

Pittsburgh Public Facilities EV CHARGING STRATEGIC PLAN



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American Cities
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Definitions and Acronyms

Types of electric vehicles

- **EV:** Electric vehicle, meaning a vehicle powered, at least in part, by electricity. EV refers to all plug-in vehicles in this report.
- **BEV:** Battery-electric vehicle, meaning a vehicle powered entirely by electricity (e.g. Nissan Leaf or Chevy Bolt).
- **PHEV:** Plug-in hybrid electric vehicle, meaning a vehicle with both a conventional engine and electric motor that can be powered either by gas or electricity through a rechargeable battery (e.g. a Chevy Volt or Prius Prime).

Electric vehicle charging terms¹

- **Electric Vehicle Supply Equipment (EVSE):** The hardware, including connectors, fixtures, devices, and other components required to charge an electric vehicle; commonly called a charging station.
- **Level 1:** AC Level 1 EV charging (often referred to simply as Level 1) provides charging through a 120-volt (120V) AC plug (a typical wall outlet) at 12-16 amps. For every hour of charging, Level 1 EV charging can provide about 3-5 miles of range.
- **Level 2:** AC Level 2 EV charging offers charging through 240V (typical in residential applications) or 208V (typical in commercial applications) electrical service (like a dryer plug) at 12-80 amps (typically 32 amps). For every hour of charging, Level 2 EV charging can provide about 10-20 miles of range.
- **DC fast charging (DCFC):** Direct-current (DC) fast charging equipment, sometimes called Level 3 (typically 208/480V AC three-phase input and less than 125 amps), enables rapid charging at a rate of at least 40 kW, with newer chargers rated up to 350 kW. Most commonly, DCFC can enable an 80% charge in 20-30 minutes. Currently, there are three types of DCFC: J1772 combo (known also as Combined Charging System or CCS), CHAdeMO, and Tesla.
- **Networked charging stations:** Networked charging stations connect to internet-based communications networks and provide many services that non-networked stations cannot, such as: integrating real-time information about a station's operational status; enabling managed charging solutions; collecting usage data, and directly processing payment for charging via credit card.
- **Curbside charging:** EV charging stations designed to provide charging access for vehicles parking in on-street spaces, typically sited at the curb in the sidewalk "furniture zone" (where parking meters, street trees, benches, etc. are) so as not to interfere with pedestrian access.
- **Capital Costs:** Fixed, one-time expenses incurred on the purchase of land, buildings, construction, and equipment used in the production of goods or in the rendering of services.
- **Operating Costs:** the ongoing expenses incurred from the normal day-to-day of running a business that include both costs of goods sold and other operating expenses.

¹ EVSE definitions adapted from the [Alternative Fuels Data Center](#).

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Executive Summary

Purpose

The purpose of creating this strategic plan is to:

- 1) Enable the City to sustainably expand access to public EV charging citywide to increase EV adoption at the level necessary to meet the City's climate goals.
- 2) Provide a strategic framework for prioritizing public facilities, streamlining the process for pursuing grants and other opportunities to expand public EV charging on City property.
- 3) Develop a multi-year implementation plan for EV charging installation and operations in public facilities, including recommendations on targets, siting prioritization, financing, policy, and operations.
- 4) Develop a sustainable funding mechanism that can leverage a small amount of City budget investment and/or charging revenues to attract utility, state, and/or federal grant opportunities.
- 5) Establish roles and responsibilities across City departments and the Pittsburgh Parking Authority for EV charging planning, installation, operations, and maintenance in public facilities.

The strategic plan and its recommendations will be implemented and updated over time as needed by the City's EV Task Force.

Scope

This plan focuses primarily on expanding EV charging in Pittsburgh Parking Authority (PPA) facilities and other public-facing City facilities, as well as leveraging opportunities to drive private investment in EV charging.

Vision for Public EV Charging

The City of Pittsburgh aims to ensure that public EV charging is **available, accessible, equitable, and convenient** for **all who live, work, and visit** in the City of Pittsburgh.

Mission for Public EV Charging

To work towards this vision in the near term, the City sees its role as:

- 1) **Enabling the market**, e.g. encouraging private investment where possible and where demand for EV charging is greatest.
- 2) **Filling market gaps**, particularly ensuring charging is available for those with the greatest barriers to charge.
- 3) Providing and managing EV charging in a **financially sustainable manner** that recovers operating costs, enabling additional investments in the City's EV charging programs.
- 4) **Engaging the community** in planning and implementation of the City's EV charging strategy, as well as to utilize the infrastructure.

2025 Public EV Charging City Targets and Citywide Planning Benchmarks

The City, Parking Authority, and key stakeholders will strive to meet by 2025:

- 1) **City targets:** measurable, specific goals that the City will strive to meet by leveraging its property and available funding.
- 2) **Citywide planning benchmarks:** measurable, but aspirational goals for the City and its external partners to strive for – i.e. all public EV charging, both public and private owned.

2025 Capacity Targets and Benchmarks

In 2020, there were over 280 publicly listed EV charging plugs in Pittsburgh, 35 of which were on Parking Authority properties. These targets and benchmarks are designed to support the number of needed chargers based on estimated EV adoption rates:

Table 1: 2025 Capacity Targets and Benchmarks

	Baseline in 2020	New Public Level 2 Charging Plugs	New DC Fast Charging Plugs
City Targets	35	180	20
Citywide Planning Benchmarks	280	1,860	515

2025 Coverage Targets and Benchmarks

These targets and benchmarks are designed to support an accessible distribution of EV chargers Citywide:

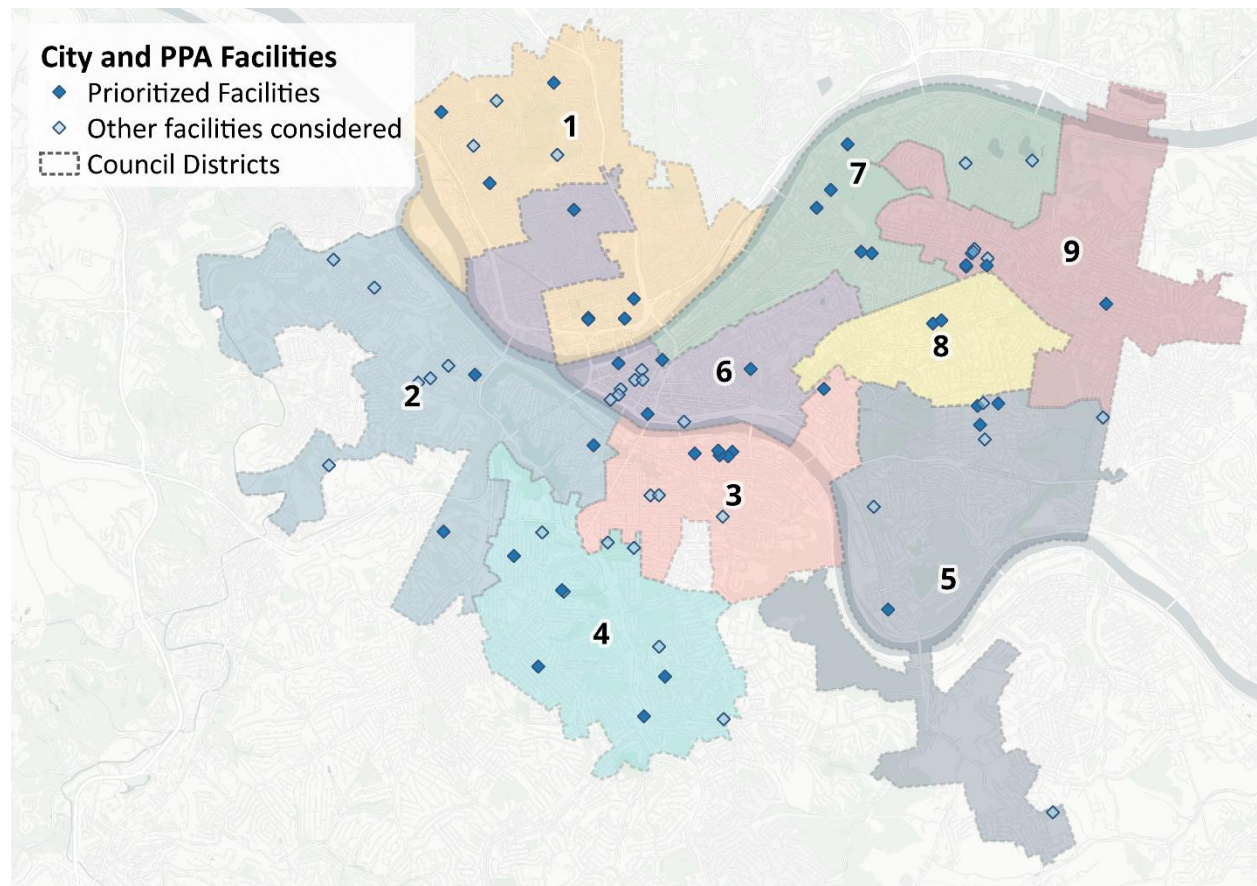
Table 2: 2025 Coverage Targets and Benchmarks

City Target	Every Council district to have at least 4 City-provided public EV charging plugs.
Citywide Planning Benchmark	Every household within a 10-minute walk of a public Level 2 charger or a 10-minute drive of a DC fast charger.

Public Facility Site Prioritization for EV Charging

Figure 1 highlights 41 facilities out of over 75 considered that are prioritized for EV charging buildout through 2025 (see full plan for draft list). The factors utilized to prioritize sites are designed to identify sites 1) serving those with the greatest barriers to charge, such as those without access to charging at home, 2) those that overlap with other upcoming City investments, such as energy efficiency renovations, and 3) those that help fill network gaps. Additionally, factors to indicate likely utilization and equity impact are included to further rank and prioritize sites. The draft list includes likely more facilities than will add EV charging in the next 5 years due to the need for flexibility. Additional review for factors such as a sites' electrical upgrade costs is needed along with community input. This list may also shift if opportunities arise for complementary integration with other City investments such as City fleet electrification, renewable energy, or micromobility charging hubs.

Figure 1: City and Parking Authority Facilities Prioritized for EV Charging



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Summary of Policy and Operational Recommendations

Table 3 summarizes the key policy and operational recommendations intended to support the City and its stakeholders to realize their vision, mission, and goals for EV charging. **These recommendations will be overseen by the EV Implementation Unit**, and are described in more detail in the plan below.

Table 3: Policy and Operational Recommendations for Public EV Charging, 2021-2025

Topic	Recommendations	Phasing*	Departments**
Planning and Siting	1. Develop partnerships and approach to assess prioritized site technical feasibility	Phase 2	DCP-S+R, PPA, DPW-F
	2. Monitor data to calibrate plan, phasing, and targets over time	Phase 1	DCP-S+R
	3. Explore curbside charging pilot co-located with micromobility charging and streetlights	Phase 3	DCP-S+R, DOMI
Community Outreach and Engagement	4. Develop approach and partnerships to engage communities on proposed EV charging sites, and integrate into existing neighborhood planning process	Phase 1	DCP-SP DCP-S+R
	5. Develop City and/or Parking Authority webpage and communication materials on EV charging	Phase 1	DCP, PPA, I+P
	6. Develop partnerships to assess community needs and pursue EV charging hub pilot concept	Phase 3	DCP-S+R, DCP-SP, DOMI, OOE
Economics and Financing	7. Establish pricing structure and rules to be phased in to City/Parking Authority networked chargers	Phase 1	PPA, OMB
	8. Establish fund to receive EV charging revenues and cover operating costs.	Phase 1	PPA, OMB
	9. Work with Duquesne Light to gain enabling legislative or regulatory approvals	Phase 1	DCP-S+R
	10. Pursue regular City or Parking Authority budget allocation to enable leverage of grants and other opportunities	Phase 1	PPA, OMB
	11. Pilot hardware options and establish standardized specifications and procurement process	Phase 2	OMB, PPA, DCP-S+R, DOMI
	12. Put out RFI and/or RFP to gauge interest in third-party owned/operated EV charging	Phase 2	PPA, DCP-S+R, OMB
Policies and Operations	13. Formalize EV Task Force and staffing	Phase 1	DCP-S+R, MO
	14. Establish internal policy/guidance to standardize charging station signage, wayfinding, and ADA approach	Phase 1	PPA, DPW-F, DOMI
	15. Establish EV-only parking policy for charging spaces to support enforcement by Parking Authority	Phase 2	PPA
	16. Incorporate EV readiness requirements into Net Zero requirements for City facilities	Phase 2	DCP-S+R

*Phase 1 = 2021; Phase 2 = 2022-2023; Phase 3 = 2024-2025.

**Index of department and organizational acronyms can be found on p. 19.

Introduction

Lack of access to electric vehicle (EV) charging, particularly for City residents who cannot charge at home, is a noted barrier to EV adoption². A key recommendation from the 2019 Pittsburgh EV Task Force Recommendations³ included developing a “Plan for Converting Pittsburgh Parking Authority Facilities” that would set targets for and determine approaches to owning, operating, and maintaining EV charging.

Purpose and Scope

The purpose of creating this strategic plan is to:

- 1) Enable the City to sustainably expand access to public EV charging citywide to increase EV adoption at the level necessary to meet the City’s climate goals.⁴
- 2) Provide a strategic framework for prioritizing public facilities, streamlining the process for pursuing grants and other opportunities to expand public EV charging on City property.
- 3) Develop a multi-year strategic plan for EV charging installation and operations in public facilities, including recommendations on targets, siting prioritization, financing, policy, and operations.
- 4) Develop a sustainable funding mechanism that can leverage a small amount of City budget investment and/or charging revenues to attract utility, state, and/or federal grant opportunities.
- 5) Establish roles and responsibilities across City departments and the Pittsburgh Parking Authority for EV charging planning, installation, operations, and maintenance in public facilities.

The strategic plan and its recommendations will be implemented and updated over time as needed by the City’s Electric Vehicle Task Force.

The scope of this plan expanded from its initial focus on Pittsburgh Parking Authority (PPA) facilities to also include other public-facing City facilities such as parks and recreation centers, primarily to enable an increased focus on improving Citywide access to public EV charging, including in areas without Parking Authority facilities. Additionally, the plan addresses opportunities to partner with stakeholders to drive private investment in EV charging, and discusses potential options for pursuing curbside charging in the future.

The strategic plan and its recommendations will be implemented and updated over time as needed by the City’s EV Task Force.

² [Emerging Best Practices for Electric Vehicle Charging Infrastructure](#). The International Council on Clean Transportation. 2017.

³ [City of Pittsburgh EV Task Force Recommendations](#). 2019.

⁴ The City’s climate goals include reducing greenhouse gas emissions 20% below 2003 levels by the year 2023, 50% GHG Reduction by 2030, and 80% GHG Reduction by 2050. [City of Pittsburgh Climate Action Plan Version 3.0](#).

City Vision and Mission for Public EV Charging

Vision: The City of Pittsburgh aims to ensure that public EV charging is **available, accessible, equitable, and convenient** for **all who live, work, and visit** in the City of Pittsburgh.

Mission: To work towards this vision in the near term, the City sees its role as:

- 1) **Enabling the market**, e.g. encouraging private investment where possible and where demand for EV charging is greatest.
- 2) **Filling market gaps**, particularly ensuring charging is available for those with the greatest barriers to charge.
- 3) Providing and managing EV charging in a **financially sustainable manner** that recovers operating costs, enabling additional investments in the City’s EV charging programs.
- 4) **Engaging the community** in planning and implementation of the City’s EV charging strategy, as well as to utilize the infrastructure.

Urban Sustainability Directors Network (USDN) Four Dimensions of Equity

The approach to equity in this Roadmap is informed by the Urban Sustainability Directors Network’s (USDN) definition of equity, which includes four interlinked components:

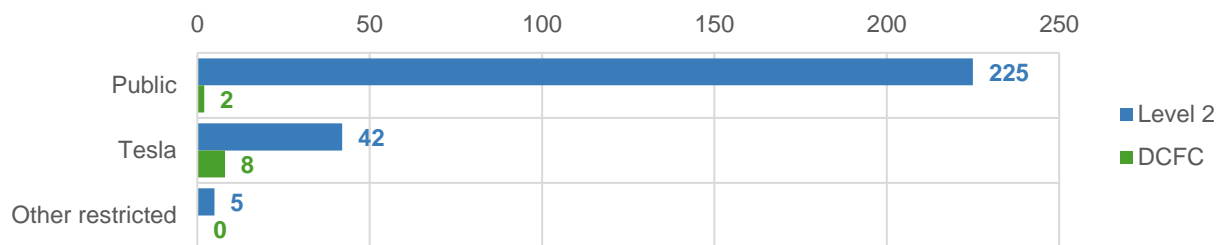
1. **Procedural**, which stresses the importance of inclusive, accessible, authentic engagement in the process of developing policies and programs;
2. **Distributional**, which emphasizes the importance of programs and policies that result in fair distributions of benefits and burdens, prioritizing those with highest need;
3. **Structural**, which emphasizes that decision-makers institutionalize accountability and address historic systemic inequities, and
4. **Transgenerational**, which emphasizes that decisions consider generational impacts and do not result in unfair burdens on future generations.

2020 Baseline and 2025 Targets

2020 Baseline: Public EV charging in Pittsburgh

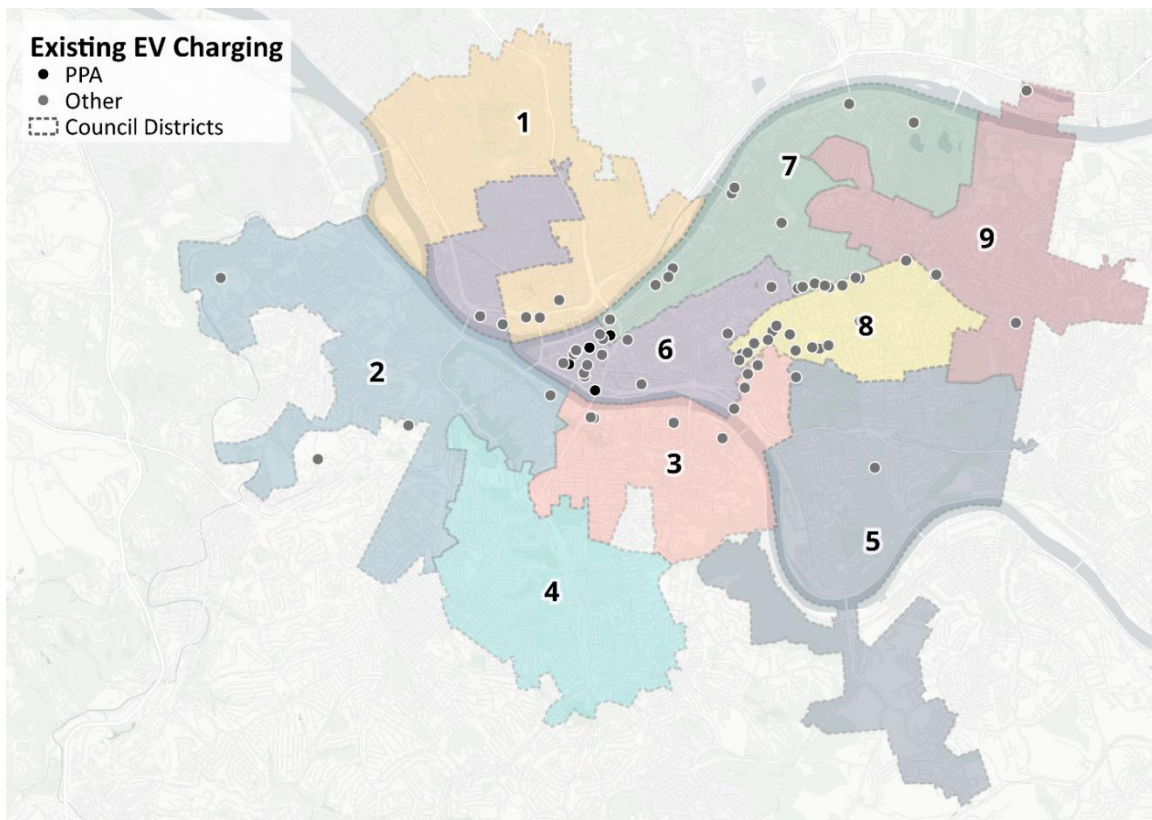
As of November 2020, there were over 280 publicly listed EV charging plugs in Pittsburgh across 75 locations, primarily clustered in downtown, the Strip, and Oakland at a mix of retail sites, garages, hotels, car dealerships, and destinations like the Convention Center and Pittsburgh Zoo & PPG Aquarium (see Figure 3).⁵ Figure 2 summarizes the publicly listed chargers as of November 2020, some of which have restrictions. Most public chargers are not networked and have no cost to charge; for those that do, some charge by the hour (typically \$1.00-\$4.00) or by kilowatt-hour (kWh) (\$0.09/kWh-\$0.49/kWh).

Figure 2: Publicly Listed EV Charging Plugs in Pittsburgh (AFDC, November 2020)



⁵ [Alternative Fuels Data Center Station Locator](#), Nov. 30, 2020.

Figure 3: Publicly Listed EV Charging Plugs in Pittsburgh (AFDC, November 2020)



City-led EV charging

To date, 35 public EV charging plugs across 4 garages have been installed in PPA facilities, 26 of which are networked. The City also has 10 additional charging plugs available for its fleet at the Second Avenue Plaza Lot, with 30 planned to be added in 2021. Table 4 summarizes the existing City and Parking Authority owned charging as of late 2020, as well as planned additions.

Table 4: Summary of City and Parking Authority EV Charging in 2020

Location and Description	Number of EV plugs/ spaces
Existing (as of 2020)	
First Avenue Garage (Third Floor)	15 (10 networked)
Grant Street Transportation Center (2 nd Floor of Red Garage)	4 (0 networked)
Third Avenue Garage	8 (all networked)
Smithfield Liberty Garage	8 (all networked)
Second Avenue Plaza Lot	10 (City fleet only)
Planned	
Second Avenue Plaza Lot	30 (City fleet only)
Kirkwood Lot	12 (8 Level 2 public, 4 DC fast charging)
Fort Duquesne & Sixth Garage	TBD (Level 2 public)

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Table 5 summarizes the City and PPA facilities under consideration for this plan, including the total number of facilities, spaces, current EV charging plugs, cost to park, and enforcement.

Table 5: Summary of City and Parking Authority facilities Under Consideration for Public EV charging as of Dec. 2020

Type of facility	Number of facilities	Number of parking spaces	Number of EV charging plugs	Cost to park and enforcement
Parking Authority garages	12	8,060	35	<ul style="list-style-type: none"> • Gated entry • Day rates \$9-\$20 depending on location • Monthly leases for \$170-\$350
Parking Authority lots	34	1,734	None ⁶	<ul style="list-style-type: none"> • Unattended, metered parking. Enforcement occurs 2-3x per 8hr day. • \$1-2 per hour. • Some long-term leases for businesses and their employees.
City facilities (parks, recreation centers, etc.)	29	825 (estimated)	None	<ul style="list-style-type: none"> • Unenforced parking – no time limits • Free to park

Based on interviews with Pittsburgh Parking Authority and City staff, Figure 4 below summarizes the experience with and lessons learned to date from installing and operating public EV charging that inform this plan.

Figure 4: Summary of Parking Authority Experience with Public EV Charging to Date

<p>Funding</p> <ul style="list-style-type: none"> • Have been funded primarily through state AFIG, Driving PA Forward grants • Have developed partnership with Duquesne Light (DLC)
<p>Hardware</p> <ul style="list-style-type: none"> • Started with non-networked chargers, moving increasingly to networked, ChargePoint chargers. • Tried out solar EV ARC to power chargers at one site which have not performed well in winter months
<p>Cost to charge</p> <ul style="list-style-type: none"> • Has been free to date (with pay to park), as all chargers are within fairly expensive paid garages • Will need to have all chargers networked to be able to charge a fee
<p>Enforcement</p> <ul style="list-style-type: none"> • Not punitive, attendants place reminder postcards “please share the space when fully charged” • Challenge: garage often full by time first driver is finished charging (i.e. they have no space to move to)
<p>Usage trends</p> <ul style="list-style-type: none"> • Several lease holders are regular chargers • EV charging spaces reaching high utilization more rapidly – within 2-3 months of activation (pre-COVID)

⁶ DEP grant awarded to add EV charging to Sheridan Kirkwood Parking Authority lot.

2025 Public EV Charging City Targets and Citywide Planning Benchmarks

This section establishes recommendations for setting:

- 1) **City targets:** measurable, specific goals that the City will strive to meet by leveraging its property and available funding.
- 2) **Citywide planning benchmarks:** measurable, but aspirational goals for the City and its external partners to strive for – i.e. all public EV charging, both public and private owned.

These targets and benchmarks for public EV charging in Pittsburgh by 2025 are designed to support the City vision for public EV charging, and strive to address both:⁷

- 1) **Filling gaps in capacity,** i.e. the number of needed chargers or increasing “supply of stations proportional to utilization.”
- 2) **Filling gaps in coverage,** i.e. the distribution of chargers or “access to charging anywhere a drivers’ travels take them.”

Capacity Targets and Benchmarks

Beginning in 2021, the City will strive to work with stakeholders to meet the following capacity targets and citywide planning benchmarks **by 2025**:

Table 6: 2025 Capacity Targets and Citywide Planning Benchmarks

	Baseline Level 2 Charging Plugs in 2020	New Public Level 2 Charging Plugs	Baseline DC Fast Charging Plugs in 2020	New DC Fast Charging Plugs
City Targets	35	180	0	20
Citywide Planning Benchmarks	280	1,860	4	515

Assumptions that informed these benchmarks and targets include:

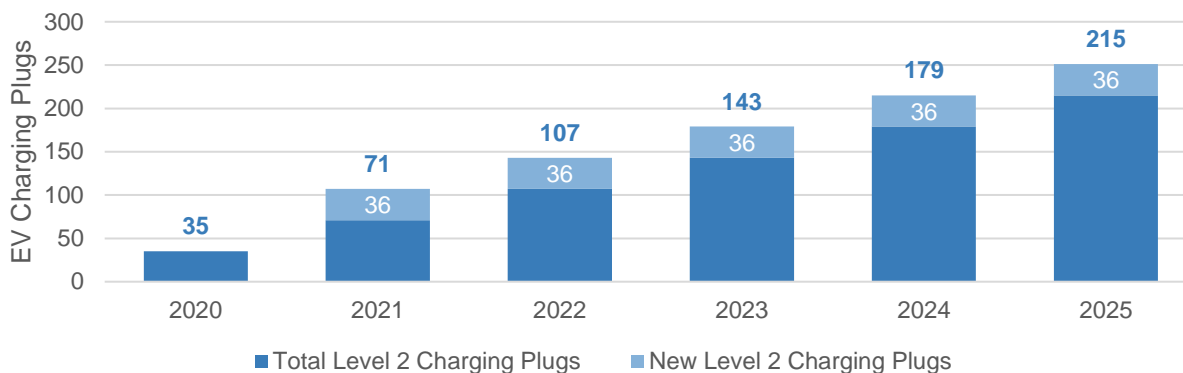
- 1) The High EV adoption scenario and resulting EVSE need estimates are utilized because this scenario best approximates the EV adoption rates needed for the City to reach its climate goals, as described below.
- 2) The City will aim to provide 10% of estimated needed public Level 2 EV plugs and 5% of public DCFC, assuming a similar yet increasing level of private investment as has occurred to date.

Figure 5 illustrates the estimated Level 2 plugs the City would need to add per year to reach its target.

⁷ [New EVSE Analytical Tools/Models: Electric Vehicle Infrastructure Projection Tool \(EVI-Pro\)](#). NREL, 2018.

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Figure 5: Estimated Trajectory of New City-Provided Level 2 Charging Plugs, 2020-2025



Supporting Analysis – Estimating EV Charging Capacity Needs

This analysis is designed to quantify the number of Level 2 and DC fast chargers needed by 2025 to address *capacity*, based on the EV adoption scenarios described below (see Table 7). The analysis relies on EV adoption scenarios developed for the Siemens Technology Roadmap (CyPT) and by NREL.⁸ The CyPT scenarios were designed to identify the EV adoption rates necessary for the City to reach its carbon reduction goals, and were calibrated to Pittsburgh’s estimated baseline for EV registrations.⁹

Table 7: Projected Registered Electric Vehicles in Pittsburgh by Scenario, 2025

Scenario	Description	2025
Low – NREL Reference Scenario	<ul style="list-style-type: none"> “Business-as-usual outlook where only incremental changes with respect to electrification occur.” Relies on Energy Information Administration (EIA) Annual Energy Outlook (AEO) projections of EV adoption 	5,580
Medium – CyPT Original Scenario	<ul style="list-style-type: none"> EVs reach 30% of registered vehicles by 2030 	15,060
High – CyPT 50x2030 Scenario	<ul style="list-style-type: none"> Pathway to deep carbon reductions, EVs reach 75% of registered vehicles by 2030 Models increased implementation rates identified in Pittsburgh’ Climate Action Plan 	28,500

The EV adoption scenarios were then input into National Renewable Energy Laboratory’s (NREL) EVI-Pro Lite online tool to estimate the number of needed public chargers to support different levels of EV adoption.¹⁰ Access to home charging is a highly sensitive input to the EVI Pro-Lite tool; given the high percentage of renter and multi-family households in Pittsburgh, about 50% of EV drivers are assumed to have access to charging at home.

⁸ Siemens. [A Technology Roadmap for Pittsburgh: Linking Climate and Innovation](#), 2019.

National Renewable Energy Laboratory. [Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States](#), 2018.

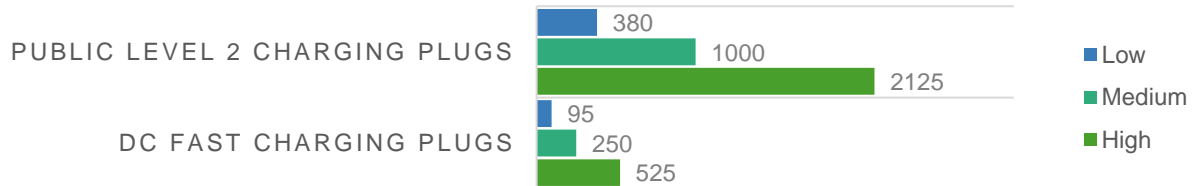
⁹ Delaware Valley Regional Planning Commission (DVRPC). [Planning for Electric Vehicles Dashboard](#).

¹⁰ [Electric Vehicle Infrastructure Projection Tool \(EVI-Pro\) Lite](#). NREL.

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Based on the inputs described, Figure 6 summarizes the estimated need for EV charging citywide by 2025, by EV adoption scenario. These figures could shift based on trends in population or employment growth, vehicle ownership, EV technology advancements, etc., and should be revisited during subsequent updates to this plan. The private market is already providing a substantial number of EV chargers in certain areas, and may be able to provide a greater share as EV adoption grows: To date, **13%** of public Level 2 plugs in Pittsburgh are owned by the City or Parking Authority.¹¹

Figure 6: Scenario Analysis for 2025 Public EV Charging Planning Benchmarks



Coverage Targets and Benchmarks

By 2025, the City will strive to work with stakeholders to meet the following coverage targets and citywide planning benchmarks:

Table 8: 2025 Coverage Targets and Benchmarks

City Target	Every Council district to have at least four new City-provided public EV charging plugs.
Citywide Planning Benchmark	Every household within a 10-minute walk of a public Level 2 charger or a 10-minute drive of a DC fast charger.

Supporting Analysis

To determine recommended coverage targets and benchmarks, the City reviewed best practices from peer cities, considered research about how far people will be likely willing to travel to charge, and analyzed the current level of citywide access to EV charging. Behavioral considerations for establishing coverage targets and benchmarks include:

- With Level 2 charging taking 2-4 hours or more, drivers will likely want to charge close to the places where they dwell for long periods, like home or work.
- Over 70% of drivers report their main gas station is within a 5-minute drive, and that their longest acceptable driving time for gas is 10 minutes.¹² DC fast charging, most similar to fueling at a gas station, could be targeted to be within a similar driving range, e.g. 5-10 minutes, or 1-2 miles.

How are other cities setting targets to ensure adequate coverage?

Vancouver: "To ensure a DCFC hub exists within a 10-minute drive of anywhere in the city and Level 2 charging is provided at 20 City-owned, public facing sites by 2021."

Boston: 1) "Every household will be within a 10-minute walk of a publicly accessible charging station by 2030" **and 2)** "Free-to-access public charging infrastructure available in every neighborhood by 2023" (i.e. not in a paid garage)

¹¹ [Alternative Fuels Data Center Station Locator](#), Nov. 30, 2020.

¹² [California Light Duty Vehicle Survey](#), California Energy Commission, 2013.

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Presently, some City Council Districts (2, 4, and 5) have no or very few EV charging stations, but do have some Parking Authority lots and City facilities that could potentially host EV chargers and improve coverage in those areas of the City over the next 5 years (see Table 9 below).

Table 9: Assessment of Current and Potential EV Charging Coverage by City Council District

Council District	Current public Level 2 plugs	City-owned EV charging station sites	Parking Authority Garages	Parking Authority Lots	Other City facilities
1	20	0	0	2	17
2	1	0	0	2	22
3	23	0	1	7	11
4	0	0	0	3	16
5	2	0	0	5	19
6	88	4	9	0	8
7	43	1	1	4	20
8	46	0	1	1	3
9	23	0	0	8	13

Public Facility Site Prioritization, 2021-2025

The criteria used to prioritize sites relies on the City's vision for EV charging, and seeks to balance:

- 1) **Filling market gaps**, particularly ensuring charging is available for those with the greatest barriers to charge, and filling gaps in the existing public EV charging network.
- 2) **Providing and managing EV charging in a financially sustainable manner**, by prioritizing sites likely to have some demand for EV charging, and seeking cost-effectiveness through integration with other City investments such as planned renovations, new construction, energy efficiency upgrades, or renewable energy development at City facilities.

The factors utilized to prioritize sites are summarized in Table 10. Additional variables that indicate likely EV charging utilization and equity impact were also included in the analysis to support prioritization. See Appendix for additional detail on these variables, and a full list of the sites considered.

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Table 10: Public Facility Site Prioritization Factors

Factors	Description
Serving those with greatest barriers to charge	<ul style="list-style-type: none"> Is this facility in/near a residential permit parking area? <i>(In residential permit parking areas, residents often don't have access to a dedicated off-street parking space where they could more easily charge at home)</i>
Filling network gaps	<ul style="list-style-type: none"> Is this facility in a Council District with few/no public chargers, or no City-owned chargers? Are there few or no other chargers nearby?
Retrofit/redevelopment schedule	<ul style="list-style-type: none"> Is this facility scheduled for a renovation or energy efficiency retrofit within the next 5 years?
Upgrade to networked charging / Already planned EV charging	<ul style="list-style-type: none"> Does this facility have non-networked public EV chargers that will need to be replaced? Does this facility have EV charging stations already planned?

Table 11 highlights 41 facilities out of over 77 considered that are prioritized for EV charging buildout through 2025. This list includes more facilities than will add EV charging in the next 5 years due to the need for flexibility. Additional factors, such as review of available electrical capacity, planned future of lot or garage, and community input, must be considered, and this list may also shift if opportunities arise for integration with other City investments such as City fleet electrification, renewable energy, or micromobility charging hubs.

Table 11: Prioritized Public Facilities for Public EV Charging

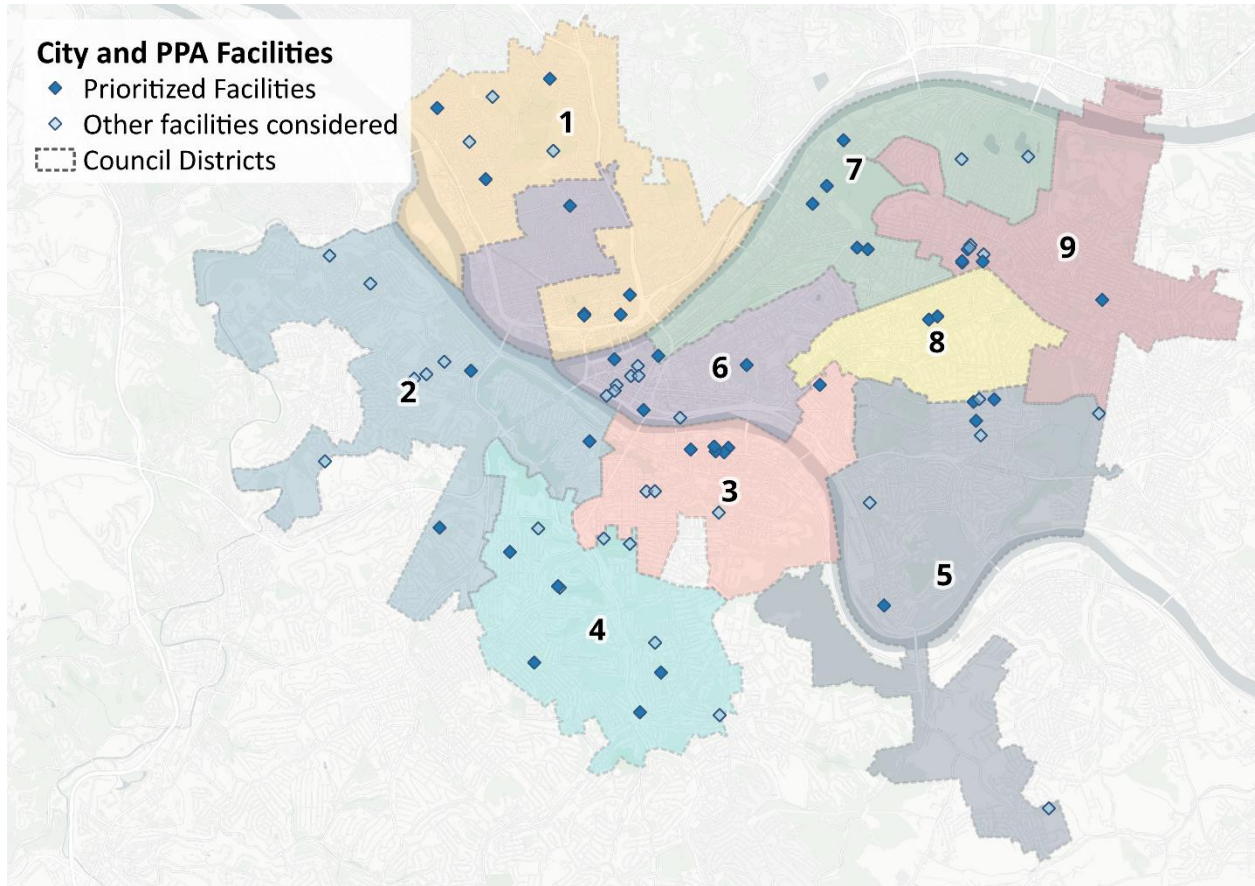
Reason for 2025 Prioritization	Facility Name	Facility Type	Council District	Parking Spaces	EVSE Utilization Score ¹³	DOMI Equity Score
Upgrade to networked EVSE / Already planned	Grant Street Transportation Center	Parking Authority Garage	7	991	97%	12%
	First Avenue Garage and Station	Parking Authority Garage	6	1243	70%	0%
	Fort Duquesne and Sixth Garage	Parking Authority Garage	6	917	96%	57%
	Sheridan Kirkwood	Parking Authority Lot	9	114	87%	77%
Serves Residential Permit Parking Area	Forbes Semple Garage	Parking Authority Garage	3	449	95%	76%
	Sue Murray Filter Building	City Facility	1	10	93%	57%
	East Ohio St.	Parking Authority Lot	1	88	91%	92%
	Shadyside Garage	Parking Authority Garage	8	208	83%	12%
	12th & East Carson Street Lot	Parking Authority Lot	3	35	80%	73%
	Taylor Street Parking Plaza	Parking Authority Lot	7	26	76%	24%
	18th & Carson Street Lot	Parking Authority Lot	3	41	76%	0%
	Friendship/Cedarville	Parking Authority Lot	7	80	75%	12%
	19th & Carson (Street Lot)	Parking Authority Lot	3	27	71%	0%
	18th & Sidney (Street Lot)	Parking Authority Lot	3	45	68%	24%

¹³ Higher utility and equity scores indicate higher prioritization for either factor. See Appendix for additional detail on these factors.

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Reason for 2025 Prioritization	Facility Name	Facility Type	Council District	Parking Spaces	EVSE Utilization Score ¹³	DOMI Equity Score
	20th & Sidney Street Parking Plaza	Parking Authority Lot	3	80	67%	24%
	Ivy/Bellefonte	Parking Authority Lot	8	74	62%	12%
	42nd & Butler	Parking Authority Lot	7	22	61%	0%
	Shiloh Parking Plaza	Parking Authority Lot	2	73	53%	53%
	Leslie Pool Building	City Facility	7	29	45%	0%
	Homewood/Zenith	Parking Authority Lot	9	24	26%	95%
	Beechview Avenue	Parking Authority Lot	4	17	17%	41%
Helps Fill Gaps in Existing Public EV Charging Network	Tamello/ Beatty	Parking Authority Lot	9	76	82%	77%
	Eva/ Beatty	Parking Authority Lot	9	130	79%	77%
	Ansley/Beatty	Parking Authority Lot	9	23	74%	77%
	Beacon/Bartlett	Parking Authority Lot	5	69	72%	68%
	JCC/Forbes	Parking Authority Lot	5	69	64%	68%
	Forbes/Shady	Parking Authority Lot	5	59	59%	41%
	Brookline Boulevard	Parking Authority Lot	4	47	50%	41%
	Banksville Pool Building and Shelter	City Facility	2	49	49%	0%
	5224 Butler Street Parking Plaza	Parking Authority Lot	7	12	47%	24%
	Overbrook Community Center	City Facility	4	10	46%	24%
	Main/Alexander	Parking Authority Lot	2	29	43%	77%
	Moore Pool and Recreation Building	City Facility	4	70	42%	12%
	Marmaduke Concession Stand	City Facility	1	15	37%	53%
	Observatory Hill	Parking Authority Lot	1	23	34%	41%
	Kennard Maintenance Building	City Facility	6	61	32%	91%
	Young Concession Stand	City Facility	1	14	32%	73%
	Fowler Recreation Center	City Facility	6	55	24%	96%
Energy Efficiency Retrofits Planned, 2021-2025	Town North Garage Aquatics Division	City Facility	1	9	66%	32%
	Hazelwood Senior Center	City Facility	5	12	26%	96%
	Phillips Gym and Recreation Center	City Facility	4	18	8%	72%

Figure 7: City and Parking Authority Facilities Prioritized for EV Charging



Policy and Operational Recommendations

Table 12 summarizes the key policy and operational recommendations intended to support the City and its stakeholders to realize their vision, mission, and goals for EV charging. These recommendations will be overseen by the EV Implementation Unit, and are described in more detail in the sections that follow.

Department and Organization Index

- **DCP-S&R:** City of Pittsburgh, Department of City Planning, Sustainability & Resilience Division
- **DCP-SP:** City of Pittsburgh, Department of City Planning, Strategic Planning Division
- **DLC:** Duquesne Light Company
- **DOMI:** City of Pittsburgh, Department of Mobility and Infrastructure
- **DPW-F:** City of Pittsburgh, Department of Public Works, Facilities Division
- **ELA:** City of Pittsburgh, Equipment Leasing Authority
- **FVS:** First Vehicle Services (City’s fleet maintenance contractor)
- **I+P:** City of Pittsburgh, Department of Innovation and Performance
- **MO:** City of Pittsburgh, Mayor’s Office
- **OMB:** City of Pittsburgh, Office of Management Budget
- **OOE:** City of Pittsburgh, Office of Equity
- **PLI:** City of Pittsburgh, Department of Permits, Licensing and Inspections
- **PPA:** Pittsburgh Parking Authority

Table 12: Policy and Operational Recommendations for Public EV Charging, 2021-2025

Topic	Recommendations	Phasing	Departments
Planning and Siting	1. Develop partnerships and approach to assess prioritized site technical feasibility	Phase 2	DCP-S+R, PPA, DPW-F
	2. Monitor data to calibrate plan, phasing, and targets over time	Phase 1	DCP-S+R
	3. Explore curbside charging pilot co-located with micromobility charging and streetlights	Phase 3	DCP-S+R, DOMI, DLC
Community Outreach and Engagement	4. Develop approach and partnerships to engage communities on proposed EV charging sites, and integrate into existing neighborhood planning process	Phase 1	DCP-SP, DCP-S+R, PPA, DLC, DOMI
	5. Develop City and/or Parking Authority webpage and communication materials on EV charging	Phase 1	DCP-S&R, PPA, I+P
	6. Develop partnerships to assess community needs and pursue EV charging hub pilot concept	Phase 3	DCP-S+R, DLC, DOMI, OOE
Economics and Financing	7. Establish pricing structure and rules to be phased in to City/Parking Authority networked chargers	Phase 1	DCP-S&R, PPA, OMB
	8. Establish fund to receive EV charging revenues and cover operating costs.	Phase 1	DCP-S&R, PPA, OMB
	9. Work with Duquesne Light to gain legislative or regulatory approvals	Phase 1	DCP-S+R, DLC, PPA
	10. Pursue regular City or Parking Authority budget allocation to enable leverage of grants and other opportunities	Phase 1	DCP-S&R, PPA, OMB

	11. Pilot hardware options and establish standardized specifications and procurement process	Phase 2	OMB, PPA, DCP-S+R, DOMI
	12. Put out RFI and/or RFP to gauge interest in third-party owned/operated EV charging	Phase 2	PPA, DCP-S+R, OMB, DLC
Policies and Operations	13. Formalize EV Implementation Unit and Staffing	Phase 1	DCP-S+R, MO
	14. Establish internal policy/guidance to standardize charging station signage, wayfinding, and ADA approach	Phase 1	PPA, DPW, DOMI, DCP-S&R
	15. Establish EV-only parking policy for charging spaces to support enforcement by Parking Authority	Phase 2	PPA, DCP-S&R
	16. Incorporate EV readiness requirements into Net Zero requirements for City facilities	Phase 2	DCP-S+R, PPA, DPW-F

Planning and Siting

1. Develop partnerships and approach to assess prioritized site technical feasibility

Lead: PPA. **Support:** DCP-S&R, DPW-F. **Timing:** Phase 2

Based on stakeholders' established principles and criteria, utilize prioritized facility list in this plan to inform grant applications and EV charging investments (see Appendix). Work with Facilities, Pittsburgh Parking Authority, and Duquesne Light to establish a streamlined process for more detailed site feasibility assessment, including electrical capacity and structural assessment (e.g. for DCFC).

2. Monitor data to calibrate plan, phasing, and targets over time

Lead: PPA. **Support:** DPW-S&R. **Timing:** Phase 1

Regularly (on at least a biannual basis) monitor and analyze utilization data from networked chargers to assess change over time in utilization, and calibrate financial assumptions and need for additional nearby chargers.

3. Explore curbside charging pilot co-located with micromobility charging and streetlights

Lead: PPA, DOMI. **Support:** DPW-S&R, DLC. **Timing:** Phase 3

Work with DOMI, Sustainability, and DLC to explore and pilot curbside charging where it could be co-located with new micromobility charging hubs and/or streetlight upgrades, both to pursue cost savings and test user benefits of co-locating different types of charging infrastructure.

Community Outreach and Engagement

4. Develop approach and partnerships to engage communities on proposed EV charging sites and integrate into existing neighborhood planning process

Lead: DCP-S&R, DCP-SP. **Support:** PPA, DLC, DOMI, community organization partners. **Timing:** Phase 1

Develop standard approaches and partnerships to educate and engage communities on proposed and new EV charging locations including for example integrating into ongoing neighborhood planning mobility efforts, leveraging the EngagePGH platform, presenting and getting feedback in community-based organization meetings, surveys and interviews, door hangers/mailers, etc.

5. Develop City and/or PPA webpage and communication materials on EV charging

Lead: DCP-S&R, I+P. **Support:** PPA. **Timing:** Phase 1

Develop City and/or Parking Authority webpage and communication materials to inform the public about existing EV chargers and planned additions. This webpage could also include additional elements such as a survey of desired charger locations to inform future investments.

6. Develop partnerships to assess community needs and pursue EV charging hub pilot concept

Lead: DCP-S&R, OOE. **Support:** DOMI, DLC. **Timing:** Phase 3

Identify community partner(s) and potential funders to assess disadvantaged community needs, and identify opportunities to leverage EV charging to also serve other community needs such as wheelchair charging, food truck power, emergency back-up power, bus ticket kiosks, etc.

Economics and Financing

7. Establish pricing structure and rules to be phased into City/PPA networked chargers

Lead: DCP-S&R. **Support:** PPA, OMB. **Timing:** Phase 1

Establish principles and a standardized approach to pricing for EV chargers on City property, with possible variation in rates for different facility types (e.g. lots vs. garages) as included in the EV Task Force Recommendations. Also pursue addition of a “dwell time fee” that would penalize drivers who leave vehicles plugged in for longer than is allotted, in order to ensure turnover. Table 13 outlines initial pricing recommendations based on a review of common charging costs nationwide.

Example: EV charging pricing principles

The [City of Vancouver](#) highlights the following principles that it uses to guide its pricing of city-owned EV chargers:

- Increasing turnover
- Ease of understanding
- Encourage home use where possible and use of lowest power infrastructure
- Eventual return on investment on infrastructure
- Fairness
- Rates that encourage the transition to electric vehicles

Table 13: Draft Public EV Charging Pricing Structure

Facility Type	Either/Or		Charging rules	Idle time fee
	Cost per hour (time)	Cost per kWh (energy)		
Lots	\$2/hour <i>(on top of \$1-2/hr for most lots)</i>	\$0.30/kWh	4-hour maximum or lot limit, whichever is lesser	\$15 fine for vehicles left 1 hour beyond limit
Garages	\$2/hour	\$0.30/kWh	No limit, 9am-5pm Other hours 4-hour maximum	\$15 fine for vehicles left 1 hour beyond limit

Table 14 outlines some considerations for choosing a time-based or energy-based fee.

Table 14: Considerations for EV Charging Pricing Structures

Policy	Description	Pros	Cons
Price per kWh (energy)	Pricing billed on a per kWh basis, equaling the amount of energy charged to the vehicle	<ul style="list-style-type: none"> • Good for locations where longer dwell times are expected or encouraged, e.g. residential areas. • Directly relates to the amount of energy delivered, fair for drivers with vehicles that charge at lower speeds. 	<ul style="list-style-type: none"> • Without other fees or policies, does not provide an incentive for drivers to move their vehicle when done charging
Price per Hour/Minute (time)	Pricing billed on length of time for EV charging session	<ul style="list-style-type: none"> • Encourages fair sharing and “etiquette” of EV charging • Easy to understand • Possible to integrate into existing time-based parking fees 	<ul style="list-style-type: none"> • Does not directly correlate with the amount of energy delivered. • May be considered unfair to drivers with vehicles that charge at lower speeds.

8. Establish fund to receive EV charging revenues and cover operating costs

Lead: DCP-S&R. **Support:** PPA, OMB. **Timing:** Phase 1

As the City begins to collect charging fees, set up a fund or utilize the Green Initiatives Trust Fund to receive charging revenues and any grant funds, and utilized to cover operating costs and reinvest in additional EV chargers or other EV charging program needs.

9. Work with Duquesne Light to gain regulatory or legislative approvals

Lead: DCP-S&R. **Support:** PPA, DLC. **Timing:** Phase 1

Work with Duquesne Light to gain regulatory or legislative approvals to support EV enabling regulation and policy. This may include, for example, “charging as a service” models or utility charging infrastructure “make ready” programs wherein the utility invests in and owns the infrastructure, including conduit, wiring, and other necessary electrical equipment, beyond the meter and up to the point of the charging equipment itself. Often this work accounts for most of the costs of making a site ready for EV charging.

10. Pursue regular City and/or PPA budget allocation to enable leverage of grants and other opportunities

Lead: DCP-S&R. **Support:** PPA, OMB. **Timing:** Phase 1

A regular City budget allocation can enable leverage of significant grant opportunities, such as Driving PA Forward, AFIG, and possibly DLC programming in the future, that require some portion of local cost share. The potential impact of annual allocations of \$25,000-\$50,000 are explored in the Cost Analysis and Financial Plan Section.

Examples: Utility-City partnerships for make-ready investments

- **St. Paul, MN** is working closely with its utility Xcel on its EV carsharing and charging hubs project; Xcel will be providing the make-ready for 140 charging hubs across the Twin Cities, while the remainder of the project is supported with U.S. DOE and CMAQ funds.
- **Boston, MA** has leveraged its utility Eversource’s make ready program to install several public chargers in city lots, using a “charging as a service” model.
- **Newton, MA** has partnered with Greenspot while also leveraging make-ready funds from Eversource to deploy EV chargers at no cost to the City.

11. Pilot hardware options and establish standardized specifications and procurement process

Lead: DCP-S&R. **Support:** PPA, OMB, DOMI. **Timing:** Phase 2

Standardizing hardware and software specifications as well as RFP language can help streamline costs both during procurement and ongoing operations and maintenance. The City will explore piloting additional lower cost networked equipment to provide a comparison to its existing networked chargers before finalizing a standard hardware and software selection. The City will also develop standardized bid documents that include additional City priorities such as inclusive workforce development goals.

12. Put out RFI and/or RFP to gauge interest in third-party owned/operated EV charging

Lead: PPA. **Support:** DLC, DCP-S&R, OMB.

Timing: Phase 2

While independently sustainable business models for EV charging are still emerging, some cities have been able to attract vendors who have installed public EV charging on City property at no cost to the City, relying on revenues from charging, sponsorship, advertising, etc. to create a sustainable business model. To gauge the viability of this approach for DC fast charging and/or other types of charging, the City will evaluate how the City/Parking Authority could lease or license their property to a third party for this purpose, and work with DLC to issue an RFI or RFP for select high-demand lots and garages, possibly also supported by grant funding.

Example: Third-party owned charging on City property in Miami

- Miami Parking Authority issued RFP seeking a private company to install, own, and operate chargers in off-street parking garages at no cost.
- Contractor selected splits revenue with the City, which includes charging costs, idle time fees, and advertising.
- Original contract to install 10+ Level 2 dual port chargers, has since added more.

Policies and Operations

13. Formalize EV Implementation Unit and Staffing

Lead: DCP-S&R. **Support:** MO. **Timing:** Phase 1

Formalize cross-departmental EV Implementation Unit (EVIU) that works to plan, implement, and maintain public and fleet charging. Pursue funding support for Parking Authority Sustainability Manager to lead EV work for PPA. Lead updates to this plan every 3-5 years. The EVIU was established in 2020 as a cross-departmental task force that works collaboratively to implement EV charging fleet projects, and will now be expanding to also cover public charging. The following departments will support implementation and management of different types of charging.

Table 15: EV Implementation Unit Roles by Type EV Charging Project (Lead in **Bold**)

	Fleet charging	Public charging on Parking Authority Facilities	Public charging on City facilities
Planning and procurement	DCP-S+R, OMB	PPA, DCP-S+R	DCP-S+R, OMB
Construction and installation	DPW-F, PLI	PPA	DPW-F, PLI
Operations and Maintenance	FVS	PPA	TBD
Payment and Enforcement	ELA	PPA	TBD

14. Establish internal policy/guidance to standardize charging station signage and wayfinding and ADA approach

Lead: PPA. **Support:** DPW-F, DCP-S&R, DOMI.

Timing: Phase 1

Establish internal policy for standardized EV charging signage, painting, wayfinding, and accessibility for City and Parking Authority-owned charging stations that can also serve as guidance for private site hosts.

15. Establish EV-only parking policy for charging spaces to support enforcement by Parking Authority

Lead: PPA. **Support:** DCP-S&R. **Timing:** Phase 2

Establish parking policy that stipulates that only EVs in the process of charging can park in charging spaces to enable enforcement at Parking Authority and City facilities. If not addressed at the state level, many cities pass local regulations to enable enforcement of EV charging spaces to be for EVs while charging only. Some cities pass these regulations in combination with charging fees for City-owned chargers and/or signage regulations.

16. Incorporate EV readiness requirements into Net Zero requirements for City facilities



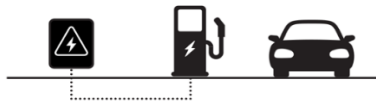
Lead: DCP-S&R. **Support:** PPA, DPW-F. **Timing:** Phase 2

Amend Net Zero requirements to include require a percentage of new parking spaces in new or redeveloped City and Parking Authority facilities to be EV capable, ready, and/or installed (see table for definitions). Adding conduit, electric panel capacity, and wiring at the time of construction is frequently 75% more cost-effective than having to retrofit a property later (installation cost estimates vary widely based on the type of parking (surface vs. enclosed), distance to the electrical panel, number of chargers installed due to economies of scale, etc.). It's recommended the City consider a threshold of 20% EV ready and 5% EVSE installed of new parking spaces built or redeveloped.

Example parking and charging policy from [Seattle, WA](#)

- A. "No person shall stop, stand, or park a vehicle other than an electric vehicle within any space marked or signed as reserved for "electric vehicle parking while charging only."
- B. It is unlawful to park or permit to be parked any electric vehicle in a space with an electric vehicle charging station that is marked as "electric vehicle parking while charging only" if such electric vehicle is not in the process of charging.
- C. Electric vehicles may be parked in any space designated for public parking, subject to the restrictions that would apply to any other vehicle that would park in that space."

Table 16: EV Readiness Definitions and Typical Costs

	Definitions	Typical Costs ¹⁴
	EV Capable: Install electrical panel capacity with a dedicated branch circuit and a continuous raceway from the panel to the future EV parking spot.	Cost during construction: \$200-\$810 Retrofit cost: \$1,010-\$5,420 Est. savings: 47-85%
	EV Ready: Install electrical panel capacity and raceway with conduit to terminate in a junction box or 240-volt charging outlet (typical clothing dryer outlet).	Cost during construction: \$1,160-\$1,380 Retrofit cost: \$1,870-\$6,260 Est. savings: 26-80%
	EVSE Installed: Install a minimum number of Level 2 EV charging stations.	Cost during construction: \$1,660-\$1,880 Retrofit cost: \$2,370-\$6,760 Est. savings: 21-74%

Cost Analysis and Financial Plan

This section estimates the capital costs, operating costs, and potential revenues from public EV charging on City property, and explores scenarios to afford the targets recommended in previous sections. All assumptions for this analysis can be found in Table 22 at the end of this section.

Capital Cost per Charger:

¹⁴ Low end of range is in a 60-space enclosed parking area with 12 EV spaces, high end is 24-space surface parking with 2 EV spaces. [Plug-In Electric Vehicle Infrastructure Cost-Effectiveness Report July 20, 2016](#) (Oakland, CA study). EVSE installed estimates add a \$500 non-networked charger to the EV-ready costs. A networked charger (more suitable for public charging) would cost more in the range of \$2,500 per port (\$5,000 per dual port charger).

Table 17 estimates the total capital cost per networked Level 2 dual port charger in City garages compared to surface lots, and compares the cost to the City if different incentive programs are available. Surface lot installations tend to be more expensive, due to both the higher cost of pedestal-mounted chargers, as well as typically more difficult installations that may require long conduit runs or trenching. Still, installing EV charging in PPA surface lots will be important for expanding access to EV charging to many parts of the city that are not close to a PPA garage.

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Table 17: Estimated Capital Cost Scenarios Per Networked Dual Port Charger

Facility type	Scenario	Equipment cost + extended warranty	Installation cost	Incentive	Total cost to City
Garages	No incentives	\$7,040	\$5,000	\$0	\$12,040
	With make-ready support	\$7,040	\$5,000	\$4,000	\$8,040
	With Driving PA Forward	\$7,040	\$5,000	\$4,500	\$7,540
	With Make-ready and Driving PA Forward	\$7,040	\$5,000	\$8,500	\$3,540
Lots	No incentives	\$7,040	\$10,000	\$0	\$17,040
	With make-ready support	\$7,040	\$10,000	\$8,000	\$9,040
	With Driving PA Forward	\$7,040	\$10,000	\$4,500	\$12,540
	With Make-ready and Driving PA Forward	\$7,040	\$10,000	\$12,500	\$4,540

The City may be able to leverage the Driving PA Forward grant program, which is a rebate for the lesser of \$4,500 per plug or 90% of total project costs, and can cover EVSE equipment, installation, project design, local permits, electric service upgrades, networking charges, maintenance contracts, signage, and lighting.¹⁵ Additionally, a scenario is explored wherein legislative or regulatory support is provided for an electric utility make-ready program, which could cover a significant portion of installation costs.

Operating Costs and Revenues Per Charger: Table 18 estimates average annual operating costs, revenues, and net revenues under different charging pricing scenarios, including 1) maintaining free charging, 2) charging \$2 per hour, and 3) charging \$2/hour and a \$15 dwell time fee for vehicles remaining connected more than an hour beyond the time limit. Operating costs include networking fees, electricity costs, and maintenance costs.

Table 18: Estimated Operating Cost and Revenue Scenarios Per Dual Port Charger

Scenario	Estimated average annual operating cost	Estimated average annual revenues	Estimated average annual net revenue
No revenues – free charging	\$2,890	\$0	-\$2,890
Charge for charging - \$2/hour	\$2,890	\$4,600	\$1,720
Charge for charging + dwell time fees	\$2,890	\$5,600	\$2,680

Total Charging Capital Costs:

¹⁵ [Driving PA Forward Program Guidelines](#)

Table 19 estimates the total cost to install the targeted number of charging stations between 2021 and 2025, with different availability of incentive programs.

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Table 19: Total Costs - Based on 180 New City-provided Level 2 Port Target by 2025 (90 dual port stations) ¹⁶

Year	New ports per year	New dual port chargers per year	Cost without make-ready	Cost with make-ready	Cost with make-ready and DPAF grants
2022	40	20	\$290,700	\$170,700	\$80,700
2023	40	20	\$290,700	\$170,700	\$80,700
2024	50	25	\$363,375	\$213,375	\$100,875
2025	50	25	\$363,375	\$213,375	\$100,875
Total	180	90	\$1,308,150	\$768,150	\$363,150

Table 20 estimates the number of Level 2 dual port chargers the City could afford under different budget scenarios and incentive availability between 2021 and 2025.

Table 20: Charger Affordability by City Budget Level and Incentive Availability

Scenarios	City budget level per year	Total City investment, 2021-2025	Total dual port chargers, 2021-2025	% of City-owned dual port target
Without make-ready	\$25,000	\$125,000	9	10%
	\$50,000	\$250,000	17	19%
With make ready	\$25,000	\$125,000	15	17%
	\$50,000	\$250,000	29	32%
With Driving PA Forward	\$25,000	\$125,000	10	11%
	\$50,000	\$250,000	21	23%
With make-ready and Driving PA Forward	\$25,000	\$125,000	31	34%
	\$50,000	\$250,000	62	69%

Even with both make-ready and Driving PA Forward grants, the City would be unable to reach its target with an annual capital budget of \$25,000-\$50,000, emphasizing the importance of pricing chargers to enable a revenue stream that can both cover operating costs and be reinvested to help close the gap in achieving the City's EV charging goals and targets.

Estimated Total Cash Flows:

¹⁶ Utilizes an average cost between lots and garages, and low and high cost charging stations.

Table 21 summarizes estimated operating costs and net revenue beginning in 2021 if the City were to introduce pricing to existing networked chargers and those installed in 2021. The table uses a \$2/hour fee to illustrate potential revenues.

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Table 21: Estimated Total Annual Cash Flows

Year	Target dual port chargers installed per year	Operating costs	Revenue - \$2/hour fee	Net revenue - \$2/hour fee
2021	13 (existing networked chargers)	-\$31,000	\$34,000	\$3,000
2022	20	-\$81,000	\$91,000	\$10,000
2023	20	-\$132,000	\$154,000	\$22,000
2024	25	-\$197,000	\$238,000	\$41,000
2025	25	-\$264,000	\$333,000	\$69,000
Totals	103	-\$705,000	\$850,000	\$145,000

Key Cost Inputs and Assumptions

Table 22: Summary of Cost Inputs and Assumptions

Assumption	Input	Unit	Source/Notes
Capital Costs			
Equipment cost	\$4,000 - \$7,250 (\$5,625 avg.)	\$/dual port Level 2 charger	Low: Cost for dual port networked EV Box charger. High: Cost for dual port networked ChargePoint charger.
Construction and installation cost	\$5,000 (garages) - \$10,000 (lots)	\$/dual port Level 2 charger	Garages: Estimate from PPA actuals from Third Avenue and Smithfield Liberty. Lots: Assumption based on typical surface lot costs.
Install cost covered by DLC in make-ready scenario	80%	Of estimated install cost	Assumption based on review of other cities' experiences with utility make-ready programs.
Extended warranty	\$1,410	\$/dual port Level 2 charger	Typical ChargePoint extended warranty costs.
Operating costs			
Expected equipment lifetime	10	years	Costs Associated with Non-Residential Electric Vehicle Supply Equipment (U.S. DOE)
Equipment rating	7.2	kW	Typical charging speed for Level 2
Networking costs	\$470	\$/dual port charger/year	Typical ChargePoint networking costs.
Maintenance costs	\$200	\$/dual port charger/year	Assumption
Electricity costs	\$6.54/kW - demand \$0.014/kWh - delivery \$0.045/kWh - supply		DLC General Medium tariff and Default Service Supply . Assumes chargers are not on their own meter, and <i>do</i> incur demand charges.
Utilization			
Number of charging sessions per day in year 1	2	#	Based on ChargePoint utilization data for PPA garage charging; average of 9 charges per day pre-Covid; 2 during.
Estimated annual growth rate	12%	%	NYSERDA study .
Average charging duration	2	hours	Assumption
Revenue			
Charging fee	\$2.00	per hour	Typical per hour charging fee
Transaction fees	10%	%	Typical cost from vendors
Dwell time fee	\$15	per violation	Assumption. For vehicles left more than 1 hour beyond allotted time
% of sessions left longer than 1 hour after finished charging	5%	%	Assumption

Appendix

Prioritized Parking Authority and City Facilities

See Table 1Table 24 for the entire list of Parking Authority and City Facilities considered for this analysis, along with key details to help further prioritize, such as the Council District, total parking spaces, existing public charging within ½ mile, an EVSE utilization score, and DOMI equity score.

DOMI Equity Score

This analysis includes the Department of Mobility and Infrastructure’s (DOMI) Equity Index that has assigned equity scores to Census block groups based on seven key variables that “typically align with marginalization, historic disinvestment, and vulnerability.” These variables include: race, children, seniors, disability status, poverty status, housing burden, and vehicle ownership. Each variable was scored based on the City median percentage, and then added together to create a total index score that ranges from 0 to 34. These scores were converted to a percentile of the scores for the facilities considered for this analysis. Higher scores indicate a greater equity need.

EVSE Utilization Score

The Electric Vehicle Supply Equipment (EVSE) utilization score was developed to indicate sites that are likely to have higher EV charging utilization. Each facility was ranked on a percentile basis according to the variables described below, and then equally weighted and added together to create an overall utilization score.

Table 23: EVSE Utilization Score Variables and Weights

Variable	Data source	Description	Weight
Higher Employment Density	LODES jobs data (Census)	Identifies high priority areas for workplace-serving EVSE. Ranks facilities by the number of estimated employees in Census blocks within ¼ mile.	25%
Higher Multi-family Housing Density	American Community Survey (Census)	Identifies high priority areas to serve multi-family housing residents. Ranks facilities by number of multi-family units in that Census block group.	25%
Higher Density of Potential Site Hosts/ Destinations	Point of interest data (OpenStreetMap)	Identifies high priority areas based on density of destinations (e.g. supermarkets, restaurants, other retail) that could offer amenities to drivers while charging. Ranks sites by the number of destinations within ¼ mile.	25%
Proximity to Higher Traffic Corridors	Annual average daily traffic (AADT) - PennDOT	Identifies high priority areas for public EVSE based on car traffic volumes. Ranks blocks by the average daily traffic of major corridors in close proximity.	25%



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Table 24: Parking Authority and City Facilities Analyzed for Public Charging

Reason for 2025 Prioritization	Facility Name	Facility Type	Council District	Parking Spaces	Level 2 Plugs within 1/2 mile	EVSE Utilization Score	DOMI Equity Score
Upgrade to networked EVSE / Already planned	Grant Street Transportation Center	Parking Authority Garage	7	991	33	97%	12%
	First Avenue Garage and Station	Parking Authority Garage	6	1243	54	70%	0%
	Fort Duquesne and Sixth Garage	Parking Authority Garage	6	917	53	96%	57%
	Sheridan Kirkwood	Parking Authority Lot	9	114	26	87%	77%
Serves Residential Permit Parking Area	Forbes Semple Garage	Parking Authority Garage	3	449	27	95%	76%
	Sue Murray Filter Building	City Facility	1	10	14	93%	57%
	East Ohio St.	Parking Authority Lot	1	88	8	91%	92%
	Shadyside Garage	Parking Authority Garage	8	208	10	83%	12%
	12th & East Carson Street Lot	Parking Authority Lot	3	35	0	80%	73%
	Taylor Street Parking Plaza	Parking Authority Lot	7	26	2	76%	24%
	18th & Carson Street Lot	Parking Authority Lot	3	41	0	76%	0%
	Friendship/Cedarville	Parking Authority Lot	7	80	2	75%	12%
	19th & Carson (Street Lot)	Parking Authority Lot	3	27	0	71%	0%
	18th & Sidney (Street Lot)	Parking Authority Lot	3	45	0	68%	24%
	20th & Sidney Street Parking Plaza	Parking Authority Lot	3	80	0	67%	24%
	Ivy/Bellefonte	Parking Authority Lot	8	74	5	62%	12%
	42nd & Butler	Parking Authority Lot	7	22	7	61%	0%
	Shiloh Parking Plaza	Parking Authority Lot	2	73	1	53%	53%
	Leslie Pool Building	City Facility	7	29	5	45%	0%
Homewood/Zenith	Parking Authority Lot	9	24	4	26%	95%	
Beechview Avenue	Parking Authority Lot	4	17	0	17%	41%	
Helps Fill Gaps in Existing Public EV Charging Network	Tamello/ Beatty	Parking Authority Lot	9	76	8	82%	77%
	Eva/ Beatty	Parking Authority Lot	9	130	8	79%	77%
	Ansley/Beatty	Parking Authority Lot	9	23	8	74%	77%
	Beacon/Bartlett	Parking Authority Lot	5	69	0	72%	68%
	JCC/Forbes	Parking Authority Lot	5	69	0	64%	68%
	Forbes/Shady	Parking Authority Lot	5	59	0	59%	41%
	Brookline Boulevard	Parking Authority Lot	4	47	0	50%	41%
	Banksville Pool Building and Shelter	City Facility	2	49	0	49%	0%
5224 Butler Street Parking Plaza	Parking Authority Lot	7	12	0	47%	24%	

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Reason for 2025 Prioritization	Facility Name	Facility Type	Council District	Parking Spaces	Level 2 Plugs within 1/2 mile	EVSE Utilization Score	DOMI Equity Score
	Overbrook Community Center	City Facility	4	10	0	46%	24%
	Main/Alexander	Parking Authority Lot	2	29	0	43%	77%
	Moore Pool and Recreation Building	City Facility	4	70	0	42%	12%
	Marmaduke Concession Stand	City Facility	1	15	0	37%	53%
	Observatory Hill	Parking Authority Lot	1	23	0	34%	41%
	Kennard Maintenance Building	City Facility	6	61	0	32%	91%
	Young Concession Stand	City Facility	1	14	0	32%	73%
	Fowler Recreation Center	City Facility	6	55	0	24%	96%
Energy Efficiency Retrofits Planned, 2021-2025	Town North Garage Aquatics Division	City Facility	1	9	20	66%	32%
	Hazelwood Senior Center	City Facility	5	12	0	26%	96%
	Phillips Gym and Recreation Center	City Facility	4	18	0	8%	72%
Not Prioritized for 2021-2025	Wood-Allies Garage	Parking Authority Garage	6	542	63	100%	0%
	Mellon Square Garage	Parking Authority Garage	6	796	74	99%	12%
	Monongahela Wharf	Parking Authority Garage	6	458	54	92%	0%
	Oliver Garage (at Piatt Place)	Parking Authority Garage	6	480	74	89%	12%
	Smithfield Liberty Garage	Parking Authority Garage	6	596	53	87%	12%
	Sheridan Harvard	Parking Authority Lot	9	41	20	86%	77%
	Third Avenue Garage	Parking Authority Garage	6	570	63	84%	0%
	Town North Maintenance Building and Aquatic Office	City Facility	1	9	20	62%	32%
	Harvard/Beatty	Parking Authority Lot	9	60	8	58%	77%
	Second Avenue Parking Plaza	Parking Authority Garage	6	810	24	57%	32%
	Douglas/Phillips	Parking Authority Lot	5	45	0	55%	41%
	Penn Circle N.W.	Parking Authority Lot	9	125	8	53%	77%
	Forbes/Murray (Library Lot)	Parking Authority Lot	5	72	0	51%	41%
	Oakwood Concession Stand	City Facility	2	10	2	39%	32%
	Moore Park Gazebo	City Facility	4	66	0	39%	12%
	Frick Park Biddle Building	City Facility	5	31	0	38%	24%
	Brownsville/Sankey	Parking Authority Lot	4	80	0	36%	41%
	Asteroid Warrington	Parking Authority Lot	3	13	0	30%	99%

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Reason for 2025 Prioritization	Facility Name	Facility Type	Council District	Parking Spaces	Level 2 Plugs within 1/2 mile	EVSE Utilization Score	DOMI Equity Score
	Walter/Warrington	Parking Authority Lot	3	15	0	29%	99%
	Public Works 5th Division Main Building	City Facility	2	14	0	25%	61%
	Thaddeus Stevens Elementary School	City Facility	2	30	0	22%	61%
	Brighton Heights Senior Center	City Facility	1	9	0	21%	61%
	Sheraden Senior Center	City Facility	2	20	0	20%	93%
	Southside Concession Stand	City Facility	3	10	0	17%	41%
	St. Raphael Bocci Building	City Facility	7	30	0	16%	32%
	Volunteer Field 2 Concession Stand	City Facility	4	24	0	14%	68%
	McGonigle Concession Stand	City Facility	2	10	0	13%	61%
	Herschel Concession Stand	City Facility	2	31	0	12%	61%
	McKinley Park Office	City Facility	4	10	0	11%	77%
	Brighton Heights Pool Building	City Facility	1	30	0	9%	32%
	Vanucci Storage Building	City Facility	4	64	0	7%	41%
	Bud Hammer Concession Stand	City Facility	5	28	0	5%	57%
	Public Works Highland Park Service Building	City Facility	7	11	0	4%	0%
	McKinley Park Recreation and Senior Center	City Facility	4	30	0	3%	77%
	McBride Picnic Shelter 1	City Facility	5	25	0	1%	53%
	Public Works 1st Division Main Building	City Facility	1	20	0	0%	0%