost difference to approximately $1.1 million. The City could further Improve the cost-effectiveness of the transition by leveraging all available grants and credits. Of course, the total amount of funding made available to the City is contingent on successful application processes, which can take considerable time and resources.

The project analysis also revealed that transitioning to an EV fleet will provide substantial environmental benefits for the City of Pittsburg. By replacing fossil fuel vehicles with EVs the City could reduce over 10,000 metric tons of GHG emissions. This environmentally responsible outcome would be equivalent to removing over 2,000 passenger vehicles from the road for one year.

Transitioning to an EV Fleet Requires Detailed Planning, Substantial Investment, and Collaboration among Stakeholders, and Experts

There are several challenges to consider when transitioning to an EV fleet: upfront costs, limited EV models, supply chain issues, charging infrastructure, uncertainty in charging time, dependence on power grid, workforce training, and take home vehicles

Despite all these benefits, transitioning to an EV fleet is a complex and multi-faceted process that the City must carefully consider. Some of the challenges that the City might face during this transition include:

Upfront Costs: While generally EVs have a lower total cost of ownership over their lifespan, the initial cost of purchasing an EV can be higher than a traditional ICE vehicle. This can be a significant financial hurdle for a City with limited budgets.

Limited Availability of EV Models: While there are an increasing number of EV models available on the market, the selection of vehicles is still limited compared to traditional ICE vehicles. This can make it difficult for the City to find the right type of EV for its specific needs.

Supply Chain Issues: EV manufacturers may have limited production capacity, which can result in longer delivery times for the City when purchasing EVs for its fleet. The production of EVs is heavily reliant on specific components, such as lithium-ion batteries and rare earth elements, which are subject to global supply constraints and geopolitical influences. Additionally, the sudden surge in demand for EVs has outpaced the current production capacities of many manufacturers, leading to longer wait times for consumers and limited model availability.

Limited Dealership Networks: The distribution network for EVs is still evolving, and there may be limited dealership networks available in some regions. This can make it more difficult for the City to access and purchase EVs for its fleet and to make sure all parts are available when the City needs to maintain them.

Charging Infrastructure: The City will need to install a network of charging stations to support its EV fleet, which can be a costly and time-consuming process. They also need to ensure that the charging stations are strategically located and able to handle the increased demand for electricity.

Uncertainty in Charging Time: In this assessment, the project team assumed that police pursuit vehicles and take home vehicles in the City's fleet would have at most 2 hours of charging time and all other vehicles in the fleet would have 8 hours of charging time. However, there may be situations where emergency response and other fleet vehicles need faster charging times to maintain their availability on the road. To accommodate such scenarios, the City would need to invest in building a more powerful charging infrastructure, which could be significantly more expensive and place a much higher burden on the City's electrical infrastructure.

Dependence on the Power Grid: EVs require electricity to operate, and any disruption to the power grid can impact the ability of the City to charge its vehicles. This can be particularly challenging during extreme weather events, such as high winds, wildfires, or flooding, which can cause widespread power outages. Most EV charging stations do not have backup power sources, which means that they will not be operational during power outages. This can impact the ability of the City to keep its EV fleets charged and operational. Additionally, during emergencies, such as natural disasters or other crises, the power grid may need to prioritize power to critical infrastructure, such as hospitals and emergency services. This may result in less power being available for charging EVs. The City can add backup power using distributed energy resources (DERs) to help mitigate this risk. This report provide high level cost estimates for a backup power system utilizing battery energy storage system (BESS) with photovoltaic (PV) solar.

Workforce Training: EVs have a different set of maintenance requirements than ICE vehicles. The City will need to invest in workforce training to ensure that its technicians have the necessary skills and knowledge to maintain and repair EVs. The technology used in EVs is different from traditional ICE vehicles, and there may be a limited number of skilled technicians available to service and maintain EVs. This can impact the ability of the City to keep its EV fleets running smoothly. In the near-term, the City will be able to conduct preventative maintenance in-house; however, if there is an issue with a vehicle battery or software, the City will likely need to send the vehicle to a dealership.

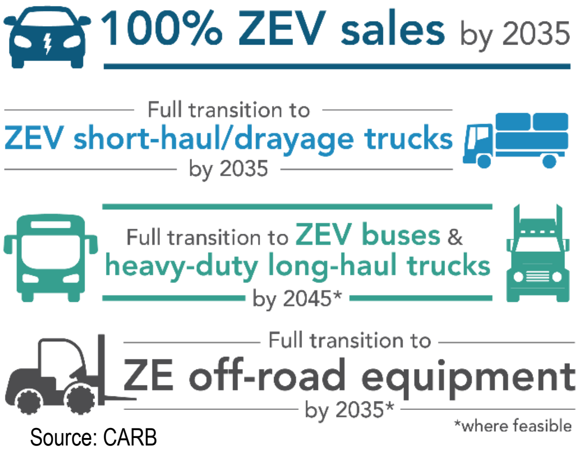
Take Home Vehicles: The City of Pittsburg utilizes numerous take-home vehicles, where employees drive the vehicles to their homes at the end of their shifts. This practice, while convenient, presents significant challenges in the city's transition to EVs. One of the primary issues is the cost and feasibility of installing charging infrastructure at employees' residences, especially for smaller fleets operating on limited budgets. Additionally, the process of reimbursing employees for home charging is complicated, particularly when separate electricity meters are not installed at their homes. To address these challenges, the project team has proposed the concept of "Take Home Hubs" at four different sites within the city. These hubs would be dedicated charging stations for city employees with take-home vehicles. However, this solution has its drawbacks. The vehicles would need to be available for charging for at least two hours, which could disrupt their regular operation. Furthermore, there might be a need to extend employees' shifts to accommodate charging times, potentially leading to overtime costs. Finally, take home EVs will also have implications for insurance, although most of the same implications apply to ICE vehicles as well.

These factors need to be carefully considered to ensure a smooth transition to EVs without significantly impacting the city's operational efficiency or budget.

Transitioning to an EV fleet requires detailed planning, significant investment, and strong collaboration among stakeholders. Although this report offers a blueprint for the City to comply with state zero-emission mandates and transition its fleet to EVs, it's important to acknowledge that the listed challenges are not exhaustive, and further obstacles may emerge during the process.

Why Transitioning to EVs?

The Need to Transition to Electric Vehicles



Source: CARB

To accelerate the adoption of zero-emission vehicles (ZEVs), the state of California has implemented a range of measures, including mandates requiring automakers to produce a certain percentage of ZEVs, financial incentives for consumers, and investments in charging and fueling infrastructure. In September 2020, Governor Newsom signed Executive Order N-79-20, which sets ambitious goals of transitioning to 100 percent light-duty ZEVs by 2035 and all medium- and heavy-duty vehicles to ZEVs by 2045. The order also includes directives for accelerating the deployment of charging infrastructure, increasing the number of ZEVs in public fleets, and promoting consumer awareness and adoption of EVs. This executive order lays the foundation for implementing policies to achieve these targets. To date, California has implemented several regulations that address all vehicle modes, including light-, medium-, and heavy-duty vehicles, transit vehicles, and rail.

Table 1 provides a summary of the most significant regulations currently in effect pertaining to the zero-emission transition of on-road vehicles.

Table 1. California Regulations Supporting ZEV Deployment

Regulation	Description
Advanced Clean Cars II	The Advanced Clean Cars II regulation will reduce light-duty passenger car, pickup truck, and SUV emissions from the 2026 model year through 2035. The regulations amend the Zero-Emission Vehicle Regulation to require an increasing number of ZEVs, including battery-electric, hydrogen fuel cell electric, and plug-in hybrid EVs. By 2035, the regulation requires 100% of new passenger vehicles sold in the state to be ZEVs.
Advanced Clean Trucks Regulation	The ACT regulation requires manufacturers of medium- and heavy-duty vehicles to sell increasing percentages of ZEVs in California. By 2035 it requires manufacturer to sell 55% of their Class 2b-3 and 75% of Class 4 -8 and 40% of Class 7-8 vehicles as zero emission.
Innovative Clean Transit Regulation	The ICT regulation, adopted in December 2018, requires public transit agencies to transition to a 100% zero-emission bus (ZEB) fleet by 2040. All transit agencies that own, operate, or lease buses with a gross vehicle weight rating (GVWR) greater than 14,000 lbs. must comply with the regulation. The ZEB purchase requirements vary depending on the transit agency's size.
Advanced Clean Fleets Regulation	Starting in 2024, the regulation requires fleets operating in California to transition to zero emission technology with the goal of transitioning all drayage trucks to zero emission by 2035 and the rest of the medium- and heavy-duty (MD-HD) vehicles to zero emission by 2045. Specific to municipality fleets, 50% of the total number of vehicle additions must be ZEVs beginning January 1, 2024, increasing to 100% beginning January 1, 2027.

Upcoming fleet requirements are influencing the City's short-term compliance priorities and long-term strategies for fleet procurement, maintenance, and operation. Despite the requirements starting in 2024, the regulation also allows fleet owners to request specific exemptions or extensions, provided they comply with all applicable requirements and meet reporting and recordkeeping obligations. A summary of these exemptions are provided below:

- **Backup Vehicle Exemption:** Fleet owners can designate vehicles as backup vehicles if they are operated less than 1,000 miles per year (excluding emergency operation miles) and meet reporting requirements. If these criteria are no longer met, the vehicle cannot operate in California and must be removed from the fleet if non-compliant with the regulations.
- **Daily Usage Exemption**: This exemption allows fleet owners to purchase a new ICE vehicle if no suitable BEV is available for their specific needs. To qualify, at least ten percent of the fleet must comprise ZEV or near-zero-emission vehicles (NZEVs). The application process requires detailed information about the vehicle to be replaced and potential BEV replacements, including make, model, weight class, and energy capacity. Fleet owners must also provide a daily usage report and explain why available BEVs cannot meet their needs.
- **ZEV Infrastructure Delay Extension:** Fleet owners experiencing delays in ZEV fueling infrastructure installation due to uncontrollable circumstances can request extensions. This is applicable only for vehicles being replaced at the affected site. The application requires documentation of the construction contract, reasons for the delay, and an executed ZEV purchase agreement. The Executive Officer will review these submissions to determine eligibility for the extension.
- **ZEV Infrastructure Site Electrification Delays**: Fleet owners can request an extension until January 1, 2030, if their electric utility provider cannot supply the required power for ZEV charging or refueling by the next compliance deadline. The initial extension can be up to three years, with a potential two-year renewal if necessary. Fleet owners must provide detailed documentation to the Executive Officer, including utility responses, capacity estimates, and information about the charging infrastructure. The number of extensions depends on the utility's capacity to supply power, and fleet owners must deploy the maximum number of ZEVs that the existing infrastructure can support.
- **ZEV Purchase Exemptions**: Fleet owners may request exemptions to purchase new ICE vehicles if the required ZEV or NZEV configurations are unavailable. The Executive Officer will maintain a list of unavailable vehicle configurations, and fleet owners can apply for an exemption if their required configuration is not on this list. The application process involves submitting detailed information about the ICE vehicle being replaced and confirmation from manufacturers that the needed ZEV or NZEV configuration is not available. The Executive Officer will use this information, along with other resources, to determine whether the configuration is available for purchase as a ZEV or NZEV.

- **Mutual Aid Assistance Exemption**: Fleet owners with mutual aid agreements can apply for exemptions to purchase new ICE vehicles. The total number of new ICE vehicles allowed under this exemption cannot exceed 25% of the total number of vehicles in the California fleet, minus the number of ICE vehicles already purchased under granted exemptions. To be eligible, the fleet must comprise a minimum percentage of ZEVs, increasing over time. The application process requires detailed information about the needed ICE vehicle, charging or fueling capabilities, and documentation from mobile ZEV fueling providers. The Executive Officer will review the submissions to determine if the exemption criteria are met.

In light of the ACF regulation and the City's commitment to lowering its carbon footprint, a master plan has been formulated. This plan involves a thorough inventory of the City's fleet to pinpoint potential areas for integrating EVs, formulating a strategy to establish EV charging infrastructure at City locations, and partnering with local and regional entities to obtain necessary funding and support for the shift towards EVs.

Overview of City's Existing Fleet

Currently, the City's on-road fleet consists of 192 vehicles, the majority of which are fueled by gasoline. All police vehicles, emergency vehicles, and take-home vehicles were also included in this assessment.

The vehicle type distribution of the analyzed 192 vehicles is illustrated in Figure 1 below. Approximately 60 percent of the vehicles (116 out of 192) are light-duty (i.e., less than 8,500 lbs.), and the remainder of vehicles are considered medium- to heavy-duty (MD-HD) vehicles. Also as shown in Figure 2, the majority of the vehicles (93) typically dwell at the City Hall/Police Department (Note that the Police Department is located at the City Hall, but for the purpose of assessing charging infrastructure, they are assigned different dwelling locations), 48 of them dwell at the Corp Yard, 29 at the Environmental Center, and the rest are within the Island Energy, Marina, Water Treatment Plant, Marina Center, and Housing Authority facilities.

Figure 1. Vehicle Types of Existing Fleet

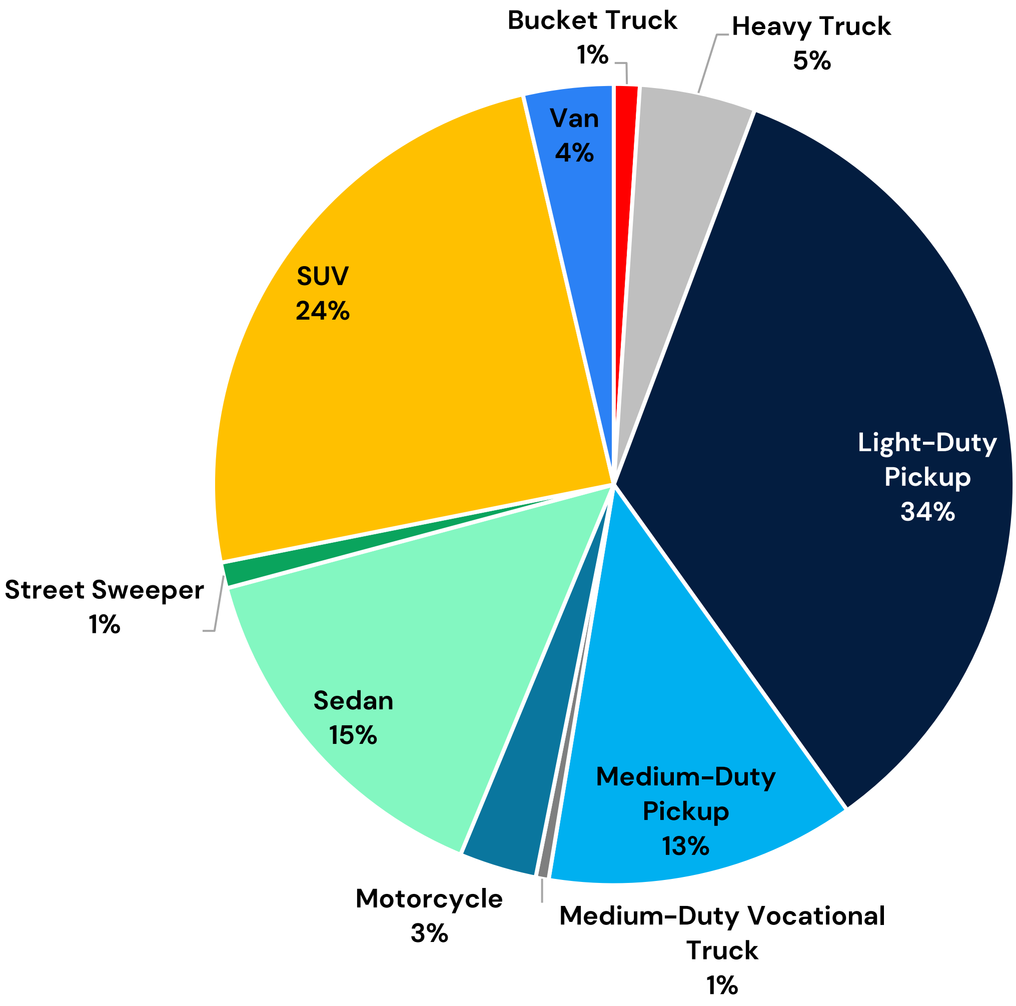
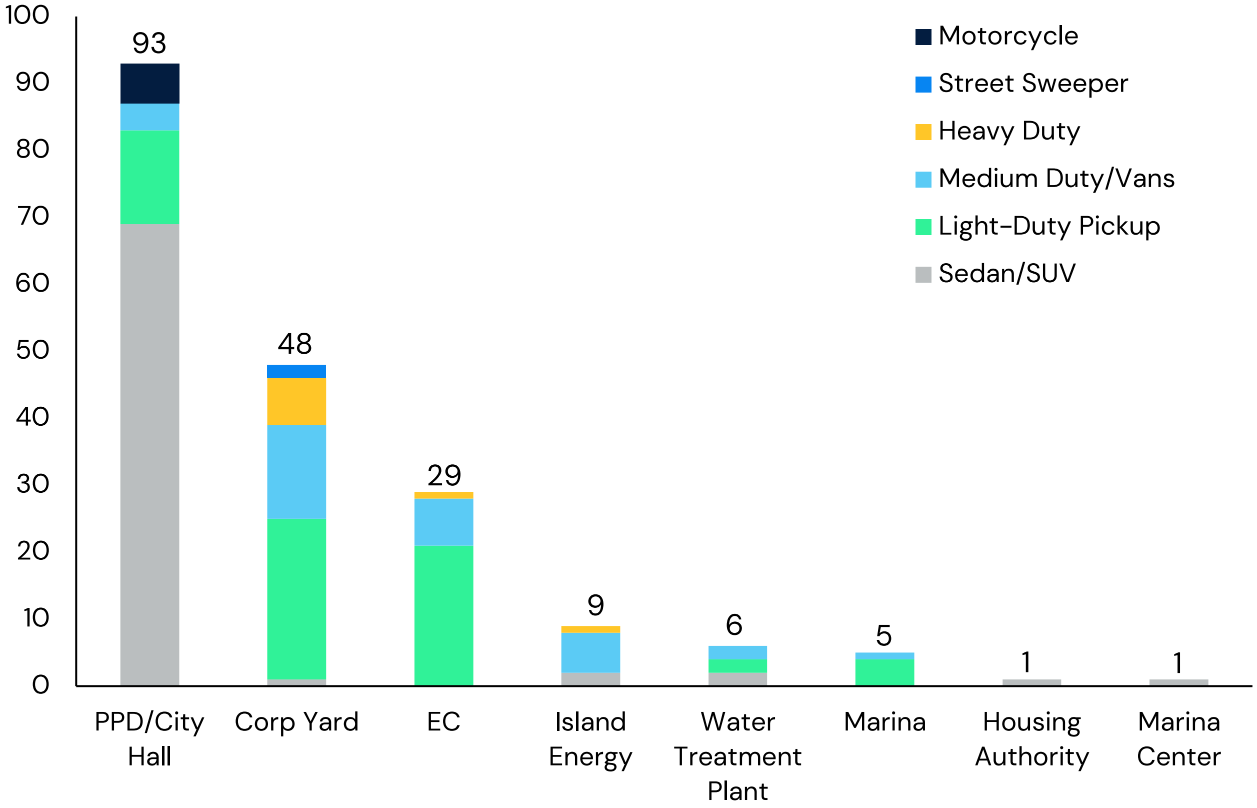


Figure 2. Number of Vehicles by Dwelling Location



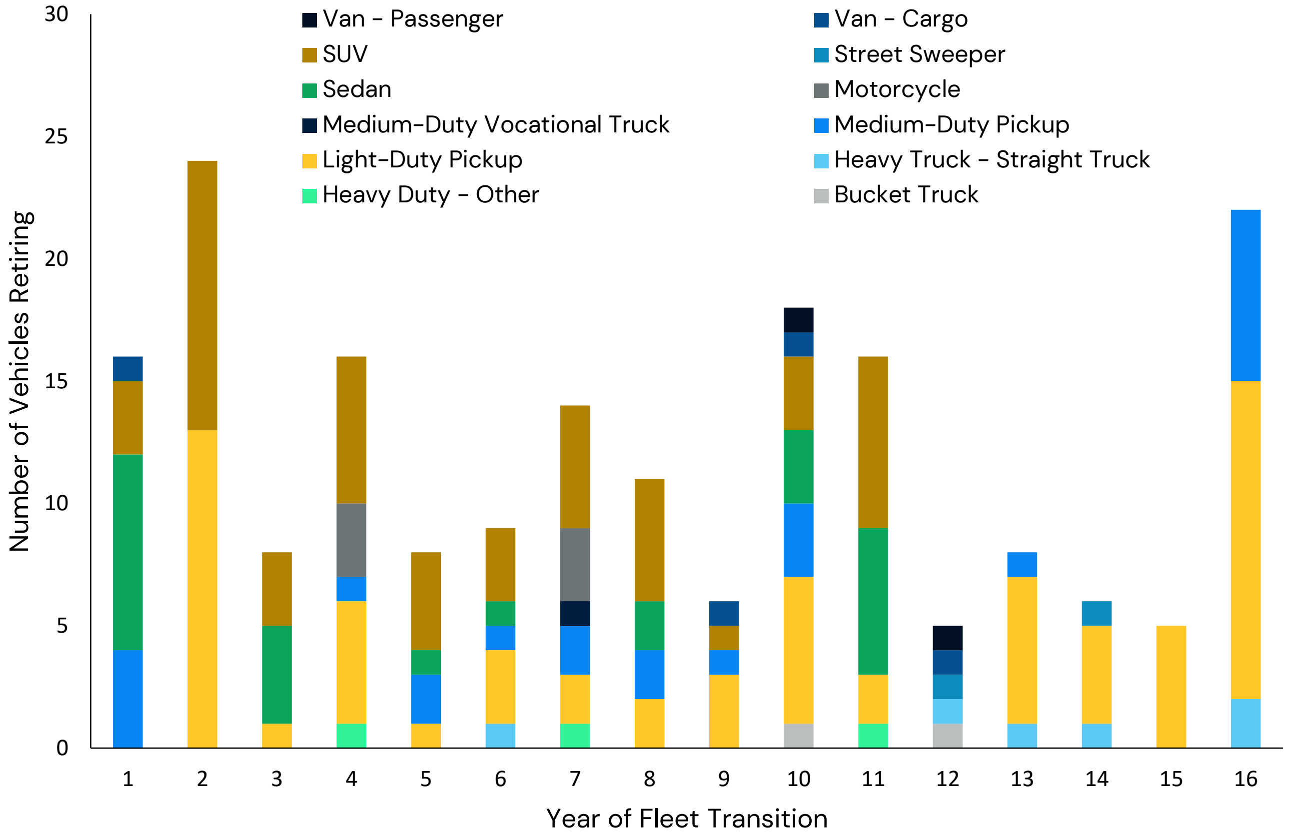
The existing retirement schedule for the City's fleet is shown in Figure 3. This schedule is based on the fleet-provided in-service date and retirement years for each vehicle, as well as information about vehicles the City planned to procure in 2023. The project team utilized both the age and the annual mileage of each vehicle to determine the appropriate time for vehicle replacement, thus establishing retirement criteria for each vehicle. The assumed lifetime vehicle mileage and age for various vehicle categories are provide in Table 2. Sedan, SUV, and Motorcycles have shorter lifetimes for multiple reasons. One reason is that larger vehicles are typically manufactured to last longer than smaller vehicles. Additionally, larger vehicles have a higher capital cost than smaller vehicles. It is usually more cost-effective to conduct maintenance and extend the useful life of larger vehicles. On the other hand, maintenance costs for smaller vehicles are disproportionately high compared to capital costs, and it often is cost-effective to just purchase a new light-duty vehicle instead of extending its useful life.

Patrol vehicles have the same lifetimes as non-patrol vehicles in their respective vehicle types. However, since patrol vehicles typically have higher mission demands and daily mileages, they are more likely to reach the end of their useful lives in miles, instead of years. This is the case for the City of Pittsburg's fleet. The average patrol vehicle in the City's fleet (excluding motorcycles) travels 47 miles daily, while the average non-patrol SUV or sedan travels only 33 miles daily.

Table 2. Lifetime age and lifetime vehicle mileage by vehicle category

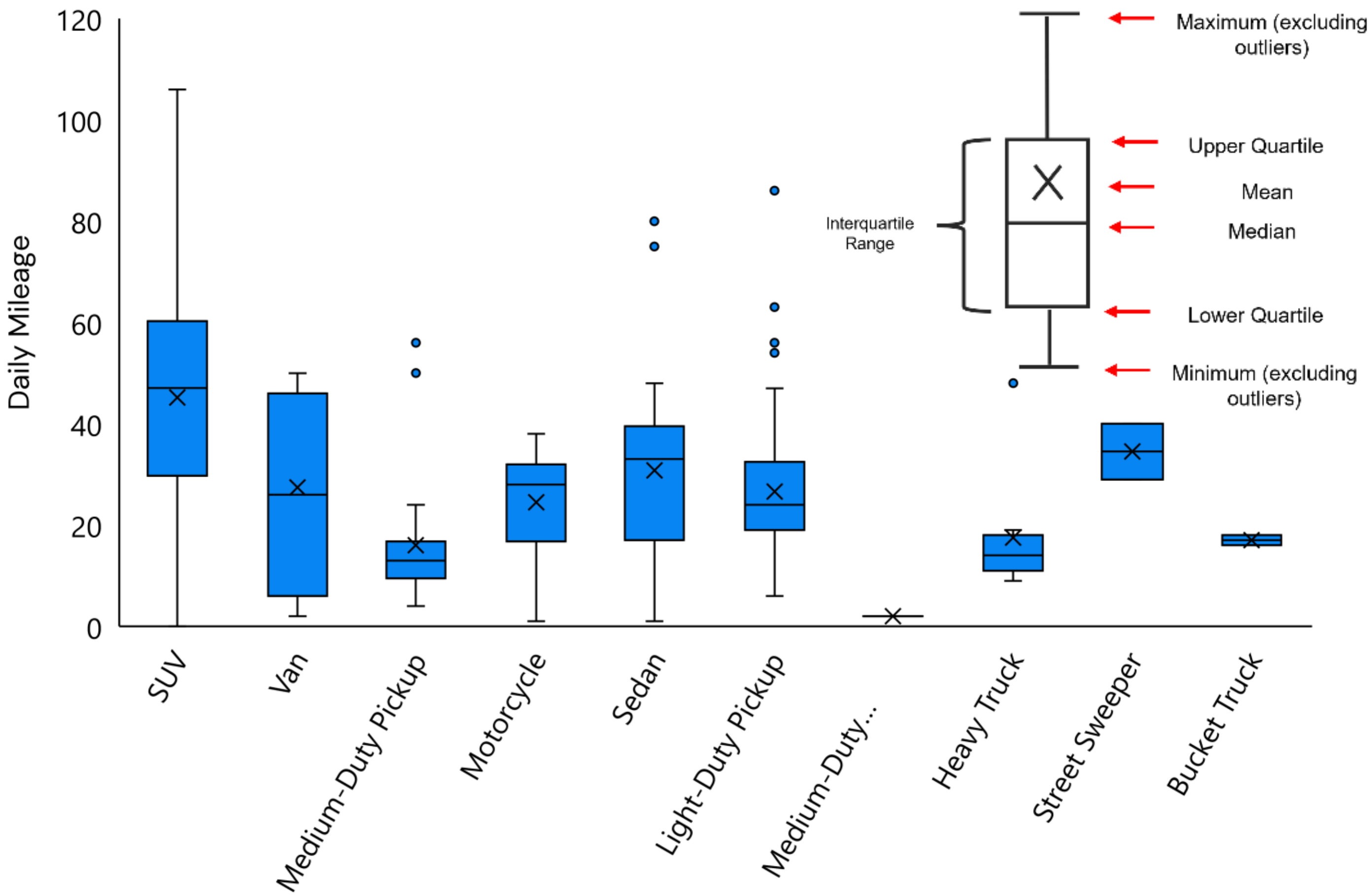
Vehicle Type	Vehicle Lifetime	Lifetime Mileage
Light-Duty Pickup	15	150,000
Sedan (including Patrol vehicles)	10	120,000
Minivan	15	150,000
SUV	10	120,000
Motorcycle	10	120,000
Medium-Duty Pickup	15	240,000
Medium-Duty Vocational Truck	15	240,000
Van	15	150,000
Box Truck	7	161,000
Street Sweeper	15	189,000
Bucket Truck	15	136,500

Figure 3. Retirement Schedule of Existing Fleet



In terms of the vehicle operation, City fleet vehicles typically cover approximately 30 miles per day, although this figure can vary significantly depending on the vehicle type. SUVs have the highest average daily mileage at 47 miles, whereas Medium-Duty Pickups and Medium-Duty Vocational Trucks have the lowest daily mileage at approximately 16 miles and 2 miles, respectively. It is worth noting that even within the same vehicle type, there can be a considerable range in daily mileage. For instance, sedans can travel anywhere from 1 to 80 miles per day. The distribution of the City's fleet daily mileages are illustrated as a box and whisker chart in Figure 4.

Figure 4. Whisker plot demonstrating the variation in daily operations of City fleet vehicles



Fleet Transition Plan

Process for Determining the EV Replacement Recommendations

To determine the most suitable EV replacements for the City's existing fleet, ICF leverages its extensive EV Library, which contains up-to-date information about currently available and soon-to-be-released EV models. ICF also utilizes its Fleet Assessment Model to evaluate the type of operations, daily mileage, fuel consumption, and retirement year of each vehicle in the City's fleet, providing a comprehensive view of the existing vehicles' requirements. The process ensures that the recommended EV replacements are the most suitable option for each vehicle, considering their unique operational requirements, while also considering factors such as performance, availability, and cost-effectiveness. The process for determining the EV replacement recommendations is summarized in the following steps:

- **Data Collection**: ICF, in partnership with the City staff, embarked on an extensive data collection initiative to gather detailed information on each vehicle in the City's fleet. This comprehensive effort focused on collecting key metrics for each vehicle, including its make, model, fuel type, and vehicle type. Additionally, data regarding the dwelling location, annual and lifetime mileage, dwelling time, and specific capabilities such as power-take-off and towing capacity were recorded. The purpose of this thorough data collection was to provide a solid foundation of information to guide and inform decisions related to vehicle replacement.
- **EV Library**: ICF maintains a comprehensive database known as the "EV Library" that contains all the essential information about each EV available in the market, such as vehicle type, sub-type, application, expected availability, all-electric range, battery size, drivetrain, GVWR, and vehicle price. Table 3 below shows the number of available BEV models by year and vehicle type.
- **Fleet Assessment**: To identify appropriate replacement options that meet the existing vehicle requirements, ICF utilizes its Fleet Assessment Model, which assesses the operations, daily mileage, fuel consumption, and scheduled retirement year of each vehicle in the City's fleet.
- **Identifying Potential EV Replacements**: ICF utilizes the Fleet Assessment outcomes to determine the EVs from the EV Library that meet the City's operational and financial criteria. ICF’s fleet assessment model makes the best effort to select EV counterparts with operational specifications consistent with standard vehicles, however, it is possible that manufacturers may not be building EVs with identical specifications.
- **Evaluation of EV Replacements**: ICF evaluates the potential EV replacements by considering factors such as their performance, reliability, availability, and cost-effectiveness.

Table 3. EV Availability by Vehicle Type[1] from ICF's Proprietary EV Library

Vehicle Type	BEV Overall Models	BEV Trim Level Models	Currently Available Overall Models	Currently Available Trim Level Models	Next Year Available Models
Sedan	15	57	13	55	2
SUV	33	127	25	99	8
Light-Duty Pickup	5	19	4	16	1
Medium-Duty Pickup	2	2	2	2	N/A
Van	11	32	11	32	N/A
Medium-Duty Vocational	24	33	23	32	1
Street Sweeper	5	6	5	6	N/A
Bucket Truck	5	8	5	8	N/A
Heavy Truck	12	24	12	24	N/A
Motorcycle	19	51	19	51	N/A

Key Assumptions

The project team relied on several key assumptions and data sources for this analysis, including those shown in the list below. These assumptions were applied within ICF's Fleet Assessment Model tool ("the model"), which was used to analyze the fleet and develop EV replacement recommendations.

- **EV Recommendation Threshold**: replacement of existing vehicles with EVs is recommended on a per-vehicle basis if a commercially available EV equivalent is capable of meeting the daily estimated range requirements of the vehicle. To assess the cost of a fleetwide transition, this analysis evaluates the total cost of ownership (TCO) for replacing all vehicles with EV equivalents that have adequate range, regardless of the cost differential between EV replacements and existing ICE vehicles.

- **Vehicle Pricing**: the model uses the 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 via 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) Table 52. New Light-Duty Vehicles Prices and ICF's CalETC report for the California Electric Transportation Coalition.

- **Fuel and Maintenance**: the model uses the gasoline and diesel prices provided by the City, which are $6.10 per gallon of diesel and $5.39 per gallon of gasoline (in 2022) and incorporates the 2022 California Energy Commission (CEC) price escalation projections in its Integrated Energy Policy Report (IEPR). The model determines the average annual fuel use for each vehicle based on its

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[1] Trim levels refer to the different versions of a vehicle model. For example, The Chevrolet Mach-E is one model, but has 6 trim levels: Mach-E CA Route 1, Mach-E GT, Mach-E Premium AWD, Mach-E Premium RWD, Mach-E Select AWD, Mach-E Select RWD

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 data provided by Pittsburg when available. When annual mileage or fuel efficiency data is not available, the model uses assumptions by vehicle and fuel type from the AFLEET Tool and ICF's CalETC report. The model also uses these sources to estimate average per mile maintenance costs based on vehicle and fuel type. Maintenance costs are escalated 2.2 percent annually.

- **Electricity Price**: the model uses a $0.29/kWh base rate, based on the City's electric utility rate and used escalation rates from the Energy Information Administration (EIA)'s 2023 Annual Energy Outlook for the Pacific region of the United States. The EIA anticipates electricity prices will decrease to 76% of their current prices in 2030 (i.e., 24% reduction) before rising again. This is mainly due to the expected drop in natural gas prices over the next 5 years from their highs in 2022. We will monitor this projection and update it if projections change, or the City's future utility rates counter the projection.
- **Timeframe**: This analysis focuses on vehicle replacements occurring through 2040, with TCO calculations extending across the vehicle lifespans of all replacements out to 2050.
- **Discount Rate**: A discount rate of 5 percent was used to estimate the net present value (NPV) of future cash flows.
- **Vehicle Ranges**: The estimated mileage ranges per vehicle were accounted for when recommending EV replacements. The analysis used an average temperature range of 39°F to 90°F to assess the potential impact temperatures in Pittsburg can have on EV ranges; the low of 39°F is estimated to reduce EV model ranges to 75 percent of their maximum mileage range. For Pittsburg's current vehicles, the model estimated the range required each day by dividing the fleet-provided annual mileage by 250 days per year; this varies from 1 to 100+ miles per day depending on the vehicle.

Electric Vehicle Acquisition and Timeline Recommendations

The City of Pittsburg's fleet comprises 192 vehicles. Of these 192 vehicles:

- 80 vehicles belong to the police department with 49 of them being patrol vehicles (i.e., pursuit rated)
- 5 vehicles are already EVs (3 PHEVs and 2 BEVs)
- 76 vehicles are subject to ACF (above 8,500 lbs. GVWR)
- 116 vehicles are not subject to ACF

It is important to highlight that the analysis conducted includes pursuit-rated vehicles used by the police department, despite the current shortfall in proven EV technology for these specific fleet segments. While there are several electric pursuit-rated models available, such as the Ford Mustang Mach-E, Tesla Model Y, and F-150 Lightning, it's worth noting that many of these vehicles are still in the testing phase, being evaluated by only a handful of police departments across the country. This testing is crucial to ensure these vehicles meet the rigorous demands and unique requirements of law enforcement operations. The inclusion of these vehicles in the analysis reflects a forward-looking approach, anticipating future developments in EV technology that could meet the high-performance standards required for police pursuit vehicles.

For the 192 on-road vehicles examined in this analysis, the project team found that most have commercially available EV equivalents (or will soon have them). However, this may not hold true for specialty vehicles, as some upfitters have not yet begun working with EV chassis. The analysis conducted for this project was set up to recommend EV replacement for 187 of those vehicles (the full fleet minus the 5 EVs) in order to assess the timeline, cost, and emissions impacts of replacing all vehicles that have EV equivalents. However, ICF's Fleet Assessment model could not find suitable replacements for three of the City's vehicles, Including two Peterbilt 348 and one Freightliner 114SD sewer combo truck. Following the discussion with the major upfitters for these sewer trucks the project team was informed that none of the existing upfitters are currently working with EV chassis for these types of trucks. Therefore, the model provided EV replacement recommendations for 184 vehicles.

However, in certain instances, the team opted to replace some of the lower-cost models, originally developed by startup companies, with vehicles produced by established, traditional OEMs. This decision was driven by the need to ensure that the vehicles acquired by the city would have access to a robust dealership network and comprehensive customer support. Additionally, traditional OEMs have lower risk associated with part replacement and staying in business. This consideration was crucial for addressing potential repair and maintenance needs, thereby ensuring reliability and efficiency in the City's vehicle fleet operations. This approach reflects a balance between cost-effectiveness and the long-term operational reliability of the vehicles. This feedback affected the light-duty pickup and cargo van recommendations. The project team, whenever feasible, advised the adoption of a single model for each vehicle type within the City's fleet. This strategy would allow the City to collaborate with just one manufacturer rather than multiple, streamlining communication processes and simplifying the logistics of part replacements. However, it's crucial to acknowledge the inherent risks associated with this approach, such as the potential pitfalls of being locked in with a single vehicle manufacturer. This could limit flexibility in terms of pricing, availability of newer models, and reliance on the manufacturer's business stability and technological advancements. Additionally, it might reduce the City's leverage in negotiating service agreements or exploring innovative solutions from emerging players in the market. Balancing the benefits of a streamlined operational process with the risks of manufacturer dependency is key to ensuring the long-term success and adaptability of the City's fleet management strategy.

The project team, taking into account feedback from the City, recommended that the Police Department's fleet of sedans be replaced with SUVs. This suggestion was primarily influenced by the preference expressed by the Police Department staff for more spacious vehicles. SUVs offer additional room and comfort, which can be particularly beneficial for law enforcement personnel who spend extended periods in their vehicles and often require extra space for equipment and gear. This shift towards larger vehicles aims to enhance operational efficiency and staff satisfaction, ensuring that the department's needs and preferences are adequately met while maintaining the effectiveness of their daily operations. Table 4**Error! Not a valid bookmark self-reference.** below summarizes the

EV makes and models recommended to replace the City's existing fleet vehicles through 2038, which is estimated to be the 16th year of the City's fleet transition. This analysis only includes all-electric BEVs and does not recommend PHEVs. While Table 4 outlines specific makes and models for each EV; it is important to recognize that the EV market is in a state of rapid evolution. New models are frequently introduced, and some existing models may be discontinued due to market dynamics. While this study recommends specific models for designing the charging infrastructure, it is crucial for the City to actively track and monitor the EV market, keeping abreast of new models as they emerge. This approach will allow the City to select vehicles that best suit their needs at the time of replacement. To aid in this process, Appendix C of this report includes two alternative options, providing the City with additional choices to consider in their decision-making process.

Table 4. Electric Vehicle Recommendations

Vehicle Type	Recommended Make/Model/EV Type	Quantity
Sedan	Nissan - Leaf SV PLUS	7
SUV	Chevrolet - Blazer EV 1LT	13
	Chevrolet - Blazer EV 2LT	6
	Chevrolet - Blazer EV PPV (Police)	45
Light-Duty Pickup	Chevrolet - Silverado EV	66
Motorcycle	Zero Motorcycles - Zero FXS ZF3.6	1
	Zero Motorcycles - Zero FXP (Police)	4
Medium-Duty Pickup	Atlis - XT (300 mi) (Crew Cab)[2]	24
Van-Cargo	Ford – E-transit Cargo Van	5
Van-Passenger	Maxwell Vehicles - ePro SR Passenger Van	2
Medium-Duty Vocational Truck	Ford - E-Transit (Chassis Cab)	1
Street Sweeper	Global - M3 SUPERCHARGED	2
Bucket Truck	Terex – EV Aerial (Class 6)	2
Heavy Truck – Straight Truck	Peterbilt - 220EV (Class 7 - 141 kW)	6

The City of Pittsburg has previously conducted trials with Zero Motorcycles - Zero FXP, noting their zero emissions as a significant advantage. However, operational challenges, particularly concerning range, were encountered, especially when these vehicles were utilized by the Police Department. Although there are alternative electric motorcycles listed in Appendix C for the City to consider, none of these alternatives have been specifically tested for police operations. Therefore, the project team continues to recommend the same EV motorcycles. This is also mainly to assess the EV charging infrastructure needed if and when the City decides to transition its motorcycles to EV. Nonetheless, as the City considers replacing their motorcycles, it is advised to diligently track and monitor the evolving market for EV motorcycles and assess and select models that best meet their specific needs in the future.

The project team also established a proposed timeline for EV replacement based on the existing fleet's retirement schedule and the predicted availability of recommended replacement EV models. Figure 5 illustrates the recommended replacement timeline for all 184 vehicles in the analysis where

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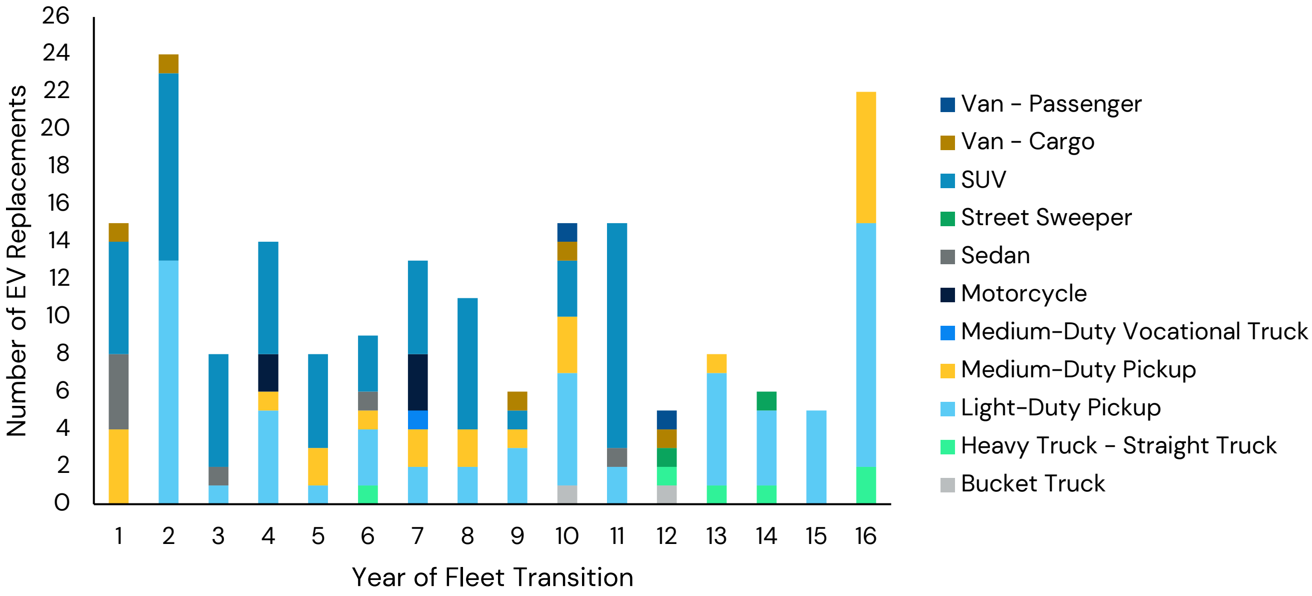
[2] In Summer 2023 Atlis announced that the XT (300 mi)is no longer going to be available. However, to make sure the City has the necessary infrastructure, the project team is keeping this vehicle in its recommendations in case the technology (or an equivalent technology) becomes available.

a feasible EV technology is available. The replacement timeline also introduces some flexibility in the final year of the transition, where the City may choose to retire some vehicles slightly before or slightly after year 16 based on its annual or departmental budget. Appendix A provides detailed EV replacement recommendations developed by the project team.

Figure 5. Recommended EV Replacement Timeline by Vehicle Types



Transitioning Police Patrol Vehicles to EVs

Transitioning police vehicles to EVs presents several distinct challenges that require careful consideration. Firstly, the reliability and performance of EVs under high-stress, high-demand police operations are critical. Police vehicles are often required to accelerate quickly, maneuver at high speeds, and endure prolonged usage, which poses questions about the battery life and overall durability of EVs in such scenarios. Additionally, the limited range of available EV models suitable for police work can be a significant constraint. These vehicles need to be equipped not only for performance but also to accommodate the necessary police equipment and space for detainees. Another major challenge lies in developing a robust and accessible charging infrastructure. This infrastructure must support rapid charging to ensure minimal downtime, considering that police vehicles are often in near-continuous use over extended shifts. The placement of charging stations is also crucial; they need to be strategically located for easy access during patrols. Furthermore, transitioning to EVs involves a substantial initial investment in both vehicle procurement and infrastructure development. Adapting to these new technologies also necessitates specialized training for the officers and maintenance staff.

While the project team has included police patrol vehicles in this analysis, it is crucial to acknowledge the associated challenges. For instance, a significant assumption made by the team to determine the suitability of specific EVs is that police patrol vehicles will have 2 hours of dwelling time for charging. While this assumption might be valid under normal conditions, there are scenarios in which patrol vehicles may not have the luxury of this much downtime. For instance, during extended emergency responses or unforeseen events like natural disasters, patrol vehicles may find their operational demands leaving them with significantly less downtime. In such cases, a much shorter charging duration, potentially just a few minutes, would be essential to maintain continuous service. While such charging times are currently not feasible (even with the fastest chargers available in the market, there is a limitation on how much power a vehicle can accept), the evolving landscape of charging infrastructure and vehicle technology offers hope in addressing this challenge. As EV technology advances, we could soon see solutions allowing for much faster charging rates, potentially providing a refueling experience similar to that of current ICE vehicles. This technological progression is vital to ensure that EVs can meet the demanding and unpredictable nature of police work without compromising efficiency or performance.

Despite these challenges, the potential benefits of transitioning to EVs in terms of environmental impact and long-term cost savings are significant. As technology continues to advance, it is expected that many of these challenges will be mitigated, paving the way for more law enforcement agencies to adopt EVs. The importance of piloting these initiatives cannot be overstated, and the City of Pittsburg's recent acquisition of Ford Mach-E police pursuit-rated vehicles is a commendable step in this direction. By undergoing a pilot test with these vehicles, the City is not only demonstrating its commitment to sustainable practices but also pragmatically evaluating the practicality of EVs in high-demand police operations. This pilot project will provide invaluable insights into the real-world performance of EVs in a law enforcement setting, helping to inform future decisions as the City considers the full transition of its police fleet to EVs. The City's proactive approach in this endeavor positions it as a frontrunner in adopting and adapting to emerging zero emission technologies in public safety.

Fleet EV Charging Infrastructure

The successful transition of the City's fleet to EVs relies not only on procuring the appropriate EVs but also on establishing a resilient, accessible, and user-friendly fleet charging infrastructure. The effectiveness of this transition is heavily dependent on the ability to power these vehicles efficiently and reliably. A well-designed charging infrastructure should not only cater to the current needs of the fleet but also be scalable to accommodate future expansions and advancements in EV technology. It should ensure that charging stations are conveniently located and easily accessible to all fleet vehicles, minimizing downtime and enhancing operational efficiency. Additionally, the system should be intuitive and straightforward, allowing for ease of use by all personnel. This comprehensive approach to both vehicle acquisition and infrastructure development is crucial for a seamless and efficient shift to a more sustainable fleet.

This section describes the charging infrastructure analysis conducted by the project team for the fleet vehicles. We assessed the charging infrastructure needs under two different scenarios. In the first scenario, the project team assessed the need for charging infrastructure assuming a dedicated charging plug for each vehicle. This scenario is called the 1:1 vehicle-to-plug (V2P) ratio scenario. The project team also assessed the charging infrastructure needs under an alternative scenario where the team optimized the V2P ratio to minimize the number of electric vehicle service equipment (EVSE) needed while meeting the overall charging demand for the fleet vehicles. This scenario Is called the Max V2P ratio scenario.

The Max V2P ratio scenario was a more efficient solution for the City of Pittsburg, as it will allow the City to power Its future EV fleet with 42 less charging stations and costs 10% less than the 1:1 V2P ratio scenario. While the 1:1 V2P scenario offers the certainty of each vehicle having its own dedicated charger, it was concluded that this approach might not be the most resource-efficient for the City's operations. The alternative, known as the Max V2P ratio scenario, requires the installation of fewer charging stations, which could result in significant savings in construction costs, particularly in areas such as trenching and conduit installation. After careful consideration of these factors, the project team and the City concurred that the Max V2P ratio scenario would be a more practical and cost-effective choice. Consequently, they agreed to proceed with the analysis under this scenario, prioritizing a balance between operational efficiency and the judicious use of City resources in developing the EV charging infrastructure.

A significant drawback of the Max V2P scenario, as outlined later in this section, is the necessity for scheduling vehicle charging throughout the week. This scenario, while efficient in terms of infrastructure and cost, demands a more complex and strategic approach to manage the charging cycles of the fleet's vehicles. Efficient scheduling is crucial to ensure that each vehicle is adequately charged and ready for operation, especially during peak usage times. This adds a layer of operational complexity, as it requires careful coordination and potentially advanced software systems to track and optimize charging schedules. Failure to effectively manage this aspect could lead to logistical challenges and potential disruptions in fleet operations.

Process for Determining the EV Charging Infrastructure Needs

To estimate charging infrastructure needs, the team first calculated each vehicles’ daily electricity consumption based on average daily mileage and energy efficiency (kWh per mile). For each vehicles’ daily energy demand, the project team also included the potential energy demand due to the use of Power Take Off (PTO), towing, and idling. Per the project team's research, vehicles that tow loads on a daily basis were assumed to lose energy at a 60% higher-rate than non-tow vehicles, and vehicles with a high-amount of Idling were assumed to lose energy at a 5% higher-rate than non-Idling vehicles. The team included these coefficients for each of the City's applicable vehicles to ultimately determine daily energy demand.

Vehicles within the City's fleet were categorized into six distinct classes: Light Duty, Light-Duty Pickup, Medium Duty, Heavy Duty, Street Sweeper, and Motorcycle, and then further organized by their respective facility locations. The rationale behind this classification and grouping was to account for the unique parking spaces and operational characteristics associated with each category. Although a Level 2 charger could technically be utilized by both a sedan and a heavy-duty vehicle, these vehicle types typically occupy different parking spaces, making it uncommon for them to share the same spot. Consequently, when designing the charging infrastructure, it becomes crucial to group together vehicles that are similar in body type and operational function. This approach ensures that the charging stations are strategically located to cater to the specific needs and parking patterns of each vehicle class, thereby enhancing the efficiency and practicality of the charging setup.

The project team also divided certain facilities into subgroups to optimize the City's charging infrastructure to meet its fleet needs. For instance, although vehicles belonging to the Police Department are parked at the City Hall, the project team designated them a unique dwelling location (i.e., PPD). This arrangement allows for dedicated chargers that are exclusively accessible to Police vehicles. Additionally, given the large number of take-home vehicles in the City's fleet, the project team assumed dedicated take-home EV charging hubs at four of the City's facilities, including City Hall, Corporation Yard, Water Treatment Plant, and Environmental Center (EC). These take-home hubs were separated from their respective facilities in the analysis because the hubs include high-powered DC Fast charging stations to accommodate the short dwelling time take-home vehicles have. Drivers of take-home vehicles will use these high-powered chargers, instead of other stations at the facility, to charge quickly before heading home. Using this framework for facilities and respective subgroups, the team accounted for how much time each vehicle In the City's fleet would have to charge at its dwelling location. Take home and police pursuit vehicles were assumed to have a charging time of two hours and all other vehicles were assumed to have a charging time of eight hours. The team divided daily energy demand by charger power level to determine the necessary charging power level for each vehicle to meet daily travel demand. Given that charging providers typically do not offer customized charging power levels and instead work with predetermined power level increments, for each charging power level calculated as necessary for the City's fleet, the team identified the nearest available power level on the market that was equal to or higher than the calculated requirement. This approach ensured that the chosen charging stations would not only meet but potentially exceed the minimum power needs of the City's fleet, thereby providing a buffer for future requirements or unexpected demands. This strategy, while pragmatic, also meant adapting to the limitations of the current market offerings and ensuring that the selected charging solutions were both practical and future-proofed for the City's evolving needs.

Maximum Vehicle to Port Ratio Charging Infrastructure Scenario

To determine the optimized maximum V2P ratios, the project team needed to calculate the highest number of vehicles that could share one EVSE plug while still maintaining their operational duty cycles. The team used the nominal daily mileage assumed vehicle efficiency for each vehicle to determine the number of days it takes for each vehicle to reach 20 percent battery state of charge (SoC)[3], which is the industry standard for requiring a vehicle to be recharged. The team then calculated the total number of vehicles in each vehicle class that could complete their duty cycle with this SoC threshold.

For example, at the Environmental Center, 7 medium-duty vehicles take an average of 12 days to reach 20 percent charge. However, one vehicle needs recharging every two days due to its 26-mile daily mileage and frequent towing tasks. Because of this, a V2P ratio of 2 is assumed, meaning each charging port can serve two vehicles, with one charging on odd days and the other on even days. Since dual-port charging stations have two ports, the City needs two stations to serve its 7 medium-duty vehicles at the Environmental Center.

Regarding charger power levels, the highest power level required for each group was assigned to all chargers in that group. This approach could be refined by using charging management solutions to further increase the V2P ratio, reducing the number of chargers and their associated power levels. In the case of Level 2 chargers (chargers ≤ 19.2 kW), the project team aimed to standardize the power levels within each City facility, ensuring consistency and efficiency in the charging process. Following discussions with the City, it was agreed that the minimum power level for non-motorcycle vehicles would be set at 15.4 kW. For motorcycles, the lowest recommended power level was determined to be 6.6 kW. This decision was made to ensure that the City's vehicles, regardless of their type, could charge more rapidly, thereby enhancing overall operational efficiency. These minimum power levels are particularly beneficial for vehicles that might accrue higher than average mileage on any given day, ensuring that they can be promptly recharged and ready for use without significant delays. This process was performed for each vehicle class and base location with BEV replacements. The resulting maximum V2P ratio for each vehicle type and base location is presented in

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[3] State of Charge describes the current level of electrical charge stored in a battery relative to its maximum capacity.

Table 5 below.

Table 5 - Estimated Maximum Vehicle-to-Plug Ratio

Dwell Location	Light Duty	Light-Duty Pickup	Medium Duty	Heavy Duty	Street Sweeper	Motor cycle
City Hall	2	6	N/A	N/A	N/A	N/A
Corp Yard	1	2	1	1	1	N/A
Environmental Center (EC)	N/A	4	2	1	N/A	N/A
Housing Authority	1	N/A	N/A	N/A	N/A	N/A
Island Energy	2	N/A	2	1	N/A	N/A
Marina	N/A	4	1	N/A	N/A	N/A
PPD - Pursuit	2	N/A	N/A	N/A	N/A	1
PPD	2	2	1	N/A	N/A	1
Water Treatment Plant (WTP)	1	N/A	2	N/A	N/A	N/A
Marina Center	1	N/A	N/A	N/A	N/A	N/A
Take Home EV Charging Hub - PD	2	N/A	N/A	N/A	N/A	1
Take Home EV Charging Hub – Corp Yard	N/A	4	N/A	N/A	N/A	N/A
Take Home EV Charging Hub - WTP	1	2	N/A	N/A	N/A	N/A
Take Home EV Charging Hub - EC	N/A	1	N/A	N/A	N/A	N/A

Logistics and Scheduling for Maximum V2P Scenario

To help understand how multiple vehicles could share an EV charging station, consider the following hypothetical maximum V2P scenario example, assuming a ratio of 5. In this case, a single DPC station can be shared among 10 vehicles at a specific location. With this arrangement, each pair of vehicles would need to charge once every 5 days, following a schedule that ensures all vehicles receive the necessary charging. This is visually demonstrated in **Error! Reference source not found.** below.

Table 6 - Hypothetical Vehicle Charging Schedule

	Plug #1	Plug #2
	Plug #1	**Plug #2**
Day 1	1	2
Day 2	3	4
Day 3	5	6
Day 4	7	8
Day 5	9	10
…	…	…
Day 26	1	2
Day 27	3	4
Day 28	5	6
Day 29	7	8
Day 30	9	10

Number of Dual-Port Charging Stations and Corresponding Power Levels

Table 7 summarizes the number of chargers by power level that the project team estimated for the Max V2P scenario. Please note that the rated power is for the whole DPC station and not for the single port. Additionally, these are the exact power levels needed to support the City's fleet vehicles. There may not be available charging stations in the market with the exact power ratings as shown in Table 7. In those situations, the City should procure the lowest-powered charging stations that can meet fleet demands. For example, the City could procure a 50 kW charger if the exact max power level is 40 kW. Overall, the City can install 63 DPCs to support a fleet of 189 EVs using the Max V2P ratio scenario illustrated in Table 5 (above).

Table 7. Number of Chargers by Power Level (kW) under maximum V2P Ratio Scenario

	Number of DPCs						Max Power Level (kW)					
Dwell Location	**Light Duty**	**Light-Duty Pickup**	**Medium Duty**	**Heavy Duty**	**Street Sweeper**	**Motorcycle**	**Light Duty**	**Light-Duty Pickup**	**Medium Duty**	**Heavy Duty**	**Street Sweeper**	**Motorcycle**
City Hall	1	1					2	30				
Corp Yard	1	4	8	2	1		3	38	17	35	53	
Environmental Center (EC)		3	2	1				40	31	17		
Housing Authority	1						1					
Island Energy	1		2	1			7		35	14		
Marina		1	1					18	1			
PPD - Pursuit	8						75					
PPD	1	1	2			1	13	20	12			1
Water Treatment Plant (WTP)			1						4			
Marina Center	1	2*					1	50				
Take Home EV Charging Hub - PD	9					2	77					4
Take Home EV Charging Hub - Corp Yard		1						128				
Take Home EV Charging Hub - WTP	1	1					12	13				
Take Home EV Charging Hub - EC		1						22				
Total Number of Chargers	**24**	**15**	**16**	**4**	**1**	**3**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Total Number of Vehicles**	**75**	**66**	**34**	**6**	**2**	**6**						

* For PPD vehicles

** Note that the number of vehicles also include the 5 current EVs owned by the City which is why they total to 189 (i.e., 184 EV replacement vehicles plus 5 currently EV)

The following tables break out the number of vehicles, charging stations and corresponding market power levels for each site supporting the City of Pittsburg's fleet. The market power levels in these tables (*shown in italics*) are the lowest commonly found charging station power levels that can support the max power levels shown in Table 7 (above) which is why they are different that the power levels presented earlier in Table 7. These levels were used in the project team's cost and load capacity analysis.

City Hall/Pittsburg Police Department (PPD) Site Overview

Table 8: Number of Vehicles, Dual-Port Chargers, and Corresponding Charger Power Levels at City Hall/PPD Site

	NUMBER OF VEHICLES (Total = 93)				NUMBER OF DUAL-PORT CHARGERS and MARKET POWER LEVELS (Total = 26 Chargers/1856 kW)			
Site	**Light-Duty**	**Light-Duty Pickup**	**Medium Duty**	**Motor cycle**	**Light-Duty**	**Light-Duty Pickup**	**Medium Duty**	**Motor-cycle**
City Hall	2	12			1 *15.4 kW*	1 *50 kW*		
PPD	3	2	4	2	1 *15.4 kW*	1 *25 kW*	2 *15.4 kW*	1 *6.6 kW*
PPD Pursuit	30			1	8 *100 kW*			
PPD Take Home Hub	34			3	9 *100 kW*			2 *6.6 kW*
Totals	**69**	**14**	**4**	**6**	**19**	**2**	**2**	**3**

***Note**: Considering that chargers can be shared among all motorcycles, the project team dropped the dedicated charger for PPD-Pursuit as that one single motorcycle can use one of the ports from the take home hub to charge.*

Corp Yard (CY) Site Overview

Table 9: Number of Vehicles, Dual-Port Chargers, and Corresponding Charger Power Levels at Corp Yard Site

	NUMBER OF VEHICLES (Total = 45)					NUMBER OF DUAL-PORT CHARGERS and MARKET POWER LEVELS (Total = 17 Chargers/719 kW)				
Site	**Light Duty**	**Light-Duty Pickup**	**Medium Duty**	**Heavy Duty**	**Street Sweeper**	**Light Duty**	**Light-Duty Pickup**	**Medium Duty**	**Heavy Duty**	**Street Sweeper**
Corp Yard	1	16	14	4	2	1 *19.2 kW*	4 *50 kW*	8 *19.2 kW*	2 *50 kW*	*1* *100 kW*
CY Take Home Hub		8					1 *150 kW*			
Totals	**1**	**24**	**14**	**4**	**2**	**1**	**5**	**8**	**2**	**1**

***Note**: While there are a total of 48 vehicles in Corp Yard and Mechanic Shops combined, three (3) of those vehicles are not eligible for electrification (sewer trucks) and therefore, only 45 are recommended for EV replacement.*

Environmental Center Site Overview

Table 10: Number of Vehicles, Dual-Port Chargers, and Corresponding Charger Power Levels at Environmental Center (EC) Site

	NUMBER OF VEHICLES (Total = 29)			NUMBER OF DUAL-PORT CHARGERS and MARKET POWER LEVELS (Total = 7 Chargers/294 kW)		
Site	**Light-Duty Pickup**	**Medium Duty**	**Heavy Duty**	**Light-Duty Pickup**	**Medium Duty**	**Heavy Duty**
EC	20	7	1	3 *50 kW*	2 *50 kW*	1 *19.2 kW*
EC Take Home Hub	1			1 *25 kW*		
Totals	**21**	**7**	**1**	**4**	**2**	**1**

Island Energy Site Overview

Table 11: Number of Vehicles, Dual-Port Chargers, and Corresponding Charger Power Levels at Island Energy Site

	NUMBER OF VEHICLES (Total = 9)			NUMBER OF DUAL-PORT CHARGERS and MARKET POWER LEVELS (Total = 4 Chargers/131 kW)		
Site	**Light-Duty/ LD Pickup**	**Medium Duty**	**Heavy Duty**	**Light-Duty/ LD Pickup**	**Medium Duty**	**Heavy Duty**
Island Energy	2	6	1	1 *15.4 kW*	2 *50 kW*	1 *15.4 kW*
Totals	**2**	**6**	**1**	**1**	**2**	**1**

Water Treatment Plant Site Overview

Table 12: Number of Vehicles, Dual-Port Chargers, and Corresponding Charger Power Levels at Water Treatment Plant Site

	NUMBER OF VEHICLES (Total = 6)			NUMBER OF DUAL-PORT CHARGERS and MARKET POWER LEVELS (Total = 3 Chargers/46 kW)		
Site	**Light-Duty**	**Light-Duty Pickup**	**Medium Duty**	**Light-Duty**	**Light-Duty Pickup**	**Medium Duty**
Water Treatment Plant	1		2			1 *15.4 kW*
Water Treatment Plant Take Home Hub	1	2		1 *15.4 kW*	1 *15.4 kW*	
Totals	**2**	**2**	**2**	**1**	**1**	**1**

***Note**: Considering that chargers can be shared between the light and medium duty vehicles, the project team dropped the charger for the light duty vehicles in the Water Treatment Plant*

Marina Site Overview

Table 13: Number of Vehicles, Dual-Port Chargers, and Corresponding Charger Power Levels at Marina

	NUMBER OF VEHICLES (Total = 5)		NUMBER OF DUAL-PORT CHARGERS and MARKET POWER LEVELS (Total = 2 Chargers/38 kW)	
Site	**Light-Duty Pickup**	**Medium Duty**	**Light-Duty Pickup**	**Medium Duty**
Marina	4	1	1 *19.2 kW*	1 *19.2 kW*
Totals	**4**	**1**	**1**	**1**

Housing Authority Site Overview

Table 14: Number of Vehicles, Dual-Port Chargers, and Corresponding Charger Power Levels at Housing Authority

	NUMBER OF VEHICLES (Total = 1)	NUMBER OF DUAL-PORT CHARGERS and MARKET POWER LEVELS (Total = 1 Charger/15.4 kW)
Site	**Light-Duty**	**Light-Duty**
Housing Authority	1	1 *15.4 kW*
Totals	**1**	**1**

Marina Center Site Overview

Table 15: Number of Vehicles, Dual-Port Chargers, and Corresponding Charger Power Levels at Marina Center

	NUMBER OF VEHICLES (Total = 1)	NUMBER OF DUAL-PORT CHARGERS and MARKET POWER LEVELS (Total = 3 Chargers/115.4 kW)	
Site	**Light-Duty**	**Light-Duty**	**PPD**
Marina Center	1	1 *15.4 kW*	2 *50 kW*
Totals	**1**	**1**	**2**

Note: *The two DCFC chargers for Marina Center are added at the request of the City. Since the PPD vehicles are not domiciled in this location, they do not show up in the project team's original infrastructure assessment. However, the City has determined that the two DCFC chargers will be needed in this facility as there are PPD vehicles visiting and often parking in this facility*

Charging Infrastructure Rollout Schedule

To ensure a successful transition of City's fleet to EVs over the next 15 years, the project team has developed a comprehensive rollout schedule for charging infrastructure. This schedule is not only pivotal for guiding the City's budget planning specific to EV charging infrastructure, but it also provides a clear roadmap for the necessary actions and coordination efforts required for effective deployment. The rollout schedule for the City's EV charging infrastructure is tailored based on the specific needs of each EV type. For example, a charging station at the Environmental Center is designated for medium-duty vehicles, with a capacity to accommodate 4 vehicles simultaneously (a V2P ratio of 2:1 on a dual port charger). This station should become operational in Year 1 of the fleet's transition, coinciding with the introduction of the first medium-duty EV. Under this plan, a subsequent charging station would only become necessary upon the arrival of the fifth medium-duty EV, projected for Year 16 of the transition.

Figure 6 and Figure 7 below depict the number of EVSE required by year to accommodate the accompanying EVs. The results of the maximum V2P ratio scenario recommend a total of 63 DPCs to be deployed across the City's eight facilities, with an average of four station installations per year. The highest number of EVSE is required in year 1 of the fleet transition (14 chargers in total), which reflects the fact that at least one charging station is needed per site that has an EV.

Figure 6 - EVSE Rollout Schedule by Year and Vehicle Type, Maximum V2P Ratio Scenario

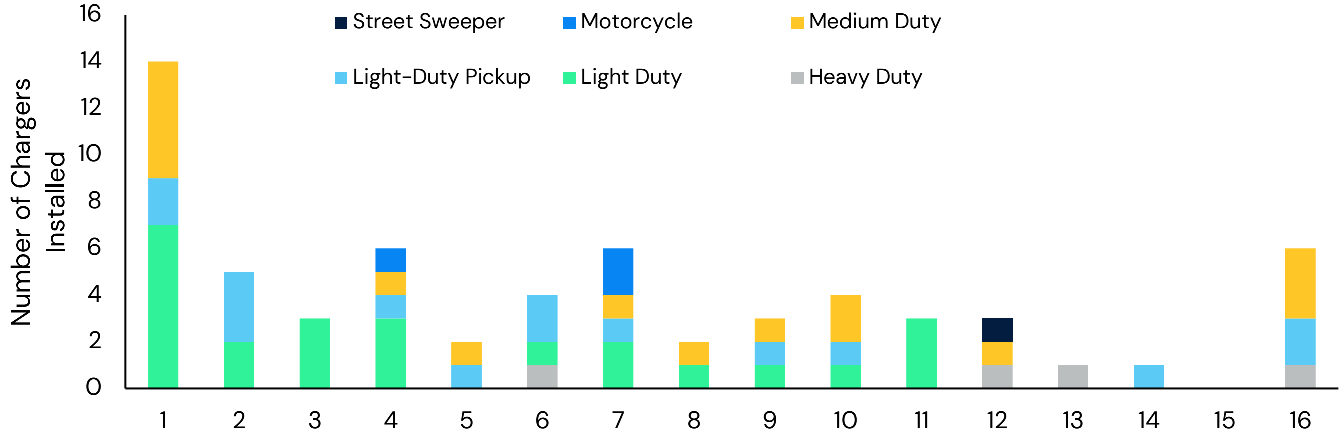
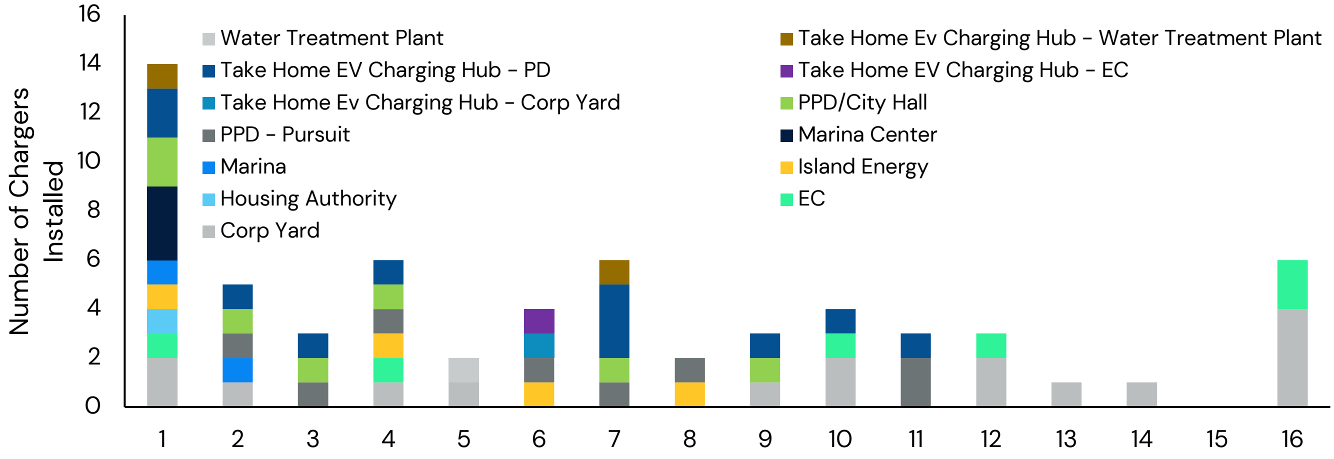


Figure 7 - EVSE Rollout Schedule by Year and Base Location, Maximum V2P Ratio Scenario

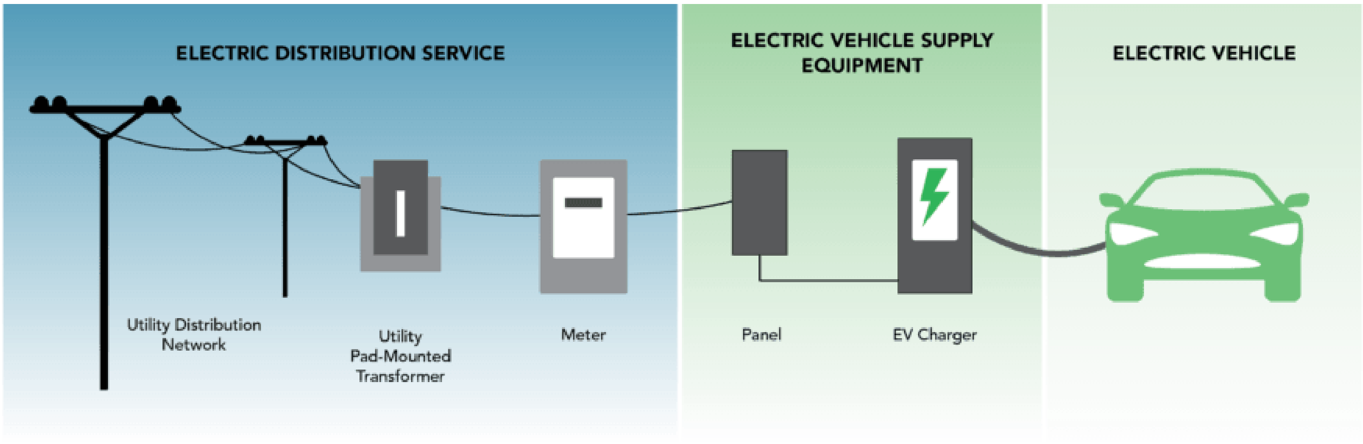


Grid- and Site-Level Electrical System Capacity and Potential Upgrades

Aside from procuring vehicles and charging equipment, the deployment of charging infrastructure for EVs necessitates substantial enhancements to the existing electrical infrastructure. As fleets transition to EVs, they typically require a significantly higher electrical load for charging purposes. This increase in demand often mandates considerable upgrades at both the facility and grid levels. For instance, a fleet facility that previously accommodated conventional vehicles might need to upgrade its transformers, install new electrical panels, and reinforce its connection to the local power grid to handle the increased load from EV chargers.

This section delves into the anticipated impact of the City's fleet electrification on the distribution systems and electric capacities of Pacific Gas and Electric (PG&E) and Island Energy. It begins with a detailed overview of the power delivery system, emphasizing the City facilities earmarked for EV deployment. Additionally, it offers an insight into the broader implications for the power system, encompassing the challenges and costs associated with managing the elevated electrical load resulting from the integration of these vehicles.

Figure 8. Structure of the Electric Power System[4]



As background information, electricity is generated at large central power plants using various energy sources such as coal, natural gas, nuclear fuels, solar, wind, and hydropower, along with energy storage systems like batteries. Transformers then increase (step up) the voltage of the generated electricity for delivery over transmission lines to areas of high electricity demand, often located far from the generation sites. Subsequently, transformers decrease (step down) the voltage to a lower level for distribution via underground and overhead lines to customers. Additional pole-mounted or pad-mounted transformers are often needed to further reduce the voltage, making it safe for residential and business use. Conversely, industrial customers with heavy equipment typically receive electricity at higher voltage levels compared to residential and business users.

To evaluate the impact of the City's fleet transition to EVs on PG&E and Island Energy's distribution systems, ICF estimated the additional load from EV charging based on the previously described

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[4] Source: https://blog.samtec.com/post/samtec-powers-future-evse-infrastructure/

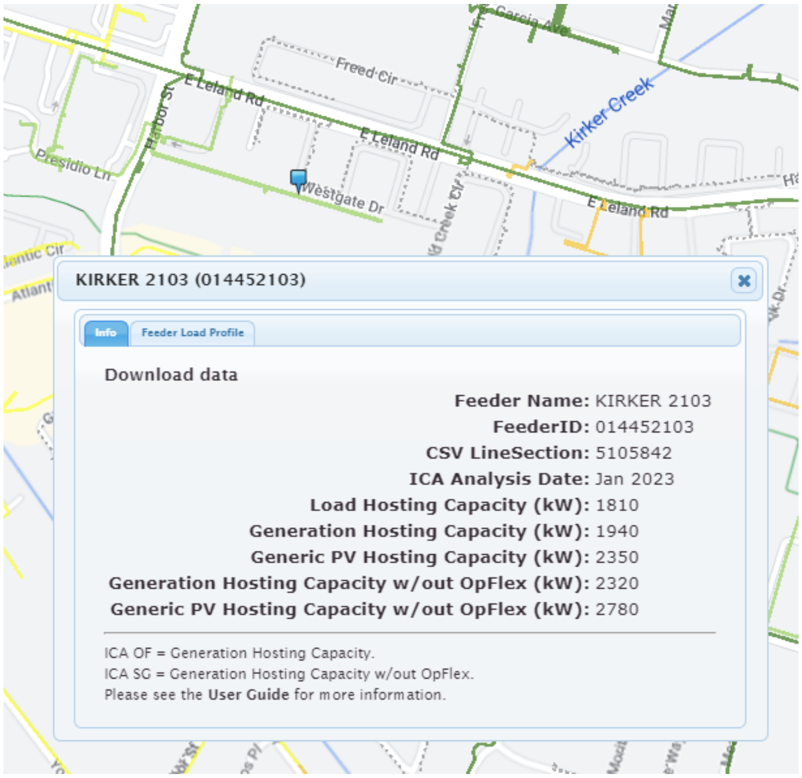
maximum V2P ratio charging scenario. Table 16 illustrates the incremental power demand expected in each of the scenarios at various locations in the City.

Table 16. Incremental Charging Demand - Max Vehicle to Charging Port Ratio

Dwell Location	Power Demand (kW)
City Hall/Police Department	1,856
Corp Yard	719
Environmental Center	294
Water Treatment Plant	46
Island Energy	131
Marina Site	38
Housing Authority	15
Marina Center	115

ICF determined the impacts of EV charging at each site based on the estimated incremental EV charging demand and the available transformer and feeder capacity at each location. ICF used PG&E's Integration Capacity Analysis (ICA) Map to identify existing load capacity (i.e., headroom) at each of the City's eight sites. ICA and supporting distribution system maps are often one of the most useful tools to assess the appropriateness of a location with respect to grid capacity and interconnection availability. These maps provide a snapshot in time of the conditions on a utility's distribution grid that reflect its ability to "host" additional distributed energy resources (DERs), such as electric vehicle charging stations, at specific locations on the grid. For example, currently PG&E has made its ICA maps publicly available on its website. With ICA maps being publicly available, we are able to assess the grid capacity of sites by searching them through ICA maps and extract the load capacity analysis (LCA) data that are available at circuit and feeder level. Users can select individual circuits or substations to see key data on load profiles and maximum capacity. Additionally, the ICA map tool can quantify the capability of specific sites to integrate distributed energy resources (DERs)

Figure 9: Environmental Center Feeder Capacity Data from PG&E ICA Map



KIRKER 2103 (014452103)

Download data

Feeder Name: KIRKER 2103
FeederID: 014452103
CSV LineSection: 5105842
ICA Analysis Date: Jan 2023
Load Hosting Capacity (kW): 1810
Generation Hosting Capacity (kW): 1940
Generic PV Hosting Capacity (kW): 2350
Generation Hosting Capacity w/out OpFlex (kW): 2320
Generic PV Hosting Capacity w/out OpFlex (kW): 2780

ICA OF = Generation Hosting Capacity.
ICA SG = Generation Hosting Capacity w/out OpFlex.
Please see the **User Guide** for more information.

within the grid's network. For example, Figure 9 shows a screenshot from the ICA map which indicates there is 1,810 kW of load hosting capacity at the City's Environmental Center.[5]

Utilizing data from ICA maps, the project team assessed the necessity for transformer upgrades at each facility where the City plans to deploy EV charging infrastructure. In instances where the team anticipated the need for new transformers, it was presumed that the transformer selected would have the minimum power rating sufficient to prevent overloading. For example, a 25 kilovolt-amperes (kVA) transformer would be used to mitigate overloads up to 25 kVA, a 50 kVA transformer would manage overloads between 25 kVA and 50 kVA, and so on. The analysis indicates that there are two sites, the Corp Yard and Island Energy, that need a new service transformer to support the increased power load from EV Charging. The Corp Yard needs a 750 kVA transformer to meet the 719 kW of power demand at the site and Island Energy needs a 150 kVA transformer to meet the 131 kW of power demand from EV charging. The total capital cost of these transformers (excluding labor, commissioning, etc.) is $100,000, including $60,000 for the Corp Yard transformer and $40,000 for the Island Energy transformer. Additionally, ICF assumed a transformer installation cost of $9,000 for each, reflecting estimates from local contractor Bear Electrical Solutions. The City does not need to install the transformer at the Corp Yard immediately. According to the PG&E ICA map, the site does have 250 kW of existing electrical capacity, and power load from EV Charging will not exceed 250 kW until year 6 of the City's fleet transition. The Island Energy site does need a transformer installed immediately to support EV Charging power load.

In addition to the transformer upgrades needed at the Corp Yard and Island Energy, multiple sites need to install step-up and step-down transformers. A site needs a step-up transformer if it does not currently have three-phase, 480V power and requires a DC Fast Charger. Four sites fit this criteria: The Corp Yard, the Environmental Center, Island Energy, and the Marina Center. These step-up transformers range in capital cost from $6,000 - $25,000. Each transformer will also cost between $7,500-$9,000 to install. Furthermore, Island Energy will need a step-down transformer to convert three-phase, 480V power from its main transformer to 208/240V power for Level 2 charging. This transformer will cost approximately $6,500 and $7,500 to install.

In the scope of electrical infrastructure, there exists a clear demarcation between assets owned by the utility and those owned by the customer. Utility-owned assets typically encompass the larger, more centralized components of the electrical grid, such as substations, transformers, and distribution lines. These elements are crucial for the generation, transmission, and initial distribution of electricity. On the other hand, customer-owned electrical assets are usually found on the customer's premises and include items such as the service panel, internal wiring, and sometimes, power generation sources like solar panels or backup generators. While the integration of EV charging infrastructure necessitates certain upgrades to utility-owned assets, such as transformers and distribution lines, there are programs in place in California that help mitigate these costs. Notably, programs like the PG&E EV Fleet Program[6] are designed to support these transitions. Such "make-ready" programs cover the expenses related to upgrading utility infrastructure to accommodate the

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[5] https://www.pge.com/b2b/distribution-resource-planning/integration-capacity-map.shtml

[6] https://www.pge.com/en/clean-energy/electric-vehicles/ev-fleet-program.html

increased demand from EV charging stations. This includes the enhancement of transformers and other related electrical distribution components that are essential for handling the higher power loads.

The project team recommends that the City purchase and install dedicated panelboards at each site for EV charging stations. The City will be responsible for the cost of these panelboards, which will ensure that the charging stations have sufficient circuit breaker connections, independent of other electrical activities (such as lighting, machinery, and power equipment) at their respective sites. The cost of a panelboard varies based on its amperage and voltage levels. The most expensive panelboards recommended for the City are the 800 amp, 480V panels, capable of connecting to 11 DC Fast Charging Ports. Market research led the team to assume a cost of $20,000 for each of these panelboards. Less expensive options include 400 amp, 480V panels and 250 amp, 240V panels, which are approximately $8,000 and $2,500, respectively. For installation costs, the team estimated $10,000 for the 800 amp panelboard, $5,000 for the 400 amp panelboard, and $2,500 for the 250 amp panelboard.

Table 17 illustrates the utility and facility upgrades, along with their respective costs, needed at each of the City's eight sites with charging infrastructure As shown the City will need to invest approximately $560,000 to upgrade its electrical system infrastructure to accommodate the additional loads from the charging infrastructure. Additionally, the City will need to pay for significant make-ready costs for trenching and conduit laying to connect EVSE with electric supply. The project team assumed that trenching would cost $100/ft for a total cost of $336,440. Additionally, conduit laying would cost approximately $39,000. **Overall, the project team estimated $937,623 for make-ready, facility upgrade, and utility upgrade costs.** This estimate does not include permitting, engineering site design, or meter costs. As previously noted, PG&E offers an EV Fleet Program that provides complimentary upgrades to the meter, including power lines, transformers, and other utility-side infrastructure to fleets purchasing medium and heavy duty EVs (above 6,000 lbs. GVWR). Additionally, the program offers incentives for behind-the-meter infrastructure for facilities located in disadvantaged communities. While more details will be provided in the Funding and Financing section of this report, the project team strongly advises the City to consult with PG&E regarding its construction plans before commencing any groundwork. Through the EV Fleet program, the City could potentially realize significant cost savings, particularly for the two service transformers, four step-up transformers, and the step-down transformer that are required.

Table 17. Site Level Incremental Charging Demand and Costs of New Infrastructure

Dwell Location	City Hall/ PPD	Corp Yard	EC	WTP	Island Energy	Marina Site	Housing Authority	Marina Center	Total Cost
Incremental EV Charging Power Demand (kW)	1,856	719	294	46	131	38	15	115	N/A
Available Electrical Capacity at Site (kW)	11,.040	250	1,810	1,030	25	730	410	3,050	N/A
New Transformer(s) Required?	No	Yes	No	No	Yes	No	No	No	N/A
Transformer Capacity (kVA)	N/A	750	N/A	N/A	150	N/A	N/A	N/A	N/A
Estimated Transformer Cost ($)	N/A	60,567	N/A	N/A	40,000	N/A	N/A	N/A	$100,567
Estimated Transformer Installation/Labor Cost ($)	N/A	9,000	N/A	N/A	9,000	N/A	N/A	N/A	$18,000
Step-up/Step-Down Transformer Required?	N/A	Step-Up	Step-Up	N/A	Step-Up and Step-Down	N/A	N/A	Step-Up	N/A
Step-up/Step-Down Transformer Capacity (kVA)	N/A	500	300	N/A	150 each	N/A	N/A	150	N/A
Estimated Step-up/Step-Down Transformer Cost ($)	N/A	25,000	19,836	N/A	Step-up: 6,791 Step-down: 6,358	N/A	N/A	6,791	$64,776
Estimated Step-up/Step-Down Transformer Installation/Labor Cost ($)	N/A	9,000	9,000	N/A	18,000	N/A	N/A	9,000	$45,000
Estimated Panel Cost ($)	105,000	47,500	30,500	2,500	10,500	2,500	2,500	10,500	$211,500
Estimated Panel Installation Cost ($)	55,000	27,500	17,500	2,500	7,500	2,500	2,500	7,500	$122,500
Conduit and Cable Cost ($)	7,860	10,150	4,120	3,540	4,950	2,480	1,640	4,100	$38,840
Trenching ($)	76,000	102,740	34,000	34,320	34,690	18,690	10,000	26,000	$336,440
								Total Cost ($)	**$937,623**

The Role of Distributed Energy Resources (DER) in Reducing EV Charging Costs

Modular distributed energy resources (DERs) such as battery energy storage systems (BESS) and solar photovoltaics (PV) can play a role in reducing EV charging costs by providing energy and capacity services for EV charging sites. However, the benefit of installing such DERs is dependent on several factors, including but not limited to location, cost, and the utilization rate of the chargers. Sites that demonstrate ideal criteria and potential for high utilization will experience increased benefits.

BESS enables use cases that can deliver significant financial benefits to the battery owner/operator under the right conditions (e.g., tariff rate structures, customer site demand, etc.). Two use cases most pertinent to EV charging sites include time-of-use bill management and demand charge management. In the first instance (time-of-use bill management), the spread between on- and off-peak prices acts as a signal to the storage device to charge during the low-priced hours and discharge during the high-priced hours. A battery co-located with EV chargers at a potential site could charge during off-peak periods from the grid. The battery could then discharge during times of peak demand to reduce grid impacts and cost.

The second use case (demand charge management) is generally beneficial to large electricity consumers with short duration load spikes who must pay demand charges based on their peak 15-minute electricity usage each month. Customers can use batteries to reduce their load during peak periods and in turn lower their demand charges. Battery discharge during peak periods could also help a customer reduce the charging site's maximum monthly EV charging demand (kW). For EV charger installations that are subject to demand charges, the use of BESS can help minimize demand charges.

DERs can also help mitigate the cost of upgrading electrical infrastructure, such as transformers, due to the added load from charging infrastructure in several ways. First, DERs, such as PV and BESS can provide local electricity generation and storage capabilities, contributing to the overall energy mix. This reduces the need for additional power generation during peak demand periods, which alleviates stress on the electrical infrastructure. By leveling the load, transformers and other components can operate within their designed capacity, reducing the need for costly upgrades. Second, DERs, particularly BESS and smart grid technologies, can participate in demand response programs. For example, during periods of high demand or when the grid is stressed, these systems can be used to reduce or shift electricity consumption, easing the burden on transformers and other grid components. This demand-side management can help defer or avoid infrastructure upgrades related to increased load from charging infrastructure. Also, DERs can be configured to create microgrids, which are small-scale, localized power networks that can operate independently from the main grid. When a microgrid is capable of "islanding," it can disconnect from the main grid during periods of high demand or grid stress, reducing the load on transformers and other grid components. This can help delay or avoid the need for costly upgrades to accommodate the added load from charging infrastructure.

DERs can also increase the resiliency of the City of Pittsburg's charging infrastructure, particularly during power outages and emergencies, through several approaches. First, by integrating DERs such as solar panels and BESS into microgrids, the City of Pittsburg can create localized power networks that can operate independently from the main grid. In the event of a power outage or emergency, these microgrids can continue to provide electricity to critical charging infrastructure, ensuring that EVs can still be charged, and essential services can be maintained. Second, BESS can be installed alongside charging infrastructure and other DERs. These storage systems can store excess energy generated by DERs or the main grid during periods of low demand. During power outages or emergencies, stored energy can be used to power EV charging stations, ensuring continued operation even when the main grid is down. Third, DERs with islanding capabilities can disconnect from the main grid during power outages and continue to generate and supply electricity to local loads, such as charging infrastructure. This ensures that critical charging infrastructure remains operational during emergencies, providing a reliable source of power for EVs used by first responders, emergency services, and the general public. Furthermore, by deploying a diverse mix of DERs throughout the city, Pittsburg can increase the redundancy and diversification of its power supply. This reduces the risk of widespread power outages affecting the entire charging infrastructure, as different DERs can continue to provide power even if one source is compromised during an emergency.

The cost of implementing DERs can have a significant impact on the overall cost of fleet electrification. Several factors can influence the cost of DERs, including the type of technology, installation, operation, and maintenance costs. For example, the upfront cost of DER technologies can vary significantly depending on the specific resources being deployed. For instance, solar panels, wind turbines, energy storage systems, and combined heat and power (CHP) systems each have different capital costs. While some DER technologies have experienced significant cost reductions in recent years, such as solar panels and batteries, others might still have relatively high initial costs. The City needs to carefully evaluate the costs and benefits of different DER technologies based on their specific needs and local conditions. The installation costs for DERs can also affect the overall cost of fleet electrification. Proper installation of DER technologies requires infrastructure, such as mounting structures for solar panels, or suitable locations for wind turbines. Additionally, interconnection with the existing electrical infrastructure, distribution level and larger grid level upgrades, and compliance with regulations and safety standards can further increase installation costs. Fleet operators must consider these expenses when determining the feasibility of integrating DERs into their electrification plans. Additionally, the operation and maintenance (O&M) costs of DERs must be taken into account as they contribute to the total cost of ownership for fleet electrification. While some DER technologies, such as solar panels, have relatively low O&M costs, others, like wind turbines and CHP systems, might require more frequent maintenance or replacement of parts.

To offer a high-level cost estimate of a backup energy system composed of PV and BESS, we are considering a solar power system with a capacity of 3,200 kW, coupled with a BESS designed to provide power for 4 hours at this capacity. The figure of 3,200 kW represents the maximum peak load from EV charging at all City facilities once the complete transition of the recommended 184 vehicles to EVs is achieved. For the solar power system, the cost is typically determined based on a per watt basis. With current market rates for utility-scale PV of about $1.06 per watt[7], the estimated cost for solar PV alone will be to approximately $3,392,000. In addition to solar PV, there is also a need for a BESS to ensure power availability during periods without sunlight or during peak demand. The cost for BESS is calculated based on the kilowatt-hour capacity needed. For a system requiring 12,800 kWh capacity (3,200 kW for 4 hours), and considering an average cost of $270 per kWh[8], the BESS is estimated to cost around $3,456,000 which include the cost of the battery pack, balance-of-system hardware, soft costs (permitting, and interconnection, among others), as well as engineering, procurement, and construction (EPC) costs. In summary, the total estimated cost for the combined solar and BESS backup power system is estimated to be approximately $6,848,000 for a 4-hr system that can handle the peak power required for EV charging across all of the City's facilities. Note that this is a very high level cost estimate and further research will be required by the City to develop a more accurate estimate.

Charging Infrastructure Cost

With respect to cost for charging infrastructure deployment, the project team is using cost estimates based on a comprehensive literature review that ICF has conducted. This included reviewing the work completed by International Council on Clean Transportation[9] (ICCT), National Renewable Energy Laboratory[10] (NREL), Rocky Mountain Institute[11] (RMI), Environmental Defense Fund[12] (EDF), Department of Energy[13] (DOE), Electric Power Research Institute[14] (EPRI), National Renewable Energy Laboratory[15] (NREL) and many others where they quantified both the cost of equipment as well as charger installation. It should be noted that the costs mentioned only cover the equipment and its installation and do not take into account any infrastructure upgrades required, such as distribution upgrades, that may need to be carried out by the utilities. A summary of costs for charging station levels recommended for the City of Pittsburg can be found in Table 18. The cost of electrical infrastructure upgrades were summarized earlier in Table 17.

Table 18. Charger Equipment and Installation Cost by Capacity

Charger Capacity (kW)	EVSE Capital Cost	EVSE Installation Cost
6.6	$2,500	$3,500
15.4	$6,500	$9,500
19.2	$8,000	$12,000
25	$12,500	$19,000
50	$29,500	$48,000
100	$59,500	$54,500
150	$89,500	$61,000

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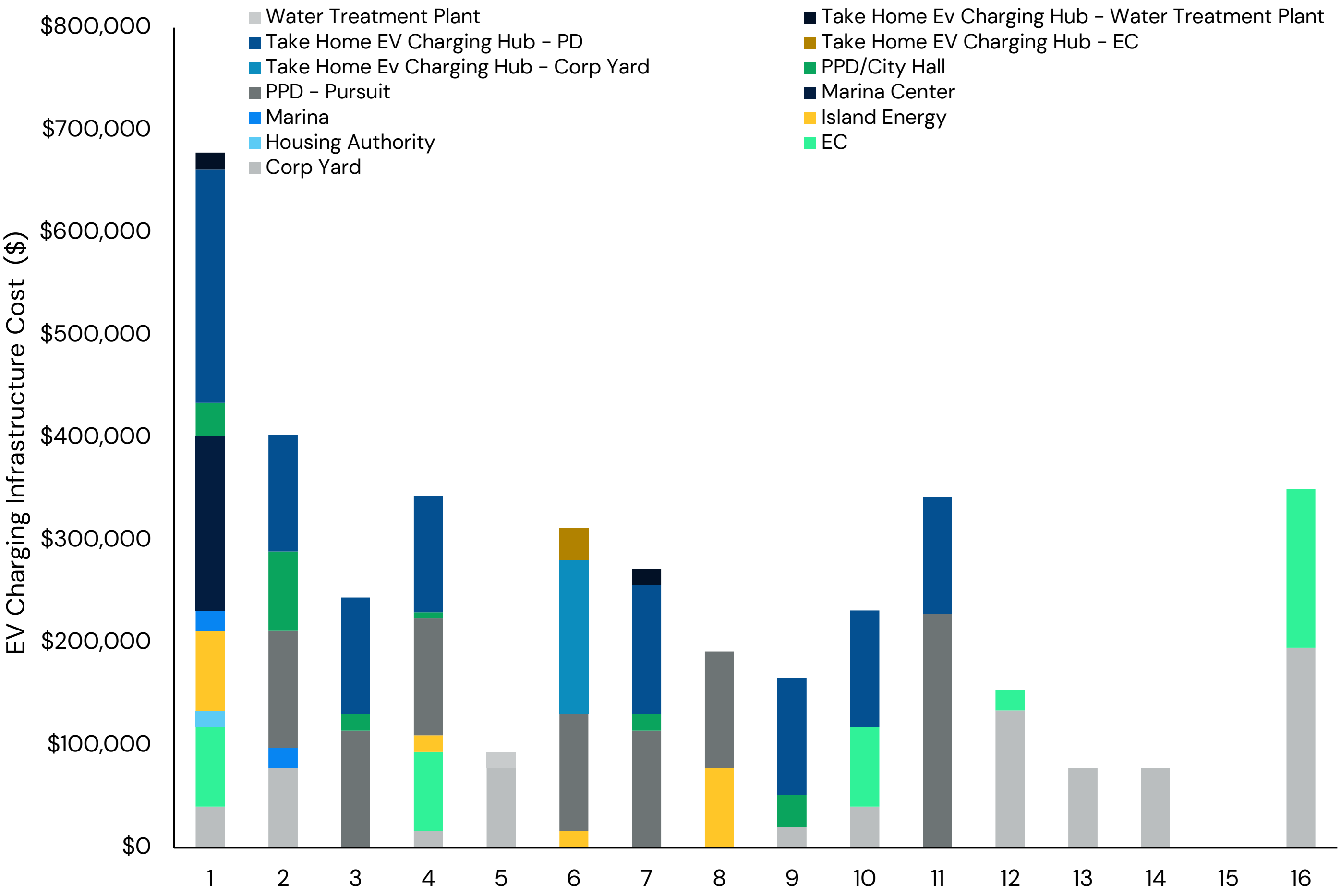
[7] https://www.nrel.gov/solar/market-research-analysis/solar-installed-system-cost.html
[8] https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/the-new-rules-of-competition-in-energy-storage
[9] https://theicct.org/sites/default/files/publications/ICCT_EV_Charging_Cost_20190813.pdf
[10] https://www.sciencedirect.com/science/article/pii/S2542435120302312
[11] https://rmi.org/wp-content/uploads/2020/01/RMI-EV-Charging-Infrastructure-Costs.pdf
[12] http://blogs.edf.org/energyexchange/files/2021/03/EDF-GNA-Final-March-2021.pdf
[13] https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf
[14] https://www.epri.com/research/products/000000003002000577
[15] https://www.cell.com/action/showPdf?pii=S2542-4351percent2820percent2930231-2

The cost of DPC stations under the maximum V2P ratio scenario amounts to approximately $1,831,000 in hardware costs and $2,104,500 in installation costs for a total cost of $3,935,500. Note that these costs are in 2022 dollars and are not discounted. Later in the report the project team presents the net present value (NPV) of charging infrastructure using a 5 percent discount rate. The largest investment occurs in the first year of Pittsburg's fleet transition, with the cost of charging stations totaling around $678,000 for all base locations. Among the eight base locations where EVSE will be installed, City Hall/PPD necessitates the highest level of investment at roughly $2,129,000. Total EVSE costs by year and location are illustrated in ***Figure 10***.

Figure 10 – EV Charging Infrastructure Cost by Year and Location, Maximum V2P Ratio Scenario



Funding & Financing Programs

After finalizing the fleet transition and charging infrastructure plans, the project team developed a funding and financing strategy designed to minimize the costs associated with transitioning to an all-electric fleet for the City of Pittsburg. This plan was formulated following extensive research into various grants, rebates, and incentives for which the City may be eligible and can apply. To conduct this research, the team utilized the Alternative Fuels Data Center's (AFDC) Laws and Incentives Database[16], which contains information on nearly 1,000 laws, incentives, and programs related to electric vehicles (EVs) and electric vehicle supply equipment (EVSE). Furthermore, the team leveraged its knowledge of California's policy environment to identify and outline other funding opportunities for the City.

The funding section of the plan details various programs available for EV procurement and charging infrastructure development. This includes federal initiatives like the tax rebates for EVs and charging infrastructure under the Inflation Reduction Act (IRA). State programs, such as the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) managed by the California Air Resources Board (CARB), are also covered. Additionally, the plan underscores local schemes like the Bay Area AQMD (BAAQMD) Charge! program and PG&E's Charging Infrastructure Rebates from its EV Fleet Program, both of which could offer EVSE funding opportunities for the City's fleet electrification efforts. The plan provides information on eligibility requirements, application procedures, and the possibility of stacking multiple funding sources; a summary of funding and financing options is available in

Table 19, and stacking opportunities are summarized in Table 20.

The financing aspect of the plan outlines methods to minimize the expenses associated with transitioning to a fully electric fleet. This can be achieved through public-private partnerships (PPP), charging infrastructure-as-a-service, and low-interest loans. In a PPP, the public sector partners with a private company to jointly finance, build, and operate a project or service. This type of partnership can bring together the resources, expertise, and incentives of both the public and private sectors to achieve a common goal. In the context of charging infrastructure deployment, a PPP can be used to finance the installation and maintenance of charging stations. The private partner could be an infrastructure provider, such as an energy company, a charging network operator, or a private equity firm. Under a PPP arrangement, the private partner could provide the financing for the charging infrastructure in exchange for a long-term contract with the public sector to operate and maintain the charging stations. This would provide the private partner with a steady revenue stream, while also enabling the public sector to benefit from increased access to charging infrastructure.

With respect to Charging Infrastructure-as-a-Service (CIaaS), a provider offers charging infrastructure for EVs on a subscription or pay-per-use basis. This model enables customers, such as fleet operators and commercial property owners, to access charging stations without having to invest in and maintain their own physical charging infrastructure. In a CIaaS model, the provider is responsible for the installation, operation, and maintenance of the charging stations, which can range

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[16] https://afdc.energy.gov/laws/state_summary?state=CA

from simple Level 2 charging to fast-charging stations. Customers pay for the charging services they use, typically based on the amount of energy consumed or the length of time spent charging. By providing access to charging stations, the ClaaS model enables fleet operators to transition to electric fleets without having to make significant upfront investments. The choice between these business models, as well as the loan financing options, will depend on the specific characteristics of the fleet. The plan considers the pros and cons of each option and evaluates which one would be most suitable for the City of Pittsburg's fleet transition.

Table 19. Summary of funding and financing programs

Program	Type	Eligibility	Funding Amount
IRA	Federal tax credit	Individuals, businesses, and tax-exempt organizations	Up to $7,500 for light-duty ZEVs Up to $40,000 for medium- and heavy-duty ZEVs
Alternative Fuel Infrastructure Tax Credit	Federal tax credit	Individuals and businesses	30% of the cost or 6% in the case of property subject to depreciation, not to exceed $100,000
CMAQ Program	Federal grant program	Public and private organizations	Up to 50 percent of identified funds
HVIP	Point-of-sale incentive	Class 2b-8 ZEVs purchased by individuals and businesses	$7,500 to $120,000 (Base)
Carl Moyer	State incentive	Clean combustion and Zero emissions Requires scrappage	Up to $160,000 for 0.02 engines Up to $410,000 for ZE trucks
EnergIIZE	State incentive	Public and private fleets of medium and heavy-duty vehicles as well as public charging	Up to 50 percent of the project cost
CVRP	State tax rebate	Individuals and businesses Public Fleets	Up to $7,000 per rebate; maximum of two rebates Up to 30 rebates per year for public fleets
LCFS	Credit based program	Non-residential EV charging	Number of credits earned x Credit price
TCIRP	State grant	Clean vehicle replacement and EV infrastructure deployment	Project specific
BAAQMD Charge!	Regional grant	Grants for EVSE deployment	Project specific up to 85% of project cost
PG&E Charging Infrastructure Rebates	Utility Rebates	Fleet Operators in Disadvantaged Communities	Up to $45,000 depending on charging station cost and power level
PPP	Joint financing	Public and private organizations	Varies
Sourcewell	Purchasing contracts	Individuals, businesses, and tax-exempt organizations	EV lease- to -purchase pathways
IBank	Loan financing	Individuals, businesses, and tax-exempt organizations	Between $1,000,000 and $65,000,000 Loan terms vary
ClaaS	EV charger revenue	Individuals and businesses	Varies by electric utility rates

Stacking Opportunities

Aside from each incentive program providing funding to facilitate the transition to clean vehicle technologies, to the extent possible, fleets may want to stack up and combine multiple funding sources to reduce the cost of transition. Examples include using one grant to fund vehicles and another to fund charging infrastructure, using a state grant to meet the match requirements of a federal grant, or stacking non-utility funding with participation in a utility program. It should be noted that despite the incentive programs having their own unique eligibility criteria, these programs often provide stacking opportunities. For example, with respect to HVIP program, local- and federal-funded incentives may be combined with HVIP vouchers, so long as each incentive program is not paying for the same incremental costs, or the total sum of incentives does not exceed the total cost of the vehicle. Local incentives that may be combined with HVIP include programs administered by local air districts or local municipalities that are locally funded. Federal incentive programs may be combined with HVIP vouchers, including funding provided by the Federal Transit Administration (FTA), the Department of Energy (DOE), and other federal agencies. Except for public transit buses, stacking HVIP with State-funded incentives is not allowed. To clarify this, Table 20 shows the stacking opportunities across various funding sources described in this report. Each cell in the table shows whether the two funding programs (the one representing the row and the one representing the column) can be stacked or not. In cases, where one funding program only pays for infrastructure and the other program only pays for vehicles, we marked those as “No Overlap”.

Table 20. Stacking Opportunities across various programs

Program	IRA	Alt. Fuel Infrastructure Tax Credit	CMAQ Program	HVIP	Carl Moyer	EnergIIZE	CVRP	LCFS	TCIRP	BAAQMD Charge!	PG&E Charging Infrastructure Rebates
IRA	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Alternative Fuel Infrastructure Tax Credit	Yes	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CMAQ	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HVIP	Yes	Yes	Yes	N/A	No	No	No	N/A	No	No Overlap	No Overlap
Carl Moyer	Yes	Yes	Yes	No	N/A	No	No	Yes	No	No Overlap	No Overlap
EnergIIZE	Yes	Yes	Yes	No	No	N/A	No	N/A	No	Yes	Yes
CVRP	Yes	Yes	Yes	No	No	No	N/A	N/A	Yes	No Overlap	No Overlap
LCFS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes
TCIRP	Yes	Yes	Yes	No	No	No	Yes	Yes	N/A	Yes	Yes
BAAQMD Charge!	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
PG&E Charging Infrastructure Rebates	Yes	Yes	Yes	No Overlap	No Overlap	Yes	No Overlap	Yes	Yes	Yes	N/A

Funding Strategy Recommendations

Fleet electrification is crucial for reducing emissions and achieving sustainability goals, but it poses challenges such as high upfront costs, limited charging infrastructure, and the need for specialized maintenance and training. Although zero-emission vehicle and infrastructure costs are expected to decrease over time, present financial burdens are hindering more widespread or rapid adoption. This guide identifies funding and financing options that can help advance fleet electrification and infrastructure deployment. Various funding and financing sources are available, including federal, state, and utility programs. The programs identified in this guide were selected based on the City's likely eligibility to receive funds, based on each specific program's requirements. Most programs identified in this guide do not require matching funds and can offer tens to hundreds of thousands of dollars in fleet electrification support; however, most of these programs only provide funding for either just zero-emission vehicle purchases or just refueling infrastructure. Additionally, total funding amounts vary based on vehicle size and purpose, as well as charger power levels in the case of EV infrastructure. As the City embarks on its fleet electrification process, the following recommendations based on vehicles and infrastructure may be considered. For more detailed explanations of the various funding and financing options, see the **Error! Reference source not found.** and

Financing Component sections in the **Error! Reference source not found.** of this report.

Options for Medium- and Heavy-Duty EVs

A funding strategy to consider for medium- to heavy-duty zero-emission vehicles that combines different incentives for maximum financial support is listed below:

1. State programs (non-stackable) directed towards fleet vehicles, such as one of:
    a. Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)
    b. Carl Moyer Program
    c. VW Environmental Mitigation Program
2. Federal program directed towards fleet vehicles and EV charging infrastructure, such as the:
    a. Inflation Reduction Act
    b. CMAQ Improvement Program
3. Financing for leased or owned fleet vehicles, through options such as:
    a. Public-Private Partnerships such as Sustainability Partners
    b. Purchasing Contracts from Sourcewell

First, consider the funding potential from State programs. The funding potential of State programs is significant, ranging between thousands and hundreds of thousands of dollars for eligible zero-emission vehicles. However, funding provided by one State program cannot be stacked with funding from another State program. Moreover, any additional funds towards the same vehicle or fleet of vehicles must come from other sources, which can either be the applicant's own matching funds or funds from local and federal incentives.

The choice between one of the three primary State programs can be narrowed down based on the City's specific vehicle needs. For example, HVIP offers funding for more vehicle classes. HVIP's maximum base amount of funding increases incrementally between Class 2b through 8 vehicle classes, ranging between $7,500 to $120,000 (as shown in Table 2). Since the City has more medium-duty vehicles than heavy-duty vehicles, funding potential could be maximized through the HVIP program and a combination of other local or federal incentives. **ICF estimates the City of Pittsburg could receive approximately $325,000 in funding through HVIP**. On the other hand, if the City foresees higher utilization of heavy-duty vehicles into the future, it may consider the Carl Moyer Program or VW Mitigation Program instead. However, pursuing either the Carl Moyer or VW Mitigation programs would mean the City would have to adhere to scrappage requirements set by those programs.

Assuming the City selects one of the three primary State programs, the next applicable pool of funding could come from the IRA, which would pay the minimum of 30% of the vehicle purchase price or the funding cap based on the GVWR. Additionally, the City may submit a CMAQ Program application for zero-emission vehicle and infrastructure funding, if it can demonstrate emission reductions that would benefit a nonattainment zone. It is likely the case that federal funding would be applied after whatever amount is discounted by the selected State program, and any remaining balance due on the vehicle purchase would need to be fulfilled either by the City or through a financing agreement in the form of a loan or bond program.

Options for Light-Duty ZEVs

A funding strategy to consider for light-duty zero-emission vehicles that combines different incentives for maximum financial support is listed below:

1. State program directed towards passenger vehicles, such as:
    a. California Clean Vehicle Rebate Project (CVRP) – *The program is no longer accepting application and the City of Pittsburg is unlikely to receive CVRP funds.*
2. Federal program directed toward passenger vehicles, such as:
    a. Inflation Reduction Act
    b. CMAQ Improvement Program
3. Financing for leased or owned passenger vehicles, through options such as:
    a. Public-Private Partnerships
    b. Purchasing Contracts from Sourcewell

Based on current program descriptions and requirements, there are less funding opportunities for light-duty zero-emission vehicles compared to those for medium- and heavy-duty zero emission vehicles. Accordingly, most of the funding that the City may find itself eligible for is through the IRA or approved CMAQ Program project, in the form of direct payments and grants, respectively. Alternatively, the City may consider mixed ownership contracts through innovative PPPs or Sourcewell contracts.

Options for Charging Infrastructure

A funding strategy to consider for charging infrastructure that combines different incentives for maximum financial support is listed below:

1. State programs, such as some of:
    a. Energy Infrastructure Incentives for Zero-Emission (EnergIIZE)
    b. California Electric Vehicle Infrastructure Project (CALeVIP) – *The City of Pittsburg is not currently eligible for funding through this program*
    c. Low Carbon Fuel Standard (LCFS)
2. Utility programs directed towards charging infrastructure, such as the:
    a. PG&E Charging Infrastructure Rebates
3. Local programs directed toward charging infrastructure, such as the:
    a. BAAQMD Charge! Program

4. Federal programs, such as the:
    a. Inflation Reduction Act
    b. CMAQ Improvement Program
5. Financing programs, such as the:
    a. Charging Infrastructure-as-a-service
    b. Financing Options through IBank, namely:
        i. Infrastructure State Revolving Fund (ISRF)
        ii. Climate Tech Finance

Based on current program descriptions and requirements, the greatest stacking potential exists within the charging infrastructure landscape. In the case of funding for charging infrastructure, most State program incentives can be combined with other federal, state, or local agency incentives; it should be noted, however, that applicants are ineligible to receive from CALeVIP if the applicant has already received funds from investor-owned utilities (IOUs).

In addition to EnergIIZE and CALeVIP, the City would be eligible to generate LCFS credits from electricity dispensed by charging infrastructure and sell the credits through a broker for additional funds. As with vehicle procurement, the IRA (through the Alternative Fuel Refueling Property Credit) is another funding option available to reduce overall charging infrastructure project costs, provided that the site meets the outlined environmental justice requirements. In the case that the City is ineligible for charging infrastructure tax credits from the IRA, direct payments are available specifically for the Commercial Clean Vehicle Credit and Alternative Fuel Infrastructure programs. Other options, such as the ISRF and ClaaS, are available for acquisition or operation stages, respectively.

Projected Costs-Benefit & Barriers to Fleet Conversion

Cost of Transition of Fleet Electrification

To provide a holistic view of the implications of transitioning City's fleet to EV and ensuring that the City is well-informed about the short-term and long-term cost considerations of this significant move, the project team conducted a comprehensive assessment of the costs associated with transitioning the City's fleet to EV. This evaluation included several key financial aspects, including the capital costs of the vehicles themselves as well as the operation and maintenance expenses, which are often distinctively different for EVs compared to traditional ICE vehicles. The cost of deploying the necessary charging infrastructure was another crucial factor, taking into account the installation of charging stations and the associated hardware. Furthermore, the assessment addressed the expenses involved in upgrading both the facility and utility electrical infrastructure to support the increased power demand and ensure efficient charging capabilities.

The fleet electrification cost analysis revealed that transitioning to EVs is a more expensive option than business-as-usual ICE vehicle replacements. The project team conducted two cost analyses regarding the replacement of the current fleet with EVs: one without incentives and one factoring in government incentives that reduce the costs of vehicles and their respective charging infrastructure. In the scenario excluding incentives, transitioning to EVs is projected to be approximately 20 percent more expensive than maintaining ICE vehicles by 2040. However, when accounting for incentives such as the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP), PG&E EV Fleet Program, and tax credits provided through Inflation Reduction Act (IRA), the cost of switching to EVs is estimated to be about 8 percent higher than replacing the fleet with ICE vehicles by the same year. These cost analyses are illustrated in Figure 11 and Figure 12, showing net present value (NPV) costs for the fleet without incentives and with incentives, respectively. Please be aware that the cost figures presented here may vary slightly from the cost data provided earlier in the document. The primary reason for this discrepancy is that the costs in these figures are represented as the Net Present Value (NPV) with a discount rate of 5 percent, while the earlier provided cost data did not incorporate this calculation.

As shown, EVs have significantly lower operating costs than their ICE counterparts. EVs have lower fuel costs since they are powered by electricity, which is typically cheaper than gasoline or diesel fuel. Additionally, EVs have fewer moving parts, which means they require less maintenance and have lower repair costs. This leads to lower total cost of ownership over the vehicle's lifetime. Moreover, EVs are becoming increasingly cost-competitive with ICE vehicles in terms of upfront costs. While the initial cost of an EV is typically higher than a comparable ICE vehicle, this cost differential is shrinking as EV technology improves and production volumes increase. Funding in the form of incentives and grants for EVs also contribute to reduced capital cost burdens for vehicles.

The analysis showed that EV replacements recommended for the City of Pittsburg have a 76 percent reduction in NPV fuel costs and a 37 percent reduction in maintenance costs compared to ICE vehicles. Without incentives, overall EV capital costs are approximately 23 percent greater than ICE vehicle capital costs; with incentives, however, EV capital costs are only 2 percent greater than ICE vehicle capital costs, with the greatest savings available for vehicles subject to the ACF regulation.

Figure 11. Fleet TCO Comparison - NPV Costs (without incentives)

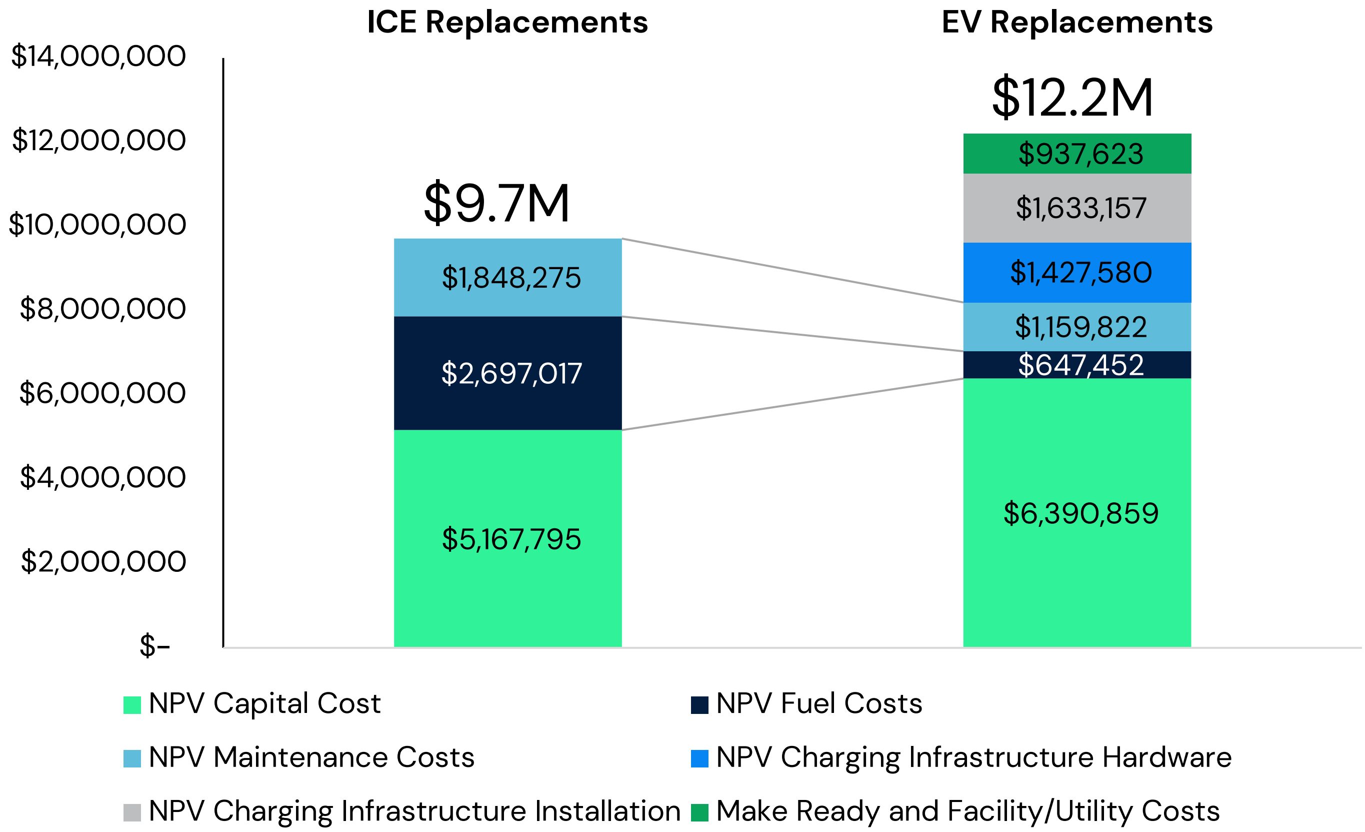
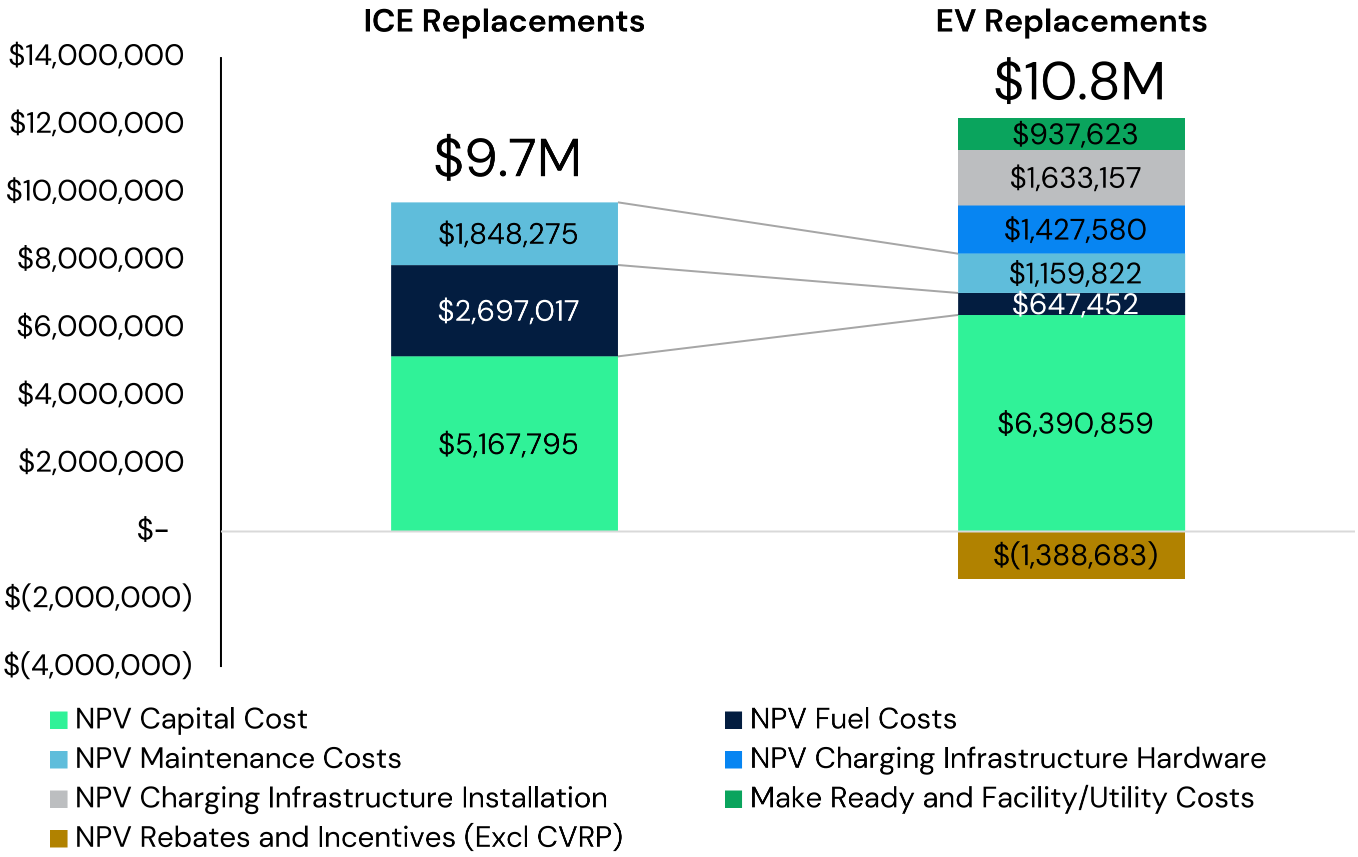


Figure 12. Fleet TCO Comparison - NPV Costs with applicable incentives (amount not guaranteed)



As the City of Pittsburg plans to build a fleet EV charging infrastructure, it is important to consider the maintenance costs, staffing needs, and any additional training required for maintenance staff. Transitioning to EVs and installing charging infrastructure will necessitate extra staffing for maintenance and operations, such as regular upkeep of the charging equipment, addressing any issues, and ensuring the equipment functions properly. In terms of staffing, the City might need to hire new employees or assign existing staff members to handle these tasks. This could involve electricians, maintenance technicians, or other trained personnel with the necessary skills and knowledge to maintain the charging infrastructure. Moreover, the City should consider the level of training required for their staff to maintain the infrastructure, including electrical safety, troubleshooting, repair techniques, and other relevant skills. All of these factors will incur additional costs for the City, which must be taken into account. Note that the cost information provided earlier does not include the staffing and maintenance costs associated with EV charging infrastructure. EV and EVSE operation and maintenance best practices are discussed later in the **Error! Reference source not found.** section of this Master Plan.

Environmental Benefit of the Transition

In addition to the long-term cost savings of transitioning to an EV fleet, this analysis has also shown that the decision can yield significant environmental benefits for the City of Pittsburg. Our analysis indicates that the transition to EVs can provide substantial environmental benefits in addition to cost savings for the City of Pittsburg. Specifically, we found that the EV replacement scenario could result in a reduction of more than 10,000 metric tons (MT) of GHG emissions over the lifespan of the vehicles (Figure 14). This would be equivalent to removing more than 2,100 passenger vehicles from the California roadways for the period of one year or planting approximately 167,109 trees. Additionally, over 15,000 lbs. of nitrogen oxide (NOx) emissions would be eliminated. These results highlight the significance of sustainable transportation practices in reducing the transportation carbon footprint and addressing the adverse impacts of climate change.

Figure 13. Summary of Environmental Benefits with the EV Replacement Scenario

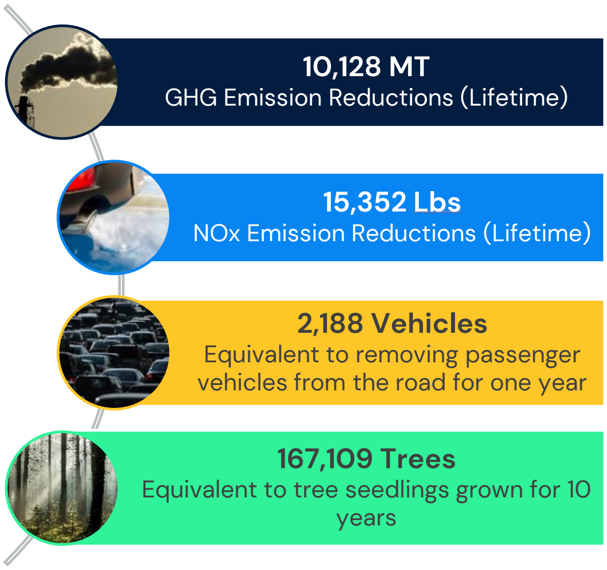
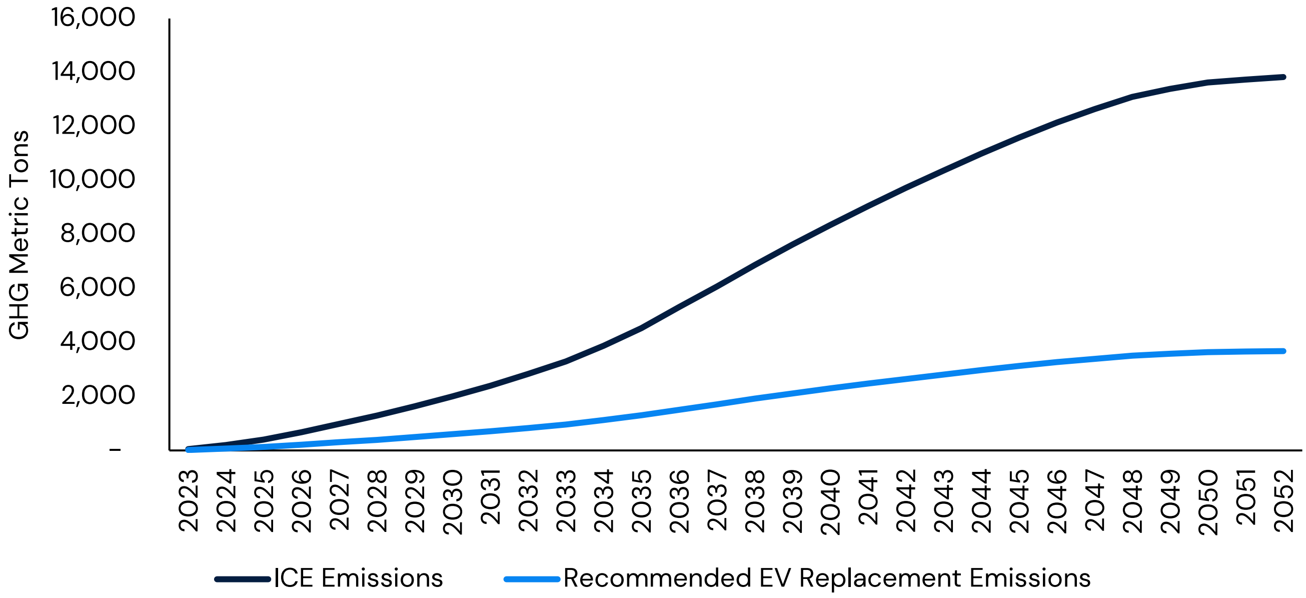


Figure 14. Total Fleet Cumulative GHG Emissions (MT), by Vehicle Replacement Scenario



Barrier to Transition

Moving to an EV fleet involves a complicated and diverse approach that requires the City to undertake careful consideration. There are numerous significant obstacles to transitioning the City of Pittsburg's fleet to EVs, including the higher initial expenses of EVs relative to ICE vehicles, the limited availability of EV models, the possibility of production capacity constraints, an ever-changing distribution network, and the necessity for charging infrastructure development. Moreover, factors such as range anxiety, reliance on the power grid, space constraints for charging, and workforce training for EV and EVSE maintenance could pose challenges in the transition process. This section delves deeper into some of these challenges.

Technology Availability & Procurement Challenges

One of the most significant procurement challenges associated with fleet electrification is the limited availability of vehicles and charging infrastructure at hand or ready to deploy. On the vehicle side, although the number of EV models on the market is increasing, the selection remains limited compared to ICE vehicles. This can pose challenges for cities trying to find the right type of EV to meet specific needs and requirements for various municipal services. Furthermore, EV manufacturers may encounter limited production capacity, potentially leading to longer delivery times for cities purchasing EVs for their fleets. The COVID-19 pandemic has underscored the vulnerability of global supply chains, with disruptions in parts and components supply impacting EV production. Despite the availability of EV technologies, the distribution network is still evolving. In some regions, dealership networks might be limited, making it more difficult for cities to access and purchase EVs for their fleets. Ultimately, these issues could affect the pace of fleet electrification.

Regarding infrastructure, the manufacturing of specialty equipment, like transformers, can involve long lead-times, potentially delaying planned vehicle or charger purchases. This is because, without the added load capacity, the grid might be unable to accommodate the increased power demand. Coordination with suppliers and contractors to identify areas where site readiness can be expedited will be critical for seamless EV charger installations.

Infrastructure Buildout Challenges

As the City moves towards expanding its fleet of EVs, it must proactively anticipate and address the challenges associated with installing sufficient charging stations to support its goals. Deploying charging infrastructure in a strategic and planned manner can help address these challenges more effectively. One of the challenges the City may face is electric grid limitations as well as site electrical infrastructure constraints. Therefore, it is necessary to review the distribution network by utility representatives to determine whether upgrades will be required or recommended. Interconnection challenges may vary based on the location, number, and schedule of charging stations, as well as charging speed. There is another potential challenge that may arise during the transition to an all-electric fleet, which is related to site constraints. EV charging infrastructure typically requires dedicated parking spaces for charging, potentially affecting the availability of parking for other vehicles. This can be particularly challenging in areas where parking is already limited.

Moreover, EVs rely on electricity, and disruptions to the power grid can impact the city's ability to charge its vehicles. This is particularly challenging during extreme weather events that cause widespread power outages. Most EV charging stations lack backup power sources, which can impact the ability of the city to keep its EV fleets charged and operational during emergencies. Additional costs could potentially be incurred as it relates to back-up generation sources and fuel to operate said equipment. As illustrated earlier, the project team's high level cost estimates of a PV/BESS backup power system that can fully support the EV charging for the period of 4 hours could cost roughly more than $6.8 million.

Emergency Response Vehicles

Transitioning emergency response vehicles – such as police patrol vehicles – to EV presents a unique set of challenges that need to be carefully considered and addressed. One of the primary concerns is ensuring that EVs can meet the rigorous performance and reliability standards required for emergency response, including high-speed acceleration, extended driving range, and the ability to handle diverse driving conditions. Additionally, these vehicles must be able to support the power demands of specialized equipment, such as communication systems, emergency lights, and other life-saving tools, without significantly reducing their driving range. Another challenge lies in the availability and deployment of charging infrastructure that can provide fast and reliable charging for emergency response vehicles. These vehicles may require more frequent charging due to the high energy demands associated with emergency response operations, which could lead to increased downtime if charging infrastructure is insufficient or unreliable. Ensuring that charging stations are strategically located near emergency response facilities and are compatible with the unique needs of emergency vehicles is essential to maintaining an effective response capability.

Consideration for Maintenance & Operation

Unlike traditional internal combustion engine vehicles, EVs have different maintenance needs, emphasizing the importance of specialized knowledge and practices. Similarly, the upkeep of EV charging infrastructure is vital. This involves routine checks and servicing of charging stations to ensure they are functioning correctly and safely, thereby preventing downtime and ensuring consistent availability for users. This section is intended to provide some of the key maintenance and operational considerations essential for the effective functioning of EVs and their charging infrastructure. These discussions aim to highlight best practices and strategies crucial for ensuring optimal performance and longevity of these systems.

EV and EVSE Operation and Maintenance Best Practices

Maintenance of Charging Stations: Maintaining charging stations is crucial, particularly for DC Fast Chargers due to their complex cooling systems and filters. The City of Pittsburg is expected to install 37 such stations to facilitate its fleet's transition to electric vehicles. Most suppliers of charging stations provide warranties and service plans tailored to the specific usage and site requirements of each station. These plans are crucial as they can offer significant savings on maintenance, repairs, and replacement costs, making them a wise investment for long-term operational efficiency.

Preventive Measures for Charging Station Maintenance: Several preventive strategies are recommended to enhance the durability and functionality of charging stations. Protective screens should be used to shield the stations from direct sunlight, thereby reducing overheating risks and preventing malfunctions. Additionally, installing bollards and clear signage can protect the stations from accidental vehicle collisions. Using shorter charging cords or establishing procedures for secure cord storage when not in use can also minimize damage risks, protecting the cords from unnecessary exposure to vehicles and pedestrians.

Adapting Vehicle Lifts for Electric Vehicles: Given that electric vehicles tend to be heavier than traditional internal combustion engine vehicles, it is important for the City of Pittsburg to ensure that its vehicle lifts can handle this extra weight. Manufacturers now often design lifts specifically for electric vehicles, taking into account aspects like sensitive wiring and battery placement. There are also specialized lifts designed exclusively for handling electric vehicle batteries.[17] Whether the City opts to update its existing equipment or purchase new lifts, verifying compatibility with each vehicle's specifications is key to ensuring safe and efficient maintenance.

Repair Shop Reconfiguration: In the context of EV repair shops, a critical safety consideration is maintaining a minimum clearance of 10 feet from any metallic objects. This clearance is necessary due to the high-voltage systems used in EVs, which pose a risk of electrical arcing – a discharge of electricity through the air that can occur when high voltage comes into close proximity with conductive materials like metal. This precaution is essential to protect technicians and equipment

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[17] https://www.fleetmaintenance.com/in-the-bay/shop-equipment/article/21295545/ev-lifts

from potential electrical hazards that can arise during the repair and maintenance of EVs. For the City, this means a careful evaluation and possible reconfiguration of their existing repair facilities is necessary if they currently do not provide this level of clearance. Adhering to this safety standard is not only a matter of compliance but also a proactive measure to ensure the safety of personnel and the integrity of the EVs being serviced.

Security and Theft Prevention for Electric Vehicle Supply Equipment: Security is a vital consideration for Electric Vehicle Supply Equipment (EVSE). Many systems come equipped with theft-deterrent devices or security cameras. To further enhance security, best practices include installing charging stations in well-lit, visible areas, or behind restricted-access barriers such as gates. The use of dashboard cameras in electric vehicles can also monitor surroundings during parking. Additionally, implementing protocols such as locking vehicles during charging sessions and possibly employing a parking attendant can significantly bolster security measures.

Cybersecurity for Networked Charging Stations: For networked charging stations, adhering to the latest cybersecurity standards is essential. Standards like ISO 15118, which governs vehicle-to-grid communication interfaces, should be implemented. Additionally, seeking cloud-based security solutions from cybersecurity firms can provide an extra layer of protection against potential cyberattacks, ensuring the integrity and reliability of the charging network.

Strategies for Power Outage Resiliency: Considering the battery storage capabilities of most EVs, which allow them to go without charging for a day or two, it is still wise to have a resilience strategy for power outages. Implementing off-grid solutions like generators or additional energy storage systems can be an effective way to ensure continuous operation of the fleet during power disruptions. As discussed earlier, the use of DER solutions can also be considered by the City.

Safety Protocols for Accidents and Fires Involving Electric Vehicles: In the event of an accident or fire involving an EV, specific safety protocols should be followed. If feasible, the vehicle should be moved to a safe location 50 feet away from any structure or other vehicle, secured, and turned off, with the hazard lights activated. Contacting emergency services and keeping a safe distance is critical in case of a fire. Personnel should not attempt to handle exposed electrical components or leaking fluids. Training courses like Safe Handling of High Voltage Battery Systems from SAE International and Electric Vehicle Community Preparedness Online Training from the National Fire Protection Association can greatly enhance staff knowledge and preparedness for dealing with electric vehicles and their batteries. Additionally, if thermal runaway occurs, the vehicle should be isolated at least 50 feet away from the nearest structure. City personnel must contact emergency responders to direct water at the battery and immediately call the vehicle manufacturer. Engineers from the manufacturer will likely need to disassemble and de-energize the battery to mitigate serious electrical hazards.[18]

Avoiding Arc Flashes: An arc flash is a dangerous electrical phenomenon that occurs when an electric current travels between conductors instead of through its intended path. Handling EV

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[18] https://www.nfpa.org/news-blogs-and-articles/nfpa-journal/2020/01/01/ev-stranded-energy

batteries increases the risk of arc flashes due to their high voltage and lithium-ion components. City staff should be properly trained and follow manufacturing guidance when handling EV batteries. Additionally, staff should use arc-rated flame-resistant personal protective equipment, including gloves, balaclavas, and face shields. Staff should also follow safety protocols such as isolating electrical systems, disconnecting battery links, and regularly conducting electrical safety tests. Regarding vehicle lifts, Occupational Safety and Health Administration (OSHA) recommends that vehicles and other electric machinery should maintain a 10 feet clearance from energized overhead lines. The project team recommends the City follow these protocols when maintaining and repairing its EV fleet while also consulting with each respective vehicle’s manufacturer to ensure safety.

Staffing & Workforce Development

As the City of Pittsburg embarks on its transition to an EV fleet, significant staffing and workforce considerations are essential to ensure a smooth and efficient shift. One of the primary areas of focus is training for both the operational and maintenance aspects of EVs and their charging infrastructure.

From an operational standpoint, staff who will be driving or managing the fleet will require comprehensive training on the specifics of EV operation. This includes understanding the nuances of EV driving dynamics, range management, and efficient utilization of charging infrastructure. Additionally, training in new software systems and digital tools often associated with EV fleet management is crucial. It is important for the City to either upskill current employees or recruit individuals with experience in EV technologies and fleet management.

Maintenance of EVs and their charging stations presents a different set of requirements. The technical skills needed for maintaining and repairing EVs differ significantly from those for traditional internal combustion engine vehicles. For instance, EV maintenance staff will need to be proficient in handling high-voltage systems, battery management, and electronic control systems. Safety training is also paramount due to the high voltage present in EVs. The City should consider developing a training program or partnering with technical schools or manufacturers for specialized EV maintenance training. Furthermore, as the charging infrastructure is a critical component of the EV ecosystem, staff must be trained in its maintenance, including troubleshooting and repairing charging stations, managing software updates, and ensuring the infrastructure's connectivity and security.

In conjunction with the training requirements, a critical aspect that the City must consider is the reassessment of its staffing levels to support the transition to an EV fleet. This transition is not merely about replacing vehicles; it involves the integration of entirely new systems and infrastructure, which may require a different skill set compared to traditional vehicle fleets. In the initial stages, there is likely to be an increased workload due to the setup and integration of EV-specific infrastructure, such as charging stations, and the implementation of new fleet management software systems. This surge in workload might necessitate the addition of new personnel who are specialized in EV technology and infrastructure.

The City should evaluate the possibility of hiring new employees who possess technical expertise specific to EVs and their associated systems. This could include specialists in EV maintenance and repair, electrical engineers for charging infrastructure, and IT professionals for managing the software systems associated with modern EV fleets. Additionally, there may be an opportunity to reallocate existing staff who have relevant skills or show potential for upskilling. For instance, current fleet maintenance personnel could be trained in EV-specific maintenance and repair, leveraging their foundational automotive skills while expanding their technical capabilities to include the nuances of electric vehicles. Similarly, staff involved in fleet operations could undergo training in EV fleet management and data analysis, adapting their existing expertise to the new technology.

This strategic approach to staffing ensures that the City not only has the necessary manpower to handle the initial setup but also maintains a skilled workforce capable of supporting the long-term operation and maintenance of the EV fleet. It is a balance between augmenting the team with new talent and investing in the existing workforce to develop the required competencies, ensuring the City is well-equipped to manage this significant shift in its transportation infrastructure.

Recommendations For Implementation

Taking an EV transition plan into the implementation phase requires a significant amount of planning, coordination, and allocation of resources. It is a complex process that involves multiple steps and considerations, as outlined in this report.

The starting point of this process should be the creation of a comprehensive implementation plan. This plan must outline specific steps to be taken, establish timelines for each action, and allocate the necessary budget for shifting to an EV fleet. Key elements in the plan should include necessary infrastructure upgrades, the full infrastructure layout, budget planning, procurement strategies, and coordination with utilities. For example, one of the most important next steps is to conduct a comprehensive analysis of the charging infrastructure. This includes the development of engineering documents outlining the technical specifications for the charging stations to ensure their safe and efficient installation. These engineering drawings should depict the precise location of EV charging infrastructure as well as the layout of equipment, service equipment locations, and service line connections.

Securing adequate funding is a pivotal aspect of this transition. City of Pittsburg should explore diverse funding avenues like grants, loans, and other financial mechanisms to ensure the transition is both timely and cost-effective. Additionally, the City must evaluate various procurement strategies for acquiring EVs, which could range from leasing to outright purchasing, based on specific needs and resource availability.

Forming a dedicated project team with expertise in fleet management, EV charging infrastructure, procurement, and finance is crucial for a successful transition. Collaborating with key stakeholders, including utility companies, EV manufacturers, and charging infrastructure providers, will also be integral. A critical step in implementation, for example, will involve discussions with PG&E to prepare potential charging sites to handle the required load and number of charging stations. These discussions may lead to upgrades in distribution infrastructure, such as transformers, and enhancements at the site level, like electrical panel upgrades, to accommodate the increased demand from charging stations.

Another key implementation step is establishing a pilot program. Pilot programs offer a strategic avenue to test the feasibility of the transition plan on a smaller scale. This approach allows the City of Pittsburg to identify and resolve potential challenges or issues before committing to a full-scale implementation, paving the way for a smoother and more efficient transition to an EV fleet. For example, the City of Pittsburg has recently taken a significant step in its journey towards fleet electrification by acquiring several Ford Mach-E pursuit-rated vehicles for its police department. This move represents a bold initiative to assess the viability and reliability of EVs in law enforcement operations. By integrating these advanced EVs into their fleet, the City is not only testing their performance in demanding police work but also ensuring that any potential issues are thoroughly addressed before fully transitioning its fleet to electric vehicles. This pilot program places Pittsburg among a select group of cities in the country that are proactively exploring the use of EVs in their police departments.

Appendix A – Details of Funding & Financing Programs

Funding Programs

Federal Programs

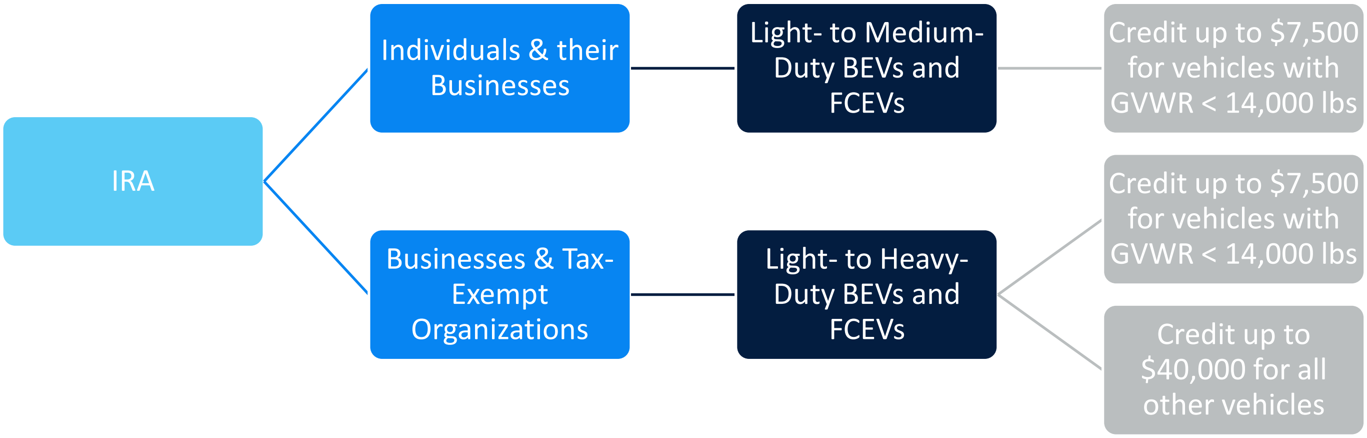
There are several federal incentive programs that are aimed at increasing the adoption of EVs and the installation of EV charging stations. Some of the key federal incentive programs include the Inflation Reduction Act (IRA) and the Alternative Fuel Infrastructure Tax Credit. These incentive programs offer different tax credits for qualifying vehicles and can reduce EV charging equipment installation costs. The federal government has initially aimed its incentive programs towards the promotion of light-duty electric vehicles (EVs) and the installation of lower-power EV charging stations. However, there are now programs available that cater to medium-duty and heavy-duty EVs as well. This section is meant to provide a general overview of the federal incentive programs that the City may be eligible for and serve as a starting point for the application process.

Inflation Reduction Act

The IRA contains several provisions aimed at increasing the number of clean fuels and vehicles used by fleets. The IRA will offer refundable income tax credits for qualifying EVs and extends tax credits for alternative fuel refueling property through 2032. Notably, the IRA will provide different tax benefits based on the type of applicant and type of EVs being considered for purchase. Figure 15 features an illustration that breaks down eligible applicants, types of EVs, and maximum applicable tax credits under the IRA. The final tax credit amount offered through IRA is the smallest of the following amounts:

- 30% of the vehicle purchase price for EVs and FCEVs
- The incremental cost of the vehicle compared to an equivalent internal combustion engine vehicle

Figure 15. Summary of IRA Tax Credits Available for Individuals and Commercial Entities



The IRA has several clean vehicle credit options, most notably: 1) Credits for New Clean Vehicles Purchased in 2023 or After and 2) Commercial Clean Vehicle Credits. Individuals and their businesses may qualify for a credit up to $7,500 when buying new, qualified battery electric vehicles (BEV) or fuel cell electric vehicles (FCEV) assembled in North America. Qualifying BEVs must have a battery capacity of at least 7 kilowatt-hours (kWh) and have a gross vehicle weight rating (GVWR) of less than 14,000 lbs.; no restrictions are set for FCEVs. Additionally, the vehicle's manufacturer suggested retail price (MSRP) cannot exceed $55,000 for light-duty vehicles or $80,000 for vans, SUVs, and pickup trucks. Credit for new clean vehicle purchases between 2023 through 2032 can be claimed by filing Form 8936, Qualified Plug-In Electric Drive Motor Vehicle Credit, and providing the vehicle identification number (VIN). One important thing to note is that the Clean Vehicle Credit is not eligible for direct pay.

Businesses and tax-exempt organizations can receive a tax credit or direct payment of up to $40,000 for buying a qualified commercial clean vehicle under IRC 45W. The credit amount is based on the lesser of 15% of the vehicle's basis or the incremental cost of the vehicle. The maximum credit is $7,500 for qualified vehicles with GVWRs under 14,000 pounds and $40,000 for all other vehicles. To qualify, the vehicle must be made by a qualified manufacturer as defined in IRC 30D(d)(1)(C), be for use in the business, not for resale, primarily used in the US, and not have received a credit under sections 30D (Clean Vehicle Credit) or 45W (Commercial Clean Vehicle Credit). The vehicle must meet also one of the following requirements a) It must be treated as a motor vehicle for purposes of title II of the Clean Air Act and manufactured primarily for use on public roads (excluding vehicles operated exclusively on a rail or rails), or b) It must be classified as mobile machinery according to IRC 4053(8), including vehicles that are not designed to transport a load over a public highway. Additionally, the vehicle or machinery must be either a plug-in electric vehicle that draws significant propulsion from an electric motor with a battery capacity of at least 7 kilowatt hours if the gross vehicle weight rating is under 14,000 pounds, or 15 kilowatt hours if the GVWR is 14,000 pounds or more. Alternatively, it can be a fuel cell motor vehicle that meets the requirements of IRC 30B(b)(3)(A) and (B). There is no limit to the number of credits a business can claim, but the credits are nonrefundable and can only be carried over as a general business credit.

Additionally, the Alternative Fuel Infrastructure Tax Credit is a federal income tax credit for businesses and individuals who install alternative fuel infrastructure. As of January 1, 2023, fueling equipment for natural gas, propane, hydrogen, electricity, E85, or diesel fuel blends containing a minimum of 20% biodiesel, is eligible for a tax credit of 30% of the cost or 6% in the case of property subject to depreciation, not to exceed $100,000. Note that permitting and inspection fees are not included as part of the covered expenses. Also note that under IRC 30C, the Alternative Fuel Infrastructure Tax Credit is direct pay eligible, meaning that entities that do not benefit from income tax credits, such as state, local, and Tribal governments or other tax-exempt entities can elect to receive these tax credits in the form of direct payments.

Eligible fueling equipment must be installed in locations that meet one of the following census tract requirements:

- The census tract is not an urban area;

- A population census tract where the poverty rate is at least 20%; or
- Metropolitan and non-metropolitan area census tract where the median family income is less than 80% of the state median family income level.

Additionally, eligible projects must also meet workforce requirements, such as apprenticeships and prevailing wages. To apply for the credit, the Internal Revenue Service (IRS) requires that Form 8911 be completed and filed with a federal income tax return.

ICF estimates the City of Pittsburg could receive $820,000 in incentives through IRA tax credits.

CMAQ Improvement Program

The Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL), continues the Congestion Mitigation and Air Quality Improvement Program (CMAQ). The CMAQ Program provides funding to State DOTs and MPOs for projects that reduce mobile source emissions in nonattainment or maintenance areas. Eligible project types include transit improvements, travel demand management strategies, congestion relief efforts (such as high occupancy vehicle lanes), diesel retrofit projects, alternative fuel vehicles and infrastructure, and medium- or heavy-duty zero emission vehicles and related charging equipment. Projects supported with CMAQ funds must demonstrate emissions reductions, be in or benefit a U.S. EPA-designated nonattainment or maintenance area, and be a transportation project. Descriptions for projects relevant to fleet electrification and eligible for CMAQ funding are listed below:

1. **Diesel Retrofits:** Vehicle and engine replacements, engine rebuild and conditioning, after-treatment or other technologies, heavy-duty vehicle retirement programs; applies to on-road vehicles, non-road construction equipment, and freight and intermodal projects.
2. **Alternative Fuel Vehicles and Infrastructure:** Purchases, conversion to alternative fuels, diesel alternatives, hybrids; fueling facilities that dispense one or more alternative fuels (public and private facilities eligible).

The FHWA administers the federal-aid program through State DOTs and MPOs, which make decisions about how to spend federal transportation funds through a continuous transportation planning process. All eligible CMAQ funded projects must be included in the MPO's metropolitan transportation plans and transportation improvement program (TIP) where applicable, and the State DOTs statewide transportation improvement program (STIP). The City of Pittsburg's MPO is the Metropolitan Transportation Commission (MTC), which most recently issued a call for projects using CMAQ funds in May of 2022.[19]

Projects are ranked based on CARB's cost effectiveness calculation methodology[20], which calculates air quality benefits of a project as CMAQ dollars per pound of emissions, and the lower the value, the higher the rank. In other words, MTC reviews transportation projects with the lowest cost-effectiveness values to determine the final funding recommendations. Although no local match is required, the CARB cost effectiveness calculation methodology would estimate a lower cost

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[19] https://mtc.ca.gov/news/one-bay-area-grants-calls-projects-open-may

[20] https://ww2.arb.ca.gov/resources/documents/congestion-mitigation-and-air-quality-improvement-cmaq-program

effectiveness value if a project utilizes local dollars, which would make the project rank higher and increase the likelihood of approval.

To apply for CMAQ Program funding, the City would need to wait for the next call for projects by MTC and submit an application similar to MTC's One Bay Area Grant (complete with air quality calculations, project description, and work phase timeline). Note that private agencies and non-profit agencies can submit a CMAQ Program project application only if it establishes a partnership with a public agency, which would oversee the application and investment process.

State Programs

The State of California has its own set of programs that provide financial incentives to purchase or lease EVs. For example, the Clean Vehicle Rebate Project (CVRP) provides rebates up to $7,000 for the purchase or lease of a new, eligible zero-emission or plug-in hybrid light-duty vehicle. Additionally, CARB has several programs in place to increase the adoption of medium- and heavy-duty EVs and installation of charging stations. The Electric Truck and Bus Voucher Incentive Project (ETVIP) provides vouchers to cover a portion of the cost of medium- and heavy-duty electric trucks, buses and delivery vehicles. The Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) provides vouchers for the purchase or lease of hybrid and zero-emission medium- and heavy-duty trucks and buses. The Carl Moyer Program provides grants for the purchase of cleaner-than-required engines, including electric powertrains, for medium- and heavy-duty vehicles. The following sections are intended to provide high-level descriptions of State incentive programs the City may be eligible for and provide starting points for application processes.

Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)

The Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) is a first-come first-served, point-of-sale incentive program. HVIP funding is available for vehicles between Class 2b through 8 weight classes: the funding amounts for zero-emission vehicles by weight class for FY22-23 is shown in Table 21. Additionally, incentives for ePTO may cover up to 65% of the incremental cost of the ePTO, not to exceed the funding amounts listed in Table 22.

Table 21. HVIP FY22-23 Zero-Emission Funding Table

Vehicle Weight Class	Funding Amount (Base)
Class 2b	$7,500
Class 3	$45,000
Class 4-5	$60,000
Class 6-7	$85,000
Class 8	$120,000

Table 22. HVIP FY22-23 Eligible ePTO Voucher Table

Energy Storage Capacity	Base Vehicle Incentive
3 – 10 kWh	$20,000
10 – 15 kWh	$30,000
16 – 25 kWh	$40,000
>25 kWh	$50,000

For HVIP, purchasers are not required to apply for a voucher, instead, HVIP has streamlined the process by having dealers become HVIP-approved and having dealers submit requests for HVIP vouchers to CARB. Upon approval, the voucher amount is discounted from the purchase order. This process makes it simpler for purchasers to explore the HVIP-eligible vehicle catalog and work with HVIP-approved dealers for direct access to incentives. Currently, HVIP offers vouchers for 151 vehicles, many of which can be found across at least 65 HVIP-approved dealers in California.

Individuals who wish to purchase vehicles are allowed to request a maximum of 30 vouchers annually. It's worth mentioning that the voucher amount may be adjusted based on the type of applicant and vehicle. Table 23 outlines the voucher adjustments based on the applicant type, while Table 24 describes the adjustments based on the vehicle type. These adjustments to the voucher amount will be applied by the dealership, so it's recommended that buyers contact dealers ahead of time to find out if they are eligible for any increased voucher amounts. For instance, the City may be eligible for a 15% increase in the HVIP voucher amount, as census tracts in the area have been identified as disadvantaged communities by CARB[21].

Noteworthy to mention is that except for public transit buses, HVIP cannot be stacked with State-funded incentives. However, local- and federal-funded incentives may be combined with HVIP vouchers, so long as each incentive program is not paying for the same incremental costs, or the total sum of incentives does not exceed the total cost of the vehicle.

Table 23. HVIP FY22-23 Public and Private Fleet Voucher Adjustments

Voucher Adjustment Type	Voucher Adjustment Base
Public and Private fleets with 10 or fewer medium- and heavy-duty vehicles	+15%
Public fleets with 11 or more medium- and heavy-duty vehicles	0%
Private fleets with between 11 and 100 medium- and heavy-duty vehicles	0%
Private fleets with between 101 and 400 medium- and heavy-duty vehicles	-20%
Private fleets with more than 500 medium- and heavy-duty vehicles	-50%

Table 24. HVIP FY22-23 Vehicle Voucher Modifiers

Modifier Type	Modifier Amount
Class 8 Drayage Truck Early Adopter*	+25%
Refuse*	+25%
Disadvantaged Community**	+15%
Class 8 Fuel Cell	+100%
Public Transit Agencies***	+15%
School Buses for Public School Districts (not including Set-Aside funds)	+65%
Plug-in Hybrid	-50%
In-Use Converted/Remanufactured	-50%

*As part of CARB's Refuse Reimagined initiative, a voucher enhancement of 25% is applied to HVIP eligible refuse vehicles used for solid waste collection starting November 18, 2022. This increased incentive amount is available until Dec. 31, 2023. The existing Drayage Truck Early Adopter 25% voucher enhancement is also extended until Dec. 31, 2023.

**For vehicles domiciled in a disadvantaged community that are purchased or leased by any public or private small fleet with 10 or fewer trucks or buses, and less than $50 million in annual revenue for private fleets, or for any purchase or lease by a California Native American tribal government. There is no revenue provision for public fleets.

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[21] CARB Climate Investments Priority Populations 2022 CES 4.0

***The Public Transit Modifier is reserved for transit buses purchased by a city or county government; a transportation district/transit district; or a public agency. Public transit includes paratransit services.

Carl Moyer Program

The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program) is a grant program in California that provides funding to offset the incremental cost of purchasing or leasing eligible equipment or technologies that reduce emissions from mobile sources, such as medium- and heavy-duty trucks, buses, and other off-road vehicles and equipment. The Carl Moyer Program provides funding for the purchase or lease of new, cleaner engines and equipment and the retrofit or replacement of existing engines and equipment. This program covers a wide range of equipment types and technologies, including electric and hydrogen fuel cell vehicles, hybrid vehicles, and technologies to reduce emissions from diesel engines, such as diesel particulate filters and diesel oxidation catalysts. The program also provides funding for the purchase of alternative fuel vehicles and the installation of alternative fueling infrastructure such as electric vehicle charging stations, hydrogen fuel stations, and compressed natural gas fueling stations.

The Carl Moyer program is an example of a program that cannot be stacked with other State-funded programs, such as HVIP, and there are other caveats that make Carl Moyer distinct from HVIP and similar programs. One of the key differences between HVIP and Carl Moyer is the scrappage requirement. An applicant is required to scrap existing vehicles in order to use funds from the Carl Moyer program. This is to ensure that the funding will achieve early or extra emission reductions beyond the natural turnover of vehicles. Additionally, the Carl Moyer program only provides funding to replace vehicles that are six years and older. For example, this year, the newest existing engine model year that is eligible to participate in the program would be 2017, and 2018 to 2023 model year vehicles would not be eligible to be scrapped, leaving them available for purchase by any consumer.

Moreover, the Carl Moyer program applies a cost-effectiveness limit to calculate the amount of funding that can be allocated to a certain project. On November 19, 2021, CARB approved amendments to the Carl Moyer program's cost effectiveness limits and funding caps for optional advanced technology and ZE replacement on-road projects. The amended cost-effectiveness limits are presented in Table 25.

Table 25. Amended Cost-Effectiveness Limits for Carl Moyer Program

Cost-Effectiveness (CE) Limit Types	Old CE Limits ($/ton)	New CE Limits ($/ton)
Base Limit	$30,000	$33,000
Optional Advanced Technology Limit	$100,000	$109,000
On-Road Optional Advanced Technology Limit – 0.02 g/bhp-hr or cleaner	$100,000	$200,000
On-Road Optional Zero-Emission Limit	$100,000	$500,000
School Bus (combustion)	$276,230	$300,000

To apply for funding through the Carl Moyer Program, eligible entities must submit a grant application during the annual application period, and follow the guidelines and requirements outlined in the grant application. CARB evaluates applications based on specific criteria and selects the most promising projects for funding. Applicants must bear in mind that the Carl Moyer program also has tax implications. Current federal and state laws do not exclude Carl Moyer Program grants from gross income, and therefore, the grant received through these programs is subject to federal and state income tax. In other words, a fraction of the grant may have to be paid as income tax, which can increase out of the pocket costs for purchasing new vehicles with the Carl Moyer program.

VW Environmental Mitigation Program

The California Volkswagen (VW) Environmental Mitigation Program is a state initiative that aims to reduce the impact of VW's excess diesel emissions on the environment. It provides funding opportunities for eligible entities to implement projects that reduce NOx emissions from mobile sources like heavy-duty vehicles, trucks, and buses, as well as off-road equipment, ferries, and shore power systems. The program has a total allocation of $423 million, of which $90 million is allocated to zero-emission Class 8 trucks, including waste haulers, dump trucks, and concrete mixers. Public agencies, private companies, and nonprofit organizations are eligible to apply for funding on a first-come, first-served basis.

The VW Environmental Mitigation program has a vehicle scrappage requirement and requires that both the old and new vehicles operate within the State 75% or more of the time. It should be noted that as with most State programs, VW Trust funding cannot be stacked with other State funding sources, such as HVIP or Carl Moyer. However, like HVIP, transit agencies may stack Federal Transit Administration (FTA) funds with VW Mitigation Trust funds for purchasing zero-emission transit buses and supportive infrastructure. One caveat is that VW funds cannot be stacked with any other funding sources that takes credit for NOx emission reductions.

Table 26 below illustrates the eligibility criteria for VW Trust Fund. As shown, for non-government fleets, the program covers up to 75% of the cost of zero-emissions truck (with the maximum funding of $200,000) and 25% (50% for drayage trucks) of Low NOx natural gas engines (with the maximum funding of $85,000). As an example, if a new Class 8 ZE truck costs $350,000 before taxes, the amount of funding is calculated as the minimum of a) 75% x 350,000 = $262,500, and b) funding cap of $200,000. In this example, the available funding is $200,000. Alternatively, a non-drayage Low NOx CNG truck with a purchase price of $200,000 would have a funding amount equal to the minimum of a) 25% x $200,000 = $50,000, and b) funding cap of $85,000. In this case, the program would offer $50,000 toward purchasing a Low NOx natural gas truck.

Table 26. Eligibility Criteria for VW Environmental Mitigation Program for HD Vehicles

Baseline Equipment	Baseline Technology	Replacement Technology	Ownership Category	Maximum Incentive Percentage (of cost)	Maximum Incentive Cap (per equipment)
Class 8 Freight Trucks (including drayage trucks, waste haulers, dump trucks, and concrete mixers)	Engine Model Years 1992 to 2012*	Zero-Emission Vehicle	Non-Government	75%	$200,000
			Government	100%	
	Engine Model Years 1992-2012*	Low NOx (certified 0.02 g/bhp-hr)	Non-Government	25% (Non-Drayage)	$85,000
				50% (Drayage)	
			Government	100%	

Energy Infrastructure Incentives for Zero-Emission (EnergIIZE)

The California Energy Commission (CEC) Clean Transportation Program is a program that provides funding to support the development and deployment of clean transportation technologies in California, including EVs and EV charging infrastructure. The program offers funding for a wide range of clean transportation projects, including fleet electrification and charging infrastructure for medium- and heavy-duty vehicles.

As part of the draft funding allocations for FY 2022–23, CEC has allocated more than $160 million to support medium- and heavy-duty ZEV infrastructure to address the need for rapid transition to ZE technologies across the state. To facilitate distribution of the Clean Transportation Program funds allocated to MD-HD vehicles, in March 2022 the CEC and CALSTART launched the $50 million EnergIIZE Commercial Vehicles block grant which will provide exclusive zero-emission infrastructure funding to support the transition of MD-HD vehicles to BEVs and FCEVs. Participation in the EnergIIZE incentive project requires that the applicant or the funding recipient belong to one of the following categories: a) a business, organization, or individual responsible for the operation of a MD-HD ZEV (vehicle Class 2b and above) in the State, or b) a business, organization, or individual responsible for the engineering, construction, procurement, and completion of a ZE infrastructure site in the state of California which shall service MD-HD ZEVs Class 2b or above. EnergIIZE also establishes four "Funding Lanes" each with differing qualifications and incentive structures, as shown in Table 27. Of the four available funding lanes, the EV Fast-Track is the most accessible funding lane for the City of Pittsburg to participate in, since any of the following that apply mean that the fleet is eligible:

EnergIIZE EV Fast-Track Eligibility for Commercial Fleets

- Can provide proof of ownership for MD/HD ZEV(s) registered in the state of California.
- Can show proof of purchase order (PO) for a vehicle(s) registered in the State of California, funded or otherwise incentivized through state/federal projects. Funding and incentive sources may include but are not limited to: Clean Off-Road Equipment Voucher Incentive

Project (CORE), Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP), VW, Carl Moyer, AB 6178, California Secure Transportation Energy Partnership (CALSTEP) CMO, and DERA.

- MD/HD off-road equipment does not require vehicle registration, but must be reside and operate 75% of its time in the state of CA.

Table 27. EnergIIZE incentive structure across four funding lanes

	EV Fast-Track	EV Jump Start	Public Charging Station	Hydrogen Fueling
Type of Application	First Come, First Served	Competitive	Competitive	Competitive
Maximum Incentive Offering	50% of Hardware and Software Costs Incurred	75% of Hardware, Software, and Soft Costs	50% of Hardware and Software Costs Incurred	50% of Hardware and Software Costs Incurred
Eligible for Milestone Payments	Yes	Yes	Yes	Yes
Maximum Project Cap	$500,000	$750,000	$500,000	$2,000,000

California Electric Vehicle Infrastructure Project (CALeVIP)

Note: As of October 2023, there are no CALeVIP rebate funds available for entities in Contra Costa County. However, if the California Energy Commission provides eligible rebates for Contra Costa County in the future, the City of Pittsburg can use the information below as a guide for eligibility and the application process.

The California Electric Vehicle Infrastructure Project (CALeVIP) was introduced by the California Energy Commission (CEC) in December 2017 to provide incentives for electric vehicle charging infrastructure. The project simplifies the funding process and accelerates charger deployment, with each project targeting specific regions throughout the state that have low rates of infrastructure installation. Through 2022, the CEC has allocated $200 million for charger rebates through CALeVIP, and 13 regional incentive projects covering 36 counties have been launched. Funding amounts are also available for disadvantaged communities and multifamily complexes, and CEC staff works with local governments to leverage other funding opportunities to increase chargers in focused locations. To apply for CALeVIP, the applicant needs to follow these steps:

1. **Determine eligibility**: The CALeVIP program provides incentives for the installation of electric vehicle (EV) chargers in California. Eligible applicants include public agencies, non-profit organizations, businesses, and individuals who own or lease property in California where EV chargers will be installed.

2. **Choose project type**: CALeVIP offers two types of projects: Regional incentive projects and Equity incentive projects. Regional incentive projects provide incentives for EV chargers in specific regions throughout California, while equity incentive projects provide higher incentives for EV chargers installed in disadvantaged communities and multi-unit dwellings.

3. **Choose charger type**: CALeVIP provides incentives for Level 2 and DC fast chargers

4. **Apply for incentives**: Once the applicant has determined their eligibility and chosen their project and charger type, they can apply for incentives through the CALeVIP website. The application process involves submitting an online application, providing project details and specifications, and signing a rebate agreement.

Eligibility requirements for CALeVIP vary depending on the type of project and the applicant. However, generally, to be eligible for incentives, applicants must meet the following requirements:

- **Applicant Requirement**: To be eligible for any CALeVIP rebate, the applicant must be a site owner or authorized agent, a business, nonprofit, California Native American tribe or public/government entity based in California or operating as a California-based affiliate. Some projects require a valid California business license, except for public agencies or joint powers authority agencies.

- **Site Requirements**: To qualify for rebates for electric vehicle charging stations in California, the properties must be located in the state and comply with federal, state, and municipal laws. DC fast charging sites must be publicly available 24/7 and located in specific areas such as airports, gas stations, and hospitals. Level 2 charging sites must be located in eligible commercial sites, workplaces, multiunit dwellings, public facilities, or curbside charging sites. Some eligibility criteria only apply to certain rebate programs, and more information can be found on individual project pages.

- **Disadvantaged Community (DAC) and Low Income Community (LIC) Requirements**: Some CALeVIP rebates are only available for EV charger installation sites located in disadvantaged or low-income communities, which are identified by the CalEnviroScreen tool and census tracts that are at or below 80% of the statewide median income. These sites may qualify for higher rebate amounts from some projects. As of October 2023, the City of Pittsburg is considered a disadvantaged community.[22]

- **Installation Requirements**: According to CA Public Utilities Code 740.20, EV chargers must be installed by Electric Vehicle Infrastructure Training Program (EVITP) certified electricians for all CALeVIP projects except for the Central Coast, Northern California, San Joaquin Valley, and Sonoma Coast projects. If the charging installation supports a port supplying 25 kW or more, at least 25% of the electricians working on the crew must be EVITP certified. One crew member may be both the contractor and the EVITP-certified electrician. To find an EVITP-certified electrician or other EV charging provider, visit CALeVIP Connects.

- **Equipment Requirements:** To be eligible for CALeVIP rebate, DC fast charger equipment must be new, have at least an SAE CCS connector, be networked, capable of 50 kW or greater, use an open standard protocol, be approved by a Nationally Recognized Testing Laboratory (NRTL) Program, and accept some form of credit card and multiple forms of payment if payment is required. For Level 2 charging equipment, it must be new, ENERGY STAR certified, networked, capable of 6.2 kW or greater per connector, use an open standard protocol, have a minimum

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[22] Priority Populations 2023 (ca.gov)

two-year networking agreement, and accept some form of credit card and multiple forms of payment if payment is required.

Eligible costs for CALeVIP projects include solar EV charging systems, demand management equipment, installation costs, network agreements, and other related expenses. Costs such as permits required by authorities having jurisdiction are not eligible for reimbursement, and certain projects may not cover upgrades of existing ADA noncompliance.

California Clean Vehicle Rebate Project (CVRP)

***Note**: Funds for this program are nearly exhausted and applications received on or after September 6, 2023, have been placed on a standby list and are not guaranteed a rebate. This program is unlikely to be reinstalled and the City of Pittsburg should not expect to receive CVRP rebates towards its fleet transition and charging infrastructure rollout. In the unlikely event this program is extended, the information below will be helpful to the City to apply for vehicle rebates.*

The Clean Vehicle Rebate Project (CVRP) promotes clean vehicle adoption in California by offering rebates from $1,000 to $7,000 for the purchase or lease of new, eligible light-duty zero-emission vehicles, including EVs, PHEVs, and FCEVs. Applicants must be based in California and submit a CVRP application within three months of the vehicle purchase or lease date while funds are available. Eligible vehicles must meet the following criteria for a purchaser or lessee to qualify for a rebate:

- Have a base MSRP for the following vehicle categories:
    - Base MSRP of $60,000 or less for vehicles that fall under the Large Vehicles category (i.e., Minivans, Pickups, SUVs)
    - Base MSRP of $45,000 or less for light-duty vehicles (i.e., hatchbacks, sedans, wagons, and two-seaters)

With the exception of FCEVs, all vehicles must meet the base MSRP caps according to the listed vehicle categories above. According to the CVRP Implementation manual, the CVRP rebate can be combined with federal, state, or local agency incentives as well as Administrator match funding, if available, to help further buy-down an eligible vehicle's cost[23]. It should be noted that individuals and businesses are limited to one rebate for a non-FCEV and one rebate for a FCEV, for a total of two rebates; when individuals or businesses meet their two-rebate limit, they will remain ineligible for an additional rebate. In contrast, public fleets are eligible for up to 30 rebates per year.

Low Carbon Fuel Standard (LCFS)

The Low Carbon Fuel Standard (LCFS) is a regulatory program that incentivizes fuel carbon intensity reduction and non-residential ZEV infrastructure. In particular, fleets that own Level 2 and DC fast chargers are eligible to apply for the generation of LCFS credits, since electricity is a low-carbon transportation fuel. The number of credits a fleet generates depends on the amount and carbon intensity of electricity dispensed to vehicles. By using renewable electricity for charging or purchasing Renewable Energy Certificates (RECs), fleets can increase their LCFS revenue streams, potentially by up to 20% as illustrated in Figure 16.

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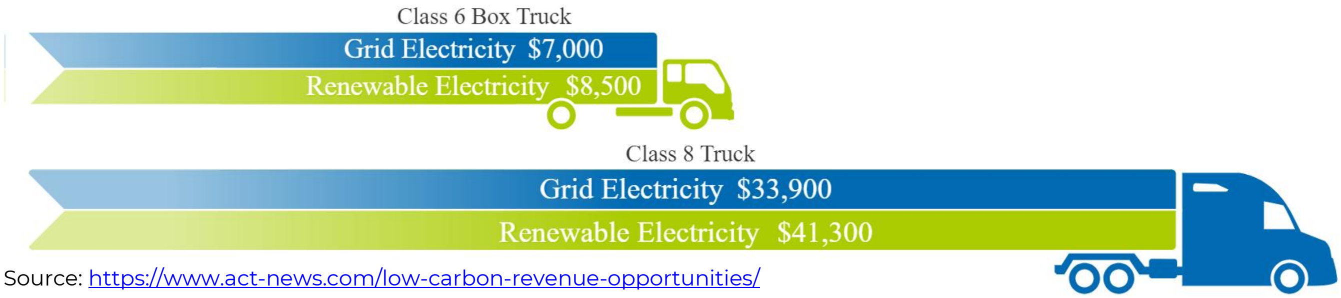
[23] https://cleanvehiclerebate.org/sites/default/files/docs/nav/transportation/cvrp/documents/CVRP-Implementation-Manual.pdf

Participants in the LCFS program can manage fuel and credit transactions through the LCFS Reporting Tool and Credit Bank & Transfer System (LRT-CBTS), part of CARB's database management system for all LCFS processes. Credits earned through the LCFS program may be sold by a registered broker, and the value of the credits are generally required to be reinvested in electric vehicle infrastructure or services. This could include services such as EV purchases and maintenance, charging infrastructure purchases and maintenance, electricity costs, and administrative fees. The value of the LCFS credits for any one EV charging site is influenced by many factors including but not limited to: the number of EV chargers in operation, the type of EV chargers installed, the amount of fuel dispensed, and the value of the credit when sold. One limitation of LCFS credits are the fluctuations in their selling price, as illustrated in Figure 17, which can lower EV and EV charging infrastructure deployment potential. For example, while in 2020, the LCFS credits were traded at $200 per credit, the credit prices have dropped to ~$75 per credit in the third quarter of 2023.

Figure 16. An Example of Annual Revenues Generated using LCFS

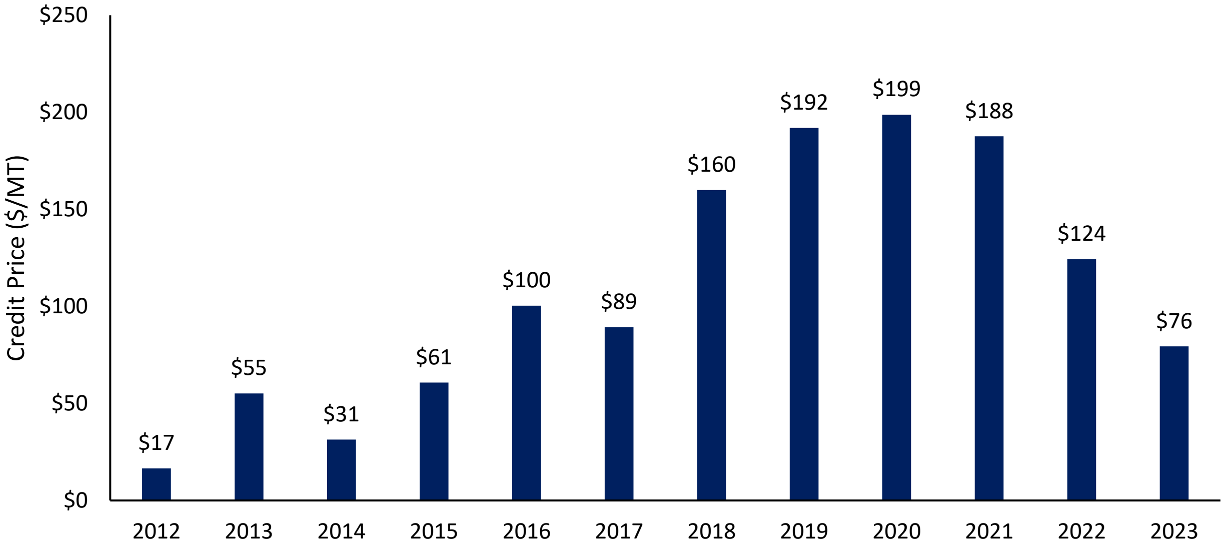


Source: https://www.act-news.com/low-carbon-revenue-opportunities/

Assumes Class 6 truck with 20,000 annual miles and 1.3 kWh/mi electricity consumption rate

Assumes Class 8 truck with 60,000 annual miles and 2.1 kWh/mi electricity consumption rate

Figure 17. Monthly LCFS Credit Price and Volume Transacted



Local Programs

Charge! Program[24]

The Bay Area Air Quality Management District (BAAQMD) operates the Charge! program, which is designed to incentivize and support the installation of EV charging infrastructure throughout the Bay Area region in California. The Charge! initiative offers a grant that can cover up to 85% of the expenses involved in purchasing and setting up new public charging stations at eligible facilities, as well as private charging units for multi-unit buildings or workplaces within the Air District's jurisdiction. These charging stations are intended for light-duty vehicles with a GVWR of 8,500 pounds or less. Both public entities and private enterprises can apply for this funding, which is competitive in nature. Once the charging stations are operational, the funding is provided to the grant recipients (referred to as "Project Sponsors") on a reimbursement model. The grant amount is determined by the expected utilization of the station, reflecting its potential to encourage EV adoption, decrease reliance on petroleum, and minimize air pollution.

The Charge! Program provides base funding for different charging station types: Level 1 stations receive $750 with a minimum usage requirement of 3,600 kWh over three years; Level 2 (3.3-6.3 kW) get $1,500 with a 9,000 kWh requirement; Level 2 (6.6+ kW) are allotted $3,000 with an 18,000 kWh requirement; and DC Fast stations receive $18,000 with a 90,000 kWh requirement over the same period. In addition to base funding, Plus-Up funding is available for certain qualifiers: Dual-port stations can get up to $10,000 with a 30,000 kWh additional usage requirement; solar power installations receive $1 for every watt of solar capacity up to $4,000 with an added usage requirement based on the investment; Transportation Corridor Facilities qualify for $7,000; and Multi-Unit Dwellings can get between $750 to $4,000 depending on the category, with corresponding usage requirements.

Eligible participants for the Charge! Program include businesses, non-profits, and public agencies that either own the property where the charging stations will be installed or can provide authorization from the property owner. Projects must be surplus and voluntary, with charging stations that are not mandated by any legal or regulatory obligations. All costs incurred before the finalization of a Funding Agreement with the Air District are not reimbursable, and a fully executed Funding Agreement is required for funding to be guaranteed. Projects must qualify for a minimum of $1,000,000 in Charge! Program funding, with certain exceptions, and applicants must be in good standing with all relevant air quality regulations. A single applicant is capped at receiving $3,000,000 in funding per fiscal year.

The facilities can fall into several categories such as multi-unit dwellings, workplaces, or transportation corridors. The charging stations funded must be new, meet specific public availability criteria, and comply with usage requirements. Any pre-existing or retroactively installed equipment is ineligible for funding. Additionally, certain facilities, particularly those in Environmental Justice communities or those supporting private fleets, may be exempt from public accessibility requirements. The Charge! Program offers reimbursement for specific costs associated with EV

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[24] https://www.baaqmd.gov/funding-and-incentives/businesses-and-fleets/charge

charging stations, including the hardware, installation, necessary electrical upgrades, permit fees, and equipment to record energy dispensed. Equipment vendors may request to use in-house labor for installation, but this requires approval and detailed documentation for reimbursement. Additionally, projects qualifying for solar power Plus-Up funding can also receive reimbursement for solar panels, inverters, battery storage hardware, and related installation costs. However, the program does not cover costs such as consultant fees, environmental review, maintenance, administrative costs, or improvements to the parking area that are unrelated to the charging station project.

Utility Programs

PG&E Charging Infrastructure Rebates

PG&E has a comprehensive EV Fleet program that includes incentives and rebates, site design and permitting, construction and activation, as well as maintenance and upgrades. PG&E offers rebates to offset Level 2 and DC Fast charging infrastructure costs for medium,- and heavy-duty electric vehicles with a GVWR greater than 6,000 pounds. To be eligible for the general EV Fleet Program, an entity needs:

- To be a PG&E electric customer
- Own or lease its property
- Acquire at least 2 medium- or heavy-duty EVs by 2024
- Agree to program requirements

To be eligible for charging infrastructure rebates, the entity needs to operate school buses, transit buses, or be located in a disadvantaged community. As of October 2023, the City of Pittsburg is considered a disadvantaged community.[25] As a result, the City of Pittsburg is eligible for the rebate amounts listed below in Table 28, which **ICF estimates will total $280,000 for the City**.

Table 28: PG&E Charging Infrastructure Rebate Amounts

Power output	Rebate
Up to 50 kW	50% of the cost of EV charger, up to $15,000
50.1 kW – 149.9 kW	50% of the cost of EV charger, up to $25,000
150 kW and above	50% of the cost of EV charger, up to $42,000

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[25] Priority Populations 2023 (ca.gov)

Financing Component

Public-Private Partnerships

Public-private partnerships (PPP) can be used to build charging infrastructure by involving a private partner who finances initial capital costs with private debt and equity in exchange for returns on investment over time. This involves a partnership between a government entity and a private sector company, where the latter takes the lead in designing, financing, constructing, and operating the charging infrastructure. The government entity provides funding, land, and other resources, while the private partner is responsible for financing and operating the charging infrastructure. This model allows for the sharing of risks and benefits and can lead to the faster deployment of charging infrastructure, as well as increased innovation.

There are several PPP models that are available for charging infrastructure deployment. Some of the common PPP models include:

- **Build-Operate-Transfer (BOT) Model**: Under this model, a private partner is responsible for the design, construction, and operation of charging infrastructure, and transfers the ownership to the government or public entity after a specified period of time.
- **Design-Build-Finance-Operate-Maintain (DBFOM) Model**: Similar to the BOT model, a private partner takes responsibility for design, construction, financing, operation, and maintenance of charging infrastructure, but operates it for a specified period of time before transferring ownership back to the government or public entity.
- **Concession Model**: This model involves the government granting a private partner the right to build and operate charging infrastructure within a specified area for a specified period of time, in exchange for payment or a share of revenue.
- **Joint Venture Model**: This model involves the formation of a joint venture between the public and private sectors, where both partners collaborate to develop and operate charging infrastructure.

The choice of PPP model depends on the specific goals and needs of the government or public entity and the private partner. The model selected should allow for efficient and effective deployment of charging infrastructure while ensuring that public interest is protected.

There are a few examples of public-private partnerships (PPPs) for medium- and heavy-duty electric vehicles. One example is the CARB and the South Coast Air Quality Management District (SCAQMD) partnership, which aims to accelerate the deployment of medium-duty and heavy-duty EVs in the state of California. The partnership provides funding for the deployment of these types of EVs, as well as for the construction of charging infrastructure. Another example is the partnership between the Port of Los Angeles and the private sector to deploy and test medium-duty electric delivery trucks. The partnership aims to reduce air pollution and greenhouse gas emissions from cargo movement in and out of the port, and to demonstrate the feasibility of electric trucks in a real-world commercial environment.

Purchasing Contracts from Sourcewell

Sourcewell is a government agency that provides cooperative purchasing contracts to public entities in the United States and Canada. Sourcewell financing is a way for entities to finance the purchase of goods or services, spreading the cost of the purchase over time. By pooling the purchasing power of its members, Sourcewell is able to negotiate lower prices and better terms on the products and services it procures. This allows its members to save time and money compared to if they had to purchase these products and services on their own. In terms of charging infrastructure, Sourcewell may negotiate contracts with suppliers and manufacturers of EV charging equipment and services and offer these contracts to its members. By leveraging the collective purchasing power of its members, Sourcewell may be able to secure more favorable pricing, terms, and conditions, which can help reduce the cost of procurement for its members.

There are a variety of Sourcewell purchasing contracts available for fleet related services, including loan and lease programs for electric vehicles, charging equipment, and workforce training. Figure 18 shows some of Sourcewell's current finance and leasing contracts. These purchasing contracts can make it easier for entities with limited budgets to access the goods and services they need. D&M Leasing has partnered with Sourcewell to offer EV leasing and purchasing solutions to commercial and government entities. Municipal leases remain eligible for any applicable state and federal incentives, and D&M Leasing simplifies the process of receiving the largest federal tax-credit. Lease terms range from 24 through 60 months, and at the end of the lease, fleets may purchase the vehicles. Over the duration of the lease, fleets also have access to vehicle telematics and vehicle maintenance programs through D&M Leasing's fleet management program. Merchants Fleet Management is another Sourcewell partner that offers EV leasing and management solutions, along with EV fleet pilot programs. Merchants Fleet Management can facilitate the delivery of different EV models to help fleet managers understand vehicle capabilities and determine which subsections of their business should adopt more EVs. NCL Government Capital, another contract available through Sourcewell, differs from the two previous contracts by offering tax-exempt financing solutions to acquire light- through heavy-duty vehicles.

Figure 18. Sourcewell Financing & Leasing Contracts

D&M Leasing (#030122-CVL)

- Open-end leases
- Municipal leases
- Vehicle maintenance programs
- Fuel programs
- Telematics
- Vehicle remarketing
- License, title, & registration
- Fleet replacement schedules
- Vehicle optimization analysis
- Driver safety
- Reporting
- Minority Business Enterprise

Merchants Fleet Management (#030122-MAG)

- Fleet leasing
- Short-term leases & rentals
- Rent to lease conversion
- Vehicle maintenance programs
- Connected vehicle technology & telematics
- Driver safety
- Vehicle data management
- Vehicle registration services
- Remarketing & guarantee buy
- Ready fleet
- Electric vehicles (EVs)
- Charging infrastructure & EV vehicle services

NCL Government Capital (#011620-NCL)

- Tax exempt municipal lease
- FMV lease
- TRAC lease
- Flex Plus lease
- PO only
- Deferred payments
- Customized terms

Financing Options through IBank

The California Infrastructure and Economic Development Bank (IBank) is a state agency that has broad authority to issue tax-exempt and taxable revenue bonds, provide financing to public agencies, provide credit enhancements, acquire or lease facilities, and leverage State and Federal funds. IBank's current programs include the Infrastructure State Revolving Fund (ISRF) Loan Program and partnership with Climate Tech Finance. The ISRF offers low-cost financing to state and local government entities and non-profit organizations sponsored by a government entity for a wide variety of infrastructure and economic development projects. In partnership with Climate Tech Finance, this program provides loan guarantees to de-risk the lending process for banks and open new sources of working capital for climate tech entrepreneurs. These financing options provide small- and mid-sized governments and businesses low-cost and direct financing for EVs and EV charging infrastructure through different loan and repayment structures. Generally speaking, IBank interest rates are set based on a combination of an Interest Rate Benchmark and Interest Rate Adjustments, which are dependent upon the repayment source. The Interest Rate Benchmark will be based on the Thompson's Municipal Market Data Index (MMD) and use published letter category ratings for the pledged revenue stream to determine the base (market price) spread from the MMD AAA GO Scale applicable to the borrower. Interest Rate Adjustments will cause the interest rate on financings to generally be below the Interest Rate Benchmark. The specifics of these programs are discussed below.

Infrastructure State Revolving Fund (ISRF)

The ISRF most notably finances economic development and public infrastructure projects, but private developments, such as zero-emission vehicle fleets and charging stations, qualify as well. ISRF financing is available in amounts ranging from $1 million to $65 million, with loan terms for the useful life of the project—up to a maximum of 30 years. The origination fee for processing of an ISRF loan the greater of $10,000 or 1% of the original loan amount. Applications for ISRF are continuously accepted and can be filled out in detail after initial consultation with IBank to determine if the project meets creditworthiness and underwriting criteria. Applications approved by the IBank board can have funds issued within 45 to 90 days, and different financing repayment solutions, such as revenue producing enterprise systems or property/sales/special taxes, can be used to repay ISRF financings.

Climate Tech Finance

The Climate Tech Finance partnership is meant to accelerate the development and adoption of technologies that reduce greenhouse gases across California. The program is administered by the Bay Area Air Quality Management District (BAAQMD) in partnership with IBank, but is accessible to entities statewide. The BAAQMD recommends contacting their office via email for proposed projects. Through the IBank and Climate Tech Finance partnership, applications for loans and loan-guarantees are available for projects focusing on emission-reducing technologies. Climate Tech Finance offers loan guarantees of up to $5 million are offered on loans of up to $20 million, with up to a 7-year term (the loan term can be longer). For the loan guarantee, 80% of the loan amount is backed by a leveraged trust fund held by the State of California. A single loan guarantee is then issued by the State of California to cover the entire single 90% loan guarantee. IBank provides loans for public entities ranging from $500,000 to $30 million, with up to 30-year terms.

Charging Infrastructure-as-a-service

Charging Infrastructure-as-a-service (CIaaS) for EV chargers refers to the provision of EV charging infrastructure as a service to customers. CIaaS for EV chargers offer a range of charging solutions and services that can be tailored to the needs of businesses, municipalities, and property managers. This type of service allows them to provide charging infrastructure to their customers without having to invest in the equipment themselves, and also allowing them to manage the installation, maintenance, and billing of the service, which can make the adoption of EV more accessible and convenient for the end-users. Some established companies providing CIaaS for EV chargers include:

1. **Sustainability Partners**: Sustainability Partners (SP) offers a usage-based utility model targeting essential institutions like municipalities, schools, and hospitals. With no upfront costs, they provide month-to-month contracts, allowing institutions to replace outdated, unreliable infrastructure with modern, safe solutions. SP can cover the entire cost, including design, materials, installation, and ongoing maintenance. They also support state and federal grant funding requirements. Key benefits include usage-based billing over long-term debt, full control over asset use, a month-to-month leasing system with easy termination, options to own assets, full transparency in accounting, and real-time monitoring.
2. **ChargePoint**: This company offers a variety of EV charging solutions, including CIaaS for businesses, municipalities, and property managers. ChargePoint provides the charging stations and manages the installation, maintenance, and billing for the service.
3. **EVgo**: EVgo is another provider of CIaaS for EV chargers. The company offers a network of fast-charging stations for EV drivers and provides CIaaS to businesses, municipalities, and property managers. EVgo also offers a mobile app for customers to locate and pay for charging services.
4. **Blink Charging**: Blink Charging is a provider of EV charging equipment and services, including CIaaS for businesses, municipalities, and property managers. The company provides the charging equipment and manages the installation, maintenance, and billing for the service.

5. **Shell Recharge**: Shell Recharge (formerly Greenlots) is an open-source network provider of EV charging infrastructure and services. They offer a variety of charging solutions, including CIaaS for businesses, municipalities, and property managers. The company provides the charging stations, manages the installation, maintenance, and billing, and also offers a mobile app for customers to locate and pay for charging services.
6. **SemaConnect**: SemaConnect is another provider of EV charging infrastructure and services. The company offers a range of charging stations and manages the installation, maintenance, and billing for the service. They also provide a web-based network management system that allows property managers and fleet operators to manage and monitor EV charging on their premises.

Appendix B: Detailed EV Replacement Recommendations

ID	Vehicle Type	Make	Model	Engine Fuel Type	Year of Transition	Replacement Fuel Type	Replacement Make/Model
100	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	7	BEV	Chevrolet - Blazer EV PPV (Police)
101	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	5	BEV	Chevrolet - Blazer EV PPV (Police)
102	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	7	BEV	Chevrolet - Blazer EV PPV (Police)
103	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	6	BEV	Chevrolet - Blazer EV PPV (Police)
104	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	2	BEV	Chevrolet - Blazer EV PPV (Police)
105	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	3	BEV	Chevrolet - Blazer EV PPV (Police)
106	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	4	BEV	Chevrolet - Blazer EV PPV (Police)
107	SUV - Police	DODGE	CHARGER	Gasoline	11	BEV	Chevrolet - Blazer EV PPV (Police)
108	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	4	BEV	Chevrolet - Blazer EV PPV (Police)
109	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	11	BEV	Chevrolet - Blazer EV PPV (Police)
110	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	4	BEV	Chevrolet - Blazer EV PPV (Police)
111	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	5	BEV	Chevrolet - Blazer EV PPV (Police)
112	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	4	BEV	Chevrolet - Blazer EV PPV (Police)
113	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	2	BEV	Chevrolet - Blazer EV PPV (Police)
114	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	8	BEV	Chevrolet - Blazer EV PPV (Police)
115	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	7	BEV	Chevrolet - Blazer EV PPV (Police)
116	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	5	BEV	Chevrolet - Blazer EV PPV (Police)
117	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	6	BEV	Chevrolet - Blazer EV PPV (Police)
118	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	2	BEV	Chevrolet - Blazer EV PPV (Police)
119	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	10	BEV	Chevrolet - Blazer EV PPV (Police)
120	SUV - Police	FORD	CROWN VICTORIA	Gasoline	11	BEV	Chevrolet - Blazer EV PPV (Police)
121	SUV - Police	CHEVROLET	TAHOE	Gasoline	11	BEV	Chevrolet - Blazer EV PPV (Police)
122	Van - Cargo	FORD	E350	Gasoline	2	BEV	Ford - E-Transit Cargo Van
123	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	4	BEV	Chevrolet - Blazer EV PPV (Police)
124	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	6	BEV	Chevrolet - Blazer EV PPV (Police)
125	Medium-Duty Pickup	FORD	F350	Gasoline	1	BEV	Atlis - XT (300 mi) (Crew Cab)
126	SUV - Police	CHEVROLET	TAHOE	Gasoline	11	BEV	Chevrolet - Blazer EV PPV (Police)
127	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	4	BEV	Chevrolet - Blazer EV PPV (Police)

ID	Vehicle Type	Make	Model	Engine Fuel Type	Year of Transition	Replacement Fuel Type	Replacement Make/Model
128	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	7	BEV	Chevrolet - Blazer EV PPV (Police)
129	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	11	BEV	Chevrolet - Blazer EV PPV (Police)
130	SUV - Police	FORD	INTERCEPTOR SED	Gasoline	8	BEV	Chevrolet - Blazer EV PPV (Police)
131	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	8	BEV	Chevrolet - Blazer EV PPV (Police)
132	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	2	BEV	Chevrolet - Blazer EV PPV (Police)
133	Motorcycle - Police	BMW	R1250RT-P	Gasoline	7	BEV	Zero Motorcycles - Zero FXP
134	Motorcycle - Police	BMW	R1250RT-P	Gasoline	7	BEV	Zero Motorcycles - Zero FXP
135	Motorcycle - Police	KAWASAKI	ZG1400C	Gasoline	4	BEV	Zero Motorcycles - Zero FXP
137	Motorcycle - Police	BMW	R1250RT-P	Gasoline	7	BEV	Zero Motorcycles - Zero FXP
138	SUV - Police	CHEVROLET	TAHOE PPV	Gasoline	11	BEV	Chevrolet - Blazer EV PPV (Police)
140	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	2	BEV	Chevrolet - Blazer EV PPV (Police)
141	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	2	BEV	Chevrolet - Blazer EV PPV (Police)
142	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	3	BEV	Chevrolet - Blazer EV PPV (Police)
143	Motorcycle	ZERO	FXP ZF6.5	BEV	4	N/A	Already EV
144	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	5	BEV	Chevrolet - Blazer EV PPV (Police)
145	SUV	FORD	ESCAPE (PLUG-IN) HYBRID	PHEV	10	N/A	Already EV
146	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	8	BEV	Chevrolet - Blazer EV PPV (Police)
147	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	8	BEV	Chevrolet - Blazer EV PPV (Police)
148	SUV	FORD	ESCAPE	Gasoline	3	BEV	Chevrolet - Blazer EV 1LT
150	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	10	BEV	Chevrolet - Blazer EV PPV (Police)
151	SUV	FORD	TAURUS	Gasoline	1	BEV	Chevrolet - Blazer EV 2LT
152	SUV	FORD	TAURUS	Gasoline	1	BEV	Chevrolet - Blazer EV 2LT
153	SUV	FORD	TAURUS	Gasoline	1	BEV	Chevrolet - Blazer EV 2LT
154	SUV	FORD	TAURUS	Gasoline	1	BEV	Chevrolet - Blazer EV 2LT
155	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	2	BEV	Chevrolet - Blazer EV PPV (Police)
156	SUV	FORD	FUSION	Gasoline	3	BEV	Chevrolet - Blazer EV 1LT
157	Light-Duty Pickup	FORD	F150 SSV	Gasoline	9	BEV	Chevrolet - Silverado EV
158	SUV	FORD	TAURUS	Gasoline	3	BEV	Chevrolet - Blazer EV 1LT
159	SUV	FORD	ESCAPE	Gasoline	5	BEV	Chevrolet - Blazer EV 1LT
160	SUV	FORD	ESCAPE (PLUG-IN) HYBRID	PHEV	10	N/A	Already EV

ID	Vehicle Type	Make	Model	Engine Fuel Type	Year of Transition	Replacement Fuel Type	Replacement Make/Model
161	SUV	FORD	TAURUS	Gasoline	11	BEV	Chevrolet - Blazer EV 1LT
162	SUV	FORD	MUSTANG MACH-E	BEV	1	N/A	Already EV
164	SUV	FORD	TAURUS	Gasoline	11	BEV	Chevrolet - Blazer EV 1LT
165	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	3	BEV	Chevrolet - Blazer EV PPV (Police)
167	SUV	FORD	TAURUS	Gasoline	11	BEV	Chevrolet - Blazer EV 1LT
168	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	2	BEV	Chevrolet - Blazer EV PPV (Police)
169	SUV	FORD	TAURUS	Gasoline	11	BEV	Chevrolet - Blazer EV 1LT
170	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	2	BEV	Chevrolet - Blazer EV PPV (Police)
171	Van - Cargo	FORD	TRANSIT 350	Gasoline	9	BEV	Ford - E-Transit Cargo Van
172	SUV	FORD	TAURUS	Gasoline	11	BEV	Chevrolet - Blazer EV 1LT
173	SUV	FORD	EXPEDITION	Gasoline	9	BEV	Chevrolet - Blazer EV 1LT
174	SUV	CHEVROLET	TAHOE	Gasoline	1	BEV	Chevrolet - Blazer EV 2LT
176	Medium-Duty Vocational Truck	FORD	F550 BATT	Gasoline	7	BEV	Ford - E-Transit Chassis Cab
177	SUV - Police	FORD	INTERCEPTOR UTI HYBRID	Gasoline	2	BEV	Chevrolet - Blazer EV PPV (Police)
179	Motorcycle	KAWASAKI	ZG1400C	Gasoline	4	BEV	Zero Motorcycles - Zero FXS ZF3.6
183	SUV - Police	FORD	INTERCEPTOR UTI	Gasoline	7	BEV	Chevrolet - Blazer EV PPV (Police)
184	Light-Duty Pickup	FORD	F250 CR CAB 4X4	Gasoline	13	BEV	Chevrolet - Silverado EV
185	SUV	FORD	FUSION	Gasoline	8	BEV	Chevrolet - Blazer EV 1LT
186	SUV	FORD	FUSION	Gasoline	8	BEV	Chevrolet - Blazer EV 1LT
187	SUV	FORD	ESCAPE (PLUG-IN) HYBRID	PHEV	10	N/A	Already EV
188	SUV	FORD	EXPLORER PLT HYBRID	Gasoline	10	BEV	Chevrolet - Blazer EV 1LT
201	Van - Passenger	FORD	TRANSIT 150	Gasoline	10	BEV	Maxwell Vehicles - ePro SR Passenger Van
320	Light-Duty Pickup	FORD	F150	Gasoline	15	BEV	Chevrolet - Silverado EV
321	Light-Duty Pickup	FORD	RANGER	Gasoline	2	BEV	Chevrolet - Silverado EV
322	Light-Duty Pickup	FORD	RANGER	Gasoline	2	BEV	Chevrolet - Silverado EV
323	Light-Duty Pickup	FORD	RANGER	Gasoline	2	BEV	Chevrolet - Silverado EV
324	Light-Duty Pickup	FORD	RANGER	Gasoline	2	BEV	Chevrolet - Silverado EV
325	Light-Duty Pickup	FORD	RANGER	Gasoline	2	BEV	Chevrolet - Silverado EV
326	Light-Duty Pickup	FORD	RANGER	Gasoline	14	BEV	Chevrolet - Silverado EV
327	Light-Duty Pickup	FORD	RANGER	Gasoline	2	BEV	Chevrolet - Silverado EV

ID	Vehicle Type	Make	Model	Engine Fuel Type	Year of Transition	Replacement Fuel Type	Replacement Make/Model
329	Light-Duty Pickup	FORD	RANGER	Gasoline	2	BEV	Chevrolet - Silverado EV
330	Light-Duty Pickup	FORD	RANGER	Gasoline	2	BEV	Chevrolet - Silverado EV
331	Light-Duty Pickup	FORD	RANGER	Gasoline	2	BEV	Chevrolet - Silverado EV
402	SUV	CHEVROLET	TAHOE	Gasoline	1	BEV	Chevrolet - Blazer EV 2LT
405	Sedan	FORD	TAURUS	Gasoline	1	BEV	Nissan - Leaf SV PLUS
500	Light-Duty Pickup	FORD	F150	Gasoline	15	BEV	Chevrolet - Silverado EV
501	Light-Duty Pickup	FORD	F150	Gasoline	16	BEV	Chevrolet - Silverado EV
502	Light-Duty Pickup	FORD	F250	Gasoline	10	BEV	Chevrolet - Silverado EV
503	Light-Duty Pickup	FORD	F150	Gasoline	3	BEV	Chevrolet - Silverado EV
504	Sedan	FORD	TAURUS	Gasoline	1	BEV	Nissan - Leaf SV PLUS
506	Medium-Duty Pickup	FORD	F350	Gasoline	10	BEV	Atlis - XT (300 mi) (Crew Cab)
507	Medium-Duty Pickup	FORD	F350 4X4	Gasoline	1	BEV	Atlis - XT (300 mi) (Crew Cab)
508	Light-Duty Pickup	FORD	F150	Gasoline	11	BEV	Chevrolet - Silverado EV
509	Light-Duty Pickup	FORD	F150	Gasoline	10	BEV	Chevrolet - Silverado EV
510	Light-Duty Pickup	FORD	F150	Gasoline	6	BEV	Chevrolet - Silverado EV
511	Heavy Truck - Straight Truck	FREIGHTLINER	M2-106	Diesel	12	BEV	Peterbilt - 220EV (Class 7 - 141 kW)
512	Heavy Truck - Straight Truck	PETERBILT	548 DUMP	Diesel	13	BEV	Peterbilt - 220EV (Class 7 - 141 kW)
513	Light-Duty Pickup	FORD	F150	Gasoline	16	BEV	Chevrolet - Silverado EV
514	Medium-Duty Pickup	FORD	F-450	Gasoline	16	BEV	Atlis - XT (300 mi) (Crew Cab)
515	Light-Duty Pickup	FORD	F150	Gasoline	6	BEV	Chevrolet - Silverado EV
516	Medium-Duty Pickup	FORD	F350	Gasoline	16	BEV	Atlis - XT (300 mi) (Crew Cab)
517	Light-Duty Pickup	FORD	F250	Gasoline	13	BEV	Chevrolet - Silverado EV
518	Light-Duty Pickup	FORD	F250	Gasoline	14	BEV	Chevrolet - Silverado EV
519	Light-Duty Pickup	FORD	F150	Gasoline	15	BEV	Chevrolet - Silverado EV
520	Street Sweeper	FREIGHTLINER	M2-106 TYMCO 600	Diesel	14	BEV	Global - M3 SUPERCHARGED
521	Street Sweeper	FREIGHTLINER	M2-106 TYMCO 600	Diesel	12	BEV	Global - M3 SUPERCHARGED
522	Light-Duty Pickup	FORD	F150	Gasoline	13	BEV	Chevrolet - Silverado EV
523	Medium-Duty Pickup	FORD	F350 SUPER CAB	Gasoline	13	BEV	Atlis - XT (300 mi) (Crew Cab)
524	Light-Duty Pickup	FORD	F250	Gasoline	16	BEV	Chevrolet - Silverado EV
525	Medium-Duty Pickup	FORD	F-350R	Gasoline	16	BEV	Atlis - XT (300 mi) (Crew Cab)

ID	Vehicle Type	Make	Model	Engine Fuel Type	Year of Transition	Replacement Fuel Type	Replacement Make/Model
526	Light-Duty Pickup	FORD	F250	Gasoline	2	BEV	Chevrolet - Silverado EV
527	Light-Duty Pickup	FORD	F250 4X4	Gasoline	5	BEV	Chevrolet - Silverado EV
528	Van - Cargo	FORD	TRANSIT CONNECT	Gasoline	10	BEV	Ford - E-Transit Cargo Van
529	Light-Duty Pickup	FORD	F150	Gasoline	9	BEV	Chevrolet - Silverado EV
530	Light-Duty Pickup	FORD	F150	Gasoline	15	BEV	Chevrolet - Silverado EV
531	Medium-Duty Pickup	FORD	F350	Gasoline	8	BEV	Atlis - XT (300 mi) (Crew Cab)
532	Light-Duty Pickup	FORD	F-250	Gasoline	16	BEV	Chevrolet - Silverado EV
533	Light-Duty Pickup	FORD	F150	Gasoline	2	BEV	Chevrolet - Silverado EV
534	Light-Duty Pickup	FORD	F150	Gasoline	15	BEV	Chevrolet - Silverado EV
535	Light-Duty Pickup	FORD	F250	Gasoline	4	BEV	Chevrolet - Silverado EV
536	Heavy Truck - Straight Truck	FORD	F-750 DUMP	Diesel	14	BEV	Peterbilt - 220EV (Class 7 - 141 kW)
537	Light-Duty Pickup	FORD	F250 SERV	Gasoline	10	BEV	Chevrolet - Silverado EV
538	Heavy Truck - Straight Truck	FORD	F-750 DUMP	Diesel	16	BEV	Peterbilt - 220EV (Class 7 - 141 kW)
539	Light-Duty Pickup	FORD	F-250	Gasoline	16	BEV	Chevrolet - Silverado EV
540	Light-Duty Pickup	FORD	F-250CREW	Gasoline	16	BEV	Chevrolet - Silverado EV
541	Medium-Duty Pickup	FORD	F350	Gasoline	16	BEV	Atlis - XT (300 mi) (Crew Cab)
542	Light-Duty Pickup	FORD	F150	Gasoline	14	BEV	Chevrolet - Silverado EV
544	Light-Duty Pickup	FORD	F150	Gasoline	10	BEV	Chevrolet - Silverado EV
545	Light-Duty Pickup	FORD	F150	Gasoline	16	BEV	Chevrolet - Silverado EV
550	Medium-Duty Pickup	FORD	F450	Gasoline	4	BEV	Atlis - XT (300 mi) (Crew Cab)
552	Light-Duty Pickup	FORD	F150	Gasoline	6	BEV	Chevrolet - Silverado EV
555	Sedan	FORD	TAURUS	Gasoline	1	BEV	Nissan - Leaf SV PLUS
556	Light-Duty Pickup	FORD	F-250	Gasoline	16	BEV	Chevrolet - Silverado EV
561	Heavy Truck - Other	PETERBILT	348	Diesel	4	N/A	Not Available (Sewer Trucks)
562	Heavy Truck - Other	PETERBILT	348	Diesel	7	N/A	Not Available (Sewer Trucks)
563	Heavy Truck - Other	FREIGHTLINER	114SD	Diesel	11	N/A	Not Available (Sewer Trucks)
564	Medium-Duty Pickup	FORD	E450	Gasoline	10	BEV	Atlis - XT (300 mi) (Crew Cab)
565	Medium-Duty Pickup	FORD	F-450	Gasoline	16	BEV	Atlis - XT (300 mi) (Crew Cab)
568	Medium-Duty Pickup	FORD	F-450	Gasoline	1	BEV	Atlis - XT (300 mi) (Crew Cab)
569	Medium-Duty Pickup	FORD	F450	Gasoline	16	BEV	Atlis - XT (300 mi) (Crew Cab)

ID	Vehicle Type	Make	Model	Engine Fuel Type	Year of Transition	Replacement Fuel Type	Replacement Make/Model
570	Medium-Duty Pickup	FORD	F450	Gasoline	9	BEV	Atlis - XT (300 mi) (Crew Cab)
571	Light-Duty Pickup	FORD	F250 SERV	Gasoline	9	BEV	Chevrolet - Silverado EV
572	Light-Duty Pickup	FORD	F-250	Gasoline	16	BEV	Chevrolet - Silverado EV
575	Light-Duty Pickup	FORD	F250	Gasoline	16	BEV	Chevrolet - Silverado EV
576	Light-Duty Pickup	FORD	F250	Gasoline	13	BEV	Chevrolet - Silverado EV
577	Light-Duty Pickup	FORD	F250	Gasoline	2	BEV	Chevrolet - Silverado EV
580	Light-Duty Pickup	FORD	F250	Gasoline	10	BEV	Chevrolet - Silverado EV
581	Light-Duty Pickup	FORD	F250	Gasoline	8	BEV	Chevrolet - Silverado EV
582	Light-Duty Pickup	FORD	F250	Gasoline	13	BEV	Chevrolet - Silverado EV
583	Light-Duty Pickup	FORD	F250	Gasoline	16	BEV	Chevrolet - Silverado EV
585	Heavy Truck - Straight Truck	FORD	F-750 DUMP	Diesel	16	BEV	Peterbilt - 220EV (Class 7 - 141 kW)
587	Van - Cargo	FORD	TRANSIT 350	Gasoline	12	BEV	Ford - E-Transit Cargo Van
588	Light-Duty Pickup	FORD	F250	Gasoline	4	BEV	Chevrolet - Silverado EV
589	Light-Duty Pickup	FORD	F250	Gasoline	4	BEV	Chevrolet - Silverado EV
590	Light-Duty Pickup	FORD	F250	Gasoline	13	BEV	Chevrolet - Silverado EV
592	Bucket Truck	FORD	F550 LTM40	Diesel	12	BEV	Terex - EV Aerial (Class 6)
593	Bucket Truck	FORD	F550	Diesel	10	BEV	Terex - EV Aerial (Class 6)
594	Light-Duty Pickup	FORD	F250	Gasoline	11	BEV	Chevrolet - Silverado EV
595	Light-Duty Pickup	FORD	F250	Gasoline	8	BEV	Chevrolet - Silverado EV
596	Light-Duty Pickup	FORD	F250	Gasoline	16	BEV	Chevrolet - Silverado EV
597	Medium-Duty Pickup	FORD	F450	Gasoline	7	BEV	Atlis - XT (300 mi) (Crew Cab)
598	Medium-Duty Pickup	FORD	F350	Gasoline	16	BEV	Atlis - XT (300 mi) (Crew Cab)
700	Light-Duty Pickup	FORD	F150	Gasoline	7	BEV	Chevrolet - Silverado EV
702	Light-Duty Pickup	FORD	F250	Gasoline	4	BEV	Chevrolet - Silverado EV
704	Van - Passenger	FORD	TRANSIT CONNECT	Gasoline	12	BEV	Maxwell Vehicles - ePro SR Passenger Van
705	Medium-Duty Pickup	FORD	F350 4X4	Gasoline	5	BEV	Atlis - XT (300 mi) (Crew Cab)
706	Sedan	FORD	TAURUS	Gasoline	11	BEV	Nissan - Leaf SV PLUS
711	Light-Duty Pickup	FORD	F150	Gasoline	14	BEV	Chevrolet - Silverado EV
804	Sedan	FORD	ESCAPE	Gasoline	1	BEV	Nissan - Leaf SV PLUS
805	Light-Duty Pickup	FORD	F250 SERV	Gasoline	10	BEV	Chevrolet - Silverado EV

ID	Vehicle Type	Make	Model	Engine Fuel Type	Year of Transition	Replacement Fuel Type	Replacement Make/Model
806	Light-Duty Pickup	FORD	F-250	Gasoline	16	BEV	Chevrolet - Silverado EV
807	Light-Duty Pickup	FORD	F150	Gasoline	7	BEV	Chevrolet - Silverado EV
810	Light-Duty Pickup	FORD	F250	Gasoline	2	BEV	Chevrolet - Silverado EV
1203	Van - Cargo	FORD	E350	Gasoline	1	BEV	Ford - E-Transit Cargo Van
3001	Light-Duty Pickup	FORD	F250	Gasoline	4	BEV	Chevrolet - Silverado EV
3002	Medium-Duty Pickup	FORD	F350 CREW	Gasoline	8	BEV	Atlis - XT (300 mi) (Crew Cab)
3003	Medium-Duty Pickup	FORD	F350 4X4	Gasoline	5	BEV	Atlis - XT (300 mi) (Crew Cab)
3004	Sedan	FORD	FUSION HYBRID	Gasoline	6	BEV	Nissan - Leaf SV PLUS
3005	Medium-Duty Pickup	FORD	F350	Gasoline	7	BEV	Atlis - XT (300 mi) (Crew Cab)
3006	Heavy Truck - Straight Truck	FREIGHTLINER	114SD	Diesel	6	BEV	Peterbilt - 220EV (Class 7 - 141 kW)
3007	Medium-Duty Pickup	FORD	F-350	Gasoline	1	BEV	Atlis - XT (300 mi) (Crew Cab)
3008	Medium-Duty Pickup	FORD	F350 4X4 SRW	Gasoline	6	BEV	Atlis - XT (300 mi) (Crew Cab)
3021	Medium-Duty Pickup	FORD	F550	Gasoline	10	BEV	Atlis - XT (300 mi) (Crew Cab)
4001	Sedan	FORD	C MAX HYBRID	Gasoline	3	BEV	Nissan - Leaf SV PLUS

Appendix C: Alternative EV Replacement Recommendations

If the City is unable to procure the primarily recommended make and model, the table below provides alternative EV makes and models for consideration. However, it is important to note that the infrastructure recommendations were tailored based on the primary vehicle recommendations. Should the City choose to acquire secondary or tertiary recommended makes/models, there may be a need to invest in additional chargers or chargers with higher power capacities to accommodate these vehicles.

Vehicle Type	Primary Recommended Make/Model/EV Type	Secondary Recommended Make/Model/EV Type	Tertiary Recommended Make/Model/EV Type
Sedan	Nissan - Leaf SV PLUS	Tesla Model 3	Hyundai Ioniq 6 SE AWD
SUV	Chevrolet - Blazer EV 1LT	Mustang Mach-E Select AWD Standard Range	Hyundai Ioniq 5 SEL AWD
	Chevrolet - Blazer EV 2LT	Mustang Mach-E Select AWD Extended Range	Hyundai Ioniq 5 SE LR AWD
	Chevrolet - Blazer EV PPV (Police)	Mustang Mach-E Select AWD Standard Range (Police)	Tesla Model Y (Police)
Light-Duty Pickup	Chevrolet - Silverado EV	Ford F-150 Lightning Pro	Rivian R1T
Motorcycle	Zero Motorcycles - Zero FXS ZF3.6	Lightning Motorcycles Strike R	Harley Davidson LiveWire One
	Zero Motorcycles - Zero FXP (Police)	Energica EVA EsseEsse9+	Harley Davidson LiveWire One
Medium-Duty Pickup	Atlis - XT (300 mi) (Crew Cab)[26]	Retrofit F-450	Retrofit F-350
Van-Cargo	Ford – E-transit Cargo Van	Maxwell Vehicles - ePro SR Cargo Van	GreenPower Motor Company EV Star Cargo
Van-Passenger	Maxwell Vehicles - ePro SR Passenger Van	Sunset Vans RP Minibus	Retrofit Ford F-350
Medium-Duty Vocational Truck	Ford - E-Transit (Chassis Cab)	Lion Electric Lion6 Chassis Cab	Isuzu NRR EV Chassis Cab - 100 kWh
Street Sweeper	Global - M3 SUPERCHARGED	Lion Electric Lion6 Street Sweeper	Elgin Broom Bear
Bucket Truck	Terex – EV Aerial (Class 6)	Navistar eMV	Lion Electric Lion6 Bucket Truck
Heavy Truck – Straight Truck	Peterbilt - 220EV (Class 7 - 141 kW)	Freightliner eCascadia 4x2 SR	Kenworth K370E - 100 mile

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[26] In Summer 2023 Atlis announced that the XT (300 mi)is no longer going to be available. However, to make sure the City has the necessary infrastructure, the project team is keeping this vehicle in its recommendations in case the technology (or an equivalent technology) becomes available.

Item No. 3

FY 23/24 Public Infrastructure-Aligned Goal Update

February 16, 2024

Goal 2:
Improve Pavement Condition Index by 5 Points

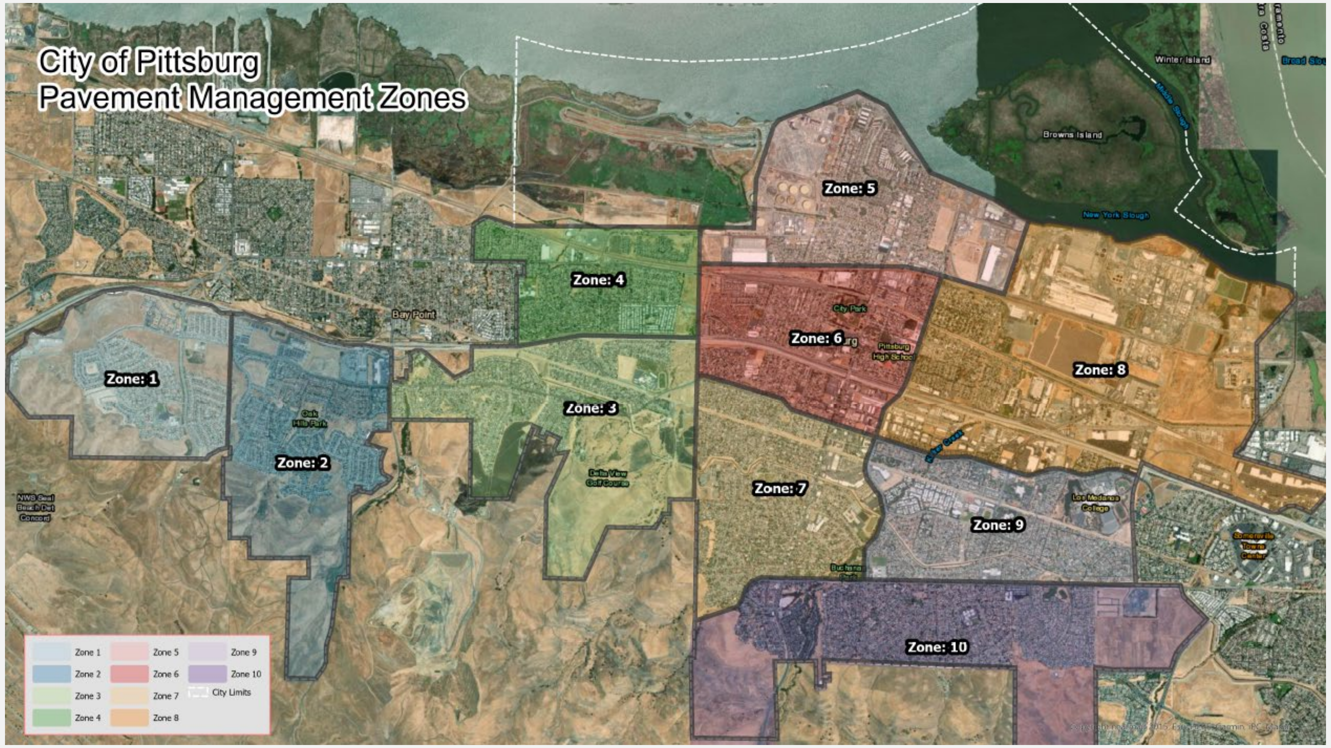
Implementation Measure 2.1 – OFF TRACK

Complete pavement rehabilitation project on Leland Rd. and Loveridge Rd.

- Project 2033 Loveridge Road Maintenance - **COMPLETE**
- Project 2241 E. Leland Road Pavement Maintenance - **COMPLETE**
- Project 2231 (OBAG 2) Pavement Improvement

Goal 2:
Improve Pavement Condition Index by 5 Points

Implementation Measure 2.2 – ACHIEVED



Create maintenance zones as a part of 10-year pavement rehabilitation program.

Goal 2:
Improve Pavement Condition Index by 5 Points

Implementation Measure 2.3 – ACHIEVED

StreetSaver®

✓ Input all pavement rehabilitation work completed in the last 3 years into StreetSaver.

CIP Project Status

FY 2023/24 through FY 2027/28

Type	Title and Description	Budget & Funding Source	Total Expenditures	Target Completion	Phase	Updates	Project Manager
Street	**Project 2019 BART Pedestrian and Bicycle Connectivity** Installation of Class lV buffered bicycle lane along Railroad Ave from California Ave to East 17th St. Included are a slurry seal, installation of roadside signs and pavement striping and markings, and a Class I path along west side of Railroad Ave from SR-4 to the Delta De Anza Regional Trail.	**TOTAL $ 6,043,050** OBAG 2 $ 3,870,000 PBTF/SR2B $ 1,300,000 TDA $ 58,000 Local TMF $ 300,000 Measure J $ 515,050	1,045,163	Sep-24	Bid and Award	Project has been advertized, and the bid opening is scheduled for 02/15/24. Caltrans is concurrently reviewing our improvement plans as well as the drainage and water quality reports.	Mariana Mena
Street	**Project 2028 (HSIP 10) Crestview Drive Safety Improvements** Improving pedestrian safety and preventing vehicular speeding at six intersections along Crestview Dr. Locations include: Crestview Ln, William Way, Atherton Ave, Kingsberry Pl, Sunnyhill Way, Nine Pl. Scope includes upgrading pavement markings, installing raised medians, and upgrading pedestrian crossings with enhanced safety features.	**TOTAL $ 933,494** HSIP 10 $ 378,220 HUTA $ 151,700 RMRA $ 41,200 CDBG $ 362,374	62,004	Jul-24	Planning and Design	Design consultant is addressing the 95% city comments and will provide a 100% plans, specifications, and estimate package by the end of February. The project is scheduled to go out to bid in mid-March, and construction is anticipated to begin May 2024.	Andrew Peters
Street	**Project 2033 Loveridge Road Maintenance** Installation of mill and overlay to extend the useful life of Loveridge Rd from Buchanan Rd to East Leland Rd. Existing roadway striping will be replaced as is. ADA curb ramps along Loveridge Rd will also be replaced.	**TOTAL $ 1,450,000** MEASURE M $ 225,000 RMRA $ 1,225,000	899,099	Feb-24	Complete	Project was accepted as complete by City Council on 02/05/24 in Resolution No. 24-14427. Notice of Completion was filed with Contra Costa County Recorders Office on 02/09/24 . Thirty days post filing, staff will release the construction retention in the final payment, and the project will be archived.	Savon Reese
Street	**Project 2038 (HSIP 10) Citywide Roadway Improvements** Installation or upgrade of signs with new fluorescent sheeting, completion of a Citywide roadway safety signing audit, and modifications to edge-line and centerline striping. Improvement locations are focused on arterial roads such as Railroad Ave, Willow Pass Rd, Bailey Rd, P-A Hwy, E Leland Rd, Loveridge Rd, Buchanan Rd, West 10th St, Harbor Rd, N Parkside Dr, California Ave, Century Blvd, and East 14th St.	**TOTAL $2,965,700** HSIP 10 $2,965,700	200,085	Sep-24	Planning and Design	City staff has expanded the scope, and the design consultant is working on the 100% plans, specifications, and cost estimate package. Staff will perform final design review in mid February. Target construction award is in March.	Andrew Peters
Street	**Project 2040 2023/24 Pavement Management** In prioritized pavement zones, implementation of pavement management techniques such as pavement overlay, reconstruction, inlay, slurry seal, patch paving, base failure repairs, and crack sealing. Scope will be determined based on staff analysis and data outcomes from the Pavement Management System.	**TOTAL $ 3,226,300** General Fund $ 600,000 GF Surplus $ 1,251,300 Measure M $ 650,000 HUTA $ 500,000 RMRA $ 225,000	5,541	Jul-24	Planning and Design	The 5-year Pavement Management Plan is complete and was presented to the Infrastructure and Transportation Subcomittee in December 2023. Staff received positive feedback and is working on the improvement plans for Zone 3. Construction award is targeted for March.	Savon Reese
Street	**Project 2050 Safe Routes to School** Installation of Rectangular Rapid Flashing Beacons (RRFB) at school crossings across Pittsburg. Locations include School St, Seeno Ave, Riverview Dr, West 4th St, and Buchanan Rd. The crosswalks are currently uncontrolled, and RRFBs will increase pedestrian safety.	**TOTAL $ 105,000** TDA $ 105,000	52,381	Mar-24	Construction	Project is under construction and it's expected to be completed by end of February .	Savon Reese
Street	**Project 2051 Marina Blvd Buffered Bicycle Lanes** Installation of thermoplastic striping and buffered bikes lanes on Marina Blvd from Herb White Way to East 5th St. Improvements will increase cyclist safety.	**TOTAL $ 56,100** TDA $ 56,100	$ 1,483	Jul-24	Planning and Design	Staff is developing bid documents including plans, specifications, and cost estimate. The project is scheduled to be go out to bid in conjuction with Project 2040 23/24 Pavement Maintenance.	Savon Reese

Type	Title and Description	Budget & Funding Source	Total Expenditures	Target Completion	Phase	Updates	Project Manager
Street	**Project 2052 (OBAG 3) Delta De Anza Multimodal Trail Safety Improvements** Installation of critical safety and operational enhancements including wayfinding signage, protected green bike lanes, rectangular rapid flashing beacons, raised/high visibility crosswalks, bulb-outs, pedestrian lighting, and upgrades to existing pavement.	**TOTAL $ 4,935,000** OBAG 3 $4,427,000 HUTA $ 33,000	4,490	Jun-25	Preliminary Implementation	Staff is preplanning pending approval of the city's Housing Element by the California Department of Housing and Community Development (HCD). This is estimated to occur by March 2024. Once approved, staff will complete project scoping and begin design.	Savon Reese
Street	**Project 2133 (TDA) Trail Crossing Improvements** Installation of RRFBs at Delta De Anza Trail Crossings including Atherton Ave, Crestview Dr, Gladstone Dr, and Presidio Ln. Crestview Dr crossing sidewalk will be widened. Existing crosswalks are uncontrolled, and the installation of RRFBs will improve pedestrian safety.	**TOTAL $ 150,000** TDA $ 120,000 MEASURE J $ 30,000	43,100	May-24	Planning and Design	The Rectangular Rapid Flashing Beacons (RRFB) will be placed within East Bay Municipal Utility District's (EBMUD) right of way. The City has applied for the Temporary Entry Permit (TEP) and sent payment for permit fees. Potholing and survey work will proceed in the coming weeks.	Savon Reese
Street	**Project 2231 (OBAG 2) Pavement Improvement** Project will improve W Leland Rd from Bailey Rd to John Henry Johnson Pkwy, from Crestview Dr to Railroad Ave, and Loveridge Rd from SR-4 to P-A Hwy.	**TOTAL $ 4,350,000** OBAG 2 $ 2,410,000 RMRA $ 1,940,000	489,216	Jul-24	Bid and Award	Notice of award has been issued to Ghillotti Constrution, and construction will start as soon as the weather permits.	Gabriel Piña
Street	**Project 2241 East Leland Road Pavement Maintenance** Project will improve E Leland Rd from Railroad Ave to eastern city limits. Treatments will include mill, overlay, and micro-surfacing, ADA curb ramp replacement, and thermoplastic striping.	**TOTAL $ 1,900,000** RMRA $ 1,700,000 HUTA $ 200,000	1,509,899	Feb-24	Complete	Project was accepted as complete by City Council on 02/05/24 in Resolution No. 24-14426. Notice of Completion was filed with Contra Costa County Recorders Office on 02/09/24 . Thirty days post filing, staff will release the construction retention in the final payment, and the project will be archived.	Savon Reese
Street	**Project 2608 Kirker Pass Road Rehabilitation** Resurfacing and roadway striping on Kirker Pass Rd between Buchanan Rd and Nortonville Rd. The project is coordinated with Contra Costa County road rehabilitation efforts and will be completed by the County's Awarded Contractor.	**TOTAL $ 610,000** General Fund $ 233,000 HUTA $ 92,000 Measure M $248,829	566	Jun-24	Construction	Surface rehabilitation activities, including microsurfacing, are scheduled to continue in Spring 2024.	Dayne Johnson
Street	**Project 4097 23/24 CDBG ADA Curb Ramp Installation** Construction or rehabilitation of multiple curb ramps in prioritized neighborhoods. Neighborhoods that qualify are determined by their census blocks focusing on data points such as resident age and neighborhood income. Neighborhoods identified for this year's project are: Parkside Manor, Carnegie Manor, and Rancho Medanos.	**TOTAL $ 220,000** CDBG $ 220,000	12,362	Feb-24	Construction	Construction of the initial scope is complete. As the project came in under budget and grant funds are available, the City will identify additional curb ramps that would benefit from retrofitting and continue construction.	Andrew Peters

Type	Title and Description	Budget and Funding Source	Total Expenditures	Target Completion	Phase	Updates	Project Manager
Signal	**Project 2132 (PASS) Program for Arterial Systems Synchronization** Facilitate traffic progression along congested corridors, update the signal timing plans to achieve operational efficiency of traffic signals with the existing capacity constraints. Locations include 15 traffic signals along W Leland Rd, 15 signals along Railroad Ave, and 5 along Buchanan Rd.	**TOTAL $ 128,600** MTC PASS $ 111,900 RMRA $ 16,700	867	Feb-24	Preliminary Implementation	Preliminary signal timing plans have been implemented and are being modified and as the signal timing results are provided. TJKM completed the signal timing report, and staff is performing a review.	Khristin Labao
Signal	**Project 2227 (HSIP 9) Citywide Traffic Signal Improvements** Improvement of traffic signal hardware at 35 signalized intersections citywide. Improvements include but are not limited to the replacement and/or installation of signal heads, lenses, pedestrian heads, push buttons, visors, backplates, retroreflective borders, controllers, cabinets, battery backup systems, and modems, as well as minor improvements to signal timing.	**TOTAL $ 1,271,000** GENERAL FUND $ 161,000 HSIP 9 $ 1,065,600 RMRA $ 44,400	309,027	Aug-24	Construction	Controller cabinets are expected to arrive in March 2024. City staff is in correspondence with the contractor to determine the construction start date.	Khristin Labao

Type	Title and Description	Budget and Funding Source	Total Expenditures	Target Completion	Phase	Updates	Project Manager
Signal	**Project 2243 Countywide Smart Signals** Upgrades to traffic signals and intersections on regional routes of significance within the city. Thirty signals have been identified as a part of this project. The project will upgrade city's signals to a smart signal system that improves signal interconnection and synchronization to optimize traffic flow and reduce congestion, prioritize transit and emergency vehicles, and uses video detection and analytics to proactively identify near-miss situations and report data to traffic management center.	**TOTAL $ 1,485,558** HSIP $ 1,332,724 HUTA $ 152,834	1,320	Jan-26	Planning, Design & Agency Coordination	City staff and the Director of Public Works/City Engineer are currently reviewing the draft ownership, operations, and maintenance agreement between Contra Costa Transporation Authority and City of Pittsburg.	Khristin Labao
Signal	**Project # TBD Pittsburg Center Smart City Pilot** Implementation of smart city technologies in the 1/4 mile transportation grid surrounding the Pittsburg Center BART station with connected technologies such as adaptive streetlights, connected traffic signals, and digital and static wayfinding signage. These upgrades will encourage transit use, alleviate traffic, encourage walking and bicycling, and attract local business investment by creating safer, more complete streets.	**TOTAL $ 1,440,000** CPFCDS $ 1,200,000	0	May-25	Planning, Design & Agency Coordination	City staff continues to work on the Request for Proposal for design. Once a design consultant is selected, staff will discuss possible Smart City Technologies to implement in the 1/4- mile transportation grid from the Pittsburg Center BART Station. Once a defined scope has been established, the City will apply for conditional approval from Caltrans.	Khristin Labao

Type	Title and Description	Budget and Funding Source	Total Expenditures	Target Completion	Phase	Updates	Project Manager
Water	**Project 5006 Water System Reliability (Cabrillo Place Waterline)** Improvement of system reliability for Zone 2 and Zone 3 customers by looping systems (Buchanan Pump Station and Brookside Dr) or based on an urgent need/chronic problem identified by Public Works.	**TOTAL $ 2,181,000** WOF $ 800,000	388,671	Jun-25	Planning and Design	City staff is reviewing quotes from the appraisers to obtain an easement through the Right of Way (ROW) within PG&E's parcel for alignment of the new waterline main. 100% design is targeted for completion in December 2024.	Andrew Peters
Water	**Project 5007 Highlands Ranch Tank Improvements** This 1MG steel on-grade tank has been operated and maintained by the city since 1999. An October 2021 needs assessment recommended that several improvement be made to prevent further erosion and damage to the tank. Scope includes, but is not limited to, installing a new cathodic protection system, new interior coating system, and installing new 12" vents.	**TOTAL $ 705,000** WOF $ 705,000	42,515	Jul-24	Planning and Design	City staff will solicit proposals from three design consultants in February. The project scope improvements include cathodic protection, tank encoding, and vent installation.	Alex Ruiz
Water	**Project 5009 Water Treatment Plant Reservoir Control Panel & PLC Replacement** Replacement of outdated programmable logic controllers (PLS), modules, and communication network of the raw water and light-level pump stations, treated water reservoirs, electrical room, and the filter control consoles. Most of the existing control system installed at the city's Water Treatment Plant (WTP) is obsolete and no longer supported.	**TOTAL $ 450,000** WOF $ 450,000	173,622	Feb-24	Bid and Award	The project received a bid for construction in December, and cost negotiations with the contractor. The project is anticipated to move forward with construction in May 2024.	Andrew Peters
Water	**Project 5067 WTP Filtration Improvements and Hypochlorite Conversion** Design and construction of six new dual media filters and replacement of segments of existing piping, installation of new valves, and new yard piping to connect and serve new facilities.	**TOTAL $ 49,181,188** WOF $ 2,481,188 WFR $ 900,0000 WATER BONDS $ 45,800,000	2,628,640	May-27	Planning and Design	West Yost will present the final bidding package to city staff mid February. The City anticipates this project to be awarded mid April and construction will begin in mid May.	Dayne Johnson
Water	**Project 5080 HDPE Water Main Reducer Emergency Repair** Repair of failed reducer on the Buchanan Rd water main near Quercus Ln. The weld failed in December 2021, and this section of pipe was shut off. The project will restore the water main back to normal operation.	**TOTAL $ 65,300** WOF $ 65,300	6,767	Mar-24	Construction	The pipe repair construction and inspections took place end of January. The project will be brought to City Council for acceptance in March.	Gabriel Piña

Type	Title and Description	Budget and Funding Source	Total Expenditures	Target Completion	Phase	Updates	Project Manager
Sewer	**Project 5003 West Santa Fe Avenue Sewer Water Rehabilitation** Replacement of approximately 15,500 linear feet of water main pipe and approximately 12,000 linear feet of sewer main pipe. The project targets areas where the water and sewer systems have reached the end of their useful life, have become maintenance problems, and/or fail to produce adequate water flow.	**TOTAL $ 7,802,530** SOF $ 3,708,530 WOF $ 4,094,000	305,060	May-25	Planning and Design	City staff is reviewing the 65% plans, specification, and estimate submittal.	Gabriel Piña

Type	Title and Description	Budget and Funding Source	Total Expenditures	Target Completion	Phase	Updates	Project Manager
Storm	**Project 1801 Frontage Road Living Green Trail** Construction of a Class I trail on Frontage Rd from Dover Way to the end of the existing pedestrian trail at Chelsea Way. Project will include the installation of pathway swales and bioretention features.	**TOTAL $ 2,166,250** Clean CA Grant $ 1,354,000 ARPA $ 812,250	262,321	Jun-24	Construction	Project construction began in January and is anticipated to be completed by June 2024.	Andrew Peters
Storm	**Project 3023 Willow Pass Storm Drain Repair** During the winter storms of 2023, two 60" reinforced concrete pipes separated at the top joints causing exfiltration upwards and damaging the roadway along Willow Pass Rd. An emergency temporary repair was completed to minimize damage. The project location is the north shoulder of Willow Pass Rd between 701 Willow Pass Rd and Nantucket Dr. City will apply for FEMA reimbursement.	**TOTAL $ 800,000** GF / FEMA $ 800,000	0	Jun-24	Planning and Design	City staff is drafting a Request for Proposal for design. A preliminary survey of the project site has been completed. The construction will consist of the removal of the existing concrete pipes and replacement with new concrete pipes/box culverts.	Andrew Peters
Storm	**Project 8336 Americana Park Bypass Channel** This project will reduce flood hazards and mitigate stormwater overflows from the detention basin in Americana Park and North Parkside Dr. Project includes the excavation of a new bypass channel from the park detention basin, south of N. Parkside Dr eastward across the parcel of land owned by PG&E and onto a nearby creek. Additional work includes the relocation of two waterlines, city and privately owned, and replacing existing irrigation valves.	TOTAL $ 1,276,700 HUTA $ 101,800 IRR $ 580,000 WOF $ 100,000 HMGP $ 374,900 2006 Tax Exempt TAB $ 89,128 2006 Taxable TAB $30,872	421,715	Oct-24	Planning and Design	City staff is working on the final plans, specifications, and cost estimate package. March is the target date for bid advertisement. Construction is projected to start in Spring 2024. Due to requirements set by the environmental agencies, construction can only be done during the dry season (Apr - Oct).	Alex Ruiz

Type	Title and Description	Budget and Funding Source	Total Expenditures	Target Completion	Phase	Updates	Project Manager
Building	**Project 3026 60 Civic Building Repair** Due to high winds during a storm event in winter 2022/23, a 60' tree fell onto the Neighborhood Center. Emergency work was completed to remove the tree and protect the building from further damage. This project will repair the damage so that the building can return to use. City will apply for FEMA reimbursement.	**TOTAL $ 800,000** GF / FEMA $ 800,000	47,925	Jul-24	Planning and Design	The contracts are circulating for signature for the structural consultant to design the framing repairs/restoration, and the restoration company to perform lead and asbestos remediation along with winterization in the front building. Afterwards, the structural consultant will begin design of the rear building. Having STS Academy return to the space is a high priority. Once the restoration has been 3/4ths of the way completed, the structural consultant can inspect for final design of the front building. City staff is in regular constant contact with MPA for ongoing approvals and to minimize project delays.	Hilario Mata
Building	**Project 3118 Corporation Yard Fueling System Replacement** The fleet fueling system at the Corp Yard is non-compliant with state regulatory requirements and requires major upgrades to include new piping, a fueling island, single wall tank replacement with above ground tanks, new dispensers, island cover, and a new concrete pad. The Environmental Center will be the new location for fleet fueling.	**TOTAL $ 1,408,100** WOF $ 504,100 SOF $ 504,000 BLDG MAINT $ 400,000	499,560	Mar-24	Bid and Award	Project was advertised for bid in December. City staff will take the project to Council on 02/20/24 to award construction contract.	Alex Ruiz

Type	Title and Description	Budget and Funding Source	Total Expenditures	Target Completion	Phase	Updates	Project Manager
Building	**Project 3119 Police Department Evidence and Intake Room Improvements** This storage area holds a broad range of materials and evidence related to pending investigations in criminal cases. This project will adjust the configuration and layout to better support evidence processing. Scope includes but is not limited to the installation of mobile shelving units, lockers, countertops, cabinets, and flooring.	**TOTAL $ 500,000** GENERAL FUND $ 350,000 BLDG MAINT $ 150,000	378,342	Mar-24	Construction	Construction was complete in February. Staff will bring the project to Council for acceptance at a March meeting.	Alex Ruiz
Building	**Project 3120 Police Department Women's Locker Room Expansion 2** An increase in female staff requires the expansion of the women's locker room. Improvements include but are not limited to converting the City Hall exercise room into a locker room, installing lockers, plumbing, and relocation of lactation room.	**TOTAL $ 440,000** BLDG MAINT $100,000	2,773	Oct-24	Preliminary Implementation	The project is on hold pending the close out phase of Project 3119. Remaining budget from 3119 will be reallocated to the women's locker room project.	Alex Ruiz
Building	**Project 3333 California Theater Marquee & Below Stage Modification** Construction of electronic theater marquee, below-stage dressing area, and restroom.	**TOTAL $ 400,000** CA NAT RES $ 400,000	2,371	May-24	Construction	The construction contract has been executed. Construction will begin early March when digital Marquee sign is expected to arrive. The grant extension was granted to 2025.	Gabriel Piña
Building	**Project 3334 City Council Chamber Upgrade** Incorporation of current technological standards and best practices into the Council Chamber's audiovisual broadcasting system. Upgrades will improve the in-person, remote, and hybrid meeting formats for future council and commission meetings, training sessions, and other events.	**TOTAL $ 535,000** PUB ED & GOVT $ 535,000	51,386	Feb-24	Construction	Electrical, AV, lighting, and painting construction activities have been completed. City staff is currently working with the Public Works Operation & Maintenance team to fix main electrical panel in City Hall. This is expected to be resolved in the next two weeks.	Dayne Johnson

Type	Title and Description	Budget and Funding Source	Total Expenditures	Target Completion	Phase	Updates	Project Manager
Park	**Project 1753 Buchanan Park Restroom Facility** This project includes the restoration of the existing restroom facility at Buchanan Park. City Staff has determined that this restroom restoration includes the best features to target some of the current issues being experienced at the park such as vandalism, misuse, lighting, etc.	**TOTAL $ 500,000** GENERAL FUND $ 500,000	0	Jun-25	Preliminary Planning	City staff will be creating an RFQ (Request for Quote) for design. Once a design consultant gets selected, staff will discuss the project scope.	Tyler Hensley
Park	**Project 1754 City Park Restroom** This project will replace the existing restrooms at City Park with a new restroom facility. The current restroom is outdated per code and could benefit from upgrading. City Staff has determined that this upgrade will alleviate vandalism, misuse, and lighting which are some of the current issues being experienced at the park.	**TOTAL $ 750,000** GENERAL FUND $ 750,000	0	Apr-25	Preliminary Planning	City staff will be creating an RFQ (Request for Quote) for design. Once a design consultant gets selected, staff will discuss the project scope.	Tyler Hensley
Park	**Project 3040 Buchanan Park Pond Loop** Replacement of portions of existing walkway around the pond that have deteriorated and have significant damage from tree roots. Project will also install slope protection, clear and grub plant overgrowth, and remove cattails from pond.	**TOTAL $ 222,300** PER CAPITA $ 222,300	9,270	Sep-24	Planning and Design	City staff is updating plans per geotechnical recommendations. Staff anticipates having a final plans, specifications, and cost estimate bidding package by end of February, with construction activities starting enf of March.	Alex Ruiz
Park	**Project 3080 Pittsburg Premier Fields** Construction of three multi-purpose fields that will serve as a regional draw for the economic benefit of residents. Design will include sport field lighting, landscaping and irrigation, site furnishings, tree planting, and restrooms. Project also includes a parking lot, paved and unpaved walkways and trails circling the facility, and a pic-up and drop-off area for visitors.	**TOTAL $ 16,437,000** GENERAL FUND $ 6,078,288 GF SURPLUS $ 1,615,000 PDF $ 1,152,712 MEAS M SURP $ 150,000	688,117	Feb-25	Planning and Design	Project is on hold due to a funding shortage. The City has applied for state funding and is awaiting the results before establishing a bid date.	Mariana Mena

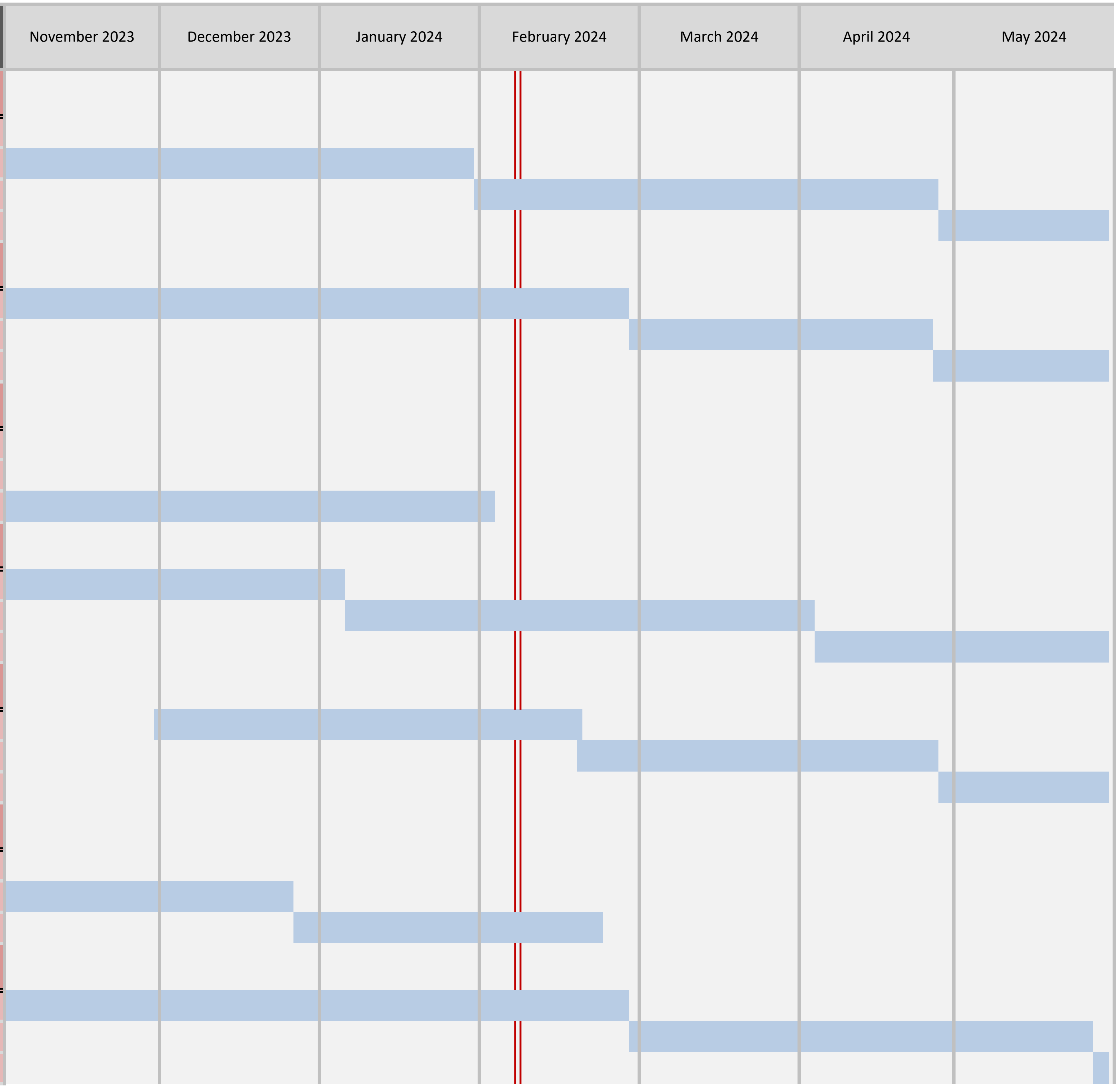
Type	Title and Description	Budget and Funding Source	Total Expenditures	Target Completion	Phase	Updates	Project Manager
General	**Project 1750 Youth Skate Plaza** Building on the 2009 Railroad Ave Specific Plan, the youth skate plaza and pump track aims to continue the beautification of the Railroad Ave corridor by adding much needed youth amenities, art installation, and park development. The City has applied for $5,000,000 Clean CA local Grant Cycle for funding.	**TOTAL $ 5,465,187** GF SURPLUS $ 465,187	256,475	Feb-25	Planning and Design	Consultant is finalizing the 100% plans, specifications, and cost estimate.	Gabriel Piña
General	**Project 1802 Police Department Electric Vehicle Chargers** Installation of 6 new electric vehicle charging station in the PPD private lot. This project will provide the power necessary to support the department's electric vehicle fleet and maintain operational functionality.	**TOTAL $ 90,300** ARPA $ 90,300	83,445	Feb-24	Complete	Project was accepted as complete by City Council on 02/05/24 in Resolution No. 24-14423. Notice of Completion was filed with Contra Costa County Recorders Office on 02/09/24 . Thirty days post filing, staff will release the construction retention in the final payment, and the project will be archived.	Gabriel Piña
General	**Project 3019 Reviving the Heart of Pittsburg Pride** Building on the 2009 Railroad Ave Specific Plan, this project will beautify the Railroad Ave corridor from Civic Ave to 8th St through landscaping, art installation, and park development.	**TOTAL $ 3,341,961** CLEAN CA $ 2,891.961 GF SURPLUS $ 62,00 ARPA $ 388,000	1,717,855	Jun-24	Construction	Construction is progressing. The majority of the pocket park is complete.	Gabriel Piña
General	**Project 3024 Buchanan Road Slope Repair** The slope was damaged and significantly eroded during the unusual atmospheric river storm events of January 2023. The failure is within the city's right-of-way and could threaten the stability of several houses above the slope. Repair will include removal of unsuitable soil, rebuilding and strengthening the terraces with suitable imported material, geotechnical fabrics, and other methods as needed. City will apply for FEMA reimbursement.	**TOTAL $ 2,150,000** GF / FEMA $ 2,150,000	126,706	Jun-24	Bid and Award	Bid opening was 2/6/2024 and city staff is reviewing bids. City staff expects to award bid on the next council meeting 2/20/2024	Alex Ruiz

Type	Project	Budget and Funding Source	Total Expenditures	Target Completion	Phase	Updates	Project Manager
Marina	**Project 5504 Central Harbor Park (CHP) and Boat Launch Facilities (BLF)** Upgrades include improved ADA paths, restroom replacements (Exeloo), parking lot striping, sealing, and securing, crime deterrents, fish cleaning station, shade structure, public fire pits, and picnic tables. Project is located north of Marina Blvd, west of the Pittsburg Marina, and east of the Pittsburg Yacht Club.	**TOTAL $ 3,867,995** DELTA CONSERV $ 3,729,295 SOLID WASTE $ 73,700 WTRFNT OPS $ 65,000	125,978	Jun-26	Planning and Design	The City executed a grant agreement with the Sacramento-San Joaquin Delta Conservancy for $3.5M. Staff is reviewing submittal of 100% plans, specifications, and cost estimate from R.E.Y. Engineers. Estimate advertise for construction bid in April 2024.	Sara Bellafronte
Marina	**Project 5515 Basin 3 Dredge** Maintenance dredging of basin and public launch ramps at the east side of the Pittsburg Yacht Club just north of the northern end of Heron Dr, the launch ramp located north of Marina Blvd between Central Harbor Park, and the Pittsburg Marina.	**TOTAL $ 1,843,900** WTRFNT LEA REV $ 1,500,000 WTRFNT OPS $ 105,000 MARINA ENT $ 238,900	985,627	Nov-23	Complete	Project was accepted as complete by City Council on 01/16/24 in Resolution No. 24-14422. Notice of Completion was filed with Contra Costa County Recorders Office. Thirty days post filing, staff will release the construction retention in the final payment, and the project will be archived.	Gabriel Piña
Marina	**Project 6240 Residential Channel Dredge** Maintenance dredging of the New York Landing residential channel located between Heron Dr. and Pelican Loop.	**TOTAL $ 2,250,000** HOA $ 2,250,000	249,400	Nov-23	Complete	Construction is complete and in close out phase.	Gabriel Piña

CIP Project Timeline
FY 2023/24 through FY 2027/28

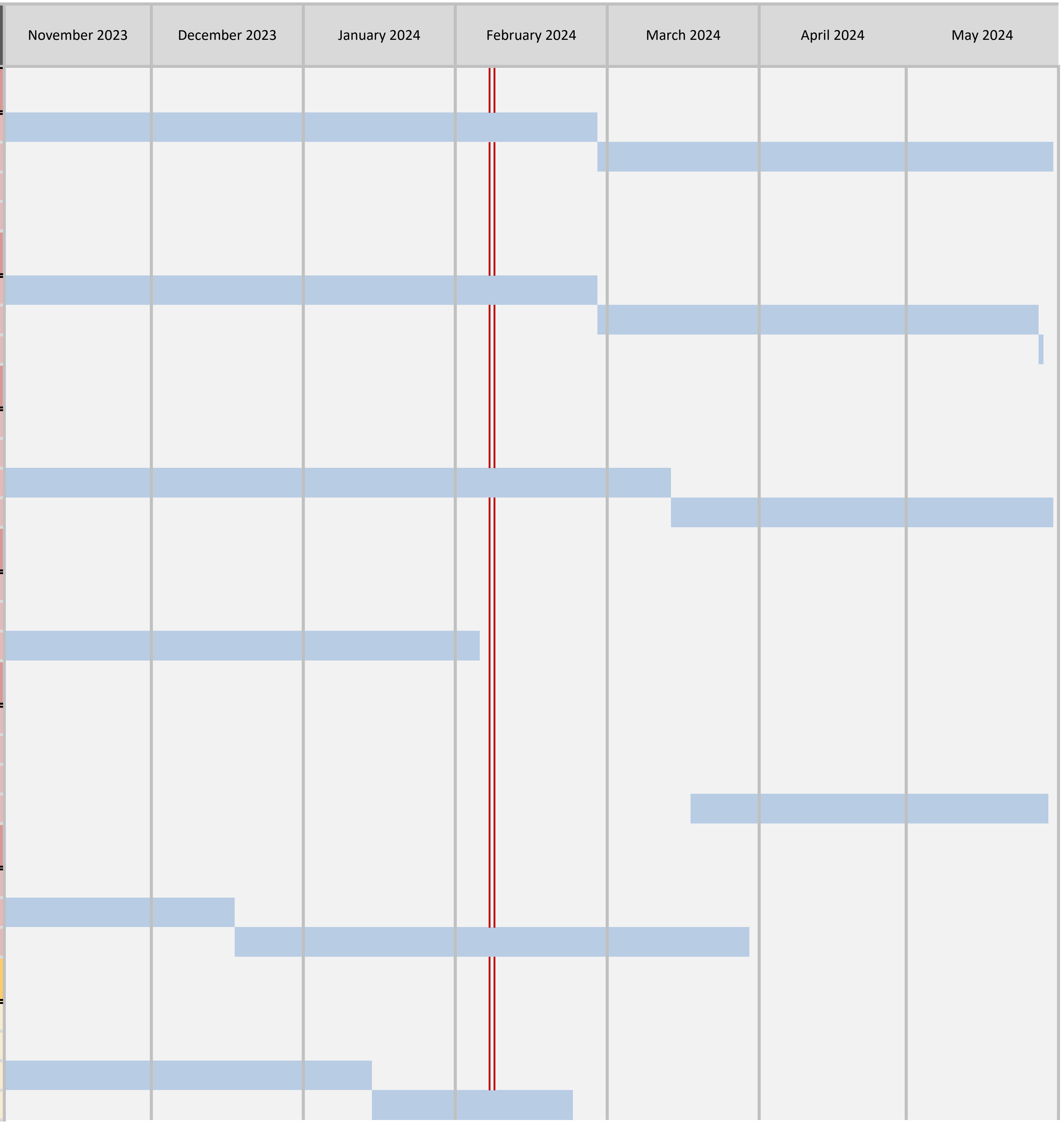
City of Pittsburg California

Project Type	Project Name	Project #	START	ESTIMATED END
Street	**BART Pedestrian and Bicycle Connectivity** - *1E Essential*	**2019**		
	Planning and Design		Jun-19	Apr-23
	Agency Permitting & Coordination		Jun-19	Jan-24
	Bid & Award		Jan-24	Apr-24
	Construction		May-24	Sep-24
Street	**(HSIP 10) Crestview Drive Safety Improvements** - *1E Essential*	**2028**		
	Planning and Design		Oct-21	Feb-24
	Bid & Award		Mar-24	Apr-24
	Construction		Apr-24	Jul-24
Street	**Loveridge Road Maintenance** - *2H Required* - ***COMPLETE***	**2033**		
	Planning and Design		Nov-22	Jul-23
	Bid & Award		Jul-23	Oct-23
	Construction		Oct-23	Feb-24
Street	**(HSIP 10) Citywide Roadway Improvements** - *2G Required*	**2038**		
	Planning and Design		Mar-23	Jan-24
	Bid & Award		Jan-24	Apr-24
	Construction		Apr-24	Sep-24
Street	**2023/24 Pavement Management** - *2H Required*	**2040**		
	Planning and Design		Nov-23	Feb-24
	Bid & Award		Feb-24	Apr-24
	Construction		May-24	Jul-24
Street	**Safe Routes to School** - *1C Essential*	**2050**		
	Planning and Design		Dec-22	Sep-23
	Bid & Award		Sep-23	Dec-23
	Construction		Dec-23	Feb-24
Street	**Marina Blvd Buffered Bicycle Lanes** - *2G Required*	**2051**		
	Planning and Design		Aug-23	Feb-24
	Bid & Award		Mar-24	May-24
	Construction		May-24	Aug-24



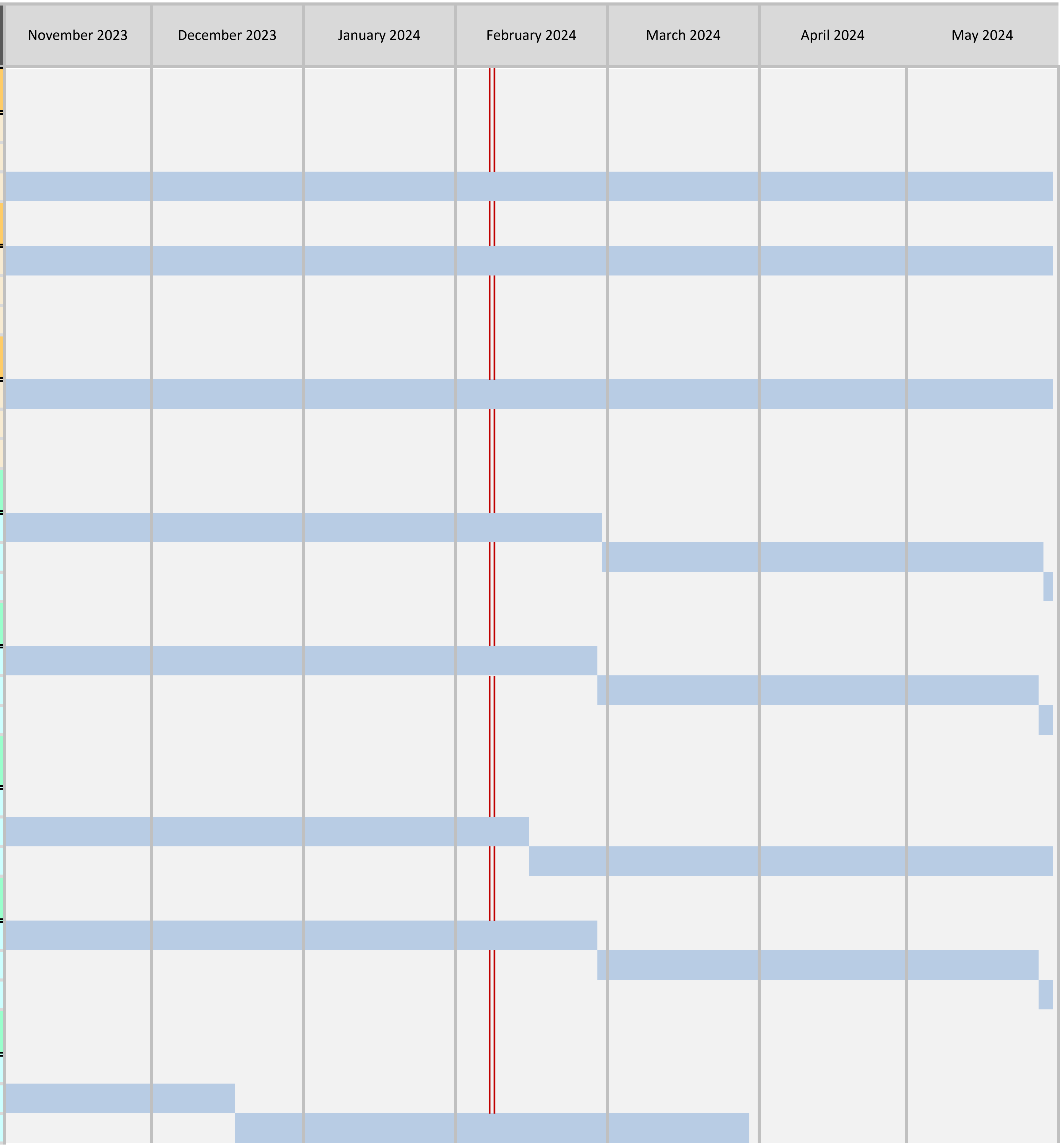
Updated February 8, 2024

Project Type	Project Name	Project #	START	ESTIMATED END
Street	**(OBAG 3) Delta De Anza Multimodal Trail Safety Improvements** - *2G Required*	**2052**		
	Preliminary Implementation		Nov-23	Feb-24
	Planning and Design		Mar-24	Oct-24
	Bid & Award		Nov-24	Feb-25
	Construction		Feb-25	Jun-25
Street	**(TDA) Trail Crossing Improvements** - *1C Essential*	**2133**		
	Planning and Design		Jan-23	Feb-24
	Bid & Award		Mar-24	May-24
	Construction		May-24	May-24
Street	**(OBAG 2) Pavement Improvement** - *1C Essential*	**2231**		
	Planning and Design		Jul-22	Aug-23
	Agency Permitting & Coordination		Sep-22	Oct-23
	Bid & Award		Oct-23	Mar-24
	Construction		Mar-24	Jul-24
Street	**East Leland Road Pavement Maintenance** - *2H Required* - **COMPLETE**	**2241**		
	Planning and Design		Nov-22	Jul-23
	Bid & Award		Jul-23	Oct-23
	Construction		Oct-23	Feb-24
Street	**Kirker Pass Road Rehabilitation** - *2H Required*	**2608**		
	Planning and Design		Jan-23	Jul-23
	Bid & Award		Jul-23	Sep-23
	Construction (Ashpalt Repairs "Dig-Outs")		Sep-23	Oct-23
	Construction (Mircosurfacing)		Mar-24	Jun-24
Street	**23/24 CDBG ADA Curb Ramp Installation** - *1C Essential*	**4097**		
	Planning and Design		Aug-23	Sep-23
	Bid & Award		Sep-23	Dec-23
	Construction		Dec-23	Mar-24
Signal	**(PASS) Program for Arterial Systems Synchronization** - *2G Required*	**2132**		
	Planning and Design		Aug-22	Sep-23
	Agency Coordination		Oct-23	Oct-23
	Peliminary Implementation		Nov-23	Jan-24
	Final Project Report with Benefit- Cost Analysis		Jan-24	Feb-24



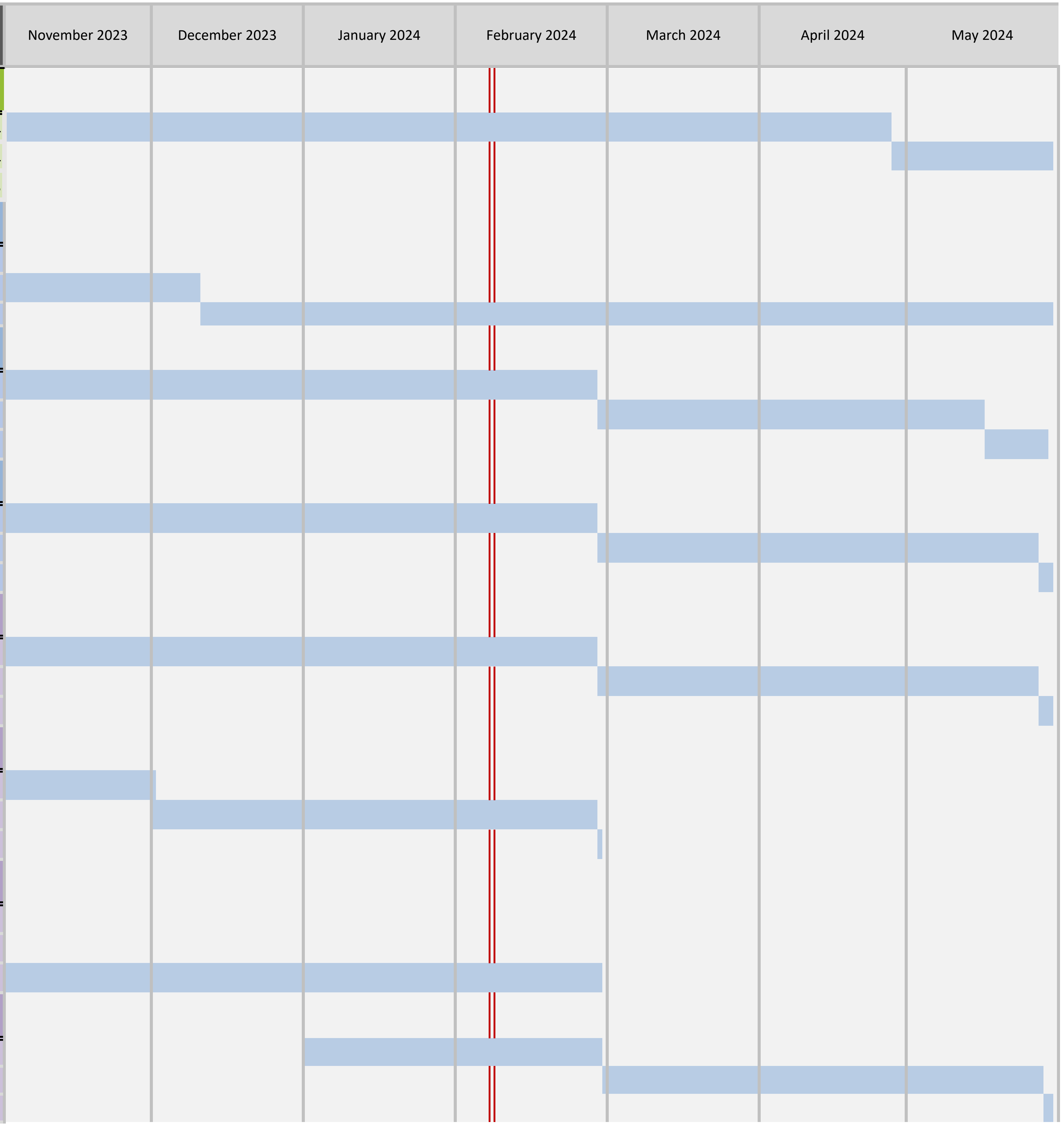
Updated February 8, 2024

Project Type	Project Name	Project #	START	ESTIMATED END
Signal	**(HSIP 9) Citywide Traffic Signal Improvements** - *1A Essential*	**2227**		
	Planning, Design, & Agency Coordination		Sep-19	Oct-21
	Bid and Award		Oct-21	Jan-22
	Construction		Jan-22	Aug-24
Signal	**Countywide Smart Signals** - *2G Required*	**2243**		
	Planning, Design, & Agency Coordination		Jul-23	Aug-25
	Bid and Award - CCTA will manage this process		Aug-25	Sep-25
	Construction		Sep-25	Jan-26
Signal	**Pittsburg Center Smart City Pilot** - *2G Required*	**TBD**		
	Planning, Design, & Agency Coordination		Oct-23	Aug-24
	Bid and Award		Sep-24	Dec-24
	Construction		Jan-25	May-25
Water	**Water System Reliability (Cabrillo Place Waterline)** - *2H Required*	**5006**		
	Planning and Design		Mar-23	Mar-24
	Bid and Award		Mar-24	May-24
	Construction		Jun-24	Jun-25
Water	**Highlands Ranch Tank Improvements** - *2H Required*	**5007**		
	Planning and Design		Oct-22	Feb-24
	Bid and Award		Mar-24	May-24
	Construction		May-24	Jul-24
Water	**Water Treatment Plant Reservoir Control Panel & PLC Replacement** - *2H Required*	**5009**		
	Planning and Design		May-22	Sep-23
	Bid and Award		Sep-23	Feb-24
	Construction		Feb-24	Jun-24
Water	**WTP Filtration Improvements and Hypochlorite Conversion** - *1C Essential*	**5067**		
	Planning and Design		Jul-22	Feb-24
	Bid & Award		Mar-24	May-24
	Construction		May-24	May-27
Water	**HDPE Water Main Reducer Emergency Repair** - *1C Essential* - **COMPLETE**	**5080**		
	Planning and Design		Apr-23	Jul-23
	Bid & Award		Aug-23	Dec-23
	Construction		Dec-23	Mar-24

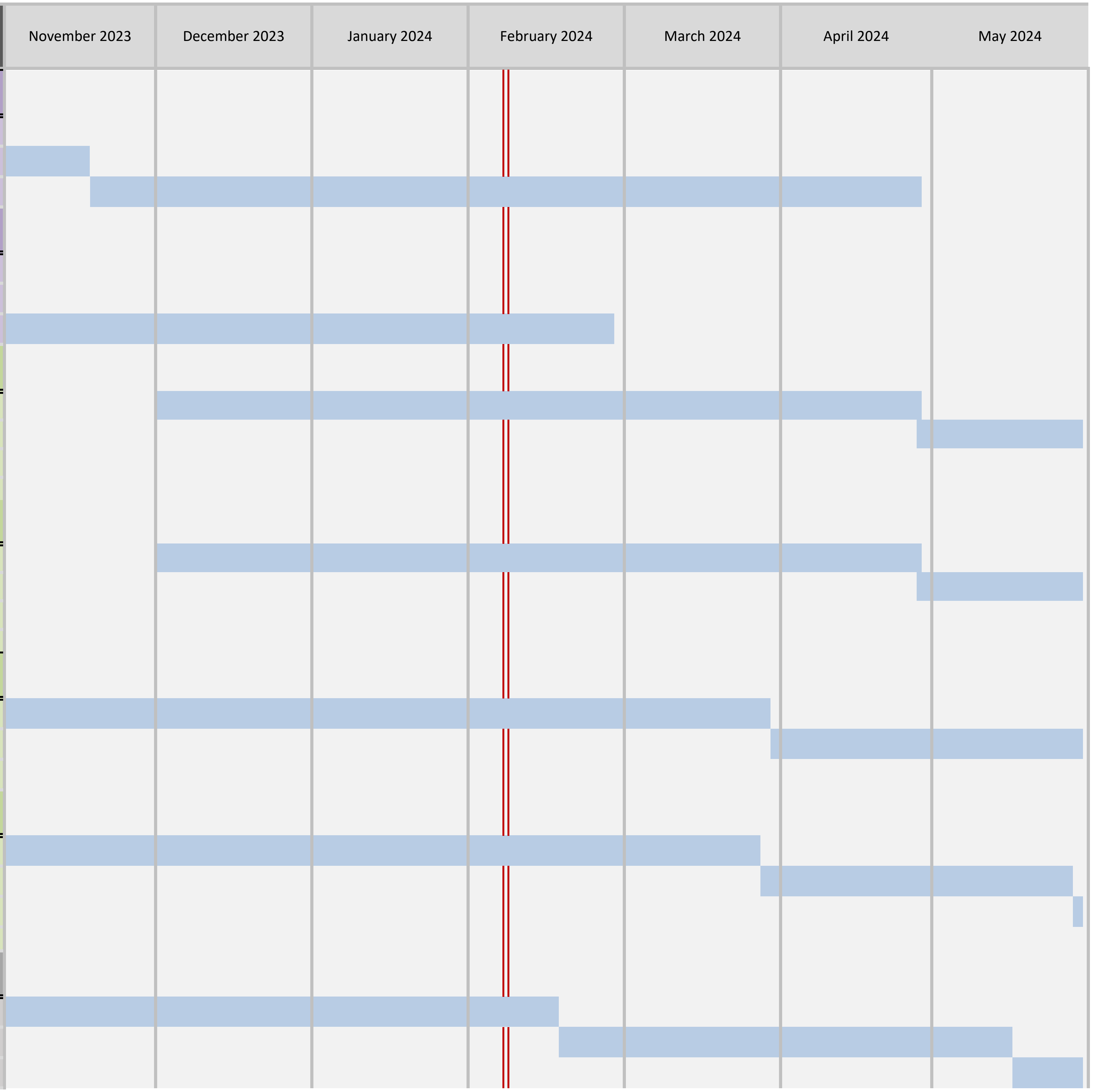


Updated February 8, 2024

Project Type	Project Name	Project #	START	ESTIMATED END
Sewer	**West Santa Fe Avenue Sewer Water Rehabilitation** - *2H Required*	**5003**		
	Planning and Design		Jun-22	Apr-24
	Bid and Award		May-24	Jul-24
	Construction		Jul-24	Jul-25
Storm	**Frontage Road Living Green Trail** - *2G Required*	**1801**		
	Planning and Design		Oct-22	Sep-23
	Bid & Award		Sep-23	Dec-23
	Construction		Dec-23	Jun-24
Storm	**Willow Pass Storm Drain Repair** - *1C Essential*	**3023**		
	Planning and Design		Jul-23	Feb-24
	Bid & Award		Mar-24	May-24
	Construction		May-24	Jun-24
Storm	**Americana Park Bypass Channel** - *1C Essential*	**8336**		
	Planning, Design & Agency Coordination		Apr-09	Feb-24
	Bid & Award		Mar-24	May-24
	Construction - *Start date based on dry season per envrionmental permits*		May-24	Oct-24
Building	**60 Civic Building Repair** - *1C Essential*	**3026**		
	Planning and Design		Jul-23	Feb-24
	Bid & Award		Mar-24	May-24
	Construction		May-24	Jul-24
Building	**Corporation Yard Fueling System Replacement** - *1B Essential*	**3118**		
	Planning and Design		Mar-20	Dec-23
	Bid & Award		Dec-23	Feb-24
	Construction		Mar-24	Mar-24
Building	**Police Department Evidence and Intake Room Improvements** - *1A Essential*	**3119**		
	Planning and Design		Jan-21	Oct-21
	Bid & Award		Oct-21	Jan-22
	Construction		Feb-22	Mar-24
Building	**Police Department Women's Locker Room Expansion 2** - *3J Goals*	**3120**		
	Planning and Design		Jan-24	Mar-24
	Bid & Award		Mar-24	May-24
	Construction		Jun-24	Oct-24



Project Type	Project Name	Project #	START	ESTIMATED END
Building	**California Theater Marquee & Below Stage Modification** - *1E Essential*	**3333**		
	Planning and Design		May-23	Aug-23
	Bid & Award		Aug-23	Nov-23
	Construction		Nov-23	May-24
Building	**City Council Chamber Upgrade** - *1A Essential*	**3334**		
	Planning and Design		May-22	Jan-23
	Bid & Award		Jan-23	Apr-23
	Construction		Aug-23	Feb-24
Parks	**Buchanan Park Restroom Facility**	**1753**		
	Planning and Design		Dec-23	May-24
	Bid & Award		May-24	Jul-24
	Construction		Jul-24	Sep-24
	Closeout		Oct-24	Dec-24
Parks	**City Park Restroom Facility**	**1754**		
	Planning and Design		Dec-23	May-24
	Bid & Award		May-24	Jul-24
	Construction		Jul-24	Sep-24
	Closeout		Oct-24	Dec-24
Parks	**Buchanan Park Pond Loop** - *2G Required*	**3040**		
	Planning and Design		Jul-23	Mar-24
	Bid & Award		Apr-24	Jun-24
	Construction		Jul-24	Sep-24
Parks	**Pittsburg Premier Fields** - *1E Essential*	**3080**		
	Planning and Design		Jul-22	Mar-24
	Bid & Award		Mar-24	May-24
	Construction		Jun-24	Dec-24
	Closeout		Dec-24	Feb-25
General	**Youth Skate Plaza** - *2G Required*	**1750**		
	Planning and Design		Mar-23	Feb-24
	Bid & Award		Feb-24	May-24
	Construction		May-24	Feb-25



Project Type	Project Name	Project #	START	ESTIMATED END	November 2023	December 2023	January 2024	February 2024	March 2024	April 2024	May 2024
General	**Police Department Electric Vehicle Chargers** - *1A Essential - COMPLETE*	**1802**									
	Planning and Design		Aug-22	Nov-22							
	Bid & Award		Feb-23	Apr-23							
	Construction		May-23	Feb-24	▨	▨	▨	▨			
General	**Reviving the Heart of Pittsburg Pride** - *2G Required*	**3019**									
	Planning and Design		Aug-22	Jul-23							
	Bid and Award		Jul-23	Oct-23							
	Construction		Oct-23	Jun-24	▨	▨	▨	▨	▨	▨	▨
General	**Buchanan Road Slope Repair**	**3024**									
	Planning and Design		Aug-23	Jan-24	▨	▨	▨				
	Bid and Award		Feb-24	May-24				▨	▨	▨	
	Construction		May-24	Jun-24							▨
Marina	**Central Harbor Park (CHP) and Boat Launch Facilities (BLF)** - *2G Required*	**5504**									
	Planning and Design		Sep-22	Apr-24	▨	▨	▨	▨	▨	▨	
	Bid & Award		Apr-24	Jul-24						▨	▨
	Construction		Jul-24	Jun-26							
Marina	**Basin 3 Dredge** - *2H Required*	**5515**									
	Planning and Design		Sep-22	Jun-23							
	Bid & Award		Jun-23	Sep-23							
	Construction		Sep-23	Nov-23	▨						
Marina	**Residential Channel Dredge** - *2G Required*	**6240**									
	Planning and Design		Sep-22	May-23							
	Bid & Award		Jun-23	Sep-23							
	Construction		Sep-23	Nov-23	▨						