EV INFRASTRUCTURE MASTER PLAN

STATUS REPORT

December 1, 2020

FDOT

CONTENTS

PURPOSE - ELECTRIC VEHICLE MASTER PLAN (EVMP)

In 2020, Senate Bill 7018 was signed by Governor Ron DeSantis to enact **Florida Statute 339.287** titled "Electric vehicle charging stations; infrastructure plan development." The statute required Florida Department of Transportation (FDOT) to coordinate, develop, and recommend a Master Plan for the development of electric vehicle charging station infrastructure along the State Highway System (SHS). FDOT, in consultation with the Florida Department of Environmental Protection, the Florida Public Service Commission and other state agencies hereby submits this Status Report containing preliminary findings and recommendations for the Electric Vehicle Infrastructure Master Plan (EVMP) for legislative consideration.

The Status Report includes findings related to topics prescribed by F.S. 339.287. These findings are not yet conclusive as further review and vetting is necessary before submitting the final EVMP to the Governor, the President of the Senate, and the Speaker of the House of Representatives on July 1, 2021. Further, preliminary recommendations are proposed based on study findings and input provided by stakeholders. All findings and recommendations contained herein should be considered preliminary and subject to change upon subsequent legislative and stakeholder review.

The primary goals and objectives of the EVMP are as follows:

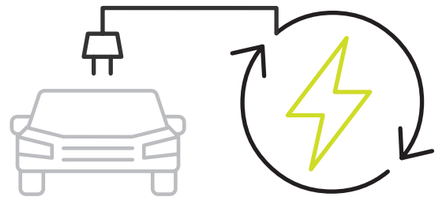
- ☑ Support both short-range and long-range electric vehicle travel;
- ☑ Encourage the expansion of electric vehicle use in this state; and
- ☑ Adequately serve evacuation routes in this state.

EV Infrastructure is also called:
- Electric Vehicle Supply Equipment (EVSE)
- Charging Stations

INTRODUCTION TO ELECTRIC VEHICLES (EVs) & EV INFRASTRUCTURE

Review emerging technologies in the electric and alternative vehicle market, including alternative fuel sources.

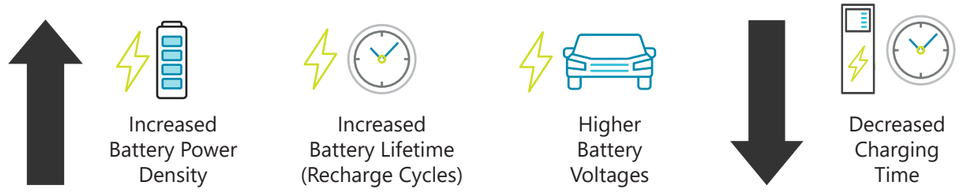
EV Technologies



1 Plug-In Hybrid Electric Vehicle (PHEV)
- Relatively short range on full battery (~40 miles), then Internal Combustion Engine (ICE) automatically starts
- Not limited in range by electricity

2 Battery Electric Vehicle (BEV)
- Battery-only propulsion, no ICE backup
- 40-300 mile range, depending on make / model
- Primary consideration for long-range travel and evacuations

EV Technology Trends



BEVs HISTORICAL BATTERY COST & RANGE

2010	2015
2010 COST ~$1,175 per kWh	2015 COST ~$375 per kWh
2010 RANGE ~75 miles	2015 RANGE ~160 miles

BEVs FORECASTED BATTERY COST & RANGE

2020	2025
2020 COST ~$160 per kWh	2025 COST ~$100 per kWh
2020 RANGE ~250 miles	2025 RANGE ~450 miles

* Targeted cost to be competitive with traditional gasoline vehicles

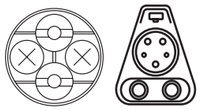
EV Infrastructure

Level 2
- Slower charging speed (>2 hours-full charge)
- Short-range travel (commuting, intra-regional)
- Currently dominant

Direct Current Fast Charger (DCFC)
- Fast charging speed (~30 minutes-full charge)
- Long-range travel (evacuation, inter-regional)
- Future-oriented

EXISTING EVSE TYPES & USE CASES

Evaluating and comparing the types of electric vehicle charging stations available at present and which may become available in the future, including the technology and infrastructure incorporated in such stations, along with the circumstances within which each type of station and infrastructure is typically used, including fleet charging, for the purpose of identifying any advantages to developing particular types or uses of these stations.

EVSE Type	Supply Voltage	Charger Examples	Power Level	Charge Rate (miles / hr)	Cost to Install	Use Cases
Level 1	120V (Toaster)	 J1772 Connector	1 - 1.8 kW	3 - 7	$	Home / Overnight
Level 2	208-240V (Clothes Dryer)	 J1772 Connector	3.3 - 19.2 kW 7.7 kW typical	10 - 60 26	$$	Home / Work Destination Charging
DC Fast Charger	480V (Commercial HVAC Unit)	 CHAdeMO / SAE Combo	50 kW **150 kW** 350 kW	175 **500** 1,200	$$$	Roadside / Travel Emergency Charging

KEY POINTS

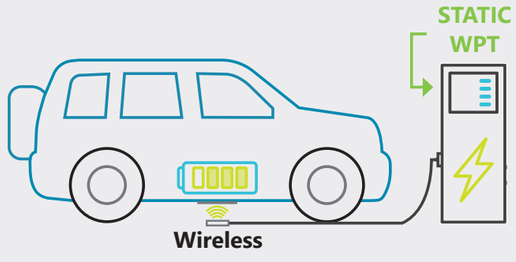
Obsolete for commercial purposes

Currently dominant for commercial purposes

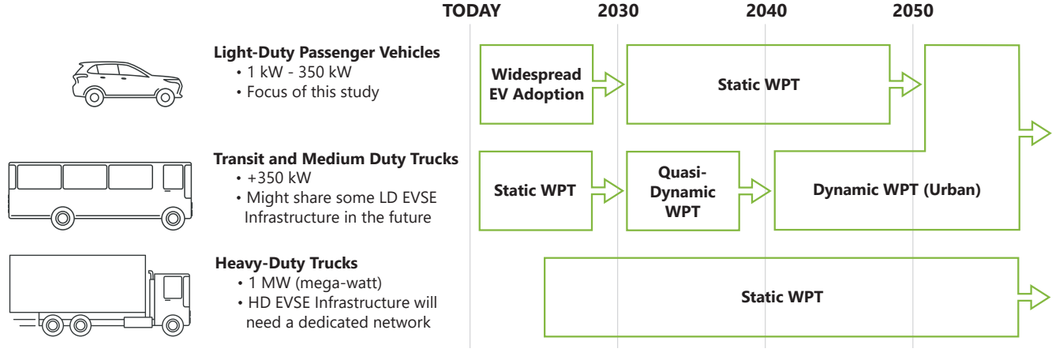
Most applicable for long-range travel and evacuations

Future EVSE Technologies for Fleet & Passenger Operations

- Higher power charging, up to 350 kW with current standards
- Extreme Fast Charging (XFC), 1 MW+ for medium / heavy duty
- Wireless Power Transfer (WPT)



WPT (Wireless Power Transfer) is Coming



EV / EVSE ADOPTION BARRIERS & RESILIENCY

Identifying any barriers to the use of electric vehicles and electric vehicle charging station infrastructure both for short-range and long-range electric vehicle travel.

EV Adoption Barriers

EV cost parity with ICE vehicles - expected to occur 2025-2030

Range anxiety during longer trips

Lack of EV models available on the market - >50% of vehicles registered in FL are truck / SUV

Lack of dealership knowledge / willingness to suggest EVs; lack of EVs available at FL dealerships

EVSE Adoption Barriers

Low EV customer base / lack of public awareness regarding EVSE locations

EVSE charging speed – function of power delivery of EVSE & how much power an EV can accept

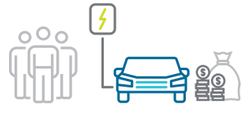
Service Providers locate EVSEs where EV adoption is highest – gaps of EVSEs, especially in low-utilization, rural, and income qualified communities

Utility demand charges

Lack of site-specific back-end utility infrastructure for DCFC stations, especially in rural and emergency critical areas

Additional costs when providing back-up power for emergency-critical EVSE locations

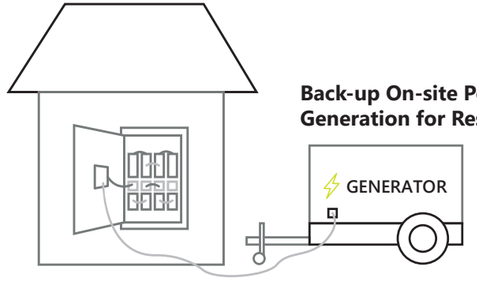
Lack of state-level public funding to deploy EVSEs, especially in low-utilization areas



Perception is that gasoline is cheap and / or familiarity with ICE vehicles

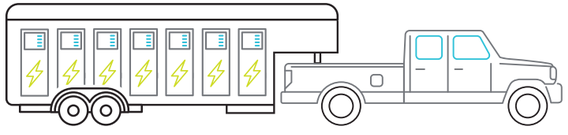
Resiliency and Emergency Preparedness

Similar to how gas stations on evacuation routes are required to have electrical infrastructure installed to accept roll on backup power generation, EVSE locations should also be wired to accept backup power generation. Alternatively, locations without existing EVSE could be host sites (i.e., rest areas) for Mobile DCFC EVSE stations.



Back-up On-site Power Generation for Resiliency

Mobile EVSE for Emergency Preparedness



FLORIDA EV MARKET ADOPTION PROJECTIONS

Projecting the increase in the use of electric vehicles in this state over the next 20 years and determining how to ensure an adequate supply of reliable electric vehicle charging stations to support and encourage this growth in a manner supporting a competitive market with ample consumer choice.

Existing EV Market Adoption in Florida

All registered light-duty vehicles in the state of Florida were examined using anonymous vehicle identification number (VIN) data to determine the number and type of electric vehicles on the road in Florida today. There are 22,617 plug-in hybrid electric vehicles (PHEV) and 44,068 battery electric vehicles (BEV) for a total of **0.41%** of all light-duty vehicles registered in Florida.

Data Source: FLHSMV VIN Registrations as of July 28, 2020.

	All Registered Light-Duty Vehicles	Other Fuel Types	Hybrid Electric Vehicles (HEV)	Plug-In Hybrid Electric Vehicles (PHEV)	Battery Electric Vehicles (BEV)
Vehicles	16,529,219	16,218,211	244,323	22,617	44,068
% Total	100%	98.12%	1.48%	0.14%	0.27%

Scenarios

The EV market adoption analysis led to the development of three forecast scenarios for light-duty vehicle sales, registrations, and vehicle miles traveled (VMT) for the state of Florida:

Conservative Growth Scenario

Growth is limited due to factors such as cost, the pace of technological innovation, and limited policy intervention.

Moderate Growth Scenario

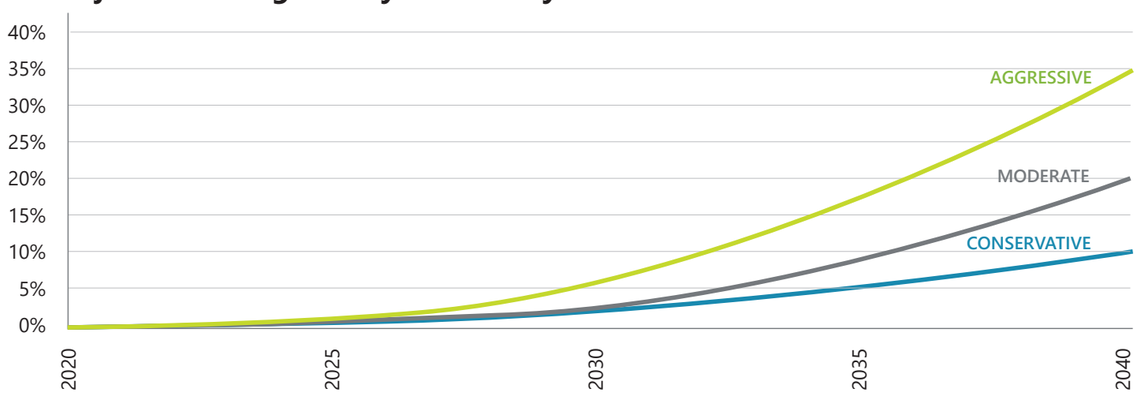
Growth occurs at a moderate or even expected pace with continued price decreases, technology improvements, and modest policy interventions.

Aggressive Growth Scenario

Growth accelerates and continues for some time at a high rate due to reductions in cost, rapid technological improvements, and extensive policy or funding intervention.

The scenarios were developed using averages from 15 recent forecasts generated by 11 public and private organizations in combination with the Market Acceptance of Advanced Automotive Technologies (MA3T) Model developed by Oak Ridge National Laboratory. The EV share of vehicle registrations lags sales by several years due to the time vehicles typically remain in use.

EV Projections of Light-Duty Vehicles by Scenario



STTF NET REVENUE IMPACT PROJECTIONS

Quantifying the loss of revenue to the State Transportation Trust Fund due to the current and projected future use of electric vehicles in this state and summarizing efforts of other states to address such revenue loss.

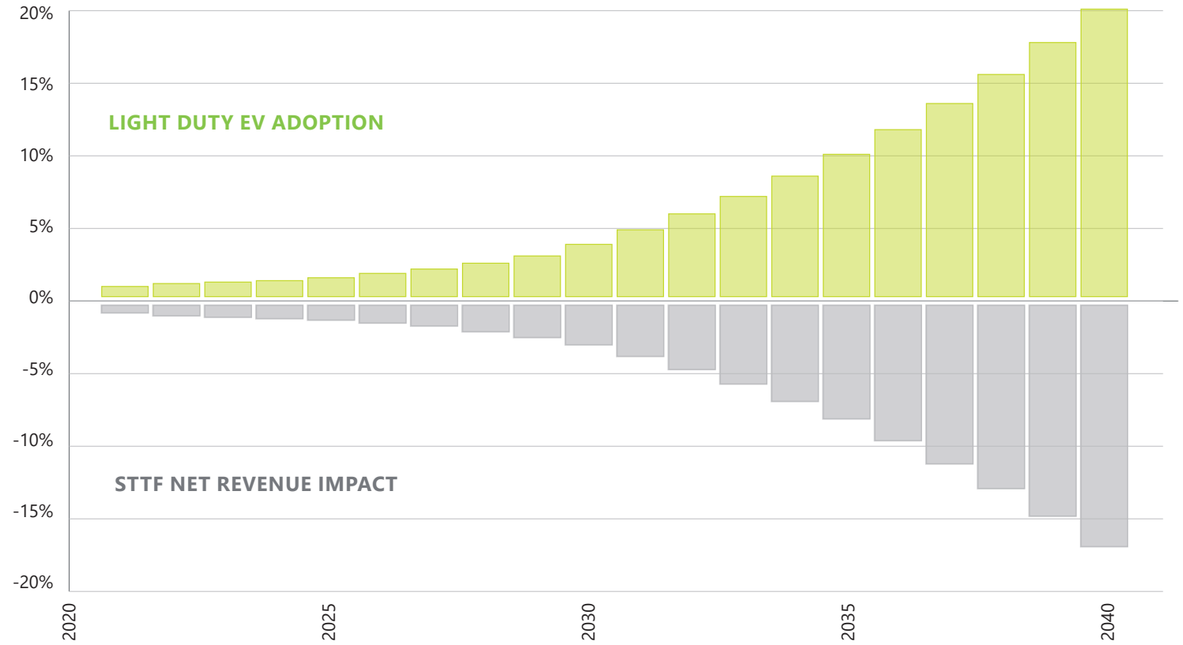
State Transportation Trust Fund (STTF) - 2040 Net Revenue Loss Projections

Conservative Growth Scenario
-8.4%

Moderate Growth Scenario
-16.6%

Aggressive Growth Scenario
-30.0%

2021-2040 Revenue Loss - Moderate Scenario



Potential Strategies to Mitigate STTF Revenue Loss

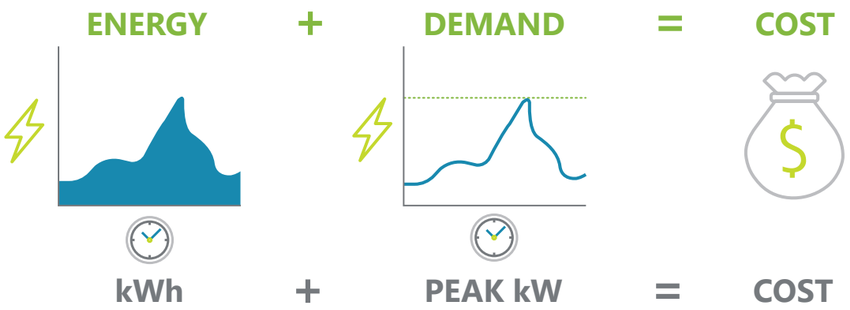
	EV Registration Fee	Road Usage Fee	EV Electricity Connection Fee	EV Electricity Usage Fee
Definition	Addition to annual registration fee (may or may not be tied to inflation)	Per mile fee for EV usage	Flat fee per charge	Charge per kWh (e.g., utility to service provider fee) Similar fee structure used in other fuel markets
Range in Cost	$32.50 to $213.88 per year	$.01 to $.03 per mile	TBD	TBD
Example Deployments	26 states	Pilot projects in California, Delaware, Oregon, Utah, and Washington	Not yet deployed at a statewide level	Not yet deployed

ELECTRICITY REGULATORY CONSIDERATIONS

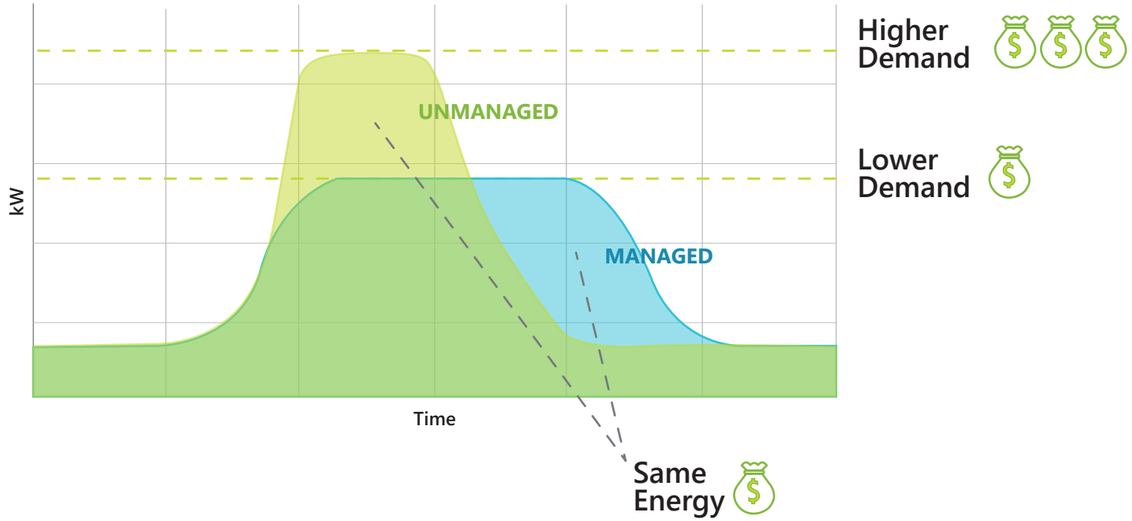
Identifying the type of regulatory structure necessary for the delivery of electricity to electric vehicles and charging station infrastructure, including competitive neutral policies and the participation of public utilities in the marketplace.

Energy and Demand Charges

Demand charges, especially for low-utilization sites, are one of the largest challenges for EVSE Service Providers (i.e., operators of charging stations)



Managed vs. Unmanaged Charging Demand Charges



Electricity Regulatory Structure Considerations

Demand charges are a major barrier for EVSE Service Providers' return on investment, especially for locations with low utilization. Updated electricity rate fees and schedules could help promote EVSE installation in rural areas where EVSE is critical for emergency evacuations. This is an issue for both passenger and fleet operations. For fleets, peak demand charges can be mitigated by employing a demand management system or schedule.

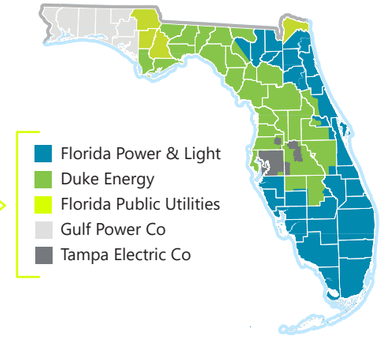
REGULATORY STRUCTURE TO DELIVER ELECTRICITY TO EVs AND EV INFRASTRUCTURE

Florida is a traditionally regulated state, with vertically integrated public electric utilities serving exclusive service territories under the jurisdiction of the Public Service Commission (PSC), pursuant to **Chapters 350 and 366, Florida Statutes**.

The PSC exercises its regulatory authority through rate setting, oversight of bulk power grid planning, safety inspections, and ensuring the provision of reliable service.

The PSC has full regulatory authority over five investor-owned public utilities in Florida.

Rates are set for public utilities based upon the cost of service.



Public utilities are permitted to recover in rates the capital invested in assets used to provide electric service, along with the opportunity to earn a reasonable return on that investment, and operating costs.

THE PSC does not regulate the rates and service quality of municipal or rural cooperative electric utilities, but does have jurisdiction regarding rate structure, safety, territorial boundaries, and bulk power supply planning.

Since the current regulatory structure of electric utilities in Florida includes exclusive service territories, the sale of electricity to retail, or end-use customers by a third party is not permitted.

However, in 2012 the Florida Legislature created an exemption for electric vehicle charging. Section 366.94(4), Florida Statutes, states that "The provision of electric vehicle charging to the public by a nonutility is not the retail sale of electricity for the purposes of this chapter. The rates, terms, and conditions of electric vehicle charging services by a nonutility are not subject to regulation under this chapter."

As such, the current process for the installation and provision of electric vehicle charging by a nonutility is not subject to regulation by the PSC.

On September 2, 2020, the PSC issued a request for comment identifying the type of regulatory structure necessary for the delivery of electricity to electric vehicle charging infrastructure and the participation of public utilities in the marketplace. In response, the PSC received 15 sets of comments from various stakeholders.

These contributors included the generating investor-owned utilities, three of the larger municipal utilities, several electric vehicle charging companies and stakeholders, and two environmental organizations.

On October 21, 2020, the PSC conducted a workshop to discuss the comments received.

Initial observations are that among stakeholders there is a general consensus that Florida's current regulatory structure is appropriate for the delivery of electricity to charging station infrastructure.

Participation by public utilities in the electric vehicle charging marketplace involves two areas of consideration.

1. **Electrical infrastructure deployment and rates**
2. **Utility-owned / operated EVSE**

A focus on flexibility should be maintained in order to adopt different models of utility and third-party ownership / operation based upon site-specific circumstances. In addition, prematurely and narrowly defining the role of public utilities should be discouraged given the nascence of the market and the urgent need to address gaps in charging infrastructure.

PUBLIC-PRIVATE BUSINESS MODELS & EVSE DEPLOYMENT STRATEGY

Considering strategies to develop supply of charging stations, including, but not limited to, methods of building partnerships with local governments, other state and federal entities, electric utilities, the business community, and the public in support of electric vehicle charging stations.

Potential Business Models

High initial investment costs, low and uncertain demand, and competition with home charging make for a challenging business case for commercial EV charging investments.

Make-Ready Utility Investment

Electric utilities invest in the supporting electrical infrastructure upgrades and the host site procures and owns EVSE. Benefits include lower capital costs for host sites, competitive bidding for EVSE equipment and pricing schemes, and the ability to cost effectively site EVSE in underserved communities.

Third-Party Profit-sharing Public Investment

A company assists a site host with site design, EVSE product selection, payment requirements, and marketing the site to customers in exchange for profit sharing with the site owner. The site owner is responsible for providing the remaining capital funding and maintaining the EVSE, minimizing their upfront costs and administrative responsibilities.

Utility Owner-Operator

An electric utility invests in the electrical infrastructure upgrades and the EVSE. The utility is responsible for the siting, installation, interconnection, marketing, operations, and maintenance of the equipment. This model allows for a streamlined investment approach and rapid scaling.

EVSE Rebate

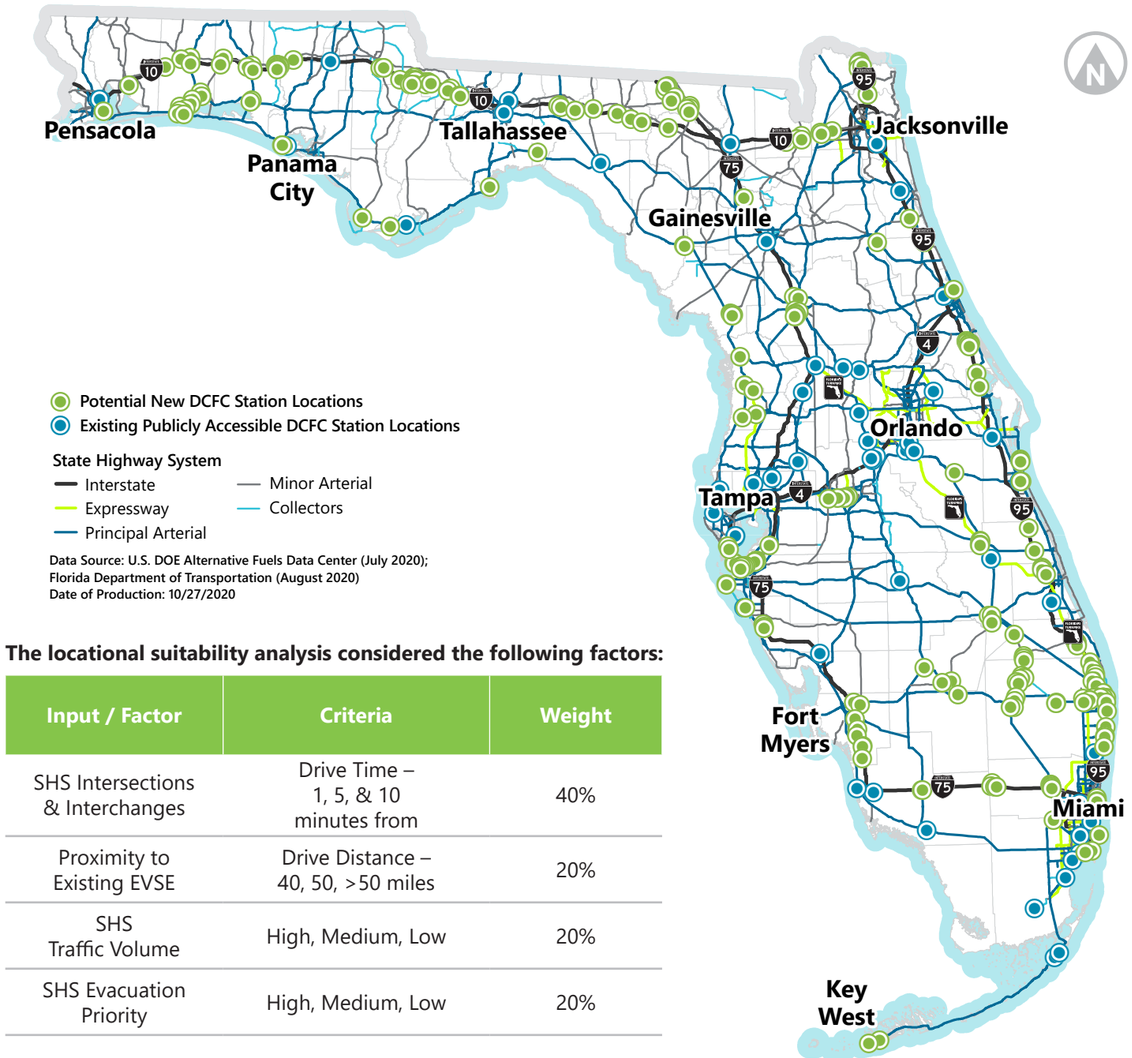
Utilities offer site hosts financial incentives toward the installation of EVSE equipment to reduce costs for developers and drivers. However, the site owner is still responsible for operation and maintenance of the equipment.

Plan Over Time to Create EVSE Network

EV Adoption %	Horizon	Objective	Action	Metric
Low (0-10%)	Near-Term (2020-2025)	Build Out the Network	Fill in the Gaps Between Locations (New Locations)	40 miles between Locations
Medium (10-20%)	Mid-Term (2025-2035)	Grow & Densify	Increase # of Chargers at each Location	6 Chargers at each Location
High (>20%)	Long-Term (>2035)	Densify & Maintain	Decrease Intervals Between Stations	20 miles between Locations

POSSIBLE NEW LOCATIONS FOR EVSE ON THE STATE HIGHWAY SYSTEM

Identifying the types or characteristics of possible locations for electric vehicle charging station infrastructure along the SHS to support a supply of electric vehicle charging stations that will support both short-range and long-range electric vehicle travel, encourage the expansion of electric vehicle use in this state, and adequately serve evacuation routes in this state.



The locational suitability analysis considered the following factors:

Input / Factor	Criteria	Weight
SHS Intersections & Interchanges	Drive Time – 1, 5, & 10 minutes from	40%
Proximity to Existing EVSE	Drive Distance – 40, 50, >50 miles	20%
SHS Traffic Volume	High, Medium, Low	20%
SHS Evacuation Priority	High, Medium, Low	20%

Potential Sites for New DCFC Locations

Existing DC Fast Charging (DCFC) locations are shown as blue dots. The green dots represent potential new DCFC locations to fill the gaps in the existing network. Not all of the proposed sites shown are needed to fill the gaps in the existing EVSE network. These locations are the starting points for further consideration based on siting characteristics that will be defined in the EV Master Plan. DCFC stations are the most appropriate EVSE type to support a network of charging stations for evacuation and long-range travel on the State Highway System. Level 2, proprietary networks and FDEP (VW Settlement) stations will be included in separate analyses as part of the EV Master Plan.

POTENTIAL IMPLEMENTATION STRATEGIES

Identifying an implementation strategy for expanding electric vehicle and charging station infrastructure use in this state.

Areas of Focus

1. **Develop Goals & Targets**
2. **Promote the Installation of EVSE Infrastructure**
3. **Encourage Private EV Adoption**
4. **Encourage Public EV Adoption**
5. Provide Guidance and Best Practices to Local Jurisdictions & Agencies
6. Mitigate Revenue Impacts
7. Develop an Outreach, Education, & Marketing Strategy
8. Coordinate Electrification Efforts
9. Establish Agency Roles & Responsibilities
10. Reexamine Utility Roles & Rates
11. Identify Funding Options
12. Prioritization Plan for Deploying EVSE

Innovative Strategies from Peer States

GOALS & TARGETS

States have developed goals that clearly describe the desired outcomes related to EVs and EV adoption. These goals are supported by targets that identify specific numbers or quantities to those goals. For example, California has recently adopted a target of 100% of vehicles sold in the state to be zero-emission by 2035. North Carolina has a goal of 80,000 zero-emission vehicles on the road by 2025, and Tennessee has a goal of 200,000 EVs on the road by 2028. These goals help state agencies to coordinate their efforts, allocate resources, and prioritize projects based on the future size of the EV fleet.

CA REST AREA CHARGING

The California Department of Transportation (Caltrans) created a program to install fast charger stations at 30 locations which included highway rest areas. The agency intended to build out the chargers in less-developed areas along the highway system, but ran into issues with a Federal law that prohibits commercial activities at rest areas. To date, California has built a handful of chargers, but cannot sell electricity to drivers, meaning the state must cover the cost for both maintenance and electricity. Just recently, Caltrans has partnered to provide solar charging stations with battery storage, which would lower electricity cost to the state.

GREEN BANK

The Connecticut General Assembly created the Connecticut Green Bank in 2011 as a funding and financing mechanism to support energy efficiency projects in the state. The bank uses a combination of public and private money to fund projects, including those supporting EVSE infrastructure. Through their Green Bank, a loan program called C-PACE (Commercial Property Assessed Clean Energy) allows commercial property owners the ability to fund EVSE infrastructure on their site, with repayment occurring through a special assessment on the property tax.

CHARGING PLAZAS

Colorado's Energy Office developed a competitive grant program that funds DC Fast charging plazas around the Denver metro region. This program relies on the private sector to develop teaming arrangements, business cases, and identify locations based on criteria identified by the state, and constructed and operated in accord with a five-year agreement with the Colorado Energy Office.

INTER-GOVERNMENTAL COORDINATION

Identify Potentially Responsible Agencies

PRELIMINARY RECOMMENDATIONS

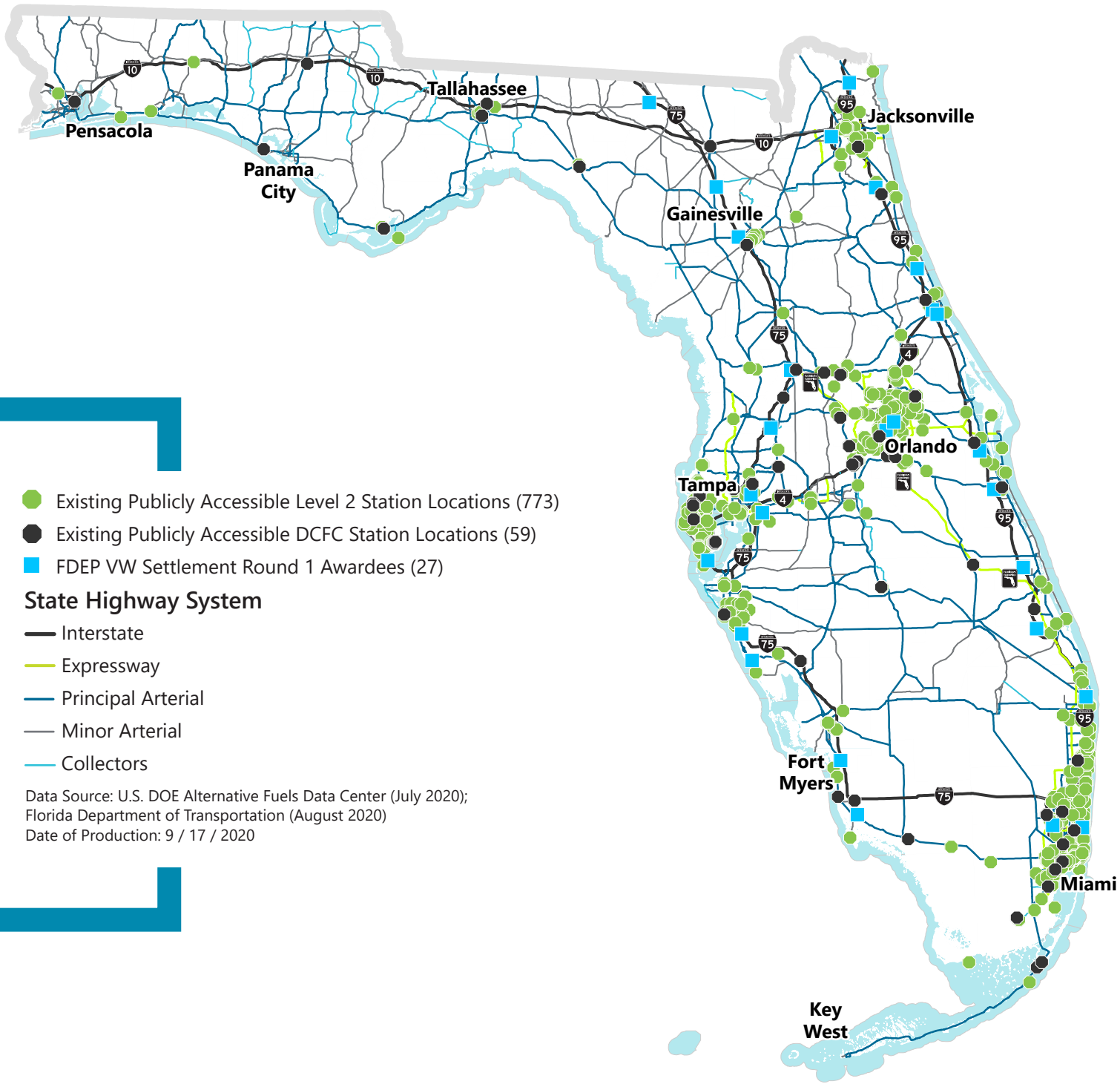
E = EXECUTIVE ORDER | L = LEGISLATIVE | A = AGENCY

Area of Focus	Strategies / Potential Action Items	Potential Action Type						Potential lead, coordinating agencies
		Funding / Incentives	Regulation	Policy	Evaluation / Study / Plan	Program / Project	Agency Coordination	
1. Develop Goals and Targets	Develop goals and objectives in line with state statute and existing agency priorities			E				
	Establish targets for share of alternative fuels, EV adoption, and deployment of EVSE			E				
2. Promote Installation of EVSE Infrastructure	Develop EVSE funding and grant programs	L				A		FDEO, FDACS
	Require public EVSE to be open to all users regardless of membership to a specific charging network		L			A		FDACS
	All DCFC should maintain an open-source data protocol		L			A		FDACS
	Allow private businesses to inform the public of EVSE availability on state-owned signage		L			A		FDOT
3. Encourage Private EV Adoption	Develop EV purchase incentive program	L		E	A	A	A	FDEO, FDACS
	Incentivize EV adoption in rental fleets	L		E	A	A	A	FDEO, FDACS
	Consider EV sales requirement to incentivize automakers to provide a wider range of vehicles for sale in Florida		L		A			FDACS, FLHSMV
	Support development of secondary EV market for used vehicles			L	A			FLHSMV, FDOR
4. Encourage Public EV Adoption	Develop transit and school bus EV transition plan	L		E		A	A	FDEP, FDMS
	Incentivize purchase of EVs for state and local fleets	L		E		A	A	FDEP, FDMS
	Establish minimum EV targets for state fleet purchases	L	L	E		A	A	FDEP, FDMS
5. Provide Guidance and Best Practices to Local Jurisdictions and Agencies	Provide guidance on incorporation of EVs into long-range transportation plans			L	A			FDOT, MPOAC
	Develop model building and zoning codes to incorporate EVSE			L	A			FDBPR, MPOAC
	Expand language restricting condominium associations from banning EVSE to include multi-family rental developments		L	L	A			FDBPR, FDACS
	Require local jurisdictions to adopt streamlined and fast-tracked permitting for EVSE		L	A				FDBPR, MPOAC
	Establish minimum standards for the functionality of EVSE installed in public parking facilities			L	A			FDOT, FDBPR
	Mandate minimum parking requirements or incentives for designated EVSE parking			L	A			FDOT, FDBPR
6. Mitigate Revenue Impacts	Evaluate potential EV registration fee structure		L	L	A			FLHSMV, FDOR
	Study potential for EV electricity surcharges		L	L	A			FPSC, FDOR
	Evaluate mileage-based fee structure		L	L	A			FLHSMV, FDOR

PRELIMINARY RECOMMENDATIONS

E = EXECUTIVE ORDER | L = LEGISLATIVE | A = AGENCY

Area of Focus	Strategies / Potential Action Items	Potential Action Type						Potential lead, coordinating agencies
		Funding / Incentives	Regulation	Policy	Evaluation / Study / Plan	Program / Project	Agency Coordination	
7. Develop an Outreach, Education, and Marketing Strategy	Develop a consumer-focused outreach, education, and marketing program					A	A	FDEP, FDOE
	Conduct training for automotive dealerships and service shops					A	A	FDOE
8. Coordinate Electrification Efforts	Partner with other states in the Southeast to harmonize interstate corridor electrification efforts			E			A	FDOT, FDACS
	Convene a Florida EV stakeholder and inter-agency work group that includes Federal, state, local, private, and research organizations			E		A	A	FDOT, FDACS
	Develop memorandum of understanding with other states in the Southeast on the development of a regional EVSE network and other shared goals			E			A	FDOT, FDACS
9. Establish State and Local Agency Roles and Responsibilities	Initiate program charter that identifies the roles and responsibilities of each stakeholder involved in statewide EV planning			E			A	FDACS, FDEP, FDOT
	Develop structure to harmonize statewide EV planning with regional and local efforts						A	FDOT, MPOAC
	Initiate report to evaluate the benefits and impacts of incorporating EVs into the electricity grid (such as vehicle-to-grid charging)			L	A			FPSC, FDACS
10. Reexamine Utility Roles and Rates	Evaluate the process and regulations related to investor-owned utility investments in EVSE		A	L	A			FPSC, FDACS
	Work with utility industry stakeholders to develop proposals for new rate structures that address transportation electrification			L	A			FPSC, FDACS
11. Identify Funding Options	Continuously monitor Federal funding options and pursue funding when it aligns with the program's needs					A	A	FDACS, FDOT
	Identify alternative state funding and financing programs			E		A	A	FDEO, FDOR
	Develop model policy for establishing public-private partnerships to encourage EVSE investment			E			A	FDOT, FPSC, FDACS
12. Prioritization Plan for Deploying EVSE	Create a prioritization process for infrastructure implementation			L / A			A	FDOT, FDEP
	Establish evacuation charging program, including mobile charging stations	L				A		FDOT, FDEM



- Existing Publicly Accessible Level 2 Station Locations (773)
- Existing Publicly Accessible DCFC Station Locations (59)
- FDEP VW Settlement Round 1 Awardees (27)

State Highway System

- Interstate
- Expressway
- Principal Arterial
- Minor Arterial
- Collectors

Data Source: U.S. DOE Alternative Fuels Data Center (July 2020);
Florida Department of Transportation (August 2020)
Date of Production: 9 / 17 / 2020

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