Metropolitan Council EV Public Charging Needs Analysis

June 2026

Executive Summary

The Metropolitan Council's Electric Vehicle (EV) Public Charging Needs Analysis identified gaps in publicly available EV charging in the Twin Cities region and prioritized locations where public-sector investment offers the greatest benefits.

The study area covered the Twin Cities Metropolitan Planning Organization (MPO) area, including Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington counties, as well as urbanized portions of Wright and Sherburne counties.

The analysis included three phases:

- Reviewing existing guidance on planning and siting best practices for EV charging
- Estimating future public charging needs at the census tract level
- Prioritizing locations for additional public investment in EV charging infrastructure

The framework developed during the analysis will inform project selection for a new EV charging infrastructure category of the Metropolitan Council's Regional Solicitation, planned for 2028. Cities, utilities, and other public agencies may also use the approach to direct their own investments in EV charging infrastructure.

Existing Guidance on EV Charging Planning Best Practices

The Twin Cities MPO area includes a wide range of community types — from dense urban neighborhoods in Minneapolis and Saint Paul to suburban cities, small towns, and rural townships. Meeting current and future EV driver needs across this diverse geography requires multiple charging types. A complete regional network includes direct current fast chargers (DCFC) to support long-distance travelers and residents who rely on rapid charging, Level 2 chargers for multi-hour sessions at workplaces, shopping centers, and residential areas, and Level 1 chargers for very long dwell-time locations such as airports, campgrounds, and overnight parking.

Historically, EV drivers in single-family homes have charged primarily at home and are less dependent on public charging infrastructure. The analysis focused on drivers who rely most on public charging: renters, multi-family housing residents, rideshare drivers, and drivers in disadvantaged communities. Research shows that interest in EVs is consistent across racial and income groups, but barriers to adoption, like limited access to home charging, cost premiums, and personal safety concerns at charging stations, disproportionately affect lower-income residents and people of color. Effective public charging investment must address these barriers directly.

Existing Public Charging Infrastructure

A baseline inventory of existing and planned publicly accessible charging stations was compiled from multiple sources, including EValuateMN (Atlas Public Policy), the National Laboratory of the Rockies (formerly National Renewable Energy Lab) API, PlugShare, and planned stations from MnDOT's National Electric Vehicle Infrastructure (NEVI) program, MPCA Volkswagen settlement grants, and Kwik Trip. Additional fuel distributors were contacted but did not respond to meeting requests. As of October 2025, the Twin Cities region had 865 publicly accessible charging stations with 2,118 ports: 699 DCFC and 1,419 Level 2 (with 35 additional ports planned).

Existing DCFCs are concentrated near major corridors, primarily in Hennepin and Ramsey counties. Level 2 chargers are concentrated in Minneapolis and Saint Paul, with sparse coverage in the

surrounding communities. This uneven distribution underscores the need for a strategic, equity-informed investment framework to fill the gaps.

Alignment with State and Local Plans

Efforts to expand the regional charging network align with a broad set of state and local policy frameworks. Minnesota's 2022 Statewide Multimodal Transportation Plan (SMTP) sets a target for 20% of vehicles on the road to be electric by 2030 and 60% of new vehicle sales to be EVs by 2030. MnDOT's NEVI deployment plan and EV Infrastructure Needs Assessment (EVINA) guide corridor-level investments, while MPCA Volkswagen settlement funds have distributed nearly $5 million in Level 2 and DCFC grants statewide. Multiple cities in the region, including Saint Paul, Minneapolis, Bloomington, and St. Louis Park, have dedicated EV charging plans or climate action goals that include EV adoption targets. Coordinating Metropolitan Council investment with these local and state efforts will be essential to efficiently directing public funds toward a cohesive regional network.

Estimating Public Charging Needs

EV Adoption Forecast

A 2040 EV adoption forecast was developed using historical vehicle registration data from the Twin Cities MPO region (2022–2024), national EV market share projections from ten industry sources, and statewide policy targets. Four scenarios were modeled: a pre-2025 scenario reflecting strong federal policy support, a 2025 scenario reflecting the current weaker federal policy environment, an average of the two, and the SMTP's aggressive target scenario. Under all scenarios, the annual growth rate of the fleet was assumed to be directly related to population growth in the region. The Average Scenario was selected as the planning basis because it accounts for projected near-term softening in EV growth while preserving the possibility of renewed policy support from future administrations.

Under the Average Scenario, approximately 1.2 million EVs are projected to be registered in the seven-county region by 2040, representing a 30.4% EV adoption rate. This is a roughly 22-fold increase from the estimated 55,000 EVs on the road today.

Public Charging Needs by 2040

The Department of Energy (DOE)'s EVI-Pro Lite tool was used to translate the EV forecast into a total count of publicly accessible charging ports needed by 2040, based on regional travel patterns, EV attributes, and assumptions about home charging access. Home charging access was estimated at the household level using housing type, tenure, age, and income data, resulting in an estimated 56% of regional drivers having access to home charging, with multi-family residents and renters in older homes assumed to have limited or no home charging access.

Table ES-1. Additional Ports Needed by Charging Type for the Twin Cities MPO Area

Charging Type	Total Ports Needed by 2040	Existing Ports	Additional Ports Needed
Level 1	3,810	Unknown	3,810
Level 2	80,002	1,401	78,601
DCFC	6,236	568	5,668
Total	~90,000+	~2,000	~88,000+

Level 2 charging accounts for roughly 89% of the total need, reflecting its role as the primary public charging mode for daily routines. DCFC accounts for approximately 7% of need but is critical for long-distance travel and for residents who cannot access Level 2 charging at home or work. The gap between current supply and projected 2040 demand represents a significant investment challenge requiring coordinated public and private action.

Geographic Distribution of Charging Needs

Charging demand was distributed across census tracts using dwell-time analysis (based on Replica-simulated travel data) and a land-use suitability matrix that matched charger types to appropriate land uses and minimum parcel sizes. The highest density of charging ports needed per square mile is concentrated near downtown Minneapolis and Saint Paul. Outside the urban core, significant needs exist at major commercial corridors, shopping destinations, and large employment centers.

Prioritizing Locations for Additional Public Investment in EV Charging Infrastructure

The prioritization framework is grounded in the Metropolitan Council's 2050 Transportation Policy Plan (TPP). TPP goals and policies were translated into charging network priorities that guided the analytical approach:

- **Lead on Climate Change:** Site chargers at high-traffic locations to maximize utilization
- **Equitable & Inclusive Region:** Prioritize charging for residents without home charging access (renters, multi-family, low-income)
- **Healthy & Safe Communities:** Support air quality improvements in high-pollution areas
- **Regional Funding Balance:** Ensure geographic coverage, including rural and outlying communities

Prioritization Measures and Methodology

The analysis translated each charging network priority into one or more quantitative measures evaluated at the census tract level. Using trip simulation data from Replica, air quality data from the Minnesota Pollution Control Agency (MPCA), and EV charging demand forecasts, the project team developed five measures.

Each measure, except air pollutants, was calculated separately for Level 2 and DCFC, reflecting the distinct use cases of each charger type. Census tracts were scored on each measure and combined into composite scores using a weighted average. Weights were developed with input from the Project

Management Team (PMT) and Technical Advisory Committee (TAC) and were adjusted based on stakeholder feedback to better reflect equity priorities. Final weights are shown in the table below.

Table ES-2. Weighted Measures for Prioritizing Level 2 and DCFC Charging Investment

Regional Goal/Policy	Charging Network Priority	Measure	Level 2 Weight	DCFC Weight
Addressing Climate Change	Site chargers at high traffic locations	**Future Public Charging Needs:** Estimated number of charging ports needed to support forecasted public EV charging in 2040 by census tract	**15%**	**25%**
Equitable & Inclusive	Prioritize charging for residents without access to home charging	**Multi-family Housing Trips:** Estimated number of trips associated with multi-family housing at the census tract level	**45%**	**40%**
		Low-Income Trips: Estimated number of trips taken by residents with household income <$75K at the census tract level	**15%**	**10%**
Healthy & Safe	Support air quality improvements	**Traffic-Specific Air Pollutants:** Concentration of traffic-specific air pollutants in census tracts	**15%**	**15%**
Regional Balance	Consider geographic coverage	**Rural Trips:** Estimated number of trips to destinations in census tracts in Rural Town Centers	**10%**	**10%**

Level 2 weights emphasize equity (multi-family access), while DCFC weights place greater emphasis on future demand and long-distance travel needs.

Key Findings: Priority Locations for Public EV Charging Investment

Composite scores were calculated for each census tract, then ranked separately for Level 2 and DCFC. The full results are available through an interactive map on the Metropolitan Council's website. The top 100 priority census tracts for each charger type reflect the following geographic patterns:

- The top 10 priority locations for both Level 2 and DCFC are relatively evenly distributed across the seven-county metro area, with concentrations in higher-density areas.
- Priority patterns closely mirror the multi-family trip, low-income trip, and future public charging needs maps, reflecting their significant combined weight in the composite score.

- Air quality priorities are more tightly concentrated in the core Twin Cities, with additional clusters in Brooklyn Center and Coon Rapids.
- Rural trip priorities are concentrated along the outer boundaries of the region, with a notable cluster in the southwest corner — ensuring that rural communities are represented in the regional charging network.

The prioritization framework is not intended to prescribe specific charger sites or project designs. It provides a census-tract-level ranking to guide public investment decisions and will be used alongside site feasibility, Title 23 compliance, and other application criteria in the Regional Solicitation process.

Figure ES-1. Priority Locations for Public Investment in Level 2 Charging Stations Based on Composite Scores

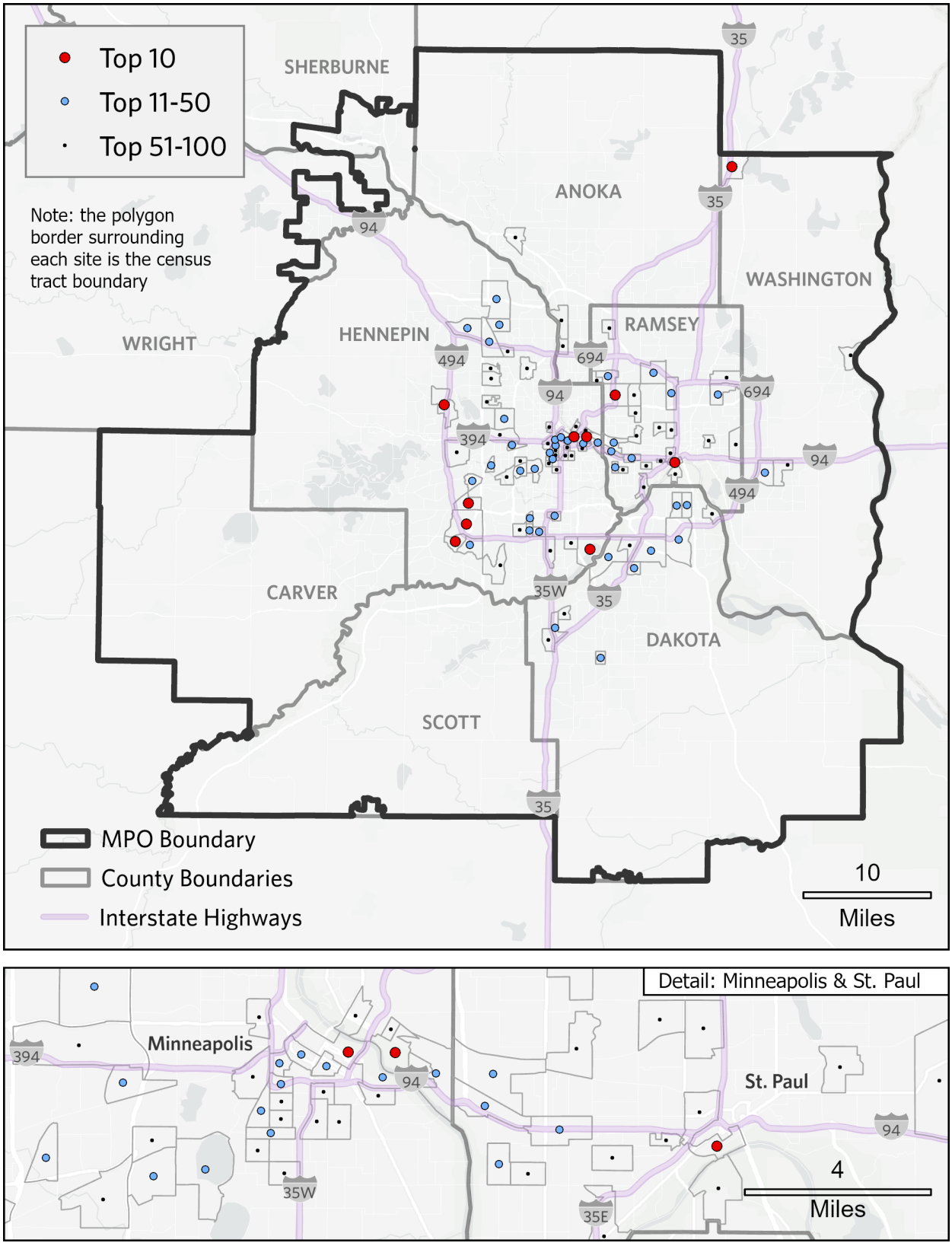
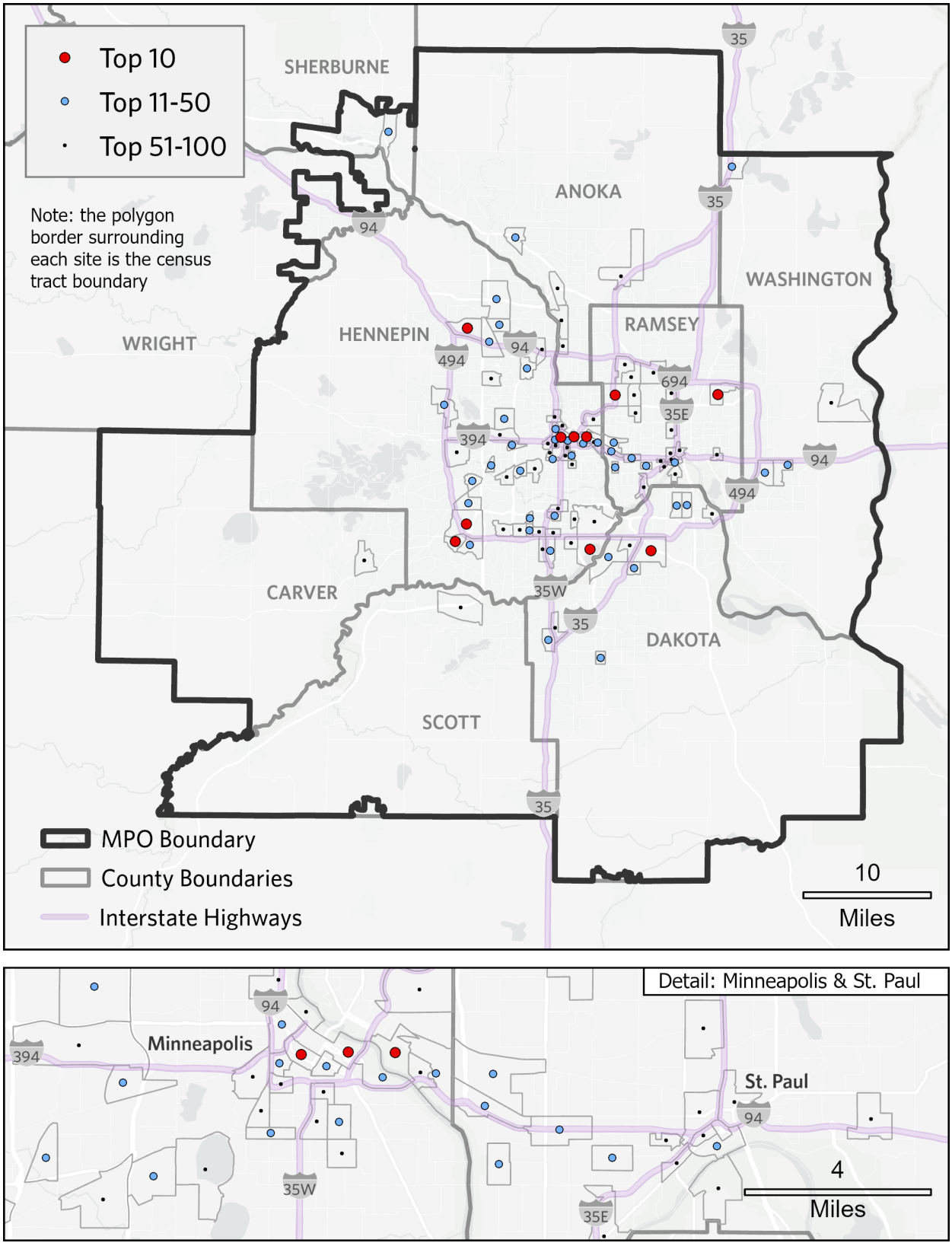


Figure ES-2. Priority Locations for Public Investment in DCFC Based on Composite Scores



Recommended Next Steps

Because approximately two years will elapse between this analysis and its application in the 2028 Regional Solicitation, the project team recommends the following actions to maintain the framework's relevance and accuracy:

- **Update the Framework:** Refine and update prioritization measures prior to the 2028 Regional Solicitation, including updated air quality data and planned and existing public EV charging station data. Revised EV adoption forecasts, assessment of medium- and heavy-duty EV charging needs, and data on shared mobility hub locations could further enhance the framework.
- **Inform the Regional Solicitation:** Apply prioritization results to the Regional Solicitation project selection for the EV charging infrastructure funding category, using the interactive map alongside site feasibility, Title 23 compliance, and other scoring factors. The map is expected to be a substantial component of project scoring.
- **Coordinate with Local Partners:** Engage cities, utilities, and other public agencies to align local charging initiatives with identified high-priority census tracts, enabling coordinated investment across jurisdictions.

Conclusion

The Twin Cities metropolitan region faces a significant and growing gap between existing public EV charging supply and projected demand in 2040. The region's 2,118 existing public ports will need to grow to roughly 90,000, an approximately 42-fold increase, to support an estimated 1.2 million EVs on the road by 2040. Meeting this need will require coordinated public and private investment guided by a clear, equity-informed framework.

This analysis provides the Metropolitan Council and its partners with a transparent, data-driven basis for directing public EV charging investment where it is most needed. By rooting the prioritization framework in the 2050 TPP's goals and policies, specifically climate action, equity and inclusion, public health, and geographic balance, the approach ensures that investment decisions reflect the region's broadest priorities rather than a single metric such as demand alone.

The framework is designed to be living and adaptable. As EV adoption accelerates, travel patterns shift, and new data sources become available, the Metropolitan Council can refine the measures and weights to reflect current conditions. The interactive map developed from this analysis will serve as a practical tool for project selection beginning in 2028, and the underlying approach can be adapted for use by cities, utilities, and other agencies working to close the region's EV charging gaps.

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Introduction

The Metropolitan Council's Electric Vehicle (EV) Public Charging Needs Analysis is a multi-part effort to understand gaps in publicly available EV charging infrastructure across the Twin Cities region and identify where public-sector investment is most needed. The study area covers the Twin Cities Metropolitan Planning Organization (MPO) area, which includes Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington counties, as well as urbanized portions of Wright and Sherburne counties.

The analysis was conducted in three phases: (1) reviewing existing EV charging guidance and siting best practices; (2) estimating future public charging needs at the census tract level; and (3) developing a prioritization framework to identify where public investment will yield the greatest benefit. This report presents findings and recommendations from all three phases.

Existing Guidance

The urban geography of the Twin Cities Metropolitan Planning Organization region is varied and includes dense urban environments, suburbs, small and medium-sized cities, and rural townships. Within this diverse region, meeting the unique needs of residents who already drive an EV or are expected to in the future will require multiple types of EV charging stations.

Potential and current EV drivers include single-family homeowners, people commuting to work, renters and those living in multi-family residential housing, residents in disadvantaged communities, rideshare drivers, and travelers passing through the region on long-distance trips.

Historically, EV drivers living in single-family homes most often charge at home and are not expected to rely as heavily on the public charging network. This report focuses on the charging needs of EV drivers who would rely primarily on public charging, such as renters, multi-family building residents, and people employed in rideshare or food delivery services.

A complete charging network will include the following charging station types:

- **Direct Current Fast Charging (DCFC)** to support visitors traveling long distances to visit the Metropolitan Council region and residents relying on fast charging to meet their routine charging/driving needs.
- **Level 2 Charging** to support EV charging for several hours during residents' daily routines, including locations like workplaces, shopping centers, and residential areas where off-street parking or charging is otherwise difficult. Even residential areas with easy access to off-street parking can support Level 2 charging, as it has historically been EV drivers' preferred charging method due to its convenience and lower electricity costs.
- **Level 1 Charging** to support EV charging for people who drive less, own plug-in hybrid electric vehicles with small batteries, park in one place for longer periods, or people seeking a low-cost alternative charging method. Cities and utilities can often use existing infrastructure, such as streetlights, to keep installation costs low and facilitate the installation of more ports than could be achieved by targeting limited budget on only Level 2 charging ports.

Determining the appropriate mix of charging station types to support a complete network typically involves several steps:

- Matching charging types to land uses and typical dwell times. Dwell time is time that vehicles spend parked in a location, which can be time spent charging an EV.
- Adjusting the mix of charging to reflect the region's objectives, or priorities for public investment, such as prioritizing charging for those without access at home, workplace and key destination charging, areas where the private market will lag, rural locations where infrastructure is lacking, and/or locations with high traffic volumes.

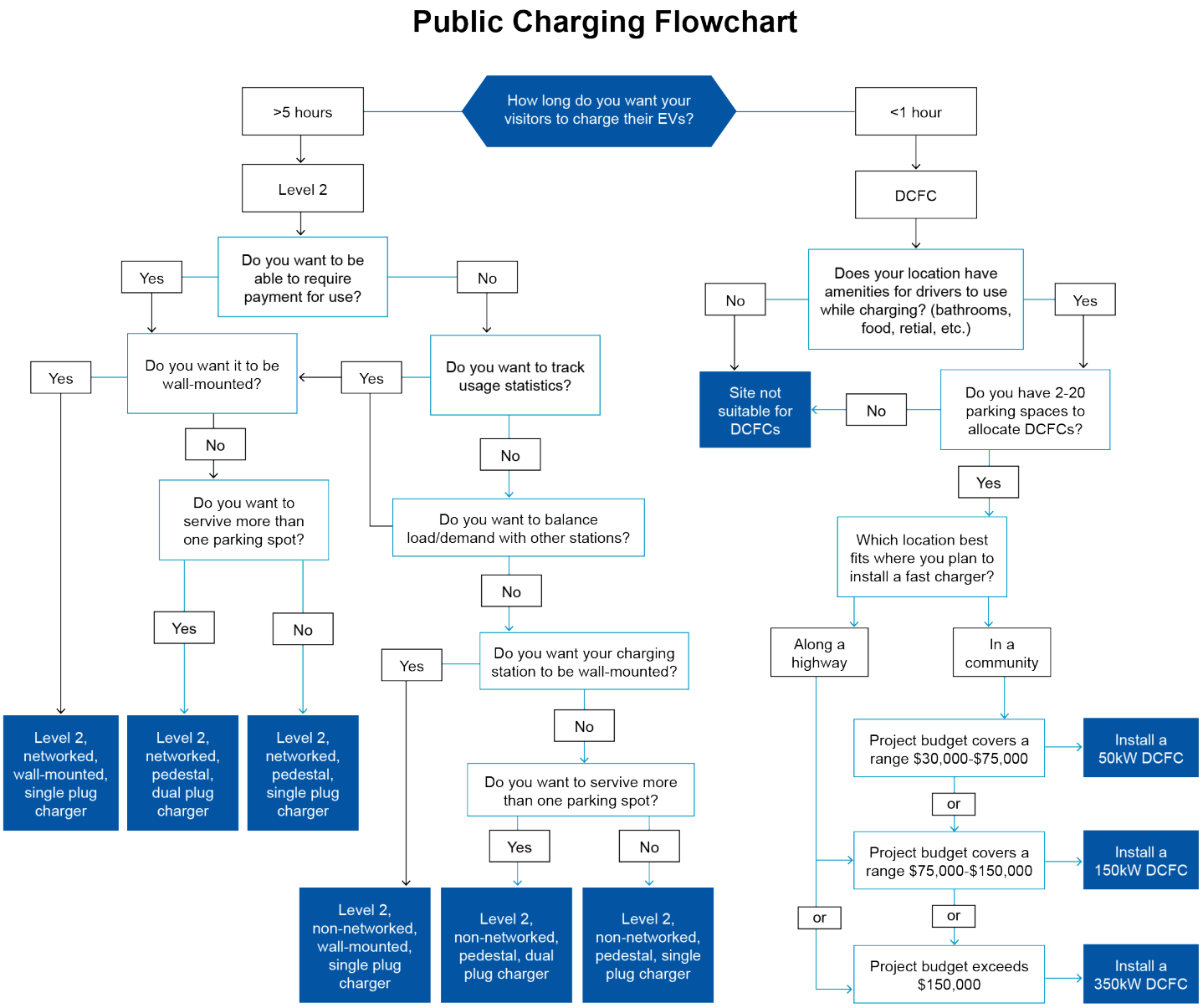
This chapter describes how to match charging types to land uses and dwell times, and offers context relevant to planning the EV charging network in the region, including opportunities to align with related state policies and local plans and initiatives.

Matching Charging Types to Dwell Times and Land Use

Existing guidance lists dwell time and land use as key considerations for selecting the appropriate charging type. For example, Drive Electric Minnesota provides the flow chart shown in **Figure 1.** Public Charging Flow Chart, Drive Electric Minnesota, which indicates that DCFCs are appropriate in locations when EV drivers stop for less than an hour, and Level 2 chargers are appropriate when EV drivers stop for more than 5 hours.[1] Guidance varies on the appropriate threshold between Level 2 and DCFCs, with some sources stating that low-powered DCFCs, such as 50-150 kW, may be appropriate for dwell times up to two hours.

[1] Drive Electric Minnesota. Public Charging Flowchart. Great Plains Institute, Sept. 2024, https://driveelectricmn.org/wp-content/uploads/2024/09/Public-charging-flowchart.pdf. Adapted by HDR for use in this report.

Figure 1. Public Charging Flow Chart, Drive Electric Minnesota



Several regional and community EV charging plans (e.g., City of Bellevue EV Roadmap, Atlanta Regional Commission Regional Transportation Electrification Plan) expand on this guidance by offering an EV Charging Transect that matches EV charging types to land use, dwell time, and other key considerations.[2] **Figure 2** provides the EV Charging Transect. Community charging and destination charging are described in more detail below, given that they are the most likely types of publicly available EV charging needed to fill gaps in the region's EV charging network.

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[2] Atlanta Regional Commission. Regional Transportation Electrification Plan. ARC, Jan. 2025, https://atlantaregional.org/what-we-do/transportation-planning/regional-transportation-electrification-plan/

Figure 2. EV Charging Transect

	Residential Charging	Community Charging	Destination Charging	Distance Charging	Depot Charging
					
Primary Land Uses	Primarily single-family homes, can include shared private charging in multifamily buildings	Public streets with on-street parking, prioritizing locations near existing or planned multifamily development	Retail, shopping, schools, transit stops, restaurants, grocery stores, workplaces; prioritizing Justice40 trip destinations	Highway exits and rest stops	Centralized depot facilities
Primary Vehicle Types	Privately owned vehicles charging at home	Privately owned vehicles without home charging access	Privately owned vehicles charging at destinations	Publicly and privately owned vehicles needing a rapid charge	Public transit and other fleets
Typical Charging Configuration	Level 1 or Level 2	Utility pole drop-down or pedestals in sidewalk or furnishing zone, prioritizing locations with excess grid capacity	Clusters of Level 2 chargers in parking lots and select DCFCs where dwell times are short	Clusters of DCFCs enabling long-distance travel, likely paired with services like a typical fueling station	Clusters of Level 2 chargers and/or DCFCs depending on operating needs
Typical Dwell Time	Up to 16 hours overnight	2-12 hours	Varies from <1 hour up to 8-10 hours	Short en-route stops of 20-30 minutes	Varies but typically >12 hours overnight
Access Type	Private	Public	Public	Public	Private
Power Requirement	Low	Low	Medium	High	High
Level Of Financial Investment	$1,500-$5,000 per Level 2 port; Level 1 charging equipment typically included with EV purchase	$500-$15,000 per port	$3,000-$15,000 per Level 2 port (6.6-19.2 kW) or $1,250-$1,750 per kW (typically 50-350 kW per port)	$1,250-$1,750 per kW (typically 50-350 kW)	$5,000-$20,000 per Level 2 port (6.68-19.2 kW) or $1,500-$2,000 per kW (typically 50-350 kW per port)

Community Charging

In the transect, ‘community charging’ refers to publicly accessible charging stations that serve the nearby community, focusing on areas with a high density of multi-family residents who may have limited access to charging at home.

There are two primary applications of community charging: charging in existing parking areas and charging along the curbside. Community chargers can serve as vital neighborhood amenities, providing residents without access to home charging with the opportunity to charge an EV as part of their daily routine. Typically, community charging leverages Level 2 chargers, which are easier to integrate into existing parking due to their lower power demand and cost. However, Level 1 chargers may be appropriate for longer dwell times, and low-powered DCFC may be appropriate when dwell times are shorter (e.g., 1-3 hours). While Level 1 charging is not the focus of this report, this chapter includes details about Level 1 best practices that could be applied to future Metropolitan Council studies, plans, and projects.

Charging in Existing Parking Areas

During the Biden administration, the Joint Office of Energy and Transportation provided the flow chart shown in **Figure 3** to select appropriate EV charging types to meet the needs of multi-family residents, renters, and those without access to charging at home.[3] This planning tool focuses on tailoring EV charging to a site's parking configurations.

When on-site parking is available, communal parking or assigned parking are common configurations. When adding charging stations to a communal parking lot, clustering chargers near existing electrical sources can reduce costs; however, this strategy should be weighed against other potential parking area placements, as highly visible, well-lit, and safe charging areas are preferred by drivers. Assigned parking can be more challenging for offering publicly accessible charging. In this setting, chargers can sometimes be tied to a unit’s meter.

Wall or ceiling-mounted chargers can be added to an enclosed garage; however, if the site is an open lot, adding charging stations outside of periphery parking stalls typically involves additional excavation and construction. Open parking lots could also add solar canopies to support EV charging with renewable energy.

Curbside Charging

Curbside parking, also referred to as on-street parking, is another typical parking configuration. Curbside parking is more prevalent in densely populated urban environments. This design configuration is typical for the EV Spot Network in the Twin Cities, with average installation costs for a Level 2 EV Spot Network charging station totaling approximately $22,000 per port (N. Haeg, personal communication, Nov. 4, 2025).

One company providing a unique curbside charging solution is “it’s electric,” which partners with street-adjacent property owners to use excess electrical capacity from buildings to support curbside charging.[4] Charging is provided through a curbside pedestal and relies on a bring-your-own-cable (BYOC) approach, common in many European countries, where drivers use their own detachable cable

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[3] Joint Office of Energy and Transportation. Community Charging: Emerging Multifamily, Curbside, and Multimodal Practices. U.S. Department of Transportation Volpe Center, Feb. 2024, https://driveelectric.gov/files/community-emobility-charging.pdf.

[4] it’s electric. https://www.itselectric.us/

to connect the vehicle to the charger. This approach has the advantage of reducing the likelihood of vandalism, such as cord-cutting. Cities like Boston, MA; Detroit, MI; and San Francisco, CA, partner with it's electric to install public curbside chargers powered by the spare electrical capacity in buildings.

Light-Pole Mounted Charging

Light-pole-mounted charging, also known as streetlight charging, is a form of curbside charging that uses existing electrical infrastructure. These installations can reduce costs by as much as 70% when compared to other types of public charging installations.[5] Light-pole-mounted charging can often support Level 2 charging, particularly if chargers are paired with other energy efficiency solutions, such as light-emitting diode (LED) bulbs. LED bulbs require less power than high-pressure sodium (HPS) bulbs, which can allow excess capacity to be used for EV charging without additional upgrades to electrical infrastructure. Power availability will vary by location, however, and may only support Level 1 charging. Voltpost is one example of a light-pole-mounted Level 2 EV charging solution.[6] Voltpost's streetlight-mounted chargers are positioned approximately 10 feet above the ground and feature retractable charging cables.

Even with the conversion to LED bulbs, additional electrical infrastructure upgrades can be necessary. A recent pilot in Kansas City, MO, found that adding a Level 2 charging station would have exceeded the electrical circuit rating of the transformer at all streetlights used in the pilot, and additional upgrades were required to support the voltage and amperage of Level 2 charging stations. Los Angeles has also implemented a streetlight charging program with the goal of adding 10,000 streetlight chargers throughout the city at poles converted for LED bulbs. Priority locations include those with adequate electrical capacity to support Level 2 charging and those near multifamily apartment buildings.[7]

In addition to locating chargers at streetlights with existing adequate electrical capacity, other best practice considerations include using EV chargers with retractable cables and ensuring adequate streetlight and sidewalk infrastructure is in place. Retractable cables minimize potential damage from routine street maintenance (such as street sweeping or snowplowing) and vandalism, such as cord cutting. They also reduce tripping hazards for pedestrians. It is worth noting that disadvantaged communities that may benefit most from convenient curbside EV charging opportunities often lack adequate sidewalks or streetlight infrastructure (more than one streetlight).

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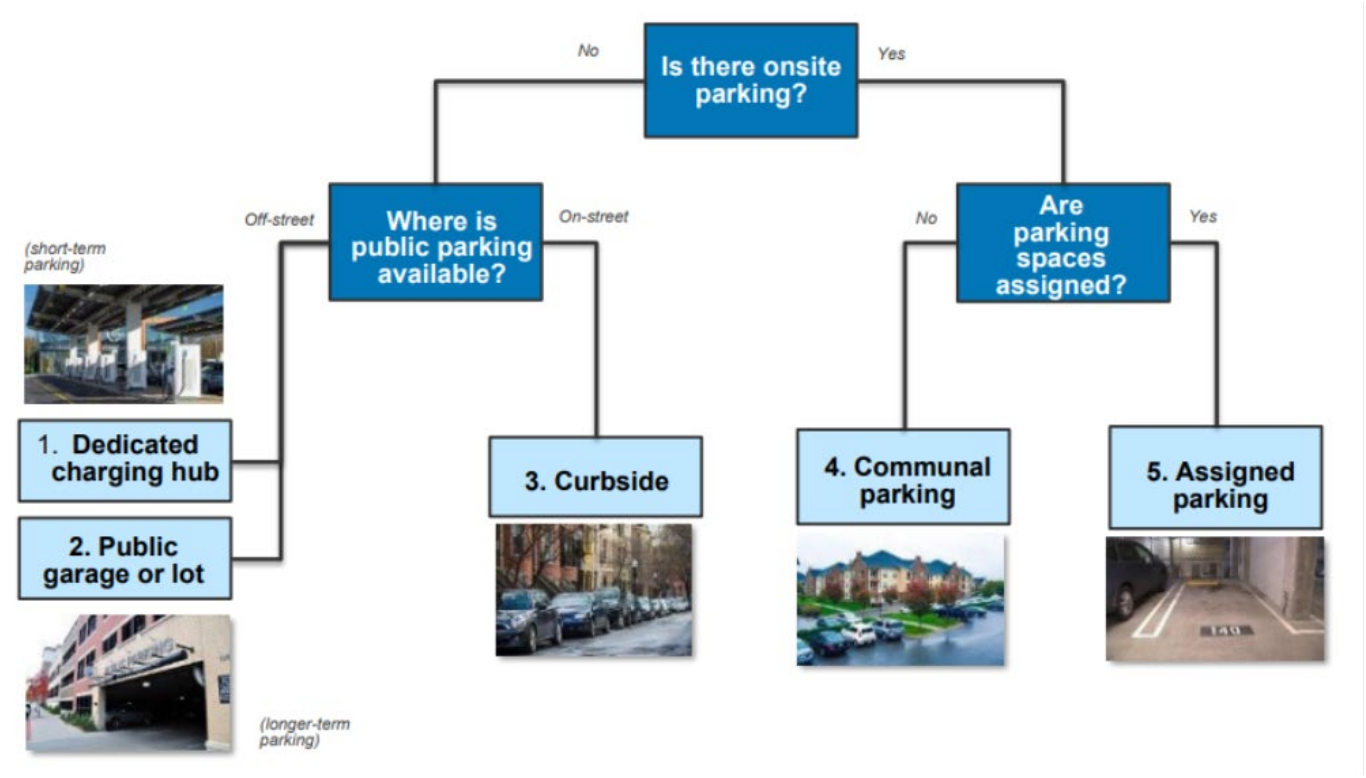
[5] World Resources Institute, November 2021, https://www.wri.org/research/pole-mounted-electric-vehicle-charging-preliminary-guidance

[6] Voltpost. https://www.voltpost.com/

[7] Berkeley Law, Center for Law, Energy, & the Environment, March 2024, https://www.law.berkeley.edu/wp-content/uploads/2024/03/City-Public-and-Curbside-EV-Charging-Strategies_CLEE-Brief_Mar2024.pdf

Figure 3. Common Multi-Family and Curbside Parking Configurations



Level 1 Charging

Level 1 charging delivers 1-2.5 kW of power and is typically provided through a standard 120V wall outlet. Electric vehicles typically come with a charging cord that is compatible with most wall outlets. EV drivers who drive infrequently or dwell for long periods of time can use Level 1 charging at a generally lower cost. Level 1 charging infrastructure is also significantly cheaper to install than Level 2, often not even considered as an additional cost.

Level 1 charging infrastructure is, however, included in most utility's standard residential rates. This means that in order to take advantage of lower off-peak energy rates offered through a utility's EV program, residents need to have a suitable Level 2 charger. Given these lower rates specific to Level 2 charging, Level 1 charging can potentially be more expensive in the long-term, but Level 2 chargers incur a higher up-front installation cost. Organizations and residents considering installing charging infrastructure should consider all lifecycle costs associated with the installation and whether Level 1 or Level 2 charging is most cost-effective.

There is less established guidance on best practices for public Level 1 charging, but there is evidence that drivers are interested in a cheaper alternative to faster charging.[8] Public access to Level 1 charging can provide an affordable alternative to other public charging options, as well as offer access to drivers who lack the ability to charge at home.

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[8] 2025 EV Driver Survey - Plug In America, https://pluginamerica.org/survey/2025-ev-driver-survey/

Effective Locations

Level 1 charging can take anywhere from 14 to more than 50 hours to fully charge a vehicle, depending on the EV battery's initial state of charge, as well as make and model of the vehicle.[9] This means that only locations with notably long dwell times are effective. Airports, workplaces, hospitals/medical facilities, multi-family residential housing, parks/campgrounds, and hotels are potential locations for Level 1 EV chargers.

Parking structures at airports are designed to hold vehicles for several days at a time, creating an ideal scenario for Level 1 charging. Some U.S. Airports have already successfully implemented Level 1 charging in their parking structures. San Francisco International Airport has implemented dual Level 1 and Level 2 charging stations, allowing drivers to select their preferred charging speed.[10] With a slightly different strategy, Tampa International Airport has implemented standard wall outlets at some of its long-term parking spaces.[11]

Level 1 charging in office parking areas can be a low-cost solution, providing employees with a valuable amenity. Dwell times are usually upwards of 8 hours at offices, allowing employees who drive shorter distances to recharge. This can be implemented on a shared building meter. Additionally, staff and visitors often have long dwell times at hospitals, making them an effective place for Level 1 charging. Similar to workplace charging, this could be provided as an included amenity for staff and/or visitors.

Residents in multifamily housing are less likely to have access to EV charging at their home than those in single family homes. However, the opportunity and need for overnight Level 1 charging is still present, providing a good opportunity to increase equity in charging access through public charging. Level 1 charging can be implemented on-site at a residential property or potentially provided via on street or curbside charging ports. Cities such as Burbank, CA, Cambridge, MA, Longmont, CO, and Oakland, CA have also implemented municipal policies allowing EV drivers to run charging cords from residential buildings across the sidewalk to on-street parking spaces.[12]

Parks and campgrounds can also be effective for Level 1 charging, particularly in locations with overnight or extended stay environments. Many campgrounds in Minnesota are already equipped with RV power outlets at campsites and allow EV drivers to charge for an additional fee. Hotels, with their longer dwell times, can provide Level 1 charging as an included amenity. These are especially effective for EV drivers on long-distance trips, offering a low-cost charging option.

It is worth noting that more outlets will be required with Level 1 chargers to meet the same demand as Level 2 chargers. This is due to the longer charge time. At a workplace, for example, a Level 1 charger

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[9] Level 1 Charging Guide: Entry Level EV Charger Explained - Electrly, https://electrly.com/ev-charging-guide/level-1-ev-charging-guide

[10] Electric Vehicle Charging | San Francisco International Airport, https://www.flysfo.com/passengers/parking/plugin-electric-car

[11] Green Parking Options | Tampa International Airport, https://www.tampaairport.com/parking/green-parking-options

[12] Electric Vehicle Charging Stations, https://www.cambridgema.gov/Departments/communitydevelopment/evchargingstations

can only serve one person each workday, whereas a Level 2 charger could serve multiple people due to the faster charge time. The expected demand should be compared with the charge time to determine the best number of chargers to install at a site.

Installation and Operation Costs

The installation of Level 1 charging infrastructure is significantly easier than that of Level 2, due to reduced trenching and simpler infrastructure. Additionally, utility companies typically do not implement demand charges for infrastructure of this size. This keeps the cost of installing Level 1 infrastructure lower than that of alternatives. The key drivers affecting the cost of installation are the distance of the charging outlet to the electrical panel, the need for trenching or metering, the type of conduit, and the wall structure where the outlet is installed.

Operational costs depend on the utility company and the potential for revenue at the site. Typically utility companies do not charge additional fees, similar to the building if it did not contain charging infrastructure. There are currently no good examples of collecting revenue from Level 1 chargers. In theory, an additional meter could be installed to track usage, but the cost of installing the meter would largely outweigh the potential revenue earned from the charger.

Drivers do not typically incur any direct cost to charge at Level 1 ports. Many facilities provide this charging as an amenity that is included in the cost of living or using the facility. There is potential for facilities with dedicated parking spaces to either tie a unit's electrical meter to an additional outlet or charge a flat fee for the ability to use additional power.

Anti-Vandalism and Durability Strategies

The common risks and concerns associated with Level 1 charging are charging cord theft, vandalism, and/or damage from other moving vehicles and snowplows. Bring your own cord (BYOC) models, retractable cord design, alternative wiring material, and general security measures can reduce the risk of these events.

To reduce damage due to weather events, outlet covers can be installed for outdoor chargers. Additionally, municipalities could explore innovative ways to manage general upkeep, such as an "adopt a charger" program, similar to the "adopt a highway" or "adopt a storm drain" concept where volunteers are responsible for snow clearing around the charger (K. Bocklund, personal communication, Oct. 31, 2025).

EV charging infrastructure owners are often concerned with cord theft or damage to their infrastructure. The burden of this risk can be transferred to the consumer by requiring them to provide their own charging cord to use Level 1 outlets. While this does not entirely mitigate the risk of damage or theft, it eliminates the need for companies and owners to implement any other mitigation techniques. It's electric has implemented this strategy with their curbside charging stations.[13]

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[13] it's electric. https://www.itselectric.us/

Some EV charging companies, such as Voltpost, are installing retractable charging cords on existing lampposts.[14] Cords are placed in high-up boxes on a lamppost with retractable technology, reducing the risk of theft or damage. In the Twin Cities region, utilities indicated that pole-mounted charging on utility-owned infrastructure is either not allowed or not desired, but pole-mounted charging on light poles owned by cities or road authorities may not have the same challenges.

One common reason for charging cord damage and theft is the use of copper material to carry power through the cord. Copper wire can be a valuable material due to its high scrap value. In theory, this can be prevented by using different materials, like aluminum, to carry power through the charging cord, but this is not commonly offered by manufacturers.

General security measures like cameras, lighting, signage, and user reporting can be implemented to reduce vandalism and theft. While fairly common, the enforcement and use of these security measures is important when trying to reduce vandalism.

Destination Charging

In the transect, 'destination charging' refers to charging at popular trip destinations where drivers can recharge EVs while they are completing a nearby activity, like shopping, eating, or recreating. These locations may also include multi-family housing. Destination charging can include Level 2 chargers and DCFC depending on dwell times at the host site or adjacent land uses.

Level 2 Destination Charging

Level 2 destination charging can be added to publicly and privately owned parking areas and is ideal for sites with dwell times of 2 to 6 hours. Suitable land uses include public buildings, schools, shopping centers, parks, hotels, and workplaces. Siting can prioritize equity by focusing on destinations with a high share of trips made by members of underserved communities. These drivers are generally less likely to be able to access charging at or near their residence; making charging available at their destination crucial in promoting wide EV adoption. Destination charging can double as community charging if it is close to existing developments whose residents can use the charger. This charging is also ideal for workplaces, where drivers will typically stay for 6 to 8 hours. Destination charging using Level 2 chargers is most often rated for 7.2 kW, but power outputs can range up to 19.2 kW. Lower power outputs can still be sufficient for sites with long dwell times. Electrical system upgrades may be needed to install larger banks of new Level 2 chargers depending on existing power availability and the number and rating of the chargers being installed.

DCFC Destination Charging

Destination charging is most often Level 2, but it can also use DCFC to enable more rapid charging. This is most appropriate at locations with dwell times of up to two hours, such as grocery stores, commercial streets, restaurants, shopping centers, and convenience stores. Fast charging can give residents without access to home charging a more convenient option than relying on Level 2 chargers. Though DCFC can reach power ratings of 350 kW or more, a destination-focused installation will most

[14] Voltpost. https://www.voltpost.com/

commonly be sized at 50 to 100 kW to allow for rapid charging without further increasing costs for EV drivers.

Seasonal Temperature Considerations

Weather conditions in the region vary widely throughout the year. Winters are notably cold, with temperatures often dropping to lows of –10°F or even lower, while summers bring warmer weather with highs reaching into the 90s or higher. These temperatures can significantly impact EV charging and range. Specifically, range can be reduced by 10-40% in cold weather.[15][16] From a siting perspective, there is no significant body of research to suggest that reduced range in cold weather should be a primary driver in determining spacing between stations. Rather, key factors in siting decisions relate to land use, dwell time, cost considerations, and power availability, as described above. Charging stations are often rated NEMA 3 or NEMA 4, which refers to a rating system from the National Electrical Manufacturers Association that dictates the environmental conditions that EV charging equipment is designed to protect against when properly installed. [17] A NEMA 4 rated charger would be protected against more environmental conditions than a NEMA 3 rated charger, such as dust, water, and corrosion, and may be more suitable for heavier utilized fleets.

Travel Behavior Summary

The following data is based on the Metropolitan Council's 2023 Travel Behavior Inventory (TBI) Household Survey. The TBI is a region-wide, comprehensive travel survey of metro residents. The survey gathers data on how people travel, along with key demographic variables that help to place travel behavior in context.

On a typical weekday, less than 0.5% of vehicles in the region travel more than 250 miles per day. Typically, drivers in the urban center and urban communities travel shorter distances than those in the emerging suburban edge and rural communities, as shown in **Figure 4**.

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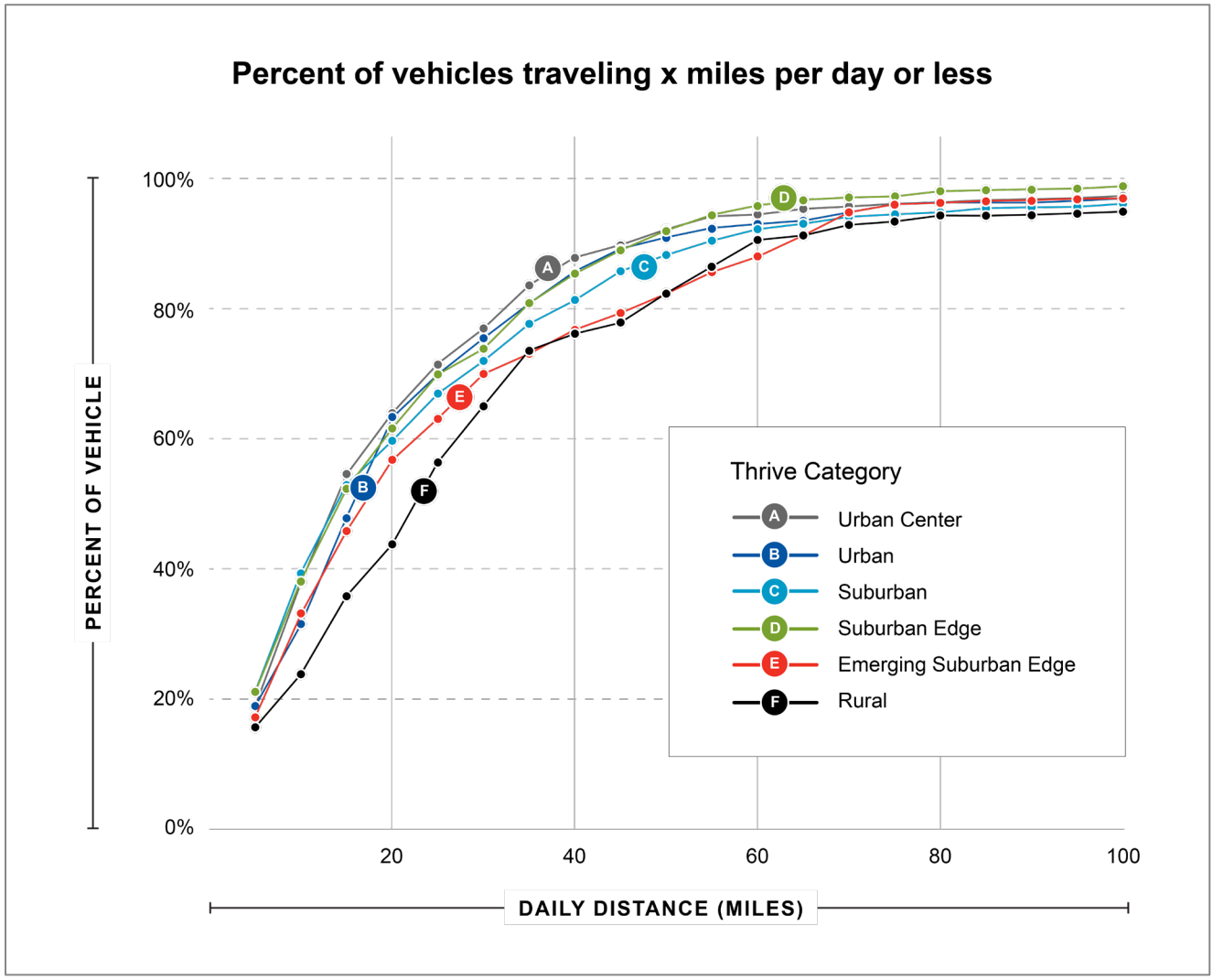
[15] Canadian Automobile Association. CAA Conducts Road Test of EV Range, Charge in Winter Conditions. CNW Group Ltd., 10 Feb. 2025, https://www.newswire.ca/news-releases/caa-conducts-road-test-of-ev-range-charge-in-winter-conditions-871713310.html .

[16] Recurrent Auto. Best EV for Winter & Cold Weather Range: 18,000 Car Study. Recurrent, 14 Jan. 2025, https://www.recurrentauto.com/research/winter-ev-range-loss .

[17] NEMA Enclosure Types

Figure 4. Percent of vehicles traveling *x* miles per day or less



Several factors influence household vehicle miles traveled (VMT). **Figure 5**, **Figure 6**, and **Figure 7** show the impact of community type, income, and number of children on VMT. People living in emerging suburban edge communities tend to drive 24 miles per day more than their peers in other communities. Households that earn more tend to drive more, with households that earn $250,000 per year driving 26 miles more per day than households with incomes between $50,000 and $75,000 per year. Additionally, households with more children tend to drive more, with households that have 4 or more children driving 77 miles per day more than households with no children.

Figure 5. Effects of Community type on VMT per household, per day

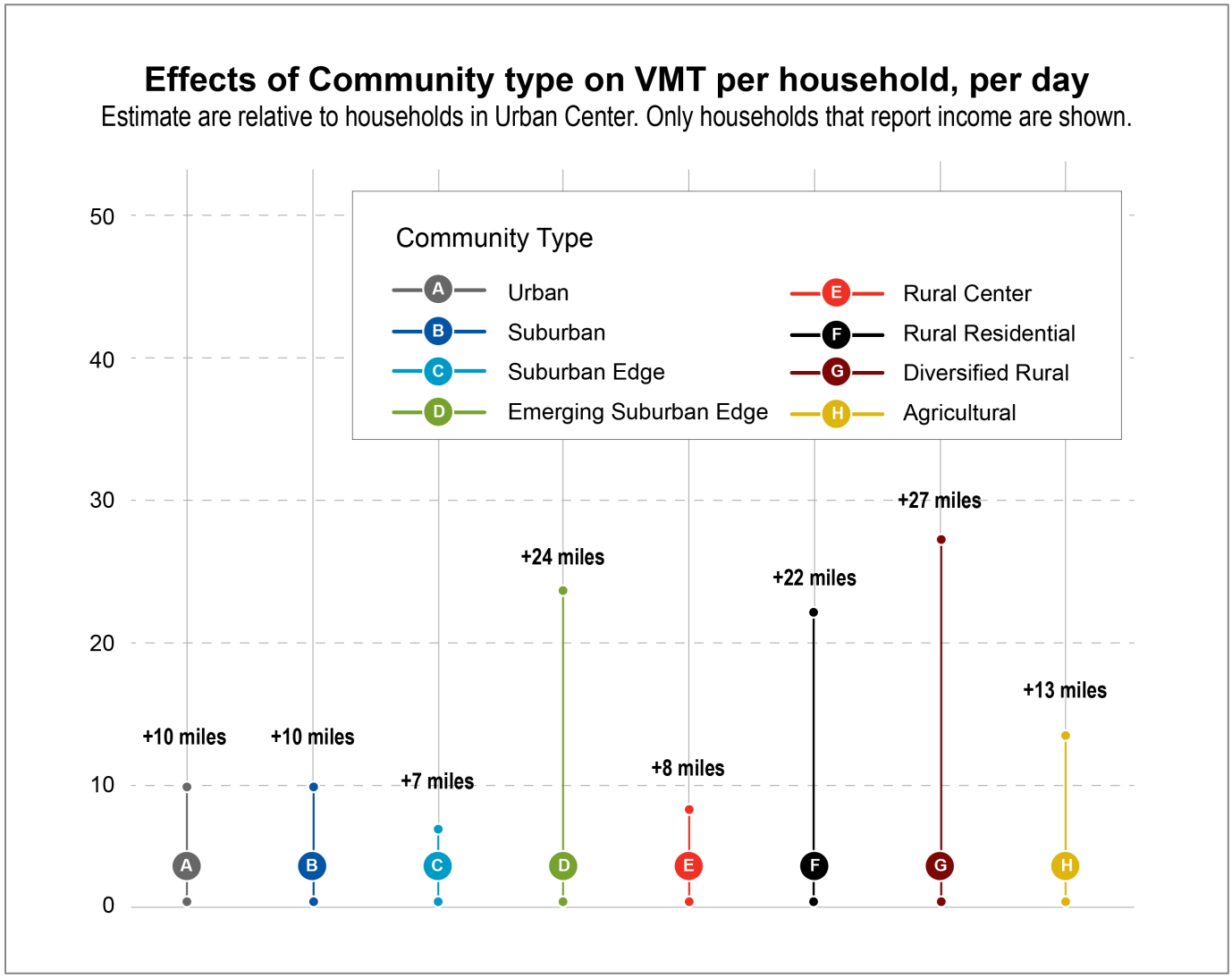


Figure 6. Effects of Income on VMT per household, per day

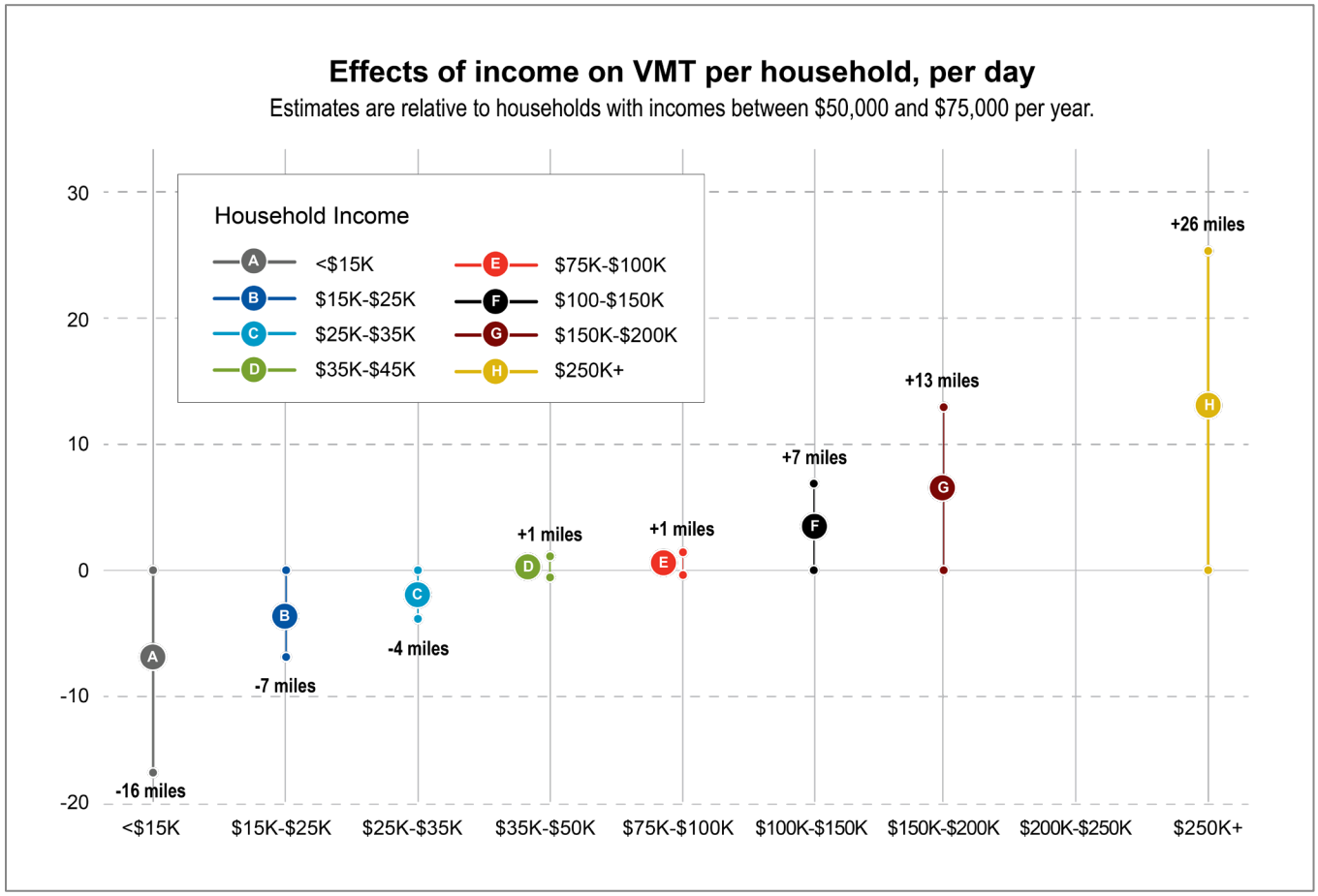
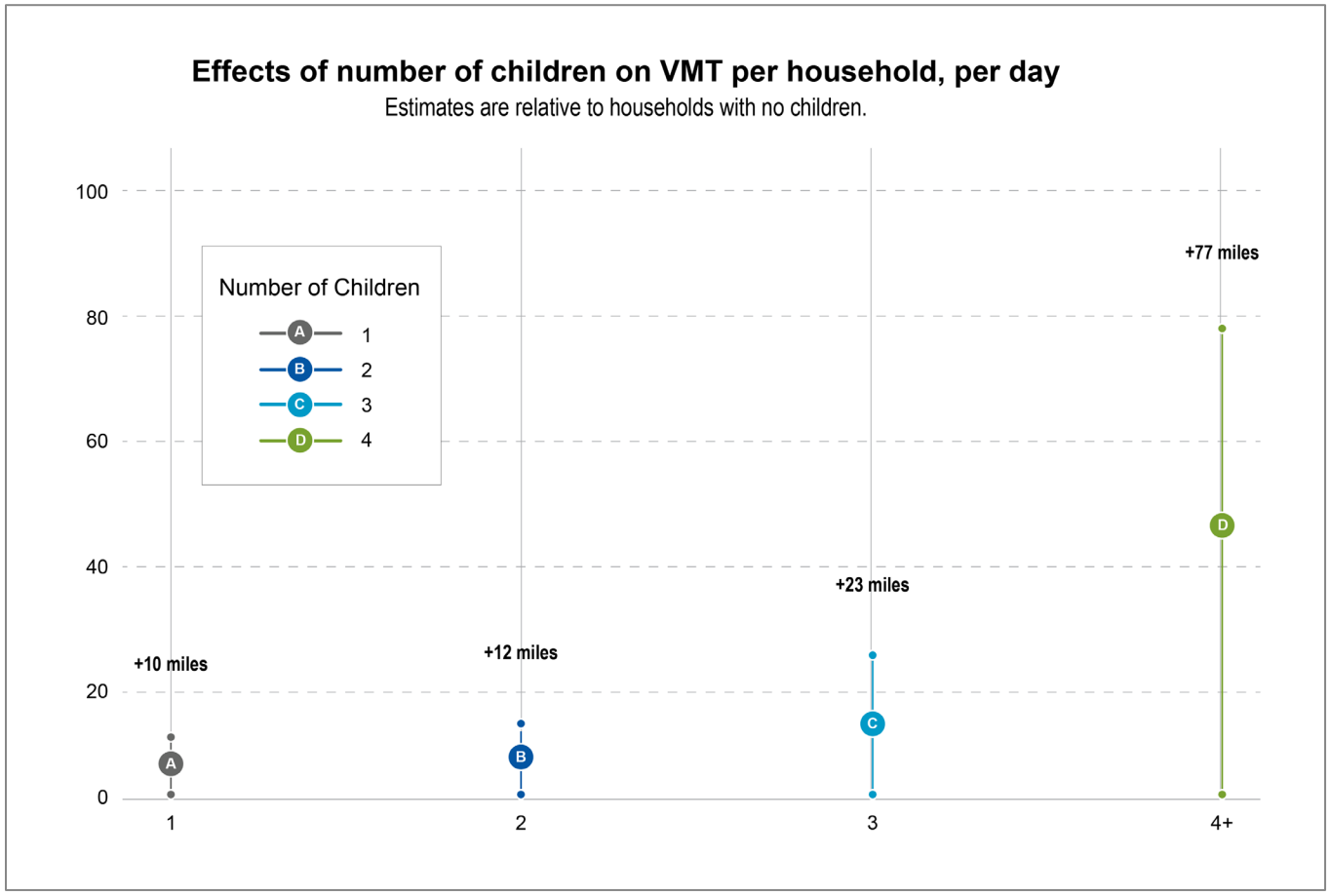


Figure 7. Effects of Number of Children on VMT per household, per day



Multi-Family and Historically Underserved Charging Needs

Multi-family housing development is projected to increase in the Twin Cities and metro area, presenting an opportunity for expanded EV charging to serve the current and future population.

- Currently, 44% of Saint Paul's housing units are multi-family and 90% of the anticipated residential development in the years ahead is multi-family.[18]
- Minneapolis' most recent comprehensive plan has eliminated single-family zoning in order to increase the prevalence and development of multi-family housing.[19]
- The metro's suburban counties like Dakota County and Anoka County also face very low multi-family housing vacancy rates and demand for multi-family units like townhomes, which is likely to spur expanded future multi-family development.[20]

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[18] Dermody, Saint Paul Electric Vehicle Charging Zoning Study.

[19] Minneapolis 2040: The City's Comprehensive Plan.

[20] Skepper, Anoka County Housing Needs Assessment; Bowen, "Dakota County, MN: Housing Needs Assessment."

Interest in EV Use

Interest in EV use is consistent across race and homeowners and renters alike in the United States, through charging needs vary for different populations. National research indicates that around 40% of U.S. adults would consider purchasing an EV for their next vehicle— a rate that is nearly identical across all racial groups.[21] Preliminary qualitative interviews suggest historically underserved focus group participants in the metro area expressed support for investment in electric vehicle infrastructure, including charging stations.[22]

Similarly, a study of multi-family housing residents in Portland, Phoenix, and Atlanta revealed 70% in support of charging infrastructure.[23] While interest in EVs is universal and attitudes surrounding charging infrastructure are positive, "a clear pattern of low community engagement around EVs" may be hampering the adoption by people of color (POC) nation-wide, which underscores the importance of community participation during EV planning.[24]

While estimates suggest over 80% of EV charging in the United States occurs at single-family homes,[25] POC are more likely than White Americans to live in multi-family housing and are more likely to park on-street or in public parking.[26] Differences in housing are reflected in charging preferences:

- **At-home charging less important for POC:** 56% of Black Americans and 58% of Latino Americans believe at-home charging is not a necessity compared to 51% of White Americans.[27]
- **Workplace charging attractive to Latino drivers:** A greater share of Latino (16%) than White (9%) Americans said access to workplace charging stations would encourage EV adoption.
- **Cost of charging:** A national survey revealed that reduced costs is the top reason for EV adoption among POC EV drivers, indicating sensitivity to costs.[28] Metro area residents also have described how cost is a significant determining factor for travel decisions with all modes of transportation.[29] Research indicates the importance of low-cost charging options for EV drivers with low incomes. Out of many types of EV incentives, free public charging is rated as a top incentive for all users. Though free charging may not be practical, access to affordable charging

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21 Survey Says: Considerable Interest in Electric Vehicles Across Racial, Ethnic Demographics. Consumer Reports, Union of Concerned Scientists, EVNOIRE, GreenLatinos, 2022.

22 Ehrlich et al., Transportation Needs In Daily Life Study.

23 Gahlaut et al., Plugging into Mobility Needs at Lower-Income Multifamily Housing.

24 Bloomquist, Transforming Transportation in Communities of Opportunity: The Cleveland Study.

25 Industry Survey: 500 EV Drivers on Public Charging; Alšauskas et al., Global EV Outlook 2024.

26 Survey Says: Considerable Interest in Electric Vehicles Across Racial, Ethnic Demographics. Consumer Reports, Union of Concerned Scientists, EVNOIRE, GreenLatinos, 2022.

27 Ibid.

28 EV Driver Annual Survey Report.

29 Ehrlich et al., Transportation Needs In Daily Life Study.

infrastructure would make the biggest difference for households where cost is the biggest deterrent to EV use.

Safety and Weather Concerns

Though more extensive data exists regarding perceptions of EVs or EV adoption, two critical themes emerge from the research surrounding EV charging stations:

- **Personal safety is top concern:** A larger share of Black (11%), Latino (12%), and Asian (15%) Americans than White Americans (6%) identified personal safety at charging stations as a concern.[30] Metro area residents of color have expressed similar concerns: many describe feeling unsafe in unlit conditions waiting for transit, in particular women. Waiting in or near a vehicle for charging to complete poses analogous concerns.
- **Extreme weather may be a barrier:** Multi-family housing residents in one study expressed concerns about vehicle charging during extreme weather like heat waves. A survey of mainly EV users with home-chargers indicates overwhelming concerns about cold weather after initial vehicle purchase.[31] Though data suggests that such cold weather concerns decrease after time as EV an owner, 40% of respondents said charging cost increased during winter. [32] This could present a challenge to adoption for all and particularly burden low-income people in Minnesota, who already identify cold weather and cost as having significant impact on their travel behavior.

Multi-Family Resident Perspectives

Though data is limited, research suggests that the perspectives of multi-family residents largely mirror those of POC with added concern about displacement. Because POC in the United States are more likely to live in multi-family housing compared to White Americans, feedback from multi-family residents reflects several key insights described in previous sections:

- **Multi-family residents make greater use of public chargers:** Twenty-five percent of multi-family housing EV drivers use shared chargers, including 8% who use work chargers, compared with only 9% in single-family housing who use non-private chargers.
- **Home charging access is not a key determinant of EV adoption for multifamily:** National data shows 67% of multi-family housing residents and 74% of renters are willing to drive EVs without home charger access.[33]
- **Displacement concern:** There are concerns about the potential of EV charging amenities to raise the cost of rent, attract new residents, and lead to displacement of existing residents.[34] With this in mind, community-based EV charging methods are emerging, like in Oakland,

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30 Bloomquist, Transforming Transportation in Communities of Opportunity: The Cleveland Study.

31 The Impact of Cold Weather.

32 Ibid.

33 Ibid

34 US Dep. Energy, “Alternative Fuels Data Center,” May 25, 2021.

California where community-owned charging sites ensure financial sustainability and contribute to the local economy.[35]

Multi-Family Housing Developer and Owner Perspectives

Multi-family housing producers consider cost, upkeep, and demand uncertainty to be the most important factors when considering whether to install EV charging. There is a wealth of recent research about barriers for multifamily housing producers, which include:

- **High costs for retrofit:** Multi-family housing producers perceive EV charging installation to be high cost.[36] Retrofitting EV charging infrastructure into existing buildings can cost 3-4 times more than installing it during construction of a new building, with added concerns for old buildings. In particular for affordable housing owners, grants for installation exist but many say applying is tedious and burdensome.[37] Responsibility for upkeep after installation, like preventing and addressing damage or vandalism, presents another barrier.
- **Lack of knowledge and coordination:** Multi-family housing producers exhibit a general lack of information about the installation process especially for new buildings, where coordination between utilities, contractor, developer, and the City is critical.[38] Updated building codes for new multi-family structures are still being finalized, but these are likely to include EV-enabled parking requirements as recommended by the Department of Labor and Industry's Technical Advisory Group in 2023.
- **Uncertainty about return on investment:** Multi-family housing producers wonder whether demand is high enough yet to make installation financially feasible or desirable.[39] One Minneapolis building owner is managing demand concern by allowing for public charging if needed, though chargers were intended for building residents.

Key Recommendations

To support publicly accessible EV charging and address the needs of multi-family and historically underserved residents, the Metropolitan Council should consider the following key recommendations:

- **Site charging stations in convenient locations for POC and low-income people:** In an Ohio study of low-income and Black residents, 65% chose infrastructure as their primary concern about EV adoption. Many stated that charging stations near to them are limited; for

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[35] Electric Vehicle Charging Community Grant (2024-2027); Johnson and Lamm, Policy Strategies to Promote Equitable EV Charging Access for Multi-Family Housing Residents.

[36] Cordova-Cruzatty et al., "Experiences and Perceptions of Multi-Family Housing Property Managers about Electric Vehicle Charging Provision"; Lewallen and Huether, Expanding EV Charging in Multifamily Affordable Housing: Insights and Strategies.

[37] Lewallen and Huether, Expanding EV Charging in Multifamily Affordable Housing: Insights and Strategies.

[38] Ibid.

[39] Ibid.

instance, “there aren’t a lot of places that I’ve seen with electric vehicle charging,” or that existing charging stations are at places like Whole Foods and “not where we shop.”

- **Outreach to immigrants:** The metro area is home to a high rate of immigrants born outside of the United States, at 11%. National EV data on immigrants is limited. In the metro, qualitative research has explored transportation behaviors within Hmong and East African diaspora communities, but perspectives and preferences regarding EVs are missing. Considering that immigrants in the metro are historically underserved and many live in multi-family housing, the Metropolitan Council may wish to emphasize outreach to immigrant residents during EV planning activities.
- **Improved waiting conditions can help:** Providing a safe, sheltered place to wait with adequate lighting is essential for public EV chargers in the metro. The United States Joint Office of Energy and Transportation recommends such features including cleanliness, surveillance, and emergency call boxes to ensure safe EV charging stations. Research shows that improvements for conditions waiting at bus stops can increase riders’ use of the stations by 92%. Considering the similarities, the Metropolitan Council may wish to consult transit station design guidance for solutions to analogous concerns.
- **Adopt charging schemes that prioritize existing residents*:*** Associating transportation improvements with displacement is not unfounded in the metro area. Long-term neighborhood residents in Minneapolis and Saint Paul identify transportation investments in greenway and transit hubs as connected with gentrification in their neighborhoods. Such sentiments underscore the importance of community outreach and participation in EV charging siting.

Aligning with State and Local Plans, Policies, and Initiatives

Efforts to expand the broader EV charging network in the region should work collaboratively with other state and local planning efforts to develop infrastructure, creating a cohesive network and avoiding redundant investments. The State of Minnesota and many cities under the Metropolitan Council’s jurisdiction, including Bloomington, St. Paul, St. Louis Park, Woodbury, Hopkins, Eden Prairie, Minneapolis, Minnetonka, and Edina, have ongoing or planned efforts to support EV charging within their community. Some cities have climate action plans that identify EV adoption as a goal, while others have more formalized EV charging initiatives. Dedicated city EV charging plans/projects and the Charging Smart program are described in more detail below.

State of Minnesota

SMTP and Climate Action Framework Goals

Minnesota has been preparing for the shift to EVs to meet statewide carbon reduction and electric and zero-emission vehicle targets as identified in the 2022 Statewide Multimodal Transportation Plan (SMTP) and the 2022 Climate Action Framework. A key target adopted by the State of Minnesota is for 20% of vehicles on the road to be electric by 2030. Minnesota also has a target for 60% of vehicle sales to be EVs by 2030.

NEVI Program and EVINA

To achieve statewide targets for EV adoption, the Minnesota Department of Transportation prepared the Minnesota EV Infrastructure Deployment Plan, which identifies where the state will spend federal funds from the National Electric Vehicle Infrastructure (NEVI) Program, and the EV Infrastructure Needs Assessment (EVINA), which looks beyond the NEVI program to guide how and where to select and prioritize EV charging infrastructure investments across the state.[40][41]

MPCA Volkswagen

The Minnesota Pollution Control Agency is using Volkswagen settlement funds to provide grants for Level 2 and DCFCs around the state. So far, nearly $1 million has been distributed for Level 2 chargers, and $4.06 million has been distributed for DCFCs.

Statewide EV Policy

Recent Minnesota policy changes include:

- **EV Fee Increase:** Annual surcharges rising to at least $150 in 2026 and $100 in 2027 onward, with many drivers paying more than $200.[42]
- **Public Charging Tax (2027):** $0.05/kWh for public chargers above 50 kW; creates an Electricity as Vehicle Fuel Working Group.[43]
- **Licensing and Inspection Requirements (2027):** Public charging operators must be licensed; annual $100/port inspection fee.[44]

The public charging tax and licensing inspection requirements will increase the operating costs of public EV charging, which are likely to be passed down to consumers. By providing financial support to address gaps in the EV charging network, the Metropolitan Council can help subsidize project costs for EV charging stations and advance the affordable deployment of EVs.

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[40] Minnesota Department of Transportation (2025). Electric Vehicle Infrastructure Needs Assessment. https://mdl.mndot.gov/items/m17837

[41] Minnesota Department of Transportation. (2024). 2024 Minnesota Electric Vehicle Infrastructure Plan. https://mdl.mndot.gov/_flysystem/fedora/2024-11/MnDOT%202024%20EV%20Infrastructue%20Annual%20Plan%20Update%20with%20Appendices-Aug2024.pdf

[42] Minnesota Legislature. House File 189: Electric Vehicle Surcharge Amendments. Office of the Revisor of Statutes, 94th Legislature, introduced 10 Feb. 2025, https://www.revisor.mn.gov/bills/text.php?number=HF189&type=bill&version=0&session_year=2025&session_number=0 .

[43] Minnesota Legislature. Senate File 2092: Electric Fuel Tax and EV Surcharge Repeal. Office of the Revisor of Statutes, 94th Legislature, introduced 31 Mar. 2025, https://www.revisor.mn.gov/bills/text.php?number=SF2092&version=0&session_year=2025&session_number=0 .

[44] Ibid.

Saint Paul/Minneapolis

Saint Paul and Minneapolis jointly operate the EV Spot Network, a dedicated public EV charging + carshare infrastructure project. This program lays out a network of mostly on-street Level 2 charging hubs (called “EV Spots”) across both cities with dual use for public EV charging and a shared fleet (Evie Carshare). In addition, there are expansion efforts, including a recent “East Side Expansion Project” in Saint Paul, adding dual-port Level 2 chargers near transit (Gold Line BRT) stops and in underserved locations.[45]

Bloomington

The City of Bloomington developed an Electric Vehicle Infrastructure Plan in 2024.[46] The purpose of the Electric Vehicle Infrastructure Plan was to create a community framework for supporting the transition to EVs. The plan included policy, program, and infrastructure recommendations.

Policy and program recommendations included:

- Conducting a community needs assessment to understand the needs of marginalized community members
- Increasing EV and EV supply equipment (EVSE) awareness to ensure a lack of information is not a barrier to adoption
- Providing assistance to navigate applications for EV incentives
- Investigating expansion of the Twin Cities’ Evie carshare program
- Increasing access to electric bikes and scooters for residents

Key infrastructure recommendations focused on 4 planning domains: Public Charging, Private & Commercial Charging, Charging Readiness, and Charging Design. To support Public Charging, Bloomington plans to develop a clear set of policies and procedures related to site design and parking policy, which includes curbside charging. The city also hopes to establish standards for charger design which will provide a consistent appearance, help residents locate charging stations, and ensure reliable operation in extreme temperatures.

For private charging, recommendations include creating clear standards and guidance in building codes, updating city ordinances to incentivize EVs, and adding workplace charging incentives. Bloomington also plans to incentivize charging in multi-family dwellings, which make up 45% of dwellings in the city. For city-led projects, Bloomington plans to combine EVSE additions with other projects to minimize costs.

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[45] City of St. Paul. EV Spot Network. https://www.stpaul.gov/departments/public-works/transportation-and-transit/ev-spot-network

[46] City of Bloomington. Electric Vehicle (EV) Infrastructure Plan. Let's Talk Bloomington, 29 Jan. 2024, https://letstalk.bloomingtonmn.gov/ev .

St. Louis Park

St. Louis Park developed its Climate Action Plan in 2018, which is broadly focused on strategies to reduce greenhouse gas emissions[47]. One key project outlined in the plan is focused on accelerating the adoption of electric vehicles by installing chargers in public parking lots. Potential sites include city-owned buildings, such as parks and schools, and the City has deployed several stations already. The charging stations will be highly visible and incorporate any branding the City develops as part of its other climate action efforts.

Charging Smart Program

The Charging Smart initiative, funded by the U.S. Department of Energy and led by IREC, with the Great Plains Institute (GPI) as a partner, recognizes communities that take steps to become more EV-ready in areas such as permitting and inspection, zoning, and utility engagement.

In 2024, nine Minnesota cities were the first in the state to earn Charging Smart designations:

- Silver designation: Hopkins; La Crescent
- Bronze designation: Eden Prairie; Falcon Heights; Faribault; Inver Grove Heights; Oakdale; Roseville; St. James

These designations mean these cities have updated permitting and inspection processes and reviewed zoning codes and rules toward increasing EV infrastructure accessibility.[48]

Utility Considerations

Utility capacity plays a critical role in the successful deployment of EV charging infrastructure. As EV adoption increases, so does the demand for electricity, particularly at fast-charging sites that require high power levels. Without adequate grid capacity, charging stations may face delays, limited functionality, or costly upgrades. The Minnesota Public Utilities Commission emphasizes that transportation electrification improves grid efficiency and can place downward pressure on utility rates by increasing off-peak electricity use.[49] MnDOT's 2024 Electric Vehicle Infrastructure Plan further highlights the importance of coordinating with utilities to ensure that charging sites are "grid-ready," especially in rural and underserved areas where infrastructure gaps are more pronounced.[50] Together, these insights underscore the need for proactive collaboration between transportation planners and electric utilities to build a resilient, equitable, and scalable EV charging network.

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[47] City of St. Louis Park. Electric Vehicle Plan. Sustainability Division, St. Louis Park, MN, May 2021, https://www.stlouisparkmn.gov/home/showpublisheddocument/20782/637570317276200000 .

[48] Great Plains Institute. Department of Energy-Funded Charging Smart Program Expands Across U.S. https://betterenergy.org/blog/department-of-energy-funded-charging-smart-program-expands-across-u-s/

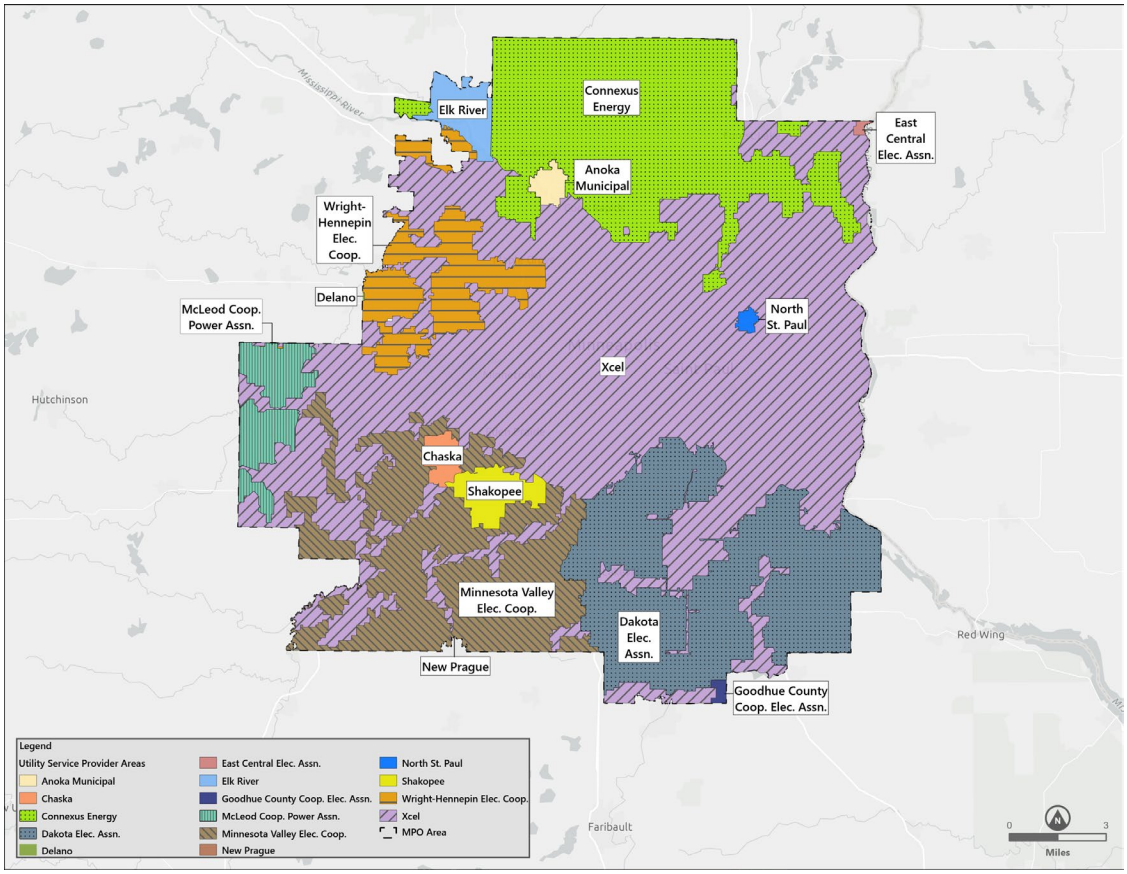
[49] Minnesota Public Utilities Commission. (2024). Electric Vehicles / Public Utilities Commission. https://mn.gov/puc/activities/economic-analysis/electric-vehicles/

[50] Ibid.

Utilities Serving the Region

Fifteen utilities serve the Twin Cities Metropolitan Planning Organization area, as shown in **Figure 8**, including Xcel Energy, eight electric cooperatives, and seven municipal utilities.

Figure 8. Utilities Serving the Twin Cities Metropolitan Planning Organization Area



Offering residential customers a time-of-use rate for EV charging and a rebate for EV charging infrastructure is becoming standard, with several utilities providing incentives for commercial customers to offer EV charging.

Xcel Energy

Xcel Energy is the only investor-owned utility within the Metropolitan Council region. It offers several EV programs:

- For single-family residential charging, Xcel Energy offers a variety of time-of-use rates to promote affordable off-peak charging. Xcel is also proposing an active managed charging program where the charger can be remotely controlled to respond to changing grid conditions. Xcel also offers Level 2 charger rebates as well as a home wiring rebate, which makes installing additional capacity for an EV charger more affordable.
- For commercial charging, Xcel is proposing shifting to a Commercial EV Infrastructure, Equipment, and Advisory Program that features EVSE rebates for multi-family, fleet, and public

charging customers. EVSE rebates will be paid at ~40-60% of the installation costs, with greater incentives available for locations within disadvantaged communities.[51]

Cooperative Utilities

Several electric cooperatives also offer EV programs to support EV adoption in their territories:

- **Connexus Energy:** Connexus Energy offers several EV programs to residents and commercial customers, including a time-of-day rate, $500 Level 2 charger rebate for subscribing to the time-of-day rate program, and Level 2 charger rebates for commercial customers.[52]
- **Dakota Electric Association:** Dakota Electric provides residential customers with two EV charging programs: an off-peak storage rate and a time-of-use rate. The off-peak storage rate is the best rate possible, offered when demand on the grid is low. The rate is $.0487/kW, but charging can only occur between 11 p.m. and 7 a.m. The time-of-use rate charges a flat rate of $.0755/kW on weekends and holidays. During weekdays, depending on the hour of the day, the time-of-use rate ranges from $.0755 to $.0442/kW. Dakota Electric also offers a $500 rebate for installing a Level 2 EV charger.[53]
- **Minnesota Valley Electric Cooperative:** Minnesota Valley Electric Cooperative offers the EV24 Time-of-Use (TOU) Charging Program, which provides members with a dedicated EV meter and lower overnight charging rates from 10:00 p.m. to 5:00 a.m., encouraging off-peak energy use. Participants receive a $150 rebate per Level 2 charger port upon enrollment.[54]
- **East Central Energy Electric Association:** East Central Energy Electric Association offers residential customers a time-of-use and an off-peak storage rate, as well as a $400 rebate for installing a Level 2 charger. Only customers enrolled in the off-peak program qualify for the rebate.[55]

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[51] Xcel Energy. Transportation Electrification Plan: Appendix to the 2025 Integrated Distribution Plan. Docket No. E002/M-25-142, Minnesota Public Utilities Commission, 2025, https://mn.gov/puc/.

[52] Connexus Energy. Electric Vehicles: Rebates and Programs. Connexus Energy, https://www.connexusenergy.com/residential/save-money-and-energy/rebates-and-programs/electric-vehicles.

[53] Dakota Electric Association. Electric Vehicle Charging. Dakota Electric, https://www.dakotaelectric.com/member-services/programs-rebates/for-your-home/electric-vehicle-charging/.

[54] Minnesota Valley Electric Cooperative. Electric Vehicle Program. MVEC, https://www.mvec.net/electric-vehicle-program/.

[55] East Central Energy. Electric Vehicle Charger Rebate. East Central Energy, https://www.eastcentralenergy.com/electric-vehicle-charger-rebate.

- **Wright-Hennepin Cooperative Electric Association**: Wright-Hennepin offers residential customers a rebate of up to $500 for a Level 2 EV charger and automatic enrollment in a time-of-use rate for charging.[56]

Municipal Utilities

Municipal utilities are increasingly providing supportive programming for EVs as well:

- **Anoka Municipal (AMU):** AMU runs a time-of-use program that requires a dedicated meter. Customers who charge off-peak receive discounted energy pricing. AMU also offers rebates for Level 2 EV chargers: $325 for full battery EVs and $215 for plug-in hybrids.[57]
- **City of Chaska:** The City of Chaska provides a residential EV off-peak rate. The 2025 residential EV rate is $0.20708/kWh on-peak (M–F, 7 a.m.–7 p.m.) and $0.07674–$0.07197/kWh off-peak depending on season; a $150 meter fee applies. Chaska also offers EV charger rebates: $250 per residential Level 2 port and $500 per commercial port.[58]
- **Elk River (ERMU):** ERMU offers up to a $700 residential rebate for purchase and installation of a Level 2 charger; qualifying installations are set up on ERMU's time-of-use EV charging rate.[59]
- **New Prague:** New Prague Utilities runs a metered EV TOU program with clearly posted prices: off-peak energy at $0.049/kWh and on-peak energy at $0.199/kWh when the EV load is served through the separate EV meter.[60]
- **Shakopee Public Utilities (SPU):** SPU offers a dedicated time-of-use EV charging rate for separately metered EV charging with defined on- and off-peak periods.[61]

Utility Engagement Themes

Themes from engagement with Xcel Energy and cooperative utilities in the region to gather information about electric grid capacity and coordinate on prioritizing locations for public investment in EV chargers are provided below.

- Utilities are supportive of coordinated planning for EV chargers in the region.

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[56] Wright-Hennepin Cooperative Electric Association. Electric Vehicles: Charging Program and Rebate. WH, https://www.whe.org/energy-savings-rebates/residential-programs-and-rebates/electric-vehicles.html.

[57] Anoka Municipal Utility. EV Charger Time-Of-Use (TOU) Program. City of Anoka, https://anokamunicipalutility.com/786/EV-Charger-Time-Of-Use-TOU-Program. Accessed 20 Aug. 2025

[58] City of Chaska. Electric Vehicles. Chaska, MN - Official Website, https://www.chaskamn.gov/782/Electric-Vehicles.

[59] Elk River Municipal Utilities. Electric Vehicle Charger Rebates: In-Home EV Charging Program. ERMU, https://www.ermumn.com/programs-rebates/residential-rebates/electric-vehicle-charger.

[60] City of New Prague. Electric Vehicles. City of New Prague, https://www.ci.new-prague.mn.us/index.asp?SEC=016308C1-DC04-40F3-B77C-6650E7C48134.

[61] Shakopee Public Utilities. EV Charging. Shakopee Utilities, https://shakopeeutilities.com/residential/ev-charging-2/.

- Level 2 chargers and smaller installations of DCFC are not typically expected to pose challenges for the electric grid in the region. Planned EV charging installations that require 1MW or more of power are important to communicate to utilities early to understand and address potential capacity limitations.
- Maps of available utility capacity are typically not publicly available. Xcel Energy does provide a public hosting capacity map, and most utilities are willing to review a list of potential gaps in the EV charging network to conduct a planning-level review of any power availability constraints.[62] Reviews can take a month or more, depending on the number of locations that require review. The Metropolitan Council should plan to coordinate as early as possible with the utilities to understand the time required for review.
- The utility industry continues to experience long lead times for infrastructure like transformers. However, the scale of public investment in addressing gaps in the EV charging network is not expected to require significant investment in utility infrastructure upgrades at this time.
- While utility pole-mounted chargers offer some efficiencies in project development, they are either not allowed or not desired in most utility territories in the region. The Metropolitan Council could continue to explore streetlight pole-mounted chargers, which are typically owned by the road authority.
- While load management is an ongoing issue for utilities in the region, it will be challenging to match EV charging station types with excess capacity on the grid. Several utilities indicated that an effective strategy for managing additional load from EV chargers is to promote time-of-use pricing so EV chargers are used at times of day when there is less load on the grid.
- The Metropolitan Council should explore opportunities to provide education on utility programs, including time-of-use rates for EV charging to manage load on the grid, particularly for residential and fleet charging. This could occur through coordinating directly with utilities and/or providing educational resources to MPO member communities, including encouraging cities to promote utility EV programs through local auto dealers.

[62] Xcel Energy. Hosting Capacity Map. https://www.xcelenergy.com/hosting_capacity_map.

Estimating Public EV Charging Needs

This chapter provides publicly accessible EV charging needs at the census tract level throughout the Metropolitan Council's seven-county region (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington, and urbanized parts of Wright and Sherburne). This analysis allows the Met Council to understand gaps between current publicly available EV charging infrastructure and future needs, as well as identify areas where the need is most acute and there may be a role for the public sector to play.

Existing and Planned Public Charging Stations

In order to estimate future publicly accessible charging infrastructure needs in the Metropolitan Council region, existing and planned charging stations were first identified. A list of existing publicly accessible charging stations was compiled, including detailed location data, which was used to create a static map illustrating the geographic distribution of existing infrastructure. Charging infrastructure data was collected from several local and national sources, including:

Existing Charging Stations:

- EValuateMN (Atlas Public Policy)[63]
- National Laboratory of the Rockies (NLR) API[64]
- PlugShare

Planned Charging Stations:

- National Electric Vehicle Infrastructure (NEVI) program, Minnesota Department of Transportation (MnDOT)[65]
- Volkswagen settlement grants, Minnesota Pollution Control Agency (MPCA)[66]
- Kwik Charge, Kwik Trip

All planned charging stations from MnDOT, MPCA and Kwik Trip were cross-checked with both EValuateMN and NLR data to eliminate duplicate data, ensure all charging stations were captured, and develop a final list of charging stations. In total, the final list contained 865 publicly accessible charging stations. These stations contained 2,083 existing ports and 35 planned ports, with 699 of these ports being DCFC ports and 1,419 being Level 2.

Charging stations were determined to be "publicly accessible" if they were labeled as "public" in either Atlas Public Policy data, NLR data, or PlugShare data. Charging stations at workplaces and car

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63 EValuateMN – Atlas Public Policy

64 All Stations API | NLR: Developer Network *Note: Alternative Fuels Data Center links to this data*

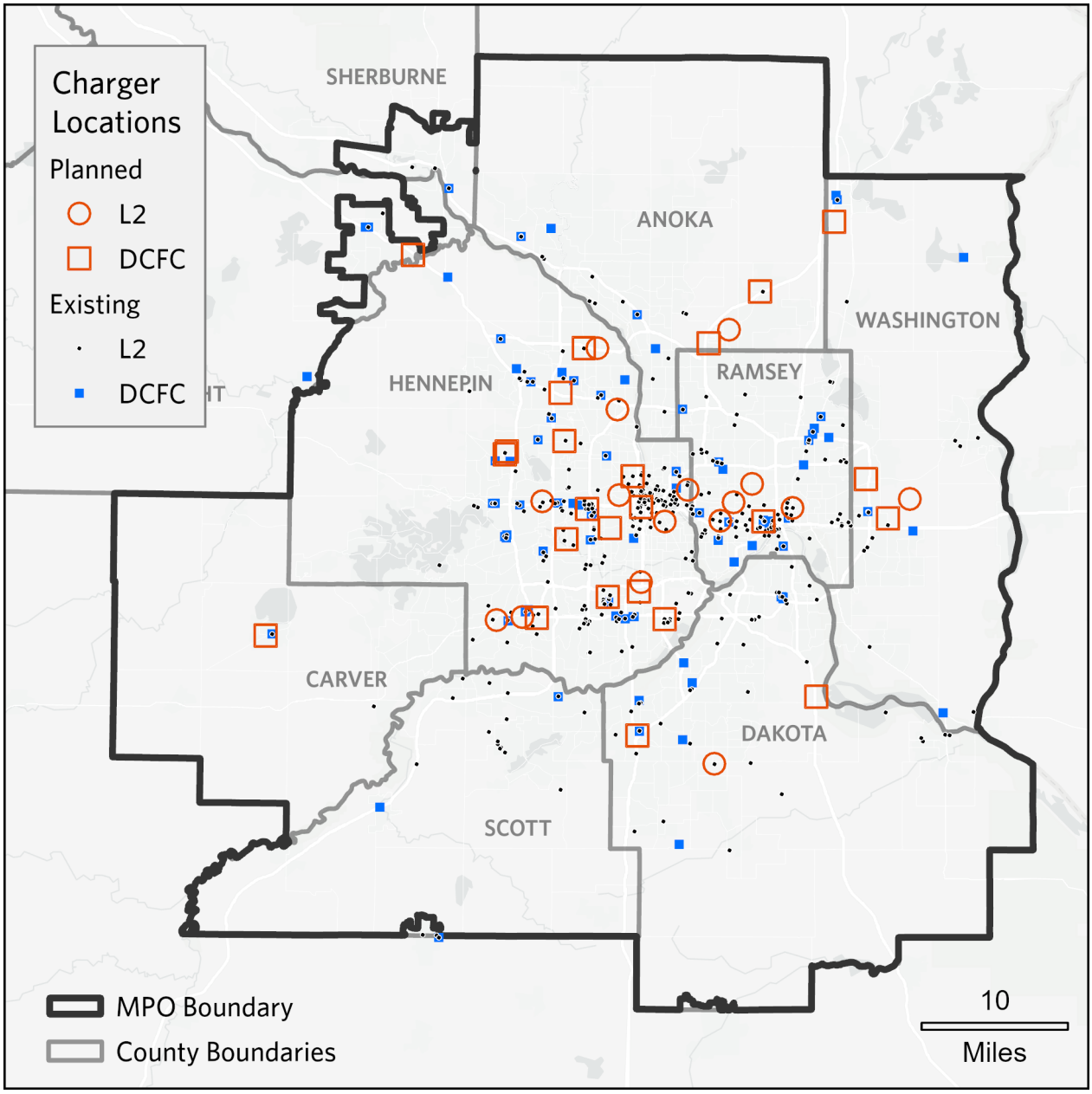
65 National Electric Vehicle Infrastructure Program - MnDOT

66 Electric vehicle charging stations | Minnesota Pollution Control Agency

dealerships were only included if they were labeled as available to the public. Private or limited access charging stations at any location were not included.

After compiling all existing and planned public charging stations, **Figure 9** was created to illustrate locations within the Metropolitan Council's regional boundaries. Note that each point represents one charging station and could contain multiple charging ports at the site.

Figure 9. Metropolitan Council Region Existing and Planned Chargers



Existing DCFCs tend to be concentrated near major corridors and are located primarily in Hennepin and Ramsey County. Planned DCFCs are also located primarily near major corridors but are concentrated on the outskirts of Hennepin and Ramsey County.

Existing and planned Level 2 chargers are concentrated in Minneapolis and Saint Paul with a few planned Level 2 stations located along major corridors in Hennepin, Ramsey and Anoka County. Existing or planned chargers are generally sparse outside of Hennepin and Ramsey County, and periphery counties have few chargers, even along major corridors. Carver County, for example, only has two existing public Level 2 chargers and one public DCFC.

Near-Term and Medium-Term Light-Duty EV Market Share

After mapping all existing and planned publicly accessible charging ports in the Metropolitan Council region, a 2040 EV forecast was developed to estimate the region's future charging needs. 2040 was chosen as the forecast year for this analysis to reflect that funding might be available for construction approximately five years in the future and to make sure this work does not become dated too quickly. Development of the forecast involved four steps:

1. Collect historical vehicle registration data for Minnesota and generate regional estimate
2. Study national EV market share trends
3. Create forecast scenarios to estimate the number of light-duty EVs on the road by 2040
4. Implement forecasting model

It is important to note the difference between *EV market share* and *EV adoption rate* discussed in this section. *EV market share* is defined as the percentage of new vehicle sales that are EVs in any given year, while *adoption rate* represents the percentage of the total fleet that are EVs.

Historical Data

Statewide vehicle registration data from 2022-2024 was collected using EValuateMN. Using this statewide data, approximately 52% of all registered vehicles [including internal combustion engine vehicles, hybrid-electric vehicles, plug-in hybrid electric vehicles (PHEVs), and battery electric vehicles (BEVs)] were assumed to be in Met Council's seven-county region, which mirrors the percentage of Minnesota residents that also reside in the seven-county region.[67] Data was only collected for years 2022-2024, as data previous to 2022 was determined to be unreliable due to immaturity of the Minnesota EV market. The following historical data was collected for each year:

- Number of original and total vehicle registrations
- Number of original and total EV registrations

EValuateMN tabulates vehicle registrations for only light-duty vehicles in Minnesota. Each registration is categorized using the vehicle identification number (VIN) and is marked as either a renewal or original registration. Only BEVs were considered in the historical data, and PHEVs were excluded from the analysis since they are significantly less reliant on public charging infrastructure. Using this data, three key assumptions were generated:

- Annual growth rate of the fleet
- Percentage of original registrations

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[67] Data by Topic: Our Projections / MN State Demographic Center

- Vehicle salvage rate

The annual growth rate of the fleet was assumed to be directly related to population growth in the region. Historical data from the Minnesota Demographics Center was used, which showed an average regional population growth rate of approximately 0.2%.[68] The overall vehicle fleet for the region was assumed to also grow by 0.2% each year after 2024.

The percentage of original registrations refers to the proportion of the total fleet in a given year that was purchased as a new vehicle. This is used in the analysis to determine how many new vehicles enter the fleet and subsequently how many EVs enter the fleet. This value was assumed to be 6.87% based on the average of new vehicle registrations from 2022-2024.

The vehicle salvage rate refers to the percentage of vehicles that are permanently removed from the fleet due to being at the end of their useful life. For the years 2022-2024, the vehicle salvage rate was determined using actual vehicle sales and vehicle registration data. For subsequent years, the vehicle salvage rate was assumed to be 6.67%, calculated using the number of original registrations and the fleet size year-over-year. Because the overall vehicle fleet is assumed to grow each year, this means that the number of original registrations is greater than the number of vehicles permanently retired from the fleet.

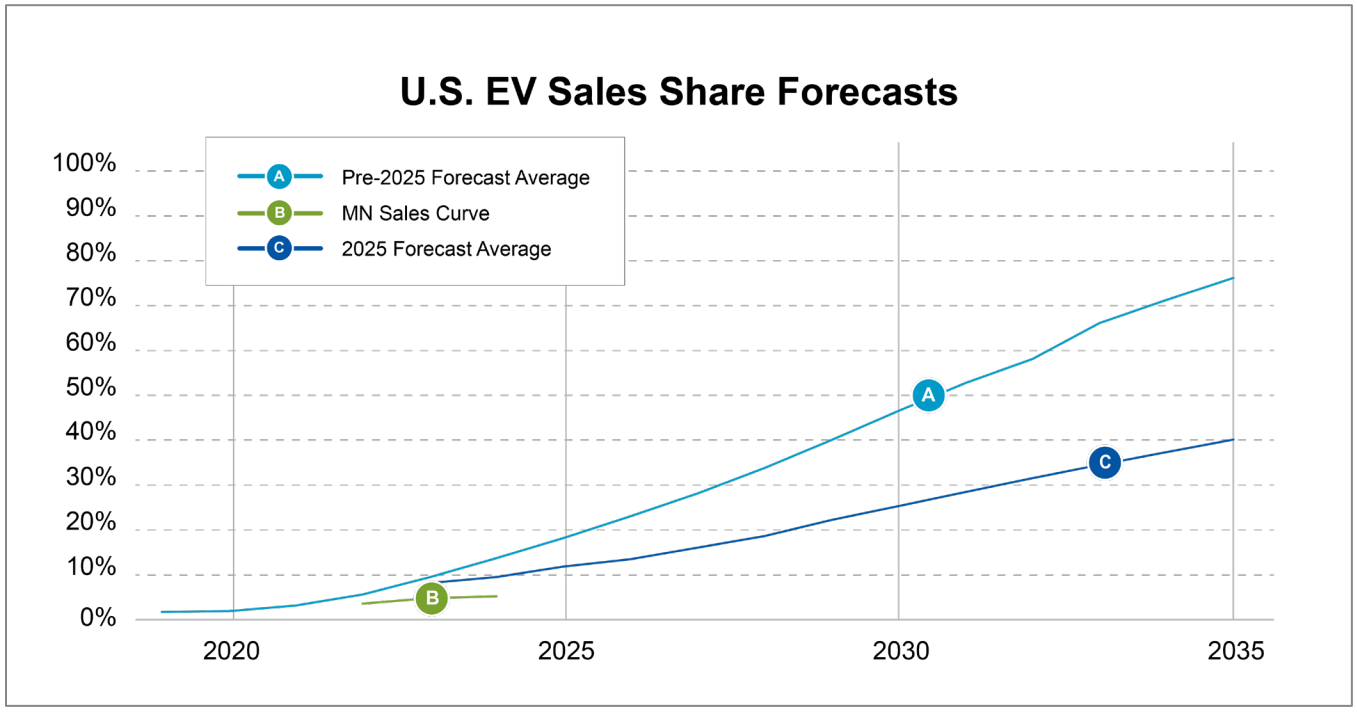
National EV Market Share Trends

National EV trends were also analyzed to develop an accurate forecast for the 2040 EV market share in the Metropolitan Council region. Two forecasts were developed: a pre-2025 forecast representing national EV sales trends influenced by strong federal policy and funding support, and a 2025 forecast representing national EV sales trends influenced by weaker federal policy and funding support. The pre-2025 forecast was created using forecasts from ten different agencies and public reports, including: the Alliance for Automotive Innovation, S&P Global Mobility, Bloomberg NEF, Edison Electric Institute, Boston Consulting Group (BCG), the U.S. EPA, Ernst & Young (EY), Guidehouse, Wood Mackenzie and the U.S. Bureau of Transportation Statistics. These forecasts represent a variety of industry perspectives including consulting, research, and governmental agencies. Only two industry sources, Bloomberg and Wood Mackenzie, had revised 2025 EV sales projections available and were used to create the 2025 forecast.

Figure 10 shows both the pre-2025 and 2025 market share forecasts, respectively shown in light blue and dark blue. Metropolitan Council historical EV sales data (shown in green) is displayed for years 2022-2024. These lines show that EV sales in Minnesota have lagged behind national industry forecasts to date.

[68] Data by Topic: Our Projections / MN State Demographic Center

Figure 10: Average U.S. Curve



Regional Market Share Scenarios

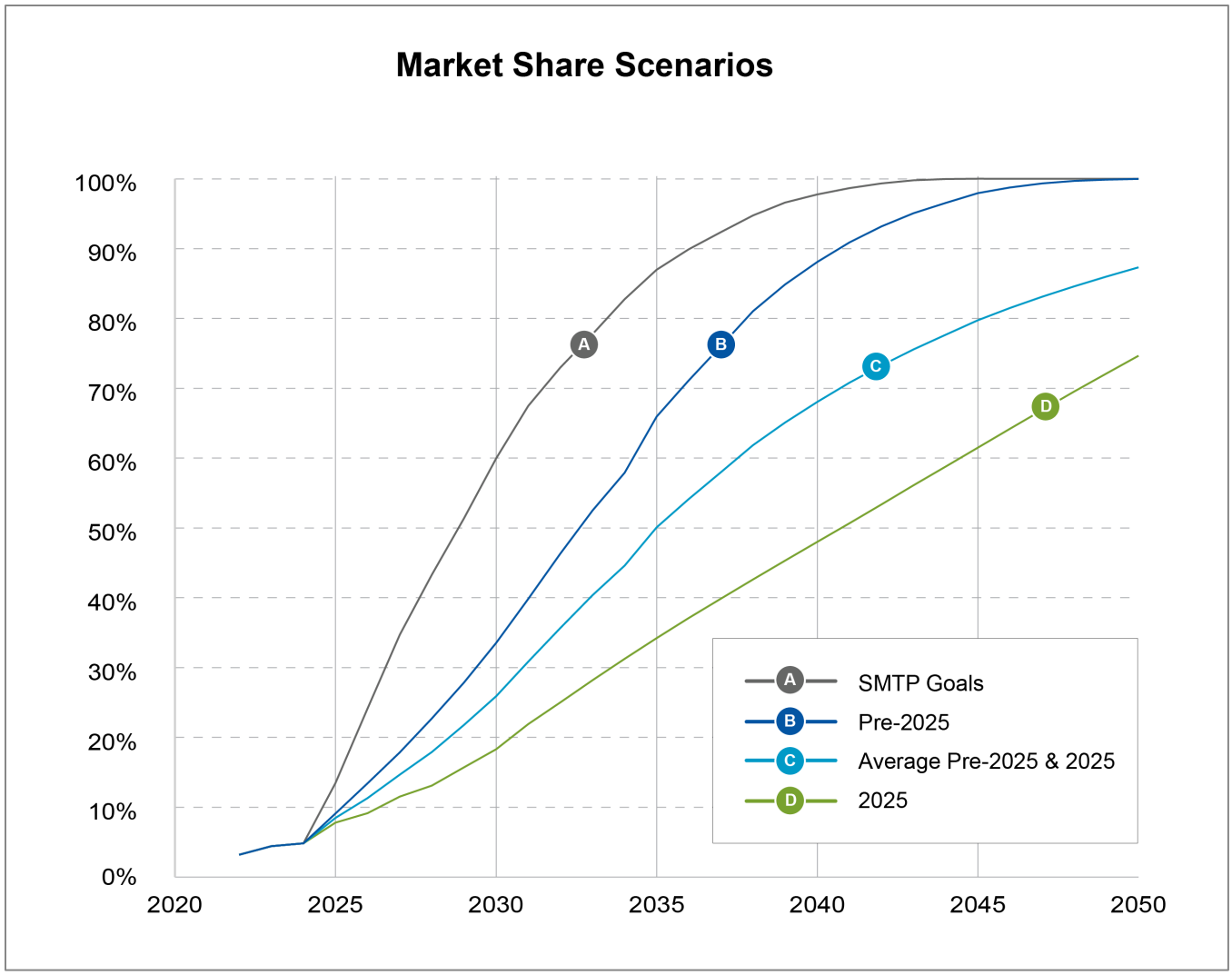
Using the historical vehicle registration data specific to the Metropolitan Council region, national EV market share forecasts, and the EV market share targets outlined in the Statewide Multimodal Transportation Plan[69] (SMTP), four different market share scenarios were developed to project varying levels of EV adoption. These four market share scenarios include:

- **Pre-2025 Scenario**, representing national EV sales trends pre-2025 which were influenced by strong federal policy and funding support
- **2025 Scenario**, representing national EV sales trends post-2025 influenced by weaker federal policy and funding support
- **Average Scenario**, representing the average of projected EV sales between the pre-2025 and 2025 scenario
- **Statewide Multimodal Transportation Plan (SMTP) scenario**, representing the statewide target of 60% EV market share by 2030 identified in the SMTP

Figure 11 illustrates all four market share scenarios.

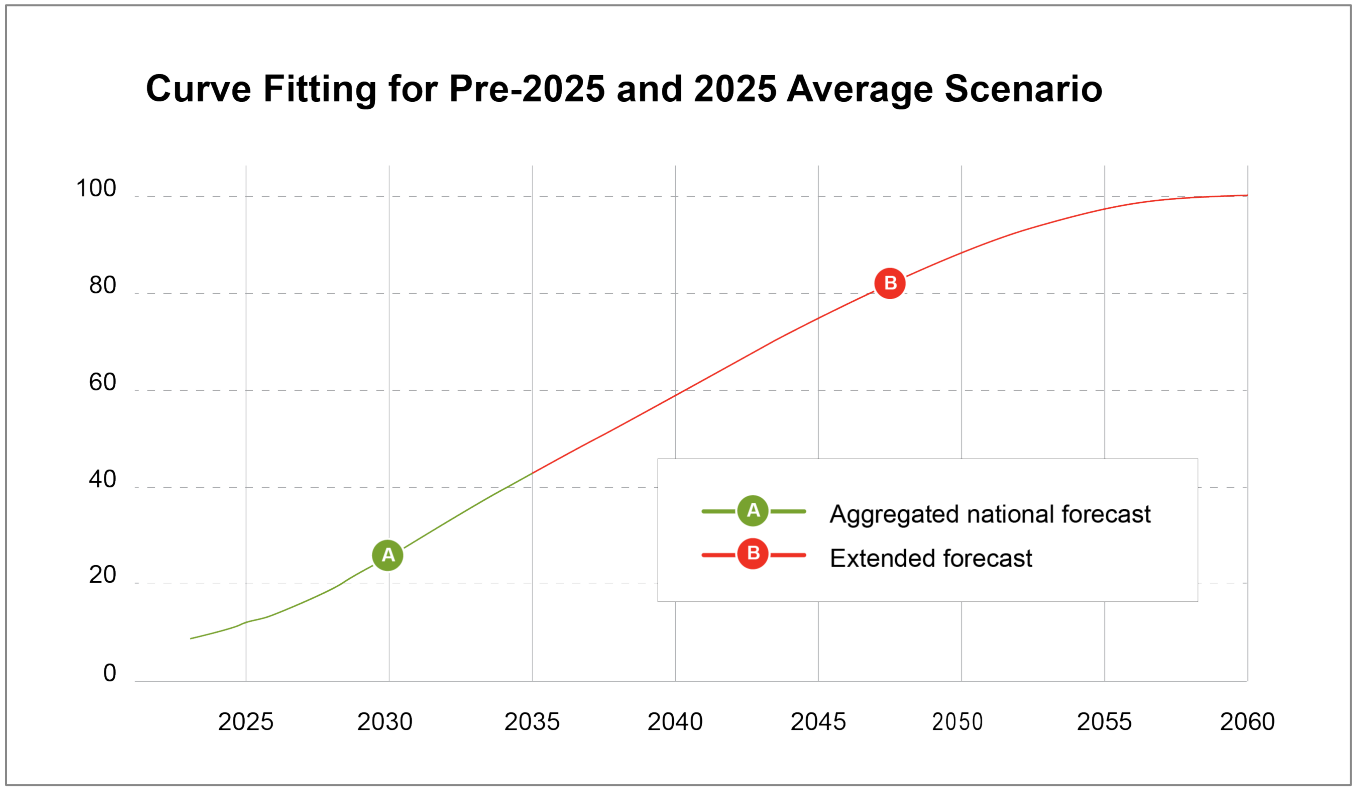
[69] Minnesota's most recent (2022) Statewide Multimodal Transportation Plan (SMTP) set a goal to have 60% of new vehicle sales as zero-emission vehicles (including EVs) by 2030 and 100% of new vehicles sales as zero-emission vehicles by 2035.

Figure 11: Market Share Scenarios



For all four scenarios, a curve-fitting method was used to integrate the Met Council region's historical EV adoption trend (based on 2022-2024 data) with national forecasts, creating a realistic, data-informed trendline. A demonstration of this method is shown for the Average Pre-2025 and 2025 scenario.

Figure 12: Curve Fitting for Pre-2025 and 2025 Average Scenario



Shown in green, the aggregated national forecast data from

Figure 12 was only available through the year 2035. A spline curve, shown in red, was then generated with the curve-fitting method to extend the forecast past the target year of 2040. The slope of the aggregated national forecast data was matched to the spline curve to create a realistic curve.

Forecasting Model

After analyzing all four scenarios, the Average Scenario was chosen as the basis for estimating the overall number of electric vehicles in the region by 2040. This scenario accounts for the projected decline in EV sales growth due to weaker federal EV policy under the current administration, while also reflecting the possibility that future administrations may adopt supportive EV policies again.

A forecast was developed to estimate overall growth in the total number of EVs in the Met Council region through 2040 using:

- the Average Scenario's projected EV market share,
- current vehicle registrations in the region, and
- typical fleet growth and salvage rates

Figure 13 shows the results of the forecasting model, and **Table 1** detail the forecasted number of EVs within the Metropolitan Council's seven-county region. In 2040, it was estimated that approximately 1.2 million EVs would be registered in the seven-county region.

Figure 13: Average Scenario EV Adoption Rate

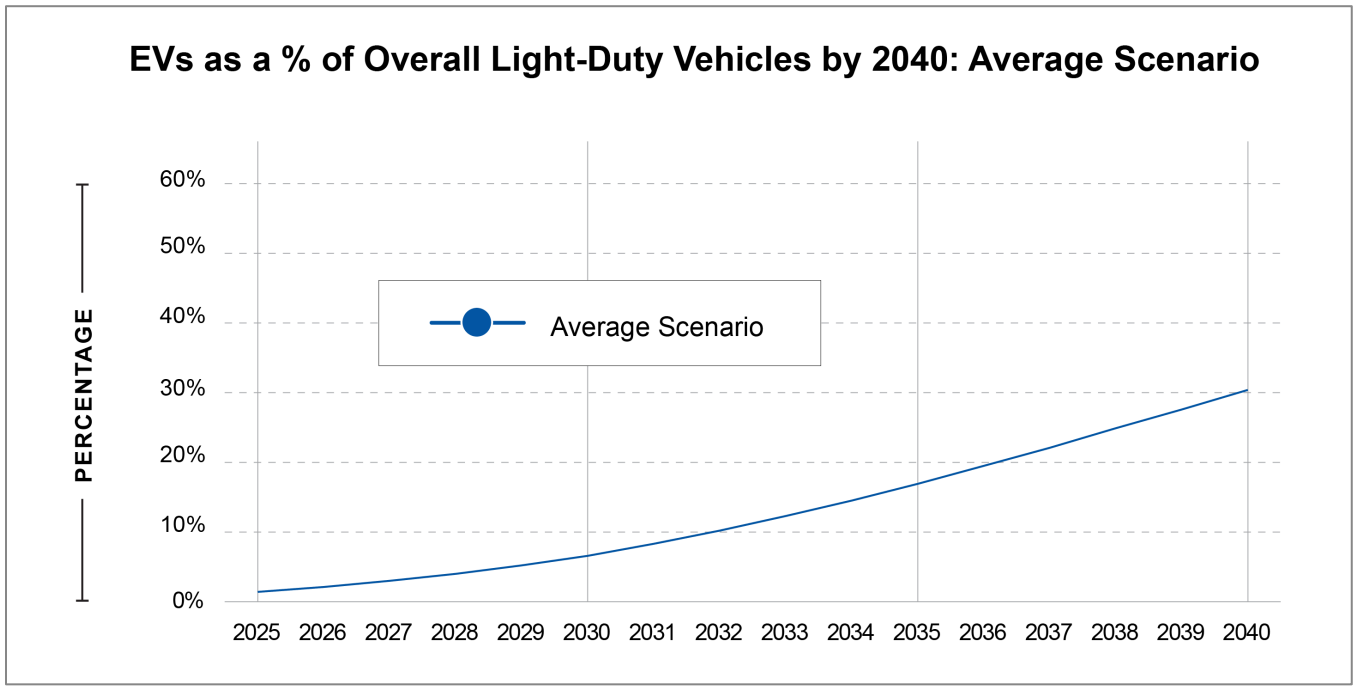


Table 1. Average Scenario Projected EV Adoption Rate and Total Count in Metropolitan Council Region

Year	EV Adoption Rate	Total Number of EVs in the Fleet
2025	1.4%	55,257
2026	2.1%	81,850
2027	3.0%	115,880
2028	4.0%	156,418
2029	5.2%	204,797
2030	6.6%	261,291
2031	8.3%	327,556
2032	10.2%	402,621
2033	12.3%	485,677
2034	14.5%	574,954
2035	16.9%	673,528
2036	19.5%	776,860
2037	22.1%	884,231

Year	EV Adoption Rate	Total Number of EVs in the Fleet
2038	24.9%	995,407
2039	27.6%	1,108,493
2040	30.4%	**1,222,600**

Future Charging Needs

Electric Vehicle Infrastructure (EVI)-Pro Lite was used to determine the total number of charging ports needed for the Met Council region. EVI-Pro Lite is a tool developed by the U.S. Department of Energy's (DOE) National Laboratory of the Rockies (NLR, formerly National Renewable Energy Lab) for use by states and metropolitan statistical areas (MSAs) to estimate EV charging needs. The tool uses data on personal vehicle travel patterns, EV attributes, and charging station characteristics to estimate the quantity and type of charging infrastructure necessary to support the adoption of EVs. Additional information on how the model was developed and the methodology behind its calculations can be found in the documentation for the tool.[70]

EVI-Pro Lite requires several inputs and assumptions to forecast the number of charging ports needed for the region, including:

- Number of registered EVs in the region
- Ride-hail electrification timeline
- Percentage of drivers with access to home charging

Number of Registered EVs in the Region

Using the results of the forecasting model, a total of 1,222,600 EVs are forecasted by 2040 in the Met Council region.

Ride-Hail Electrification

EVI-Pro Lite provides three options for ride-hail electrification: Conservative, Aggressive, and Transportation Network Company (TNC) market share growth. The Conservative and Aggressive options change the rate of EV growth for ride-hail vehicles, and the TNC market share growth option assumes an increase in the size of the ride-hail fleet. For this analysis, the Aggressive option was chosen for ride-hail electrification, given that many ride-hail companies like Uber and Lyft are implementing progressive electrification policies.

Drivers with Access to Home Charging

Access to home charging was estimated based on several driver characteristics, including:

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[70] Alternative Fuels Data Center: Electric Vehicle Infrastructure Toolbox (EVI-X Toolbox)

- Housing type
- Housing tenure[71]
- Housing age
- Household income

Information on driver characteristics was taken from Replica, a data platform that uses third-party data sources, such as mobile phone applications, to provide travel insights. Based on these driver characteristics, the portion of drivers assumed to have access to home charging was determined to be:

- 0% of multi-family residents[72]
- 0% of renters of pre-1925 single family homes
- 80% of owners of pre-1925 single family homes with a household income above $125K
- 20% of owners of pre-1925 single family homes with a household income below $125K
- 80% of owners of post-1925 single family homes
- 25% of renters of post-1925 single family homes

This resulted in an estimated 56% of total drivers in the Twin Cities having access to home charging.

EVI-Pro Lite Results

Using these three inputs, EVI-Pro Lite was used to determine the number of publicly accessible charging ports needed for the Metropolitan Council region.[73] The number of publicly accessible ports provided by EVI-Pro Lite was compared with the number of existing publicly accessible ports to determine the number of additional ports needed in the region. These results are shown in **Table 2** and are broken down by charging type (Level 1, Level 2, and DCFC).

In the Metropolitan Council region, nearly 89% of the need for publicly accessible EV charging is for Level 2 ports. Level 2 ports take several hours to fully recharge a vehicle, but they're less costly to install and operate because they draw less power. They're also typically the least expensive option for drivers, which makes them the most sought-after type of public charging.

Level 1 ports (standard 120V, similar to a household outlet) are the lowest cost to install, but can take more than a day to fully recharge a vehicle. They're best suited to very long dwell times, such as long-term airport parking.

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71 Housing tenure, or whether a housing unit is owner- or renter-occupied, is assumed to affect access to home charging. A higher share of owner-occupied housing units are assumed to have access to home charging compared to renter-occupied housing units.

72 These assumptions are intentionally conservative and may overstate public charging demand in areas where multifamily charging access improves over time.

73 Alternative Fuels Data Center: Electric Vehicle Infrastructure Toolbox (EVI-X Toolbox)

DCFC ports make up roughly 7% of the overall need. DCFC is the most expensive to build and generally the most expensive for drivers, but is critical to a complete EV network because it provides rapid charging (about 30 minutes or less) for quick turnarounds.

Table 2: EVI-Pro Lite Results

Charging Category	Total Number of Publicly Accessible Ports Needed	Number of Existing Publicly Accessible Ports	Number of Additional Publicly Accessible Ports Needed
Level 1	3,810	Unknown[74]	3,810
Level 2	80,002	1,401	78,601
DCFC	6,236	568	5,668

Regional Travel Behavior and Dwell Times

Dwell times and traveler behavior in the region can inform potential EV charger locations and appropriate power levels. Dwell time maps were generated using Replica, a transportation data platform that produces simulated travel behavior data using an activity-based travel demand model built on a combination of location-based services data (e.g., GPS tracks from mobile phones and connected vehicles) and public demographic data. This enables Replica to generate a full-scale synthetic population aligned to American Community Survey (ACS) data at the census tract level and a simulation of a typical day of trips taken by this population. Specifically, the Replica trip data was the source of trip origin and destination locations, the home locations of the trip-takers, household income levels of trip-takers, housing tenure (owner vs. renter) of trip-takers, and housing type (multi- vs. single-family). Replica produces a new weekday model and weekend model for each quarter; the specific dataset used in this analysis represents a typical weekday in 2024 Q4.

One additional dataset, the Metro Regional Parcel Dataset was used to assign a housing age attribute to each household in the Replica database.[75]

Dwell Analysis Assumptions

The dwell analysis is based on several assumptions:

- Multi-family residents will always seek a public charge.
- Renters of pre-1925 single family homes will always seek a charge.

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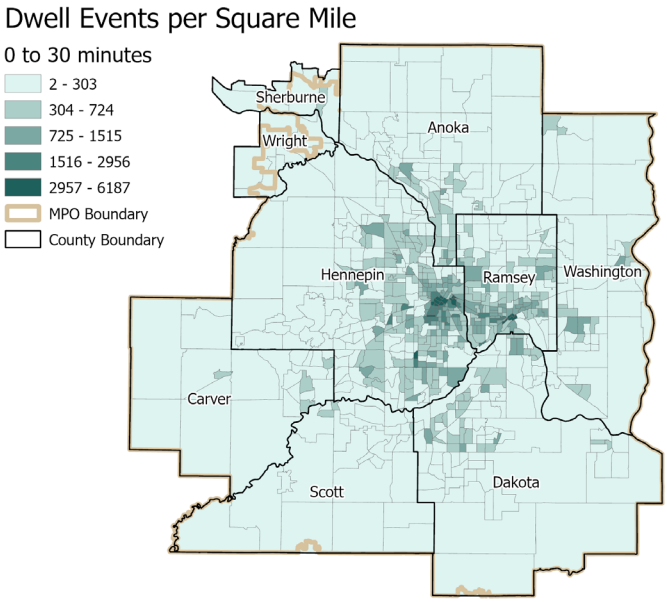
[74] The data sources used to compile existing charging station information did not offer visibility into Level 1 charging availability. No data source systematically tracks Level 1 charging stations, so reliable data on locations was not available.

[75] Metro Regional Parcel Dataset: https://gisdata.mn.gov/dataset/us-mn-state-metrogis-plan-regional-parcels

- Owners of pre-1925 single family homes with a household income above $125K will seek a charge 20% of the time.
- Owners of pre-1925 single family homes with a household income below $125K will seek a charge 80% of the time.
- Owners of post-1925 single family homes will seek a charge 20% of the time.
- Renters of post-1925 single family homes will seek a charge 75% of the time.
- After 150 miles of driving in a day, every driver will seek a charge, regardless of housing profile.

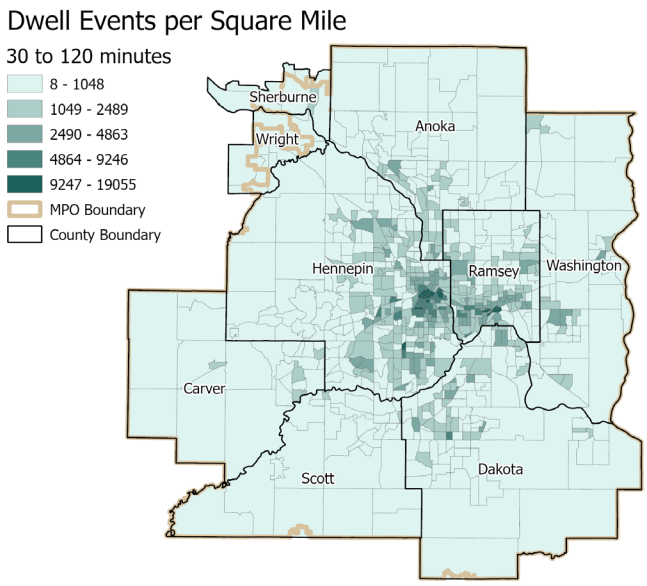
Because census tracts vary in size, all dwell event counts were standardized by calculating a density of dwell events per square mile. All dwell event maps show higher densities in areas with more commercial land use than in residential areas. Downtown Minneapolis and the University of Minnesota have high counts of dwell events across all of the maps. The pattern of short dwell times (0 to 30 min.) and medium dwell times (30 to 120 min.) shown in **Figure 14** and **Figure 15** are very similar, with high counts appearing in downtown Minneapolis and St. Paul, at shopping centers such as those in Maple Grove (including the Costco), Coon Rapids, Edina, St. Louis Park, and St. Anthony, and at large commercial/industrial parks in the Plymouth, Eagan, Eden Prairie area and elsewhere. **Figure 16** is similar, but long dwell events are concentrated at the Minneapolis–Saint Paul International Airport, Downtown St. Paul, as well as a mix of residential, agricultural, industrial, and retail locations in Sherburne and Wright County.

Figure 14. Dwell Times, 30 minutes or less, Twin Cities Metropolitan Planning Organization Area



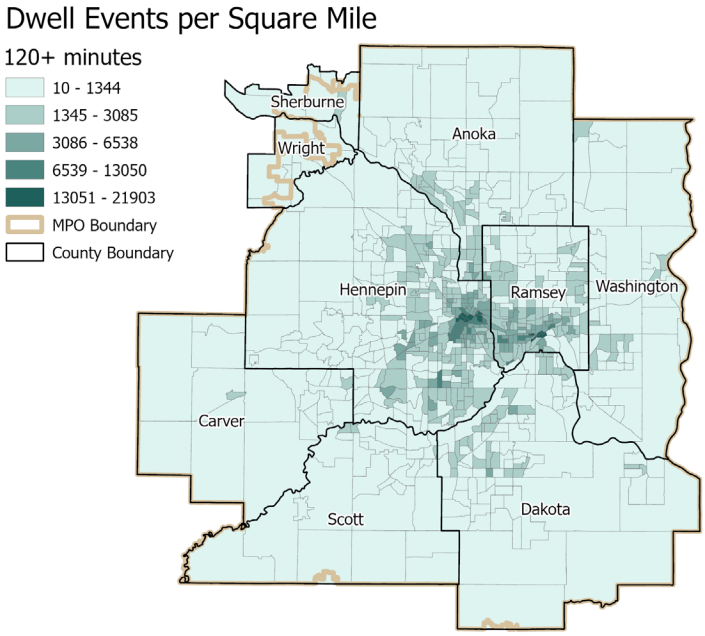
The figure shows normalized dwell times by square mile of 30 minutes or less.

Figure 15. Dwell Times, 30 minutes-2 hours, Twin Cities Metropolitan Planning Organization Area



The figure shows normalized dwell times by square mile between 30 minutes and 2 hours.

Figure 16. Dwell Times, Over 2 hours, Twin Cities Metropolitan Planning Organization Area



The figure shows normalized dwell times by square mile between over 2 hours.

Scaling Charging Needs to Census Tracts

Normalized Charging Demand

To accurately describe charging needs for the Metropolitan Council region by smaller geographies, publicly accessible port counts were scaled down to census tracts. Each tract was given a "normalized" charging demand, or "weight", which reflects each census tract's proportional share of the total dwell events that occurred throughout the seven-county region. Dwell events are used to calculate charging opportunities. To summarize, the following equations were used:

$$Census\ Tract\ \#\ of\ Ports = Normalized\ Demand * Total\ \#\ of\ Ports$$

$$Normalized\ Demand\ (0 < x \leq 1) = \frac{Census\ Tract\ Demand}{Regional\ Demand}$$

For Level 1 and Level 2 charging, the dwell events that counted toward the demand weight include:

- 100% of long dwell events (over 120 minutes)
- 50% of medium dwell events (between 30 and 120 minutes)
- 0% of short dwell events (under 30 minutes)

For all DCFC types, the contributing dwell events were the reverse, which include:

- 100% of short dwell events
- 50% of medium dwell events
- 0% of long dwell events

Land Use Suitability

Each census tract was also evaluated for the presence of suitable land use with a land use and charging type suitability matrix (**Table 3**). Land use data was obtained from the Minnesota Geospatial Commons.[76] A dot in a cell indicates that the land use is suitable for installing that type of EV charger.

[76] Regional Planned Use, https://gisdata.mn.gov/dataset/us-mn-state-metc-plan-pland-land-use

Table 3: Land Use and Charging Type Suitability Matrix

Land Use	Level 1	Level 2	DCFC Low (150 kW)	DCFC Med (250 kW)	DCFC High (350 kW)
Agricultural	Served Privately				
Rural or Large-Lot Residential	Served Privately				
Single Family Residential	✓	✓			
Multifamily Residential	✓	✓			
Commercial, Retail, or Undifferentiated		✓	✓	✓	✓
Neighborhood Commercial		✓	✓	✓	✓
Community Commercial		✓	✓	✓	✓
Regional Commercial		✓	✓	✓	✓
Highway / Convenience Commercial		✓	✓	✓	✓
Rural Commercial		✓	✓	✓	✓
Office, Undifferentiated	✓	✓			
Marina (Commercial)		✓			
Industrial	Served Privately				
Institutional	✓	✓	✓		
Mixed Use	✓	✓	✓		
Multi-Optional Development	✓	✓	✓	✓	✓
Park and Recreation	✓	✓	✓		
Open Space or Restrictive Use	Served Privately				
Rights-of-way	Served Privately				
Railway	Served Privately				

If a census tract contained any of the suitable land uses, it was allowed to contain the respective charging types. To ensure a minimum land area was available for charger installation, it was assumed that approximately 9,700 square feet or 0.2 acres (900 square meters) of suitable land use must be present within a census tract to assign a given charging type. If suitable land uses were not present in a tract for a given charging type, that tract's demand was adjusted to zero prior to calculating the tract's normalized demand. This ensured that the normalized demand weights summed to one within each charging type.

The next step was to assign to each tract a proportional number of charging ports from each charging type based on the normalized demand for that census tract. Because the proportional allocation resulted in fractional numbers of ports, the numbers of ports were then rounded to whole numbers.

Finally, the rounded values were corrected so that the final regional sum matched the target regional demand. This involved adding or subtracting a single port to each of a small number of census tracts to correct the overall rounding error.

Preliminary Results

Using this methodology, **Figure 17**, **Figure 18**, and **Figure 19** where charging needs are most concentrated in the seven-county region by charging level **Figure 20**, **Figure 21**, and **Figure 22** further break down DCFC ports needed by power level (low, medium and high). These figures are designed to show trends or relative levels of charging needs by acre. Across nearly all charging levels (Level 1, Level 2 and DCFC), the highest density of ports needed per acre occurs near downtown Minneapolis, Saint Paul and the surrounding census tracts.

Figure 17: Level 1 Charging Needs by Census Tract, Standardized by Area of Tract in Square Miles

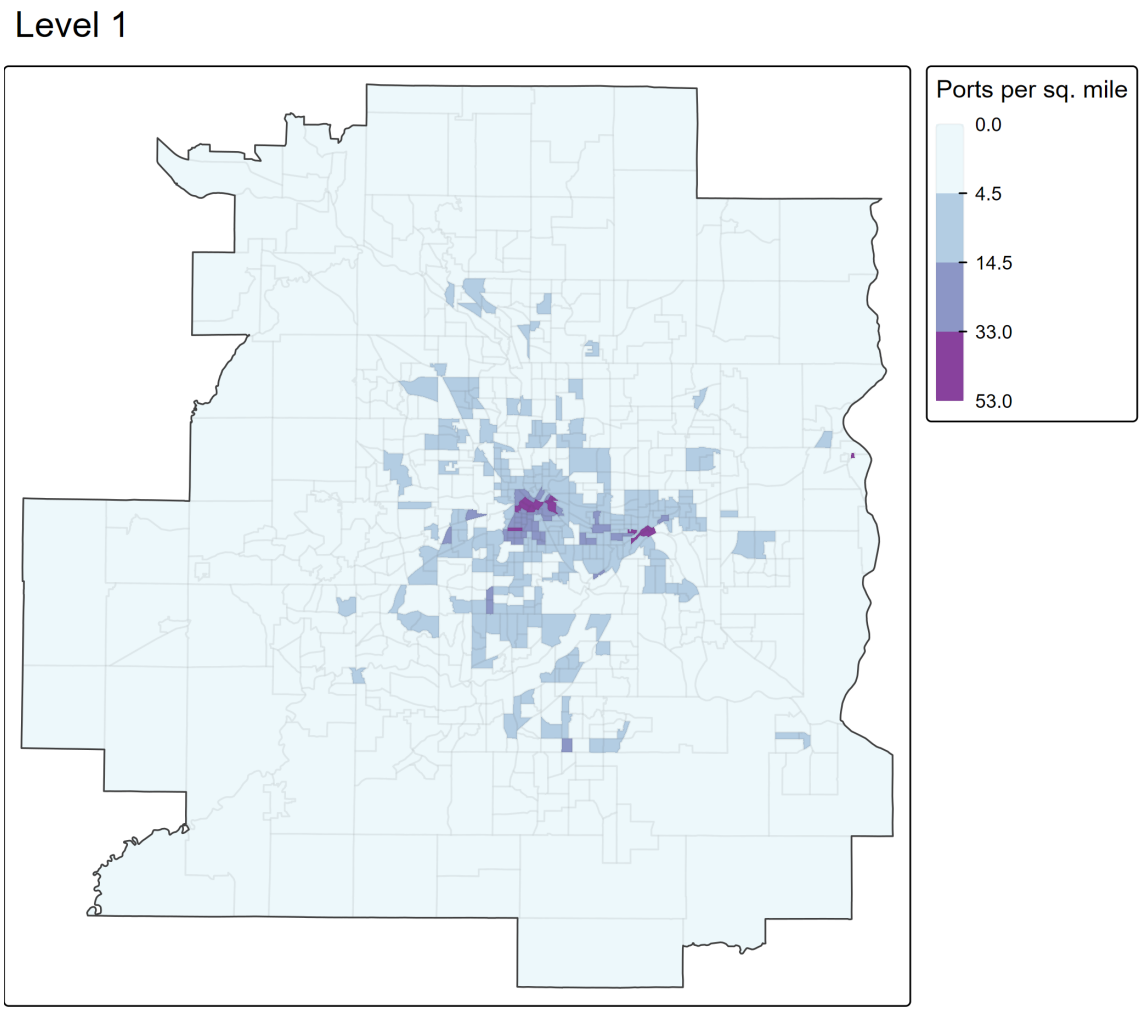


Figure 18: Level 2 Charging Needs by Census Tract, Standardized by Area of Tract in Square Miles

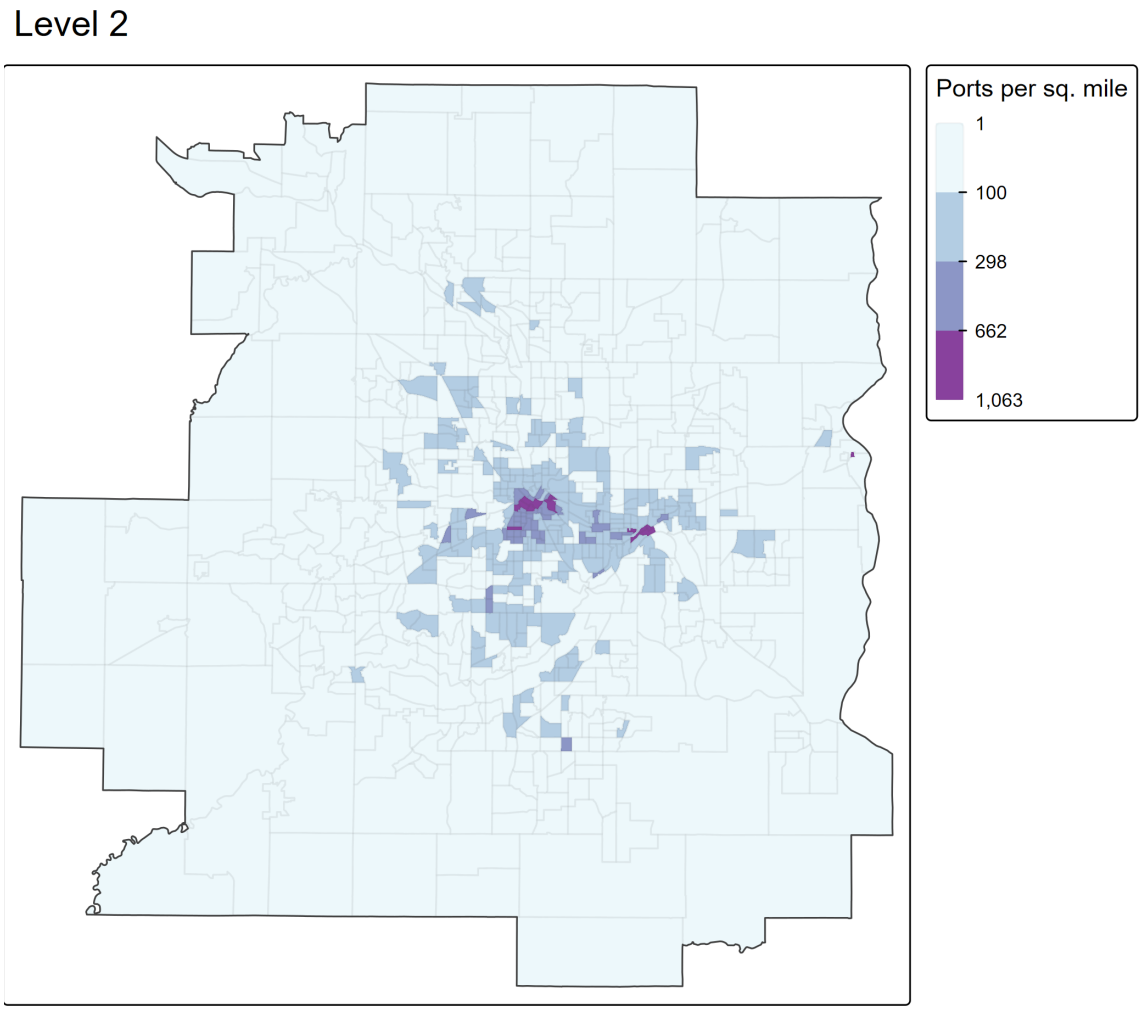


Figure 19: DCFC (all power levels) Charging Needs by Census Tract, Standardized by Area of Tract in Square Miles

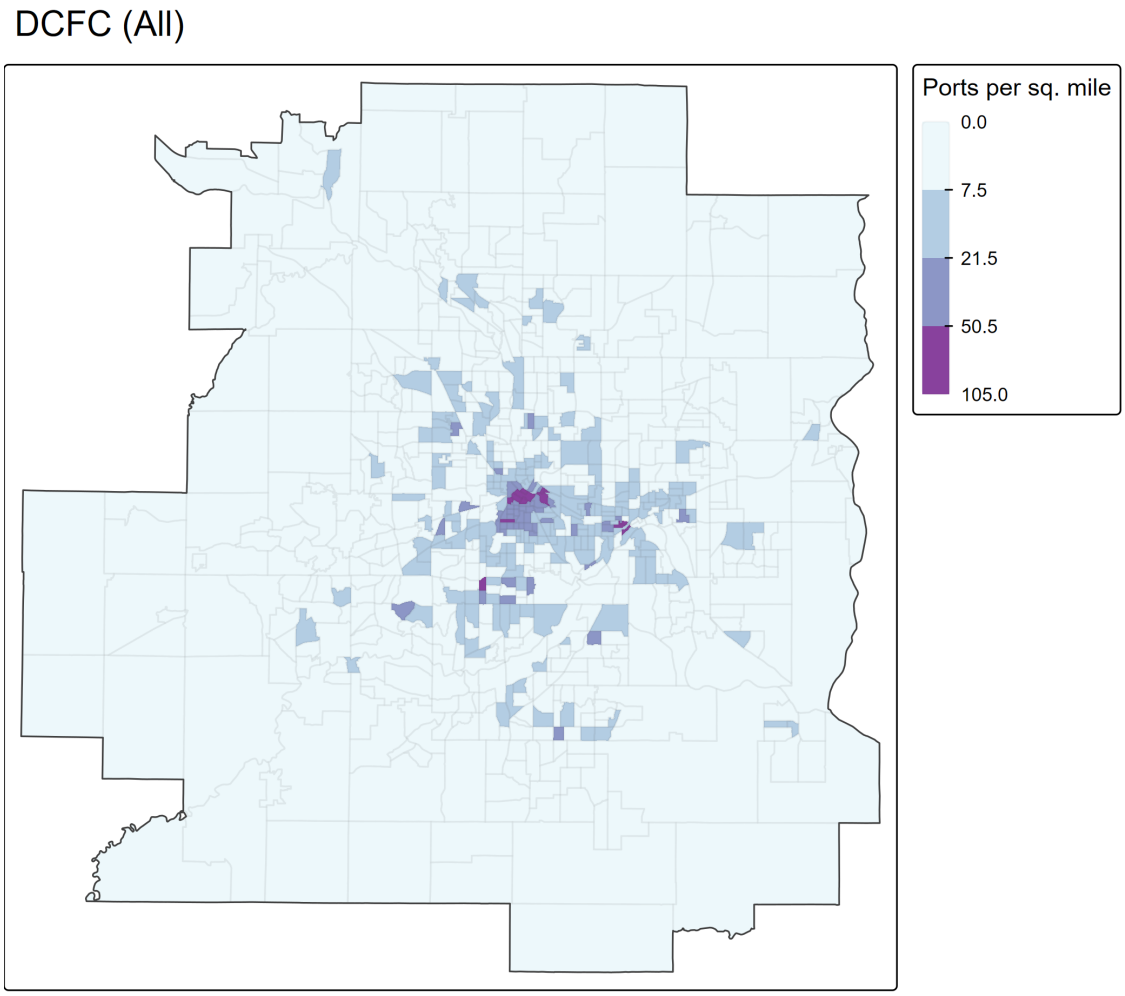


Figure 20: DCFC (High-powered) Charging Needs by Census Tract, Standardized by Area of Tract in Square Miles

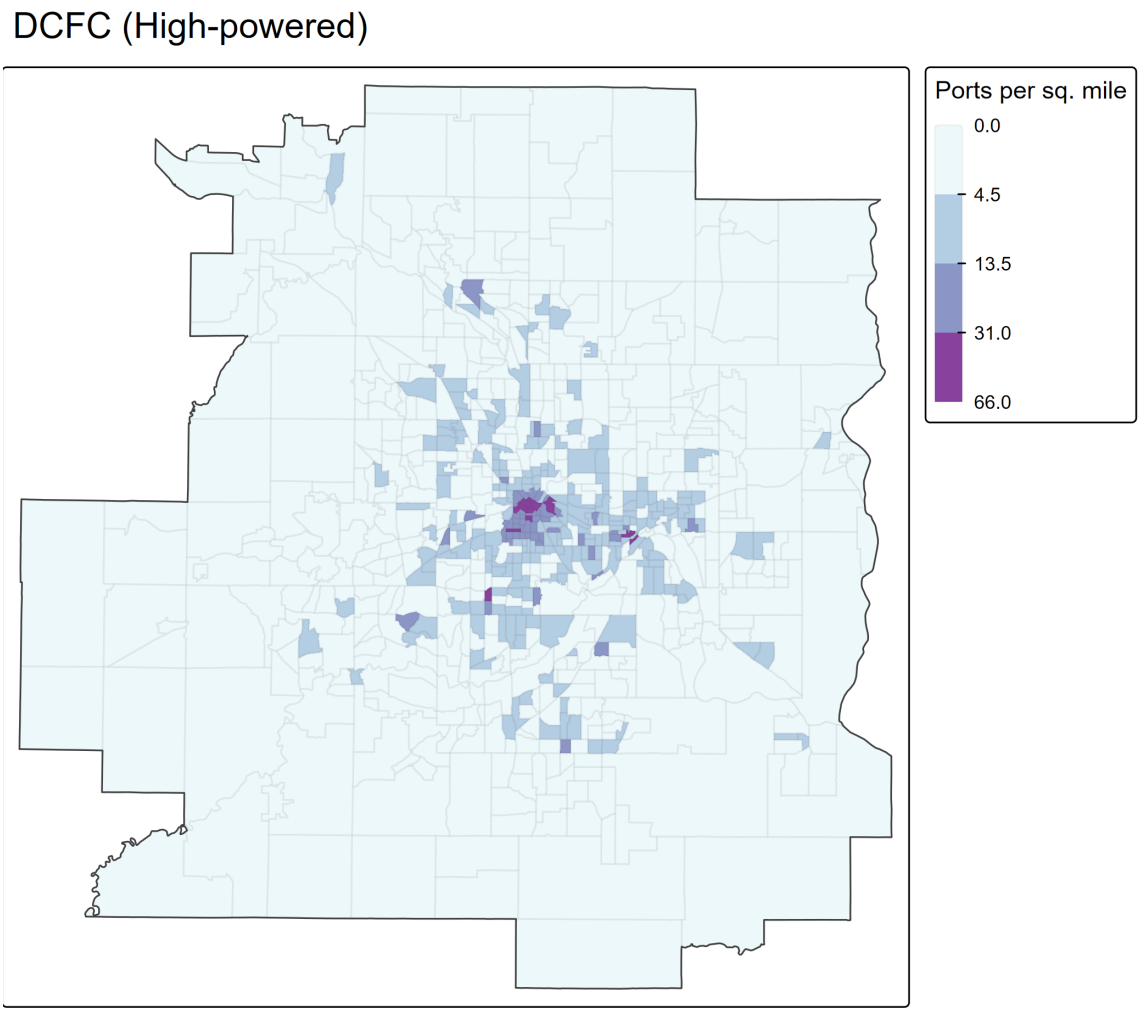


Figure 21: DCFC (Medium-powered) Charging Needs by Census Tract, Standardized by Area of Tract in Square Miles

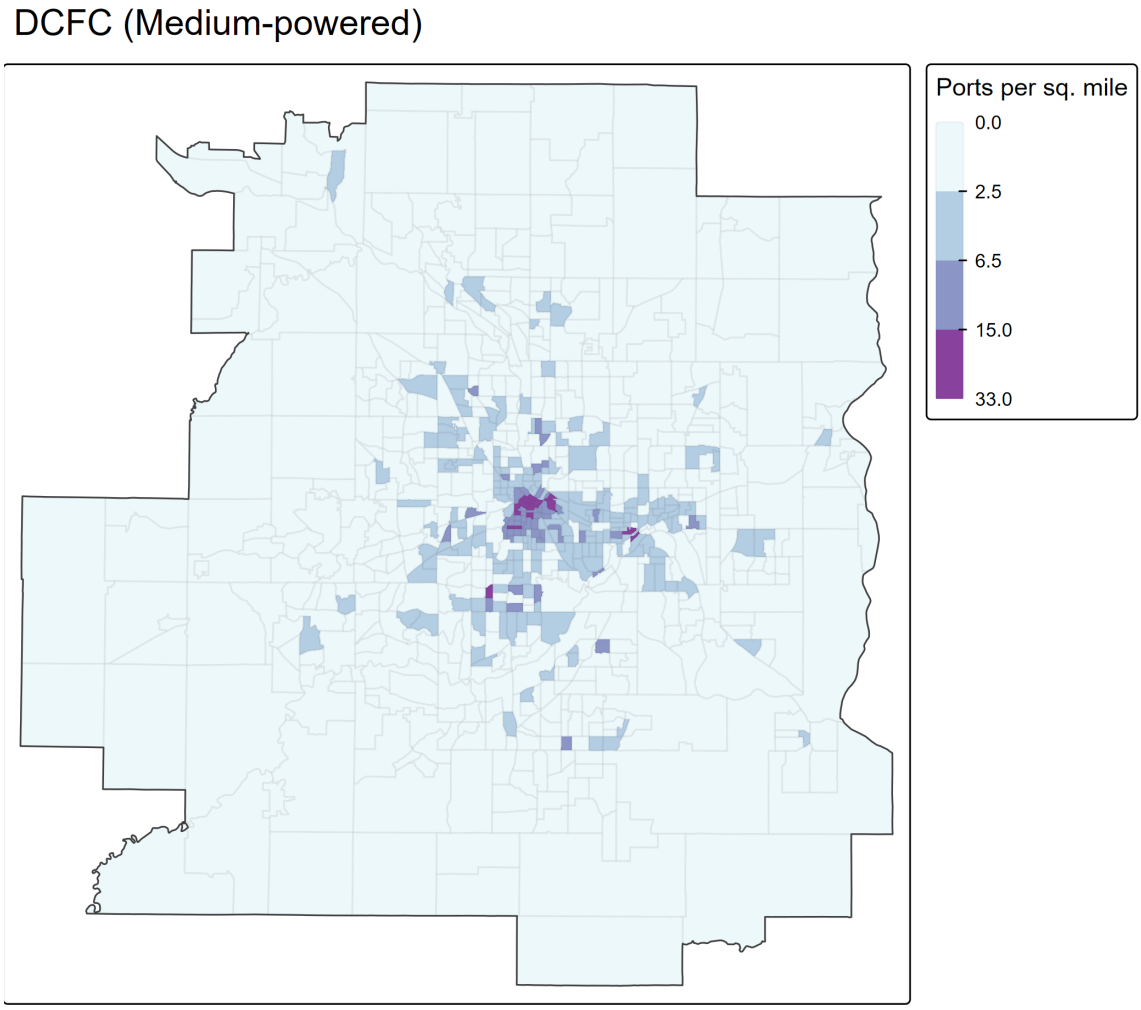
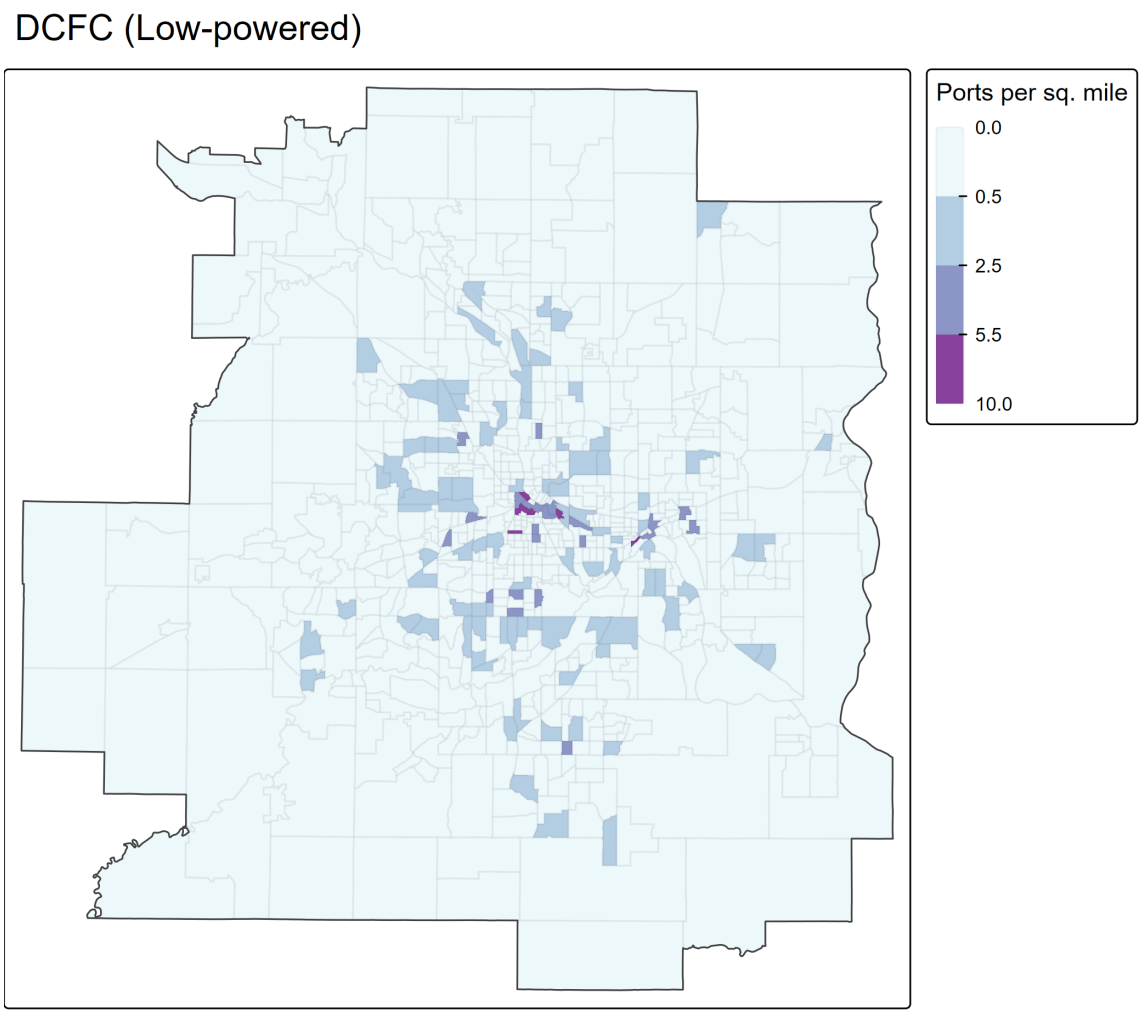


Figure 22: DCFC (Low-powered) Charging Needs by Census Tract, Standardized by Area of Tract in Square Miles



These results can be explored in further detail through the accompanying interactive web map, which illustrates charging needs by power level per census tract.

Future Regional Charging Needs Summary

Based on the model results, approximately 1.2 million EVs are expected in the region by 2040. These vehicles will require over 89,000 publicly accessible charging ports across all three charging types (Level 1, Level 2, and DCFC) with Level 2 making up the majority of required ports (78,601). An analysis of the existing and planned publicly available charging ports showed that the region currently has 2,083 charging ports. This means that significant investment will be required both publicly and privately to meet the future charging demand. Charging demand mapped to display charging needs at the census tract level showed that the most acute need for charging infrastructure exists near downtown urban areas in the Metropolitan Council region based on a numerical analysis of dwell times for each census tract.

Prioritizing Locations for Public EV Charging Infrastructure

Regional Goals and Charging Network Priorities

The Metropolitan Council established regional goals in its 2050 Transportation Policy Plan (TPP). Early in the analysis, the project team recommended charging network priorities aligned with relevant TPP goals and policies, which are listed in **Table 4.** The goals/policies and priorities were designed to guide the development of the prioritization framework.

Based on input from the Project Management Team (PMT), Technical Advisory Committee (TAC), and community stakeholders, the project team produced a final set of charging network priorities.

Table 4. Regional Goals/Policies and Charging Network Priorities

TPP Goal/ Policy	Goal/Policy Description	Charging Network Priority	Charging Network Priority Justification
We lead on addressing climate change (goal)	We have mitigated greenhouse gas emissions and have adapted to ensure our communities and systems are resilient to climate impacts	Site chargers at high traffic locations	This priority reflects the need to maximize utilization of public charging infrastructure by supporting charging where demand is highest
Our region is equitable and inclusive (goal)	Racial inequities and injustices experienced by historically marginalized communities have been eliminated, and all people feel welcome, included, and empowered	Prioritize charging for residents without access to home charging	This priority addresses disparities in EV access, particularly for renters, residents of multi-family housing, and lower-income households who may be less able to install private charging
Our communities are healthy and safe (goal)	All our region's residents live healthy and rewarding lives with a sense of dignity and well-being.	Support air quality improvements	This priority recognizes the public health benefits of reducing exposure to traffic-related air pollutants in areas with higher concentrations of emissions.
Ensure the region has funding to achieve our goals (policy)	A key action under this policy is to consider equity and geographic balance principles when allocating federal funds. Ensure all community types have adequate opportunity to	Consider geographic coverage	This priority ensures that charging investments are not limited solely to high-density urban areas and that rural areas are included

TPP Goal/ Policy	Goal/Policy Description	Charging Network Priority	Charging Network Priority Justification
	access regional transportation funding.		in the regional charging network.

Together, these regional goals and charging network priorities establish the foundation for the prioritization framework. To operationalize the priorities, the analysis linked them to measures described in the next section.

Prioritization Measures

Each regional goal was translated into one or more quantitative measures at the census tract level. **Table 5** summarizes the relevant regional goals/policies, charging network priorities, and measures. This section of the report describes each measure, associated data source(s), and the analytical approach. Some measures were analyzed differently for Level 2 charging and DCFC. Details about the differences are included in the sub-section below about the individual measures.

Table 5. Regional Goals/Policies, Charging Network Priorities, and Measures

Regional Goal/Policy	Charging Network Priority	Measure
Addressing Climate Change	Site chargers at high traffic locations	**Future Public Charging Needs:** Estimated number of charging ports needed to support forecasted publicly accessible EV charging in 2040 by census tract
Equitable & Inclusive	Prioritize charging for residents without access to home charging	**Multi-family Housing Trips:** Estimated number of trips associated with multi-family housing. Trips aggregated at the census tract level.
		Low-Income Trips: Estimated number of trips taken by residents with household income <$75K. Trips aggregated at the census tract level.
Healthy & Safe	Support air quality improvements	**Traffic-Specific Air Pollutants:** Concentration of traffic-specific air pollutants in census tract
Regional Balance	Consider geographic coverage	**Rural Trips:** Estimated number of trips to destinations in census tracts in Rural Town Centers

Future Public Charging Needs

Measure: Estimated number of charging ports needed to support forecasted publicly accessible EV charging in 2040 by census tract

This measure estimates future gaps between projected EV charging demand and existing or planned public charging supply. Charging stations were determined to be "publicly accessible" if they were labeled as "public" in the Atlas Public Policy data, Alternative Fuels Data Center data, or PlugShare data. Charging stations at workplaces and car dealerships were only included if they were labeled as available to the public. Private or limited access charging stations at any location were not included. Separate analyses were conducted for Level 2 chargers and DCFC.

Analyzing unmet demand involved four steps:

1. Inventory existing and planned public charging stations
2. Forecast future EV market penetration
3. Estimate future charging demand based on travel behavior and vehicle adoption
4. Identify unmet charging demand by census tract.

Additional details about the four steps in the methodology for analyzing future public charging needs are available in the Estimating Public EV Charging Needs chapter of this report.

Multi-Family Housing Trips

Measure: Estimated number of trips associated with multi-family housing at the census tract level

This measure captures areas where residents are less likely to have access to private charging infrastructure.

To analyze multi-family housing trips, the project team counted simulated trips associated with multi-family housing at the census tract level using Replica data. Replica is a transportation data platform that produces simulated travel behavior data using an activity-based travel demand model built on a combination of location-based services data (e.g., GPS data from mobile phones and connected vehicles) and public demographic data. This combination enables Replica to generate a full-scale synthetic population aligned to American Community Survey data at the census tract level and a simulation of a typical day of trips taken by people who live in multi-family housing. With this data structure, demographic and household characteristics of simulated trip takers are available for analysis. Specifically, the Replica trip data was the source of trip origin and destination locations, the home locations of the trip-takers, and housing type (multi- vs. single-family). Replica produces a new weekday model and weekend model for each quarter; the specific dataset used in this analysis represents a typical weekday in Q4 2024.

The analysis filtered the Replica-simulated daily trip table to include only trips taken by residents of multi-family housing. Then, the analysis linked the home and trip destination locations to census tracts. Two measures were created based on the filtered dataset—one for Level 2 charging and another for DCFC. For Level 2 charging, the analysis tallied the total number of trips for each census tract that either had a destination in that tract or were taken by an individual with a home in that tract. For DCFC, the analysis counted only trips with a destination within the census tract. Simulated trips originating at

multi-family housing were not analyzed for DCFC because dwell time at home tends to be longer, and longer dwell times are better suited for Level 2 chargers.

Low-Income Trips

Measure: Estimated number of trips taken by residents with a household income of $75,000 or less annually at the census tract level

This measure serves as a proxy for travel activity among lower-income households that may face greater barriers to installing at-home charging. Installing a home charger can be cost-prohibitive for low-income households. Additionally, many low-income households are renters, and securing the property owner's support to install a charger can be difficult.

To analyze low-income trips, the analysis counted trips associated with households making $75,000 or less annually at the census tract level using Replica data. As described above for multi-family trips, the analysis filtered the Replica-simulated daily trip table to include only trips taken by residents of lower-income households. Then, the analysis linked the home and trip destination locations to census tracts. Two measures were developed based on this filtered dataset—one for Level 2 charging and another for DCFC. For Level 2 charging, the analysis tallied the total number of trips for each census tract that either had a destination in that tract or were taken by an individual with a home in that tract. For DCFC, the analysis tallied trips with a destination in the census tract. Simulated trips originating from low-income households were not analyzed for DCFC because dwell time at home tends to be longer, and longer dwell times are better suited for Level 2 chargers.

Traffic-Specific Air Pollutants

Measure: Concentration of traffic-specific air pollutants in census tract

This measure identifies areas where increased EV adoption and charging availability could yield air quality and public health benefits. The impact of EVs on traffic-specific air pollutants is variable and, in some cases, could be negligible, especially when EV adoption levels are still relatively low. For example, if a census tract has high traffic-specific air pollution, but a disproportionately high level of heavy truck traffic, EV charging for light-duty vehicles may not significantly improve air quality. In other cases, EVs can significantly improve local air quality.

To analyze traffic-specific air pollutants, the project team analyzed the MNRISKS dataset provided by the Minnesota Pollutant Control Agency (MPCA). MNRISKS was recommended by the MPCA as the best available data. MPCA's MNRISKS model uses reported emissions, air dispersion modeling, and health benchmarks to determine cumulative pollution risks. It includes air pollution from permitted facilities, traffic, residential and commercial heating, and other sources. These data help identify census tracts with higher-than-average air pollution that traffic travels through for this analysis.

There are several limitations of using the MNRISKS dataset in this analysis. First, it was released in 2017 and will be updated later in 2026. Second, the traffic-related air pollutants it captures include Particulate Matter 2.5, Polycyclic Aromatic Hydrocarbons (PAHs), Benzene, and Butadiene. It does not capture all the criteria pollutants associated with transportation (e.g., carbon monoxide, nitrous oxide). The Metropolitan Council should explore updating this measure with new data or data from an alternative source prior to the Regional Solicitation. Newer data may show different results based on cleaner fuel technologies, changes in vehicle miles traveled, and other trends from the last decade.

In the future, the Metropolitan Council could request the most recent National Emissions Inventory (NEI) submittal prepared by the MPCA and scale the results down to the census tract level. Alternatively, the Metropolitan Council could use national-scale emissions factors from MOVES, or MPCA's county-scale emissions factors from the NEI database, and multiply those against tract-level travel volumes from Replica to estimate total emissions for each criteria air pollutant. Additionally, the Metropolitan Council could study and identify areas where electrification efforts for heavy duty vehicles could have significant local air quality benefits, (e.g. near railyards or transfer stations).

Rural Trips

Measure: Estimated number of trips to destinations in census tracts in Rural Town Centers

This measure supports geographic coverage by identifying rural communities to include in the regional charging network.

For this analysis, the project team started with Rural Town Center (RTC) delineations from the Imagine 2050 Community Designations. The Metropolitan Council assigns a community designation to each city and township based on prevailing characteristics, which indicate the overall state of current and anticipated development and the regional issues faced by that city or township. RTCs have lower densities than other community designations within the region. The analysis overlaid the RTCs with the census tracts and tallied the number of trips (using the same Replica daily trip table described above for the multi-family and low-income measures) to each census tract that had a destination within an RTC boundary.

Combining Prioritization Measures

Each measure was scored and normalized. To normalize the scores, the analysis scaled each measure's results to a consistent range of 0 to 1 (0 being the tract with the minimum value for the measure and 1 being the maximum). This provided a starting point for combining the measures into one score for each tract.

Weights were assigned to each measure based on:

- Best practices for charger siting
- Prior discussions with the PMT and TAC.
- Results from community engagement activities, including a public survey (225 respondents) and stakeholder interviews (13 participants). See the Project Engagement Report for details.

The project team shared a draft set of weights for prioritizing investment in Level 2 chargers and DCFCs:

Future public charging needs (Draft weight: 30%)

This measure identifies census tracts that are expected to have the highest EV traffic in the region. These locations have the greatest potential to reduce GHG emissions from light-duty vehicles by supporting EV adoption, which is a priority for the Metropolitan Council. However, private developers will also prioritize these locations because of their revenue potential. It was initially set at 30% of the combined prioritization score to function as a driving factor in prioritizing locations for public investment but avoids over-prioritizing areas where the private sector will install chargers. This aligned with feedback from the PMT, TAC, and community engagement on earlier tasks of the analysis.

Multi-family housing trips (Draft weight: 25%) and Low-income trips (Draft weight: 15%)

In early discussions about the analysis, the PMT and TAC indicated that increasing publicly available charging for residents without access to home charging is a priority. Community engagement also identified this as a top priority. The multi-family housing trips measure identifies census tracts with higher concentrations of trips by drivers who live in multi-family housing, and the low-income trips measure identifies census tracts with higher concentrations of trips by low-income households. Both types of drivers face greater barriers to installing home chargers. By initially setting these measures at a combined weight of 40%, they served as the central driver of the prioritization approach.

Traffic-specific air pollutants (Draft weight: 20%)

Some members of the PMT and TAC indicated that addressing air quality was a priority; however, it did not emerge as a top priority compared to other measures. Additionally, EV charging is just one of many strategies that can improve air quality in the region, and the localized air quality benefits of EV adoption and charging may be limited in areas where heavy-duty vehicles account for a significant share of emissions. For these reasons, the traffic-specific air pollutant measure initially accounted for 20% of the prioritization score. This weighting allowed air quality and public health to meaningfully influence the prioritization approach, without overstating the impact of EV charging in traffic-specific air pollution.

Rural trips (Draft weight: 10%)

While geographic coverage did not emerge as a top priority in feedback from the PMT, TAC, or community engagement, the project team included this measure to avoid prioritizing exclusively higher-density urban areas. Rural communities often have fewer public charging options, travel longer distances between destinations, and would benefit from additional investment in public charging. The rural trips measure was initially weighted at 10% to acknowledge the importance of regional coverage while maintaining a primary focus on future public charging needs, multi-family housing trips, and low-income trips.

Feedback on the draft weighting recommendations

Upon review of the draft weighting recommendations, the PMT recommended decreasing the weight of the future public charging needs measure and increasing the weight of the multi-family trips measure to emphasize access for residents without charging access at home. The TAC recommended treating the weights for Level 2 charging and DCFC differently to account for their different uses. Level 2 chargers support longer charging sessions at work, home, or community destinations, while DCFCs are more often used to support long-distance trips. Based on this feedback, the project team decreased the weight of the future public charging needs measure and increased the weight of the multi-family trips measure for the Level 2 and DCFC prioritization, but to different degrees. Smaller adjustments to Level 2 and DCFC prioritization were made to low-income trips and traffic-specific air pollutants.

Table 6 lists the final weights for the measures that led to prioritized public investment locations for Level 2 charging and DCFC.

Table 6. Weighted Measures for Prioritizing Level 2 and DCFC Charging Investment

Regional Goal/Policy	Charging Network Priority	Measure	Draft Weight	Final Level 2 Weight	Final DCFC Weight
Addressing Climate Change	Site chargers at high traffic locations	**Future Public Charging Needs:** Estimated number of charging ports needed to support forecasted public EV charging in 2040 by census tract	30%	**15%**	**25%**
Equitable & Inclusive	Prioritize charging for residents without access to home charging	**Multi-family Housing Trips:** Estimated number of trips associated with multi-family housing at the census tract level	25%	**45%**	**40%**
		Low-Income Trips: Estimated number of trips taken by residents with household income <$75K at the census tract level	15%	**15%**	**10%**
Healthy & Safe	Support air quality improvements	**Traffic-Specific Air Pollutants:** Concentration of traffic-specific air pollutants in census tract	20%	**15%**	**15%**
Regional Balance	Consider geographic coverage	**Rural Trips:** Estimated number of trips to destinations in census tracts in Rural Town Centers	10%	**10%**	**10%**

Prioritized Locations for Public EV Charging

Composite scores were calculated separately for Level 2 and DCFC. Census tracts were ranked from highest to lowest priority based on their composite scores. The results are available as an interactive map, and the top 100 census tracts for each charger type are shown in Figures 9 and 10.

Figure 23 and **Figure 24** show the geographic distribution of the prioritization process's final results. The top 10 priority locations for Level 2 chargers and DCFCs are relatively evenly spread across the seven-county metro area, with concentrations in areas with higher population density, closely resembling the maps of the future public charging needs, multi-family trips, and low-income trips because of their significant weights in the prioritization approach.

Figure 23. Priority Locations for Public Investment in Level 2 Charging Stations Based on Composite Scores

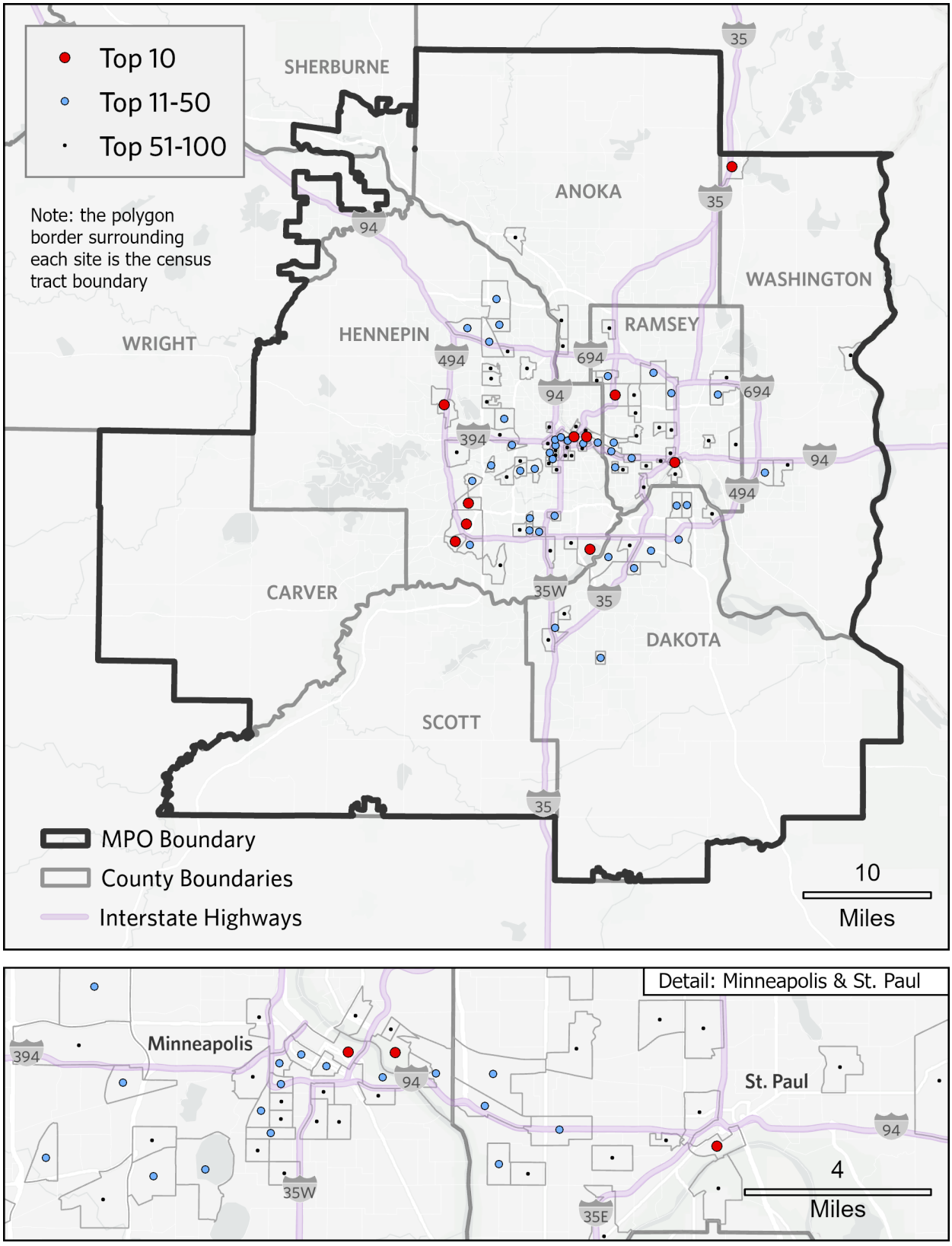
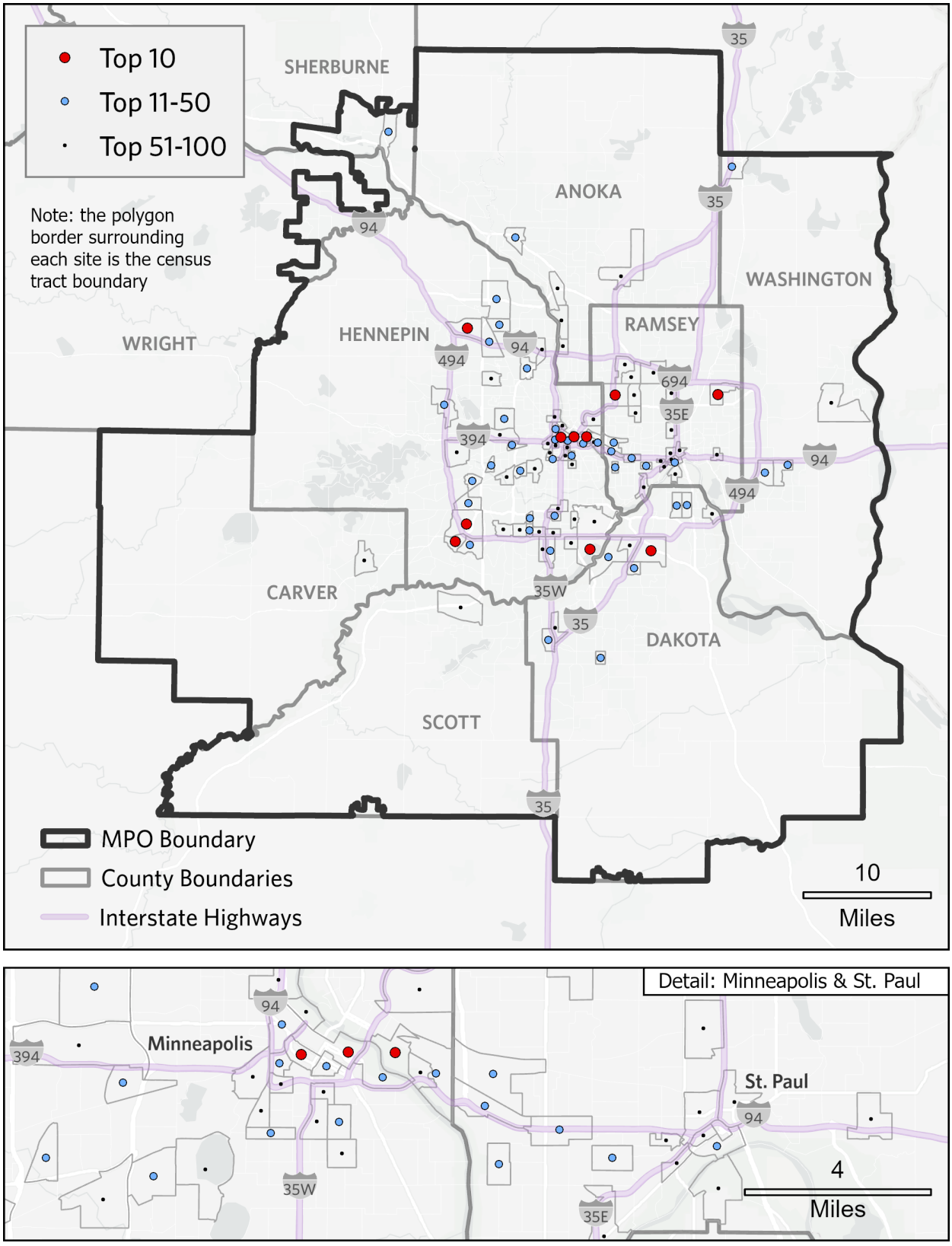


Figure 24. Priority Locations for Public Investment in DCFC Based on Composite Scores



Recommended Next Steps

Refine and update prioritization measures prior to releasing the Regional Solicitation in 2028, including incorporating updated air quality data, revised EV adoption forecasts, medium- and heavy-duty EV charging needs, shared mobility hub locations, and improved information on planned and existing EV charging station locations in the next 1-2 years.

Use the prioritization results to inform Regional Solicitation project selection, particularly for the new EV charging infrastructure funding category, in combination with site feasibility, ability to comply with Title 23 requirements, and other considerations in the application process. Specifically, the interactive map developed based on this analysis will go through a formal approval process and will be used with other scoring factors to select projects. It will be a substantial part of the score.

Coordinate with cities, utilities, and other public agencies to align local charging initiatives with the identified priority census tracts in the long term.

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