

Electric Vehicle Charging Station Plan

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Electric Vehicle Charging Station Plan

BACKGROUND

The widespread use of electric vehicles (EVs) could result in significant improvements in environmental quality due to their reliance on “clean technology”. An electric vehicle is a vehicle that is either partially or fully powered on electric power. EVs consume less fuel, if any, and produce fewer emissions than similar conventional vehicles.

To meet future increased demand for EV charging stations, the St. Lucie TPO FY 2020/21 – 2021/22 Unified Planning Work Program (UPWP) includes an Electric Vehicle Charging Station Plan. The purpose of the Plan is to develop criteria for siting electric vehicle charging stations and select appropriate locations based on the criteria. Because EV infrastructure planning is complex and requires collaboration among private and public sector entities, a secondary objective of the Plan is to raise awareness of the need to incorporate electric vehicle charging station planning into major planning efforts.



WHAT IS AN ELECTRIC VEHICLE?

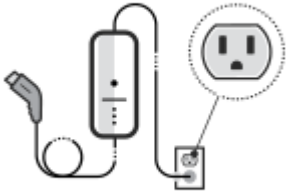
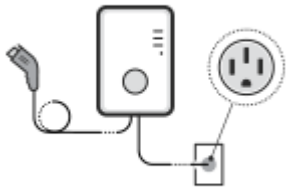
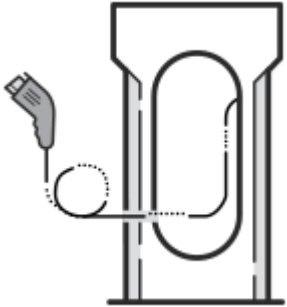
There are three basic types of EVs: All-electric vehicles (AEVs), hybrid-electric vehicles (HEVs), and plug-in hybrid electric vehicles (PHEVs).

AEVs run only on electricity; when the battery becomes depleted, it must be recharged. EVs always operate in all-electric mode and have typical driving ranges from 150 to 300 miles.

HEVs are powered by an internal combustion engine and an electric motor that uses energy stored in a battery. The battery pack and electric motor provide supplemental power. The vehicle is fueled with gasoline to operate the internal combustion engine, and the battery is charged through regenerative braking, not by plugging in.

PHEVs use both gasoline and electricity as fuel sources, so they have a battery, an electric motor, a gasoline tank, and an internal combustion engine. This allows drivers to use electricity as often as possible while also being able to rely on gasoline-powered propulsion when needed. Most PHEVs can travel between 20 and 40 miles on electricity alone, and then will operate solely on gasoline.

Although the majority of EV owners charge their vehicles at home, public charging stations can increase the daily useful range of EVs and reduce the amount of gasoline consumed by hybrids.

Charging Options	Level 1 (120v) 	Level 2 (240v) 	Direct-current (DC) Fast Charging 
How fast do they charge?	2–5 miles per 1 hour of charging	10–20 miles per 1 hour of charging	At least 60 miles per 20 minutes of charging. Charging time may be shorter depending on station power.
Where can I find them?	<ul style="list-style-type: none"> • In your house/garage • Possibly at your apartment/condo and workplace • No need to install anything; most automakers provide charger cords 	<ul style="list-style-type: none"> • In your house/garage (You will need additional equipment) • Possibly at your apartment/condo and workplace • At public charging stations 	<ul style="list-style-type: none"> • At public charging stations • Limited availability, though becoming more common <p>Source: epa.gov</p>

HOW MUCH PUBLIC CHARGING CAPACITY IS NEEDED?

A wide variety of foreign and domestic automakers market EVs in the United States, ranging from Audi to Tesla. Despite rapid growth in sales, EVs make up a relatively small percentage of vehicles on the road. According to a study by the Center for Urban Transportation Research (CUTR) at the University of South Florida, "Even the most aggressive forecasts, however, indicate that the electric vehicle fleet is not expected to exceed 15% of the overall U.S. vehicle stock in 2040." According to the Edison Electric Institute, a trade association, by 2030, approximately 10 million EV charging ports will be needed in the United States. One of the goals of the Biden-Harris Administration is to accelerate the deployment of electric vehicle charging infrastructure.

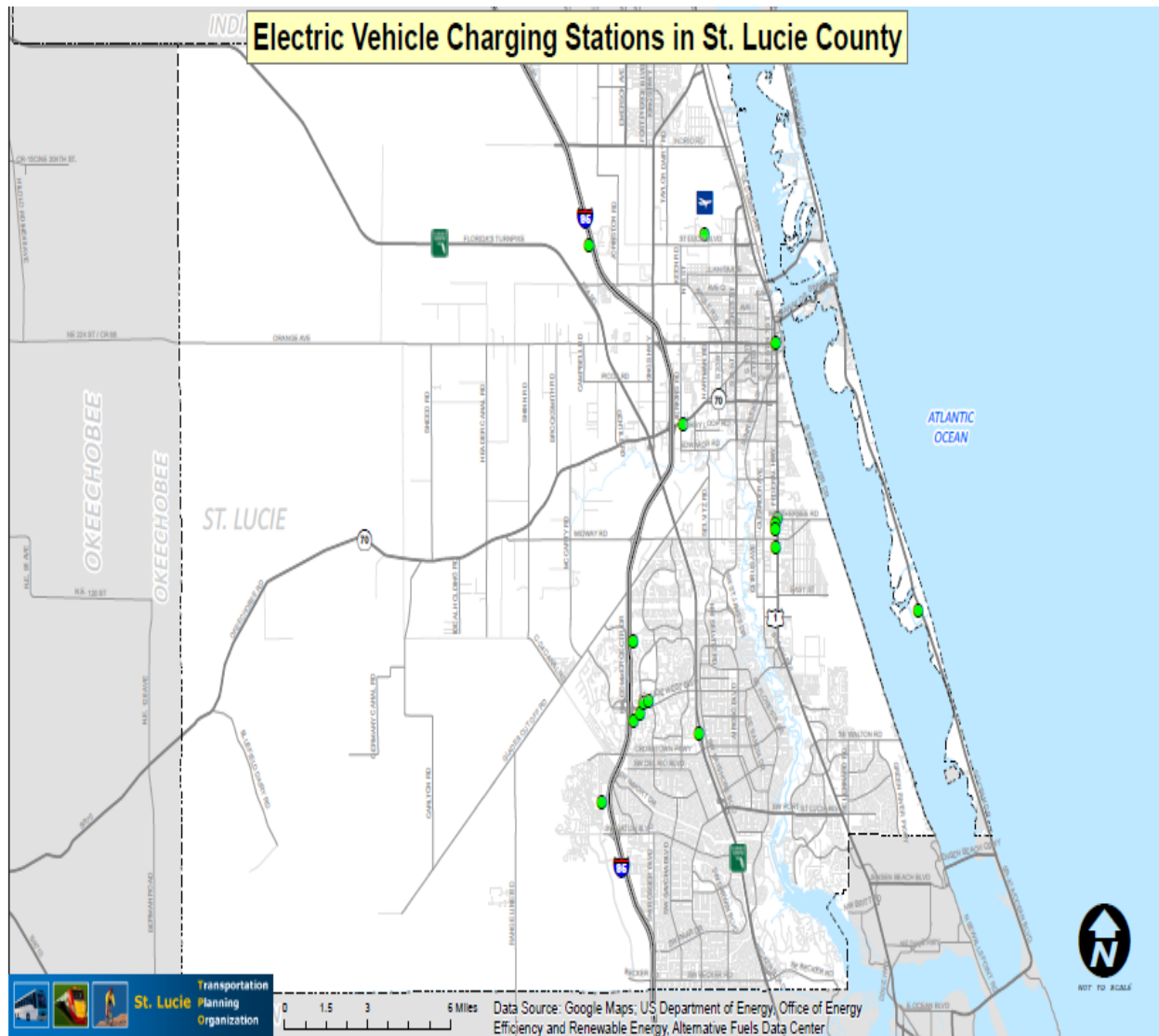


The Florida Department of Agriculture and Consumer Services' Office of Energy recently conducted a survey of Florida resident owners of EVs to assess needs and concerns. Key takeaways from the survey include:

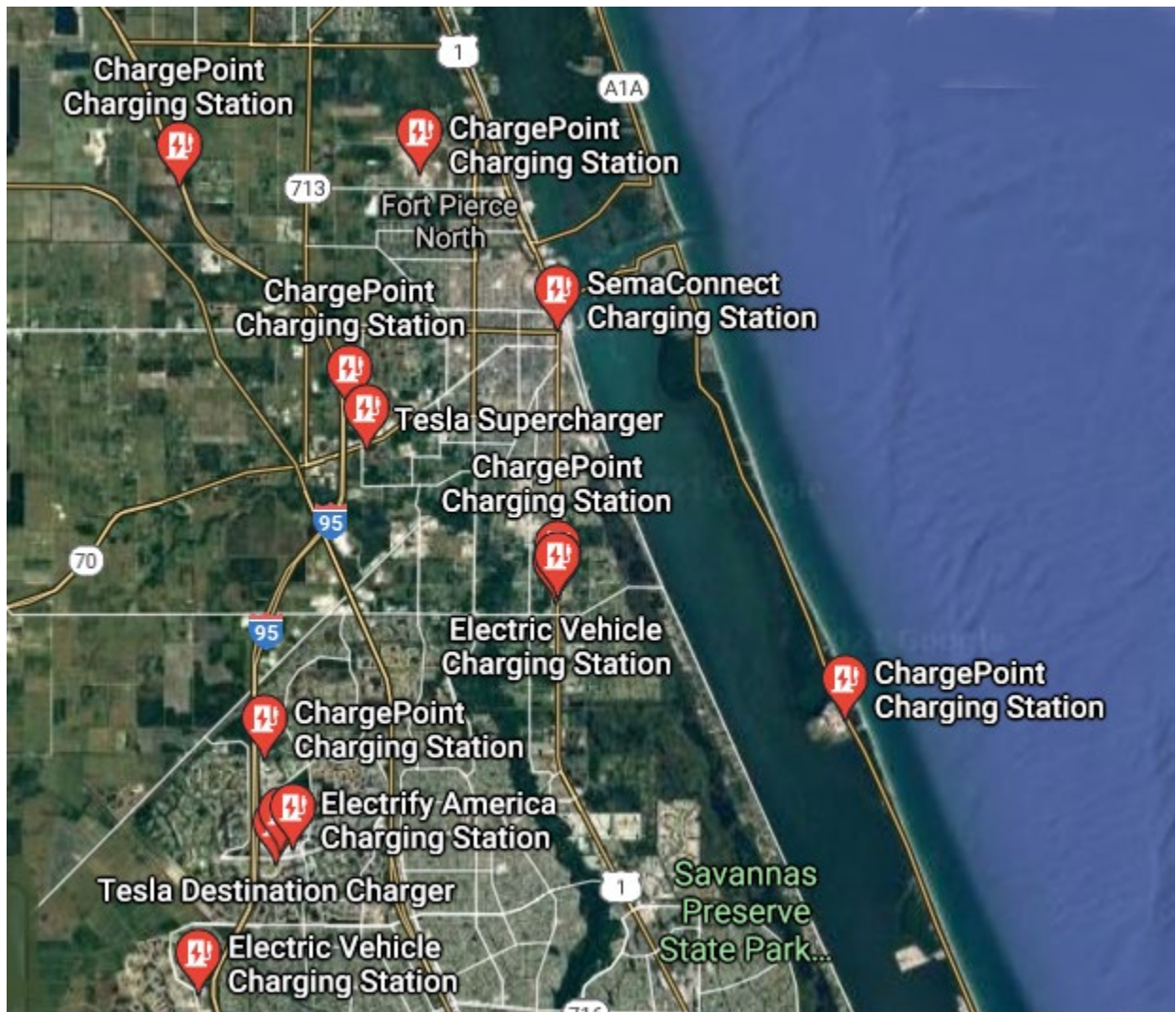
- 1) The majority of users feel that Florida's public charging infrastructure is inadequate and the availability needs to be improved.
- 2) Most EV drivers charge their vehicles at home.
- 3) The locations EV drivers would most like to see additional public charging infrastructure is along highways or at shopping/entertainment centers.

EXISTING PUBLIC CHARGING STATIONS IN ST. LUCIE COUNTY

The U.S. Department of Energy (DOE) Alternative Fuels Data Center and Google Maps show the locations of public charging stations in the United States. The following graphic displays public charging stations in St. Lucie County based on information at the DOE website and Google Maps as of July 2021.



The following screen capture from Google Maps depicts the variety of EV charging station operators in St. Lucie County, ranging from Tesla to ChargePoint.



BARRIERS TO EV ADOPTION

Long-distance travel is a barrier to the widespread adoption of EVs due to drivers' concerns regarding the availability of charging infrastructure. This is known as "range anxiety." According to the J.D. Power 2021 Electric Vehicle Experience (EVX) Ownership Study of existing owners of EVs, the most common criteria in selecting an electric vehicle to buy is battery and driving range. The Study found that public charging infrastructure "is a key determinant" of EV owner satisfaction, with Tesla owners being more satisfied due to the high-speed Tesla public charging network.



Range anxiety is heightened if consumers are unaware of the existence of public charging stations. The siting of charging stations in high visibility activity centers can help alleviate these fears.

Another issue is that charging an EV takes much longer than refueling a car. Not only must EV owners plan ahead to ensure the availability of charging infrastructure they must plan on being at the specified location for the amount of time it takes to charge their EVs.



ELECTRIC VEHICLE CHARGING STATION LOCATION CRITERIA

At the forefront of siting EV charging stations is safety and necessity. Safety refers to the avoidance of life-threatening conditions. In Florida this typically comes down to hurricane evacuation. Necessity refers to the need for charging an EV prior to depletion of its battery. If a driver is traveling a limited access highway on a low battery, the driver must exit and recharge at the nearest charging station. Consequently, surveys indicate EV drivers' preference for siting EV stations along highways.

Surveys also indicate EV drivers' preference for siting EV stations at retail centers. Since EV charging can take hours, locating charging stations within retail centers enables EV drivers to shop or entertain themselves while their cars are charging.

Taking these factors into account, the following criteria are used to determine potential locations for electric vehicle charging stations:

- Population density
- Employment density
- Retail Major Activity Centers (MACs)
- Highway corridors
- Evacuation routes
- Title VI/Environmental Justice areas

A MAC is a walkable geographic area that contains multiple, often unique, attractions. A Retail MAC is anchored by a national department store chain or national grocery store chain that contains all the major food categories.

A Title VI/Environmental Justice community contains more than fifty percent minority persons and/or low-income persons. A corridor that serves a Title VI/EJ community is considered to be in or within one mile of the Title VI/EJ community.

Based on the above factors, three screening criteria are proposed for siting electric vehicle charging stations in St. Lucie County:

- Highway intersections
- Retail Major Activity Centers (MACs)
- Title VI/Environmental Justice Areas

Combining safety and necessity, the goal is to site electric vehicle charging stations near highway intersections, at the nearest Retail MAC to its corresponding highway intersection, and at Retail MACs along U.S. 1. A Title

VI/Environmental Justice analysis was then conducted to analyze the geographic distribution of stations.

Recommendations for siting electric vehicle charging stations near highway interchanges is consistent with the SmartMoves 2045 Long Range Transportation Plan (LRTP). The SmartMoves LRTP recommends the development of an ACES (Automated, Connected, Electric, Shared-Use) Network at major intersections along I-95. The ACES Network would consist of park-and-ride lots incorporating EV charging stations and connecting to transit.

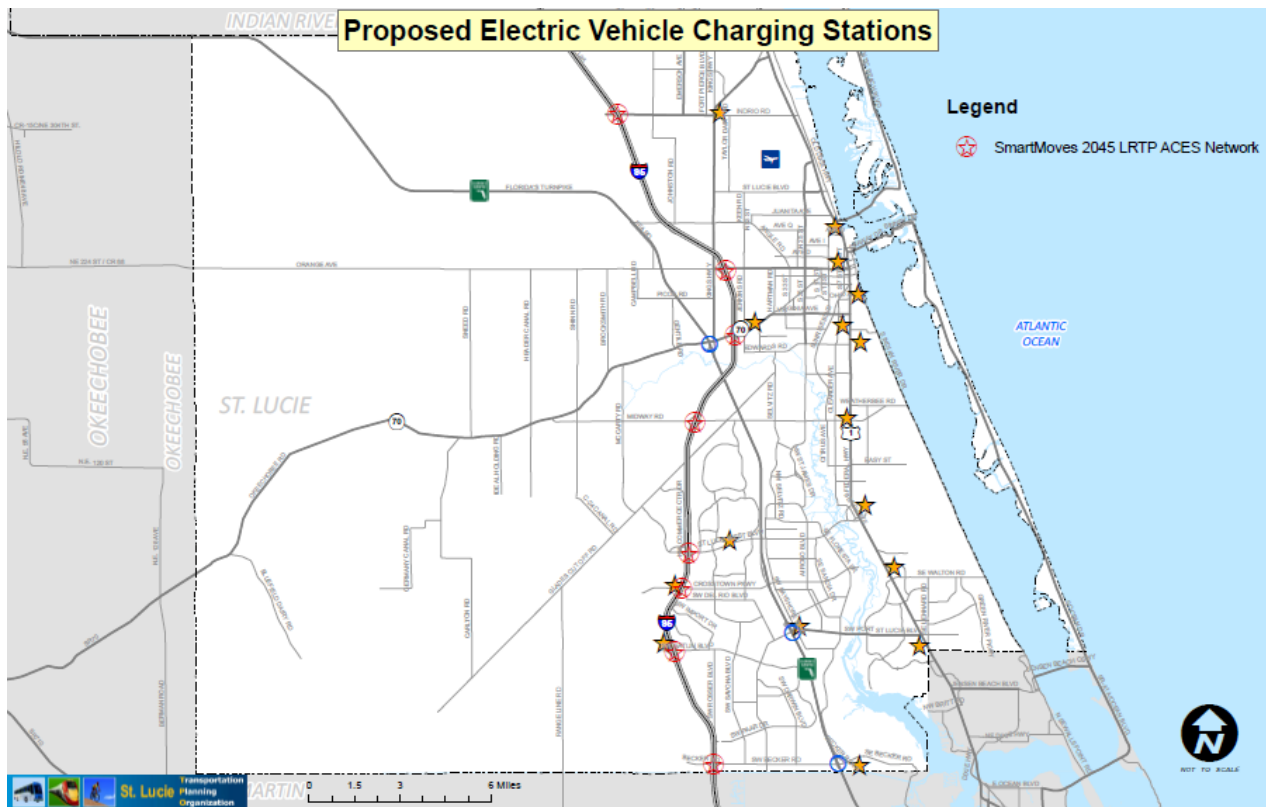
As a result of this process, the Draft Electric Vehicle Charging Station Plan proposes the following locations for EV charging stations, the distribution of which is almost evenly split between the northern and southern portions of St. Lucie County; almost half of the proposed locations are in Title VI/EJ areas.

Proposed EV Charging Station Locations Highway Intersections & Nearest Retail MAC

Highway Intersection*	Title VI/EJ Area	Nearest Retail MAC	Title VI/EJ Area
Turnpike/Becker Road	No	Publix	No
Turnpike/Port St. Lucie Blvd	Yes	Winn Dixie	Yes
Turnpike/Okeechobee Road	No	Walmart	Yes
I-95/Becker Road	Yes	Publix	No
I-95/Tradition Parkway	No	Target	No
I-95/Crosstown Parkway	Yes	Publix	No
I-95/St. Lucie West Blvd	No	Walmart (Existing)	No
I-95/Midway Road	No	Winn Dixie	No
I-95/Okeechobee Road	No	Walmart	Yes
I-95/Orange Avenue	Yes	Publix	Yes
I-95/Indrio Road	No	Winn Dixie	Yes

Proposed EV Charging Station Locations Along U.S. 1

U.S. 1 Intersection/Nearest Retail MAC	Title VI/EJ Area
Lennard Road – Walmart	No
Walton Road - Publix	Yes
Prima Vista Blvd - Publix	No
Midway Road – Winn Dixie	No
Edwards Road – Save A Lot	Yes
Virginia Ave - Publix	Yes
Ohio Ave - Aldi	Yes
A1A - Publix	Yes



WIRELESS TECHNOLOGY

Advancements in the wireless charging of electric vehicles is occurring rapidly. Most automakers have future visions of wireless charging and have wireless charging capability in development. Government agencies are researching the requirements and feasibility of wireless charging as well. According to the National Renewable Energy Laboratory (NREL) of the U.S. DOE, 'High-power, in-road, dynamic wireless charging could go a long way toward realizing the

potential of charge-sustaining electric vehicle operation (i.e., unlimited range with in-route recharge) while enabling the use of smaller, cheaper batteries.”

The Florida Department of Transportation (FDOT) Electric Vehicle Master Plan acknowledges that In-Road (Highway) or En-Route (Transit) Wireless Power Transfer (WPT), currently in the research and development phase, could enhance the State highway system by allowing EV drivers to charge their vehicles while driving. FDOT is closely monitoring this technology for future implementation.

Wireless charging is seen as a key enabling technology to increase the adoption of electric vehicles. Given rapid changes in technology and the inevitability of wireless charging, the implications for the establishment of wired electric vehicle charging stations is to focus on short-term needs for the foreseeable future.

