metroplan orlando
A REGIONAL TRANSPORTATION PARTNERSHIP

Electric Vehicle (EV) Readiness Study

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1 Introduction

The popularity of electric vehicles (EVs) has increased significantly in recent years. However, one of the main barriers to adoption is where the vehicles can be charged. The development of this Plan occurs at a time when EVs are trending and being adopted throughout the MetroPlan Orlando region, the country, and world. In 2021, there were about 11,271 registered EVs within the MetroPlan Orlando region, representing approximately 0.5% of the 2.2 million registered vehicles. However, various forecasts anticipate EV adoption to range from 5 - 30% of total vehicles by 2035.

The Electric Vehicle Readiness Plan will provide a regional approach for supporting current and future EV drivers traveling within the MetroPlan Orlando planning area. The information from this plan will assist in competing for EV implementation funding and make recommendations for the region and local jurisdictions to consider in designing and implementing programs to facilitate adoption of EVs. **Appendix A** provides a listing of EV terminology and acronyms that are described within this plan.

1.1 ELECTRIC VEHICLES

The term “electric vehicle” describes any vehicle powered by one or more electric motors for propulsion. There are various types of electric vehicles:

Battery Electric Vehicles (BEVs): These vehicles operate only on an electric battery and are also known as "all-electric vehicles". BEVs are powered only by electricity and are charged by an external power source. BEVs have a very large battery and can travel between 150 and 400 miles on a single charge[1]. Some popular models of BEVs include Tesla Model 3, Nissan Leaf, and Rivian delivery vans.

Plug-In Hybrid Electric Vehicles (PHEVs): These vehicles have an electric battery that operates an electric motor in addition to a gasoline tank that fuels a gasoline motor. The electric battery can be plugged in to recharge and the gas tank can be refilled. PHEVs consume 14 - 47% less fuel than conventional vehicles when their batteries are fully charged[2]. Using just the battery and electric motor PHEVs can travel between 20 and 40 miles on a single charge[1], but in the absence of electricity, PHEVs can also operate on gasoline. Some popular models of PHEVs include Chevrolet Volt, Chrysler Pacifica, and Ford Fusion Energi.

Hybrid Electric Vehicles (HEVs): These vehicles have an electric battery that operates an electric motor and a gas tank that fuels a gasoline motor. The gas tank can be refilled, but the electric battery cannot be plugged in to charge. Instead, the battery recharges through regenerative braking – converting the kinetic energy of a car into electric energy when braking. The battery is typically smaller than the battery for PHEVs. Some popular models of HEVs include Toyota Prius and Ford Maverick.

Fuel Cell Electric Vehicles (FCEVs): These vehicles use hydrogen to power an electric motor. They are not very common for use as a personal vehicle but are gaining traction for commercial uses such as buses and long-haul trucks. Similar to gasoline powered vehicles, FCEVs have a tank that is filled with hydrogen at a centralized station (similar to a gas station).

[1] Alternative Fuels Data Center: Electric Vehicles. (n.d.). *Electric vehicles*. Retrieved January 4, 2023, from https://afdc.energy.gov/vehicles/electric.html.
[2] Charge Together Fleets. (2020, April 17). *Electric vehicles introduction*. Retrieved January 4, 2023, from https://fleets.chargetogether.org/article/introduction/. This is the main source of information, unless otherwise noted.

Zero-Emission Vehicles (ZEVs): ZEVs do not emit exhaust gas or other harmful pollutants from the onboard source of power during vehicle operation. BEVs, PHEVs, and FCEVs qualify as ZEVs.

For the purposes of the MetroPlan Orlando EV Readiness Study, the term EVs will refer collectively to Battery Electric Vehicles (BEVs) and Plug In Hybrid Electric Vehicles (PHEVs).

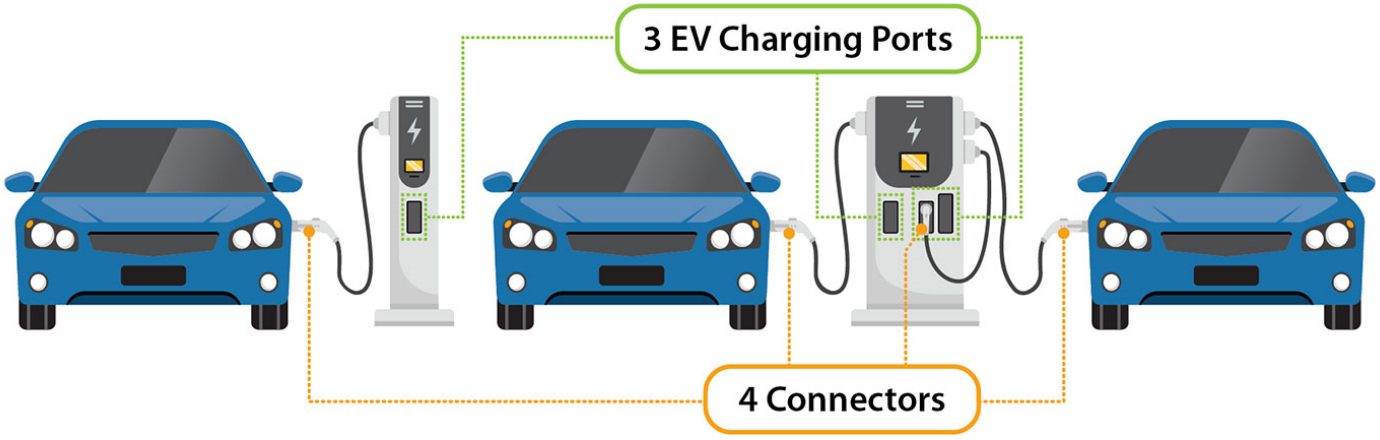
1.2 CHARGING INFRASTRUCTURE

EVs charge by plugging a cable into a power source to allow for the movement of electrical current. At its most basic form, an EV can be charged by plugging into a standard wall outlet. However, more sophisticated charging stations can provide faster charging for vehicles.

The equipment used to charge EVs is known as **Electric Vehicle Supply Equipment (EVSE)**. EVSE allows for the transfer of energy between the electric utility power and the EV. EVSE includes EV charge cords, charge stands (residential or public), attachment plugs, vehicle connectors, and protection. The vendors who supply EVSE are known as **Electric Vehicle Service Providers (EVSP).** EVSP deliver end-to-end EV charging, handling charging station installation, operations and maintenance.

Several terms are used to describe EV charging stations. A charging station is a location where there may be several chargers available. A charger is the equipment used to charge a vehicle. One charger may have multiple ports, used to distribute the power available to the charger between multiple vehicles. For example, in the example shown in **Figure 1-1**, the charger on the right has two ports which could distribute 150 kWh between the two vehicles, for example 75 kWh to each vehicle. Each charger may have multiple connectors, for different vehicle types. Only one connector is used at a time.

Figure 1-1. Charging Stations, Ports, and Connectors



Source: Alternative Fuels Data Center

There are different types of chargers that charge EVs at different speeds. EVs can charge at three “levels”, each of which carries a different amount of electricity, measured using kilowatt-hours (kWh). Simply stated, the larger the kWh, the faster electricity is refueling the EV.

Level 1: Can be publicly available but is frequently associated with at home charging using standard wall outlets. Provides a slow charge (generally only 3 5 miles of range per hour of charge).

Level 2: Generally found at public charging stations but can be installed in residential settings. Provides a moderate charge (generally 12 50 miles per hour of charge).

Level 3: Known as DCFC (direct current fast charging) equipment, it typically only available at public charging stations. Provides a fast charge (generally 75 300 miles per hour of charge).

As charging equipment has developed, different charging connectors have emerged from different vehicle manufacturers due to a lack of regulatory standards as well as proprietary technologies. This results in needing multiple connectors at charging stations. Many of the largest automakers have pledged to convert to the Tesla Supercharger standard for DCFC starting in 2025, although some 2024 vehicles can use adapters for the Tesla Supercharger standard[3].

1.3 IMPACTS OF ELECTRIC VEHICLES

1.3.1 ELECTRIC VEHICLE WEIGHT

Based on the Automotive Trends Data collected by the Environmental Protection Agency for 2023, the average weight of an electric vehicle is approximately 400-1,000 pounds heavier than the equivalent gasoline powered vehicle, representing a 10% (sedan/wagon) to 28% (car SUV) increase in weight. Even with the increase in weight, most electric vehicles will still fall into the "light duty" vehicle classification, with a total loaded weight under 10,000 pounds. As a comparison, "medium duty" vehicles range from 10,001-26,000 pounds, and heavy-duty vehicles are over 26,000 pounds.

A recent study from University of California Institute of Transportation Studies analyzed the impact of EV trucks on the roadway network[4]. The conclusions of the study included that the pavement damage on state highways, county roads and urban arterials would cause a zero to one percent decrease in life expectancy, and that residential streets would fail by exposure to the environment before the impacts of increased weight were noted.

While electric vehicles are heavier than their gasoline powered equivalents, the increase in weight of the vehicle is anticipated to have minimal impact on roadway maintenance and design elements of bridges and parking structures.

Per the 2021 International Building Code (Table 1607.1), parking garages must be designed for a loading of 40 pounds per square foot (psf). With a standard 9'x18' parking space (not including the available loading of the drive aisle behind the parking space) at 40 psf, the minimum design standards for a parking garage can accommodate a 6,480 lb vehicle. Thus, the minimum loading standards can accommodate a garage completely full of electric pickup trucks.

[3] Barry, K. and J. Bartlett. *Automakers Move to a Common Plug Standard to Allow Their EVs to Use Tesla Superchargers.* Consumer Reports. https://www.consumerreports.org/cars/hybrids-evs/tesla-superchargers-open-to-other-evs-what-to-know-a9262067544/.

[4] Harvey, John, Arash Saboori, Marshall Miller, Changmo Kim, Miguel Jaller, Jon Lea, Alissa Kendall, and Ashkan Saboori. Rep. Effects of Increased Weights of Alternative Fuel Trucks on Pavement and Bridges, November 2020. https://escholarship.org/content/qt4z94w3xr/qt4z94w3xr.pdf?t=qo95b9.

1.3.2 HEARING IMPAIRED PEDESTRIANS

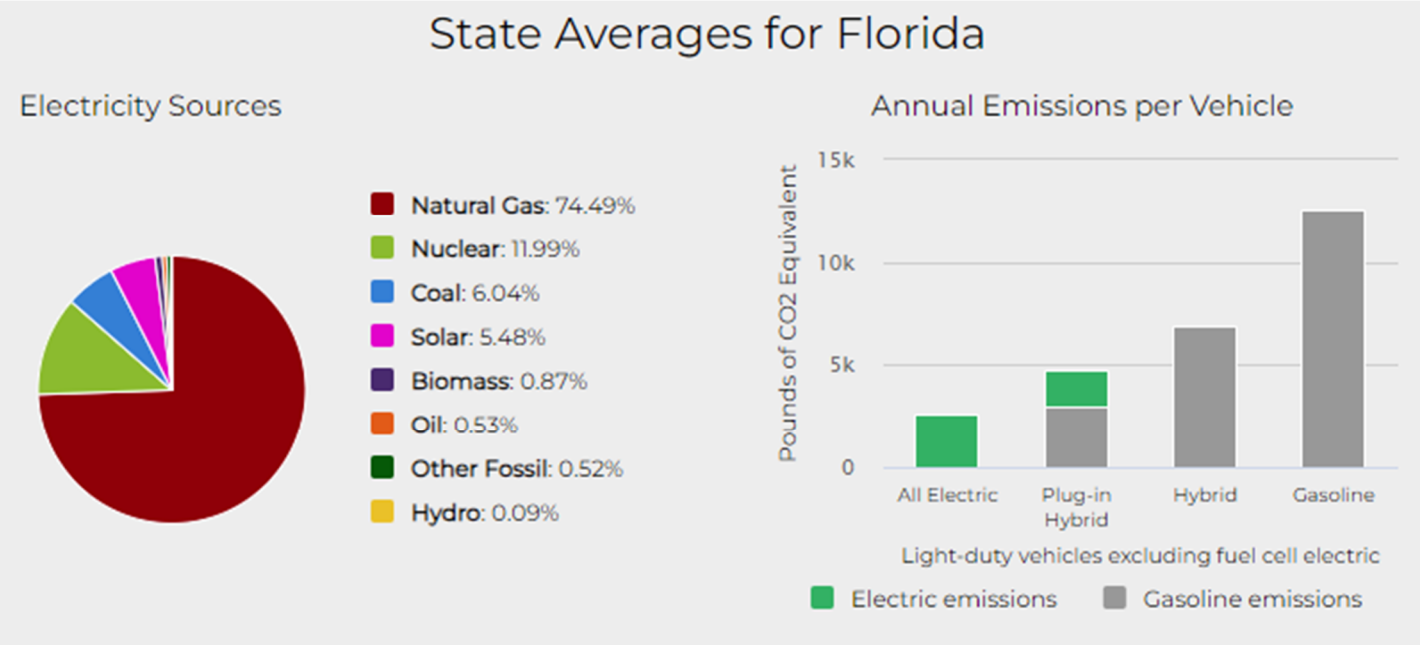
Electric vehicles are considerably quieter than gasoline powered vehicles. In 2016, the US Department of Transportation's (USDOT) National Highway Traffic Safety Administration (NHTSA) mandated minimum sound requirements for hybrid and electric vehicles, requiring hybrid and electric passenger cars, light trucks and vans, and low speed vehicles to produce sounds to help to ensure that blind, visually impaired, and other pedestrians are able to detect and recognize nearby hybrid and electric vehicles[5].

1.3.3 EMISSIONS

As of 2021, 28% of the United States greenhouse gas emissions came from the transportation sector. Personal vehicles (passenger cars, SUVs, minivans, and pickup trucks) are responsible for approximately 58% of the transportation sector greenhouse gases, while medium and heavy-duty trucks are responsible for approximately 23% of the transportation sector greenhouse gases. Aircraft, pipelines, ships and boats, and rail are responsible for the other 19% of transportation sector greenhouse gas emissions[6].

While electric vehicles do not have tailpipe emissions of greenhouse gases, generation of the electricity used to charge the EVs may create carbon pollution. The US Department of Energy Alternative Fuels Data Center estimates the emissions of all-electric and plug-in hybrid vehicles based on how electricity is produced. In Florida, where 74% of electricity is from natural gas, the annual emissions of an all-electric vehicle are approximately 20% of a gasoline-powered vehicle, as shown in **Figure 1-2**[7].

Figure 1-2. CO_2 Emissions per Vehicle in Florida



[5] Federal Motor Vehicle Safety Standards: Minimum Sound Requirements for Hybrid and Electric Vehicles, NHTSA-2016-0125-0001, https://www.regulations.gov/document/NHTSA-2016-0125-0001.
[6] United States Environmental Protection Agency, Sources of Greenhouse Gas Emissions, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions.
[7] https://afdc.energy.gov/vehicles/electric_emissions.html.

2 EVSE Assessment

2.1 PLANNING CONTEXT

To integrate MetroPlan Orlando's EV Readiness Plan in coordination with other ongoing studies, plans, and the latest literature on EV needs and impacts, a literature review was performed. At the local, regional, state, and national levels, EV infrastructure planning and implementation is front and center as an important part of increasing transportation system resiliency, decreasing transportation emissions, and improving air quality. Florida Department of Transportation (FDOT) and City of Orlando are engaged with these efforts, which are described below. Ensuring consistency with these partner agency plans will be a crucial aspect of implementing effective, efficient, and equitable charging infrastructure in the MetroPlan Orlando Planning area.

2.1.1 FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT)

FDOT manages the National Electric Vehicle Infrastructure (NEVI) program within the State of Florida. Currently, FDOT's NEVI program focuses on the formula funds provided through the Infrastructure Investment and Jobs Act (IIJA). The program will be implemented in phases, with the first phase focused on the interstate system. The key considerations for FDOT funding through the NEVI program include:

- Public EV charging along a designated Alternative Fuel Corridor (AFC) a maximum of 50 miles apart.[8]
- Prioritize rural, underserved, and disadvantaged communities.
- Consider locations with other amenities (public restrooms, lighting, seating areas).

FDOT solicited feedback and recommendations on planning, coordination, and development of EV charging infrastructure. Thirty-one responses were received from a variety of utility providers, electric vehicle infrastructure providers, local governments, consultant firms, and local jurisdictions. The responses from each organization are found on the FDOT EV Program webpage:

https://www.fdot.gov/emergingtechnologies/home/evprogram/references/rfi-responses

FDOT has also released a series of planning documents for electric vehicle infrastructure.

FLORIDA EV ROADMAP (2020)

The Florida EV Roadmap was the first Statewide planning effort for EV infrastructure in Florida. The work included a survey of Florida EV owners regarding their experience using EV charging infrastructure.

EV INFRASTRUCTURE MASTER PLAN (JULY 2021)

The FDOT EV Infrastructure Master Plan built upon the Florida EV Roadmap and developed an overarching plan for EV infrastructure in the State. The Master Plan considered aspects including emergency evacuation, overall infrastructure need, and a gap analysis of existing charging infrastructure.

[8] AFCs are designated by the Federal Highway Administration (FHWA) through Round 6 nomination cycle.

The Infrastructure Master Plan resulted in four major initiatives:

Adapt: Anticipate trends, support research & testing of next generation of EVSE, expand EVSE network along major transportation infrastructure.

Facilitate: Promote EVSE infrastructure to support long range corridor travel, emergency evacuation, and community charging infrastructure and identify and pursue funding opportunities.

Educate: Support EVSE education and outreach, support local agencies, increase awareness of publicly available EVSE locations.

Coordinate: Advance regional and comprehensive approaches and coordinate stakeholders for EVSE efforts, establish state, regional, local agency, and utility roles and responsibilities.

FDOT ELECTRIC VEHICLE INFRASTRUCTURE DEPLOYMENT PLAN

The FDOT EV Infrastructure Deployment Plan is developed on an annual basis to meet the NEVI requirements and implement federal funding for EV infrastructure. The Deployment Plan focuses on installing DCFC charging stations along federally recognized AFC, with a goal of providing DCFC charging stations no more than 50 miles apart with a minimum of four ports at each location. The Deployment Plan also includes the metrics that FDOT is planning on using to measure the goals set within the plan, focused on buildout of the AFC network, equity, reliability, accessibility, resiliency, and EV adoption.

FDOT identified one location within the MetroPlan Orlando Area as part of the Phase 1 Gap Segments list (as of 6/23/2023), at I 4 and US 17 92 in Seminole County.

2.1.2 NATIONAL STRATEGIES

U.S. DEPARTMENT OF TRANSPORTATION CARBON REDUCTION STRATEGY

As part of the 2021 Bipartisan Infrastructure Law, the federal Carbon Reduction Program provides funding to state and local governments to develop carbon reduction strategies. As of December 2023, FDOT has opted out of the program, stating that the costs of creating and establishing targets and compliance with the rule were too great.

2.1.3 LOCAL GOVERNMENT PLANS

OSCEOLA COUNTY EV CHARGING MASTER PLAN (2023)

Osceola County is currently developing a master plan to deploy a charging network to support EVs within its urban growth boundary. A technical report documented the existing EV charging infrastructure funding opportunities, current EV technologies, and existing public charging stations within Osceola County. There are currently three electric companies within Osceola County that provide EV charging stations, including Duke Energy, Kissimmee Utility Authority (KUA), and Orlando Utilities Commission (OUC). Their programs are outlined below:

Duke Energy has a commercial charger rebate program to install up to 10 chargers for qualifying businesses, cities, schools, and multi-family housing (for fleets, school buses, and transit buses). More information can be found on their Commercial Charger Rebate Application webpage.

KUA has 60 EV chargers (includes both Level 2 and DC Fast Chargers) throughout Kissimmee powered through the Community Solar Program. Customers can apply for new charging stations through a five-year EVSE service agreement. More information can be found on their

OUC offers wo charging station options through their Plug In & Charge Up program. The CHARGE-IT program allows charging stations to be installed, maintained, and owned by OUC. The OWN-IT program allows OUC to design, procure, and install a charging station that the customer owns. More information can be found in their EV Charging Services Catalog.

CITY OF ORLANDO'S 2030 ELECTRIC MOBILITY ROADMAP (2021)

The City of Orlando Electric Mobility Roadmap created a vision of how mobility will transform in Orlando by 2030 and beyond. The roadmap created four overarching goals with targets and indicators to measure the progress: provide equitable and affordable access to e-mobility, accelerate EV adoption in multiple transportation sectors, develop a robust charging ecosystem, and advance multimodal e-mobility options. The Roadway map will be updated every five years.

The City of Orlando has identified strategies to meet the goals of the roadmap, including but not limited to:

- Outreach to disadvantaged communities.
- Converting the City of Orlando's fleet to electric and offer technical assistance to other agencies for fleet conversion.
- Establish an EV bulk purchase program and develop a program to support used EV adoption with incentives and financing for low- and moderate-income residents.
- Expand education to adults and in driver's ed curriculum.
- Update land development code to increase charging access in multifamily and commercial properties.
- Pilot projects for EV fast-charging hub, EV charging stations for multifamily housing, e-bike incentives, e-cargo bikes.
- Pursue additional charging hub locations, with an emphasis on underserved communities.

ORANGE COUNTY MOBILITY HUB STRATEGY (2022)

The Orange County Mobility Hub Strategy establishes principles and guidelines for mobility hub planning in Orange County. The mobility hubs are focused on collocating regional and local travel modes and amenities to encourage multi-modal travel. Although not specifically focused on electric vehicles, the strategy includes EV charging as an amenity that should be considered at mobility hubs.

PERFORMANCE MEASURES

The FDOT EV Infrastructure Master Plan provides background on metrics for EV adoption, including EV market share, statewide EV market adoption by vehicle type, and registered BEVs by county. EV market share is the percentage of total EV sales compared to other vehicle types. EV market adoption by vehicle type includes all registered Florida light-duty vehicles and is broken up into HEVs, PHEVs, and BEVs. FDOT is currently working on defining specific performance measures for EV infrastructure.

CENTRAL FLORIDA CLEAN CITIES COALITION

The Central Florida Clean Cities Coalition collaborates with vehicle fleets, fuel providers, community leaders, and other stakeholders to identify community-driven solutions that conserve energy and promote the use of alternative fuels and advanced vehicle technologies in transportation. Some projects and case studies include:

The **Drive Electric Orlando** project promotes PHEV adoption by offering thousands of visitors rental PHEVs in Orlando with incentives like competitive rates and theme park perks. More information can be found on Alternative Fuel Vehicle Deployment Initiatives.

Creating an Alternative Fuel Vehicle Training Network for Florida will establish a statewide training network in Florida for alternative fuel vehicles, focusing on electric, CNG, and propane vehicles, and provide specialized safety and technical training for first responders, educators, and other professionals. More information can be found on Alternative Fuel Vehicle Deployment Initiatives.

The Advancing Alternative Fuel Markets in Florida project created model codes, ordinances, and guidelines, provided safety and training programs for key professionals, and developed a strategic plan for deploying alternative fueling infrastructure statewide. More information can be found on Alternative Fuel Market Project Awards.

Key Takeaways of Planning Context

FDOT and local agencies are in the preliminary stages of planning for EV charging as a method for encouraging the adoption of EV vehicles.

FDOT is focusing on providing DCFC along regional roadways with a maximum of 50 miles between charging stations and providing resources for local governments to develop and implement their own plans.

Osceola County is currently developing its EV Charging Master Plan with a research and discovery technical report available that covers funding opportunities, existing charging infrastructure totals, and utility company EV charger programs.

The City of Orlando is working to update their land development code to require charging access, fund pilot projects to add charging infrastructure, incentivize the transition to EVs for low and moderate income households, and provide equitable distribution of charging infrastructure.

2.2 REGIONAL CONTEXT

The regional context provides an understanding of the local community and their travel patterns, which in turn can influence how electric vehicles are used within the region and where charging equipment should be located. Maps detailing the regional context can be found in **Appendix C**.

2.2.1 LAND USES

The MetroPlan Orlando region comprises three counties with a wide range of land use contexts, from high density urban cores to low density agricultural or conservation land uses. People travelling to, from, or through these different land use contexts have different needs related to EV charging infrastructure. Within the urban area, residential land uses make up the majority of the area, with commercial land uses located primarily along the regional corridors and in the tourist districts. The underlying land use impacts how drivers interact with the area and can provide context for the EVSE that should be located within each land use.

Residential: Vehicles are generally parked at residential land uses for 10+ hours overnight. Thus, level 1 or 2 chargers can provide sufficient charge overnight for drivers to complete their daily travels. EV owners with access to charging at home tend to primarily charge their vehicles at home.

Retail: Vehicles are generally parked at retail land uses for short periods. DCFC are preferred at retail locations that serve long distance travelers, while Level 2 can be provided at other retail locations.

Office: Vehicles are generally parked at office locations for 8 hours. Level 2 chargers provide the ability for the vehicle to be charged during a standard workday.

Tourism: Hotels and attractions should prioritize Level 2 chargers to provide a charge overnight or while spending a day at an attraction.

2.2.2 TRAVEL PATTERNS

EVSE can be located in consideration of existing travel patterns in the region for different users. EV owners may charge at public locations if they do not have access to home charging, if they cannot get back home on a single charge, or if public charging is more convenient than charging at home. While the earliest EVs could travel at least 60 miles on a single charge, most EVs currently on the market can travel more than 300 miles on a single charge. A user's charging needs vary greatly based upon the range of their vehicle.

Daily Driving: In general, EV owners tend to charge at home when they can. With most EVs, someone with access to at-home charging can charge sufficiently at home to cover their daily driving habits.

Long Distance Commuters: People who commute a longer distance to work often will benefit the most from the fuel and maintenance savings EVs offer compared to gasoline powered vehicles. However, those whose round-trip commute is close to (or exceeds) the range of their vehicle would need access to charging stations while at work. Around 60% of employees commute less than 60 miles, while 5% of employees commute 60-100 miles.

Long Distance Trips: People driving long distance along regional corridors may need to quickly charge up and return on their journey. This travel pattern is largely supported by FDOT's efforts related to the NEVI program, which is placing DC Fast Chargers along major highways with a maximum of 50 miles between charging stations.

2.2.3 DISADVANTAGED COMMUNITIES

Many burdens of the transportation system are borne disproportionately by disadvantaged communities. In considering the development of EV technology and the investment of charging infrastructure, it is important to proactively ensure that the same pattern of burden distribution is not continued. Disadvantaged communities can be identified in multiple ways.

EQUITABLE TRANSPORTATION COMMUNITY

The USDOT Equitable Transportation Community (ETC) Explorer is an interactive application that implements the Justice40 initiative. 2020 census tracts and data were used in the ETC. The ETC provides deeper insight into the transportation disadvantage component of the Climate and Economic Justice Screening Tool (CEJST).

CLIMATE & ECONOMIC JUSTICE SCREEN TOOL

The Joint Office of Energy and Transportation (JOET) identified Census Tracts throughout the United States as disadvantaged as part of the Justice40 Initiative through the Climate & Economic Justice Screen Tool (CEJST). The Justice40 Initiative is intended to identify and prioritize projects that benefit communities facing barriers to affordable, equitable, reliable, and safe transportation. The National Electric Vehicle Infrastructure (NEVI) Program is required to spend 40% of funding in historically disadvantaged communities using this definition.

ALTERNATIVE FUEL INFRASTRUCTURE TAX CREDIT

The Alternative Fuel Infrastructure Tax Credit was designed by the U.S. Department of the Treasury and Internal Revenue Service to provide incentives for placing alternative fueling stations in disadvantaged communities. The tax credit is available for low-income census tracts, as defined in federal law specifically for the New Markets Tax Credit (NMTC), and for rural census tracts. This credit can provide businesses with a tax credit of 6-30% of the depreciable costs per item for installation of charging stations.

The three definitions of disadvantaged communities (ETC, CEJST, and Alternative Fuel Infrastructure Tax Credit) are each utilized for specific grant and funding opportunities. MetroPlan Orlando uses a combination of the ETC and CEJST definitions in the All for Transportation Plan.

The ETC and CJEST disadvantaged communities overlap in Winter Garden, Ocoee, Apopka, South Apopka, Pine Hills, Oak Ridge, Casselberry, Sanford, Azalea Park, and Southchase. The largest overlap of all three areas occurs in Pine Hills and Kissimmee.

Consideration of disadvantaged populations requires more than the consideration of where EV charging infrastructure is located. Lower-income households are less likely to buy EV vehicles due to the higher cost. Adoption of EVs may require a strong used-car market and/or incentives for purchasing new EV vehicles. Additionally, transportation-disadvantaged households are more likely to live in multi-family dwellings (around 44% of the disadvantaged households live in multi-family dwellings compared to 35% for the entire region), which may not provide at-home charging opportunities, and public charging reliance can increase the monetary cost of recharging EVs[9].

[9] Dong-Yeon, L., Yang, F., Wilson, A., & Wood, E. (April 2022). *Electric Vehicle Infrastructure – Equity.* National Renewable Energy Laboratory.

Key Takeaways of Regional Context

MetroPlan Orlando's three county region covers a range of land uses, four types of potential EV charging station uses, three types of travel patterns, and areas of disadvantaged communities.

Concentrations of residential land uses in the urbanized area are typically fronted by commercial, office, or retail uses along major arterials.

Those using EV charging stations fall into four categories: residential, retail, office, and/or tourism. These user categories can help determine the type and level of EVSE needed in certain areas within the MetroPlan Orlando region. The service areas of existing charging infrastructure will be explored in the next step of the EV Charging Master Plan.

Understanding how the purposes of trips and aligning charging needs to accommodate those trip purposes, particularly for the needs of disadvantaged communities, is explored in the Infrastructure and Ownership Context.

2.3 INFRASTRUCTURE AND OWNERSHIP CONTEXT

EV ownership and existing charging infrastructure trends and distributions across the MetroPlan Orlando region were analyzed and inventoried, including where existing public charging infrastructure overlaps with where people live and work. Maps detailing the infrastructure and ownership context can be found in **Appendix C**.

2.3.1 ELECTRIC VEHICLE OWNERSHIP

The existing EV ownership within the State of Florida was determined using data from the AFDC TransAtlas[10], which counts the number of light-duty registered vehicles through the selected year. As shown in **Table 2-1**, Battery Electric Vehicles are outpacing the growth of Plug-In Hybrid Electric Vehicles, representing 82% of the electric vehicles registered in Florida in 2022, up from 53% in 2016. The total number of electric vehicles registered in the State has grown by 33-67% per year since 2016 and currently represent 1.7% of the registered light-duty vehicles in the state.

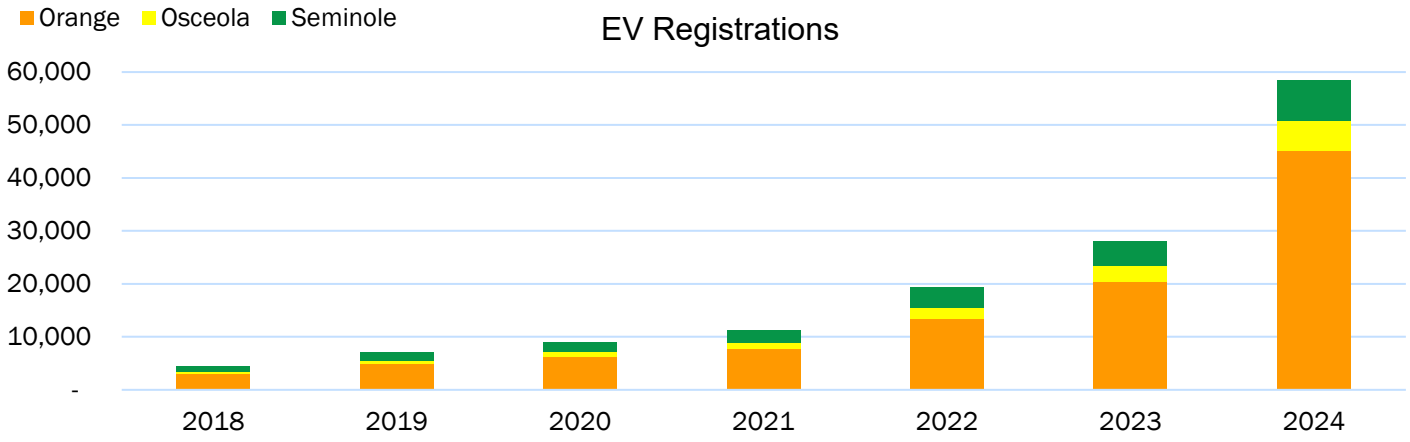
Table 2-1. Statewide EV Registration 2018-2023

Vehicle Type	2016	2017	2018	2019	2020	2021	2022	2023
BEV	11,600 (0.1%)	15,900 (0.1%)	27,400 (0.2%)	40,300 (0.2%)	58,200 (0.3%)	95,600 (0.5%)	168,000 (0.9%)	254,900 (1.4%)
PHEV	10,100 (0.1%)	13,400 (0.1%)	17,400 (0.1%)	20,400 (0.1%)	22,400 (0.1%)	32,200 (0.2%)	45,800 (0.3%)	57,300 (0.3%)
Total	21,700 (0.1%)*	29,300 (0.2%)	44,800 (0.3%)	60,700 (0.4%)*	80,600 (0.5%)*	127,800 (0.7%)	213,800 (1.2%)	312,200 (1.7%)
Growth from Previous Year		35%	53%	35%	33%	59%	67%	46%

**Percentages are based on total vehicle ownership to account for rounding errors when summing individual percentages.*

The EV ownership within the Metroplan Orlando region is summarized by county in **Figure 2-1**. Although statewide data is not available for 2024, the number of EVs registered in the MetroPlan Orlando region doubled between July 2023 and July 2024.

Figure 2-1. EV Ownership by County



The number of registered EVs per capita by zip code is shown in Error! Reference source not found.. The highest per capita EV ownership is found in the more affluent areas, such as downtown Orlando, Winter Park, Winter Garden, Windermere, Horizon West, Wekiva Springs and Markham Woods. Low EV ownership is found in areas such as Pine

[10] https://afdc.energy.gov/transatlas#/?state=FL

Hills, Orlovista, and Pine Castle. Many of the registered EVs are concentrated in affluent areas and not within disadvantaged areas.

2.3.2 ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

As of October 2023, there are 585 Level 2 and DCFC charging stations in the MetroPlan Orlando area, with a total of 1,405 chargers. The highest concentrations of charging stations are located along the I-4 corridor, in downtown Orlando, and in Lake Mary. The only charging stations significantly outside of the urban boundary are at the Canoe Creek Service Plaza on Florida's Turnpike and near the intersection of US 192 and US 441. The number of charging ports by county is summarized in **Table 2-2**.

Table 2-2. EV Chargers by County and Type

Charger Level	Charger Type	Orange	Seminole	Osceola
Level 2	Workplace Level 2	37	26	0
	Public Level 2	1070	149	199
	Total	**1107**	**175**	**199**
PHEV	Non-TESLA Network	358	76	63
	TESLA Network	56	8	10
	Total	**414**	**84**	**73**

The region has a total of 529 Level 2 Charging Stations with 1,156 chargers. There are clusters of Level 2 chargers in Downtown Orlando, along the International Drive corridor, and in Lake Mary. As Level 2 chargers require multiple hours to charge a vehicle, these clusters make sense for commercial and mixed-use locations where vehicles park for longer periods of time. Of the Level 2 chargers, 9 stations (26 chargers) are reserved for fleet vehicles or employees of private businesses.

The region has a total of 56 DCFC Stations with 249 chargers. As DC Fast Chargers are meant to quickly charge a vehicle, they are primarily located along I-4 and other regional highways. Unlike Level 1 and Level 2 chargers, DC Fast Chargers have different connectors based on the manufacturer of the vehicle, and thus not every DC Fast Charger can be used by every EV. However, manufacturers have committed to moving to the Tesla connector as a standard to mitigate this issue.

KEY LAND USES

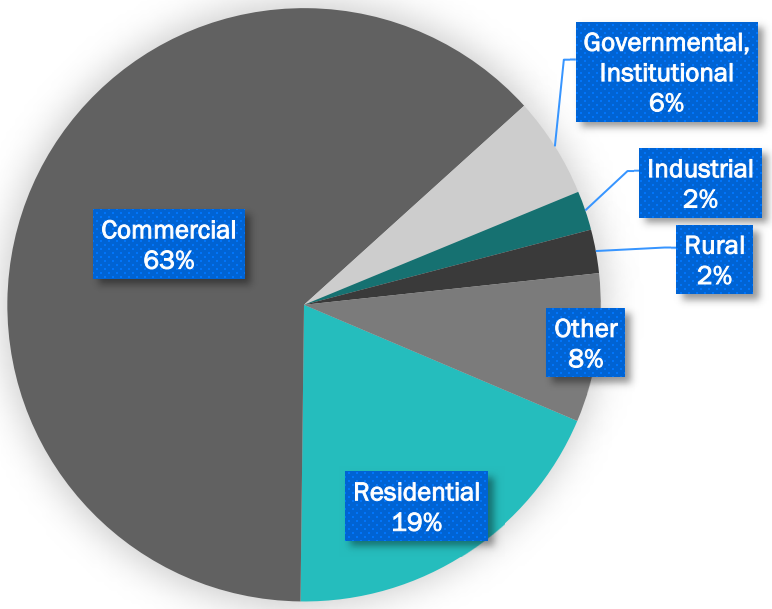
How drivers interact with each land use is a factor in determining the type and quantity of charging stations that should be available. Most persons with single family homes are assumed to have access to Level 1 charging at their residence, be able to charge their car overnight, and be able to conduct their daily business without having to recharge. For persons living in multi-family housing, charging overnight may not be as feasible, and thus having access to public chargers at or near their workplace or daily destination is necessary to recharge their vehicle. Level 2 chargers are often able to provide sufficient charge during a business day. On the other hand, people traveling through the region need to be able to quickly charge their vehicle to continue on their trip and need access to Level 3 chargers. **Table 2-3** compares the number of Level 2 and DC Fast Chargers (station and number of ports) by the parcel land use category and

Figure 2-2 shows the distribution of all charging stations based on its land use.

Table 2-3. Charging Stations and Ports by Land Use

Land Use Category	Level 2 Workplace	Level 2 Public	DC Fast Charger
	Stations (Ports)		
Residential	2	87	1
Commercial	11 (32)	232 (646)	53 (326)
Governmental	3	95 (255)	6 (27)
Industrial	1 (6)	12 (30)	2
Institutional	0	28 (68)	1 (1)
Rural	0	4 (15)	0
Other	1 (2)	4 (10)	0

Figure 2-2. Total Charging Stations by Land Use



Workplace land use includes commercial, governmental, institutional, and industrial land uses. Workplace charging can be provided as an amenity for employees in company parking lots or garages that increases the convenience and affordability of driving electric vehicles. As Level 2 and DC Fast Chargers have a higher cost to the consumer, charging at home is preferable to many EV owners. While single-family houses generally can charge using their home electric service, multi-family housing often does not provide that opportunity.

High concentrations of charging stations related to workplace land uses can be found in Downtown Orlando, Winter Park, areas near the Orange County Convention Center, and along I-4. Although charging stations where people live are more evenly distributed than charging stations where people work, there are still higher concentrations of residential charging stations around SR 429 and US 192, along US 17-92, and around the City of Kissimmee.

When comparing the location of charging stations to the locations of Activity Centers within the region, downtown Orlando, Lake Mary, and the International Drive corridor have the highest concentration of charging stations, whereas the Altamonte Springs, Maitland, Winter Garden, and Airport Activity Centers have the lowest concentration.

The Lake Buena Vista area, Kissimmee, and UCF activity centers have charging stations, but not at the concentration of other Activity Centers.

Table 2-4 shows the total number of charging stations by charging type within ETC Disadvantaged tracts. The number of charging stations in disadvantaged tracts is overrepresented on a per-capita basis. Approximately 37% of Level 2 charging stations and 45% of DC Fast Charger stations are in ETC disadvantaged tracts, although the population within these communities represents 35% of the population in the region. This is due to the size of the disadvantaged tracts and location along freeways. There are large sections of disadvantaged tracts in Pine Hills, the area around US 441/Sand Lake Road, and Kissimmee which do not have charging infrastructure available.

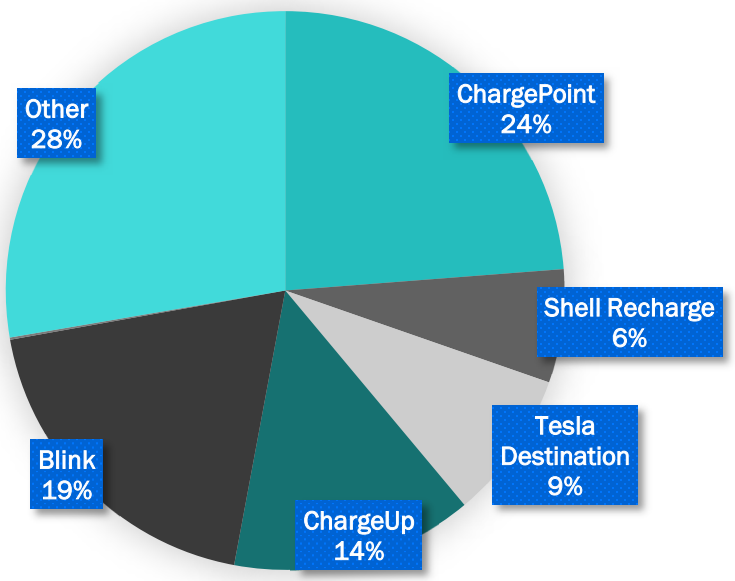
Table 2-4. Existing Charging Stations in Disadvantaged Communities

Charger Type	Charging Stations in Disadvantaged Tract	Charging Stations in Non Disadvantaged Tract
Level 2	193	327
DC Fast Chargers	25	31

CHARGING NETWORKS

There are currently 23 charging networks operating in the region, with ChargePoint operating the most chargers (341).[11] The percentage of charging ports by network is shown in **Figure 2-3**.

Figure 2-3. Distribution of Charging Ports by Network



PERFORMANCE OF EVSE

Performance indicators for EVSE in the MetroPlan Orlando region are not currently publicly available. Utilization and other performance indicators are available through networked chargers as non-networked chargers are not able to provide the granularity of metrics needed to monitor performance. OUC currently uses ChargeUp, a platform for drivers and EVSE providers to connect their chargers to a cloud network, for both the purchase of fuel and for providers to monitor utilization.

[11] https://afdc.energy.gov/transatlas/#/?state=FL.

Key Takeaways of Infrastructure and Ownership Context

The MetroPlan Orlando region has seen a large growth in EV ownership in the last four years, with 2021 ownership nearly double of ownership in 2018.

Currently, most of the EV ownership is concentrated in more affluent areas but as the EV market becomes more accessible to all socio economic groups and EVSE infrastructure is more readily available, this distribution may level out throughout the region.

More than half of charging stations are located within commercial, office, and retail uses. These can potentially serve adjacent residential land uses where only 19% of existing charging stations are located. Analysis of the service areas of existing charging stations will be explored in the next phase of the EV Readiness Plan with an emphasis on multi family housing land uses.

Because performance of EVSEs is not publicly available, additional coordination with utility companies within the MetroPlan Orlando planning area will be needed.

2.4 EV POLICIES

Local governments are updating codes and regulations to create a consistent regulatory framework to allow, incentivize, and in many cases, require EVSE infrastructure. The design and installation of EVSE infrastructure will vary depending on the type of land use, type of charging station, footprints of charging stations, desired level of readiness, and use-case. Policies that impact the EVSE installation generally include land use and site planning requirements such as on-site circulation for all modes (vehicles, pedestrians, and bicyclists), parking requirements (dimensions, ratios, and queuing), and other building codes related to safety.

2.4.1 LOCAL EV CODES

The codes and regulations for the various cities and counties within the MetroPlan Orlando region were reviewed to determine what existing policies are in place regarding electric vehicles. The policies are summarized below, with the full text of the policies included in **Appendix D**. Although these policies are currently in place, it is anticipated that they may have to be updated to comply with Florida Senate Bill 1084, which preempts the regulation of EVSE to the State of Florida (described further in Error! Reference source not found.).

CITY OF ORLANDO

The City of Orlando adopted an EV Readiness Code that requires new construction projects to meet current EV charging needs through installation of charging stations and prepare for future demand of parking spaces capable of supporting EV demands. Sections 61.360 to 61.367 of the Orlando Municipal Code outline the EV Readiness Code. Two levels are considered:

- EV Capable: These parking spaces prepare for future Electric Vehicle Supply Equipment (EVSE) installation by providing dedicated electrical capacity in the service panel (40amp breaker for every two EV Capable two spaces) and conduit to the EV Capable space. These spaces do not require wiring to the space or a receptacle. For multi-family housing, hotels, and parking structures, a minimum of 20% of spaces are required to be EV capable. For commercial and industrial land uses, a minimum of 10% of spaces are required to be EV capable.
- EVSE Installed: These parking spaces are reserved for EVs and provide drivers the opportunity to charge their electric vehicle using EV charging stations rated at a minimum of 32amp 7.2 kW. These spaces should be installed per the requirements of the National Electrical Code (NFPA 70) as adopted and amended by the State of Florida. Certified affordable multi-family housing is exempt from the requirement to install EVSE. For other Multi-Family, Hotel, and Parking Structures, a minimum of 2% of the parking is required to have EVSE installed if the facility has a minimum of 50 spaces. For commercial and industrial uses, a minimum of 2% of the parking is required to have EVSE installed if the facility has a minimum of 250 spaces.

Additionally, the Orlando Utilities Commission (OUC) provides its own incentives relating to EVs, including:

- A rebate of $200 to residential customers who purchase or lease an eligible EV;
- Up to $75 per vehicle for dealerships who sell more than three electric vehicles per month;
- OUC commercial customers can pay a monthly fee for the installation and maintenance of an OUC-owned Level 2 or direct current fast charging (DCFC) stations.

CITY OF WINTER PARK

The City of Winter Park municipal code allows for the development and implementation of electric vehicle infrastructure through detailed guidelines and incentives that encompass not only public but also private properties. This approach includes defining electric vehicles and charging stations, specifying installations on public property, and integrating EV charging requirements into zoning codes for non-residential and multi-family residential properties. These efforts are articulated across several sections of their municipal code:

- Section 98-12 provides guidance on definitions, rules, and enforcement of EV Charging station requirements.
- Section 58-86 provides requirements for off-street parking and loading regulations. For multi-family residential and nonresidential properties, one electric vehicle space must be provided for every 20 required off-street parking spaces. Electric vehicle parking spaces shall, at a minimum, be equipped with an electric vehicle charging station rated at electric vehicle charging Level 2.

The City of Winter Park also has policies within the 2024 Comprehensive Plan that promote EV and alternative fuel vehicles through their alternative fuel and transportation alternatives sections. Charging stations are encouraged throughout the City, including the promotion of public-facing charging stations. Efficient multimodal systems, including bus and rail transit are addressed to promote the overall alternative modes of transportation vision for the City.

CITY OF OVIEDO

The City of Oviedo outlines 2045 Comprehensive Plan incentives for installing EVSE infrastructure through the following policies related to density bonuses and new technologies. Density bonuses can encourage developers to install EV charging stations. New technologies, such as autonomous and connected vehicles or electric City fleet vehicles will be evaluated.

Within their municipal code, the City of Oviedo provides language relating to the requirements for electric vehicle charging stations in Article VIII, Sec 8. For mixed-use developments, office and commercial developments, and parking garages (Sections 8.6, 8.7, and 8.8, respectively):

- Charging stations for electric cars. A minimum of one (1) electric vehicle charging station per development requiring more than fifty (50) parking spaces. The charging station shall serve two (2) parking spaces.

CITY OF APOPKA

The City of Apopka municipal code provides guidelines for electric vehicle charging stations, as well as incentives for developers to install EV infrastructure.

- Section 5.1.6 states that a maximum of ten percent of the mandated off-street vehicular parking spaces can be allocated and labeled as EV charging stations. The City can also authorize the utilization and labeling of additional mandatory parking spaces as electric vehicle charging stations. However, such additional spaces will be counted as only half a parking space when calculating the minimum number of required parking spaces. These designated parking spaces for electric vehicle charging should be arranged in one or more groups of adjacent spaces.
- Sec 5.11.4 awards points towards classification of a development as a “Green Building.” Developments must earn 3 to 4 points (varies based on size of development) to earn this classification. Points are provided based on the number of spaces reserved for EV vehicles and the number and types of charging stations that are provided.

CITY OF WINTER GARDEN

The City of Winter Garden’s comprehensive plan, City Plan 2020, includes a short statement that the municipality will monitor policies relevant to EVs and golf carts between 2010 and 2020. Policy 2-1.1.4. Golf Cart Use states the following:

- The City will continue to allow and will continuously evaluate policies allowing golf cart and EV (electric vehicle) access to the downtown area from the surrounding residential neighborhoods as a means of easing use of traditional motorized vehicles and available parking to reduce greenhouse gases.

CITY OF MAITLAND

The City of Maitland's municipal code establishes definitions for EV charging station types, mandates dedicated EV parking spots with specific requirements and incentivizes sustainable building practices through their Green Building certification. The code specifies the types of stations and their electrical configurations, defines spaces reserved for charging, and provides guidelines for parking lot design. The code specifies ADA compliance requirements as well specific zones that permit public charging stations. EV charging stations are reserved exclusively for electric vehicles and require clear signage indicating cost, voltage, amperage, and other essential information. For off-street parking, parking lots exceeding 35 spaces, two EV charging stations and three EV-ready spaces are required. For every 75 extra spaces, two additional stations and three additional EV-ready spaces are required.

CITY OF SANFORD

The City of Sanford promotes resilient development practices by encouraging the installation of EV charging infrastructure in new projects, providing design guidelines for EV parking spaces. Developers who include EV infrastructure may be eligible for reduced parking requirements. EV language found in the City of Sanford's municipal code includes potential reductions in parking spaces if EV charging stations or EV-capable spaces are installed. Design guidelines outline requirements for EV charging stations. Specifically, multifamily developments must provide 10% EV charging or EV-capable spaces.

ORANGE COUNTY

The Orange County municipal code specifies requirements for what vehicles may use electric vehicle charging spaces in Sec 35-63. Vehicles not capable of using an electrical recharging station are prohibited from parking in spaces designated for charging an electric vehicle.

OSCEOLA COUNTY

Osceola County's comprehensive plan includes language for the development of infrastructure that encourages public access to alternative fuel and electric vehicle charging locations. Policy 18-1.3.12 emphasizes facilitating the transition to alternative fuels by ensuring accessible charging points for EVs across the region and includes the following:

- Public Access to Alternative Energy Facilities. The County shall plan for and facilitate the development of infrastructure that provides public access to alternative fuels and electric vehicle charging locations.

Osceola County is currently working on their EV Readiness Plan.

2.4.2 FLORIDA LAW REGARDING LOCAL GOVERNMENT POLICY

During the 2024 Legislative Session, the Florida State Legislature passed Senate Bill 1084. As part of this bill, which was put into effect on July 1, 2024, the State of Florida has preempted the regulation of electric vehicle charging stations to the state. This means local government entities are limited from enacting or enforcing such regulations. As a result, the regulation of EVSE has been passed to the Florida Department of Agriculture and Consumer Services (DACS). DACS held public workshops on potential rules in Fall 2024 and the final rules are under development.

Key Takeaways of EV Policies

Currently, municipalities in Orange, Osceola, and Seminole county have common language within their comprehensive plans to consider EVs in their transportation and sustainability efforts. However, existing language for EVSE minimums has not been implemented in the majority of local municipal codes.

Readiness for EV infrastructure is a common theme across the codes and comprehensive plans of the local municipalities. For instance, Orlando's EV Readiness Code mandates new developments to be equipped with EV charging stations and supporting infrastructure, ensuring they are prepared for increasing EV usage. Similarly, Winter Park integrates EV charging requirements into zoning codes for various property types, emphasizing the need for new developments to be able to support a surge in EV usage.

The language used in these policies often includes incentives to encourage the adoption of EV infrastructure. For example, Orlando and Oviedo offer specific incentives like parking reductions and potential bonuses for developments that include EV charging stations. By providing incentives such as reductions in required parking spaces and allowances for additional development bonuses, these policies are crafted to appeal directly to encourage develop to support the future of EVs in the region. For instance, both Apopka and Maitland award points towards "Green Building" classifications for developments that include EV infrastructure, which can lead to allowable density or building height bonuses and reduced parking requirements.

The State of Florida is currently working on statewide regulations for Electric Vehicle Infrastructure which is anticipated to preempt many of the policies currently in place by the local governments. The new regulations are an attempt to provide consistency across the state.

2.5 MARKET DEMAND ANALYSIS

Estimating the market demands for EVs is a challenge as there are multiple factors that go into the rate at which EVs will be introduced into the market. In order for consumers to switch to EVs, there must be vehicles available in the market to purchase, consumers must be able to afford the vehicles, and consumers have to have confidence in their ability to charge the vehicles.

2.5.1 AUTOMAKER COMMITMENTS

In order for consumers to purchase vehicles, vehicle manufacturers must offer electric vehicles for purchase. Currently, vehicle manufacturers which have made statements as to their plans for electrification include General Motors Company (GMC), Ford Motor Company, Toyota, and Tesla.

Volvo has stated a long-term aim to become a fully electric car company and reach net zero greenhouse gas emissions by 2040. There are currently five fully electric vehicles available with five additional vehicles under development. Volvo aims for 90 to 100 percent of its global sales volume by 2030 to consist of electrified cars (both fully electric and plug-in hybrid).[12]

GMC has stated a goal to eliminate tailpipe emissions from new US light-duty vehicles by 2035 and have EVs in segments that cover a majority of US industry volume by 2025. GMC has stated that they are dedicated to also investing in EV charging infrastructure and EV education to support mass adoption of EVs.[13]

Ford has a goal of achieving carbon neutrality globally by 2050. Ford started by electrifying its most popular vehicles and is continuing to produce new electric vehicles. In addition to electrifying vehicles, Ford has invested in battery research and the Ford BlueOval Charge Network.[14]

Tesla currently has the highest market share of electric vehicles and only produces electric vehicles. However, Tesla is currently working towards net-zero emissions from mining and production through use and end-of-life recycling, as well as transitioning their operational electricity load to 100% renewables.[15]

Many of the current plans from the vehicle manufacturers have slowed their predictions of when they will be fully electric due to the lack of charging infrastructure available, although GMC, Ford, and Tesla have all committed to expanding public charging infrastructure.

2.5.2 ADOPTION RATES

The anticipated adoption rate for EVs within the MetroPlan Orlando region was estimated by comparing the FDOT adoption rate scenarios, the National Renewable Energy Laboratory (NREL) adoption rate scenarios, and the historical adoption rate of electric vehicles within the region. The City of Orlando utilizes NREL adoption rates and projects a 10% adoption by 2030. The NREL analysis assumes 75% of Orlando's households would have access to some form of home charging and the resulting projection curve reflects incremental changes (excluding dramatic socioeconomic shifts). **Table 2-5** shows the assumptions used for each NREL projection curve.

As of December 2022, Florida has a 1.1 percent adoption rate[16]. FDOT displays their current EV market adoption with three measures: conservative, moderate, and aggressive. MetroPlan Orlando's existing EV registration as of

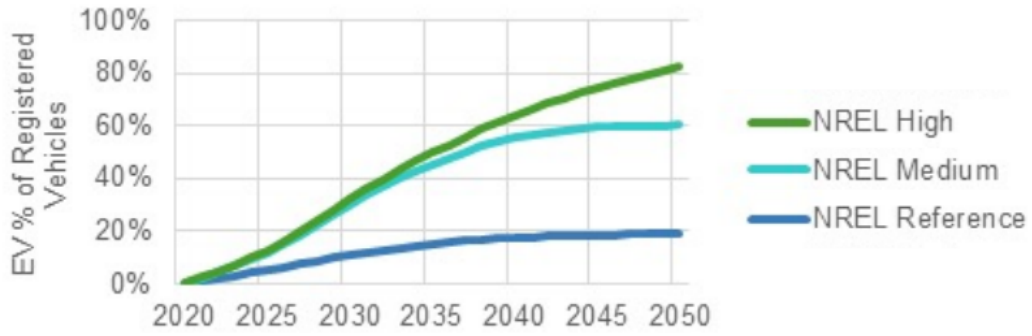
[12] https://www.media.volvocars.com/global/en-gb/media/pressreleases/333213/volvo-cars-adjusts-electrification-ambitions-remains-committed-to-fully-electric-future
[13] https://www.gm.com/content/dam/company/docs/us/en/gmcom/company/GM_2023_SR.pdf
[14] https://media.ford.com/content/fordmedia/fna/us/en/media-kits/2021/electric-vehicles.html.html
[15] https://www.tesla.com/ns_videos/2023-tesla-impact-report-highlights.pdf
[16] https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/emergingtechnologies/evprogram/2023_florida%27s-evidp_update_092923.pdf?sfvrsn=1e4aee0_1

2024 falls between FDOT's moderate and aggressive projections and therefore its future projection range is anticipated to fall between these two projections as well.

Table 2-5. NREL Projection Assumptions

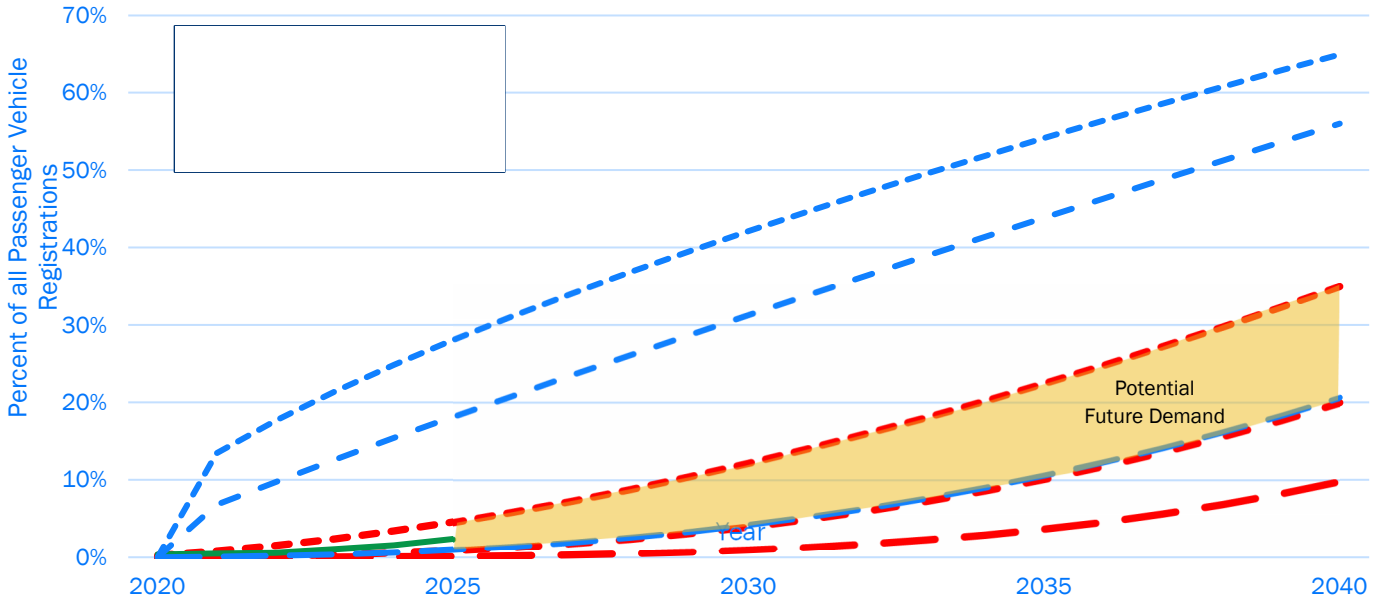
Reference	Medium	High
• Business-as-usual outlook, only incremental changes with respect to electrification occur • Excludes potential of dramatic societal, technological, or behavior shifts • Relies on the U.S. Energy Information Administration (EIA) Annual Energy Outlook (AEO) Projections of EV adoption	• Intended to reflect an electrification future that is plausible but not transformational • Assumes gasoline and electricity fuel price projections from EIA AEO • Assumes battery cost reduction trajectory reaching $135/kWh by 2050	• Assumes a more favorable set of conditions for electrification – including a combination of technology breakthroughs, policy support, and underlying societal and behavioral shifts. • Intended to represent a scenario enabling Orlando to reach its climate goal of reducing greenhouse gas emissions 80% by 2050

Figure 2-4. NREL Adoption Forecasts



Source: NREL

Figure 2-5. EV Market Adoption Projections



2.5.3 EV CHARGING INFRASTRUCTURE NEED

NREL's Electric Vehicle Infrastructure Projection (EVI Pro) Lite[17] was used to estimate the number of chargers that are needed to serve the projected EV demand. The tool was developed in collaboration with the California Energy Commission and includes detailed data on person vehicle travel patterns, EV attributes, and charging station characteristics to estimate the required quantity and type of charging infrastructure. The tool takes the estimated number of EV vehicles within the region and uses regional data (for the Orlando-Kissimmee-Sanford Metropolitan Area) to estimate the vehicle types (Sedans, SUVs, Pickups, and Vans). The tool then takes an assumption for the percentage of drivers with access to at-home charging and the anticipated charging needs of the EV vehicular mix to estimate the number of charging ports needed to supply the region.

According to the US Department of Energy, approximately 80% of EV owners in the United States use at-home charging as their primary charging method. The City of Orlando used an assumption of 75% of EV owners using at-home charging, but since the City of Orlando has higher densities of residential land uses than the full MetroPlan Orlando region, the national assumption that 80% of EV owners would use at-home charging was maintained for the regional analysis. Additional assumptions include:

- A steady number of vehicles in the region for the estimation of the number of EVs.
- EV adoption is not fully predictable, so a range of adoption scenarios are considered. If EV adoption occurs at a greater rate, EV charging infrastructure will be more highly utilized.
- Forecasts are developed for several types of chargers:
    - Shared private chargers are those that are installed in multi-unit dwellings or workplaces.
    - Public level 2 chargers are accessible to everyone, they are often installed at retail locations or in neighborhoods.
    - Public DCFC are accessible to everyone, they are often installed in easy to access places.

Based on the estimated EV ownership, **Table 2-6** estimates the charging demand that will be needed in 2026, 2030, and 2035 based on the anticipated adoption for the MetroPlan Orlando region.

Table 2-6. Estimate of EV Chargers Needed in MetroPlan Orlando Region

	2024	2026	2030	2035
% of EV Adoption	1 – 3%	1 – 6%	4 – 12%	10 – 22%
Number of EVs	11,000 – 69,000	26,000 – 120,000	81,000 – 250,000	208,000 – 461,000
Estimated Shared Private Chargers Needed	400 – 2,200	900 – 3,800	2,600 – 7,400	6,100 – 13,600
Estimated Publicly Accessible Level 2 Chargers Needed	400 – 2,500	1,000 – 4,300	2,900 – 8,200	6,800 – 14,400
Estimated Publicly Accessible DC Fast Chargers Needed	40 – 190	90 – 330	230 – 560	460 – 940
Total Non-Single Family Home Chargers Needed	**800 – 4,900**	**2,000 – 8,500**	**5,800 – 16,200**	**13,500 – 29,000**

Source: Kittelson and Associates, Inc. (2024); AFDC EV Infrastructure Pro-Lite (September 4, 2024)

The low and high ranges projected need for chargers was compared to the existing number of chargers in the region, as shown in **Figure 2-6** and **Figure 2-7**. Based on the projections, the region currently has more DCFC than are anticipated to be needed by 2035, but a deficit in public and private Level 2 chargers. While DCFC provide the fastest charge, they are often more expensive options for the consumer than Level 2 chargers and the driver is expected to move their car out of the space when the charging is complete, which requires the driver to stay nearby.

[17] https://afdc.energy.gov/evi-x-toolbox#/evi-pro-ports

Public and shared private Level 2 chargers provide a slower, cheaper, options for drivers, where their car can remain in the same space for a longer period of time (and the driver is able to leave the vehicle unattended for over an hour). Public and shared private chargers allow drivers who do not live in single family homes (where power is more readily available where they park their car) to be able to charge overnight, during the workday, or while running errands.

Figure 2-6. Comparison of Existing and Low Range Projected EV Charging Need

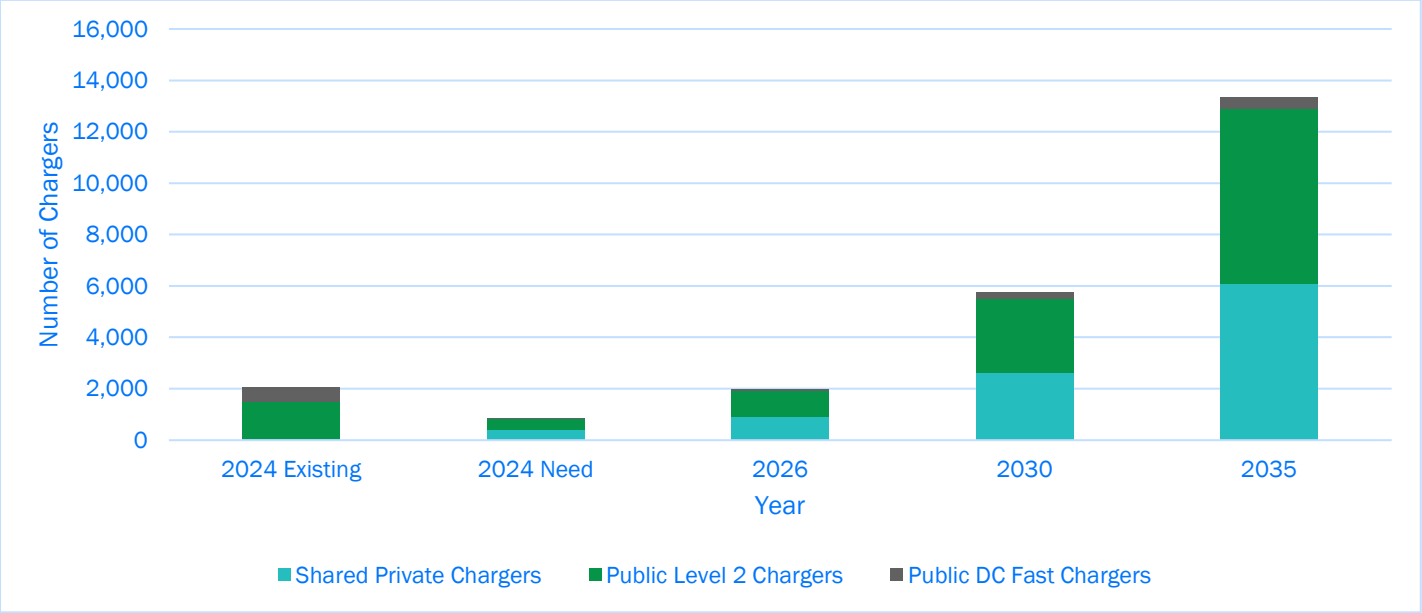
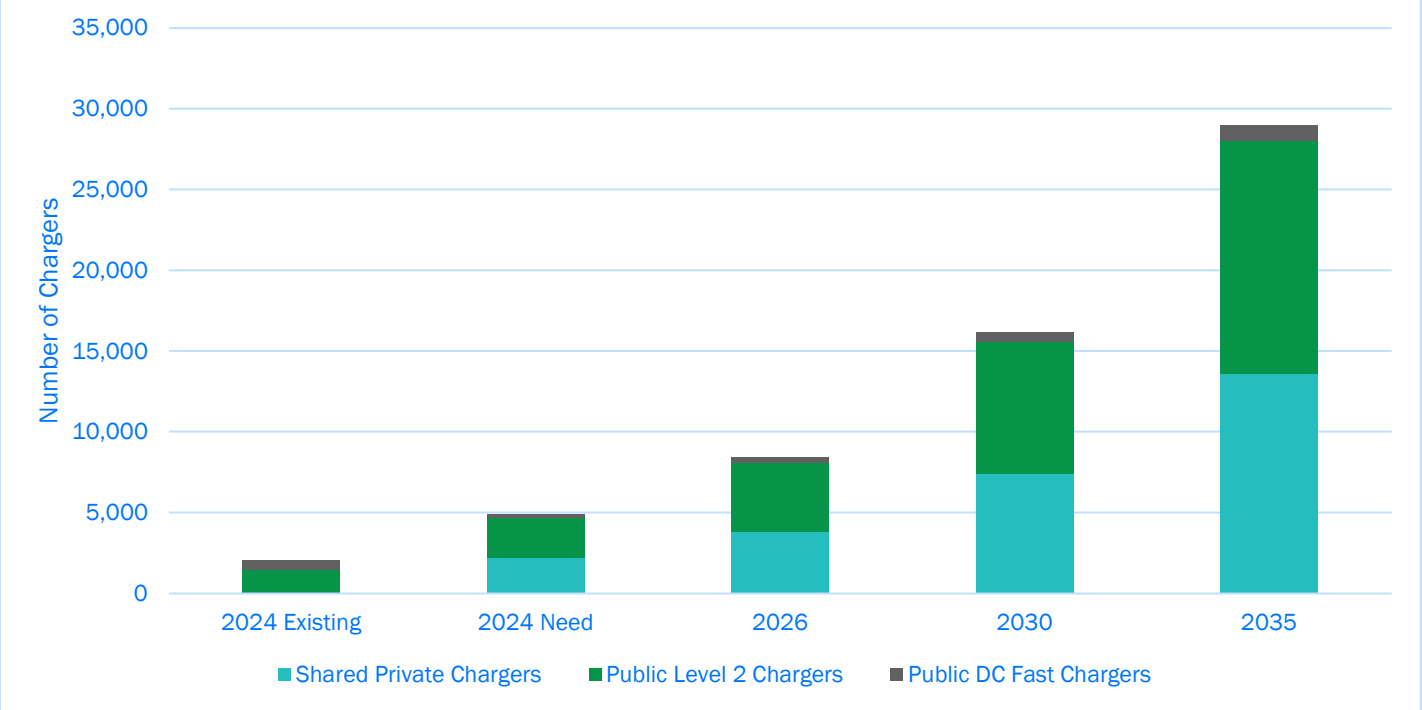


Figure 2-7. Comparison of Existing and High Range Projected EV Charging Need



Key Takeaways of Market Demand Analysis

The adoption of EVs is influenced by the availability and variety of EVs in the market. Automaker commitments have shown to further reach low/no emission targets by rolling out more hybrid and EV options. Many of the current plans from the vehicle manufacturers have slowed their predictions of when they will be fully electric due to the lack of charging infrastructure available, although GMC, Ford, and Tesla have all committed to expanding public charging infrastructure.

Projected adoption rates are based on both FDOT and NREL's conservative/reference, moderate/medium, and aggressive/high scenarios. MetroPlan Orlando's existing EV registration as of 2024 falls between FDOT's moderate and aggressive projections and therefore its future projection range is anticipated to fall between these two projections as well.

Based on the projections, the region currently has more DCFC than are anticipated to be needed by 2035, but a deficit in public and private Level 2 chargers. While DCFC provide the fastest charge, they are often more expensive options for the consumer than Level 2 chargers and the driver is expected to move their car out of the space when the charging is complete, which requires the driver to stay nearby. Considerations for additional Level 2 chargers should be considered. The location of DCFC should account for faster turnover of charging customers.

3 Charging Infrastructure Analysis

3.1 CHARGING INFRASTRUCTURE SITING

Charging infrastructure should be tailored to the land uses and travel patterns of the region in order to meet the needs of the users.

3.1.1 EXISTING CHARGING INFRASTRUCTURE AND SERVICE GAPS

This charging infrastructure analysis focuses on Level 2 chargers as they have a faster charging time than Level 1 chargers, can provide charging for both residential and commercial land uses and are where the greatest demand is anticipated to be in the next 10 years. **Figure 3-1** shows the distribution of existing Level 2 charging stations within MetroPlan Orlando. Each hexagon represents the number of Level 2 chargers found within a square mile. Sanford and Oviedo have higher concentrations of Level 2 chargers within Seminole County. Most existing Level 2 charging stations can be found along I-4 and urbanized areas. Within Orange County, concentrations of Level 2 charging stations are found in Winter Park, Downtown Orlando, and along I-4 near Bay Lake. Within Osceola County, Kissimmee and St. Cloud have higher concentrations of Level 2 charging stations compared to the rest of the county.

3.1.2 RESIDENTS & DISADVANTAGED COMMUNITIES

Most EV drivers can use at-home charging to satisfy their daily demand for electricity, as people can charge their vehicles overnight on a Level 1 (or Level 2) charger to make up for the electricity used during the day. People who live in single-family homes typically have greater access to at-home charging, since those homes are more likely to have dedicated parking spaces and plug-in access. However, people who live in multi-family housing often lack access to at-home charging, which can present an additional challenge to ownership and utilization of an electric vehicle. Disadvantaged communities often have a higher mix of multifamily housing, which presents an additional barrier for these communities.

Multi-family housing can be served by charging stations (Level 1 or 2) within the housing area specifically, or by providing Level 2 charging stations within walking distance, where someone could leave the vehicle and walk to their home for a few hours and then return once the vehicle is charged. Multi-family housing includes 2022 parcel data identified as “multi-family with less than 10 units”, “multi-family”, and “mixed-use” land uses.

To identify potential locations for new charging hubs, a service range was created by creating a half-mile buffer (approximately 15 minute walkshed) around existing stations and selecting multi-family housing parcels outside of these buffers, as shown in **Figure 3-2.** The multi-family housing without access to Level 2 chargers has concentrations found in Pine Hills, Oak Ridge, and Winter Park. Overall, approximately 50% of multi-family housing units lack Level 2 chargers. Of that, approximately 50% of the multi-family housing not covered by Level 2 chargers falls within disadvantaged populations. This is valuable to understand when identifying potential locations for new charging hubs.

Figure 3-1. Existing Level 2 Charging Stations

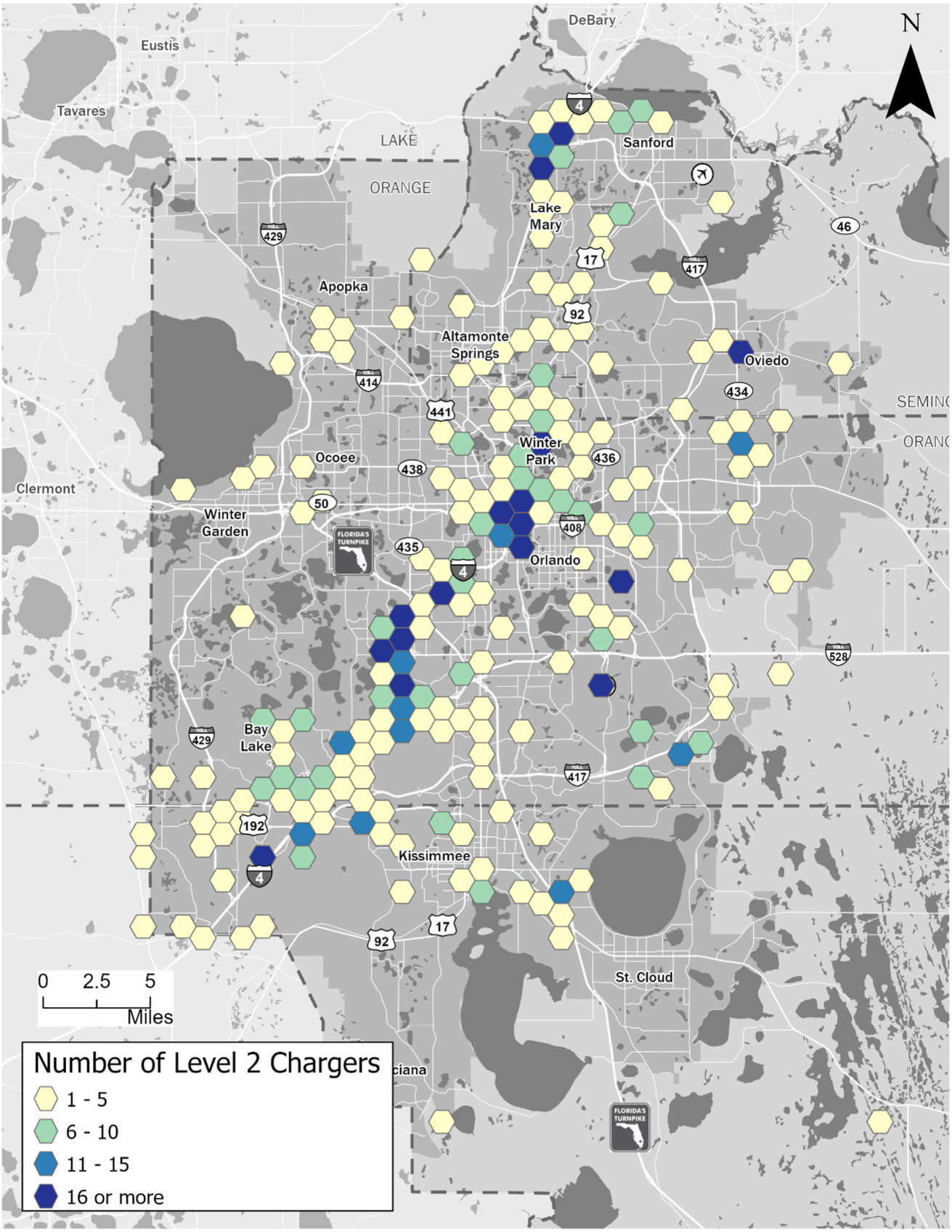
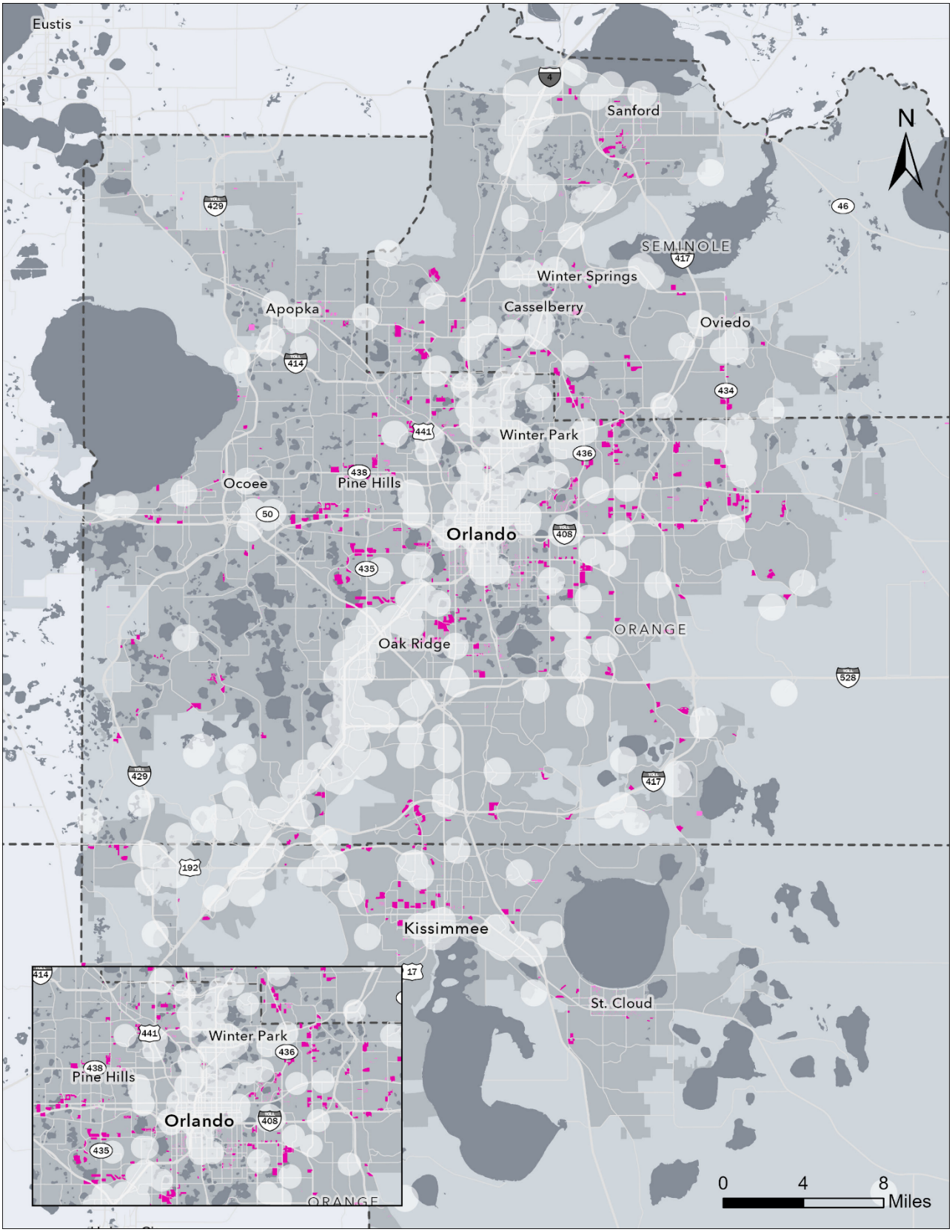


Figure 3-2. Existing Level 2 Service Gaps and Multi-Family Housing Outside of Service Buffers



3.1.3 SITE SELECTION TOOL

A charging infrastructure siting tool[18] was developed and utilized during the Charging Siting Workshop to assist local municipalities in identifying variables that support a demand for Level 2 or DCFC charging stations.

ELECTRICAL AVAILABILITY

Access to the electrical grid is necessary to provide EVSE. Within the urban area, the electrical grid generally has the capacity and density to allow for EVSE installation on any site, but connections to the local power grid may be more challenging in developing areas. However, as sites are developed, attention needs to be placed on ensuring that electrical capacity is provided to parking areas to support EVSE installations.

OWNERSHIP

Public charging stations can be installed on property owned by a locality or by a private entity. Having a property owned by a jurisdiction simplifies the process in creating a public charging station. However, jurisdictions may partner with other land owners to create public charging stations in high traffic locations.

RESILENCY

While a potential charging station location may be attractive due to the vehicular traffic, it may not be a suitable location due to the floodplain. Locations where flooding is possible need to be constructed in a manner to protect the safety of the equipment and the community if flooding were to occur.

SURROUNDING USES

A successful charging station should be located adjacent to land uses where drivers are already frequenting. This can be high-density multi-family housing, employment centers, or other destinations (shopping centers, community centers, recreational uses). The location of existing Level 2 charging stations should also be considered to prioritize gaps in the charging network.

MULTIMODAL CONSIDERATIONS

The availability of multimodal connections at a charging station can allow drivers to leave their car to charge at a central charging station while continuing to their destination. Additionally, a charging station can also provide charging for e-bikes, ride-hailing/car-sharing services, or transit vehicles.

[18] https://experience.arcgis.com/experience/3f4e6ccbbc0f46fcb748119967165b2b#data_s=id%3AdataSource_3-f1a0294d49eb47e087cbbe53ae7e178e-8e25d3e022614cf49a9406b7da1180a7%3A37543

Does the location have electricity or is electrification possible at this location?

Does your jurisdiction own the property? If not, does the property owner approve of installing EV chargers?

Is this location in a floodplain? If the location is in a floodplain, consider another location or consider the resilience in the design if flooding is possible.

Is this location convenient to high density multi family housing, employment centers, and/or other destinations such as shopping centers or community centers?

Are there multimodal connections at this location? Is there room for other charging needs, such as e bikes, ride hailing, car sharing, or transit charging needs?

This tool includes hosted data layers on a web platform (ArcGIS Online). The siting tool includes publicly available data to help answer the questions with data sources as identified in **Table 3-1**.

Table 3-1. Site Selection Tool Themes and Sources

Theme	Guiding Questions	Layers Available in the Tool (Source)	Potential Additional Layers (Source)
Electricity	Does the location have electricity, or is electrification possible at this location?	Utility Lines (Living Atlas), Existing Level 2 Charging Stations (AFDC)	Utility Company Lines (OUC, KUA, Duke Energy)
Ownership	Does your jurisdiction own the property? If not, does the property owner approve of installing EV chargers?	City Boundaries and Parcels (County's Property Appraiser)	Parcels Owned by the Local Municipality (County's Property Appraiser)
Resilience	Is this location in a floodplain? If so, consider another location or incorporate resilient design features if flooding is possible.	Flood Zones (FEMA)	Evacuation Routes (County/City)
Connectivity	Is this location convenient to high-density multi-family housing, employment centers, and/or other destinations such as shopping centers or community centers?	Land Use (Parcel Data)	Future Land Use (County/City)
Multi-Modal	Are there multimodal connections at this location? Will other power needs, such as charging for e-bikes and ride-hailing, or car-sharing services be needed?	Sidewalks, Trails, and Bicycle Facilities (FDOT)	Planned Pedestrian and Bicycle Facilities, Mobility on Demand Zones, Transit Stations, Micromobility Zones (County/City/Micromobility Operators)
Population	Who will this location serve? Is there an opportunity to serve populations that do not have existing access to EV chargers?	Population Density (American Community Survey)	EV Registrations (Atlas EV Hub)

3.1.4 OTHER CONSIDERATIONS

WORKERS

Workplace charging provides a convenient charging option for drivers who live in multifamily housing or drive long distances to work. Workplace charging can be provided via Level 1 or 2 charging stations, as vehicles are parked at the workplace for many hours. With Level 2 charging stations, policies to prevent charged vehicles from parking too long in charging spaces may be necessary.

VISITORS

The MetroPlan Orlando region has a high number of visitors who have the region as their vacation destination. While DCFC are best located along major highways for the through-traffic, additional charging stations should be considered at locations tourists visit. Level 2 chargers should be considered for retail, recreation, and entertainment venues. Level 2 or DCFC should be considered at hotels.

3.2 INFRASTRUCTURE INVESTMENT

In the last few years unprecedented funding for EV charging infrastructure has been available and the process for identifying and applying for the proper funding can seem daunting. For this reason, the Electrification Coalition created the EV Funding Finder which helps eligible recipients identify available federal funds for transportation. The tool is updated quarterly with current funding opportunities.[19]

Typical budgets associated with EVSE include both one-time capital expenses and on-going operational costs.

Capital Expenses

- EVSE units and installation costs
- Site restoration
- Labor (contracted or in house)
- Design and engineering
- Utility Make Ready fees
- Permitting costs
- Networking
- Commissioning

Operational Expenses

- Maintenance
- Networking & credit card processing
- Electricity
- Customer support
- Program management

Municipalities can play different roles when investing in EV charging infrastructure. **Table 3-2** compares the three owner/operational models.

[19] https://electrificationcoalition.org/ev-funding-finder/

Table 3-2. Deciding the Role of Your Municipality

	Operator	Landlord	Enabler
Brief Description	Municipality purchases and installs the charging stations.	Municipality provides land for equipment that a vendor installs and operates stations.	Municipality prepares a property for a vendor to buy and build on.
Funding	Municipality pays all capital and operational costs. Municipality seeks grants, credits, and rebates. Municipality maintains records and reports.	Vendor pays a municipality a leasing fee, may ask municipality to pay some site prep and restoration costs including electrical upgrades. Vendor handles all financing and takes all incentives and credits.	Municipality provides electrical upgrades, streamlined path for permitting, reduced development fees, clear design guidelines. Grants may be available.
Maintenance	Municipality staff perform hardware maintenance or hire a vendor. Municipality staff or a third-party may handle customer support.	Vendor provides technical support, maintenance, and operation. As landlord, municipality may be responsible for property upkeep.	Vendor must meet code requirements for property upkeep.
Data Management	Separate service contract with vendor and Municipality staff.	Vendor collects and reports most data.	N/A
Fees	Municipality pays all fees for networking, management software, credit card payments (if applicable).	Vendor may ask municipality to provide insurance, pay property tax.	N/A

Grants and rebates are opportunities that municipalities can utilize to fund EV charging infrastructure investment. In the past few years, the following programs have been available:

- The **Inflation Reduction Act (IRA)** accelerated transportation electrification by providing federal money for charging infrastructure and tax credits for consumers and manufacturers of EVs or batteries that upgrade or build new facilities. The IRA authorized the Environmental Protection Agency (EPA) to create and implement the Greenhouse Gas Reduction Fund, a historic $27 billion investment to combat the climate crisis by mobilizing financing and private capital for greenhouse gas- and air pollution-reducing projects in communities across the country and includes tax credits and EV capital project grants.
- The IRA of 2022 extended and amended the **30C Alternative Fuel Vehicle Refueling Property Credit** (30C credit), which provides a tax credit for installing qualified alternative fuel vehicle refueling infrastructure in low-income and/or non-urban locations. It can apply to individuals, businesses, and tax-exempt organizations. The tax credit is for the property owner and does not apply to land that a city sells to a developer. Further guidance and coordination with a municipality's finance department is recommended for exploration of this tax credit.
- The **Bipartisan Infrastructure Law (BIL)**, also known as the **Infrastructure Investment and Jobs Act (IIJA)**, established the **NEVI Program** to provide funding to States to strategically deploy EV charging infrastructure and to establish an interconnected network to facilitate data collection, access, and reliability. The BIL allocated $18 billion in investments to reduce emissions through vehicle electrification with the following programs:

- $5 billion through the NEVI Formula Program, of which $198 million was directed to Florida-specific projects
- $2.5 billion through the Charging & Fueling Infrastructure (CFI) Discretionary Grant Program to strategically deploy accessible EV charging and alternative fueling infrastructure. These were distributed through community-focused and corridor-focused grants. No additional funding rounds are currently anticipated.
- $5 billion through the Clean School Bus Program
- $5.6 billion through the Low- and No-Emission Transit Bus Program
- $250 million through the Electric or Low-Emitting Ferry Program

- The **National Association of State Procurement Officials (NASPO)** has set prices for vendors related to EV charging station equipment and support services. Eligible entities that can utilize this procurement contract include state departments, institutions, agencies, political subdivisions, federally organized tribes, public/non-profit entities, and suppliers.
- Past and present electric utility rebates within MetroPlan Orlando include:
  - The **Duke Energy Commercial Charger Rebate**[20] that allows qualifying businesses, cities, schools, and apartment complexes to install EV chargers for fleets, school buses, and transit buses. The deadline for this program concluded December 31, 2024.
  - The **Florida Power & Light Company (FPL) Public and Fleet EV Charging Solutions**[21] provides assistance in the design, build, installation, and maintenance of EV chargers.
  - The **KUA Home EV Charger $200 Rebate**[22] program that allows residents to directly purchase a charger for their home.

3.2.1 GRANT APPLICATION PREPARATION PROCESS

Grants can be used by agencies to secure funding for planning or installing EV charging infrastructure. The availability of grants and the specific requirements of each grant can fluctuate between grant cycles. However, there are common steps that jurisdictions can use when preparing for grants.

STEP 1: ENGAGE WITH COMMUNITY MEMBERS

Community engagement can both help you develop community priorities and increase your competitiveness for grant funding. Many grant programs emphasize an inclusive and representative community process as well as collaboration with the public and relevant stakeholders. To prepare a successful grant application, you should:

- Clearly identify a problem and community need that will be addressed by the project.
- Point to community engagement that has already occurred prior to the grant.
- Consider how this project helps “transportation disadvantaged” communities.

STEP 2: ALIGN PLANS AND POLICIES WITH GRANT PROGRAM GOALS

Many of the new grant programs provide funding for both planning and implementation. Your grant application should demonstrate your community’s readiness for the project you are applying for by pointing to existing plans, policies, and processes that reflect the goals and objectives of the grant program.

[20] https://www.duke-energy.com/business/products/ev-complete/charger-rebate
[21] https://www.fpl.com/electric-vehicles/for-business.html
[22] https://kua.com/ev/home-ev-chargers/

STEP 3: BUILD RELATIONSHIPS WITH POTENTIAL GRANT PARTNERS

Collaboration with partner agencies can be an effective strategy for leveraging project funding and developing successful grant proposals. When considering grant teaming partners make sure to:

- Build a well-rounded team with partnerships.
- Pick the right partners, which can involve public/private partnerships as well as new inter-agency partnerships.
- Demonstrate strong, tangible commitment from project partners.

STEP 4: ASSEMBLE YOUR GRANT WRITING TEAM

Assemble or hire a multidisciplinary grant-writing team whose members have a strong understanding of each element of the grant.

STEP 5: TRACK FUTURE FUNDING OPPORTUNITIES

Stay tuned for upcoming grant notifications, which you can find on the USDOT's or Department of Energy's (DOE) web sites.

Here are some of the key USDOT and DOE programs:

- National EV Infrastructure Formula Program (NEVI).
- Congestion Mitigation and Air Quality Improvement (CMAQ).
- Charging and Fueling Infrastructure (CFI) Discretionary Grant Program.
- Federal Lands Access Program (FLAP).
- Rebuilding American Infrastructure with Sustainability and Equity (RAISE, formerly known as BUILD and TIGER).
- Transportation Alternatives (TA) Set-Aside from the Surface Transportation Block Grant (STBG) Program.
- Title XVII Renewable Energy and Efficient Energy Projects (Loan Programs Office).

3.3 UTILITIES

A workshop was conducted in June 2024 with utility providers within MetroPlan Orlando's region to gather insights on the challenges of implementing and maintaining EVSE and measuring success in EV adoption.

3.3.1 CHALLENGES

The utility providers identified challenges that they have faced with the installation of EVSE. KUA identified the shortage of EV charger technicians as the biggest challenge, while OUC and Duke identified the power supply at the site location as their biggest challenge.

TECHNICIAN SHORTAGE

KUA identified the shortage of qualified EV charger technicians as the biggest challenge. Misdiagnosis of problems with the EVSE has been a concern, which leads to extended periods where the EVSE is non-operational. OUC has not found this a significant challenge yet, but they expect it to become an issue as their EV operations continue to scale.

POWER AVAILABILITY

Both OUC and Duke identified the power supply at the site location as their biggest issue. This is almost always a problem: unless a site is brand new, it will have a power supply issue and require upgrades to infrastructure. KUA added that network is the second biggest challenge they are contending with. OUC concurred, adding that the network is a huge cost.

PERMITTING

The need for consistency in permitting processes across different counties was emphasized by utility provider representatives. In on-site host agreements, providing 'cradle to grave' services were preferred. Selling chargers has been less successful, except for sister agencies such as the County, City, or LYNX — in these cases, the legal hurdles are less complex.

RETURN ON INVESTMENT

There was consensus among the three utilities that selecting optimal charger installation sites is a key decision they are facing. All three utilities look for locations that are "site ready"; for example, parking lots with free spaces, available power, and enough users to generate a positive ROI. The participants also agreed that they are not looking to be "in the gas station business", and that it is preferable if a third party owns the charging equipment. Both OUC and KUA have recognized that there is little payback with Level 2 chargers and are focusing on DCFC/Level 3 fast chargers to obtain a positive ROI. Grid capacity was not considered a significant concern given the longer-term planning horizon that utilities work towards.

THEFT AND VANDALISM

OUC identified theft and vandalism as an issue within disadvantaged census tracts. KUA agreed with this point during the discussion and added that installing cameras to monitor and manage theft adds to the cost of EVSE at these sites. Both OUC and KUA concurred that it is difficult to attract investment for EVSE in these areas because of the payback challenges. OUC and KUA also agreed that more consistent regulatory and policy support is needed for EVSE in DEI areas.

3.3.2 METRICS

The utilities were asked for the metrics they use in capacity planning and measuring the success of their programs.

- Percentage of EV ownership and transitioning EV fleet vehicles
- Data from submetering EV power equipment
- Additional load demand and services after EVSE installation at sites
- Numbers of BEV and PHEV
- Percentage of chargers located within disadvantaged census tracts

OUC's top two metrics are the number of registered EVs and the location of chargers; the former indicates how OUC is doing in terms of adoption rates and incentives, and the latter indicates whether the ESVE are servicing the public appropriately. KUA is interested in usage data from submetering EV power equipment, particularly driver zip codes, in order to indicate whether EVSE is utilized mostly by the local community or vehicles traveling through the region. However, the network is an issue: since KUA does not own the network, they do not have access to this information.

For the EVSE equipment itself, the utilities are using the following metrics to track EV charger hubs:

- Data from the chargers and/or submeters
- Additional load demand
- Reliability data (uptime, number of service calls, etc)
- Percentage of chargers located within DEI census tracts

Data from chargers and submeters is the key metric tracked by all three utilities. Understanding how often the chargers are used and how long each charging session helps them to determine whether to add more charging stations. This data also helps them to assess the value of any Level 3 chargers installed. All three utilities concurred

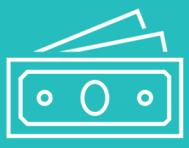
that reliability data is also an important metric, allowing them to compare networks and manufacturers and make better decisions for future projects.

3.3.3 UTILITY EV PLANNING

The utility companies all use various methods to communicate their progress toward EV readiness. Duke Energy has found that providing updates to staff and stakeholders helps to build support and strengthen the case for EV, which is then communicated via the organization's website. KUA added that in addition to the methods listed above, they conduct surveys and use social media. OUC has conducted ride-and-drive events and found these to be very effective.

Key Takeaways of Charging Infrastructure Analysis

A gap analysis was conducted to understand the areas within MetroPlan Orlando that are currently not serviced by Level 2 chargers, with a focus on proximity to multi family housing. A site selection tool further supports municipalities and private entities to understand potential challenges and opportunities for the installation of charging hubs and other charging stations. This tool includes publicly available data including the location of existing chargers, utility lines, flood plains, parcel information, land use, sidewalks, bicycle and trail facilities, and population density.



Although there have been unprecedented funding opportunities for EV infrastructure, there are other mechanisms to support the installation, operation, and maintenance of EV chargers. Municipalities can decide which role they want to play as an operator, landlord, or enabler. Municipalities are encouraged to work with their local utility provider to address opportunities to provide EV charging to their residents/customers.

4 Public Outreach

Public outreach is essential to increase the purchase and utilization of EVs within the region. Drivers who have misconceptions about EVs or are concerned about the availability of charging stations are less likely to purchase an EV. As technology surrounding EVs is constantly changing, keeping the public updated on the improvements being made to EVs and EV charging is essential.

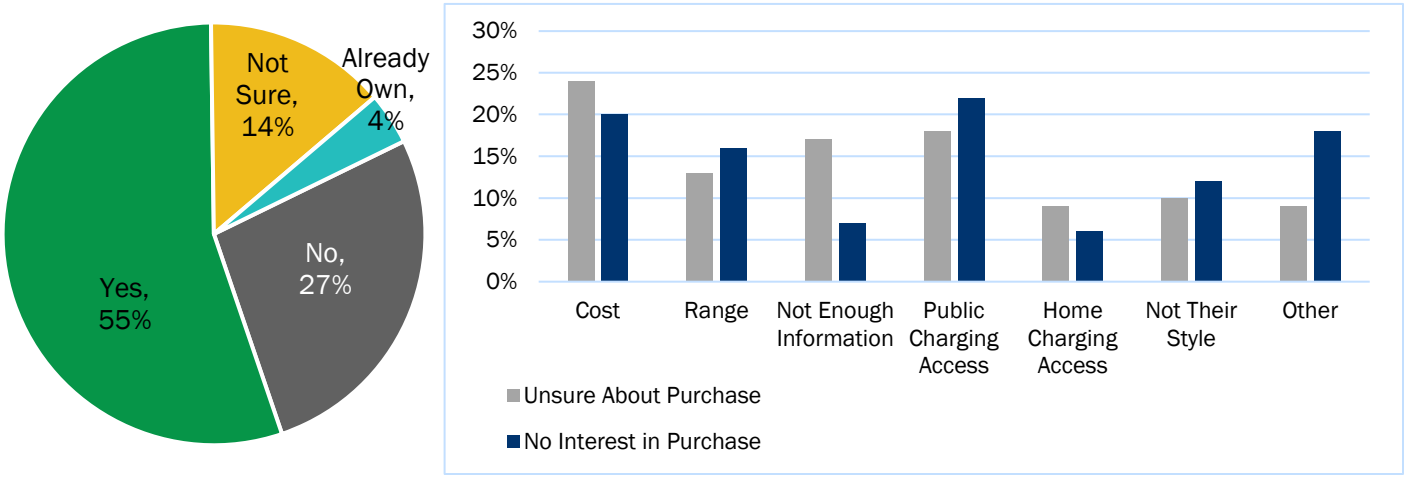
4.1 REGIONAL TRANSPORTATION SURVEY

As part of the 2024 Regional Transportation Survey conducted by Metroplan Orlando, participants were asked for their feelings on electric vehicles. The survey had 3,134 total respondents and reasonably reflected the demographics of the region, although survey respondents had a slightly higher rate of high school degrees, bachelor's degrees, and current employment than the general population.

4.1.1 INTEREST IN PURCHASING ELECTRIC VEHICLE

Survey respondents were asked about their interest in purchasing a completely electric vehicle. If they said no or weren't sure, they were asked what were the main reasons that they answered that way. **Figure 4-1** summarizes the answers to whether or not the respondents were interested in purchasing an electric vehicle and the reasons why they are unsure or uninterested. Based on the survey, almost 60% of respondents already own or are interested in purchasing an electric vehicle, while 40% of respondents are unsure or uninterested. The cost of purchasing an electric vehicle as well as concerns about finding a public charging station ranked the highest amongst concerns.

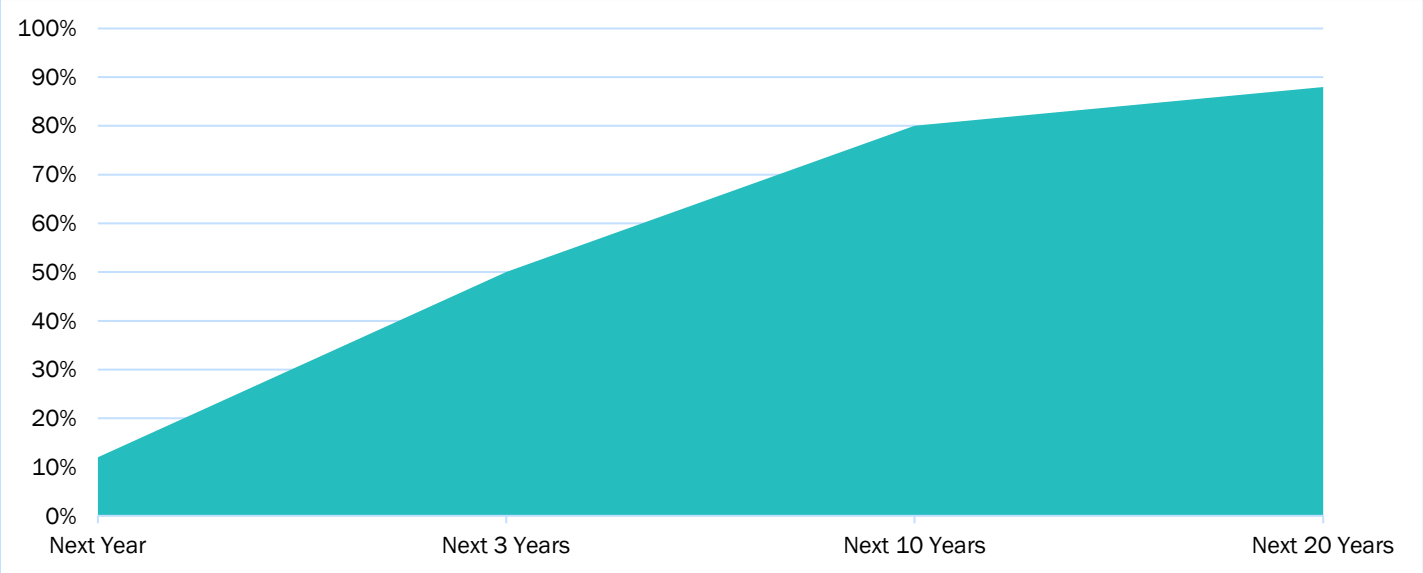
Figure 4-1. Interest in Purchasing an Electric Vehicle



4.1.2 TIMING OF ELECTRIC VEHICLE PURCHASE

Of those who said they were interested in purchasing an electric vehicle or not sure, approximately 50% said they would consider purchasing an electric car within the next 3 years, with 80% considering purchasing an electric car within the next 10 years, as shown in Error! Not a valid bookmark self-reference.. When combining these results with the percentage of survey respondents who are interested in purchasing an electric vehicle (55%), the survey indicates that approximately 20% of the all survey respondents would consider purchasing an electric car within the next 3 years, and 44% of all survey respondents would consider purchasing an electric car within the next 10 years, which may result in a higher adoption rate than projected.

Figure 4-2. Timing of Purchase of Electric Vehicle



4.2 PUBLIC INVOLVEMENT PLAN

The survey results indicated that some of the reasons people are unsure or uninterested in purchasing EVs include a lack of information or concerns about range and charging station availability. Lack of awareness of, information about, and experience with EVs among consumers, stakeholders, and government officials are barriers to the successful market introduction of this innovative technology.

4.2.1 OUTREACH MATERIALS

To help educate consumers, stakeholders, and government officials , outreach materials were prepared to supplement this report, which can be included for informational purposes on the MetroPlan Orlando website and printed out as flyers at events MetroPlan Orlando attends. The target audiences for these materials include residents who are curious about EVs, as well as municipalities, utility companies, and private entities interested in best practice guidance related to installing, maintaining, and operating EV charging infrastructure.

ELECTRIC VEHICLES 101

The Electric Vehicles 101 fact sheet is intended for individuals who are unfamiliar with electric vehicles. It provides information on various types of EVs and the types of chargers that are available to charge EVs.

DESIGNING FOR EVS

The Designing for EVs fact sheet is intended for local jurisdictions interested in installing EV charging hubs as well as developers who may want to prepare their properties for EVSE. The fact sheet includes considerations when installing, maintaining, and operating EVSE.

FUNDING FOR EV CHARGING INFRASTRUCTURE

The Funding for EV Charging Infrastructure fact sheet is intended for local jurisdictions, utility companies, and property owners wishing to install public charging stations. It provides an overview of the grant process as well as information on where to find current grants for the installation of EVSE and examples of existing/past grant programs.

4.2.2 MONITORING PUBLIC KNOWLEDGE

Continued integration of EV questions in MetroPlan Orlando's Regional Transportation Survey is recommended to not only understand the potential market demand for EV vehicles but also identify and address the concerns that individuals have (when possible) towards using EVs.

5 Planning and Monitoring

5.1 REGIONAL GOALS AND TARGETS

As the adoption of EV vehicles increases throughout MetroPlan Orlando's region, so will the demand for EV charging infrastructure. Recommendations to meet the charging needs reflect the percentage of total number of EV vehicles within the region, rather than a specific number of EV charging sites. Therefore, the following metrics should be tracked every one to three years for MetroPlan Orlando's three county region:

- Percent EV Adoption (total EV registrations/total vehicle registrations)
- Number of EVs
- Existing Private Chargers
- Existing Publicly Accessible Level 2 Chargers
- Existing Publicly Accessible DC Fast Chargers
- Existing Non-Single Family Home Chargers
- Based on the number of EVs, the following can be estimated with the EVI Pro Lite adoption forecast tool:
    - Estimated Private Chargers Needed
    - Estimated Publicly Accessible Level 2 Chargers Needed
    - Estimated Publicly Accessible DC Fast Chargers Needed
    - Total Non-Single Family Home Chargers Needed

Data sources and links for each of these metrics can be found in **Appendix E**.

5.2 POLICY RECOMMENDATIONS

Local governments across the country are updating codes and regulations to create a consistent regulatory framework to allow, incentivize, and in many cases, require EVSE infrastructure. The design and installation of EVSE infrastructure will vary depending on the type of land use, type of charging station, footprints of charging stations, desired level of readiness, and use-case. Policies that impact the EVSE installation generally include land use and site planning requirements such as on-site circulation for all modes (vehicles, pedestrians, and bicyclists), parking requirements (dimensions, ratios, and queuing), and other building codes related to the safety of the site design. Best practices related to land use policies and examples from other cities are found in **Appendix F**.

5.2.1 SITE LOCATION CONSIDERATIONS

When planning the site and components of a charging station, the site should consider the users and use case. For users, it is important to determine if users are expected to leave their vehicle for long periods of time, or stay on the property while the vehicle is charging. For the use case, it is important to determine whether the charging stations are limited to the residents/occupants of a building, accessible to the public, or dedicated/restricted for fleet vehicles.

Due to the preemption of Senate Bill 1084, municipalities cannot require minimum standards for EV charging. While regulations based on Senate Bill 1084 are still under development, it is anticipated that municipalities may be able to offer incentives to promote the installation of EVSE. Tools to incentivize developers to incorporate EVSE within new development or redevelopment projects may include:

- Parking reductions, including opportunities to include shared parking opportunities
- Impact fee waivers
- Expedited permitting processes

5.2.2 SITE DESIGN CONSIDERATIONS

When a property includes plans to incorporate EV charging facilities, site design should be considered. Municipal policies that typically affect EVSE installation generally include land use and site planning requirements including:

- On-site circulation for vehicles, pedestrians, and cyclists
- Parking dimensions, ratios, and queuing
- Landscaping, buffering, screening, and tree protection
- Signage (such as logos and business identification sign panels, general service signs, alternative fuel corridor signs, and parking/standing/stopping signs through the Manual on Uniform Traffic Control Devices (MUTCD) 11th Edition, Part 2[23])
- Building Codes (electrical, fire, and life safety)

CIRCULATION

When locating the EVSE within a site, vehicle and pedestrian circulation should be considered. The equipment mounts and station amenities should be designed so as not to interfere with driveways, bicycle paths, sidewalks, passenger pick-up and drop off areas, or site circulation. Queuing space should be provided that doesn't interfere with site circulation. Accessible pedestrian connections to existing sidewalks and buildings should also be considered when located the EVSE.

ACCESSIBILITY

The design of the charging station should follow the United States Access Board's Design Recommendations for Accessible Electric Vehicle Charging Stations[24] to provide physical access for people in wheelchairs and people using mobility devices. When designing EV charger accessibility, accessible mobility features and accessible communication features should be considered. The location of the charging inlet is not the same across EV models - some EVs have a charging inlet on the front of the vehicle, others at the rear or the sides of the vehicle. People in wheelchairs and people using mobility devices need an accessible route around all sides of the vehicle in an accessible EV charging space so they can access the plug at their vehicle charging inlet.

Additionally, accessible communication features enable the EV charger interface to be used by people who are deaf or hard of hearing, little people, drivers with vision impairments, and people with other disabilities. Communication features include display screens; audible cues; visual status indicators; input controls; and keys, cards, or payment systems.

PROXIMITY TO POWER

There are tradeoffs of power extensions. For example, the shortest route might reduce site disturbance but longer routes may be cost effective to avoid impacting key infrastructure, such as state roadways.

EVSE INSTALLATION

EVSE should be installed at heights of 1.5 feet or more above floor level for indoor locations and 2 feet or more above grade level for outdoor locations. Cord management should be required for cords that exceeds 25 feet[25] in length. DCFC cords are commonly shorter to minimize power loss.

Additionally, vehicle impact protection should be required to reduce risk of damage to charging equipment. This can include installation on a side wall not subject to vehicle impact or 4 feet or more above floor level, wheel barriers, bollards, or other approved barriers.

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[23] https://mutcd.fhwa.dot.gov/kno_11th_Edition.htm
[24] https://www.access-board.gov/tad/ev/
[25] https://newbuildings.org/wp-content/uploads/2022/11/2020-NEC-EVSE-Single-Family-Permitting-and-Inspection-Guide.pdf

FUTURE PROOF

Although the demand may not currently exist to justify the full installation of EVSE, encouraging developments to include additional parking stalls which are EV-Capable or EV-Ready can help accommodate increased demand in the future. By reducing the need for multiple excavations, a dig-once policy can help avoid or minimize damage to existing infrastructure (parking lots, sidewalks, landscaping, etc), reducing the future costs to install EVSE.

SECURITY

Safety is a concern for both the users of the charging stations as well as to discourage vandalism of the charging stations. Lighting, video cameras, and strategic siting of charging stations closer to store fronts can be used to improve user comfort.

MAINTENANCE, OPERATIONS, AND DATA COLLECTION

Maintenance contact information should be clearly posted on each EVSE so users can report issues directly to a maintenance service provider. Municipalities should specify maintenance and repair plans in their EVSE services agreements. When possible, charging utilization data, as well as data on the number of times a plug was picked up but not working, should be collected to monitor maintenance and operational performance.

AMENITIES

The user experience for the charging station can be improved by adding amenities tailored to the specific charging locations, which can include trash cans, weather protection, solar canopies, and benches or tables.

LANDSCAPING

Most site design standards require a minimum level of landscaping. The installation of new EV charging spaces and related equipment cabinets could displace existing code-required landscaping or impact a developer's ability to meet the landscaping requirements. At a minimum, new standards or review processes should be required to describe how landscaping will be addressed and how the equipment (including transformers, switchgear, and other similar items) will be screened. Innovation should be encouraged. For example, shade alternatives to tree canopies include solar photovoltaic covers or green roof covers.

6 Moving Forward with EV Planning

EVs are one of many tools we can use to reduce transportation emissions and improve public health in the MetroPlan Orlando region. The total number of EVs registered in the region has doubled in the past year to 4-5% of the overall vehicles registered. We anticipate the EV market share will continue to grow over the next 10 years, based on the responses to the regional transportation survey and the commitments by auto manufacturers to electrify their fleets. As EVs are still an emerging market, the technology surrounding EVs is constantly changing. Some of the concerns identified in the Regional Transportation Survey regarding battery range or the availability of charging stations are being addressed by the manufacturers with longer battery range and the pledge to standardize charging ports so that drivers aren't limited to certain EVSE. Understanding the trends in EV development and educating the public on the newer technologies available may encourage drivers to switch to electric vehicles with their next vehicle purchase.

Early EV adopters generally charge their vehicle at home overnight. This is a convenient and low-cost option for people who are able to access or install a charger where they live. EV drivers who cannot charge at home need access to public charging stations. Based on the analysis within this Electric Vehicle Readiness Study, the MetroPlan Orlando region has enough public DCFC within the region to meet today's demands but still needs to add Level 2 chargers throughout the community. While DCFC can charge vehicles quickly, they generally have a higher cost than Level 2 chargers. Providing lower-cost Level 2 charging options is needed to provide affordable and convenient charging options for all members of the community. Renters and people who live in multi-family apartments, mobile homes, or older homes built before 1960 may not be able to install an EV charger at their residence or might need costly electrical upgrades to ready their home for an EV charger. The lack of at-home charging opportunities and lack of Level 2 chargers in the community make some people less likely to purchase an EV.

The installation of much of the existing EVSE network has been led by the private sector. While this is expected to continue, local municipalities and utilities can also work together to promote the installation of EVSE in the gaps. With the State of Florida preempting local agencies abilities to require EVSE, it will be important for local agencies to work closely with the State to review the guidance and policies being proposed by the State and find ways to incentivize the installation of EVSE or EV-Capable/EV-Ready parking spaces. Additionally, municipalities and/or utilities may be able to pursue grants to help fund EVSE installation.

Metroplan Orlando should continue to monitor the usage of EVs within the region and assist the local municipalities and utilities in pursuing additional EVSE as needed for the current and future demand.

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Electric Vehicle (EV) Readiness Study

Appendices

January 31, 2025

Final

CONTENTS

Appendix A. Terminology

	30C Alternative Fuel Vehicle Refueling Property Credit. A program from the Inflation Reduction Act that provides a tax credit for individuals, businesses, and tax-exempt entities that install qualified refueling properties into service during a tax year in eligible census tracts.
AFC	**Alternative Fuel Corridor.** A federally designated network of electric vehicle charging and hydrogen, propane, and natural gas fueling infrastructure along national highway system corridors.
AFDC	**Alternative Fuels Data Center.** A program of the Federal Department of Energy that provides information on alternative fuels and advanced vehicles.
AEO	**Annual Energy Outlook.** A program of the Federal Energy Information Administration that provides data on long-term energy trends in the United States.
BEVs	**Battery Electric Vehicles.** Vehicles which operate only on an electric battery.
BIL	**Bipartisan Infrastructure Law.** A federal law authorized by congress in November 2021 in the Infrastructure Investment and Jobs Act, which authorized up to $108 billion for public transportation.
CFI	**Charging & Fueling Infrastructure.** A grant program through the Federal Highway Administration to provide funding for publicly accessible electric vehicle charging and alternative fueling infrastructure.
CMAQ	**Congestion Mitigation and Air Quality.** A federal funding program through the for transportation projects that improve air quality and reduce traffic congestion. The program began in 1991 and was most recently reauthorized in 2021.
DACS	**Department of Agriculture and Consumer Services.** A department within the State of Florida which has been given authority by the Florida government to set regulations on the installation of EVSE.
DCFC	**Direct Current Fast Charging.** Level 3 charging equipment, which provides the fastest charge of electric vehicles.
EIA	**Energy Information Administration.** The federal government authority which is responsible for energy statistics and analysis.
EPA	**Environmental Protection Agency.** The federal government agency which has the mission of protecting human health and the environment.
EV	**Electric Vehicle.** Vehicles which are powered by at least one electric motor.
EVSE	**Electric Vehicle Supply Equipment.** Equipment used to transfer energy between the electric utility provider and an electric vehicle.
EVSP	**Electric Vehicle Service Providers.** Vendors who supply equipment used to charge EVs.
ETC	**Equitable Transportation Community Explorer.** A webtool from the US Department of Transportation based on census data to explore transportation disadvantaged areas.

FLAP **Federal Lands Access Program.** A program of the US Department of Transportation Federal Highway Administration to improve transportation facilities that access, are adjacent, or are located within Federal lands.

FCEV **Fuel Cell Electric Vehicles.** Vehicles which use hydrogen to power an electric motor.

FDOT **Florida Department of Transportation.** The agency within the State of Florida responsible for transportation funding and policy within the state.

FPL **Florida Power & Light Company.** A utility provider within the State of Florida providing electricity along the east coast, treasure coast, and western panhandle.

GHG **Greenhouse Gases.** Gases which absorb radiation emitted by the planet and raise the surface temperature, which are often found in emissions from gasoline-powered vehicles.

GMC **General Motors Company.** An American automotive manufacturing company.

HEV **Hybrid Electric Vehicles.** Vehicles which have an electric battery that operates an electric motor and a gasoline tank that fuels a gasoline motor. The electric battery recharges through regenerative braking.

IIJA **Infrastructure Investment and Jobs Act.** A federal statue enacted in 2021 to provide funding for infrastructure projects.

IRA **Inflation Reduction Act.** A federal law which invested in the American economy, energy security, and climate.

JOET **Joint Office of Energy and Transportation.** An office which works with the US Department of Energy and US Department of Transportation to help states and communities plan and deploy zero-emission fueling and charging infrastructure.

KUA **Kissimmee Utility Authority.** The utility company which provides electrical capacity within Osceola County.

Level 1 Charging Equipment. Charging equipment that provides electricity to a vehicle through a common 120-volt AC outlet and provides the slowest charge to the vehicle.

Level 2 Charging Equipment. Charging equipment that provides electricity to a vehicle through a 240V (residential) or 208-volt (commercial) AC outlet.

Level 3 Charging Equipment. Charging equipment that provides electricity to a vehicle using a DC outlet, providing the fastest charging to the vehicles. Also known as DCFC equipment.

NASPO **National Association of State Procurement Individuals.** A non-profit organization dedicated to assisting public agencies in procurement.

NEVI **National Electric Vehicle Infrastructure.** A program that provides federal funding to states to strategically deploy electric vehicle charging stations.

NHTSA **National Highway Traffic Safety Administration.** An agency within the US Department of Transportation focused on vehicle safety regulations.

NMTC **New Markets Tax Credit.** A program within the US Department of Treasury Community Development Financial Institutions Fund to use tax credits to attract private investment in distressed communities.

NREL	**National Renewable Energy Laboratory.** A laboratory within the US Department of Energy to develop answers to energy challenges.
OUC	**Orlando Utilities Commission.** A utility company that provides electric (and water) services within the City of Orlando, in eastern Orange County, and in eastern Osceola County.
PHEV	**Plug-In Hybrid Electric Vehicles.** Vehicles which have an electric battery that operates an electric motor in addition to a gasoline tank that fuels a gasoline motor. The electric battery can be plugged in to recharge.
	Regenerative Braking. Converting the kinetic energy of a car into electric energy while breaking.
RAISE	**Rebuilding American Infrastructure with Sustainability and Equity.** Federal grant program.
ROI	**Return on Investment.** A financial metric that compares the financial benefits to the cost of a program.
STBG	**Surface Transportation Block Grant.** A federal-aid program within the US Department of Transportation Federal Highway Administration to provide funding for projects on Federal roadways.
TA	**Transportation Alternatives.** A funding program within the Surface Transportation Block Grant program which sets aside funding for smaller-scale transportation projects.
USDOT	**United States Department of Transportation.** The federal agency which governs transportation issues within the US.
ZEV	**Zero-Emission Vehicles.** Vehicles which do not emit gas or other harmful pollutants from the onboard source of power.

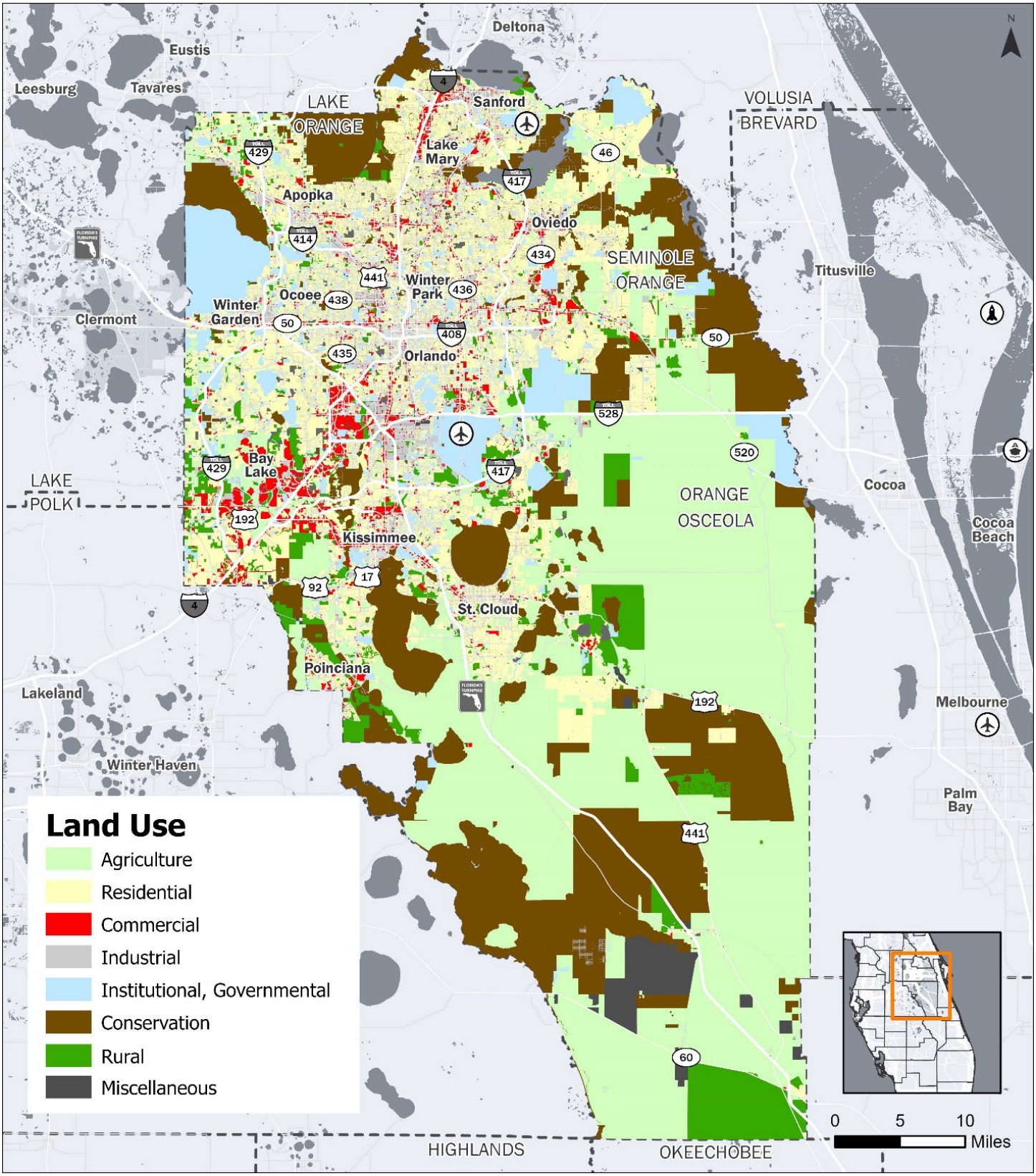
Appendix B. Data Sources

Table 1. Data Sources

Data	Geography	Source	Year
Existing Public and Private Chargers	MetroPlan Orlando planning area	U.S. Department of Energy Alternative Fuels Data Center (AFDC)	Latest
EV Pro Lite	MetroPlan Orlando planning area	AFDC	-
Statewide EV registration	Florida county, state	Atlas EV Hub	2018-2021
ZIP Code EV registration	Florida Zip code	Florida Highway Safety and Motor Vehicles	2021
Single/multi-family housing units	Census Tract/Block Group	American Community Survey 5-Year Data (2009-2021)	2009-2021
Population	Census Tract/Block Group	American Community Survey 5-Year Data (2009-2021)	2009-2021
Number of Households	Census Tract/Block Group	American Community Survey 5-Year Data (2009-2021)	2009-2021
Urban and Rural Area	MetroPlan Orlando planning area	MetroPlan Orlando	-
Job Density	Census Blocks	Longitudinal Employer-Household Dynamics (LEHD)	2009-2021
Disadvantaged/ Non-disadvantaged Neighborhood	Census Tract	MetroPlan Orlando	-
LODES		Longitudinal Employer-Household Dynamics (LEHD)	

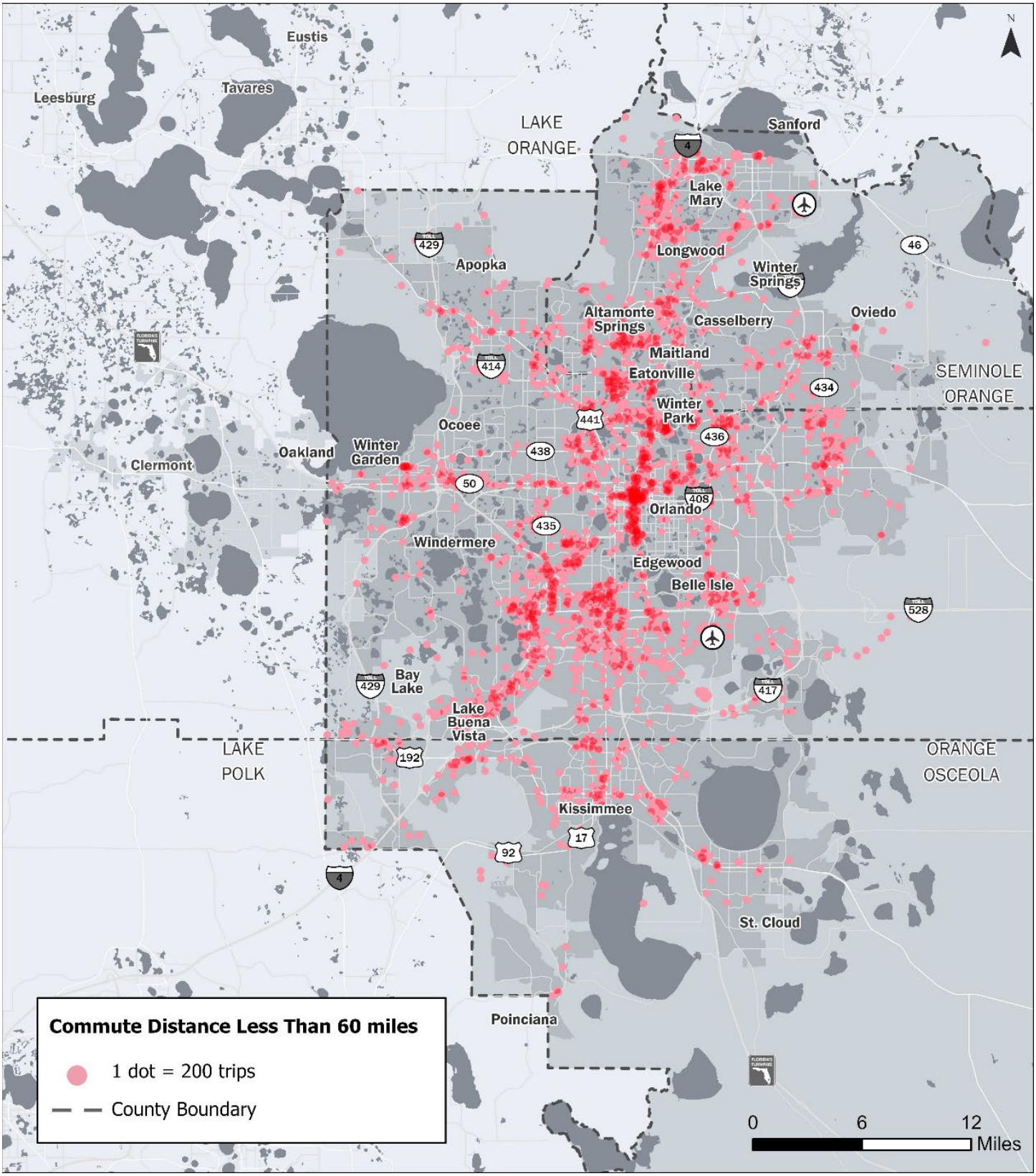
Appendix C. EVSE Assessment Map Series

Map 1. Existing Land Uses



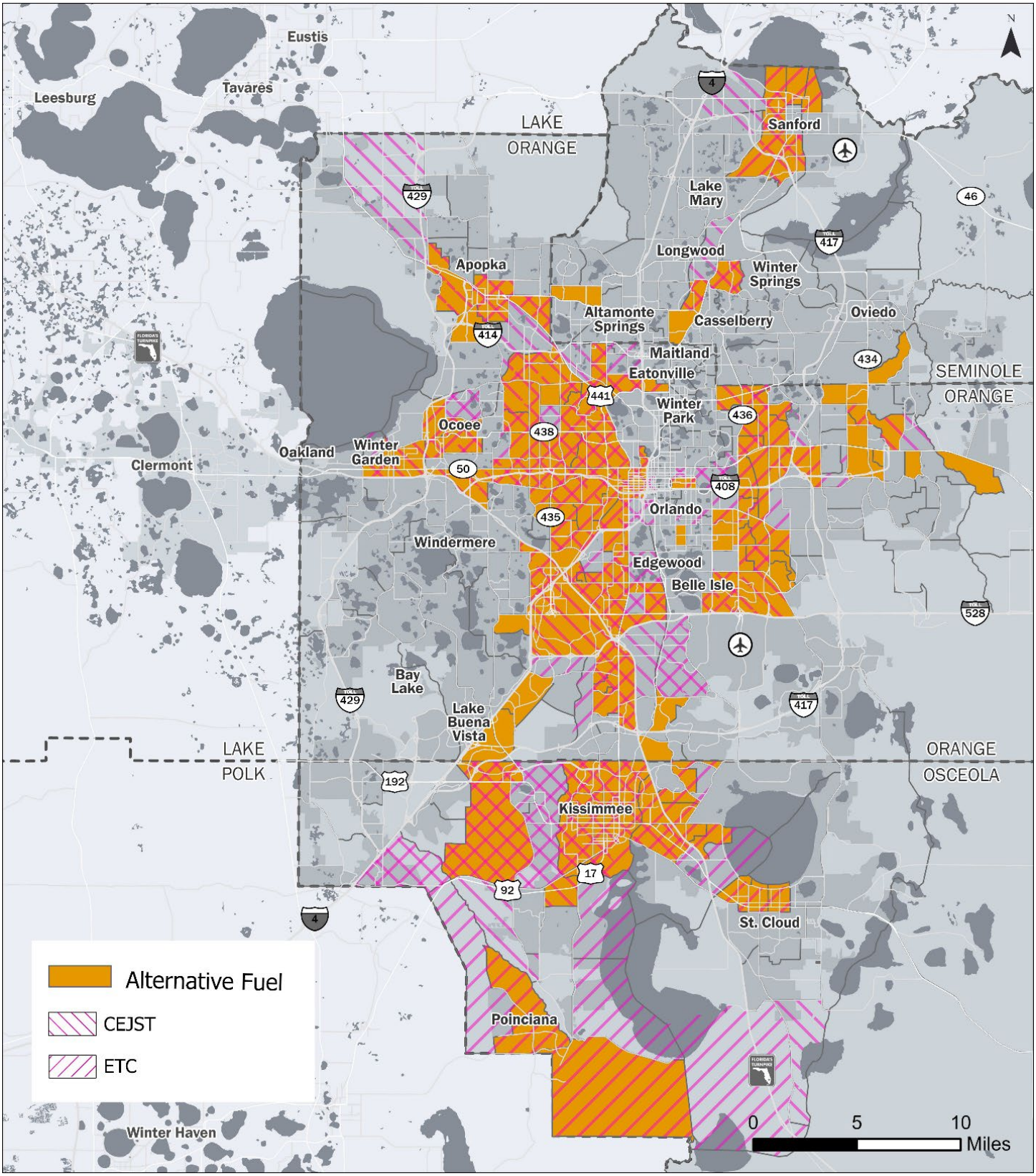
(County Property Appraiser, 2022)

Map 2. Long-Distance Commuters



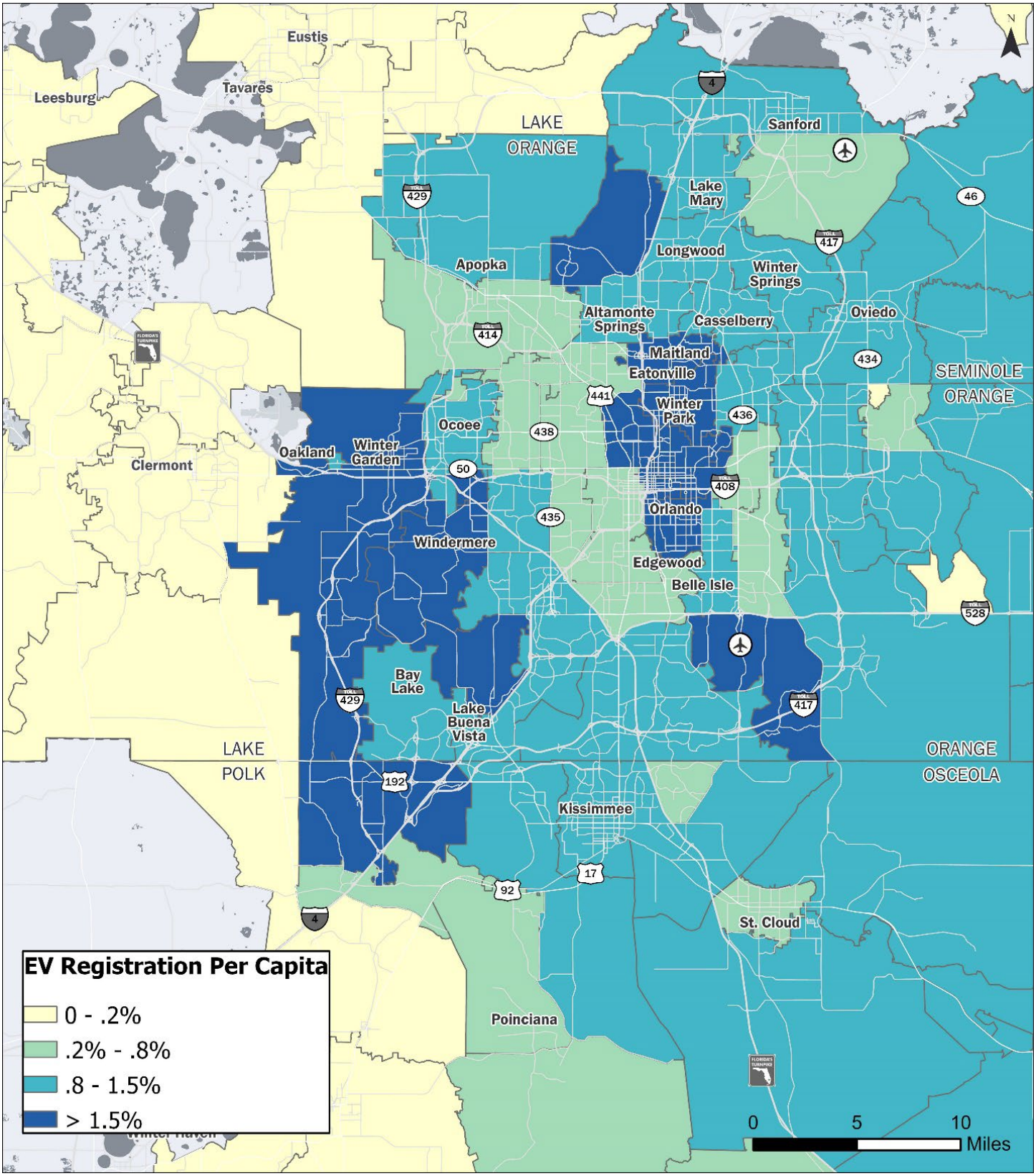
(LEHD Longitudinal Employer-Household Dynamics, 2023)

Map 3. Disadvantaged Communities



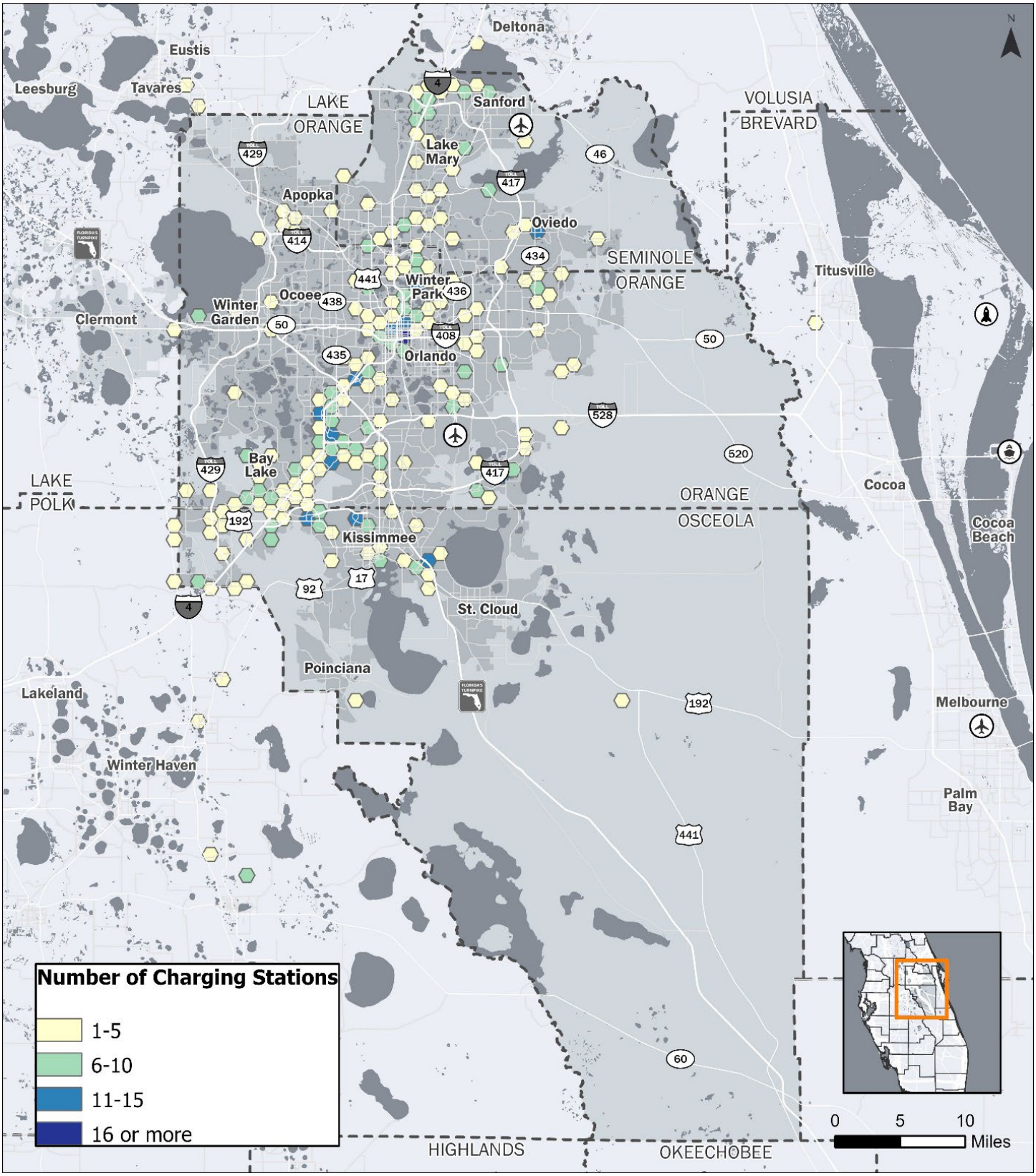
(Florida Department of Transportation, 2024; Joint Office of Energy and Transportation, 2024, USDOT, 2024)

Map 4. EV Ownership per Capita



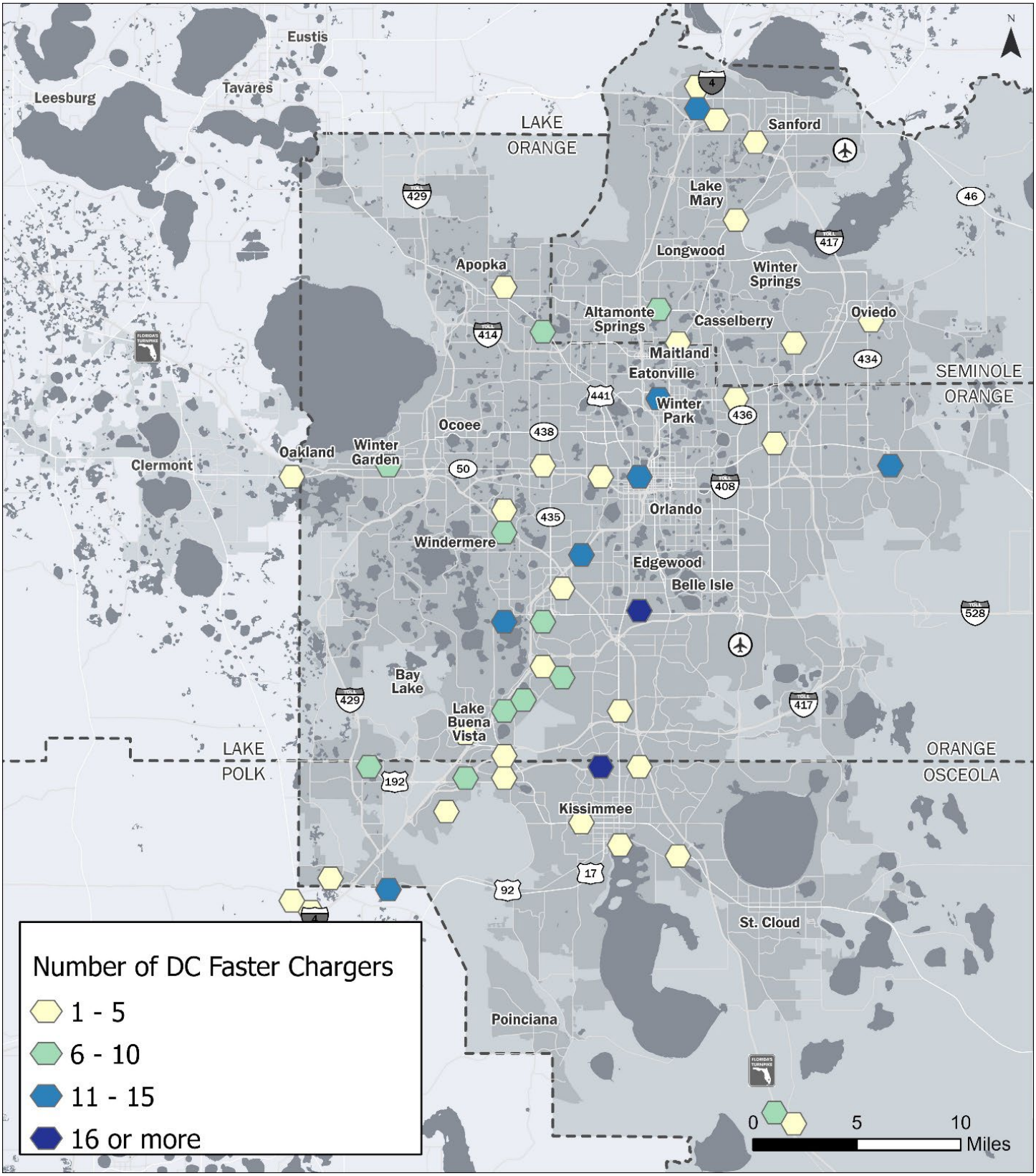
(AFDC TransAtlas, 2023)

Map 5. Existing EV Charging Infrastructure



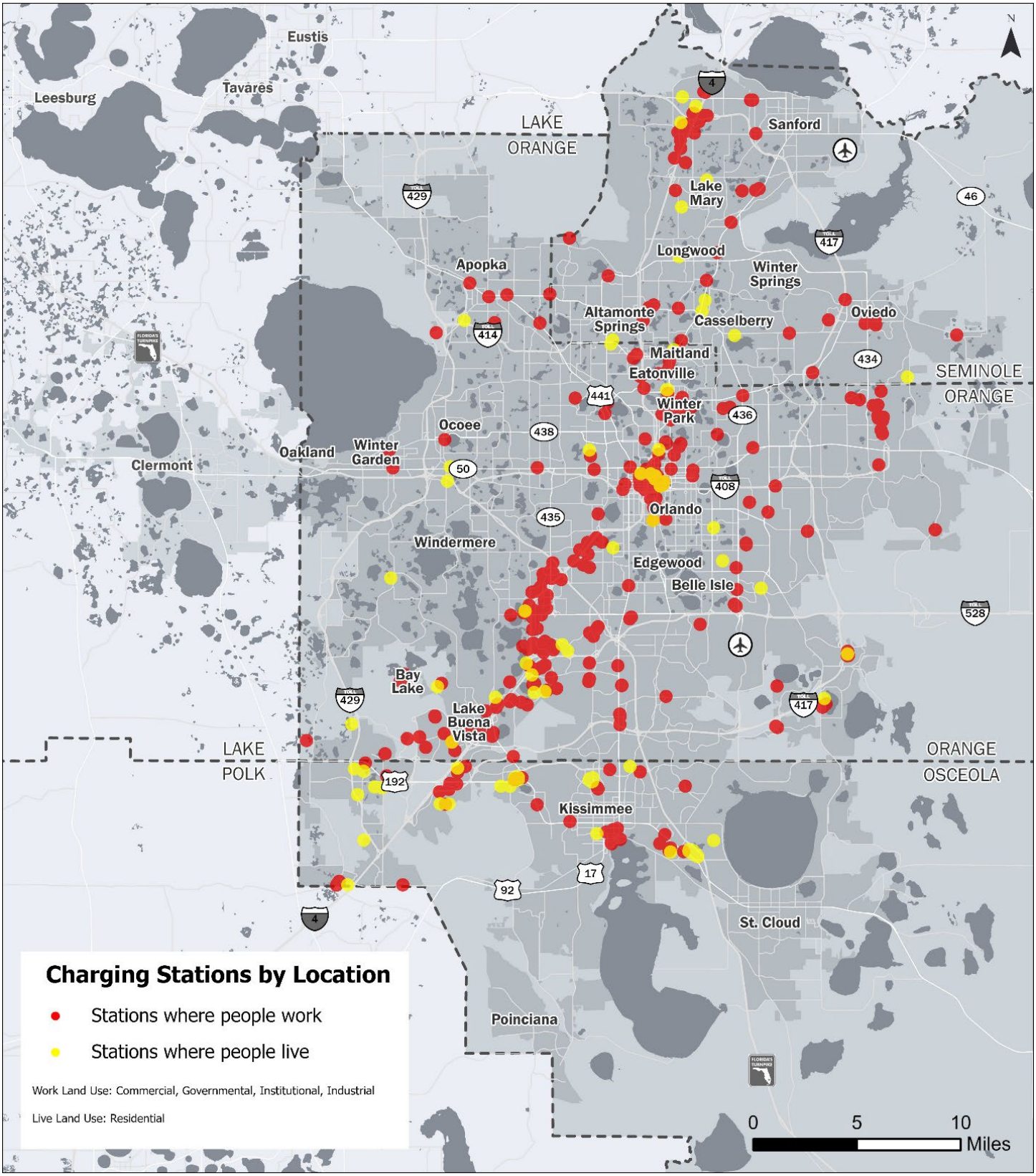
(AFDC, 2024)

Map 6. Existing DC Fast Charger Infrastructure



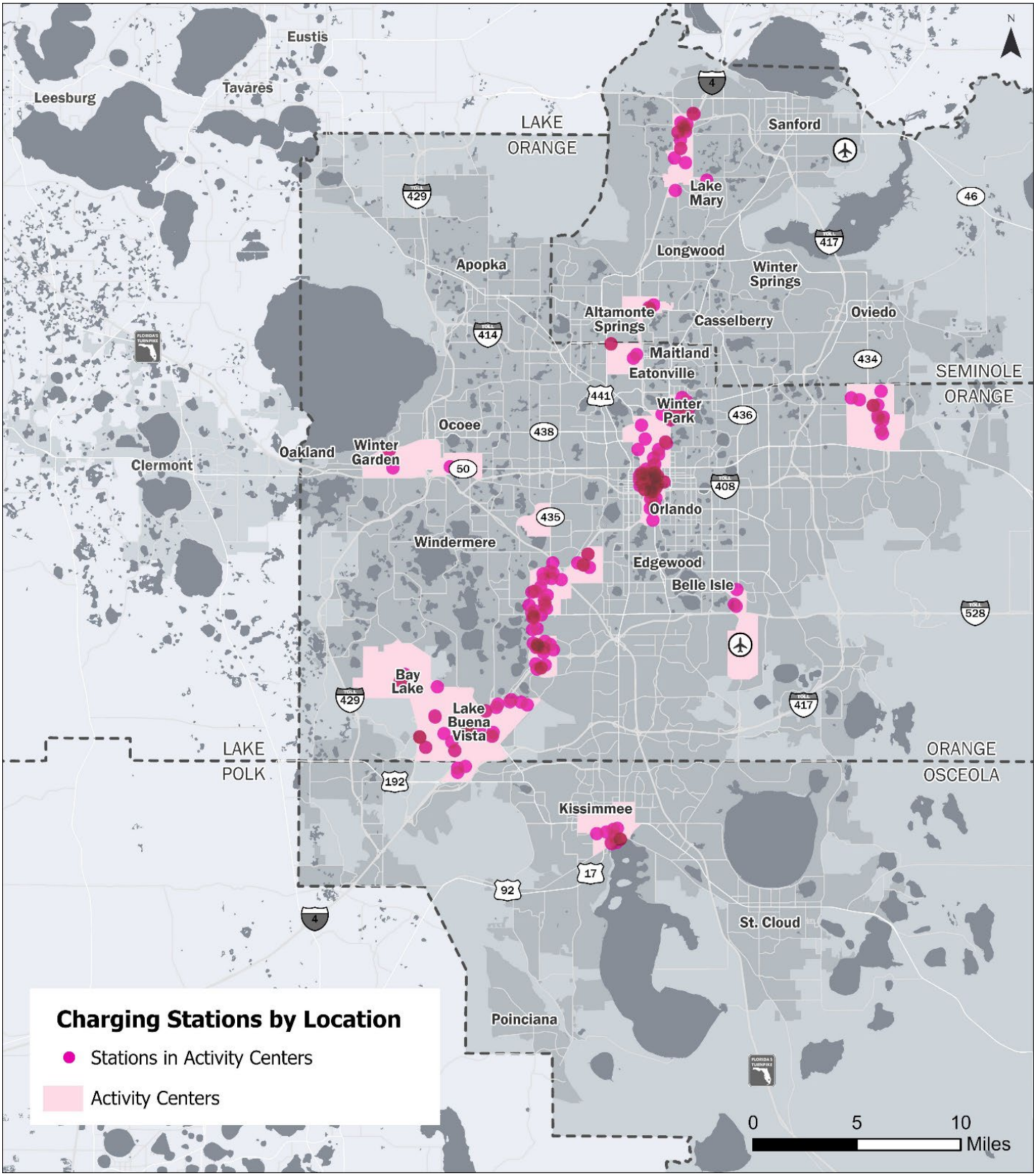
(AFDC, 2024)

Map 7. Charging Stations in Residential and Commercial Areas



(AFDC, 2024; County Property Appraiser, 2022)

Map 8. Charging Stations within Activity Centers



(AFDC, 2024)

Appendix D. Local EV Codes

City of Orlando Municipal Code

Sec. 61.360. - Purpose of Electric Vehicle Parking Requirements

- The requirements of this Part are intended to provide electric vehicle charging abilities distributed throughout the City to serve public mobility needs, prepare for emerging electric vehicle technologies, improve air quality, and achieve City sustainability goals, including climate change mitigation.

Sec. 61.361. – Applicability

- The requirements of this Part shall apply to new development or substantial enlargement of structures. Only the new parking spaces added as part of a substantial enlargement are subject to the requirements of this Part.

Sec. 61.362. - General Requirements

- Electric vehicle parking spaces shall meet all performance standards of Ch. 61 Part 3.
- EV Readiness requirements are categorized in two levels as follows:
    - EV Capable: These parking spaces prepare for future Electric Vehicle Supply Equipment (EVSE) installation by providing dedicated electrical capacity in the service panel (40amp breaker for every two EV Capable two spaces) and conduit to the EV Capable space. These spaces do not require wiring to the space or a receptacle.
    - EVSE Installed: These parking spaces are reserved for EVs and provide drivers the opportunity to charge their electric vehicle using EV charging stations rated at a minimum of 32amp 7.2 kW. These spaces should be installed per the requirements of the National Electrical Code (NFPA 70) as adopted and amended by the State of Florida.

Sec. 61.363. - Number of Spaces Required

- The parking requirements of this Part are intended to provide minimum standards and do not count towards maximum parking requirements. The EV parking requirements are based on a percentage of the minimum required parking spaces of Part 3 of this Chapter.

Sec. 61.364. – Location

Type	EV Capable**	EVSE Installed (threshold)**
Certified Affordable Multi-family housing	20%	n/a
Multi-family, hotel, all parking structures	20%	2% (requirement begins at 50 spaces)
Commercial (non-residential)* (office, retail, and public, recreational & institutional uses)	10%	2% (requirement begins at 250 spaces)
Industrial (employee parking only)	10%	2% (requirement begins at 250 spaces)

* Commercial projects for fuel retailers in which automotive services is the primary use are excluded from requirements contained in this Part.

** All partial space requirements are rounded down.

Sec. 61.365. – Design

- Charging equipment must be mounted on the wall or on a structure at the end of the electric vehicle parking space provided.
- No charging devices may be placed within the dimensions of a space, on the sides, or entrance to a space.

- When cords and connectors are not in use, retraction devices or locations for storage shall be located sufficiently above the pedestrian surface and the parking lot as to reduce conflicts with pedestrians and vehicle maneuvering.
- Cords, cables, and connector equipment shall not extend across the path of travel in any sidewalk or walkway.(e)Equipment mounted on structures such as pedestals, lighting posts, bollards, or other device shall be located in a manner that does not impede pedestrian, bicycle, or transit travel.(f)Alternative designs may be approved by the Zoning Official.(g)Additional landscape screening may be required for mechanical equipment such as transformers associated with charging equipment, consistent with mechanical equipment screening requirements.

Sec. 61.366. – Accessibility

- A minimum of one (1) EVSE Installed space must be located adjacent to an ADA designated space to provide access to the charging station.
- The accessible space must be designated as an EV reserved space.
- The EVSE Installed accessible spaces should have all relevant parts located within accessible reach, and in a barrier-free access aisle for the user to move freely between the EVSE and the electric vehicle.

Sec. 61.367. – Signage

- All EVSE Installed parking spaces should be designated following MUTCD standards.

City of Winter Park Municipal Code

Sec. 98-12. Electric vehicle charging station spaces.

- Definitions:
    - Electric vehicle means any vehicle that operates, either partially or exclusively, on electrical energy from the grid, or an off-board source, that is stored on board for motive purpose.
    - Electric vehicle charging station means a public parking space that is served by battery charging station equipment that has as its primary purpose the transfer of electric energy (by conductive or inductive means) to a battery or other energy storage device in an electric vehicle.
- Electric vehicle charging stations on public property. Public electric vehicle charging stations that are located on public property are reserved for parking and charging electric vehicles only. When a sign provides notice that a space is a designated public electric vehicle charging station, no person shall park or stand any nonelectric vehicle in that space. Any nonelectric vehicle is subject to fine or removal. Any electric vehicle in any designated public electric vehicle charging station space on public property that is not electrically charging shall be subject to a fine and/or removal. For purposes of this subsection, "charging" means an electric vehicle is parked at an electric vehicle charging station and is connected to the charging station equipment.
- Where public electric vehicle charging stations are constructed and installed, the city engineer shall cause appropriate signs and markings to be placed in and around the parking spaces of said stations, indicating prominently thereon the parking regulations. The signs shall state that the parking space is reserved for charging electric vehicles and that an electric vehicle may only park in the space for charging purposes.
- Enforcement.
    - A violation of this ordinance or section shall be enforceable pursuant to the procedures for code violations and enforcement against code violations provided in chapter 1, including Sec 1-24 of the Municipal Code of the City of Winter Park, and the fine for any violation found shall be a class II violation in accordance with the provisions in chapter 1, of the Municipal Code.

- Further, A minimum of one electric vehicle parking space must be located adjacent to a required accessible parking space such that the electric vehicle charging station can be shared between an accessible parking space and electric vehicle parking space. A minimum five feet wide accessway must be provided by the accessible electric vehicle parking space if the accessway is not already provided as part of the planned accessible parking space.
    - Site lighting shall be provided where an electric vehicle charging station is installed.
    - Signage must be posted at each EV parking space indicating its reserved use for electric vehicles charging.
    - EV charging stations must be maintained in good condition by the property owner, and removal of required EV charging stations is only permitted in the case of replacement.
- Readiness requirements for multi-family residential and non-residential properties. In order to proactively plan for and accommodate the anticipated future growth in market demand for electric vehicles, all new development shall provide electric vehicle charging station infrastructure per this section. The infrastructure shall be installed per technical amendments to the Florida Building Code found in chapter 22, section 2703 of the City of Winter Park Code of Ordinances.
    - Readiness requirements for new multi-family residential projects that require a conditional use, shall be determined as part of the conditional use approval process.
    - Non-residential properties (like commercial, office, institutional, and industrial sites) are required to install the electrical infrastructure and underground raceway necessary for future installation of Level-2 EV charging stations in at least 10% of the total parking spaces. If extra EV parking spaces are available beyond the minimum, they can be counted towards this readiness requirement, while those fulfilling the required EV parking quota cannot be counted.

City of Winter Park Comprehensive Plan

- Policy 2-3.1.5: Alternative Fuel. The City will continue to support alternative fuel vehicles through the encouraging of the provision of charging stations throughout the City.
- Policy 5-1.1.1: Transportation Alternatives The City shall continue to plan for transportation alternatives to gasoline-powered automobiles by promoting electric vehicles (EV) usage with public-facing charging stations, planning efficient pedestrian and bicycle systems and by evaluating future feasibility for multimodal systems, including bus and passenger rail transit, and by adapting streets, and parking structures to facilitate pedestrian and bicycle transportation.

City of Oviedo Comprehensive Plan

- Policy 1-1.1.6: Density/Intensity Bonuses might be awarded for installing electric vehicle charging stations, along with other public benefits classified as green building and acknowledged sustainability practices. The Land Development Code will oversee the range of Density or Intensity Bonuses, which will be formalized via a development agreement between the City and the landowner/developer. This agreement will specify the bonus amount and the mutually agreed-upon public benefit(s).
- Policy 2-2.1.21: The City of Oviedo shall evaluate the impacts of new technology, such as autonomous and connected vehicles, electric City-owned vehicles, and electric vehicle charging demands, as well as other sustainable technology to determine the impacts of future technology and demands on the City's multimodal transportation network.

City of Apopka

- Section 5.1.6: Electric Vehicle (EV) Charging Stations: A maximum of ten percent of the mandated off-street vehicular parking spaces can be allocated and labeled as electric vehicle (EV) charging stations, adhering to the criteria outlined in this section. The Director holds the authority to authorize the utilization and labeling of additional mandatory parking spaces as electric vehicle charging stations. However, such additional spaces will be counted as only half a parking space when calculating the minimum number of required parking spaces. These designated parking spaces for electric vehicle charging should be arranged in one or more groups of adjacent spaces, easily identifiable by electric vehicle drivers (e.g., through signage), while discouraging use by non-electric vehicles.
- Sec 5.11.4 awards points towards classification of a development as a "Green Building". Developments must earn 3 to 4 points (varies based on size of development) to earn this classification. The following points are awarded for installing EV infrastructure:
- Sec 5.12.6 provides the following incentives for achieving status as a "Green Building" through the same requirements as Sec 5.11.4:
    - An increase in the maximum allowable height by up to one story or 14 feet beyond the maximum allowed in the base zoning district;
    - An increase in the maximum allowable lot coverage by 15 percent beyond the maximum allowed in the base zoning district;
    - A modification to the off-street parking requirements resulting in a reduction from the minimum requirements by 15 percent, or an increase to the maximum allowable number of spaces provided by 15 percent (without an alternative parking plan).

City of Maitland Municipal Code

- Definitions: Per Sec 10.3.2, the City of Maitland defines electric vehicle charging stations as a vehicle parking space served by an electrical component assembly or cluster of component assemblies (battery charging station) designed and intended to transfer electric energy by conductive or inductive means from the electric grid or other off-board electrical source to a battery or other energy storage device within a vehicle that operates, partially or exclusively, on electric energy.
    - Level 1 Charging Station: Slow-charging on a 15- or 20-amp breaker with a 120-volt AC circuit.
    - Level 2 Charging Station: Medium-speed charging on a 40- to 100-amp breaker with a 208- or 240-volt AC circuit.
    - Level 3 Charging Station: Fast-charging using a high-voltage circuit.
- Sec 4.3.4. Reserved Spaces:
    - EV charging stations are reserved exclusively for electric vehicles and require clear signage indicating cost, voltage, amperage, and other essential information.
    - Accessible parking spaces may also serve as charging stations if ADA compliant.
    - Charging equipment must not impede vehicle, bicycle, or pedestrian access.
    - Non-residential zones permit public charging stations.
- Sec 5.2.5. Off-Street Parking:
    - For parking lots exceeding 35 spaces, two EV charging stations are required, with three additional spaces being EV-ready.
    - For every 75 extra spaces, add two more stations and three EV-ready spots.
    - EV charging stations must be Level 2 or 3, grouped together, and easily identifiable via signage.
- Sec 5.12.3: The City of Maitland provides similar quotum for achieving "Green Building" status, and awards point values of 0.75, 1.00, and 1.50, respectively, for the three requirements listed in Table 6 of Sec 5.12.3

Development Feature	Points Earned

Provide a minimum of five percent of required automobile parking spaces that are signed and reserved for hybrid/electric/low energy vehicles in preferred locations near the primary building entrance	0.75
Provide at least one electric vehicle (EV) level 2 charging station that is made available to those using the building, in addition to any EV charging stations required in accordance with Sec. 5.2.5(c), Electric Vehicle Charging Stations	1.00
Provide at least one electric vehicle (EV) level 3 charging station that is made available to those using the building, in addition to any EV charging stations required in accordance with Sec. 5.2.5(c), Electric Vehicle Charging Stations	1.50

City of Sanford Municipal Code

- Sec 2.0: Developers are encouraged to install EV charging spaces and infrastructure throughout the city to promote resilience. In certain cases, this may be required based on parking capacity or discretion of the Administrative Official.
- Sec 5.0: A reduction in parking spaces can be approved if applicants include at least two out of six design elements, such as EV charging stations or electric conduits.
- Sec 7.0: The city encourages EV readiness and infrastructure within new and existing developments.
- Definitions: Sanford follows Orlando's definitions of "EV Capable" and "EVSE Installed."
- Sec 8.0: Design guidelines for EV parking spaces include:
    - EV charging stations count toward required parking spaces.
    - Charging equipment should be wall-mounted or at the end of the parking space.
    - Devices cannot obstruct parking access, pedestrian paths, or maneuvering.
    - EV parking spaces must be close to associated buildings.
    - Multifamily developments must provide 10% EV charging or capable spaces.
    - Cords must be stored safely above ground to prevent conflicts with pedestrians or vehicles.
    - Equipment on posts or pedestals must not interfere with pedestrian, bicycle, or transit travel.
    - Alternative designs can be approved by the Administrative Official.
    - Additional landscape screening for mechanical equipment such as transformers associated with charging equipment may be required at the discretion of the Administrative Official.

Orange County Municipal Code

Sec. 35-63. - Prohibited in specified places.

- M. In any parking space specifically designated for charging an electric vehicle if the vehicle is not capable of using an electrical recharging station, consistent with F.S. § 366.94.

Appendix E. Fact Sheets

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DESIGNING FOR EVs

Developers, engineers, and planners all have important parts to play in creating opportunities for supportive EV infrastructure. The right charging setup depends on user needs, surrounding land use, and site constraints. Accessibility for people with disabilities is a major component in a well-designed EV charging space.

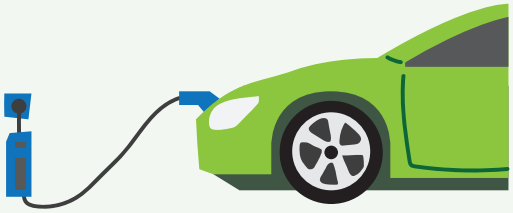
MEETING USER NEEDS

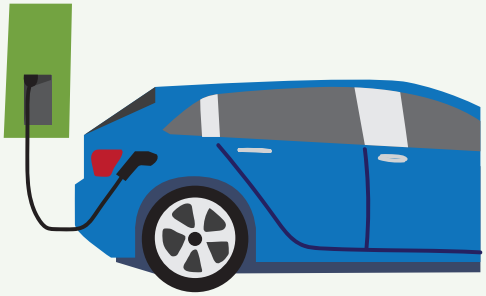
EV charger user needs will vary depending on land use and whether chargers are for homes, apartments, commercial/industrial areas, or recreational spaces. With any new construction, developers should estimate the current and future demand for EV charging. There are three general readiness levels for EV charging, so that new development can plan for both the current and future demand while minimizing the need to rebuild infrastructure when more demand is necessary:

EV-CAPABLE
Sufficient electrical panel capacity and installed conduit for future power.

EV-READY
Have all the required hardware in place for future EV equipment..

EV-INSTALLED
Sufficient electrical panel capacity and installed conduit for future power.





For Residents

Most EV drivers charge their cars at home. People who live in single-family homes typically have greater access to at-home charging, since they are more likely to have dedicated parking spaces and plug-in access. To facilitate wider EV adoption, people living in multifamily developments like condos and apartments also need access to at-home charging.

- Install Level 1 and Level 2 chargers near multifamily housing, paying particular attention to supply disadvantaged communities with equitable access to charging infrastructure.

For Employees

Employees who commute to work may need access to charging during the day. It is important to offer chargers where there are high concentrations of employees or large parking lots.

- Provide Level 1 and Level 2 chargers for employees to slowly charge their vehicles while they are parked at work.
- Implement charging management system or policies to prevent charged vehicles from parking too long in charging spaces.

For Visitors

The MetroPlan Orlando area is a top vacation destination and visitors need to have access to charging stations whether they are staying in town or just passing through. Visitors renting cars may be curious about EVs and take the opportunity to try out the technology while they are on vacation.

- Provide DC fast charging stations on corridors with high volumes of through-traffic (Florida's Turnpike, I-4).
- Install Level 2 chargers for retail, recreation, and entertainment area.
- Install a combination of Level 2 and DC fast chargers for hotels and motels.

DESIGN CONSIDERATIONS

To meet the future demands of EVs, any new construction, modification, or retrofit to buildings or parking lots should consider EV charging stations at the planning level. The following is a checklist of design considerations for EV charging stations.

Number of Charging Stations and Ports

- What is the demand?
- Are the parking spaces for public use, private use, or a combination of uses? Are spaces shared or assigned?
- How long are vehicles anticipated to stay parked at this location? What type of charger is needed?

Location

- Are there existing amenities where chargers would be able to be retrofitted? What is the impact on the existing landscaping?
- Can you design the site so that EV charging equipment such as transformers can be screened from the rest of the site?
- Are the EV chargers in well-lit areas and/or security cameras provided for increased user comfort?

Circulation

- Does the equipment mount interfere with the movement of vehicles and/or pedestrians within the site? Are there accessible pedestrian connections from the charging spaces to existing sidewalks and buildings?
- Is there space for vehicles to queue while waiting for a charger?

Accessibility

- Are the chargers designed at heights accessible to people who use wheelchairs or other mobility devices? Follow the US Access Board's Design Recommendations.
- Is there room for people with mobility disabilities to maneuver around the EV to access the charging cable and charging port, no matter where they are located on different vehicles?
- Is there an accessible route that leads to an accessible entrance of the building or facility?

Proximity to Power

- Where is existing power infrastructure available? Does coordination need to occur with utilities to identify any needed upgrades?
- Can you minimize disturbance and impacts to key infrastructure to minimize the installation costs?

Operations & Maintenance

- Where is existing power infrastructure available? Does coordination need to occur with utilities to identify any needed upgrades?
- Can you minimize disturbance and impacts to key infrastructure to minimize the installation costs?

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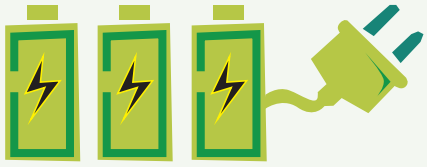
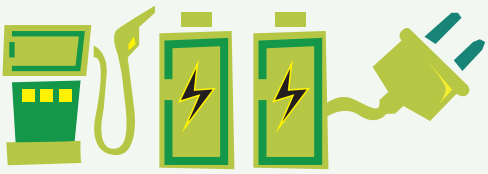
Electric Vehicles 101

What is an Electric Vehicle?

The term “electric vehicle” describes any vehicle powered by one or more electric motors for propulsion. The term covers a range of vehicles that are currently available in the market:



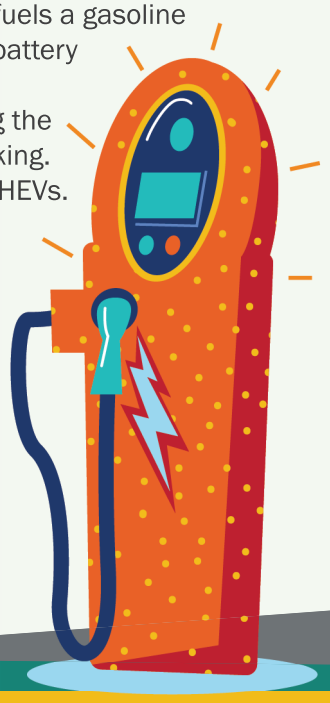
Battery Electric Vehicles (BEVs): These vehicles operate only on an electric battery and are also known as "all-electric vehicles". BEVs are powered only by electricity and are charged by an external power source. BEVs have a very large battery and can travel between 150 and 400 miles on a single charge. Some popular models of BEVs include Tesla Model 3, Nissan Leaf, and Rivian delivery vans.



Plug-In Hybrid Electric Vehicles (PHEVs): These vehicles have an electric battery that operates an electric motor in addition to a gasoline tank that fuels a gasoline motor. The electric battery can be plugged in to recharge and the gas tank can be refilled. PHEVs consume 14 - 47% less fuel than conventional vehicles when their batteries are fully charged. Using just the battery and electric motor PHEVs can travel between 20 and 40 miles on a single charge, but in the absence of electricity, PHEVs can also operate on gasoline. Some popular models of PHEVs include Chevrolet Volt, Chrysler Pacifica, and Ford Fusion Energi.

Hybrid Electric Vehicles (HEVs): These vehicles have an electric battery that operates an electric motor and a gas tank that fuels a gasoline motor. The gas tank can be refilled, but the electric battery cannot be plugged in to charge. Instead, the battery recharges through regenerative braking – converting the kinetic energy of a car into electric energy when braking. The battery is typically smaller than the battery for PHEVs. Some popular models of HEVs include Toyota Prius and Ford Maverick.

Fuel Cell Electric Vehicles (FCEVs): These vehicles use hydrogen to power an electric motor. They are not very commonly used as a personal vehicle but are gaining traction for commercial uses such as buses and long-haul trucks. Similar to gasoline powered vehicles, FCEVs have a tank that is filled with hydrogen at a centralized station (similar to a gas station).

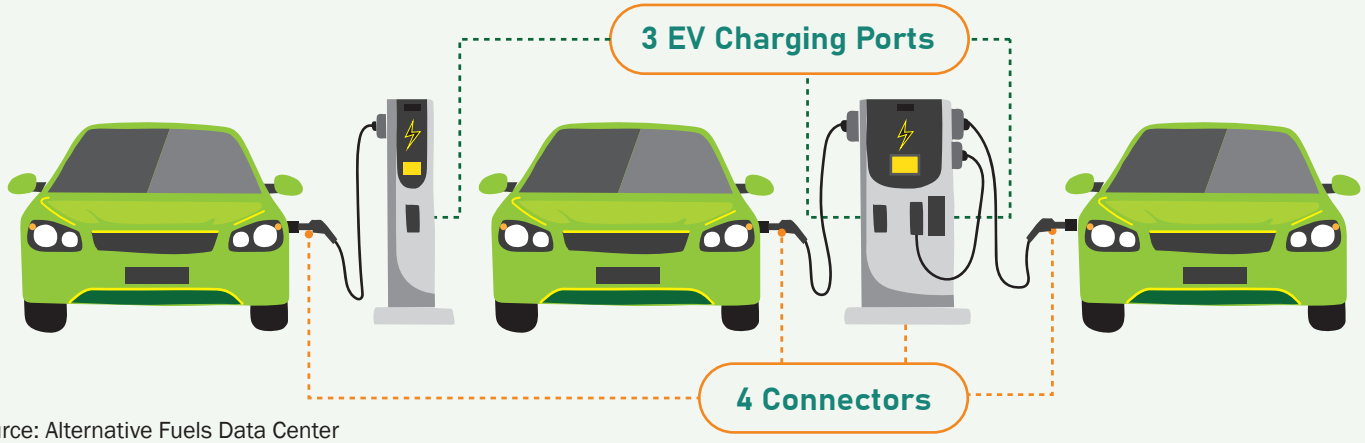


Charging Infrastructure

Battery electric vehicles and plug-in hybrid electric vehicles charge by plugging a cable into a power source to allow for the movement of electrical current. At its most basic form, an EV can be charged by plugging into a standard wall outlet. However, more sophisticated charging stations can provide faster charging for vehicles.

The equipment used to charge EVs is known as Electric Vehicle Supply Equipment (EVSE). EVSE allows for the transfer of energy between the electric utility power and the EV. EVSE includes EV charge cords, charge stands (residential or public), attachment plugs, vehicle connectors, and protection. The vendors who supply EVSE are known as Electric Vehicle Service Providers (EVSP). EVSP delivers end-to-end EV charging, handling charging station installation, operations and maintenance.

Several terms are used to describe EV charging stations. A charging station is a location where there may be several chargers available. A charger is the equipment used to charge a vehicle. One charger may have multiple ports, used to distribute the power available to the charger between multiple vehicles.

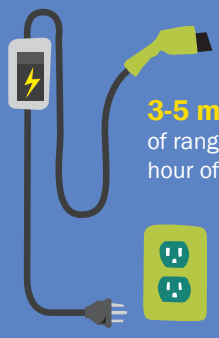


Source: Alternative Fuels Data Center

There are different types of chargers that charge EVs at different speeds. EVs can charge at three “levels”, each of which carries a different amount of electricity, measured using kilowatt-hours (kWh). Simply stated, the larger the kWh, the faster electricity is refueling the EV.

LEVEL 1
Slow Charge

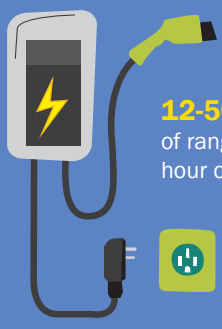
Can be publicly available but is frequently associated with at-home charging using standard wall outlets.



3-5 miles of range per hour of charge

LEVEL 2
Moderate Charge

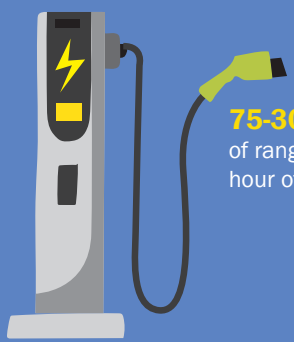
Generally found at public charging stations but can be installed in residential settings.



12-50 miles of range per hour of charge

LEVEL 3
Fast Charge

Known as Direct Current Fast Charging (DCFC) equipment, it typically only available at public charging stations.



75-300 miles of range per hour of charge

As charging equipment has developed, different charging connectors have emerged from different vehicle manufacturers due to a lack of regulatory standards as well as proprietary technologies. This results in needing multiple connectors at charging stations. Many of the largest automakers have pledged to convert to the Tesla Supercharger standard for DCFC starting in 2025, although some 2024 vehicles can use adapters for the Tesla Supercharger standard.

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Funding for Electric Vehicle Charging Infrastructure

EV FUNDING OPPORTUNITIES

Funding opportunities for Electric Vehicle infrastructure change rapidly, which can make the process of identifying and applying for the proper funding seem daunting. For this reason, the Electrification Coalition created the EV Funding Finder which helps eligible recipients identify available federal funds for transportation. The tool is updated quarterly with current funding opportunities: https://electrificationcoalition.org/ev-funding-finder/

GRANT PROCESS

Step 1: Engage with Community Members

Community engagement can both help you develop community priorities and increase your competitiveness for grant funding. Many grant programs emphasize an inclusive and representative community process as well as collaboration with the public and relevant stakeholders. To prepare a successful grant application, you should:

- Clearly identify a problem and community need that will be addressed by the project.
- Point to community engagement that has already occurred prior to the grant.
- Consider how this project helps “transportation disadvantaged” communities.

Step 2: Align Plans and Policies with Grant Program Goals

Many of the new grant programs provide funding for both planning and implementation. Your grant application should demonstrate your community’s readiness for the project you are applying for by pointing to existing plans, policies, and processes that reflect the goals and objectives of the grant program.

Step 3: Build Relationships with Potential Grant Partners

Collaboration with partner agencies can be an effective strategy for leveraging project funding and developing successful grant proposals. When considering grant teaming partners make sure to:

- Build a well-rounded team with partnerships.
- Pick the right partners, which can involve public/private partnerships as well as new inter-agency partnerships.
- Demonstrate strong, tangible commitment from project partners.

Step 4: Assemble Your Grant Writing Team

Assemble or hire a multidisciplinary grant-writing team whose members have a strong understanding of each element of the grant.

Step 5: Track Future Funding Opportunities

- Stay tuned for upcoming grant notifications, which you can find on the USDOT's or Department of Energy's (DOE) web sites.
- Here are some of the key USDOT and DOE programs:
- National EV Infrastructure Formula Program (NEVI).
- Congestion Mitigation and Air Quality Improvement (CMAQ).
- Charging and Fueling Infrastructure (CFI) Discretionary Grant Program.
- Federal Lands Access Program (FLAP).
- Rebuilding American Infrastructure with Sustainability and Equity (RAISE, formerly known as BUILD and TIGER).
- Transportation Alternatives (TA) Set-Aside from the Surface Transportation Block Grant (STBG) Program.
- Title XVII Renewable Energy and Efficient Energy Projects (Loan Programs Office)

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MAY 2024

2050 MTP STATUS REPORT

WHAT IS THE 2050 MTP?

The Metropolitan Transportation Plan (MTP) establishes the vision of Central Florida's entire transportation system for Orange, Osceola, and Seminole Counties. This plan for the year 2050 identifies current and future transportation needs. Projects must be included in the plan to receive federal and state funding. The plan is updated every five years to reflect the changing dynamics of the region.

ONGOING WORK AND PROGRESS TO DATE

BACKGROUND & EXISTING CONDITIONS

- Completed Public Participation Plan
- Continued travel patterns and origin-destination analyses

GOALS & OBJECTIVES

- Refinement of goals and objectives and development of draft indicators underway
- Continued evaluation of future trends for 2050

TECHNICAL ANALYSIS

- Coordination with FDOT on the Central Florida Regional Planning Model underway
  - Review of socioeconomic data complete and comments submitted to FDOT
- Congestion Management Process (CMP) update underway, including: compiling interim year performance metrics, evaluating performance measures to add/delete, and preparing for internal staff CMP workshop
- Interdisciplinary interviews & outreach to health partner agencies for their insight and expertise
- Compiling housing element best practices through a literature review
- Developing an Environmental Existing Conditions Technical Memorandum
- Began resilience strategy literature review and data collection

NEEDS ASSESSMENTS

- Active transportation needs assessment complete: www.MetroPlanOrlando.gov/ATP
- Transportation Systems Management and Operations (TSMO) needs assessment complete: https://metroplanorlando.gov/plans/transportation-systems-management-operations-master-plan/
- Transit needs assessment underway, analysis of rail system and bus system, second round of stakeholder engagement complete
- Roadway needs assessment underway
- Safety needs assessment (Vision Zero Action Plan) is underway: www.VisionZeroCFL.gov
- Freight needs assessment is underway, including data collection, a review of key plans/resources, and an interview outline for the freight stakeholders outreach and interdisciplinary interviews

2050 MTP SCHEDULE

TASK	2024				2025			
	Jan – Mar	Apr – Jun	Jul – Sep	Oct – Dec	Jan – Mar	Apr – Jun	Jul – Sep	Oct – Dec
Background & Existing Conditions								
Goals & Objectives								
Technical Analysis, Needs Assessment, Investment Scenario Planning								
Cost Feasible Plan Development								
Plan Adoption & Implementation								

UPCOMING 2050 MTP MEETINGS AND OUTREACH EVENTS

Date/Time	Meeting/Event	Location
June 13, 2024 at 2:00pm	2050 MTP Technical Workshop	Virtual / Zoom https://metroplanorlando.gov/calendar/
August 8, 2024 at 2:00pm	2050 MTP Technical Workshop	Virtual / Zoom https://metroplanorlando.gov/calendar/
October 10, 2024 at 2:00pm	2050 MTP Technical Workshop	Virtual / Zoom https://metroplanorlando.gov/calendar/
December 12, 2024 at 2:00pm	2050 MTP Technical Workshop	Virtual / Zoom https://metroplanorlando.gov/calendar/

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MetroPlanOrlando.gov/Draft2050Plan

Appendix F. Metric Tracking Data Sources

Metric	Data Source Link
Percent EV Adoption (total EV registrations/total vehicle registrations)	https://afdc.energy.gov/transatlas#/?state=FL https://www.flhsmv.gov/motor-vehicles-tags-titles/license-plates-registration/motor-vehicle-registrations/
Number of EVs	https://afdc.energy.gov/transatlas#/?state=FL
Existing Private Chargers	https://afdc.energy.gov/stations#/analyze?country=US&region=US-FL
Existing Publicly Accessible Level 2 Chargers	https://afdc.energy.gov/stations#/analyze?country=US&region=US-FL
Existing Publicly Accessible DC Fast Chargers	https://afdc.energy.gov/stations#/analyze?country=US&region=US-FL
Existing Non-Single Family Home Chargers	https://afdc.energy.gov/stations#/analyze?country=US&region=US-FL
EVI Pro Lite Adoption Forecast Totals	https://afdc.energy.gov/stations#/analyze?country=US&region=US-FL

Appendix G. Policy Best Practices

Land-Use Specific Best Practices

Specific EVSE planning considerations for parking requirements enacted in other cities are summarized below. Error! Reference source not found. and

provide details of strong examples of EV parking requirements for multi-family housing and commercial parking organized by smaller cities (population under 200,000), and mid-large cities (population over 200,000). Error! Reference source not found. provides details from the International Energy Conservation Code (IECC). These codes are specifically for Level 2 chargers.

Table 2. Example EV Parking Ordinances from Smaller Cities (population under 200,000)

Jurisdiction	Multi-family Housing Parking	Commercial Parking	Notes
Avon, Colorado (population 6,058) Passed January 2023	1-6 spaces provided: 1 EV-Ready space 7+ spaces provided: 5% EV-Installed, 10% EV-Ready, 15% EV-Capable	1 space provided: 1 EV-Ready space 2-9 spaces provided: 1 EV-Installed space, 1 EV-Ready space 10+ spaces provided: 5% EV-Installed, 10% EV-Ready, 15% EV-Capable	Where new accessible parking is provided, at least one accessible parking space shall be EV installed.
Issaquah, Washington (population 39,505) Passed March 2023	10% EV-Installed, 30% EV-Ready for new buildings or 20% for existing undergoing substantial improvement	5% EV-Installed, 10% EV-Ready	Code also addresses accessibility, affordable housing units, and EV-ready requirements.
South Windsor, Connecticut (population 26,054) Passed March 2022	16+ spaces provided: 10% Level 2 EV-Ready or EV-Installed, 3% EV-Ready (increasing to 7% in 2024 and 10% in 2028)	16+ spaces provided: 10% Level 2 EV-Ready or EV-Installed, 3% EV-Ready (increasing to 7% in 2024 and 10% in 2028)	See Section 6.4.10 and Appendix H of code for comprehensive EVSE requirements

Table 3. Example EV Parking Ordinances from Mid-Large Cities (population over 200,000)

Jurisdiction	Multi-family Housing Parking	Commercial Parking	Notes
Charlotte, NC (population 897,709) Passed August 2022	0-9 spaces provided: None, 10-25 spaces: 20% EV-Capable, 26-50 spaces: 20% EV-Capable and 1 space EV-Installed, 51+ spaces: 20% EV-Capable and 2% EV-Installed	26+ spaces provided: 2% EV-Installed or 1 space, 10% EV-Ready, 20% EV-Capable	VSE-Installed stations: do not count toward parking maximums or count as 2 parking minimum spaces, and count as 2 EV-Capable stations. (Section 19.3)
Denver, CO (population 711,463) Passed March 2023	15% EV-Installed, 5% EV-Ready, 40% EV-Capable	10% EV-Installed, 5% EV-Ready, 10% EV-Capable	Up to 10 EVSE-Installed required spaces may be replaced for each DCFC-Installed space plus 1 EV-Ready space (max. 50 spaces reduced)
Madison, WI (population 269,196) Passed January 2023	2% EV-Installed (increases by 2% every 5 years), 10% EV-Ready (increases by 10% every 5 years)	1% EV-Installed (increases by 1% every 5 years), 10% EV-Ready (increases by 10% every 5 years)	Applies to new parking facilities and existing parking where 10,000 sq-ft are repaved or expanded. Considers parking use durations. (Section 28.141(8)(e))
St. Louis, MO (population 293,310) Passed Feb. 2021	2% EV-Installed, 5% EV-Ready (increases to 10% in 2025)	2% EV-Installed, 5% EV-Ready (no change in 2025)	Applies to new construction and Level 3 alterations (work exceeds 50% of the building area).

Table 4. Proposed EV Requirements from IECC

Other Entity	Multi-family Housing Parking	Commercial Parking	Notes
International Energy Conservation Code (IECC)	General: 40% EV-Capable; 3+ Floors: 20% Installed, 5% EV-Ready, 75% EV-Capable	15% EV-Installed, 30% EV-Capable	Proposed 2024 requirements; not yet adopted

Single/Two-Family Dwelling Units

EVSE planning considerations related to specific land uses are described below. Examples of local government policies relevant in areas with single/two-family dwelling units that might be considered are:

- New Home Construction: Require all new houses be "EV-ready" with a minimum Level 2 circuit installation.
  - City of Boise
- On-Street Parking: Consider EVSE to be installed at the curbside on residential streets in areas where homes lack off-street parking.
  - City of Portland
  - City of Denver
- Coordination with Neighborhood Associations: Decisions made by Homeowner Associations (HOAs) may not be controlled by cities or counties. However, governments have enacted laws that compel HOAs to allow EV charging development, including:

- Oregon state law (ORS 94.672) prevents HOAs from prohibiting installation or use of an EV charging station.
- Boston, Massachusetts prohibits HOAs, community associations, and condominium associations from preventing the installation of EVSE.

Multi-Family Dwellings And Mixed-Use Districts

- DCFC Equivalents: Consider how one DCFC could meet the demand of multiple Level 2 chargers while still providing options for resident charging needs.
- Willingness to pay: EVSE is offered as an amenity where stalls are shared. As EV adoption increases, residents may prefer assigned spaces. Demand may increase resident willingness to pay for EVSE use.

Non-Residential

- Visibility: To encourage use and maximize security, visibility is important but also highly dependent on the layout of the parking lot, on-site traffic circulation, and the adjacent roadway network. EV charging spaces are typically located where there is a good line of sight from adjacent roadways and directly near the entrance of a parking lot.
- Pavement markings and signage: provide clear pavement markings and signage to indicate EV charging only and time restrictions for parking if necessary. Reference guidance set in the Manual on Uniform Traffic Control Devices[1] (MUTCD) for signage requirements.
- Circulation and Queuing Space: Provide adequate queuing space that does not interfere with site circulation including site ingress and egress. Turnover rates are much slower than conventional fueling stations, which can result in queues of vehicles waiting to charge. Additionally, consider providing adequate space within one or two parking spaces for EVs pulling a trailer, recreational vehicles (RVs), or medium- and heavy-duty EVs (like fire trucks or garbage trucks) to access and maneuver around the charging station.

Public Spaces

- Accessibility: Locating EVSE in public spaces that are walkable to surrounding homes and multi-family dwellings so users can enjoy the public spaces or walk home while their vehicle charges.
- Public vs. Private Vehicle Use: Municipal fleet vehicles may be stored on public spaces. Develop plans for public or restricted use, vehicle charging priority, and payment models. Other considerations for the use of chargers by public fleet vehicles include reservation systems, payment bypass options, and location of charging stations convenient for the fleet vehicles.
- Circulation and queuing space: provide adequate space for EVs pulling a trailer, RVs, or medium and heavy duty EVs to access and maneuver around the charging station and queue while waiting to charge.

Existing Parking Facilities

- It can be expensive to add EVSE to existing parking facilities that are not EV-Capable. Municipalities should identify thresholds for additions or alterations to existing multi-family and non-residential buildings or parking facilities that trigger a requirement for EV-Capable wiring at a minimum.
- Examples of cities that have such trigger thresholds include:
    - Madison, Wisconsin's zoning code (Section 28.141.8.e): EV charging station requirements apply to any new parking facility or an existing parking facility that is expanded by 10,000 square feet, as measured in parking spaces being created after January 1, 2021.
    - St. Louis, Missouri's EV Charging ordinance states that EV charging station requirements apply to new construction and Level 3 alterations "where the work exceeds 50% of the building area."

[1] https://mutcd.fhwa.dot.gov/resources/policy/rsevcpfmemo/

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