Drive ELECTRIC Florida

Getting Southeast Florida Plug-in Ready

Volume I: Getting Southeast Florida Plug-In Ready

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March 29, 2013

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Funded By:
U.S. Department of Energy
Under Award Number DE-EE0005561

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Background

Disclaimers

This document sets forth one or more suggested approaches to the deployment of electric vehicles and electric vehicle supply equipment and has been prepared by the South Florida Regional Planning Council, Southeast Florida Clean Cities Coalition, Florida Power & Light Company, and The Curtis Group, in conjunction with various other state, local, and private entities and individuals (collectively, the "Parties"). The Parties reserve the right to make changes to this document at any time without prior notice to any party. THE INFORMATION CONTAINED HEREIN IS PROVIDED "AS IS" AND THE PARTIES MAKE NO REPRESENTATIONS AND OFFER NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THOSE OF MERCHANTIBILITY AND FITNESS FOR A PARTICULAR PURPOSE, AS TO (I) THE ACCURACY OF THE INFORMATION CONTAINED HEREIN; (II) THE SUITABILITY OF THIS DOCUMENT FOR ITS INTENDED PURPOSE; (III) THE INTELLECTUAL OR OTHER PROPERTY RIGHTS OF ANY PERSON OR PARTY IN; OR (III) THE MERCHANTABILITY, SAFETY, OR FITNESS FOR PURPOSE OF ANY INFORMATION, PRODUCT OR PROCESS DISCLOSED, DESCRIBED, OR RECOMMENDED IN THIS DOCUMENT. NONE OF THE PARTIES ASSUMES ANY LIABILITY OF ANY KIND ARISING IN ANY WAY OUT THE USE BY A THIRD PARTY OF ANY INFORMATION, PRODUCT OR PROCESS DISCLOSED, DESCRIBED OR RECOMMENDED IN THIS DOCUMENT, OR ANY LIABILITY ARISING OUT OF RELIANCE BY A THIRD PARTY UPON ANY INFORMATION, STATEMENT, OR RECOMMENDATIONS CONTAINED IN THIS DOCUMENT.

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This material is based upon work supported by the U.S. Department of Energy under Award Number DE-EE0005561.

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Drive Electric Florida – Acknowledgements and Thanks

The Drive Electric Florida team leads are sincerely grateful for the participation, guidance, and contributions of the following individuals.

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We are also sincerely grateful to the following individuals – who each provided varying degrees of participation in the development of the plan – including guidance, content development, and data.

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Glossary[1]

120-volt AC outlet	A standard U.S. household electrical outlet, which can be used to recharge most plug-in electric vehicles.
240-volt AC outlet	Commonly used to power larger household appliances, such as electric ovens and dryers. It can provide faster PEV Level-2 charging.
Alliance	The Southeast Florida Electric Vehicle and Infrastructure Alliance is a public/private partnership brought together under the Clean Cities Community Readiness and Planning for Electric Vehicles and Charging Infrastructure Grant awarded by the U.S. Department of Energy. The Alliance includes the South Florida Regional Planning Council and its Southeast Florida Clean Cities Coalition, Florida Power & Light Company, local governments, private companies, and individuals.
Battery Electric Vehicle (BEV)	Any vehicle that operates exclusively on electric power from the grid, stored in the vehicles' batteries.
Car-Sharing Program	Program to provide vehicles for short-term use by multiple members of the program. The vehicle and asset ownership and operational responsibilities are maintained by the program's management unit(s).
CHAdeMO	The trade name of a DC-Fast Charging (DCFC) method that delivers high-voltage direct current via a special connector. This Japanese standard differs from the SAE International's DCFC standard connectors. The Nissan Leaf and Mitsubishi i-MiEV use the CHAdeMo standard.
Charging Station	Device that safely transfers electricity to a PEV, also called Electric Vehicle Supply Equipment.
Commercially Available	Technologies that are available for purchase, unrestricted for use by the general public, and compliant with all applicable regulations.
Coupler	A mating electric vehicle inlet and electric vehicle connector set.
DC-Fast Charging (DCFC)	Charging stations that use DC voltage to charge a PEV at significantly faster rates than AC Level-1 and AC Level-2. This is sometimes erroneously referred to as Level-3 charging.
Drive Electric Florida Team	Those public and private representatives who worked on task teams to complete this plan.
Early Adopter	Marketing term used to describe individuals who purchase or try new technologies before most of the population.
Electric Vehicle (EV) or Plug-in Electric Vehicle (PEV)	A generic/ambiguous term that people use to refer to any vehicle that plugs in to the grid for all or part of its power source, otherwise known as Plug-in Electric Vehicles. Others use it to refer to vehicles that rely exclusively on electricity for power, otherwise known as Battery Electric Vehicles.
Electric Vehicle Service Provider (EVSP)	A supplier of electric vehicle charging services, which may include EVSE, networked communications and support services, and billing capability. Some EVSPs may provide turnkey solutions for site hosts, including equipment selection, installation, maintenance, billing, and 24-hour customer service for users.
Electric Vehicle Supply Equipment (EVSE)	Device that safely transfers electricity to a PEV and complies with Article 625 of the National Electric Code.
Extended Range Electric Vehicle (EREV)	In addition to battery-electric drive, these vehicles have a gas engine that powers an electric generator for several hundred additional miles after the battery is fully discharged.
Fuel Cell Electric Vehicle	A vehicle that uses electricity produced by an on-board fuel cell to power electric motors for the vehicle's wheels. The fuel cell is powered by fueling the tank with hydrogen.
Hybrid Electric Vehicle (HEV)	Vehicles that combine a conventional internal combustion engine (ICE) propulsion system with an electric propulsion system. HEVs do not receive energy from the grid and do not have plugs for recharging. The traditional Toyota Prius is an HEV.

[1] Many terms and definitions adapted from: Plug-in America, State of Hawaii. "Hawaii EV Ready: Guidebook for Commercial Electric Vehicle Charging Station Installations." March 2012. Online. Available: http://www1.eere.energy.gov/cleancities/toolbox/pdfs/hawaii_ev_guidebook.pdf. 15 Dec. 2012.

Inlet	The receptacle on the PEV into which the charging connector is inserted for charging.
Internal Combustion Engine (ICE)	Engines that burn gasoline or other fossil fuels for energy. The majority of vehicles on the road today operate on internal combustion engines.
J1772 Connector	The North American design standard for charging connectors, adopted by SAE International. All of the major automakers have adopted this standard for AC Level-1 and AC Level-2 charging, and most U.S. and European automakers have adopted it for DCFC. This way, the majority of vehicles will be compatible with the majority of charging stations.
Kilowatt (kW)	A unit of power (or rate of power) equal to 1,000 watts.
Kilowatt-hour (kWh)	A unit of electrical energy equal to 1,000 watts for one hour
Leadership in Energy and Environmental Design Certification	LEED is the green-building rating system of the U.S. Green Building Council (USGBC) to provide a suite of standards for environmentally sustainable construction and operation.
Level-1 Charging	Charging from a 120-volt AC outlet or from hardwired EVSE with 120-volt AC connections.
Level-2 Charging	Charging from EVSE with 208/240-volt AC connectors. Level-2 is faster than Level-1 charging, using higher voltage.
Miles per Gallon Equivalent (MPGe)	A measure of the average distance traveled per unit of energy consumed. This is used by the U.S. Environmental Protection Agency (EPA) to compare energy consumption of PEVs with the fuel economy of conventional internal combustion engine vehicles.
Modular Unit	A non-permanent, removable EVSE that can be plugged into an electrical outlet. Most PEVs come with a modular Level-1 EVSE. Portable Level-2 EVSEs are now available.
Motor Vehicle	Any self-propelled vehicle, including a motor vehicle combination, not operated upon rails or guideways, excluding vehicles moved solely by human power, motorized wheelchairs, and motorized bicycles as defined in Section 316.003, Florida Statutes.
Mounting Style	Refers to the placement location for hard-wired/permanently affixed charging stations – wall, pole, pedestal, and ceiling mounted.
National Electrical Code (NEC)	NEC section 625 is the portion of the electrical code that covers electrical conductors and external equipment used to charge a PEV.
National Electrical Manufacturers Association (NEMA)	NEMA is the association of electrical equipment manufacturers. It provides a forum for the development of technical standards that are in the best interests of the industry and users; advocacy of industry policies on legislative and regulatory matters; and collection, analysis, and dissemination of industry data.
Neighborhood Electric Vehicle (NEV)	Vehicles that have a maximum speed of 25 miles per hour (mph) and maximum loaded weight of 3,000 pounds. They are legally limited to roads with posted speed limits up to 45 mph. They are classified as low-speed vehicles by the U.S. Department of Transportation.
NEMA 5-15R	All NEMA 5 devices are three-wire grounding devices (hot-neutral ground) rated for 125 volts, maximum. The 5-15 is a grounded version and is the most common electrical outlet in North America since the mid-twentieth century. All mass-market PEVs are capable of recharging on a NEMA 5-15R outlet. This receptacle requires 15 amps.
NEMA 5-20R	See definition for the NEMA 5-15. The NEMA 5-20 is also a grounded outlet intended to supply lighter-duty, general-purpose electrical devices. It has an amperage rating of 20 amps.
Off-peak Charging	Charging PEVs during periods of low energy demand on the electric grid – typically overnight when people are sleeping, and more likely to be charging their vehicles.
Plan	The Southeast Florida (Gold Coast) Sustainable Community Planning for Electric Vehicle Charging and Infrastructure Plan, as outlined in this report.
Plug-in Electric Vehicle (PEV)	A generic/ambiguous term that people use to refer to any vehicle that plugs in to the grid for all or part of its power, otherwise known as Electric Vehicles. Others use it to refer to vehicles that rely exclusively on electricity for power, otherwise known as Battery Electric Vehicles.
Plug-in Hybrid Electric Vehicle (PHEV)	A vehicle that uses electricity from the grid along with another fuel type, such as gasoline. An example of a PHEV with a limited electric range is a Toyota Plug-in Prius.
Public Charging	PEV charging station or electrical outlet meant for PEV charging, designated for use by the general public – i.e. publically accessible PEV charging.
Region	The Region, as defined in this report, includes the seven counties in Southeast Florida that are the focus of this grant, including: Monroe, Miami-Dade, Broward, Palm Beach, Martin, St. Lucie, and Indian River counties.

SAE International	Formerly the Society of Automotive Engineers, SAE International is a global body of scientists, engineers, and practitioners that manage and distribute mobility-related information through education, standards, technical publications, and global standardization.
Semi-Public Charging Infrastructure	PEV charging station, or electrical outlet meant for PEV charging, designated for use by a restricted population. For example, workplace charging is a semi-public charging location often reserved for employee use only, not for use by the general public.
Time-of-Use Metering (TOU)	A utility rate structure with different rates for electricity used at different times of the day, depending upon grid demand.
Underwriters Laboratories (UL)	Provides third-party safety certification and labeling of EVSE.
Zero Emissions Vehicle (ZEV)	A vehicle that does not produce any tailpipe emissions. A battery electric vehicle is a zero-emissions vehicle.

Acronyms

AC – Alternating Current	ADA – Americans with Disabilities Act
AMI – Advanced Metering Infrastructure	BEV – Battery Electric Vehicle
DACS – Department of Agriculture and Consumer Services	DC – Direct Current
DCFC – DC Fast Charge/Charging	DOE – U.S. Department of Energy
EPAct – Energy Policy Act	EREV – Extended Range Electric Vehicle
ESF – Energy Smart Florida	EV – Electric Vehicle
EVSE – Electric Vehicle Supply Equipment	EVSP – Electric Vehicle Service Provider
FDACS – Florida Department of Agriculture & Consumer Services	FDOT – Florida Department of Transportation
FE – Fuel-efficient	FGBC – Florida Green Building Council
FLAGFA – Florida Association of Government Fleet Administrators	FPL – Florida Power & Light Company
FPSC – Florida Public Service Commission	FS – Florida Statutes
FTA – Federal Transit Administration	GFI – Ground Fault Interrupter
HEV – Hybrid Electric Vehicle	HOA – Homeowners' Association
HOV – High Occupancy Vehicle	ILEV – Inherently Low Emission Vehicle
ICE – Internal Combustion Engine	ITE – Institute for Transportation Engineers
kW – Kilowatt (also refers to demand)	kWh – Kilowatt-hour
LDR – Land Development Regulations	LE – Low-Emitting (Vehicle)
LEED – Leadership in Energy and Environmental Design	MPGe – Miles per Gallon Equivalent
MUD – Multiple Unit Dwelling	MUTCD – Manual on Uniform Traffic Control Devices
NAFA – National Association of Fleet Administrators	NEC – National Electrical Code
NEV – Neighborhood Electric Vehicle	PACE – Property-Assessed Clean Energy Programs
PEV – Plug-in Electric Vehicle	PHEV – Plug-in Hybrid Electric Vehicle
PTRG – Permitting Technical Review Group	PV – Solar Photovoltaic
RFID – Radio Frequency Identification Subscription Access Card	SAE – SAE International (formerly Society of Automotive Engineers)
SFRPC – South Florida Regional Planning Council	SGIG – Smart Grid Investment Grant
SRPP – Strategic Regional Policy Plans	TCRPC – Treasure Coast Regional Planning Council
TOU – Time of Use	UL – Underwriters Laboratories
VMT – Vehicle Miles Traveled	ZEV – Zero Emissions Vehicle

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Chapter 1 – Introduction & Executive Summary

Our *mission* is to prepare communities in Southeast Florida for the widespread adoption of plug-in electric vehicles and to assist other regions in the state with readiness planning to drive electric.

The Region of Southeast Florida could have as many as 74,000 plug-in electric vehicles (PEVs) on its roads in the next decade,[2] up from 1,074 today – an exciting forecast, given the tremendous economic and environmental opportunities presented by electric-drive transportation.

Helping to pave the path from PEV *potential* to *reality*, the Southeast Florida Electric Vehicle and Infrastructure Alliance (Alliance) has come together under the "Clean Cities Community Readiness and Planning for Electric Vehicles and Charging Infrastructure Grant," awarded by the U.S. Department of Energy (DOE),[3] to develop plans addressing the institutional, technological, and market barriers to accelerate PEV adoption in Southeast Florida – including Monroe, Miami-Dade, Broward, Palm Beach, Martin, St. Lucie, and Indian River counties (Region).

The Alliance is a public/private partnership, including the South Florida Regional Planning Council and its Southeast Florida Clean Cities Coalition (formerly the Gold Coast Clean Cities Coalition), Florida Power & Light Company (FPL), local governments, private companies, and individuals, who have worked collaboratively to develop this plan, branded "Drive Electric Florida" – which is one of 16 similar projects funded nationwide.

The Benefits of Going Electric: Regionally, widespread adoption of plug-in electric vehicles (PEVs) – whether they are battery-electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), or extended-range electric vehicle (EREVs)[4] – will bring the Region and its residents several key benefits, such as:

- ***Economic advantages, including lower fuel and operating costs for owners***: Owners can expect to fuel up for 80 percent less than they'd pay at the gas pump in Southeast Florida.[5]
- ***Environmental and health benefits from reduced emissions***: Battery electric vehicles emit 70 percent fewer emissions than gas-powered cars in the Region, when considering upstream emissions from power plants.[6]
- ***Improved energy security, due to lower reliance on foreign fuels***: Less than 1 percent of the Region's electricity is generated from oil.
- ***Better utilization of the Region's electrical infrastructure***: There is sufficient electrical capacity in the grid to support widespread adoption of PEVs in Southeast Florida.

The Opportunity and Outlook: The Southeast Florida Region – which comprises 33 percent of the state's population, hosts millions of visitors annually, and is the nation's fourth largest urbanized area[7] – offers tremendous potential for PEV market growth.

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[2] Appendix B-7: PEV and Charging Infrastructure Forecast (p. 182).
[3] Department of Energy grant award of $500,000. Award number: DE-EE0005561.
[4] See Glossary in this report for definitions, or refer to Today's PEV Models on page 3-17 of this report.
[5] For customers of Florida Power & Light Company, which provides electricity to most of the Region's residents.
[6] Based on FPL's power plant emissions profile (emissions per kilowatt-hour, per mile – as consumed by a PEV) compared to the emissions per mile of the average conventionally fueled automobile in the U.S. Details on the Region's fuel mix can be found later in the report: Southeast Florida's Electricity Supply (p. 5-31).

The Region's population primarily lives along densely populated corridors, with a humid sub-tropical/tropical climate and flat topography. Residents enjoy: affordable electricity, with rates 26 percent below the national average; electricity with an emissions profile below the U.S. average; and more than 99.8 percent service reliability – amplifying the benefits of driving an electric vehicle.

In February 2013, Southeast Florida had nearly 1,074 PEVs on the road – representing 34.6 percent of the PEVs on Florida's roads – and 97 public AC Level-1 and AC Level-2 charging stations supporting the Region.

The State of Florida, as a whole, is number four in the nation for penetration of hybrid-electric vehicles[8] – which is a likely proxy for PEV adoption. Additionally, the Region of Southeast Florida has an above-average number of residents with daily travel distances of less than 40 miles, which is well within the range of commercially available PEVs. Furthermore, the demographic profile of Southeast Florida residents indicates a solid percentage of likely "early adopters" – people with a tendency to purchase new technologies ahead of the general population. More detail about the Region's demographics and other characteristics can be read in the Regional Snapshot section of this report (p. 5-30).

Our *vision* for the Region includes these strategies: well-placed public and workplace charging infrastructure in adequate quantities; supportive codes, policies, incentives, and ordinances; fleet managers who choose to replace vehicles with comparable PEVs; residents who are aware of the benefits of PEVs and PEV charging infrastructure; and the launch of an effective PEV and charging infrastructure demonstration project along a heavily congested mass-transit corridor.

This early adopter group, who is pioneering PEV technologies today, is critical for helping to "mainstream" PEV technology. Not only will early adopters bring awareness to electric vehicles – and their many benefits – among the Region's population, but they will also provide the first-generation of used PEVs available for purchase among a wider segment of the population. This, in conjunction with PEV car-sharing programs along mass-transit corridors, will help make PEV technologies more accessible to the masses as people become increasingly familiar with the technology.

Suitability for PEVs: The above factors paint a picture of a Region that is well suited for the transition to plug-in electric drive transportation and PEV market growth, providing an excellent test-bed for the state – and nation. In fact, as part of this project, the Drive Electric Florida team forecasts that by 2022, the Region could have 61,545 PEVs (32,000 – 74,000) on Southeast Florida's roads and 1,800 to 4,100 public and semi-public charging stations supporting them.

The Challenges and Potential Barriers: While the Region offers favorable characteristics for market growth, the road to high PEV penetration is not without obstacles.

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[7] United States Bureau of the Census. 2010 Census Data. Online. Available: http://www.census.gov/2010census/data/.
[8] Hill, Kim and Joshua Cregger. "Deployment Rollout Estimate of Electric Vehicles 2011-2015." Ann Arbor, Michigan: Center for Automotive Research, 2011. Online. Available: http://www.cargroup.org/?module=Publications&event=View&pubID=12. Pages 14-15. Accessed: June 2012.

Whether these obstacles are more rooted in reality or perception and myth, they are very real in their ability to slow market adoption. In fact, while PEV sales nationwide tripled between 2011 and 2012,[9] the market has still experienced slower-than-initially-predicted PEV market growth globally.[10] This plan considers the following PEV barriers:

- ***Limited range compared to gasoline vehicles***: While the range of commercially available PEVs on the road today exceeds the average U.S. daily commute, a lack of familiarity with PEV technology can lead to feelings of "range anxiety" among drivers.
- ***Limited public/semi-public charging infrastructure***: While most PEV owners will charge at home, regions with high penetrations of multi-unit dwellings (i.e. apartments and condominiums) – like Southeast Florida – will rely more on public and semi-public workplace charging infrastructure to support vehicle charging.
- ***Higher upfront cost***: The purchase prices of today's PEVs are higher than comparable gas-powered cars. Fortunately, when lifetime operating costs are considered, most PEVs have a lower total cost of ownership than gas-powered cars. Additionally, federal tax incentives and attractive lease options exist to help lower the cost barrier.
- ***Long charge times***: Charge times can take six to eight hours or more on a 120-volt, AC Level-1 charge. Fortunately, this is more than adequate for most PEV owners, who will charge overnight. For other PEV owners, an investment in a faster charging station is an option – but more expensive.
- ***Limited styling***: Today's PEVs are offered in fewer body styles than traditional gas-powered cars and are predominantly offered in the styling of more traditional sedans.
- ***Lack of technology familiarity:*** People lack familiarity with reliability features, range, general capabilities, and charging requirements of PEVs. For these reasons, it is important to bridge that gap in technology understanding with education and PEV access.

Overcoming Barriers: The major barriers as they exist today can lead to a lack of broad appeal. Increased awareness and interest will perhaps be most dependent on improved customer education and outreach, as a number of these barriers result from misconceptions and "myths" about PEV range, charge times, safety, impact on electric bills, and overall performance. For this reason, outreach is a core part of the Drive Electric Florida team's plan to drive awareness and make Southeast Florida plug-in ready – along with providing access to low-cost opportunities to try out PEVs and charging technologies through a Regional demonstration project (along the U.S.-1 Corridor).

Even with information and access to electric vehicles, PEVs are certainly not for everybody. However, the "playing field" is currently stacked in favor of gas- and diesel-powered cars – with an abundance of gas stations available to drivers, compared to a relatively small number of charging stations. Supporting current and future PEV owners with adequate public and semi-public charging infrastructure will require an additional collaborative effort among public and private entities in the Region and beyond.

This collaborative effort is needed – and is currently underway – to: ensure adequate public and private charging infrastructure exists; help make the installation of electric vehicle supply equipment (EVSE) a smooth process with supportive codes, policies, permitting, and zoning; help jumpstart the market – and public acceptance – of PEVs by supporting the conversion of gas fleets to electric fleets; and drive a master

[9] Voelcker, John. *Green Car Reports*. "Plug-in Electric Car Sales Triple In 2012 As Buyers, Models Increase." January 3, 2013. http://www.greencarreports.com/news/1081419_plug-in-electric-car-sales-triple-in-2013-as-buyers-models-increase. Accessed: 5 January 2013.
[10] Young, Peter. "Electric vehicles: a numbers game." *The Engineer*, Blog, January 6, 2012. Online. Available: http://www.theengineer.co.uk/home/blog/electric-vehicles-a-numbers-game/1011348.article. Accessed: March 2013.

plan for a networked, transit-linked, PEV car-sharing demonstration project along U.S.-1 in downtown Miami (Miami-Dade U.S.-1 Clean Transportation Corridor Project).

Setting the Strategy

Through this planning process afforded by the grant award from the DOE, many stakeholders have already come together to create an even stronger foundation for the PEV market in the Region. This plan leverages stakeholder input to set a course for sustained activities to grow the PEV market by specifically addressing the greatest Regional adoption barriers. The plan outlines six strategies to achieve its vision:

- **Identify financial and non-financial incentives to support adoption of PEVs and EVSE:**
  - Identify and recommend additional financial and non-financial incentives to help support the adoption of PEVs and the deployment of charging infrastructure in the Region.
  - Outline existing federal, state, local, and private incentives available today.

- **Identify options for public and private infrastructure deployment:**
  - Provide a consolidated guide to the siting and installation of charging stations and charging equipment features and options.
  - Summarize multi-unit dwelling and workplace charging policy and process considerations.
  - Outline public charging location characteristics and considerations for charging levels, ownership, and payment models.
  - Identify the appropriate quantity, concentration, and location types for public charging.

- **Make it easier to install public and private charging infrastructure with supportive codes, policies, and zoning:**
  - Streamline the infrastructure permitting and inspection process.
  - Ensure state, county, and local codes, policies, and ordinances are supportive of PEVs and infrastructure.
  - Consider zoning – including appropriate parking, signage, and accessibility.

- **Facilitate fleet purchases of PEVs to jumpstart the market and ultimately help drive down costs:**
  - Serve as a source of unbiased information.
  - Help to build a business case for fleet operators considering the purchase of PEVs.
  - Develop tools and resources for fleet operators to use when considering the potential for transitioning to electric vehicles.
  - Connect fleet managers with vendors.
  - Seek public and private funding opportunities.

- **Create education and outreach opportunities for stakeholders, including the Region's community and business leaders and residents:**
  - Seek opportunities to convey the benefits of PEVs and charging infrastructure.
  - Identify opportunities for targeted outreach to key audiences on a variety of topics.
  - Provide tools and resources to drive awareness and support the transition to high PEV penetration, including support/training materials for charging-infrastructure implementation.
  - Develop plans for continued engagement beyond the grant period.

- **Develop a master plan for a transit-linked, PEV car-sharing demonstration project along U.S.-1 in downtown Miami (Miami-Dade U.S.-1 Clean Transportation Corridor Project), outlined in Volume II[11], to:**
    - Provide low-cost commuter access to PEVs and charging infrastructure through a car-sharing program along the U.S.-1 mass-transit corridor.
    - Provide for increased use of regional transit services, through access to PEV car-sharing that addresses the "last-mile" dilemma faced by mass-transit riders.
    - Provide mobility options to those without personal vehicles.
    - Provide opportunities for potential adopters to experience PEV technology, which may influence a future purchase decision.

Summary of Recommendations

Based on months of research and planning related to the above strategies, the Drive Electric Florida team arrived at the following recommendations. Additional comprehensive recommendations and planning pertaining to the Miami-Dade U.S.-1 Clean Transportation Corridor Project are contained in Volume II of this report at www.DriveElectricFlorida.org.

Details on each of these recommendations are available in their respective sections of Chapter 6 – Strategies (starting on page 6-50).

Recommendations: Implementing Incentives

- Florida should consider implementation of new financial and non-financial incentives, including:
    - Research and development grants and loans made available for alternative fuels and vehicle technologies – as a means of advancing the industry and encouraging economic development in the state.
    - Rebates toward the purchase of qualifying PEVs.
    - Sales tax reduction or exemption on qualifying PEVs.
    - Free or discounted registration rates on qualifying PEVs.
    - Free Sunpass tolls, including express lanes along interstate roadways, for a limited timeframe of a certain number of years.
- The seven counties in Southeast Florida should more fully leverage existing state PEV incentives, including the Florida PACE Funding Agency for financing to install EVSE.
- Local governments should utilize and encourage developers to leverage eligible PEV, EVSE, and car-sharing credits when seeking U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) and/or Florida Green Building Council (FGBC) certification. In addition, local governments should utilize eligible PEV, charging infrastructure, and car-sharing credits when seeking Green Local Government certification.
- Additional language and/or incentives should be added to the green-building programs through USGBC, FGBC, and LEED to enhance coverage of PEVs – helping strengthen incentives for builders and building owners to implement charging equipment in the Region. A number of

[11] Available at www.DriveElectricFlorida.org.

recommendations are made in Appendix A-5: Building Incentives – LEED, FGBC, and Green Local Government Certification Program (p. 164).

See Implementing Financial and Non-Financial Incentives for PEVs and EVSE (p. 6-51) for more details.

Recommendations: Deploying Public and Private Infrastructure

- Charging locations should be prioritized where they are needed most:
  - Home: Single-family and multi-unit residential dwellings and "home" fleet locations.
  - Workplace: Where employees tend to stay parked for 6-8 hours daily.
  - Destination locations: Where people drive from afar and stay for a few hours.
  - Along major highways and corridors: *Connecting* urban areas (particularly DC-Fast Charging) and *in* dense-urban areas to support car-sharing programs.
- Quantity of public charging should grow as demand for them increases – phased growth:
  - A higher growth rate is needed in the earlier years to attain sufficient charging access at key locations, and then a lower growth rate is needed over time based on increasing numbers of PEVs and charging needs in the Region.
  - Quantity needed is also based on the charging levels installed. For example, a greater number of AC Level-1 charging stations are needed to serve the same number of vehicles as a single DC-Fast Charger (DCFC). Charging need and charging level are both highly location-specific.
- Charging levels should be selected based on the expected mileage and parking duration of users:
  - AC Level-1: Low miles and/or long parking durations.
  - AC Level-2: Moderate miles and moderate parking durations, up to four hours.
  - DCFC: High miles and short parking durations – in locations with a high expected volume (100+ charging sessions per month).
    - DCFC stations should use both available[12] connectors so that all PEVs capable of accepting a fast charge will be able to use them.
- Site-specific charging policies should be developed to support the hosts' and users' needs, considering key questions:
  - Parking duration: Is there a maximum duration in which users are permitted to park?
  - User authorization: Who is able to use the charging stations (customers, residents, employees, or others)?
  - Payment terms: Is there a fee for use and how will it be collected?
- Payment models and methods of sale should be fair and should maximize space utilization, increasing vehicle turnover:
  - Consider fees based on time connected rather than electricity/kilowatt-hours (kWh) consumed to encourage vehicle turnover.
  - AC charging prices should be less than the equivalent cost of gasoline (see Table 6: Guidelines for Selecting Charging Fees Based on Price of Gas, p. 6-83), and charging should be free at local/retail dining locations.
  - DCFC prices should consider the expected volume of use and cost to serve.

[12] CHAdeMO and SAE J1772.

- Public charging stations:
    - Should not be located in prime parking spaces to reduce instances of resentment and unauthorized parking by drivers of conventional vehicles, unless:
        - Offered as a non-financial incentive for PEV drivers – i.e. premium parking.
        - To help minimize installation costs – with installations closer to the power source.
        - To provide access to people with disabilities or families with small children.
    - Should have adequate signage, including way-fare signage to help users locate and use public charging stations.
    - Should have 24/7 contact information posted in case of equipment malfunction or issues encountered by users.
    - Should be included in the Clean Cities national "Alternative Fuels Station Locator" database so that users can find them.
        - New public and workplace charging stations can be reported to info@driveelectricflorida.com.
- The Department of Energy should consider adding a third category of charging stations to its Alternative Fuel Locator Database – "workplace charging." Workplace charging is typically categorized as "private" by the DOE; however, this category operates more like a "public" station with restrictions.

See Deploying Public and Private Infrastructure (p. 6-55) for more details.

Recommendations: Ensuring Supportive Codes, Policies, and Ordinances

- The State of Florida should continue its progress of updating its energy policies, laws, regulations, and incentives to recognize and include changes in alternative-fuel vehicle technology, including but not limited to PEVs.
- The State of Florida should amend Chapter 163, Part II, Florida Statutes (Fla. Stat.), sometimes referred to as the "Community Planning Act," to encourage cities and counties in Florida to allow charging stations within industrial, civic, residential, commercial, and recreational land use and their associated zoning districts. These charging stations should be outright permitted uses within all other land-use and zoning districts.
- Local government land-development regulations in Florida should allow AC Level-1 and AC Level-2 stations as an accessory to the principal permitted use within recreational land use and their associated zoning districts. These facilities should be as-of-right permitted uses within industrial, civic, commercial, and residential land-use and zoning districts.
- Local government permitting departments should undertake pre-approval of EVSE to streamline the process and shorten time of review for EVSE permits by establishing a master file and specifications. Pre-approval would limit the number of required internal reviews for subsequent permits submitted for the installation of charging stations, as those reviews would be undertaken in the pre-approval process.
- The State of Florida should formally petition the various agencies responsible for enforcement of the Americans with Disabilities Act (ADA) to determine whether PEV charging infrastructure is to be

governed by the standards for "Depositories, Vending Machines, Change Machines, Mail Boxes, and Fuel Dispensers" and "Automatic Teller Machines and Fare Machines."

- The Florida Department of Agriculture and Consumer Services (FDACS) has been tasked by the Florida Legislature to develop guidelines for PEV signage in the State of Florida, culminating in the adoption of signage standards via administrative rule. Drive Electric Florida should continue to work with FDACS on way-finding signs, and FDACS should also coordinate with the States of Michigan, Oregon, and Washington to review their data regarding regulatory signs for PEV parking spaces.
- When formulating the parking standards, local governments should consider: providing charging and parking incentives; reducing parking requirements for EVSE implementation; incenting charging station installations in existing parking lots; enforcing hours on PEV charging; considering the number of parking spaces dedicated to PEVs; and consider location of charging infrastructure (based on ADA accessibility and a preliminary assessment of electrical panels, breakers, and the like).
- The State of Florida should enact legislation mandating a policy to be developed that will address present and anticipated future PEV charging needs of multi-unit dwelling residents.
- Building Code should be revised to require that new multi-unit dwelling construction be equipped with electrical infrastructure to accommodate PEV charging.
- Local government land-development regulations should require that some percentage of designated parking spaces at newly constructed multi-unit dwellings be equipped with electrical infrastructure for PEV charging. Details on appropriate charging types for multi-unit dwellings are available in that section of the report: PEV Charging at Multi-Unit Dwellings (p. 6-68).
- Uniform policy requests should be crafted for local, state, and federal government policy packages.

More information is available in the Ensuring Supportive Codes, Policies, and Ordinances (p. 6-86) section of this report.

Recommendations: Facilitating Fleet Adoption

- The Southeast Florida Clean Cities Coalition should continue to provide technical assistance to fleets in the Southeast Florida Region to ensure attainment of national alternative fuel vehicle goals.
- All state purchasing lists should include all PEV technologies – including PHEVs, EREVs, and BEVs – classified as vehicles eligible for alternative-fuel credits.
- State, county, and local public agencies should allow fleet managers to factor in lifetime cost to own and operate a vehicle as a cost justification for PEV purchase, rather than a focus only on the initial purchase price. That's because PEVs can be less expensive to operate than gas-powered vehicles – and can often overcome a higher upfront purchase price through savings over time. This saves taxpayer money in the long run.

More information is available in the Facilitating Fleet Adoption section of this report (p. 6-106).

Recommendations: Creating Education & Outreach Opportunities

- Leverage the Southeast Florida Electric Vehicle and Infrastructure Alliance Partner relationships and existing organizational communication channels to place prewritten/pre-approved, PEV-related content – prepared by the Drive Electric Florida team and other sources, such as the Electric Drive Transportation Association – to provide the Region's residents with sustained, accurate information on PEVs and electric-vehicle charging infrastructure from trustworthy sources over time. More information is available in the Creating Education & Outreach Opportunities section of this report (p. 6-116).

Looking Ahead

As these strategies are executed, some of the most common barriers to widespread PEV adoption and charging infrastructure implementation can be overcome – creating a more enjoyable user experience for current PEV owners, encouraging the purchase of PEVs by general consumers and fleet managers, and smoothing the process for the implementation of private, semi-public, and public charging stations.

Moving forward, members of the Southeast Florida Electric Vehicle and Infrastructure Alliance will continue to collaborate with one another and with other Clean Cities organizations throughout the state on the implementation of the recommendations outlined within this report – integrating and establishing methods for regularly measuring progress. The continued engagement of this public-private partnership will help ensure that Southeast Florida is PEV-ready so that it may serve as a resource for other communities looking for guidance on PEV market development.

Chapter 2 – Project Approach

About – "Drive Electric Florida"

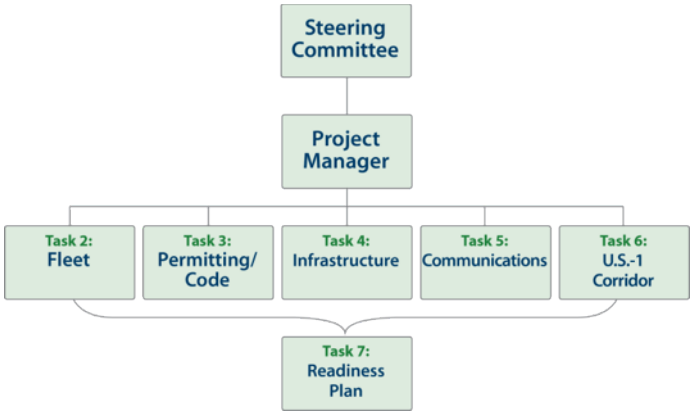
The Southeast Florida Electric Vehicle and Infrastructure Alliance (the Alliance) is a public/private partnership that includes the South Florida Regional Planning Council and its Southeast Florida Clean Cities Coalition (formerly the Gold Coast Clean Cities Coalition), Florida Power & Light Company (FPL), local governments, private companies, and individuals. It was formed to develop plans to address institutional, technological, and market barriers to accelerate PEV adoption. The effort is branded "Drive Electric Florida."

Project Approach

PEV Stakeholder Summit: In September 2011, FPL, in conjunction with the South Florida Regional Planning Council (SFRPC) and Southeast Florida Clean Cities Coalition, hosted a daylong Electric Vehicle Stakeholder Summit. More than 140 stakeholders attended the Summit. Attendees heard from industry experts on a number of PEV-related topics and learned about the recently awarded Community Readiness and Planning for Electric Vehicles and Charging Infrastructure Grant from the DOE/Clean Cities Program.

Project Organization: Drive Electric Florida was guided by a three-member steering committee, managed by a project manager, and split into five task teams, which were each lead by a senior-level professional. Each task team had representatives from both the private and public sectors and experts in a number of related fields. All told, there were more than 75 individuals – representing dozens of public and private entities – involved in planning for this report, which officially kicked-off in March 2012.

Figure 1: Project Organization & Team Structure



Task Teams: Each task team was encouraged to meet (at least) monthly during the development phase of the project. Teams engaged in research, information gathering, analysis, debate, and collaboration. Task team leads managed their work against a project plan and prepared monthly progress reports submitted to the project manager. Task team leads met frequently – sometimes weekly – to ensure collaboration and that project targets and milestones were met.

Stakeholder Engagement and Outreach: Throughout the planning period, the Drive Electric Florida team met with public and private stakeholders on a number of related topics including: permitting, codes, infrastructure, general awareness, benefits of electric vehicles, fleet outreach, and other topics. A range of meeting objectives included information and data collection, dissemination of information, and enrollment in the cause.

In addition, the Drive Electric Florida team participated in a number of public events, including the Miami International Auto Show – a 10-day event with more than 570,000 visitors. The show featured an Eco Experience exhibit, where attendees had opportunities to learn about PEVs and trial them on an indoor track with professional drivers. The team also participated in the September 2012 Alternative Vehicle Road Show, with tour stops in Delray Beach and Miami.

Report Preparation: Each team lead coordinated the development of their respective task-team sections and contributed their task-specific content to the collectively written state and regional snapshots.

Audiences

There are a number of different target audiences for this report. It is assumed that while some readers are involved in the industry and are knowledgeable about PEVs already, others know very little about PEVs, and this may be the only PEV-related document they have ever read. Therefore, this report is designed to suit both types of readers.

Target audiences include:

- ***Policymakers/Government*** – looking for information about the impacts of PEVs on their constituents and potential policy actions to help enable the market.
- ***Employers*** – looking for information on how to implement a workplace charging policy and the benefits to their organizations.
- ***Business Owners/Site Hosts*** – looking for information about offering charging to the public, including siting considerations, equipment selection, and possible business models.
- ***Enthusiasts/Other Organizations*** – looking for information on PEV forecasting methodologies or "canned communication" content they can leverage with their own constituents.
- ***Fleet Managers*** – looking to understand PEV benefits, how to calculate bottom-line savings, and which available PEVs could meet their needs.
- ***Building Management/Home Owners Associations*** *(HOAs)* – looking for information on meeting residents' charging needs.
- ***General Public*** – looking to learn more about PEVs and how to get their employers, HOAs, and/or favorite destinations to offer charging infrastructure.

People who are just learning about the industry can educate themselves with information presented in the first part of the paper. Those seeking to augment their existing knowledge-base can flip to the sections providing regional and state snapshots (starting with Chapter 4 – State Snapshot, p. 4-23) and to each of the task-team sections on: incentives, infrastructure, permitting and policy, fleets, education and outreach, and developing plans for a PEV-demonstration project along a mass-transit corridor (Miami-Dade U.S.-1 Clean Transportation Corridor Project).[13]

[13] The complete plan for the Miami-Dade U.S.-1 Clean Transportation Corridor Project can be found at www.DriveElectricFlorida.org.

Appendices and Tools

While there is considerable detail available within the plan, the Appendices are included with additional granularity for those requiring it. Appendices include detailed forecasts for PEVs and charging stations (residential/fleet/public/workplace) in the Region, methodologies, buyer profiles, IRS codes, and more. The Appendices begin on page 157.

In addition, this report contains a section of tools, which include abridged fact sheets on a number of topics – for easy dissemination to stakeholders – and other helpful resources for reaching out to target audience groups. The Tools & Resources section begins on page 133.

Chapter 3 – Overview: PEVs & Charging Infrastructure

Benefits of Plug-In Electric Vehicles

Today's PEVs offer a number of benefits for both consumers and fleet managers over conventional gas-powered cars with traditional internal combustion engines (ICE). While offering features that are "as good or better than conventional vehicles in most performance categories[14]," PEVs also provide environmental, cost, and energy security benefits that far exceed those of traditional gas-powered cars. Outlined below are some key benefits of electric vehicles.

Lower 'Fuel' Costs

PEVs can dramatically reduce fuel costs compared to traditional vehicles. Because electric vehicles are powered by electricity, not gasoline or diesel, efficiency is often measured as "miles per gallon equivalent" (MPGe) or kilowatt-hours (kWh) per 100 miles. Dependent on a driver's usage patterns, many PEVs today exceed 100 MPGe when driven in electric mode.[15]

In layman's terms, 100 MPGe is essentially equal to fueling up for 3 to 5 cents per mile. Compare this to a gas-powered car, which costs an average of 14 cents per mile to drive (if it gets 27.5 MPG). Traveling 15,000 miles per year in a battery electric vehicle (BEV), or PEVs in all-electric mode, owners could save between $1,300 and $1,600 in annual fuel costs.[16]

PEV owners in FPL's service territory can charge their car's batteries for approximately 80 percent less than what they usually pay at the gas pump – the equivalent of about 77 cents per gallon.

Did you know?

A 30-mile commute in a PEV costs about $1 worth of electricity, and the PEV can be recharged on a standard 120-volt outlet overnight.*

*$0.10 per kWh; vehicle rated at 34 kWh/100 miles.

Federal tax incentives – such as the federal income tax credit of up to $7,500 – and state incentives may also help lower the overall cost of PEV ownership for customers.[17] Today, 48 states plus the District of Columbia provide tax credits and/or non-monetary incentives for those who purchase fuel-efficient hybrids and PEVs – including Florida.[18]

[14] U.S. Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy (EERE). "Plug-in Electric Vehicle Handbook for Consumers." Prepared by the National Renewable Energy Laboratory (NREL). September 2011. Online. Available: http://www.afdc.energy.gov/pdfs/51226.pdf. Accessed: 15 October 2012.
[15] DOE, EERE. "Plug-In Electric Vehicle Handbook for Consumers."
[16] DOE, EERE. "Plug-In Electric Vehicle Handbook for Consumers."
[17] DOE. EERE. "Federal Tax Credits for Electric Vehicles Purchased in or after 2010." Online. Available: http://www.fueleconomy.gov/feg/taxevb.shtml. Accessed: October 2012.
[18] Electric Drive Transportation Association (EDTA). October 2012.

Maintenance and Operating Savings

Driving an all-electric vehicle means that owners no longer have to worry about oil changes, maintenance on exhaust and transmission systems, and repair work on many of the other moving parts contained within a conventional vehicle. That means lower maintenance costs and fewer tune-ups – saving electric vehicle owners even more money. In fact, it's estimated that over conventional vehicles, BEVs will save: 35 percent on scheduled maintenance[19] and 30 percent on repairs.[20]

Environmental and Health Benefits: Reduced Emissions

Local governments in the Southeast Florida Region have adopted emissions-reduction targets and recognize the benefits of fuel efficiency and fossil-fuel replacement strategies. PEV expansion will further the local and regional goals, such as those in the Southeast Florida Regional Climate Action Plan.[21]

The only emissions from all-electric vehicles, or BEVs, come from the power plants that generate electricity to charge their batteries. And even when emissions from power plants are taken into consideration, BEVs emit significantly less greenhouse gasses than gas-powered vehicles – a fact that is not only good for the environment, but also for the population's general health. The statistics are impressive:

- If just 60 percent of U.S. light-duty fleet vehicles were powered by the electric grid, the overall transportation sector's carbon emissions would drop by a third.[22]
- Electric vehicles could reduce greenhouse gas emissions from vehicles by more than 450 million metric tons annually in 2050 – that's the equivalent of taking 82.5 million passenger cars off the road – with widespread adoption.[23]

The environmental benefits for the Southeast Florida Region are even greater. Even when taking emissions from power plants into consideration, electric vehicles powered by the Region's electricity have 70 percent fewer emissions than gas-powered vehicles and are 37 percent cleaner than PEVs powered by utilities in other parts of the U.S.[24] – making them an especially feel-good option for car buyers.

Because no emissions are released from the tailpipes of BEVs or PEVs in all-electric mode, they also provide significant improvements to the air quality in heavily populated urban areas and reduce the overall percentage of greenhouse gasses emitted into the atmosphere. Berkeley Law and UCLA Law estimate that electric vehicles could significantly reduce healthcare costs for the state of California, recognizing that particulate matter in California air is responsible for approximately the same number of premature deaths as second-hand smoke and traffic accidents.[25]

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[19] Loveday, Eric. "Study: Electrics 35% Less Costly to Maintain Comparable to Gas Vehicles." Plug-inCars.com. 18 December 2012. Online. Available: http://www.plugincars.com/study-electrics-35-less-costly-maintain-comparable-ice-vehicles-125755.html. Accessed: 20 December 2012.
[20] GE Capital data and PRTM estimates. "Fleet Electrification Roadmap." Electrification Coalition. November 2010. Cited in figure 3M: "% Improvement over ICE Maintenance and Repair Costs." p. 104. Accessed: 2011.
[21] This report can be accessed at the following URL: http://southeastfloridaclimatecompact.org/pdf/Regional%20Climate%20Action%20Plan%20FINAL%20ADA%20Compliant.pdf.
[22] Natural Resources Defense Council. Cited in: Electric Drive Transportation Association (EDTA)'s "Electric Vehicle (EV) Talking Points for Communications and Media Professionals." 10 October 2012.
[23] Natural Resources Defense Council. "EPRI-NRDC Report Finds Environmental Benefits of Deploying PHEVs." Palo Alto, Calif.: July 19, 2007. Press release. Online. Available: http://www.nrdc.org/media/2007/070719.asp. Accessed: 10 October 2012.
[24] Based on FPL's power plant emissions profile (emissions per kilowatt-hour, per mile – as consumed by a PEV) compared to the emissions per mile of the average conventionally fueled automobile in the U.S. and the emissions per kilowatt-hour of the average U.S. utility. Details on the Region's fuel mix can be found later in the report: Southeast Florida's Electricity Supply (p. 5-31).
[25] Berkeley Law, UCLA Law, Bank of America. "Electric Drive by '25: How California can Catalyze Mass Adoption of Electric Vehicles by 2025." September 2012. Online. Available: http://www.law.berkeley.edu/files/ccelp/Electric_Drive_by_25-2.pdf. Accessed: 15 October 2012.

Furthermore, it's not just air pollution that's reduced. Because PEVs are much quieter than traditional vehicles, neighborhoods with high PEV penetration will also experience less noise pollution.

Energy Security: Reducing the Need for Foreign Fuel

The widespread adoption of PEVs can help make the United States – which is largely dependent on petroleum-based transportation – far more energy independent. In fact, today, the U.S. imports more than 60 percent of the petroleum it consumes, with more than two-thirds of those imports used for the transportation sector, according to the DOE.[26] The Congressional Research Service (CRS) estimates that the United States will spend $451 billion on imported oil in 2012 – up $30 billion over 2011.[27]

PEVs could significantly reduce the need for foreign oil. By electrifying the nation's light-duty vehicle fleet, the U.S. would reduce oil imports by more than three million barrels per day in 2030.[28]

For the Southeast Florida Region, which is primarily served by FPL, this story is even better. Today, FPL generates less than 1 percent of its power from oil, while approximately 87 percent of FPL's power is generated from cleaner burning natural gas or emissions-free nuclear power – so FPL customers can charge their PEVs with electricity generated from largely domestic sources of fuel. Additionally, FPL's cost-effective and efficient infrastructure investments help reduce the amount of fuel the utility uses to generate electricity. In fact, FPL has dramatically reduced its use of fuel oil by 97 percent since 2001. That's 41 million barrels down to just 1 million.[29] Southeast Florida is a particular beneficiary of this since the vast majority of residents are served by FPL.

Cutting-Edge Technology, Safety, and Reliability

In addition to environmental and fuel-cost benefits, PEVs provide drivers with a significant "fun" factor – offering cutting-edge technologies, quick and smooth acceleration, advanced displays, and sophisticated mobile applications that provide drivers with more information and control.

They also offer safety and reliability benefits equal to, or better than, traditional vehicles. In fact, PEVs produced by major auto manufacturers are held to the same safety standards as conventional vehicles set by the National Highway Traffic and Safety Administration (NHTSA). Additionally, they must also meet the electrical and safety standards set by the Society of Automotive Engineers, the National Electric Vehicle Infrastructure Working Council, and others, while charging equipment must be tested by independent and certified labs – such as Underwriters Laboratories, CSA International, and Edison Testing Laboratories.

An example of advanced safety mechanisms in some PEVs is a feature that automatically disables the battery in the event of an accident. Furthermore, emergency responders are undergoing training for how to respond to accidents involving electric cars. And potential PEV buyers should feel comfort knowing that odds of being injured in a car crash are 25 percent lower for people in a hybrid vehicle than in a non-hybrid vehicle.[30]

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[26] DOE, EERE. "Plug-In Electric Vehicle Handbook for Consumers."
[27] Wayne, Brian. "EVs Can Accelerate Energy Independence." *National Journal.* September 12, 2012. Online. Available: http://energy.nationaljournal.com/2012/09/seeking-elusive-energy-indepen.php#2243458. Accessed: 20 October 2012.
[28] Inter-Industry Forecasting Project at the University of MD, Keybridge Research LLC & Electrification Coalition. *Economic Impacts of the Electrification Roadmap*. April 2010.
[29] Florida Power & Light. *Energy News*. "Efficiency drives lowest bill in the state." Online. Available: http://www.fpl.com/news/news_and_notes/pdf/energy_news_0912.pdf. September 2012.
[30] Highway Loss Data Institute. "Hybrid models have lower injury odds than their conventional counterparts." November 17, 2011. Online. Available: http://electricdrive.org/index.php?ht=a/GetDocumentAction/id/29985. Accessed: 1 November 2012.

Greater Convenience

PEVs offer a number of improved conveniences over traditional vehicles with internal combustion engine technology, with key examples below.

Did you know?
PEVs are not new and accounted for a good deal of the U.S. car market 100 years ago.

- With fewer moving parts and fluids to change, PEVs require less regularly scheduled maintenance than traditional gas-powered cars, and with regenerative braking, brake systems in PEVs will often last longer than those in traditional vehicles.[31]
- PEV owners can enjoy the convenience of home charging – often while they're sleeping – avoiding additional stops on their commute for refueling at a gas station.
- PEV owners may also enjoy the added benefit of back-up power from their charged PEV batteries during a blackout or power outage to help them keep important electronic devices – like refrigerators and household lighting – operating until utility power is restored.[32] In fact, when "Super Storm Sandy" impacted the Northeastern U.S. in 2012, PEV drivers noted that they were readily able to charge their batteries and drive their PEVs, while drivers of internal combustion engine vehicles were unable to fuel their vehicles with gasoline – due to extreme fuel shortages.[33]
- Experts anticipate back-up power to be a real and tangible benefit of PEV batteries in the near term. There are already power inverters on the market that can connect to PEV batteries and convert the battery's DC power into AC power needed by most U.S. households. Most owners of a Nissan LEAF – an all-electric vehicle on the market today – come home with 12 kilowatt-hours (kWh) of remaining charge in their LEAF's battery. This could be enough electricity to power a number of home circuits for a couple of hours.[34]

Optimizing Existing Infrastructure

The Pacific Northwest National Laboratory claims that 73 percent of the nation's light-duty vehicle fleet could actually be powered and recharged with existing capacity from generation and transmission infrastructure.[35] This means that not only is current infrastructure technically enough to meet the growing PEV charging needs in the United States, but that PEVs can actually help utilities optimize their current assets, using off-peak power (i.e. mainly at night).

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[31] DOE, EERE. "Plug-In Electric Vehicle Handbook for Consumers."
[32] *Los Angeles Times*. LA at Home. "Summer blackouts beware: Cars can be turned into backup generators." June 8, 2012. Online. Available: http://latimesblogs.latimes.com/home_blog/2012/06/car-generator.html. Accessed: 15 October 2012.
[33] Berman, Bradley. *The New York Times*. "Electric Car Owners Unfazed by Storm." Automobiles, November 2, 2012. Online. Available: http://wheels.blogs.nytimes.com/2012/11/02/electric-car-owners-unfazed-by-storm/. Accessed: 15 November 2012.
[34] Carpenter, Susan. *Los Angeles Times*. LA at Home. "Summer blackouts beware: Cars can be turned into backup generators." June 8, 2012. Online. Available: http://latimesblogs.latimes.com/home_blog/2012/06/car-generator.html. Accessed: 15 November 2012.
[35] Pacific Northwest National Laboratory. "Impact Assessment of Plug-In Hybrid Electric Vehicles on the U.S. Power Grid." November 2010. Online. Available: energyenvironment.pnnl.gov/ei/pdf/Impact%20Assessment%20of%20PHEV%20on%20US%20Power%20Grid.pdf. Accessed 10 November 2012.

Types of Electric Vehicles

PEVs are not new. In fact, 100 years ago, electric cars accounted for a good deal of the U.S. car market; however, their usage decreased as internal-combustion engine vehicles emerged to provide greater range.[36]

But, as concerns over the environment and energy independence began to increase in recent years, PEV and battery-powered automobile technologies surfaced again – re-emerging first with hybrid-electric vehicles (HEVs), and now evolving into plug-in hybrid electric vehicles (PHEVs), which combine an internal combustion engine and a rechargeable plug-in battery, and cars that are 100 percent fueled by electricity from grid-charged batteries, known as battery-electric vehicles (BEVs). Depending on a consumer's preference and needs, there are a number of PEV options available on the market today. These include:

- ***Plug-in Electric Vehicles (PEVs):*** As a general category, these vehicles get all or part of their power from electricity from the electric grid and include pure all-battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and extended range electric vehicles (EREVs).
- ***All-Electric Vehicles (EVs) or All-battery Electric Vehicles (BEVs):*** These vehicles are fueled entirely by one or more electric motor, which operates on electricity from batteries that are recharged by the grid. BEVs use no petroleum-based fuel and release no tailpipe emissions. Examples of pure all-electric vehicles include the Nissan LEAF and Tesla Roadster or Model S.
- ***Hybrid Electric Vehicles (HEVs):*** As defined by the DOE, these vehicles "combine an ICE or other propulsion source with batteries, regenerative braking, and an electric motor to provide high fuel economy. They rely on a petroleum-based or alternative fuel for power and are not plugged in to charge. HEV batteries are charged by the ICE or other propulsion source and during regenerative braking."[37] An example of an HEV is the original Toyota Prius. More than 2 million HEVs have been sold to date.[38]
- ***Plug-In Hybrid Electric Vehicles (PHEVs):*** These vehicles have motors that run off of batteries that are recharged by the grid, while also containing a petroleum-based source to power an internal combustion engine. An example of a PHEV is the Ford C-MAX Energi.
- ***Extended-Range Electric Vehicles (EREVs):*** In addition to battery-electric drive, these vehicles have a gas engine that powers an electric generator for several hundred additional miles after the car's battery is fully discharged. An example of an EREV available today is the Chevrolet Volt.[39]
- ***Fuel-Cell Electric Vehicle (FCEVs):*** These cars will be able to generate electricity with hydrogen fuel cells to power an electric motor, with their only emissions being heat and water. Hydrogen fuel cell vehicles include the Hyundai Tucson and Honda FCX Clarity.[40]

Today's PEV Models

As of October 2012, there were approximately a dozen models of PEVs available in the U.S. market. Looking ahead, automakers have announced that 25 additional PEVs will be available by 2015.[41] Figure 2 below demonstrates the passenger PEVs available in the U.S. today.

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[36] DOE, EERE. "Plug-in Electric Vehicle Handbook for Consumers."
[37] DOE, EERE. "Plug-in Electric Vehicle Handbook for Consumers."
[38] Electric Drive Transportation Association (EDTA). Technology page. Online. Available: http://www.electricdrive.org/index.php?ht=d/sp/i/2446/TPL/LandingPageTechIss/pid/2446. Accessed: October 2012.
[39] Electric Drive Transportation Association (EDTA). Technology page.
[40] Electric Drive Transportation Association (EDTA). Technology page.

Figure 2: Today's Available PEV Models

Plug-In Electric Vehicles

2013 Chevy Volt (EREV)

- Engine: 4 cyl, 1.4 L; Motors: 111 kW traction + 54 kW generator
- 35 kWh per 100 miles
- MPGe: 98, MPG: 37
- 38 mile electric range
- 380 mile total range
- MSRP: $39,145
- Tax credit: $7,500

Photo credit: General Motors

2013 Ford C-Max Energi (PHEV)

- Engine: 4 cyl, 2.0 L; Motor: 68 kW
- 34 kWh per 100 miles
- MPGe: 100, MPG 43
- 21 mile electric range
- 620 mile total range
- MSRP: $32,950
- Tax credit: $3,750

Photo credit: Ford

2013 Ford Fusion Energi* (PHEV)

- Engine: 4 cyl, 2.0 L; Motor: 68 kW
- MPGe: 100, MPG 47
- 21 mile electric range
- MSRP: $39,495
- Tax credit: $3,751

*note, estimates only. Ratings not yet published by the U.S. Dept. of Energy

Photo credit: Ford

2012 Nissan Leaf (BEV)

- 80 kW electric motor
- 73 mile electric range
- 34 kWh per 100 miles
- MPGe: 90
- MSRP: $35,200
- Tax credit: $7,500

Photo credit: Nissan

2013 Toyota Prius Plug-in

- Engine: 4 cyl, 1.8 L; Motor: 18 kW
- 29 kWh per 100 miles
- MPGe: 95, MPG 50
- 11 mile electric range
- 540 mile total range
- MSRP: $32,000
- Tax credit: $2,500

Photo credit: Toyota

2013 Ford Focus Electric (BEV)

- 107 kW electric motor
- 32 kWh per 100 miles
- MPGe: 105
- 76 mile electric range
- MSRP: $39,200
- Tax credit: $7,500

Photo credit: Ford

2013 Mitsubishi i-MiEV (BEV)

- 49 kW electric motor
- 30 kWh per 100 miles
- MPGe: 112
- 62 mile electric range
- MSRP: $29,125
- Tax credit: $7,500

Photo credit: Mitsubishi

2013 CODA Automotive (BEV)

- 100 kW electric motor
- 46 kWh per 100 miles
- MPGe: 73
- 88 mile electric range
- MSRP: $37,250
- Tax credit: $7,500

Photo credit: Adrian Gaut

2013 Tesla Model S – (85kWh BEV)

- 270 kW electric motor
- 265 mile electric range
- 38 kWh per 100 miles
- MPGe: 89
- MSRP: $57,400; $77,400 - 85 kWh model
- Tax credit: $7,500

Photo credit: Teslas Motors

2012 Fisker Karma (EREV)

- Engine: 4 cyl, 2.0 L; Motors: 2 @ 150 kW (300 kW total)
- 62 kWh per 100 miles
- MPGe: 54, MPG 20
- 33 mile electric range
- 240 mile total range
- MSRP: $102,000
- Tax credit: $7,500

Photo credit: Fisker

2013 Honda Fit EV (BEV)

- 92 kW electric motor
- 82 mile electric range
- 29 kWh per 100 miles
- MPGe: 118
- MSRP: not available

Photo credit: Honda

2013 Smart fortwo (BEV)

- 55 kW electric motor
- 32 kWh per 100 miles
- MPGe: 107
- 68 mile electric range
- MSRP: not available

Photo credit: Smart

December 2012 25753

[41] Electric Drive Transportation Association (EDTA). 10 October 2012.

PEV Charging

Most drivers will charge their PEVs at home, using either 120 volts or 240 volts, depending on the speed of charge needed. Public and workplace charging options have also become increasingly available in urban areas, but deployment is still very much in its infancy.

Fortunately, the average daily commute of most Americans can be supported – and exceeded – by the certified range of commercially available PEVs on the road today. According to the U.S. Federal Highway Administration, 100 miles of electric range will cover more than 90 percent of all U.S. household trips.[42]

A number of charging options are available today, with charging times varying and depending on the vehicle's battery size, existing state of charge, rate of charge, or the type of charger being used. For example, a PHEV has a much smaller battery than a BEV, so getting a full charge on a PHEV will take much less time.

Below are options for charging equipment – also known as electric vehicle supply equipment (EVSE).

- ***AC Level-1 Charging***: This refers to charging with a 120-volt outlet, with an average rate of charge of 3 to 5 miles of range per hour. Every new mass-market PEV comes with a portable cord that connects the PEV to any standard electrical outlet. An AC Level-1 charge will fully recharge a PEV in a few hours, or up to 20 hours, depending on the battery size, type, and the battery's current state of charge.[43] Since the average American drives less than 40 miles a day,[44] AC Level-1 charging with a standard household outlet is sufficient for most owners.
- ***AC Level-2 Charging***: This refers to 240-volt charging, with an average rate of charge of 10 to 20 miles of range per hour (depending upon specifications of the car and the charging equipment)[45], but up to 60 miles of range per hour is possible for the fastest Level-2 stations.[46] Mass-market PEVs will have a standard connector (or adapter in the case of Tesla) for these charging stations. The installation costs for AC Level-2 chargers vary considerably – between $750 and $2,000 or more for an average residential installation. Commercial installations can easily be several times that amount, depending upon several factors – including distance from power source, trenching needs, and more. An experienced, licensed electrician will need to handle the installation of AC Level-2 charging stations, including permitting and inspections.
- ***DC-Fast Charging***: This refers to a high-voltage charging station – 480 volt – that can recharge PEVs at a much faster rate, up to 60 to 80 miles of range in 20 minutes.[47] For example, a 24-kWh battery with a 100-mile range can recharge from 0 percent to 80 percent in less than 30 minutes with some DC-Fast Chargers. Because these stations are expensive to install and generally require three-phase electrical infrastructure, they are best suited along major highways and commercial or other public-access locations, where a high volume of usage is expected, and not in private homes.
- ***Inductive Charging***: Inductive-charging EVSE transfers electricity to a PEV by using an electromagnetic field. This type of charging station has been used in the past and is still being used in some areas where equipment was installed for charging in the 1990s. It is currently being piloted for use with modern-day PEVs, and SAE International is in the process of developing a standard that could apply to PEVs in the future.[48]

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[42] DOE, EERE. "Plug-In Electric Vehicle Handbook for Consumers."
[43] DOE, EERE. "Plug-In Electric Vehicle Handbook for Consumers."
[44] GM.Volt.com. "How did GM Determine that 78% of Consumers Drive Less than 40 Miles Per Day?" Online. Available: http://gm-volt.com/2007/12/06/how-did-gm-determine-that-78-of-commuters-drive-less-than-40-miles-per-day/. Accessed: March 2013.
[45] DOE, EERE. "Plug-In Electric Vehicle Handbook for Consumers."
[46] DOE, EERE. "Plug-In Electric Vehicle Handbook for Consumers."
[47] DOE, EERE. "Plug-In Electric Vehicle Handbook for Consumers."
[48] DOE, EERE, Alternative Fuels Data Center. "Developing Infrastructure to Charge Plug-In Electric Vehicles." Online. Available: http://www.afdc.energy.gov/fuels/electricity_infrastructure.html. Accessed: November 2012.

With inductive charging, a car parks over a charging pad, which is approximately the size of a bath mat. Electricity runs through a coil in the mat, creating an electromagnetic field. This electromagnetic field wirelessly "induces" a current within a coil on the PEV, "refueling" the car's battery. This process is similar to wireless, inductive charging used for some smart phones and electric toothbrushes today and makes charging PEVs even more convenient, eliminating the need to physically plug in the vehicle.

A number of automakers and some startups are working on this type of charging, despite the fact that there is some loss of electricity with inductive charging[49] and that it will take longer than a conventional charger to refuel a PEV battery.[50] Some universities around the country are also studying inductive charging, with a positive nod at private utility companies and the public sector working together to explore technological advances such as this.[51] Some induction enthusiasts envision a future where these devices would be installed within roadways and highways in populated areas so vehicles could recharge wirelessly when driving.[52] Certainly there would be benefits to this type of embedded charging – vehicles could have smaller batteries, and range anxiety would be all but forgotten.[53] However, the big question remains – how, *and by whom*, would this mammoth infrastructure investment be paid for?

This report will focus on AC Level-1, AC Level-2, and DC-Fast Charging infrastructure, which are the most feasible, viable, and available options for today. More information on charging levels, types, and speeds can be found in the Deploying Public and Private Charging Infrastructure section of this report (p. 6-55).

Public Charging Options

Semi-public and public charging stations enable PEV owners to charge their PEVs while on the road, at work, or in public areas – like parking garages at airports, malls, or office buildings. While more than 5,000 public charging stations existed in the U.S. as of February 2013,[54] the need for an adequate number of strategically placed public charging stations is still significant and will be critical as PEV adoption expands.

Public and semi-public charging stations will utilize AC Level-1, AC Level-2, and DC-Fast Charging infrastructure and are needed in areas with a heavy concentration of vehicles – like employment centers, parking garages, shopping malls, government buildings, airports, and the like. While many public charging stations are available at no cost to PEV owners today, a number of payment options are also in place and will likely become more common in the future.

Another option for "on the road" or public charging is something called "battery switching," whereby PEV owners can swap out an "empty" battery for a fully charged one. However, this option is not currently widely available in the United States.[55]

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[49] LaMonica, Martin. *CNET*. "Nissan EV charging – look ma, no wires!" December 6, 2011. Online. Available: http://news.cnet.com/8301-11128_3-57337356-54/nissan-ev-charging-look-ma-no-wires/. Accessed: 20 October 2012.
[50] Smith, Trevor C. *Gearheads*. "Inductive Charging for Vehicles is Coming … Slowly." July 27, 2012. Online. Available: http://gearheads.org/inductive-charging-for-vehicles-is-comingslowly/. Accessed: 20 October 2012.
[51] Succar, Sonia M. "Sustainable Transit Solutions for the 21st Century: Addressing Climate Change and Fuel Costs with Wireless Electric Vehicle Technology and Bus Rapid Transit." Harvard University. August 2012.
[52] Howard, Bill. *ExtremeTech*. "Inductive car charging: No plugs or exposed wires, no muss, no fuss." October 25, 2011. Online. Available: http://www.extremetech.com/extreme/101581-inductive-car-charging-no-plugs-or-exposed-wires-no-muss-no-fuss. Accessed: 20 October 2012.
[53] Howard, Bill. *ExtremeTech*.
[54] U.S. Department of Energy (DOE). Alternative Fuels Data Center. "Electric Vehicle Charging Station Locations." Online. Available: http://www.afdc.energy.gov/fuels/electricity_locations.html. Accessed: 19 February 2013.
[55] Berkeley Law, UCLA Law, Bank of America. "Electric Drive by '25: How California can Catalyze Mass Adoption of Electric Vehicles by 2025."

Common Barriers to Widespread Adoption of Electric Vehicles

From 2011 to 2012, sales of PEVs tripled in the U.S.[56] While the early growth of the PEV market is significant, and the benefits of electric vehicle technology are clear, there are a number of barriers that affect widespread adoption, including:

- ***Limited range when compared to gasoline vehicles***: "Range anxiety" is the term most often used to describe a driver's fear of running out of power before reaching his or her destination – or a convenient, available charging station. While mainstream BEVs are all targeting an 80 to 120-mile (or more) range on a full charge – with 100 miles of range being more than adequate for over 90 percent of all U.S. household trips – many people still fear they will run out of "fuel" while away from home or while far from a public charging station.[57] With a traditional, gas-powered vehicle, consumers can travel several hundred miles to a tank, and there's rarely a shortage of gas stations for re-fueling while "on the go."
- ***Limited public charging infrastructure***: Going hand-in-hand with "range anxiety," there is currently a lack of public charging infrastructure available nationwide. While charging stations are being actively deployed across the U.S., 5,000 public charging stations is not an adequate number to support widespread PEV adoption or to assuage feelings of range anxiety. Additionally, there are even challenges with respect to charging at home – especially for those living in apartment complexes, high rises, and multi-unit dwellings, as well as homeowners who have on-street parking. These issues are explored in-depth later in the report.
- ***Higher upfront purchase cost***: The purchase prices of today's PEVs are higher than the prices of comparable gas-powered cars. Fortunately, those considering an electric vehicle purchase can lower that upfront cost by taking advantage of government incentives, as well as the recent attractive lease deals offered by several automakers. The Federal Qualified Plug-In Electric Drive Motor Vehicle Tax Credit provides a tax credit of $2,500 to $7,500 for new electric vehicle purchases, depending on the vehicle's size and battery's capacity. Today, all light-duty electric vehicles on the market qualify for the credit.[58] Lower operating costs of PEVs also help decrease the total cost of ownership. In fact, resources exist to help potential owners calculate the total cost of ownership of the vehicle, accounting for fuel savings, initial price of the vehicle, and government incentives. The DOE's Alternative Fuels Data Center provides the "Vehicle Cost Calculator" to help people make more educated decisions about PEV purchases.[59]
- ***Long charge times***: Depending on the type of EVSE being used, daily charge times can take six to eight hours – in some cases even more – on an AC Level-1 charge, compared with the four to six minutes required at the gas station's fuel pump. People can speed up this process with an AC Level-2 EVSE, but this often requires additional investment in the home's infrastructure. On the bright side, with prior planning, PEV charging can provide even greater convenience and time savings than

[56] Voelcker, John. *Green Car Reports*. "Plug-in Electric Car Sales Triple In 2012 As Buyers, Models Increase." January 3, 2013. http://www.greencarreports.com/news/1081419_plug-in-electric-car-sales-triple-in-2013-as-buyers-models-increase. Accessed: 5 January 2013.
[57] DOE, EERE. "Plug-In Electric Vehicle Handbook for Consumers."
[58] DOE, EERE. "Plug-In Electric Vehicle Handbook for Consumers."
[59] DOE. Alternative Fuels Data Calculator. Online. Available: http://www.afdc.energy.gov/calc/. Accessed: October 2012.

traditional vehicles if owners are able to charge in their home garage while they sleep at night. Long charge times present the biggest challenge when PEV owners are away from home.

- ***Limited styling***: Today's PEVs are offered in fewer body styles than traditional gas-powered cars and are predominantly offered in the styling of more traditional sedans. Consumers looking for an SUV, station wagon, or pickup truck would have difficulty finding a PEV option today. However, one might argue that what PEVs lack in style options is made up for in high-tech features and displays – not to mention fuel savings and environmental benefit. While the body-style options may not currently be incredibly diverse, automakers have announced that 25 additional PEVs will be available by 2015, giving consumers many more options.[60]
- ***Lack of familiarity and experience with technology:*** Similar to other new innovations, people lack familiarity with electric-drive technology – including reliability features, range, general capabilities, and charging requirements. For these reasons, it is important to bridge that gap in technology understanding with not only information, but with low-risk, low-cost access to PEVs throughout the region (such as implementation of a potential PEV car-sharing program, which is detailed in Volume II[61]).

The major barriers as they exist today lead to a lack of broad appeal. The majority of early PEV adopters fall within upper-income demographics, are more environmentally conscious, live in urban areas, and have a preference for cutting-edge technologies.[62] Broader adoption will perhaps be most dependent on improved customer awareness and education, as a number of misconceptions exist today around PEV range, safety, impact on electric bills, and overall performance.

Fortunately, a number of public, private, and academic organizations are embarking on research projects, tests, and public-awareness initiatives to help drive consumer education efforts that will also help overcome major barriers to electric vehicle adoption. In fact, one goal of this report is to inform and educate key PEV stakeholders – including the general public (consumers), as well as the governments, employers, and homeowners' associations (HOAs) that will be implementing PEV charging infrastructure – to help overcome many of these speed bumps and pave a smoother path towards broad PEV adoption.

[60] EDTA. 10 October 2012.
[61] Volume II is available at www.DriveElectricFlorida.org.
[62] See Appendix B-6: Profile of Early PEV and HEV Drivers (p. 180) for more detail.

Chapter 4 – State Snapshot

Florida's Thirst for Transportation Fuel

Florida's transportation accounts for more than one-third of the total energy used in the state and is the second largest energy use sector behind electricity. It imports almost all of its supply of oil and gasoline. Over the last decade, the state consumed 9.8 billion gallons of gasoline and diesel fuel per year, and the average annual consumption is growing by 59 million gallons.[63] If residents and public and private entities were to replace a growing portion of the state's 13.4 million conventionally fueled cars and trucks[64] with PEVs, the amount of imported gasoline and diesel consumption would be meaningfully reduced each year.

Florida's Vehicle Usage Patterns and Characteristics

Work travel contributes to about 22 percent of total travel miles in Florida. It also influences other trip purposes since non-work trips are often planned around or linked to work schedules.[65]

Table 1: Summary of Annual Household Vehicle Travel by Trip Purpose

Trip Purpose	Florida			U.S. Excluding Florida		
	Vehicle Trips (%)	VMT (%)	Trip Length (mi)	Vehicle Trips (%)	VMT (%)	Trip Length (mi)
To/From Work	21.6	28.6	12.11	22.1	27.7	12.19
Shopping	23.5	14.8	5.78	22.6	15.0	6.49
Family/Personal	21.0	15.5	6.78	21.7	15.1	6.80
Church/School	4.9	4.5	8.64	4.9	4.4	8.78
Social/Recreational	15.1	13.5	8.13	14.8	13.1	8.64
Other	14.0	23.2	15.36	13.9	24.6	17.31
All Purposes	100.0	100.0	9.19	100.0	100.0	9.76

Source: U.S. Department of Transportation. Federal Highway Administration. "Summary of Travel Trends: 2009 National Household Travel Survey." 2009. Online. Available: http://nhts.ornl.gov/2009/pub/stt.pdf. Accessed: June 2012.

[63] Florida Department of Agriculture and Consumer Services. "Office of Energy Annual Report 2011." 2011. Online. Available: http://www.freshfromflorida.com/offices/energy/docs/Office_of_Energy_Annual_Report_2011.pdf.
[64] Florida Department of Highway Safety and Motor Vehicles. "Registered Vehicles by County." March 1, 2013. Online. Available: http://flhsmv.gov/html/reports_and_statistics/CVR/12-13/CVR-03-2013.pdf. Accessed: March 25, 2013.
[65] Florida Department of Transportation, Office of Policy Planning, and Center for Urban Transportation Research, University of South Florida. "TRAVEL DEMAND: Travel Demand and Travel Behavior Trends." Florida: August 2011. Online. Available: http://www.dot.state.fl.us/planning/trends/tc-report/behavior082611.pdf. Accessed: June 2012.

Shopping trips and family/personal travel also contribute to a large portion of daily trips and the total miles traveled for Florida residents. The average trip length, across all travel purposes, is slightly more than nine miles, and the average total daily vehicle mileage is slightly more than 20 miles[66] – certainly well within the electric range of all BEVs and many PHEVs.

The vast majority of trips happen during the daytime hours – with very few occurring between 10 p.m. and 6 a.m. This supports the fact that charging at home overnight is most convenient, since cars are parked there for long durations. The table below includes data on the distribution of trips by start time.

Table 2: Distribution of Person Trips by Start Time of Trip (Percent)

Time of Day	1983	1990	1995	2001	2009	95% CI
10 p.m.–1 a.m.	4.0	4.1	3.5	2.9	2.6	0.13
1–6 a.m.	3.3	1.8	1.7	1.8	1.8	0.08
6–9 a.m.	14.4	12.5	13.8	14.4	15.0	0.21
9 a.m.–1 p.m.	23.4	20.6	24.2	24.6	24.8	0.29
1–4 p.m.	20.8	20.7	22.1	22.1	22.4	0.34
4–7 p.m.	21.2	22.9	23.0	22.3	22.6	0.29
7–10 p.m.	12.3	13.2	11.8	11.7	11.0	0.23
ALL	100.0	100.0	100.0	100.0	100.0	0.00

Source: U.S. Department of Transportation. Federal Highway Administration. "Summary of Travel Trends: 2009 National Household Travel Survey." 2009. Online. Available: http://nhts.ornl.gov/2009/pub/stt.pdf. Accessed: June 2012.

[66] Note: Average daily vehicle miles traveled in Florida is 20.31 and ranges by age group, to a high of 29.14 daily miles for people aged 49-54. From: Florida Department of Transportation, Office of Policy Planning, and Center for Urban Transportation Research, University of South Florida. "TRAVEL DEMAND: Travel Demand and Travel Behavior Trends."

Florida's Outlook for PEVs

Florida is No. 4 in the nation for penetration of hybrid-electric vehicles – a proxy for likelihood of PEV adoption.

Florida has characteristics of an ideal PEV market. First, it is a populous state and has one of the top national volumes of car and truck sales, which can accelerate the penetration of electric transportation in the state. Additionally, Florida has flat terrain, concise traffic patterns, and moderate temperatures year round, which are all conditions under which today's PEVs operate at their best.

Furthermore, the state has favorable demographics for "early adopters" – individuals who embrace and purchase new technologies before the general population. The general profile of an early adopter of PEVs is older, highly educated, with an annual household income greater than $100,000, and daily travel distances of less than 40 miles.[67] Florida's population fits many of those characteristics more strongly than the national averages, further demonstrating a likelihood of solid PEV sales.[68]

This early adopter group, who is pioneering PEV technologies today, is critical for helping to "mainstream" PEV technology. Not only will early adopters bring awareness to electric vehicles – and their many benefits – among the Region's population, but they will also provide the first-generation of used PEVs available for purchase among a wider segment of the population.

In addition, Florida has a high penetration of hybrid electric vehicles (5.3 percent of total HEV sales – only behind California, New York, and Texas), which is often considered a proxy for PEV penetration.[69] All these factors add up to a favorable PEV market.

Florida PEV Sales and Forecast

Since Florida was not selected by automakers as an early launch market for their vehicles, PEVs have only been for sale in the region for about 18 months (versus two-and-a-half years in other markets). Yet, even with limited availability, there are more than 3,100 PEVs on Florida's roads as of February 2013 – not including PEVs owned by tourists and seasonal residents.[70] This number already accounts for about 4 percent of the U.S. PEV market, even with considerable constraints in supply and limited availability of PEVs for Florida residents.[71] Certainly, the long-term outlook is favorable – with a forecast of approximately 226,000 PEVs on Florida's roads by 2022.[72]

Supporting the state's 3,100 PEVs, there are more than 747 public charging stations, of which 282 are AC Level-1 stations, and 465 are AC Level-2.[73] There are no DC-Fast Charging (DCFC) stations in Florida; however, now that SAE International has adopted a new DCFC standard, and more automakers will be adding the fast-charge feature to their vehicles, the state will likely start seeing DCFC installations in the near future.

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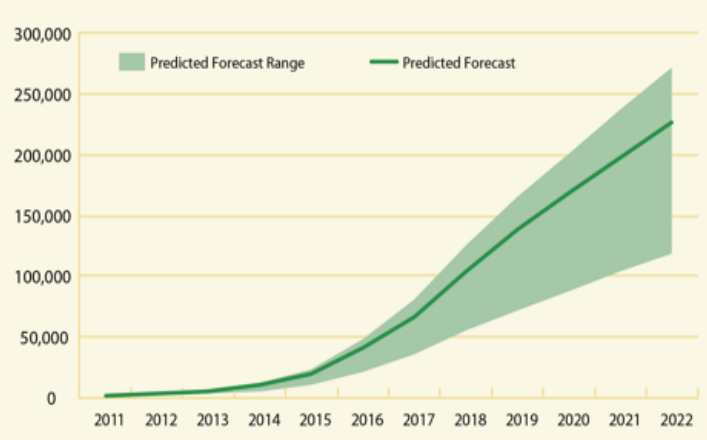
[67] See Appendix B-6: Profile of Early PEV and HEV Drivers (p. 180) for more detail about the profile of early PEV and HEV owners – demographics and lifestyle characteristics.
[68] See Appendix A-1: Southeast Florida Demographical Data: Selected Characteristics of Residents (p. 158) for characteristics data for U.S., Florida, and Southeast Florida counties.
[69] Hill, Kim and Joshua Cregger. "Deployment Rollout Estimate of Electric Vehicles 2011-2015." Ann Arbor, Michigan: Center for Automotive Research, 2011. Online. Available: http://www.cargroup.org/?module=Publications&event=View&pubID=12. Pages 14-15. Accessed: June 2012.
[70] See Appendix B-1: PEV Sales in Florida and the Region (p. 170) for details about PEV sales in Florida.
[71] Cobb, Jeff. "February 2013 Dashboard." HybridCars.com. Online. Available: http://www.hybridcars.com.
[72] See Appendix B-7: PEV and Charging Infrastructure Forecast (p. 182) for additional details about the PEV forecast in Florida and the Region
[73] U.S. DOE, EERE. Alternative Fuels Data Center. "Electric Vehicle Charging Station Locations." Online. Available: http://www.afdc.energy.gov/fuels/electricity_locations.html.

Figure 3: Florida Cumulative PEV Sales Forecast



For more detail, see: Appendix B-7: PEV and Charging Infrastructure Forecast.

Energy policies, as well as related incentives, in Florida have the potential to play a significant role in the long-term PEV and EVSE forecast in the state. The following section provides a summary of the state's energy policy.

Florida Energy Policy

Background

The Florida Department of Agriculture and Consumer Services (FDACS) manages the Office of Energy, which is the state's primary organization for energy and climate change programs and policies responsible for:

- Administering financial incentive programs and provisions of the Florida Energy and Climate Protection Act (Section 377.801 – 377.806, Fla. Stat.).
- Representing Florida in the Southern States Energy Compact.
- Performing or coordinating the functions of any federal energy programs delegated to the state.
- Providing recommendations to the governor and the legislature.[74]

The Energy Office also cooperates with the Florida Public Service Commission (PSC), Florida Energy Systems Consortium, and other state entities on state energy and climate change policies and programs.[75] Since February 2009, the Energy Office has concentrated on disbursing approximately $176 million received by the State of Florida from the federal American Recovery and Reinvestment Act (ARRA), and is now focused on developing and implementing a statewide energy policy that:

- Promotes energy efficiency and conservation.
- Supports investments in Florida's energy infrastructure.
- Fosters the expansion of Florida's clean energy resources and new technologies.[76]

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[74] Florida Department of Agriculture and Consumer Services. Office of Energy. Online. Available: http://www.freshfromflorida.com/offices/energy/index.html.
[75] Florida Department of Agriculture and Consumer Services. Office of Energy.
[76] Florida Department of Agriculture and Consumer Services. "Office of Energy Annual Report 2011." 2011. Online. Available: http://www.freshfromflorida.com/offices/energy/docs/Office_of_Energy_Annual_Report_2011.pdf. Page 6.

Energy Policy Related to PEVs and EVSE

Florida energy policies that are favorable to PEV adoption and EVSE implementation are beginning to emerge, with the greatest momentum picked up in recent years, including:

- Incentives at the local level, including "property-assessed clean energy" (PACE) improvements that help fund authorized projects, like PEV charging infrastructure.
- Legislation from 2012 that allows local governments to include EVSE in the definition of "energy efficiency improvements" so loans, grants, and rebates to residential or commercial property owners can be provided at the local level to those who install PEV charging equipment.[77]

Legislation in 2012 Recognizes PEVs as Viable Alternative-Fuel Vehicles

The Florida Legislature enacted in 2012 additional changes that recognized the need to address the emergence of PEVs as a viable alternative fuel vehicle. The legislation, enacted as Chapter 2012-117, Laws of Florida,[78] provided the following directives:

- Included EVSE in the definition of "energy efficiency improvement," which now allows local governments, via the local infrastructure surtax, to provide loans, grants, or rebates to residential or commercial property owners who install charging equipment.[79]
- Provided that the rates, terms, and conditions of electric vehicle charging services by a non-utility are not subject to regulation by the Florida Public Service Commission (PSC).[80]
- Required the Department of Agriculture and Consumer Services to adopt rules[81] related to sales at electric vehicle charging stations (labeling, price posting, methods of sale, etc.).[82]
- Directed the PSC to conduct a study on the potential effects of EVSE on both energy consumption and the electric grid and investigate the feasibility of using off-grid solar photovoltaic power as a source of electricity for the EVSE.[83]
- Made it unlawful to park a non-electric vehicle in a parking spot designated for PEVs.[84]

It should be noted that the Legislature reinstated and revised the sales tax exemption for renewable energy technologies, the renewable energy technologies investment corporate income tax credit, and the renewable energy production corporate income tax credit, and that PEVs *are not* included in the defined technologies.[85]

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[77] State of Florida. "The 2012 Florida Statutes." Section 212.055, Fla. Stat. Official Internet Site of the Florida Legislature. Online. Available: http://leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0200-0299/0212/Sections/0212.055.html.
[78] Florida Department of State. "Chapter 2012-117, Committee Substitute for Committee Substitute for House Bill No. 7177." State Library and Archives of Florida, Laws of Florida. Online. Available: http://laws.flrules.org/2012/117.
[79] State of Florida. "The 2012 Florida Statutes." Section 212.055, Fla. Stat.
[80] State of Florida. "The 2012 Florida Statutes." Section 366.94, Fla. Stat. Official Internet Site of the Florida Legislature. Online. Available: http://leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0300-0399/0366/Sections/0366.94.html.
[81] Report and recommendations are expected in late 2013.
[82] State of Florida. "The 2012 Florida Statutes." Section 366.94, Fla. Stat.
[83] State of Florida. "The 2012 Florida Statutes." Section 366.94, Fla. Stat.
[84] State of Florida. "The 2012 Florida Statutes." Section 366.94, Fla. Stat.
[85] State of Florida. "The 2012 Florida Statutes." Section 212.08, Fla. Stat.

Local "Property-Assessed Clean Energy" (PACE) Improvements for Charging Infrastructure

Starting in 2010 with the Supplemental Authority for Improvements to Real Property Act (§163.08 Fla. Stat.),[86] local governments in Florida are now allowed to levy non-ad valorem assessments to fund qualifying improvements[87] – including electric vehicle charging infrastructure.[88]

The funding of the changes and improvements are commonly referenced as "property-assessed clean energy" (PACE) improvements. The financed improvement is repaid over time as an addition to ad-valorem assessments and is secured with a lien on the property, and the assessment travels with the property regardless of sale.[89] In other words, improvements get repaid by property owners over a period of time through a voluntary "special assessment" added to their tax bill.[90]

In 2011, Flagler and Pinellas Counties and the City of Kissimmee entered into an inter-local agreement, pursuant to §163.01(7)(g), Fla. Stat., and created the Florida PACE Funding Agency,[91] which is one of four PACE programs in the state that is either active or under development (others include Florida Green Energy Works Program, Leon County Commercial PACE Program, and Clean Energy Green Corridor).[92]

The intent of Florida PACE is "to create a uniform program rather than pursue purely local efforts that would likely not be able to achieve the economies of scale anticipated by the Agency."[93] Florida PACE is authorized to issue up to $2 billion in bonds to finance qualifying improvements authorized by §163.08(2)(b)1., Fla. Stat.[94]

On February 5, 2013, Florida PACE announced it had secured $500 million in capital from a partnership with Samas Capital, LLC, and the funding will be available to all counties that choose to participate.[95]

Counties can learn more about how PACE works and how to join by visiting the Florida PACE website and viewing an informative presentation: http://www.floridapace.gov/how-it-works/florida-pace-finance-agency-presentation. More information on this program is included as a fact sheet in Appendix A-6: About PACE Financing (p. 169).

The Public Service Commission Deems Grid Impact Negligible

Section 366.94, Fla. Stat., also required the Public Service Commission (PSC) to evaluate the potential impact that PEVs may have on the electric grid. The PSC submitted its findings on December 31, 2012, presenting the following conclusions:

> "EV charging is expected to have a negligible effect on electricity consumption in Florida within the ten-year planning horizon. At the same time, EV owners should reduce the

[86] State of Florida. "The 2012 Florida Statutes." Subsection 163.08(3), Fla. Stat. Official Internet Site of the Florida Legislature. Online. Available: http://leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0100-0199/0163/Sections/0163.08.html.
[87] State of Florida. "The 2012 Florida Statutes." Subsection 163.08(3), Fla. Stat.
[88] State of Florida. "The 2012 Florida Statutes." Section 163.08(2)(b)1., Fla. Stat. Official Internet Site of the Florida Legislature. Online. Available: http://leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0100-0199/0163/Sections/0163.08.html.
[89] U.S. DOE, EERE. "Property-Assessed Clean Energy (PACE) Programs." Solution Center. Online. Available: http://www1.eere.energy.gov/wip/solutioncenter/financialproducts/PACE.html.
[90] Florida PACE Funding Agency. "Press Release." Orlando, Florida, February 5, 2013. Online. Available: http://www.floridapace.gov/press-releases/florida-pace-funding-agency-secures-500-million-in-financing-2.
[91] Florida PACE Funding Agency. "Charter." Online. Available: http://www.floridapace.gov/about/charter.
[92] See www.PaceNow.org for more details.
[93] Florida PACE Funding Agency. "How It Works." Online. Available: http://www.floridapace.gov/how-it-works.
[94] Florida PACE Funding Agency. "Final Judgment." Online. Available: http://www.floridapace.gov/about/judgment.
[95] Florida PACE Funding Agency. "Press Release."

> consumption of gasoline in Florida by more than two million gallons in 2012. EVs are also not currently expected to cause a significant increase in electric demand or contribute significantly to a need for new generation until well past 2021. Clusters of electric vehicles charging simultaneously on a single residential transformer could potentially require upgrades to that transformer, but individual vehicles are not expected to affect the distribution system."[96]

The Drive Electric Florida team also recommends that state legislators continue their progress in updating the state's energy policies, laws, regulations, and incentives to recognize and include changes in alternative fuel vehicle technology including, but not limited to, PEVs. Recommendations can be found in the Ensuring Supportive Codes, Policies, and Ordinances section of this report (p. 6-86).

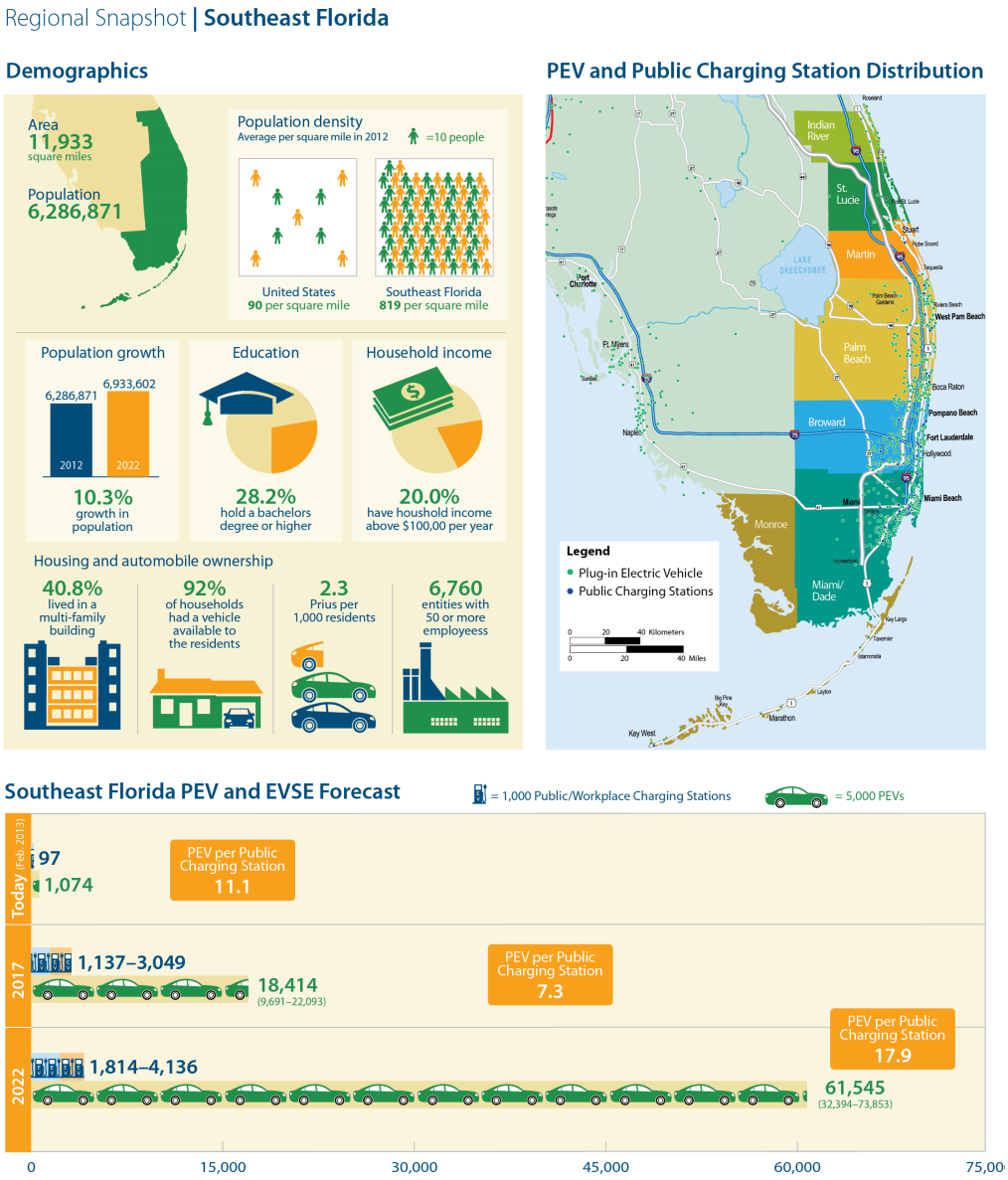
One major gap that remains is legislation that removes barriers for the implementation of PEV charging infrastructure, also known as EVSE. In Florida, work must be done to resolve permitting and inspection issues related to EVSE installation and to establish regulatory uniformity and streamlining. Other states recognize that pro-PEV and EVSE legislation can promote economic development in the state, while improving the economy, air quality, and more. Additional detail on the topic of permitting is included in the Ensuring Supportive Codes, Policies, and Ordinances section of this report (p. 6-86). Details on the history of energy policy in Florida related to alternative-fuel vehicles and PEVs can also be found in Appendix A-4: The History of Alternative-Fuel Vehicle Policies in Florida (p. 162).

[96] Florida Public Service Commission. "Report On Electric Vehicle Charging." Tallahassee, Florida, December 31, 2012. Online. Available: http://www.floridapsc.com/utilities/electricgas/electricvehicles/09_06_2012/Electric_Vehicle_Charging_Report.pdf. p. 3.

Chapter 5 – Regional Snapshot

The Southeast Florida Region – including Monroe, Miami-Dade, Broward, Palm Beach, Martin, St. Lucie, and Indian River counties – comprises 33 percent of the state's population, hosts millions of visitors annually, and is the nation's fourth largest urbanized area. It is bordered on the east by the Atlantic Ocean, and on the west by the Everglades, condensing the population to a long, narrow corridor, making deployment of charging infrastructure easier than in a wide-open and geographically dispersed region.

Figure 4: Southeast Florida Regional Snapshot and PEV/EVSE Forecast



For more information and data, see Appendix A-1: Southeast Florida Demographical Data: Selected Characteristics of Residents; Appendix B-1: PEV Sales in Florida and Region; Appendix B-2: Public Charging; Appendix B-6: Profile of Early PEV and HEV Drivers; and Appendix B-7: PEV and Charging Infrastructure Forecast.

Like Florida, the Southeast region has demographics and other conditions favorable for PEV adoption over time.[97] Southeast Florida residents are skewed slightly older than across the nation and slightly more hold a bachelor's degree or higher. Car ownership within the Region is also slightly higher than the nation – with 92 percent of households having a car available. Although the percentage of households with income greater than $100,000 annually is slightly lower than the national percentage (19.92 percent, versus 20.88 percent), per capita income is slightly higher. These characteristics – income, age, education, and car ownership – suggest favorable growth of PEV adoption in the Region.

Multi-unit dwellings make up almost 41 percent of housing units, which is nearly twice the national rate – making access to residential charging a particular challenge. There are at least 6,760 employers in the Region with 50 employees or more, a target for communications and outreach efforts in promoting workplace charging – a strategy that can relieve some of the pressure associated with lack of charging accessibility at multi-unit dwellings.

Furthermore, the Region is committed to the environment. Local governments in the Southeast Florida Region have adopted emissions-reduction targets and recognize the benefits of fuel efficiency and fossil-fuel replacement strategies. PEV expansion will further the local and regional goals, such as those in the Southeast Florida Regional Climate Action Plan.[98]

Southeast Florida PEV and EVSE Forecast

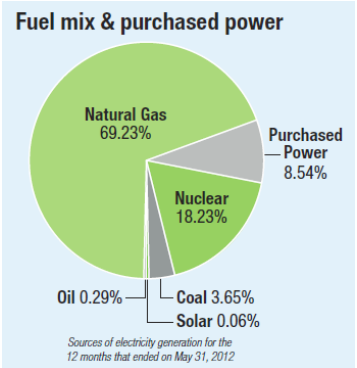
As of February 2013, there were more than 1,074 PEVs in Southeast Florida, or 34.6 percent of the state's total PEVs. These PEVs are primarily clustered in the more populous areas of Miami-Dade, Broward, and Palm Beach Counties. By 2022, the Region can expect around 61,545 PEVs (32,000 – 74,000) on Southeast Florida's roads.[99]

Supporting the Region's PEVs, there are 97 public charging stations, of which 29 are AC Level-1 and 68 are AC Level-2. By 2022, the Region should have between 1,800 and 4,100 public charging stations to support PEV growth. These will include a mix of AC Level-1 and AC Level-2, as well as DC Level-1 and DC Level-2 Fast Charging stations.[100] There is a large variability in the number of forecasted charging stations because this number depends on the concentration and quantity of the charging levels installed, the number of PEVs on the road, and the technological advances over the next decade. For example, a well-placed DC-Fast Charging station can meet the needs of dozens of cars each day, while an AC Level-1 charging station can realistically serve just one or two cars daily. More information on citing EVSE can be found in the Deploying Public and Private Infrastructure section (p. 6-55) of this report.

Southeast Florida's Electricity Supply

The Region's electricity needs are primarily served by Florida Power & Light Company (FPL), which is the largest of the state's 55 electric utilities.

FPL's customer bills are the lowest in Florida and 26 percent below the national average. Additionally, the utility has one of the lowest power plant emissions profiles among all U.S. utilities and offers better than 99.98 percent



[97] See Appendix A-1: Southeast Florida Demographical Data: Selected Characteristics of Residents (p. 158).
[98] This report can be accessed at the following URL: http://southeastfloridaclimatecompact.org/pdf/Regional%20Climate%20Action%20Plan%20FINAL%20ADA%20Compliant.pdf.
[99] More information on the number of PEVs and EVSE in the Region, as well as forecast methodologies, can be found in Appendix B, starting on p. 170.
[100] More information on the number of PEVs and EVSE in the Region, as well as forecast methodologies, can be found in Appendix B, starting on p. 170.

service reliability. That means that the Region's PEV drivers can fuel their cars with low-cost, reliable, clean and domestically fueled electricity, making the PEV value proposition even better here than it is in many other parts of the country.

Additionally, FPL has an active Electric Vehicle Program with initiatives to:

- Understand the impact of electric vehicle charging on the electric grid to maintain its system reliability.
- Support customers' need for PEV-related information with an active website, brochures, communications, and participation in more than 60 PEV-related events annually.
- Work with local, state, and national stakeholders on PEV issues.
- Add PEVs to its fleet as they become commercially available, with more than 50 PEVs in its Florida-based fleet today.

Other electric utilities serving a small portion of the Region's residents include:

- Vero Beach Electric.
- Florida Municipal Electric Association (FMEA).
- Florida Keys Electric Cooperative Association.
- Ft. Pierce Utility Authority (FPUA).
- Lake Worth Utilities.
- Keys Energy Service.

Notable Fleets in Southeast Florida

Below is a sample of notable vehicle fleets in the Region, with examples of county-specific fleets in the sections that follow:

- AT&T
- Comcast
- Enterprise
- Coca-Cola
- Florida Power & Light Company
- DHL
- FedEx
- UPS
- Waste Management
- Broward County and School District
- Palm Beach County and School District
- Miami-Dade County and School District
- Florida Department of Transportation
- Ryder

Notable Incentives in Southeast Florida

In addition to state and federal incentives for PEV purchases available to the Region's residents, the most notable PEV incentives in the Southeast Florida Region will be related to the use of HOV lanes. There are two segments of HOV lanes in the Southeast Region: (1) north and southbound on I-95 in Broward County from the Miami-Dade County line to the Palm Beach County line, extending the entire length of the county,[101] and (2) north and southbound on I-95 in Palm Beach County from the Broward County line to State Road 706 (Indiantown Road) in Jupiter. The hours of operation for the HOV lanes are Monday through Friday, 7 a.m. to 9 a.m. and 4 p.m. to 6 p.m.[102]

[101] Florida Department of Transportation. State Traffic Engineering and Operations Office. "Broward County HOV Operations." Online. Available: http://www.dot.state.fl.us/TrafficOperations/OtherLinks/HOV/Broward.shtm.
[102] Florida Department of Transportation. State Traffic Engineering and Operations Office. Palm Beach County HOV Operations. Online. Available: http://www.dot.state.fl.us/TrafficOperations/OtherLinks/HOV/Palm_Beach.shtm.

Figure 5: HOV Lanes in Region

HOV Lanes in Broward County

HOV Lanes in Palm Beach County

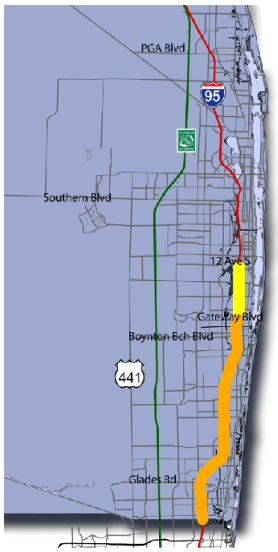


Image credit: Florida Department of Transportation, State Traffic Engineering and Operations Office.

Florida is transitioning HOV lanes on I-95 to managed toll lanes, also known as the 95 Express Lanes. The initial implementation of the 95 Express Lanes began in December 2008 in Miami-Dade County, running southbound from Miami Gardens Drive/NE 183th Street to State Road 836 and northbound from State Road 836 to NW 151st Street.[103] According to South Florida Consumer Services, registered inherently low-emission vehicles (ILEV) can use the 95 Express Lanes at no charge.[104] The second phase of the 95 Express Lanes will range from the Golden Glades Interchange in Miami-Dade County to Broward Boulevard in Broward County.[105] Ensuring that PEVs can utilize express lanes and HOV lanes without charge is an incentive for first adopters that should be maintained for the next several years.

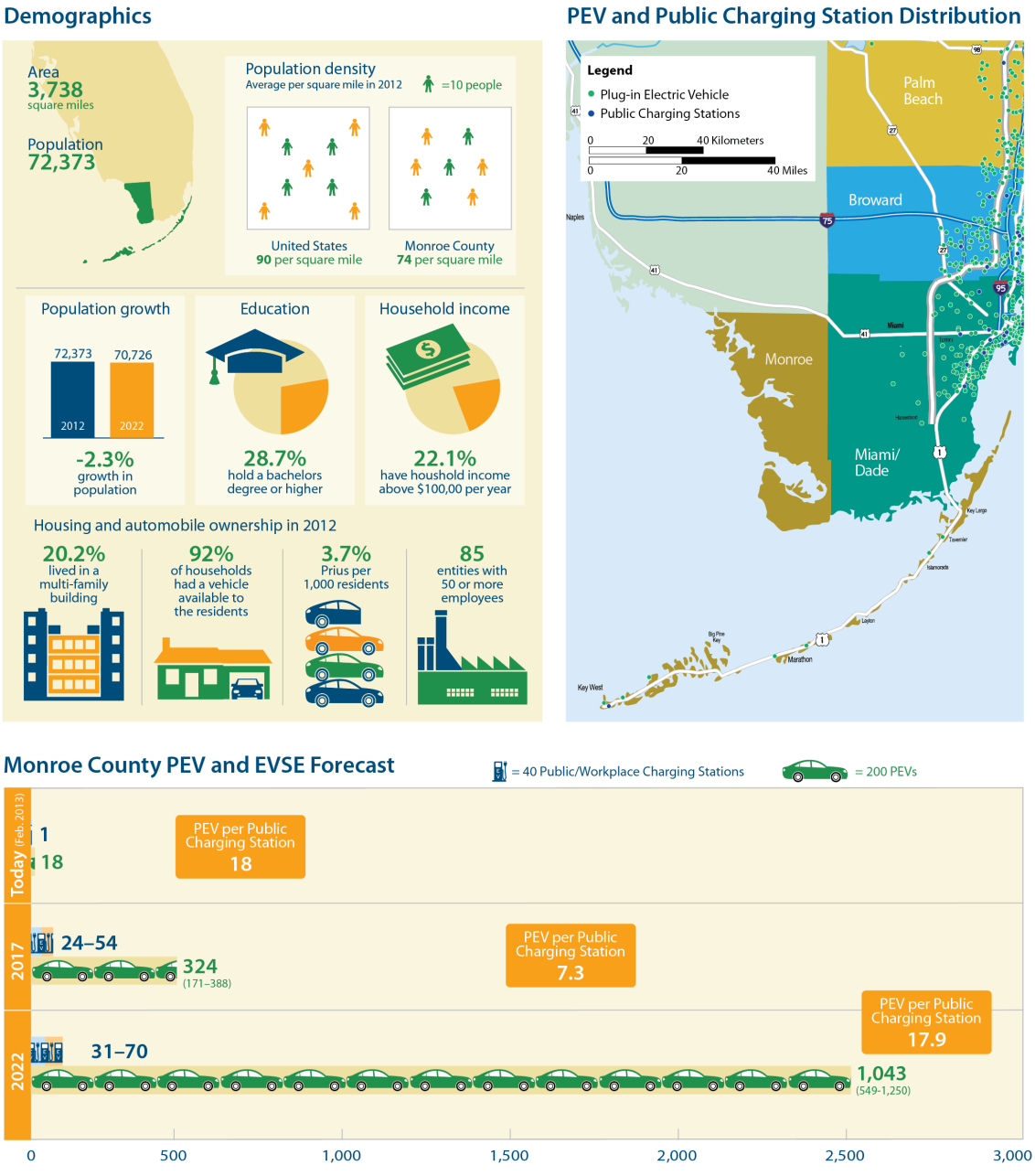
In addition to incentives in the Region, more information on federal and state incentives can be found later in the report in the section covering Implementing Financial and Non-Financial Incentives for PEVs and EVSE (p. 6-51).

[103] South Florida Commuter Services. "95 Express Lanes General Information." Online. Available: http://www.1800234ride.com/95expresslanesgeneralinformation.
[104] South Florida Commuter Services. "95 Express Lanes FAQs." Online. Available: http://www.1800234ride.com/page/95_Express_Lanes_FAQs/446/168/section3.php.
[105] State of Florida, Department of Transportation. 95 Express. Online. Available: http://www.95express.com/.

Regional Snapshots: By County

Monroe County

Figure 6: Monroe County Snapshot – Demographics, PEV and Public Charging Station Distribution, and PEV/EVSE Forecast



For more information and data, see Appendix A-1: Southeast Florida Demographical Data: Selected Characteristics of Residents; Appendix B-1: PEV Sales in Florida and Region; Appendix B-2: Public Charging; Appendix B-6: Profile of Early PEV and HEV Drivers; and Appendix B-7: PEV and Charging Infrastructure Forecast.

Monroe County is at the southernmost part of the United States, and is home to 72,373 people and more than 3 million[106] annual visitors. More than 99 percent of Monroe County's population lives in the island chain known as the Florida Keys.[107] The majority of Monroe County is water and conservation land, and the population density is low – 74 people per square mile. However the majority of Monroe County's population lives within a long narrow corridor – making PEV infrastructure development efficient. In contrast to the rest of the counties in Southeast Florida, the population of Monroe County is expected to slightly decline by 2022.

A slightly higher percentage of Monroe County residents hold a bachelor's degree or higher and have a household income of more than $100,000 annually compared to the Region as a whole. Car ownership within Monroe County is on par with the region at 92 percent, and there are 3.7 Toyota Prius HEVs per 1,000 residents, versus 2.3 for the region – a characteristic that suggests a higher likelihood of PEV ownership. However, given the county's small relative population size, there will be a relatively small number of PEVs in the county over the next decade compared to other parts of the Region.

Multi-unit dwellings make up only about 20 percent of housing units, which is about half that of the Region as a whole and also lower than the U.S. average – making access to PEV charging at home more accessible. There are 85 large employers, each with 50 employees or more, a target for communications and outreach efforts in promoting workplace charging.

Major Roadway and Transportation Facilities in Monroe County

- U.S. 1
- Florida East Coast (FEC) Rail Corridor

Parks and Recreation in Monroe County

- Everglades National Park
- Bahia Honda State Park
- Islamorada Founder's Park
- Various Beaches, including Higgs County Beach
- Duvall Street in Key West
- Curry Hammock State Park
- John Pennekamp Coral Reef State Park
- Fort Zachary Taylor Historic State Park
- Dolphin Research Center

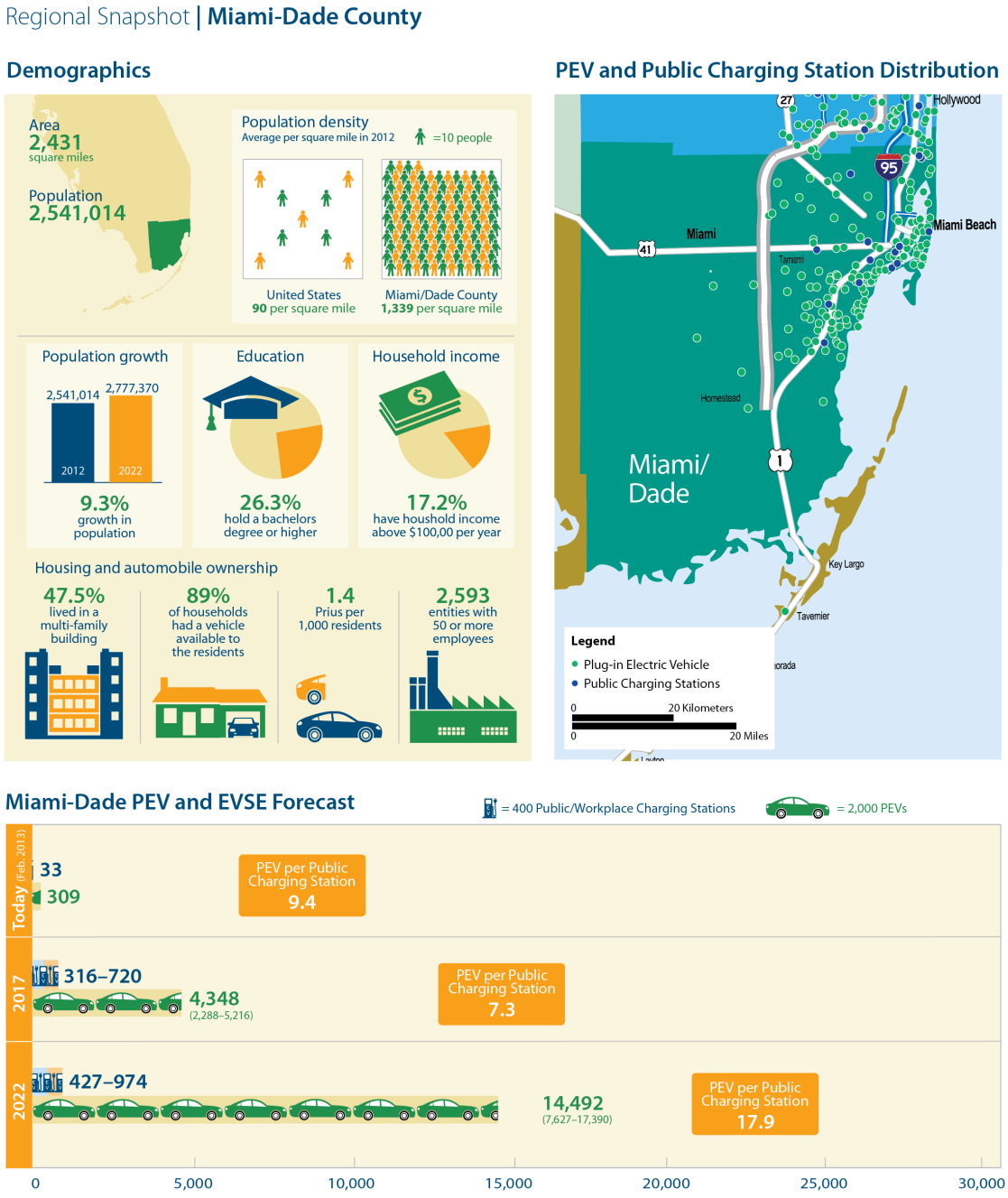
Notable Fleets in Monroe County

- Monroe County
- City of Key West
- Florida Keys Electric Cooperative

[106] U.S. Department of Commerce. "Profiles and Economic Contribution: General Visitors to Monroe County, Florida 2000-2001." Office of Management and Budget, Special Projects Division, April 2003. Online. Available: http://coastalsocioeconomics.noaa.gov/core/reefs/monroe.pdf.
[107] Wikipedia. "Monroe County, Florida." Available. Online: http://en.wikipedia.org/wiki/Monroe_County,_Florida. Accessed: October 2012.

Miami-Dade County

Figure 7: Miami-Dade County Snapshot – Demographics, PEV and Public Charging Station Distribution, and PEV/EVSE Forecast



For more information and data, see Appendix A-1: Southeast Florida Demographical Data: Selected Characteristics of Residents; Appendix B-1: PEV Sales in Florida and Region; Appendix B-2: Public Charging – as of August 2012; Appendix B-6: Profile of Early PEV and HEV Drivers; and Appendix B-7: PEV and Charging Infrastructure Forecast.

Miami-Dade County is at the southern end of Southeast Florida and is home to more than 2.54 million people. It is the most populous county in the state and among the most populous in the nation. The county is heavily urbanized, with many high-rise condominiums along the coastline and a dense downtown business district. The population density is exceptionally high, with 1,339 people per square mile, versus the Regional average of 819 and the national average of 90. Over the next decade, the population of Miami-Dade County is expected to increase by approximately 9.3 percent, which is slightly less than the country and the Region.

A lower percentage of Miami-Dade County residents hold a bachelor's degree or higher, or have a household income of more than $100,000 annually, than the Region or the nation as a whole. Car ownership within the county is lower than the Region and the nation at 89 percent, and there are just 1.4 Toyota Prius Hybrids per 1,000 residents, versus 2.3 for the Region. These characteristics imply a lower likelihood of PEV purchase. In spite of this, given the county's large population size, there will be a large number of PEVs in Miami-Dade County over the next decade.

Since multi-unit dwellings make up more than 47 percent of housing units, which is more than twice the national percentage and higher than the Region's, access to PEV charging at home is a big challenge for a large percentage of residents of Miami-Dade County. Therefore, public charging and workplace charging is particularly important in the county. There are almost 2,600 large employers in Miami-Dade, and many key destination locations where access to public charging is a priority.

Major Transportation Hubs in Miami-Dade County

- Miami International Airport
- Port of Miami (including cruise lines)
- Tri-County Commuter Rail Stations – connecting Miami-Dade, Broward, and Palm Beach Counties along I-95
- All Aboard Florida Rail Station – Express Commuter Rail connecting Miami and Orlando (Coming soon!)

Major Roadways and Transportation Facilities in Miami-Dade County

- Interstate 95
- Interstate 395
- Gratigny Parkway (SR 924)
- Downtown Distributor (SR 970)
- CSX Rail Corridor
- Interstate 75
- Dolphin Expressway (SR 836)
- Airport Expressway (SR 112)
- Palmetto Expressway (SR 826)
- FEC Rail Corridor
- Florida's Turnpike
- Homestead Extension
- Don Shula Expressway (SR 874)
- Snapper Creek Expressway (SR 878)

Universities in Miami-Dade County

- University of Miami
- Barry University
- Carlos Albizu University
- Miami International University of Art & Design
- Florida International University
- Nova Southeastern University
- Johnson and Wales University
- Talmudic University
- Miami-Dade College
- Florida Memorial University
- St. Thomas University

Major Museums in Miami-Dade County

- Frost Art Museum at FIU
- Holocaust Memorial
- Jewish Museum of Florida
- Rubell Family Collection
- Gold Coast Railroad Museum
- Bass Museum of Art
- Fairchild Tropical Botanic Garden
- Miami Art Museum
- Miami Children's Museum
- Vizcaya Museum and Gardens
- Weeks Air Museum
- Wolfsonian (FIU) St. Thomas University
- Wings Over Miami Museum
- World Erotic Art Museum

Culture and Wildlife in Miami-Dade County

- Villa Vizcaya
- Monkey Jungle
- Ancient Spanish Monastery
- Gusman Center for the Performing Arts
- Miami Seaquarium
- Bayside Marketplace
- Adrienne Arsht Center for the Performing Arts
- Bayfront Park Amphitheatre
- Zoo Miami
- Jungle Island
- Wertheim Performing Arts Center
- Florida Grand Opera

Sporting Arenas in Miami-Dade County

- Sun Life Stadium
- Tennis Center at Crandon Park
- Hialeah Park Race Track
- Marlins Park
- BankUnited Center
- Calder Race Course
- Alex Rodriguez Park
- American Airlines Arena
- Tropical Park Stadium
- Homestead Miami Speedway

Other Attractions in Miami-Dade County

- Miami Convention Center
- South Beach
- Ocean Drive
- Calle Ocho
- Lincoln Road
- Downtown Miami
- Bal Harbour Shops
- Dolphin Mall
- Aventura Mall
- Biltmore Hotel
- Freedom Tower
- Miami Art Deco District
- Miami Design District
- Bayside Marketplace
- Little Havana
- Star Island
- City of Miami Cemetery
- Española Way
- Mary Brickell Village
- Wynwood Art District
- Cape Florida Lighthouse

Parks in Miami-Dade County

- Tropical Park
- Bayfront Park
- Biscayne National Park
- Bicentennial Park
- Crandon Park
- Everglades National Park
- Bill Baggs Cape Florida State Park
- Oleta River State Park

Notable codes, policies, ordinances affecting PEVs, charging infrastructure

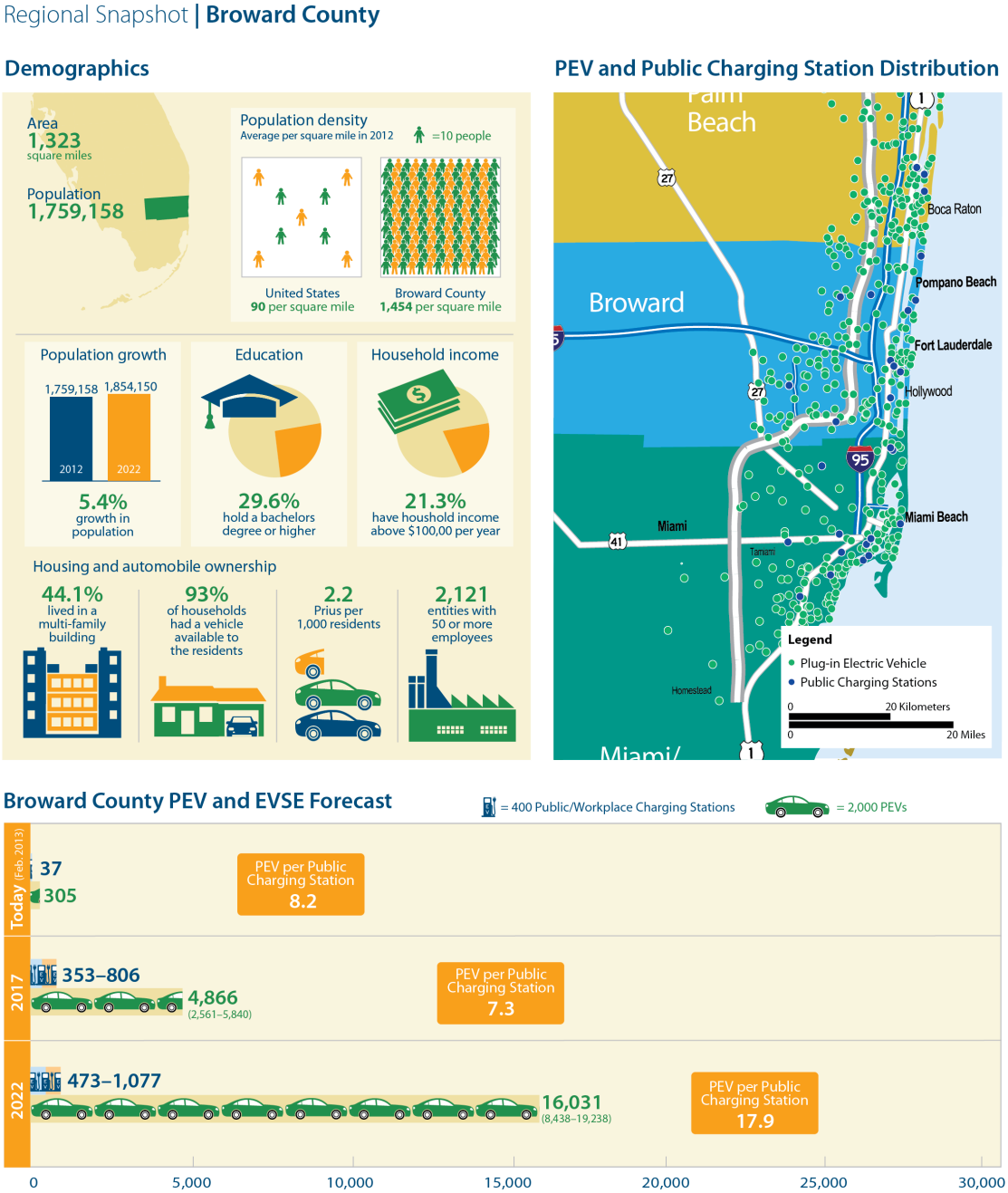
Miami-Dade County is in the process of developing an ordinance that would set standards for the number of parking spaces dedicated for PEVs required by new development. The County currently requires dedicated parking spaces for persons with disabilities, expecting mothers, and families with small children. Recommended considerations and guidelines for parking spaces for PEVs can be found in the Ensuring Supportive Codes, Policies, and Ordinances section of this report (p. 6-86).

Notable Fleets in Miami-Dade County

- DHL
- Miami-Dade County
- City of Miami

Broward County

Figure 8: Broward County Snapshot – Demographics, PEV and Public Charging Station Distribution, and PEV/EVSE Forecast



For more information and data, see Appendix A-1: Southeast Florida Demographical Data: Selected Characteristics of Residents; Appendix B-1: PEV Sales in Florida and Region; Appendix B-2: Public Charging; Appendix B-6: Profile of Early PEV and HEV Drivers; and Appendix B-7: PEV and Charging Infrastructure Forecast.

Broward County is at the southern end of Southeast Florida, between Miami-Dade and Palm Beach counties, and is home to almost 1.76 million people – making it the second most populous county in the state. The county is urbanized with populations clustered between natural boundaries of the Atlantic Ocean to the east and the Everglades National Park to the west. The population density is the highest in the Region – with 1,454 people per square mile, versus the Region's 819 and the country's 90. Approximately two-thirds of the land is conservation and tribal land, and there is very little vacant land remaining. Over the next decade, the population of Broward County is expected to increase by approximately 5.4 percent, which is considerably less than the country and the Region.

A slightly higher percentage of Broward County residents hold a bachelor's degree or higher and have a household income of more than $100,000 annually than the Regional or national average. Car ownership within the county is slightly higher than the Region, and Toyota Prius Hybrid adoption is similar to the Region's rate of 2.3 per 1,000 residents. These characteristics imply a solid likelihood of PEV purchase. Plus, given the county's large population size, there will likely be a large number of PEVs in the county over the next decade.

Since multi-unit dwellings make up more than 44 percent of the county's housing units, which is more than twice the national percentage and higher than the Region's average, access to PEV charging at home is a big challenge for a large percentage of residents in Broward County. Given that, public charging and workplace charging is particularly important in the county. There are almost 2,100 large employers in Broward County, and many key destination locations where access to public charging is a priority.

Major Transportation Hubs in Broward County

- Ft. Lauderdale International Airport
- Port Everglades (including cruise lines)
- Tri-County Commuter Rail Stations - connecting Miami-Dade, Broward, and Palm Beach Counties along I-95
- All Aboard Florida Rail Station – Express Commuter Rail connecting Miami and Orlando (Coming Soon!)

Major Highways in Broward County

- Interstate 95 (SR 9)
- Interstate 595
- A1A Scenic Highway
- CSX Rail Corridor
- Interstate 75 (SR 93)
- Sawgrass Expressway (SR 869)
- U.S. 1
- FEC Rail Corridor
- Florida's Turnpike
- Homestead Extension (SR 821)
- U.S. 27

Universities in Broward County

- The Art Institute of Fort Lauderdale
- Nova Southeastern University
- Keiser University
- DeVry University
- Broward College
- Technological University of America
- University of Phoenix

Major Museums in Broward County

- Ah-Tah-Thi-Ki Museum Big Cypress
- Int'l Swimming Hall of Fame Museum
- My Jewish Discovery Place Museum
- South Florida Railway Museum
- Bonnet House Museum and Garden
- Historic Stranahan House Museum
- Museum of Art / Fort Lauderdale
- New River Inn
- Old Davie School Historic Museum
- Buehler Planetarium
- IGFA Fishing Hall of Fame and Museum
- Museum of Discovery and Science
- Old Dillard Museum

Culture and Wildlife in Broward County

- Fern Forest Nature Center
- Broward Center for the Performing Arts
- Secret Woods Nature Center
- Flamingo Gardens
- Anne Kolb Nature Center

Sporting Arenas in Broward County

- BB&T Center (formerly Bank Atlantic Center)
- Ansin Sports Cmplex
- Fort Lauderdale Aquatic Complex
- Sun Life Stadium
- Broward Table Tennis Club
- Tennis Center of Coral Springs
- Fort Lauderdale Stadium
- International Swimming Hall of Fame
- Incredible Ice
- Dania Jai Lai
- Jimmy Evert Tennis Center

Other Attractions in Broward County

- Broward County Convention Center
- Seminole Hard Rock Gambling Hotel and Casino
- Gulfstream Park Racing & Casino
- Las Olas Boulevard
- Mardi Gras Casino
- Sawgrass Mall
- War Memorial Auditorium
- Isle Casino Racing Pompano Park
- Swap Shop

Parks in Broward County

- Boaters
- Central Broward Regional
- Everglades Holiday
- Markham
- Plantation Heritage
- Tradewinds
- Brian Piccolo
- Deerfield Island
- Hollywood North Beach
- Quiet Waters
- Tree Tops
- West Lake
- C. B. Smith
- Easterlin
- Long Key
- Topeekeegee Yugnee
- Vista View

Notable codes, policies, ordinances affecting PEVs, charging infrastructure in Broward County

The City of Lauderhill adopted Ordinance 120-06-119 on June 25, 2012. The ordinance requires all new single-family residential units that do not include charging infrastructure to incorporate charging equipment into the building plans.[108]

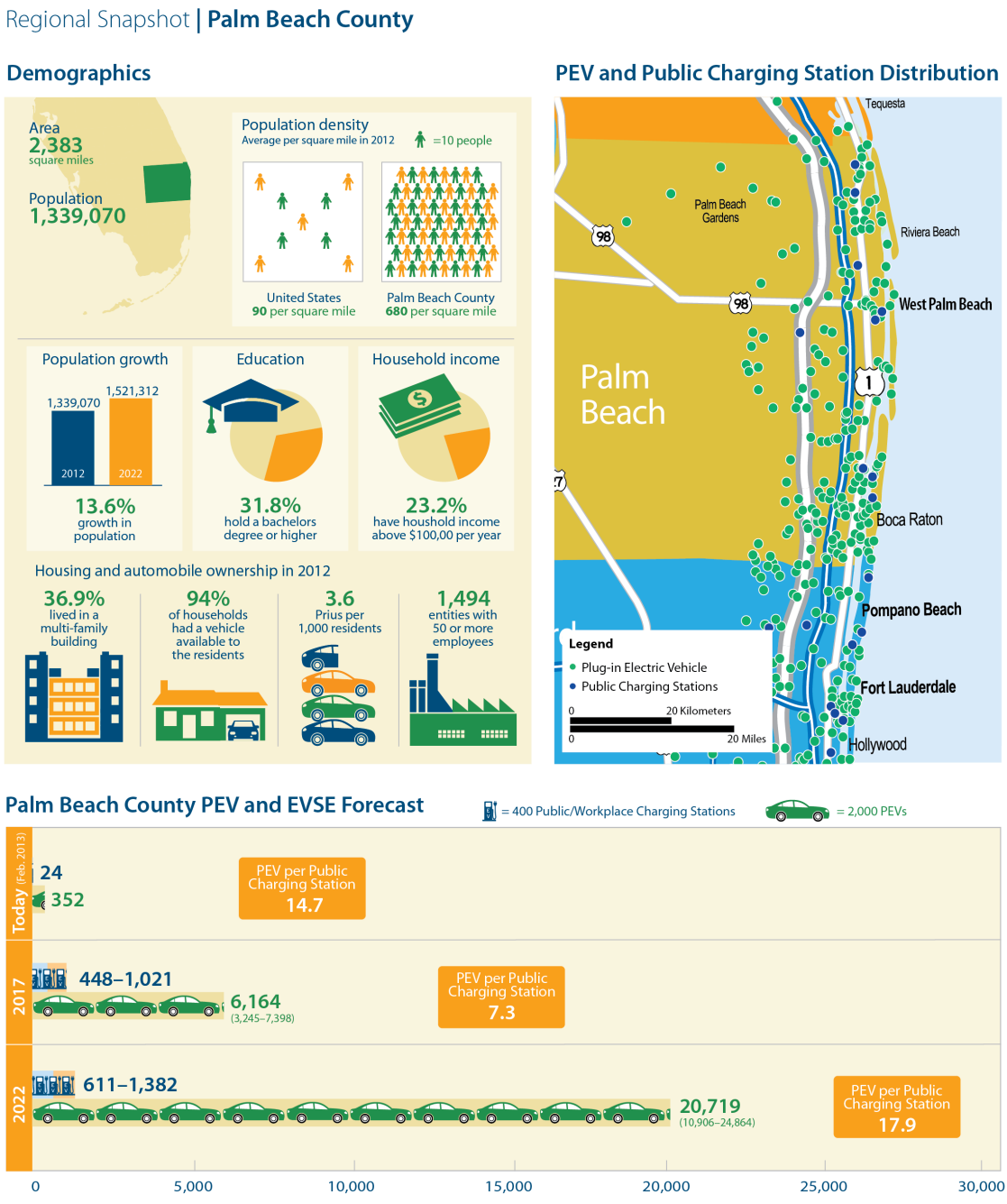
Notable Fleets in Broward County

- Enterprise Holdings
- Broward County
- City of Ft. Lauderdale

[108] Broward County. "Ordinance No. 120-06-119." Online. Available: http://broward.org/GoGreen/Municipalities/Documents/LauderhillSolarRenewableEnergyElectricVechicleReadinessOrdinanceFINAL2012.pdf.

Palm Beach County

Figure 9: Palm Beach County Snapshot – Demographics, PEV and Public Charging Station Distribution, and PEV/EVSE Forecast



For more information and data, see Appendix A-1: Southeast Florida Demographical Data: Selected Characteristics of Residents; Appendix B-1: PEV Sales in Florida and Region; Appendix B-2: Public Charging; Appendix B-6: Profile of Early PEV and HEV Drivers; and Appendix B-7: PEV and Charging Infrastructure Forecast.

Palm Beach County is situated between Broward County to the south and Martin County to the north and is home to almost 1.34 million people – making it the third most populous county in the state and the largest by land area east of the Mississippi River. The county is urbanized with its population clustered to the east and agricultural land and Lake Okeechobee to the west; the population density is 680 people per square mile, versus the region's 819 and the country's 90. Over the next decade, the population of Palm Beach County is expected to increase by approximately 13.61 percent, which is considerably higher than the country's and Region's projected growth.

A higher percentage of Palm Beach County residents hold a bachelor's degree or higher and have a household income of more than $100,000 annually than the Region and the nation. Car ownership within the county is also higher than the Region and the nation at 94 percent, and there are 3.6 Toyota Prius Hybrids per 1,000 residents, versus 2.3 for the Region. These characteristics imply a strong likelihood of PEV purchase. Plus, given the county's large population size, there will likely be a large number of PEVs in the county over the next decade – more than any other county in the Region.

Since multi-unit dwellings make up almost 37 percent of housing units, which is more than the national percentage but lower than the Region's, access to PEV charging at home is a big challenge for a significant percentage of residents of Palm Beach County. Access to public charging and workplace charging is, therefore, important in the county. There are almost 1,500 large employers and many key destination locations in Palm Beach County where access to public charging is a priority.

Major Transportation Hubs in Palm Beach County

- Palm Beach International Airport
- Port of Palm Beach
- Tri-County Commuter Rail - connecting Miami-Dade, Broward, and Palm Beach Counties along I-95
- All Aboard Florida Rail Station – Express Commuter Rail connecting Miami and Orlando (Coming Soon!)

Major Roadways and Transportation Facilities in Palm Beach County

- Interstate 95 (SR 9)
- U.S. 1
- U.S. 27
- Southern Blvd. (FL 80 / US 98)
- Bee Line Expressway, Route 710
- CSX Rail Corridor
- Florida's Turnpike
- U.S. 441
- FEC Rail Corridor

Universities in Palm Beach County

- Nova Southeastern University
- Lynn University
- Palm Beach Atlantic University
- Palm Beach State College
- Florida Atlantic University
- Northwood University

Sporting Arenas and Popular Parks in Palm Beach County

- Roger Dean Stadium
- Burt Aronson South County Regional Park
- Du Bois
- John Prince Memorial Park
- Carlin
- Phil Foster
- Okeeheelee
- Gulfstream
- Jupiter Beach

Attractions in Palm Beach County

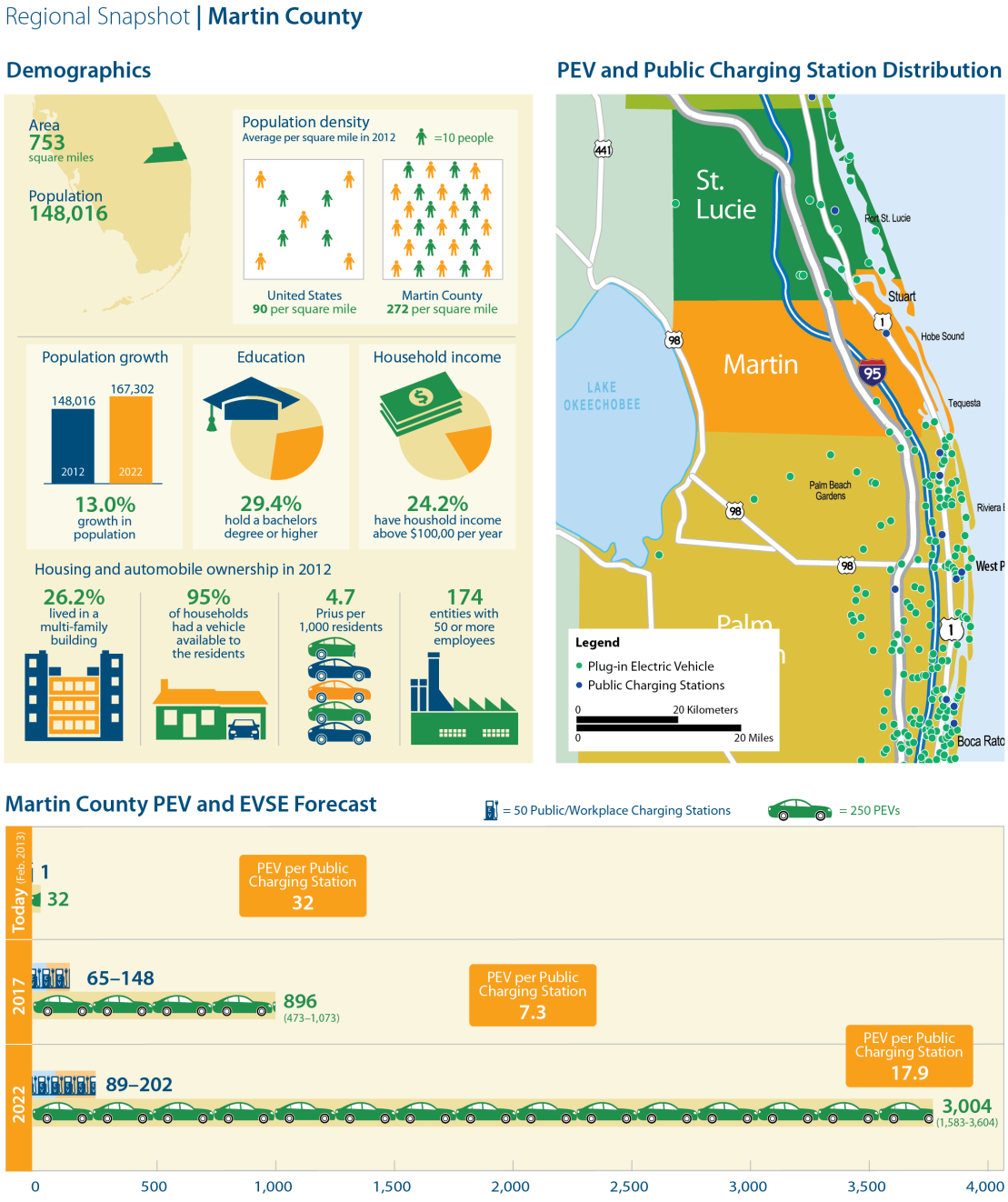
- Kravis Center for the Performing Arts
- American Orchid Society and Botanical Garden
- Palm Beach Maritime Museum
- South Florida Science Museum
- Palm Beach County Convention Center
- City Place
- Lion Country Safari
- Mounts Botanical Garden
- Palm Beach Zoo
- Jupiter Inlet Lighthouse
- Morikami Museum and Japanese Gardens
- Norton Museum of Art
- Lake Okeechobee

Notable Fleets in Palm Beach County in Palm Beach County

- Palm Beach County
- City of West Palm Beach
- City of Boca Raton

Martin County

Figure 10: Martin County Snapshot – Demographics, PEV and Public Charging Station Distribution, and PEV/EVSE Forecast



For more information and data, see Appendix A-1: Southeast Florida Demographical Data: Selected Characteristics of Residents; Appendix B-1: PEV Sales in Florida and Region; Appendix B-2: Public Charging; Appendix B-6: Profile of Early PEV and HEV Drivers; and Appendix B-7: PEV and Charging Infrastructure Forecast.

Martin County is nestled between Palm Beach County to the south and St. Lucie County to the north and is home to about 148,000 people; the population density is 272 people per square mile, versus the Region's 819 and the country's 90. Over the next decade, the population of Martin County is expected to increase about 13 percent, which is considerably higher than the country's and Region's projected growth.

A higher percentage of Martin County residents hold a bachelor's degree or higher and have a household income of more than $100,000 annually than the Region and the nation. Car ownership within the county is also higher than the Region and the nation at 95 percent, and there are 4.7 Toyota Prius Hybrids per 1,000 residents, versus 2.3 for the Region. These characteristics imply a strong likelihood of PEV purchases. However, given the county's small relative population size, there will be a relatively small number of PEVs in the county over the next decade compared to other parts of the Region.

Multi-unit dwellings make up about 26 percent of housing units, which is on par with the national percentage but lower than the Region's. Access to PEV charging at home will be a big challenge to these residents, who may rely on access to public charging and workplace charging if they were to buy a PEV. There are about 174 large employers and several key destination locations in Martin County where access to public charging is a priority.

Major Roadways and Transportation Facilities in Martin County

- Interstate 95
- U.S. 1
- Jensen Beach Causeway
- CSX Rail Corridor
- U.S. 441
- SR A1A
- Florida's Turnpike
- FEC Rail Corridor
- SR 76/Kanner Highway
- SR 710/Beeline Highway
- Atlantic Intracoastal Waterway

Universities in Martin County

- Indian River State College

Attractions in Martin County

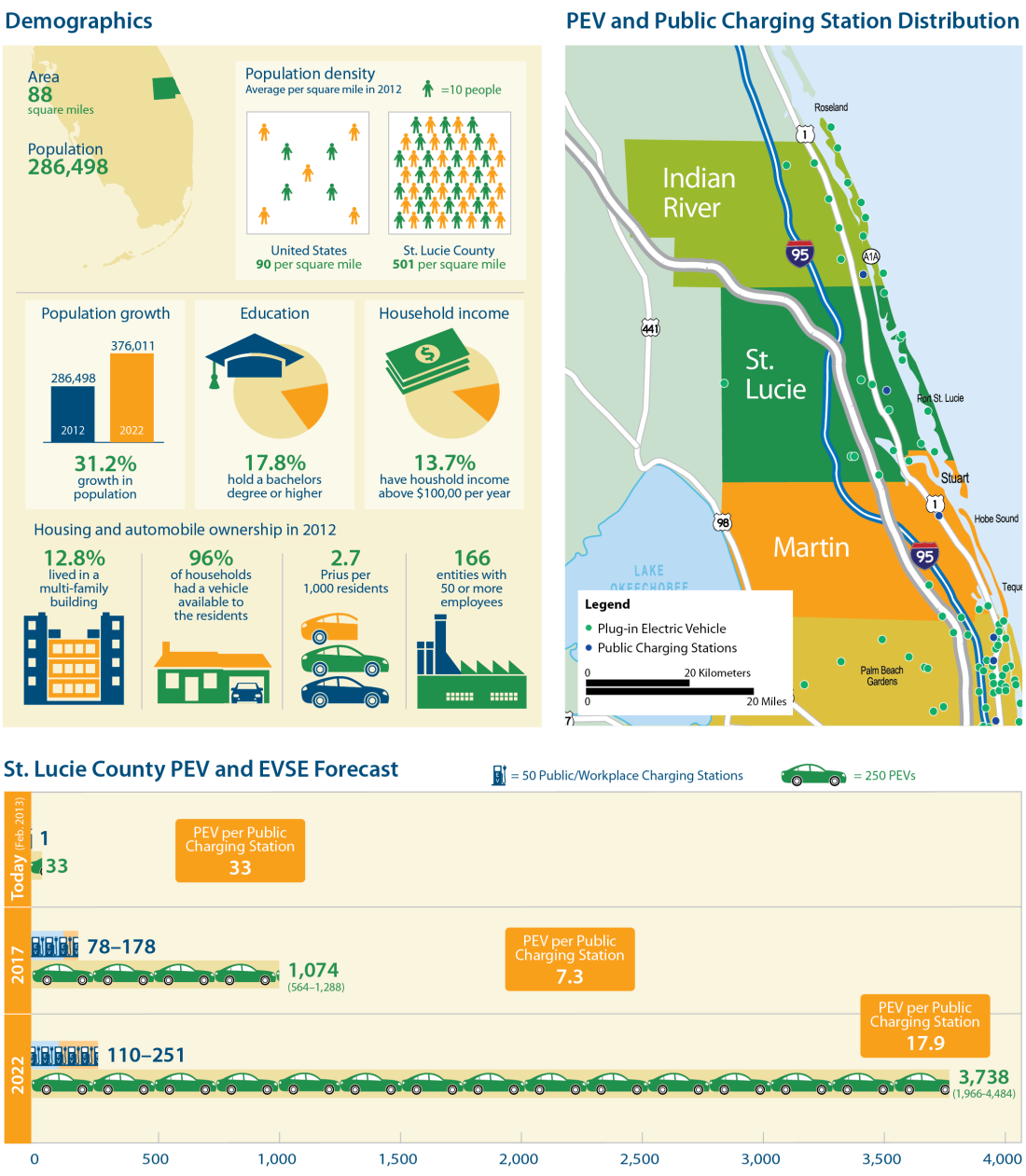
- FPL/Next Generation Solar Energy Center
- Audubon of Martin County, Possum Long Nature Center
- Elliott Museum
- Savannas State Preserve
- Hiking and camping preserves
- Jonathan Dickinson State Park
- St. Lucie Inlet Preserve State Park

Notable Fleets in Martin County

- Martin County
- City of Stuart

St. Lucie County

Figure 11: St. Lucie County Snapshot – Demographics, PEV and Public Charging Station Distribution, and PEV/EVSE Forecast



For more information and data, see Appendix A-1: Southeast Florida Demographical Data: Selected Characteristics of Residents; Appendix B-1: PEV Sales in Florida and Region; Appendix B-2: Public Charging; Appendix B-6: Profile of Early PEV and HEV Drivers; and Appendix B-7: PEV and Charging Infrastructure Forecast.

St. Lucie County is nestled between Martin County to the south and Indian River County to the north and is home to about 286,000 people; over the next decade, the population of St. Lucie County is expected to increase by approximately 31.24 percent, which is significantly higher than the country's and Region's projected growth.

A lower percentage of St. Lucie County residents hold a bachelor's degree or higher or have a household income of more than $100,000 annually than the Region and the nation. However, car ownership is higher than the Region and the nation at 96 percent, and there are 2.7 Toyota Prius Hybrids per 1,000 residents, versus 2.3 for the Region. These characteristics imply a mixed likelihood of PEV purchase. However, given the county's small relative population size, there will be a relatively small number of PEVs in the county over the next decade compared to other parts of the Region.

Multi-unit dwellings make up about 12.8 percent of housing units, which is far less than the national and Region's percentage. While only affecting a small percentage of residents, access to PEV charging at multi-unit dwellings is a challenge, meaning those PEV owners may require access to public charging and workplace charging. There are about 166 large employers in St. Lucie County and several key destination locations where access to public charging is a priority.

Major Roadways and Transportation Facilities in St. Lucie County

- Interstate 95
- Atlantic Intracoastal Waterway
- State Road A1A
- Florida's Turnpike
- State Road 70 (Okeechobee Road)
- Crosstown Parkway
- FEC Rail Corridor
- U.S. 1

Universities in St. Lucie County

- Barry University branch
- Indian River State College
- University of Florida – Institute of Food and Agriculture Sciences
- Keiser University

Attractions in St. Lucie County

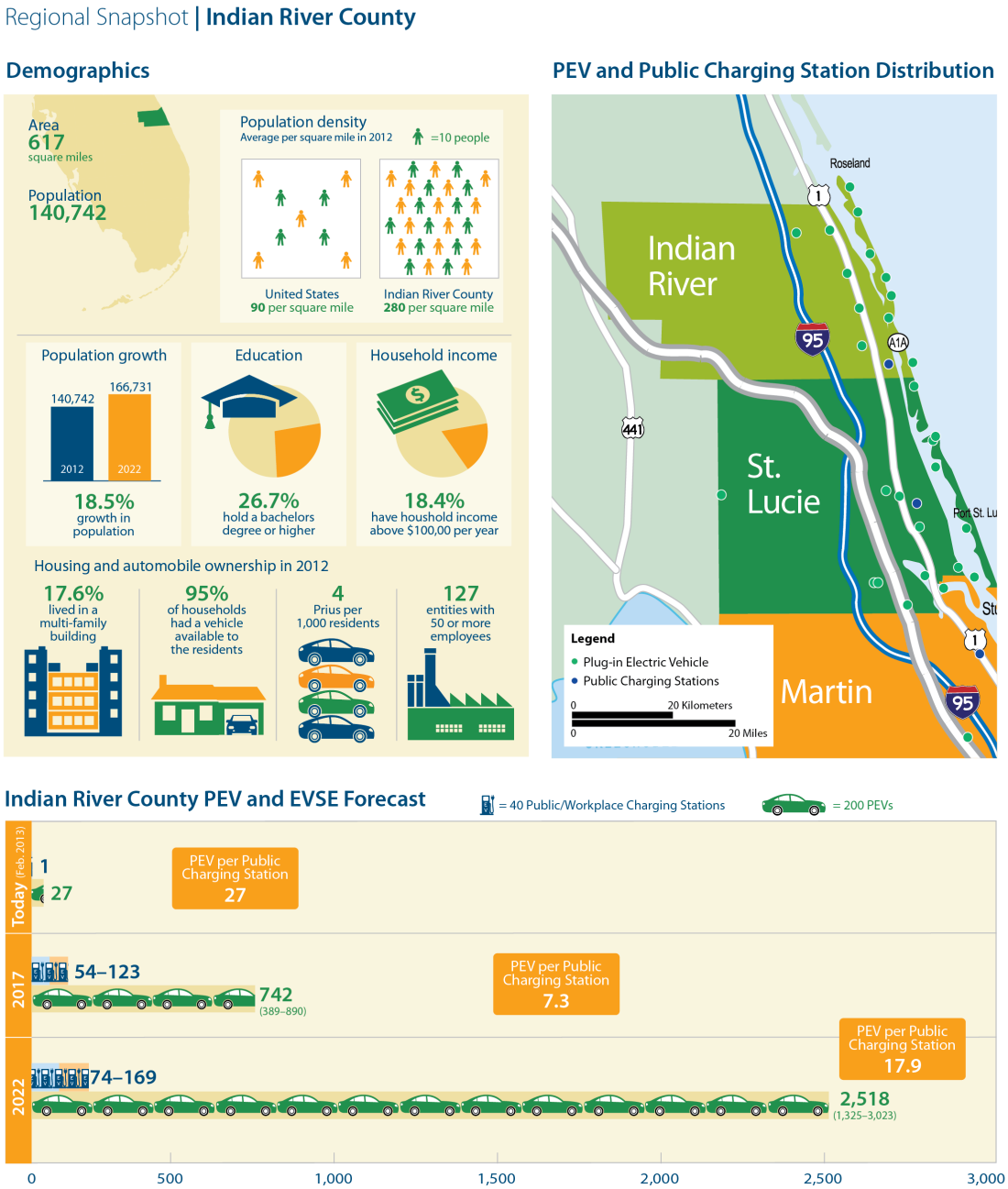
- Navy UDT-Seal Museum
- PGA Golf Learning Center
- Hutchinson Island Beaches
- City of Port St. Lucie Civic Center
- Savannah State Preserve
- Veterans Memorial Park
- Fort Pierce Marina
- Downtown Fort Pierce Historic District
- St. Lucie River
- Port St. Lucie Botanical Gardens
- St. Lucie County State Historical Museum
- Avalon State Park
- Heathcote Botanical Gardens
- St. Lucie County Marine Center
- Mets Baseball Spring Training Stadium
- St. Lucie West Regional Activity Center
- Fort Pierce State Recreation Area

Notable Fleets in St. Lucie County

- St. Lucie County
- City of Port St. Lucie
- City of Fort Pierce

Indian River County

Figure 12: Indian River County Snapshot – Demographics, PEV and Public Charging Station Distribution, and PEV/EVSE Forecast



For more information and data, see Appendix A-1: Southeast Florida Demographical Data: Selected Characteristics of Residents; Appendix B-1: PEV Sales in Florida and Region; Appendix B-2: Public Charging; Appendix B-6: Profile of Early PEV and HEV Drivers; and Appendix B-7: PEV and Charging Infrastructure Forecast.

Indian River County, nicknamed "gateway to the tropics," is at the northern border of the Southeast Florida. It lies between St. Lucie to the south and Brevard County to the north and is home to nearly 141,000 people. The population density is 280 people per square mile, versus the Region's 819 and the country's 90. Over the next decade, the population of Indian River County is expected to increase by approximately 18.5 percent, which is much higher than the country's and Region's projected growth.

A lower percentage of Indian River County residents hold a bachelor's degree or higher or have a household income of more than $100,000 annually than the Region or the nation. However, car ownership is higher than the Region and the nation at 95 percent, and there are four Toyota Prius Hybrids per 1,000 residents, versus 2.3 for the Region. These characteristics imply a mixed likelihood of PEV purchase. However, given the county's small relative population size, there will likely be a relatively small number of PEVs in the county over the next decade compared to other parts of the Region.

Multi-unit dwellings make up about 17.6 percent of housing units, which is far less than the national and Regional percentage. While only affecting a small percentage of residents, access to PEV charging at multi-unit dwellings is a challenge, meaning these PEV owners may need to rely on access to public charging and workplace charging. There are about 127 large employers in St. Lucie County and several key destination locations where access to public charging is a priority.

Major Roadways and Transportation Facilities in Indian River County

- I-95
- Atlantic Intracoastal Waterway
- State Road 60
- U.S. 1
- FEC Rail Corridor
- Highway A1A

Universities in Indian River County

- Indian River State College
- University of Florida extension

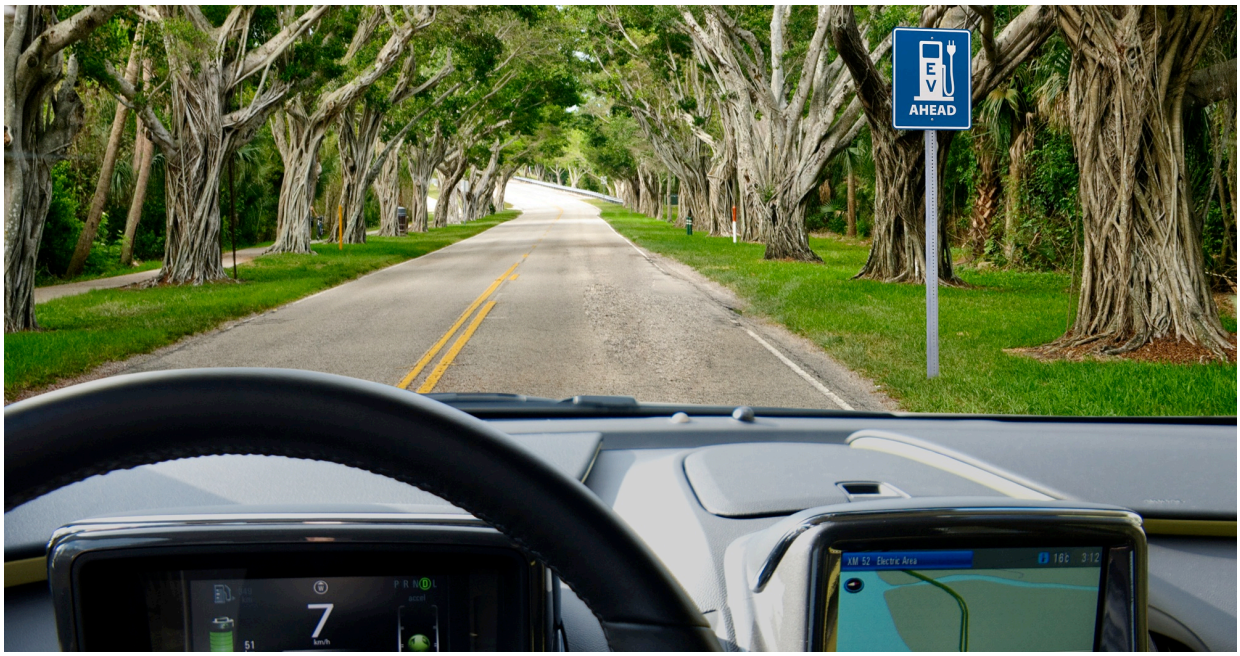
Attractions in Indian River County

- Indian River Citrus Museum
- Sebastian Fishing Museum
- Vero Beach Railroad Station Exhibit Center
- McKee Botanical Gardens
- Orca Walk
- Vero Beach Museum of Art
- Jungle Trail
- McLarty Museum
- Manatee Observation and Education Center

Notable Fleets in Indian River County in Indian River County

- Indian River County
- City of Vero Beach

Chapter 6 – Strategies



The Southeast Florida Region is ideal for plug-in electric vehicle (PEV) market growth and to serve as a model for other regions to follow. A transition to electric transportation would bring the Region, its residents, and society as a whole several key benefits, including economic advantages, improved air quality, reduced greenhouse gas emissions, and lowered reliance on foreign oil.

This plan leverages the input of many stakeholders and sets a course for sustained activities to advance the market over the coming years. As referenced in the Executive Summary of this report, the plan outlines six strategies to achieve its vision, including:

- Identifying financial and non-financial incentives.
- Identifying options for public and private infrastructure deployment.
- Making it easier to install public and private charging infrastructure with supportive codes, policies, and zoning.
- Facilitating fleet purchases of PEVs to jumpstart the market and ultimately help drive down costs.
- Creating education and outreach opportunities for stakeholders, including the Region's community and business leaders and residents.
- Developing plans for a demonstration project along a heavily traveled mass-transit corridor.

As these strategies are executed, some of the most common barriers to widespread PEV adoption can be overcome. This will create a more enjoyable user experience for current PEV owners and encourage the purchase of PEVs by general consumers and fleet managers considering new vehicles. Over the next decade, the Region can expect as many as 74,000 PEVs on its roads, supported by between 1,800 and 4,100 AC and DC-Fast Charging (DCFC) stations.[109] Southeast Florida will be ready, and it will serve as a resource for other communities looking for guidance on PEV market development.

[109] Appendix B-7: PEV and Charging Infrastructure Forecast (p. 182).

Implementing Financial and Non-Financial Incentives for PEVs and EVSE

One key strategy for helping to support the adoption of PEVs and the deployment of charging infrastructure is the implementation of statewide incentives for consumers, manufacturers, and other electric-vehicle stakeholders, as well as to promote the incentives that already exist to build awareness – which is a priority of the Drive Electric Florida team. Recommendations for incenting the adoption of PEVs and electric vehicle supply equipment (EVSE) are called out throughout this report, with a summary of available and recommended incentives outlined below.

Incentives Background

To boost demand for and promote adoption of PEVs, many states and other public and private entities have implemented financial and non-financial incentives. Financial incentives include rebates or tax credits on PEVs or EVSE, exemptions or discounts on vehicle registration fees, and discounted tolls and parking. Non-financial incentives can also be effective and include preferred parking spaces, access to high-occupancy vehicle (HOV) highway lanes during peak hours of congestion, and expedited permitting and installation of charging equipment.

Some incentives are more effective than others, and what works in one part of the country may not work as well in other regions. For example, high-occupancy vehicle lane access for HEVs was enough to dramatically increase adoption of hybrid vehicles in the highly congested urban areas of California. However, that same incentive is less effective in states with less traffic and congestion. Therefore, states should examine the unique characteristics of their region and design programs around what matters most.

As part of this plan, the Drive Electric Florida team researched currently available state and federal incentives and building incentives, as well as financial and non-financial incentives available elsewhere that could be applied in Florida and the Southeast Florida Region.

Available Federal Incentives

Floridians benefit from federal incentives, including:

- A federal tax credit is available for the purchase of new, qualified PEVs of at least four kilowatt-hours of capacity. The minimum credit amount is $2,500, and the credit may be up to $7,500 based on each vehicle's traction battery capacity and the gross vehicle weight rating.
- EVSE installed between January 1, 2006, and December 31, 2013, are eligible for a tax credit of 30 percent of the cost, not to exceed $30,000. Fueling station owners who install qualified equipment at multiple sites are allowed to use the credit towards each location. Consumers who purchased qualified residential fueling equipment prior to December 31, 2013, may receive a tax credit of up to $1,000. Unused credits that qualify as general business tax credits, as defined by the Internal Revenue Service (IRS), may be carried backward one year and carried forward 20 years.[110] (Reference Public Law 112-240 and 26 U.S. Code 30C and 38).

[110] U.S. DOE, EERE. Alternative Fuels Data Center. "Alternative Fuel Infrastructure Tax Credit."

Central Florida was also the recipient of federal funding for the installation of PEV charging infrastructure. As a part of the American Recovery and Reinvestment Act (ARRA), the Tampa/Orlando area was included as one of 10 regions across the nation in the ChargePoint America Program – providing charging stations, supported with private funds for installation costs. There are now nearly 200 charging stations in the Orlando area and more than 120 in the Tampa area[111]; certainly, the ARRA funding for charging stations successfully stimulated the infrastructure development in the Central Florida region.

Available Incentives in Florida

The following incentives are currently available in the State of Florida:

- Qualifying vehicles may be driven in HOV or managed/premium lanes at any time, regardless of the number of passengers in the vehicle, at no additional cost. The current list of qualifying vehicles is available on the Florida Department of Motor Safety and Motor Vehicles' website.[112]
- Restrictions on insurance surcharges for electric vehicles, per Section 627.06535, Fla. Stat."[113]
- EVSE financing. The State of Florida approved the use of property-assessed clean energy (PACE) programs to finance installation of EVSE. More information is available in the Florida Energy Policy section of this report (p. 4-26).
- County permission to levy an infrastructure surtax, upon approval of the majority of county commission and a referendum for voters, to generate revenue for EVSE installation.[114]

Examples of State Incentives

PEV incentives and laws for each state are available from the DOE's Alternative Fuel Data Center (AFDC).[115] The following summary of incentives can also be effective at stimulating the market and are recommended for consideration in the State of Florida:

- *Research and Development (R&D)*: Grants and loans made available for R&D projects relating to alternative fuels and energy-saving vehicle technologies. This could serve to attract additional business and stimulate Florida's and the Region's economy.
- *Rebates*: A vehicle rebate program allocating funds toward vehicle purchases for qualifying new PEVs and alternative-fuel vehicles. Funds are allocated for citizens, public, and private fleets.
- *Sale Tax Reduction/Exemption*: On qualifying plug-in electric or alternative-fuel vehicles.
- *Registration Discounts*: Free or discounted vehicle registration rates.
- *No Tolls*: On interstate, turnpike, and expressway corridors.

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[111] ChargePoint. Searchable map. Online. Available: https://na.chargepoint.com/index.php/charge_point. Accessed: March 2013.

[112] Florida Department of Highway Safety and Motor Vehicles. "HYBRID/ILEV VEHICLES, as of January 25, 2013." Official Website of the Florida Department of Highway Safety and Motor Vehicles, 2013. Online. Available. http://www.flhsmv.gov/dmv/ILEV-HYBRID-VEHICLE-LIST.pdf. Accessed: March 11, 2013.

[113] Section 627.06535, Fla. Stat., states: "[a]n insurer may not impose a surcharge on the premium for motor vehicle insurance written on an electric vehicle, as defined in s. 320.01, if the surcharge is based on a factor such as new technology, passenger payload, weight-to-horsepower ratio, or types of materials, including composite materials or aluminum, used to manufacture the vehicle, unless the office determines from actuarial data submitted to it that the surcharge is justified."

[114] The surtax can be for no more than one-half percent and can be used to install electric vehicle charging equipment – Section 212.055, Fla. Stat. There are 17 counties that have approved the infrastructure surtax: Charlotte, Clay, Duval, Escambia, Flagler, Glades, Highlands, Hillsborough, Indian River, Lake, Monroe, Osceola, Pasco, Pinellas, Putnam, Sarasota, and Wakulla. At this time, no county is using surtax revenue for PEV infrastructure. Two of the primary reasons are (1) the surtax has been dedicated to retire bonds that contained specific transportation projects and §212.055, Fla. Stat., was took effect July 1, 2012, thereby limiting the amount of time for local implementation.

[115] Available in a section called "Laws and Incentives" on AFDC's website (see: http://www.afdc.energy.gov/laws/matrix/tech).

Table 3: A Summary of Current and Potential Incentives for PEVs and Charging Infrastructure in Florida

Current Incentives	Potential Incentives
HOV Lane Access[116] **Restrictions on Insurance Surcharges**[117] **EVSE Financing/PACE**[118] **Sales Tax, Revenue Generation for EVSE Installation**[119] **Gas Tax Exemption*** *** For BEVs only; PHEVs pay tax on gas they consume.**	**Sale Tax Reduction or Exemption**: On qualifying plug-in electric or alternative-fuel vehicles. **Registration Discount**: Free or discounted state vehicle registration rates. **Rebates** - Toward vehicle purchases for qualifying new PEV and alternative-fuel vehicles. Funds allocated toward citizens, public, and private fleets. Some states offer as much as $5,000 per vehicle. **Research & Development Loans:** Promotes projects related to alternative-fuel and energy-saving vehicle technologies – encouraging economic development and job creation. **Free Tolls**: On state roads.

Examples of County, City, and Employer Incentives

Below are incentives that can be implemented locally and that may be considered in the Region:

- *Parking*: Free parking for PEVs at street meters and some parking lots, as well as priority designated PEV-only parking spaces.
- *Taxi-Use Extension*: PEV or alternative-fuel vehicles can be operated as taxicabs for an extra 24 months beyond the existing limits.
- *EVSE Financing*: Property owners may apply to their local government for funding to help finance installations of charging equipment at their property or enter into a financing agreement with the local government for the same purpose.

Examples of Private Incentives

Private institutions may also opt to provide incentives for PEV owners:

- *Hotels*: Discounted or free parking and special room rates to customers who own or rent a PEV/alternative-fuel vehicle.
- *Insurance*: PEV/alternative-fuel vehicle drivers are eligible for insurance discounts.
- *Loans*: Green-vehicle loans to purchase new and used qualified PEV/alternative-fuel vehicles.
- *Charging*: Free or reduced-rate PEV charging for customers/residents/employees.
- *Parking Locations*: Premium-parking locations for PEV drivers.
- *Airports and Seaports*: Discounted parking fees and free valet service for car charging.

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[116] The Florida Department of Highway and Motor Safety administers the program and maintains a qualifying list of vehicles at the following link: http://www.flhsmv.gov/dmv/ILEV-HYBRID-VEHICLE-LIST.pdf. The PEV owner must obtain an annual decal from FHMV.

[117] Section 627.06535, Fla. Stat., states: "[a]n insurer may not impose a surcharge on the premium for motor vehicle insurance written on an electric vehicle, as defined in s. 320.01, if the surcharge is based on a factor such as new technology, passenger payload, weight-to-horsepower ratio, or types of materials, including composite materials or aluminum, used to manufacture the vehicle, unless the office determines from actuarial data submitted to it that the surcharge is justified."

[118] Section 163.08(2)(b)1., Fla. Stat.: Florida also has approved the use of property-assessed clean energy (PACE) programs as a means of financing the installation of electric vehicle infrastructure

[119] A county, upon approval of the majority of county commission and a referendum for voters, may levy the infrastructure surtax. The surtax can be for no more than one-half percent and can be used to install electric vehicle charging equipment – Section 212.055, Fla. Stat. There are 17 counties that have approved the infrastructure surtax: Charlotte, Clay, Duval, Escambia, Flagler, Glades, Highlands, Hillsborough, Indian River, Lake, Monroe, Osceola, Pasco, Pinellas, Putnam, Sarasota, and Wakulla. At this time, no county is using surtax revenue for PEV infrastructure. Two of the primary reasons are (1) the surtax has been dedicated to retire bonds that contained specific transportation projects and §212.055, Fla. Stat., was took effect July 1, 2012, thereby limiting the amount of time for local implementation.

Sustainable Building Program Incentives

Sustainable building programs, such as Leadership in Energy and Environmental Design (LEED) and the Florida Green Building Council (FGBC), also offer incentives for EVSE installation in the form of credits toward LEED certifications that are aimed at increasing PEV adoption through the implementation of PEV charging infrastructure and access to vehicle charging.

As an incentive, LEED certifications provide a number of benefits to employers, property managers, landlords, and other stakeholders across the Region and country, including, but not limited to: happier occupants and employees, competitive differentiation, an enhanced public image, increased rental rates, and more. In fact, 75 percent of firms say they view sustainability efforts as consistent with profit missions.[120] In summary, sustainable building program incentives for the implementation of EVSE in the Region include:

- *LEED*: The majority of PEV and car-sharing LEED credits are in the Sustainable Sites Credit category and are awarded for providing preferred or discounted parking for low-emissions vehicles, the installation of alternative-fuel fueling stations, offering building occupants access to a low-emitting vehicle or fuel-efficient vehicle car-sharing programs, and more. See Appendix A-5: Building Incentives – LEED, FGBC, and Green Local Government Certification Program (p. 164) –for a summary table of eligible credits for PEVs, EVSE, and car sharing by the LEED Rating System.
- *FGBC*: As a non-profit Florida corporation providing a statewide green-building program, the FGBC also defines, promotes, and encourages sustainable efforts – including the implementation of EVSE – with environmental and economic benefits. A table in Appendix A-5: Building Incentives – LEED, FGBC, and Green Local Government Certification Program (p. 164) – includes the FGBC building standards that provide credits for PEVs, EVSE, and car-sharing programs.
- *Green Local Government Certification Program*: Additionally, the FGBC provides this program, for which Miami-Dade County recently received Gold-level certification. This program provides local governments a step-by-step toolkit for developing and implementing sustainability plans that encourage the adoption of environmentally friendly practices across all government functions. For details on the points available towards certification, see Appendix A-5: Building Incentives – LEED, FGBC, and Green Local Government Certification Program (p. 164).

Identifying and offering incentives for PEVs and EVSE can influence market adoption. However, the incentives, alone, are not enough. Unless consumers are aware of them, the incentives will be underutilized. It is, therefore, critical that stakeholders promote available incentives to PEV owners and non-owners. Related tactics to drive awareness of PEVs and add to the overall value proposition of PEV-ownership are included in the Creating Education and Outreach Opportunities section of this report (p. 6-116).

[120] U.S. Green Building Council. "The Business Case." For Commercial Building Owners, For Commercial Building Tenants. Available. Online: https://www.usgbc.org/ShowFile.aspx?DocumentID=18691. Accessed: March 1, 2013.

Deploying Public and Private Infrastructure

In many ways, fueling an electric vehicle is simpler than fueling a conventional gasoline or diesel powered vehicle. That is because access to electricity is ubiquitous – just about every home and business in the U.S. is connected to the electric grid, and the most basic requirement to charge a PEV is access to a 120-volt outlet.

However, broad PEV adoption depends on having the appropriate infrastructure in place to support charging – even when *far from home,* or for those who do not have access to parking near an electric outlet, such as residents of multi-unit dwellings.

This section of the report deals with identifying options for public and private infrastructure deployment to support broad-scale PEV adoption – with recommendations for how the Region should prioritize this rollout. It provides a consolidated guide to:

- Siting and installation of charging stations.
- Charging equipment features and options.
- Multi-unit dwelling and workplace charging policy and process considerations.
- Public charging location types and considerations for charging levels, ownership, and payment models.
- Identify the appropriate quantity, concentration, and location types for public charging within the Region.

Considerations for Siting PEV Charging

There are a number of factors to consider for siting charging equipment – including connecting to a power source, ensuring available electrical capacity, integrating into existing site structures, assessing the environment, ensuring safety, and considering accessibility for all groups.

Some of these factors are listed below, but because sites are unique and have different installation possibilities, it is strongly encouraged that site hosts consult with licensed contractors or electricians who are experienced and trained for installation of electric vehicle supply equipment (EVSE). This can also lower cost, improve usability, and reduce potential safety hazards.

The following considerations are applicable in public and semi-public (i.e. workplace charging) locations with multiple users; however, some of the principles can be applied in single-family home charging, as well.

Visibility – Locate charging stations in areas with high visibility, foot, and vehicle traffic, ensuring charging stations are:

- Less likely to be vandalized.
- More likely to be found and used by PEV drivers.

Lighting – Site charging stations in well-lit locations to:

- Reduce risk of pedestrians and users tripping over cords.
- Deter vandalism.
- Reduce the risk that vehicles will hit the charging station or run over the cord set.

- Enable better user operation, including entering user authorization information (if applicable). If parking space lighting is not feasible, consider charging equipment with lighted screen displays.[121]
- Refer to the codes and standards of local jurisdictions regarding illumination requirements and restrictions on public and private properties. Some business practices and ordinances require dimming of area lighting after close of business – a key consideration for 24-hour EVSE.[122]

Proximity to Sufficient Power Source – Lowest-cost installations have short run lengths, few barriers, and existing, sufficient electrical capacity.

- A licensed electrician can evaluate the existing service load and adequacy of infrastructure and install necessary upgrades for the EVSE, including a new panel and dedicated branch circuits.[123]
- If a long conduit run from the existing electrical panel is needed, or insufficient capacity is available and upgrades are not prudent, site operators may choose to open a new service with the utility (including a new meter) in closer proximity to utility-owned transformers.
- An EVSE infrastructure plan may require extensive and costly utility upgrades, involving transformers and other infrastructure – especially for the installation of one or more high-load DC-Fast Charging stations at a facility with a low prior load.[124]

Surroundings – Minimize disruption of existing infrastructure and:

- Avoid installation under trees to protect charging equipment and cars from droppings and branches.
- Avoid installation locations that require significant trenching through concrete or additional landscaping. This can significantly increase the cost of installation and affect site aesthetics.

Parking Space Size – Ensure local zoning requirements for parking space size and number are met. Larger spaces are more

Selecting the Right Contractor Matters

Licensed

Ensure your contractor is a licensed electrician, in good standing

Certified by Manufacturer

Check to see if the manufacturer of your selected charging equipment (or vehicle) recommends using an electrician that has been certified to install its brand of EVSE. Some manufacturers offer a list of contractors who have met its criteria and understand how to assemble, install, and connect the charging station to the network (if applicable).

Experienced

Select electricians experienced with electric vehicle charging equipment installations. A contractor with prior experience (particularly at public venues), will often be able keep costs down by identifying creative siting solutions. They will also know what to look for and avoid in terms of avoiding tripping hazards and locating charging equipment optimally.

Permitting and Inspections

Be sure that your contractor pulls the appropriate permit(s) for the job and arranges for inspection. This process helps to ensure your job has been completed safely and is up to code – not something to be taken lightly.

[121] This may be the case along the beach where lighting is restricted during turtle hatching season.
[122] Mayfield, David. "Site Design for Electric Vehicle Charging Stations." Version 1. Editor: Carlotta Collette. Sustainable Transportation Strategies, Supported by NYSERDA, July 2012. Online. Available: http://www.sustainabletransportationstrategies.com/wp-content/uploads/2012/08/Site-Design-for-EV-Charging-Stations-1.0.pdf. Accessed: August 2012.
[123] Mayfield, David. "Siting Electric Vehicle Charging Stations." Version 1. Editor: Carlotta Collette. Sustainable Transportation Strategies, April 2012. Online. Available: http://www.sustainabletransportationstrategies.com/wp-content/uploads/2012/05/Siting-EV-Charging-Stations-Version-1.0.pdf. Accessed: August 2012.
[124] Read more about these potential utility upgrade costs in the Selecting Charging Equipment section of the report (p. 6-59).

usable and better protect equipment. For example:

- Longer parking spaces allow for greater room to fit a charging station, helping minimize damage to equipment from vehicle impact. Plus, the user will need enough space to maneuver between the car and the charging station – a three-foot by three-foot area is optimal.[125]
- Wider parking spaces improve maneuverability and decrease the risk of cords being run over.

Weather and Climate – Consider the elements for usability and equipment life.

- Select equipment rated for outdoor use when installed outdoors or in areas exposed to the elements (such as covered carports).
- Install EVSE in well-drained locations, avoiding standing water or areas subject to flooding or significant salt-water corrosion. Consider the potential long-term impact of sea-level rise in certain locations in the Region.[126]
- If possible, install EVSE in covered parking locations. Plus, emerging evidence suggests batteries may charge more efficiently in covered/cooler environments.[127]
- For outdoor AC Level-1 installations, the National Electrical Code requires the use of ground fault circuit interrupter (CFCI) outlets. Outlets should also have weatherproof coverings installed for use, including when the EVSE cord is plugged-in.

Electrical Safety – Select safe equipment, hire an experienced and licensed electrician, and follow the manufacturer's operating instructions.

- Some EVSE are hardwired, while modular (portable) units can be plugged into dedicated outlets.
    - AC Level-1: Requires a dedicated 120-volt electrical circuit and outlet for PEV charging.
    - AC Level-2: Requires a dedicated 240-volt electrical circuit and outlet for Level-2 charging.
- Select EVSE that has been tested and approved for use by Underwriters Laboratory (UL), or a similar nationally recognized, independent testing lab.
- Select an experienced, licensed electrician to perform installation work and ensure all appropriate permits are pulled and inspections are conducted for safe installation.

Ventilation – Refer to operating manuals and equipment labeling for required indoor ventilation.

- Most PEV batteries from major automakers today do not emit hydrogen gas in quantities that could cause an explosion, meaning mechanical and/or passive ventilation are often not required.[128]
- PEV batteries that generate hydrogen do require ventilation. Section 625.29(D) of the National Electric Code (NEC) has requirements for ventilation for single and multiple vehicles. Section 625.15(B) & (C) provides ventilation labeling requirements for EVSEs.[129]
    - *Ventilation Not Required* - 625.29(C), the EVSE shall be clearly marked by the manufacturer: VENTILATION NOT REQUIRED.
    - *Ventilation Required* - 625.29(D), the EVSE shall be clearly marked by the manufacturer: VENTILATION REQUIRED.

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[125] Mayfield, David. "Siting Electric Vehicle Charging Stations."
[126] To learn more about the work being done about the potential effects of sea-level rise on Southeast Florida, and whether a proposed EVSE site is in potentially vulnerable area, visit: http://www.broward.org/NATURALRESOURCES/CLIMATECHANGE/Pages/SoutheastFloridaRegionalClimateCompact.aspx.
[127] Additional research is reportedly being conducted on this topic by ECOtality.
[128] Electric Vehicles Standards Panel, American National Standards Institute (ANSI). "ANSI EVSP Standardization Roadmap for Electric Vehicles." Version 1. April 2012. Online. Available: http://publicaa.ansi.org/sites/apdl/evsp/ANSI_EVSP_Roadmap_April_2012.pdf. Accessed: August 2012.
[129] Electric Vehicles Standards Panel, American National Standards Institute (ANSI). "ANSI EVSP Standardization Roadmap for Electric Vehicles."

Orientation – Install charging stations based on parking type, parking aisles, and pedestrian facilities.

- Install EVSE at the front of the parking space – either centered or between two pull-in parking spots. This allows the cable to reach charging inlets located on the front or side of most PEVs.
- Install EVSE at the front-third of the parallel parking spot, based on the direction traffic flows.[130]
- Consider formal and informal walking routes and install EVSE to minimize tripping hazards.
- Adhere to local codes for minimal sidewalk widths (36 inches, or more depending upon local code.)[131]
- Avoid unsafe encroachments into parking aisles – adhere to local codes regarding acceptable widths.
- As a consideration to the general public, avoid placing charging stations in the most high-demand parking spaces until there is a rise in the number of PEVs in the Region. This will reduce resentment when the charging spaces remain empty, while the surrounding parking spaces are full. Exceptions include:
    - Charging spaces for expecting mothers and people with disabilities, who should be able to park close to the destination's entrance.[132]
    - When premium parking spots serve as an incentive for PEV drivers.
    - Instances when installation in a high-demand location would reduce EVSE installation costs.

Mounting – Consider the best way of mounting charging stations. Here are some options:

- Floor/ground-mounted EVSE with a post or a pedestal is common in public lots and on streets.
- Wall-mounted units are common in residential and public garages, or in parking lot installations adjacent to a building. These can be more cost-effective than post-mounted units.
- Existing poles, columns, and posts commonly found in a parking garage also offer good mounting surfaces for EVSEs, particularly because they often have buffer space or barriers that would also protect the EVSE, negating the need for bollards or wheel stops.[133]
- Overhead mounted units are less common, but they help prevent the tripping hazard of cords.

Protective Barriers – Ensure charging stations are protected from collision damage from the vehicle.

- Wheel stops or bollards may be necessary to protect charging equipment. Bollards create less of a tripping hazard, yet they are more costly to install. Bollards should be placed a minimum of three feet apart, but less than five feet apart to block vehicles.[134]
- When EVSE is installed on or behind curbs, additional protective equipment may be unnecessary.
- Wall-mounted barriers can be used with wall-mounted EVSE and are preferable to wheel stops and bollards, which can create tripping hazards and maneuverability challenges for the disabled.[135]

ADA Accessibility[136] – Ensure public charging meets any accessibility requirements.

- Suitable sites for persons with disabilities are firm, level, and smooth and in close proximity to the building entrance with an accessible pathway.[137]

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[130] Since automakers have not standardized placement of the charging inlet on PEVs, parallel-parking locations can be a challenging site for proper EVSE placement. To date, most PEV charging inlets appear to be at the front or front-side of the vehicle.
[131] Mayfield, David. "Site Design for Electric Vehicle Charging Stations."
[132] Mayfield, David. "Siting Electric Vehicle Charging Stations."
[133] Mayfield, David. "Site Design for Electric Vehicle Charging Stations."
[134] Mayfield, David. "Site Design for Electric Vehicle Charging Stations."
[135] Mayfield, David. "Site Design for Electric Vehicle Charging Stations."
[136] While there are not yet official ADA requirements for vehicle charging, the Ensuring Supportive Codes, Policies, and Ordinances section of this report addresses accessibility (p. 6-86).

- Persons with disabilities need additional room to maneuver – at or near the EVSE and beside the vehicle – while operating the charging station.
- Care should be taken to place curbs, wheel stops and other barriers to avoid posing user challenges.
- Cables on traditional EVSE without cord-management systems do not lie flat on the ground and are often heavy to lift, making it extra challenging for a person with disabilities. EVSE with cord-management systems should be considered.

More detail on ADA accessibility can be found in the section of this report titled, Ensuring Supportive Codes, Policies, and Ordinances (p. 6-86).

Signage – Way-finding signs and signs marking the charging station are both critical in public charging locations.

- Signs should be well located, recognizable and readable.
- Way-finding signs that direct drivers to charging stations are best placed where they are seen but do not block an important view.
- Signage at a charging station should clearly identify it as a PEV charging station and inform users of the rules – such as time limits, cost, etc.
- The Manual on Uniform Traffic Control Devises (MUTCD) has a standard sign for identifying charging stations. However, in 2011, the Federal Highways Administration agreed to an interim alternate and will grant jurisdictions approval to use it upon written request.[138]
- In early 2012, The Florida Department of Agriculture and Consumer Services (FDACS) was charged with adopting rules to provide definitions, methods of sale, labeling requirements, and price-posting requirements for electric vehicle charging stations to allow for consistency. Site operators should check with FDACS on the status of its work prior to posting signage.

More detail about this topic can be found in the section of this report titled, Ensuring Supportive Codes, Policies, and Ordinances (p. 6-86).

Cord Safety – Minimize the risk of injury with proper cord management and equipment location.

- Charging stations should be installed in locations where the cord does not obstruct walkways.
- Hooks or brackets should be mounted adjacent to the EVSE for safe cord storage while not in use.
- Cord length should be sufficient to reach the inlet of most PEVs, but not longer than 25 feet.

EVSE Maintenance – Typically, there are relatively few EVSE maintenance requirements.

- Charging cords should be securely stored so they are not damaged.
- Check accessible EVSE parts periodically for wear and/or vandalism.
- Keep the charging station clean.
- Periodic inspection, testing, and preventative maintenance by a qualified electrician may be recommended by the EVSE manufacturer.

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[137] Mayfield, David. "EV Charging for Persons with Disabilities." Version 1. Editor: Carlotta Collette. Sustainable Transportation Strategies, February 2012. Online. Available: http://www.sustainabletransportationstrategies.com/wp-content/uploads/2012/01/EV-Charging-ADA-Version-1.0.pdf. Accessed: August 2012.

[138] Lindley, Jeffrey A. "Interim Approval for Optional Use of an Alternative Electric Vehicle Charging General Service Symbol Sign (IA-13)." U.S. Department of Transportation, Federal Highway Administration: Memo to Federal Lands Highway Division Engineers, Division Administrators. April 2011. Online. Available: http://mutcd.fhwa.dot.gov/resources/interim_approval/ia13/index.htm. Accessed: August 2012.

Selecting Charging Equipment

A number of decisions must be made when selecting charging equipment – based on the charging level required, the type of location in which the EVSE will be installed, and an understanding of the users' driving patterns, preferences, and behaviors. This section details types of charging available today – including charging levels and various feature options that will be important to understand when reading through the remainder of this report's infrastructure section. The Equipment Selection Worksheet available in the Tools Section of this report (p. 134) can help site hosts select the equipment that suits their facility and users' needs, and the table in Appendix B-4: EVSE Manufacturers & Websites (p. 178) contains a list of a number of EVSE manufacturers.

Charging Levels

The categories of PEV charging available today are detailed in Table 4: Available Charging Levels (below). PEV owners (for fleet and residential applications) and site hosts (for workplace charging and public applications) should consider the characteristics of the site, their budget, and the expected usage patterns (mileage and parking duration) of the user(s) before deciding what level of charging is most applicable.

It is critical to match charging speed/charging level with expected mileage and parking duration of most users. Relatively low mileage, and/or long parking durations are suitable for AC Level-1 charging. AC Level-2 charging should be matched with shorter parking durations of one to four hours and/or longer mileage, and DC-Fast Charging belong with high expected mileage and very short parking durations. Given the higher installation cost and higher electric demand requirements and monthly costs of DC-Fast Charging, it is most cost-effective to select locations where there is a high volume of expected usage.

Table 4: Available Charging Levels

	AC Charging – Home and Public Use		DC Charging – Public and Large Fleet Use	
Type	Level 1	Level 2	Level 1	Level 2
Power	120V, 1.4 kW @ 12 amp 120V, 1.9 kW @ 16 amp	240V, up to 19.2 kW (80 amp)	200–500V, up to 40 kW (80 amp)	200–500V, up to 100 kW (200 amp)
Charge Time (Miles of range per hour charged)	3 to 5 miles	3.3 kW – 10 to 14 miles 6.6 kW – 20 to 25 miles 9.6 kW – 40 to 45 miles 19.2 kW – up to 60 miles	40 kW – up to 120 miles	100 kW – up to 300 miles

Source: SAE International. "SAE Charging Configurations and Ratings Terminology." Available. Online: www.sae.org/misc/pdfs/chargingtable10-3-2012.pdf. Accessed: October 2012.

AC Level-1 Charging

AC Level-1 EVSE can recharge the battery of an electric car within four to eight hours if it is driven less than 30 miles per day. Drivers plug their cars into a standard electrical outlet (NEMA 5-15R or 20R), using the portable Level-1 EVSE cord set that comes standard with the car.

Alternatively, site hosts can purchase and install hardwired AC Level-1 charging equipment that is permanently affixed to the building or post-mounted at the parking space. The AC Level-1 cord set uses a J1772 connector to plug into the vehicle – the same connector used for AC Level-2 charging. AC Level-1 charging is the least expensive and most available charging option, since 120-volt outlets are so readily available, and the portable/modular equipment comes standard with the vehicle. Since AC Level-1 charging requires more time to fully recharge batteries, it follows the typical driver pattern of parking and leaving the vehicle unattended for many hours, or overnight, sufficiently meeting most residential and workplace charging needs.

AC Level-2 Charging

AC Level-2 EVSE can recharge the batteries of most PEVs two to four times faster (or more) than AC Level-1. AC Level-2 charging is appropriate for BEV drivers who routinely surpass 40 daily miles or in certain public venues, where users are typically parked for relatively short durations – while shopping or dining.

> The financial viability of DC-Fast Charging will depend on selecting the right locations for high usage volume, and the willingness of PEV drivers to pay a premium.

Most AC Level-2 EVSE use the same J1772 connector as AC Level-1 charging equipment.[139] The equipment typically uses electrical circuits similar in capacity to those that run electric ovens and clothes dryers. However, some AC Level-2 charging equipment runs on circuits rated up to 80 amps, providing up to 60 miles of range per hour for vehicles rated to this level.

Depending upon the venue and typical mileage of users, a PEV could be parked at an AC Level-2 charging station for many more hours than is necessary to charge the battery. In fact, early PEV Project data indicates that users remained plugged in to AC Level-2 charging stations an average of seven hours a day, yet the cars averaged less than 2.5 hours actively charging.[140] This suboptimal use of infrastructure could be avoided by using AC Level-1 charging equipment in locations with long park times. Alternatively, fee-based policies or a valet service could encourage faster vehicle turnover at an AC Level-2 charging station.

SAE J1772 Combo Connector – SAE International

DC-Fast Charging Levels

DC-Fast Charging (DCFC) will be important for making PEVs a viable choice for the masses. DCFC can recharge PEVs in minutes, making inter-city trips possible and providing multi-unit dwelling residents an alternative to home charging in suburban areas. Most vehicles capable of DCFC today can refuel from 0 to 80 percent in 30 minutes or less. And it is likely these speeds will improve in the future as automakers and equipment manufacturers work together to improve the recharge speed of batteries.

Practical Applications – Because of the high installation and ongoing electrical demand charges, DCFC locations should be carefully selected based on an expected high volume of usage and not where cars are left for hours. Since cars will most likely charge for 10 to 30 minutes, users should stay near the vehicle and be ready to move it once it is adequately

[139] Tesla has adopted its own charging connector standard, and provides buyers with an adapter so they can use public charging stations with J1772 connectors. Most other automakers are using the SAE J1772 standard connector.

[140] The EV Project, ECOtality North America. "Q4 2011 Report: the EV Project." 2012. Online. Available: http://www.theevproject.com/downloads/documents/Q4%20INL%20EVP%20Report.pdf. Accessed: April 2012.

charged. Alternatively, this type of EVSE could be operated and managed by a valet service – such as at an airport or major attraction, where it is impractical for users to wait.

DCFC is a practical choice along major highway corridors, allowing BEVs to travel beyond their battery's range, and PHEV/EREV drivers to maximize their electric range to minimize gasoline use. DCFC can also be practical in major destination locations, such as sporting arenas or theme parks, in close proximity to services and shopping, or in major downtown areas with high concentrations of multi-unit dwellings.

Availability and Standards – DC-Fast Charging is just becoming available to PEV drivers in the U.S. In the near-term, it appears that two charging standards will be used: the Japanese automakers Nissan and Mitsubishi use the CHAdeMo connector on their BEVs; and the Society of Automotive Engineers (SAE) adopted a different standard in October 2012.[141] The newly adopted standard is a modification of the J1772 connector that will support both DC-Fast Charging and AC Level-1 and AC Level-2 charging. The new standard is known informally as the "dual connector" and will be used by most major U.S. and European automakers beginning in 2013. Site hosts considering installation of DCFC stations should install EVSE with both CHAdeMo and SAE J1772 connectors so that all fast-charge-capable PEVs will be able to use it.

The Effect on Load – Site operators should conduct an analysis on the site's average monthly electricity usage and peak-demand history over a year's time and consider the affect of DC Level-1 or DC Level-2 Fast Charging.[142] If the DC-Fast Charger is added to an existing account, the site operator should consider the maximum monthly bill impact of the added demand – assuming the EVSE is used at peak demand periods. Alternatively, the site operator could open a separate electrical account, with a new meter for the DCFC station to keep it separate from the facility's other electrical load. Another alternative is to install a battery buffer with the DC-Fast Charger, minimizing the total load pulled by the grid. For example, a site operator who wishes to offer PEV drivers a 50kW DC-Fast Charger, but who wants to lower her utility-demand charges, could use a battery buffer designed to draw 20 kW of electrical demand from the grid, with an output of 50 kW to the PEV.[143] While this adds to the overall equipment and installation costs, the monthly savings over time may be considerable for some sites, depending upon their electricity rate and site plan.

Understanding Costs – Table 5 below shows a scenario of the typical incremental costs associated with a number of DC-Fast Charging loads. Clearly, a high volume of usage brings the cost per charge down.

[141] SAE International. "SAE International Releases New Fast-Charging 'Combo' Coupler Standard (SAE J1772™) for Plug-In Electric and Electric Vehicles." Warrendale, Pennsylvania: October 15, 2012. Online press release (PRNewswire). Available: http://www.prnewswire.com/news-releases/sae-international-releases-new-fast-charging-combo-coupler-standard-sae-j1772-for-plug-in-electric-and-electric-vehicles-174183361.html. Accessed: October 2012.

[142] Demand is a term to describe how much electricity is used at any given moment. Demand is measured in kilowatts (kW), while the total amount of electricity used is measured in kilowatt-hours (kWh). Peak power for a given billing cycle is determined by calculating the average power in 30-minute consecutive periods by a demand meter.

[143] EV Collective. "Buffer Battery 50KW DC Fast Charger." Online. Available: www.evcollective.com/charger/BB50KW.html.

Table 5: Impact of DCFC on Utility Bill – Demand Charges

Example:	Incremental Cost at Different Monthly Volumes			
Rate: GSD 1 (21 499kW)		10 Charges	50 Charges	100 Charges
20 kW DCFC	Incremental monthly bill amount	$222.20	$254.99	$295.98
	Incremental cost per charge	**$22.22**	**$5.10**	**$2.96**
50 kW DCFC	Incremental monthly bill amount	$543.20	$575.99	$616.98
	Incremental cost per charge	**$54.32**	**$11.52**	**$6.17**
100 kW DCFC	Incremental monthly bill amount	$1,078.20	$1,110.99	$1,151.98
	Incremental cost per charge	**$107.82**	**$22.22**	**$11.52**
Assumptions: Each charge is 16 kWh; uses FPL rates in effect January 2013; does not take into account any additional costs incurred for an upgraded utility service (CIAC if applicable).				

In addition to predicting the impact of DCFC on recurring demand charges, it will also be necessary for site operators and their contractors to work with the utility to understand if the existing electrical service is capable of serving the load. Upgrades to the utility infrastructure can be expensive to the customer, depending upon the expected electrical usage over time, among other criteria.[144]

The Drive Electric Florida team recommends that the Florida Department of Transportation should continue exploring the potential for DCFC infrastructure along various arterials.

Equipment Features and Options

Modular EVSE can be securely fastened to the vehicle using a lock, which prevents unauthorized disconnection. Photo credit: Stuart Irwin, ClipperCreek, Inc.

EVSE comes with many features and options depending upon the needs and requirements of the site. Basic, lower-cost EVSE can be purchased for reliable "no-frills" PEV charging. Or, more specialized EVSE can be purchased to include a number of enhanced features – including various mounting options, aesthetics, and digital screens that can display advertising, payment systems and reservation features. The following are some equipment features and options to consider when selecting equipment. The Equipment Selection Fact Sheet (available in the Tools section of this report, p. 134) provides a useful worksheet to record selections. A list of some of today's available EVSE manufacturers is available in Appendix B-4: EVSE Manufacturers & Websites (p. 178).

Modular vs. Hardwired

AC Level-1 and Level-2 EVSE are available in both modular and permanently affixed configurations. Modular or portable charging equipment is plugged into an electrical outlet dedicated for that purpose. Permanent or hard-wired units are affixed to the home's or business's electrical system.

[144] Contribution in Aid of Construction (CIAC) – a nonrefundable charge for electric service where the utility service upgrade is not justified by projected revenues and/or non-standard service requested for the load served. To learn more: http://www.fpl.com/doingbusiness/builder/select_your_project/pdf/ess.pdf.

Most PEVs on the market today come equipped with a portable AC Level-1 EVSE. In addition, buyers can now purchase portable AC Level-2 EVSE.[145] Modular and portable systems may work well in residential settings, including multi-family units where residents supply their own charging equipment and plug into dedicated outlets provided by the condominium or apartment complex. Modular designs also work well in workplace charging settings, where the employer supplies AC 120-volt or 208/240-volt outlets for use by their employees. Users can attach a lock to their connector handle to prevent it from unauthorized use or theft.

A Level-2 Charging Station (dual unit) with a standard cord set, carelessly stored by a user. This can create a tripping hazard, or allow rainwater to enter the connector – prematurely aging the equipment.
Photo credit: Brian Hanrahan, Florida Power & Light Co.

Dual and Quad Units

The majority of EVSE sold today charges one vehicle at a time. However, a number of manufacturers are offering models that can connect two to four cars at once – and some have connections for both AC Level-1 and AC Level-2 charging. The equipment and installation of multi-unit systems can be cost-effective. While the power requirements and conduit still need to be sufficient for the maximum number of vehicles that can charge at a time, savings are achieved on the equipment, mounting, and installation costs. The configuration of the parking spaces is critical in determining if a dual or quad unit is appropriate.

Cord System

Most EVSE installed today have hooks or brackets where the unused cord can be stored. There are some drawbacks to this simple system, however, because it requires users to manually coil the hose. The cord tends to get dirty over time, and some drivers carelessly leave the cords and connectors hanging – causing early equipment failure and tripping hazards.

As a solution, some manufacturers offer EVSE with more advanced cord-management features – including retractable or suspended cords – and more options for enhanced usability and safety are on the horizon.

Network Communications – Smart Charging Equipment

Some EVSE offer advanced electrical metering that tracks power usage and communication network connections to transmit this power usage and other data. Users of networked EVSE can remotely check on the status of the charging station, determine where units are located, and even make reservations. Networked charging stations can perform user authorization, authentication, and accept payments.

Some networked EVSE can even communicate with utility smart grid networks and participate in pricing-signal or demand response programs; however, this feature is in its infancy and not yet available in Southeast Florida or most of the U.S. Smart/networked charging stations come with a higher upfront purchase price and often have recurring network fees. Operators would also need to ensure reliable internet or cellular connections at the site.

Smart and networked charging equipment features can include:

- Advanced, customizable displays.
- Charging status notifications.

[145] Portable AC Level-2 charging equipment is not yet common.

- Notifications/reports to site operators with aggregate and individual user data.
- Remote software upgrades.
- Two-way smart grid communications with utility – to participate in programs and rate options (if available).
- User reservation services.
- Fee collection and user authorization.
- Advertising display, electronic coupons and other marketing material.
- Customized charging station wrap with site host's logo and other branding.

Lighted Screens

Some EVSE offer lighted display screens, which is a good feature if adequate parking lot or garage lighting is unavailable. However, screens should also be easily readable in the Region's bright sunlight.

Circuit Reclosure

Some charging stations offer a reclosure circuit that restarts charging following a momentary interruption in power. This feature reduces the chance of leaving users unexpectedly stranded with low battery power.

In the following sections, you will see how these charging levels, features, and options might be applied in residential, workplace, or public applications.

Residential Charging – Including Multi-Unit Dwellings

Early PEV charging data indicates that 96 percent of recorded charging events and 97 percent of electricity is consumed at home.[146] Even as additional public and semi-public charging (i.e. workplace) stations become available in the future, it is very likely that home charging will continue to prevail as the preferred location for PEV owners. That is because charging at home – particularly in single-family homes or townhomes – offers convenience, and the benefit of low, stable residential electricity rates.

Multiple studies have shown that the majority of PEV drivers charge their cars in the evening and night hours – after they have spent their days commuting to various destinations. While drivers may encounter (and utilize) public charging during their daily travels, access to charging at home provides the most consistent and accessible charging point for their needs. In addition, cars tend to remain parked for long durations overnight, providing ample opportunity to fully recharge using AC Level-1 or AC Level-2 EVSE.

Selecting the Single-Family Residential Charging Types

PEV drivers should consider a number of different factors to determine whether they should use AC Level-1 charging at home, or if an upgrade to more costly AC Level-2 charging is warranted. Considerations include:

1. **The average number of miles driven each day and length of time typically parked at home.**

   AC Level-1 is adequate for long parking durations or lower daily mileage. Alternatively, short parking durations or higher daily miles indicates the need for AC Level-2 charging. Cars should be charging the majority of time they are plugged in to maximize investment in charging infrastructure.

   This principle is true regardless of whether the driver owns a BEV with a high electric range or a PHEV with a small electric range. That is because owners with access to residential charging tend to recharge

[146] The EV Project, ECOtality North America. "Q4 2011 Report: the EV Project."

their vehicles at least once daily – whether or not their battery is fully depleted. For example, a BEV owner who averages less than 40 miles each day, using only a small fraction of her vehicle's maximum range, will likely top off her battery daily – rather than waiting a few days until her battery is fully depleted. This can be accomplished using AC Level-1 charging overnight. On the other hand, a BEV owner who regularly uses the full range of her vehicle, perhaps commuting 80 miles or more per day, would need to upgrade to a faster AC Level-2 EVSE to ensure her vehicle is fully charged for the following day.

2. Access to workplace or public charging.

PEV owners should consider whether they have regular access to public or workplace charging. In the example outlined above, the BEV driver with a round trip 80-mile daily commute would need AC Level-2 EVSE at home. However, if workplace charging were available, AC Level-1 would now meet her needs at home, as her vehicle would be topped off at work. In this scenario, the driver should also evaluate the cost of charging at home versus the cost (if any) of charging at the workplace to determine the most cost-effective charging level for the home.

Another plausible scenario is a BEV driver who typically drives less than 40 miles per day and charges at home using AC Level-1. Occasionally, this driver makes long trips and fully depletes her battery. On these occasions, she can seek public DC-Fast Charging[147] to recharge, or simply lease a vehicle for occasional long trips – making routine use of AC Level-1 charging at home possible.

3. Cost and feasibility of home charging access.

If AC Level-1 charging is deemed sufficient to meet the daily needs of the PEV owner, there would be no out-of-pocket expense required for charging equipment and installation for many single-family home dwellers. That is because most PEVs are sold with a modular AC Level-1 cord set for use on a standard electric outlet.

One study concluded, however, that as many as half of new car buyers do not have access to an electrical connection within 25 feet of their home parking space – inclusive of those living in single-family and multi-unit dwellings.[148] So, even some single-family homeowners would need to invest in charging infrastructure – a NEMA 5-15R or NEMA 5-20R dedicated outlet near the parking space.

Those requiring the added speed and convenience of AC Level-2 charging would need to purchase AC Level-2 EVSE – which can range from $750 to more than $2,000, depending upon the brand and desired features and options. They would also require the services of an experienced, licensed electrician to perform the installation. Installation of the EVSE on a 240-volt circuit can range between $500 and $1,500 or more, depending upon the physical characteristics of the charging location, capacity in the panel, and distance to the charging station. Fortunately, the most common configurations of the electrical meter, electrical panel, and parking in single-family homes in Southeast Florida make EVSE installation less complicated and less costly than in some parts of the U.S. – at the lower end of the price range for many of the Region's residents.[149]

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[147] As of October 2012, there are no DC Fast Charging stations in Florida. Since the U.S. standard was adopted in late 2012, it is probable that DC Fast Chargers will be installed here in the future – such as along the Florida Turnpike and other key urban routes. Additional automakers (beyond Nissan and Mitsubishi) will likely begin adding DCFC ports on their vehicles, making it possible to use DCFC for most PEVs of the future.

[148] Axsen, John and Ken Kurani. "The Early U.S. Market for PHEVs: Anticipating Consumer Awareness, Recharge Potential, Design Priorities and Energy Impacts." Institute of Transportation Studies, University of California at Davis, 2008. Online. Available: http://pubs.its.ucdavis.edu/download_pdf.php?id=1191.

[149] The majority of Level-2 charging station installations done in single-family homes cost less than $1,350 for participants in a small residential charging pilot program conducted by Florida Power & Light Company in 2012.

The U.S. government currently has programs aiming to lower the cost and increase the features of EVSE.[150] These will certainly benefit PEV buyers of the future, potentially making AC Level-2 charging significantly more affordable, while offering additional features, such as smart grid integration, to make rate options and other utility programs more feasible. Until then, many PEV buyers will choose AC Level-1 charging at home to meet their daily driving needs, without requiring significant capital investment.

[150] Grants.gov. "Smart Grid Capable Electric Vehicle Supply Equipment." Grants notice, U.S. Department of Energy, June 3, 2011. Online. Available: http://www07.grants.gov/search/search.do?oppId=97833&mode=VIEW. Accessed: July 2011.

PEV Charging at Multi-Unit Dwellings

Southeast Florida has a high proportion of multi-unit dwellings, posing a hurdle to widespread access to home charging for many of the Region's residents.
Photo courtesy: Art Seitz

Access to electric vehicle charging in multi-unit dwellings, such as apartments and condominiums, is an obstacle to expanding widespread adoption of PEVs in large urban areas, due to the added challenges associated with charging station installations within these residential properties.[151] Public and workplace charging can provide an alternative solution for these residents, but access to home charging is preferable.

Approximately 41 percent of the Southeast Florida Region's occupied homes are multi-unit dwellings, which is a significantly higher percentage than the nation (23 percent). Certain counties within the Region, particularly Miami-Dade and Broward counties, have an even larger percentage – 48 and 44 percent, respectively.

In contrast to single-family home installations, multi-unit dwelling installations include more steps, more stakeholders, and more complex physical structures, with unique parking configurations.[152] According to experts, installations can take as long as six months or more from the point at which residents express their charging needs.[153]

In 2010, the City of Los Angeles adopted a Green Building Code, mandating that all new single-family and multifamily construction

Of 1,000 multi-unit dwelling residents surveyed across U.S. metropolitan areas:

- 55 percent have no assigned parking.
- 75 percent have no access to an electrical outlet while parked.
- 30 percent are governed by a homeowners' association.

(Survey conducted by Advanced Energy and Knowledge Networks, January, 2012)

[151] Plug-in America. "Lutz on Politicalization of the Chevy Volt." YouTube channel, 2012. Online. Available: http://www.youtube.com/user/pluginamerica?feature=mhum#p/u/0/79ShT3YUVVA. Accessed: October 2012.
[152] Dubin, Jeffrey; et al. (2011) "Realizing the Potential of the Los Angeles Electric Vehicle Market." UCLA Luskin Center for Innovation and the UCLA Anderson School of Management. May 2011.
[153] Presentation by Joel Pointon, SDG&E at Florida's EV Stakeholder Summit, October 11, 2011.

be equipped with the necessary electrical infrastructure and designated parking spaces to accommodate PEVs.[154] The Drive Electric Florida team recommends that similar legislation be adopted in Florida to help increase access to PEV charging in residential locations; however, it would only apply to new construction.[155] On average, there are about 11,500 multi-unit dwelling building permits issued annually in the Region – providing an opportunity to improve access to residential PEV charging over time. However, given the large number of existing multi-unit dwellings, residents need help understanding how to negotiate access to charging.

Charging Types for Multi-Unit Dwellings

Like other residential charging, AC Level-1 and AC Level-2 EVSE are practical. Because AC Level-2 charging draws two to four times more power as AC Level-1, and often requires expensive upgrades, many multi-unit dwellings will find AC Level-1 more feasible for residents.

A hybrid approach may be considered, where the bulk of charging is AC Level-1, with a few AC Level-2 charging stations available in unassigned, shared spaces for residents and visitors who need the quicker charge. Level-2 stations should have a higher, time-based fee attached to them to ensure they are used only when needed – helping accommodate multiple cars during the day and night.

Issues and Potential Solutions for EVSE Installation and Policy at Multi-Unit Dwellings

There are five common barriers to installation of PEV charging stations at multi-unit dwellings. Fortunately, each barrier has a number of possible solutions. Given the complexity of these EVSE installations, and the uniqueness of each situation, there is no single approach that would work in all cases.

1. Approval for installation from building management and/or homeowners' association (HOA).

There are potential points of conflict among building management, HOAs, and residents about the approval of charging stations – and associated policies – often making this a lengthy process. Landlords, building management, and HOAs are often deterred from approving EVSE installations and charging because of complicated installation and parking space allocations, details regarding responsibility for removing the equipment, and uncertainty around payment for electricity.[156]

Potential solutions:

- Set up an advisory committee of interested residents who will be involved in each decision.
- Reach out to experienced third parties for help along the way – for technical decisions, installation decisions, and negotiations. To arrange for support, start with an email to:
  - Electric-Vehicles@FPL.com.
  - Help@DriveElectricFlorida.org.
- Seek input from experts at other multi-unit dwellings who have successfully implemented PEV charging and related policies.

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[154] City of Los Angeles. "Ordinance No. 181480." For incorporation into 2010 California Green Building Standards Code. Online. Available: http://ladbs.org/LADBSWeb/LADBS_Forms/PlanCheck/2011LAAmendmentforGreenBuildingCode.pdf.

[155] More information on this topic is included in the Ensuring Supportive Codes, Policies, and Ordinances section of this report (p. 6-86).

[156] Balmin, Judith, et al. "Increasing Electric Vehicle Charging Access in Multi-Unit Dwellings in Los Angeles." UCLA Luskin Center for Innovation and the UCLA Anderson School of Public Affairs, July 2012. Online. Available: http://luskin.ucla.edu/sites/default/files/EV%20Charging%20in%20LA%20MUDs.pdf. Accessed: August 2012.

2. Determining the party responsible for equipment and installation costs.[157]

Costs can range from $2,000 for a low-cost multi-unit dwelling installation to $10,000 or more for buildings requiring significant work.[158] Common cost items can include the following:

- Charging equipment.
- Electrical assessment.
- Conduit.
- Installation.
- Permits.
- Panel upgrade.
- Trenching.
- Repair to landscaping, concrete.

Reportedly, the majority of early multi-unit dwelling installations nationwide have been funded by the interested residents, rather than HOAs or building management. That is largely because it is easier for the interested resident to handle the details directly than to wade through the challenging issues involved with getting approval from multiple parties. In addition, unit owners may be able recoup some of their initial capital costs when they sell their home. This, of course, does not benefit renters, who would leave behind their investment in a move.[159]

Alternatively, some believe that building management or HOAs should pay for access to PEV charging to accommodate the needs of current and future residents. The building could leverage economies of scale for a lower per-unit installation costs – particularly if creative solutions are required for the least costly installation (for example, upgrading common-area lighting to more energy-efficient lighting to make room in the electrical panel for EVSE installation – avoiding costly electrical upgrades).

Others may perceive it as unfair for the HOA fund to pay for the installation, equipment, and maintenance since the amenity would only be used by PEV drivers. However, other expensive building amenities, such as a gym or pool, only serve the residents who choose to use them.[160]

Potential solutions:

- The advisory committee should poll residents to gauge interest in current or future charging needs.
  - Widespread interest may help justify the HOA fund assuming the costs.
  - Low interest or considerable debate may indicate interested parties only should bear costs.
- A third alternative with limited or no out-of-pocket expense for either the HOA or residents is to engage a third-party electric vehicle service provider (EVSP). EVSPs pay for the installation of charging equipment in common-area parking spaces and then charge a per-use fee.

3. Determining appropriate payment system and processes for ongoing electricity consumption.

Once electrical outlets and/or EVSE have been installed and are accessible to PEV drivers, electricity usage and costs need to be accounted for and allocated to the users. Clearly the amount of electricity consumed will be different for each driver, based on a number of factors, including miles driven, vehicle efficiency, etc.

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[157] Residents, and building operators should also look into any added insurance costs/impacts the installation of charging equipment may or may not have.
[158] Peterson, David "Addressing Challenges to Electric Vehicle Charging in Multifamily Residential Buildings." UCLA Luskin Center for Innovation and the UCLA Anderson School of Public Affairs, June 2011. Online. Available: http://luskin.ucla.edu/sites/default/files/EV_Multifamily_Report_10_2011.pdf. Accessed: 2012.
[159] Peterson, David "Addressing Challenges to Electric Vehicle Charging in Multifamily Residential Buildings."
[160] Peterson, David "Addressing Challenges to Electric Vehicle Charging in Multifamily Residential Buildings."

Possible solutions:

Mini-meter installed on the back of a Level-2 charging station to record kWh usage. Photo courtesy: Charles Whalen

- Connect EVSE to residents' existing electricity service meter and bill residents directly. Multi-unit dwelling configuration often makes this option unavailable.
- Connect the EVSE to the building's common-area meter and devise a system to account for electric usage and repayment by the users. For example:
    - Measure usage and precisely bill each user, using:
        - Utility sub-meter, requiring added initial cost, plus ongoing utility metering fees.
        - Smart/networked EVSE, involving higher equipment cost, plus monthly fees.
        - Mini-meter on standard charging equipment, offering low additional equipment costs, but an ongoing administrative function to record and bill usage.
    - Apply a flat monthly access fee for PEV charging, similar to the way some waterfront multi-unit dwellings handle repayment of electricity use by resident boats owners. Rates can be applied depending upon the average monthly mileage driven, including an adjustment for routine workplace or public charging.[161]
        - Advantage: Informal agreements make the installation process easier, less time consuming, and often less costly since a networked or smart EVSE is not necessary. The costs can be included with rent or HOA dues.
        - Disadvantage: HOAs and building owners may not be fully compensated for common-use charging, and residents may fear being overcharged for their usage. Furthermore, a flat rate offers no incentive to conserve and benefits heavy users.[162]
    - An EVSP can provide the billing process used with the equipment it has provided. Smart charging equipment is connected to the common-area meter, and the cost to access the EVSE accurately reflects kilowatt-hour (kWh) usage. Multiple residents and guests can use the equipment and be billed separately, and the HOA is reimbursed for actual expenses.
        - Advantage: EVSE is owned and maintained by a third-party with incentive to attract and retain users with quality service – lessening the "red tape" of in-house systems.
        - Disadvantage: The third-party may overprice their service since they have the monopoly on the building (can be mitigated contractually). Buildings with only a few PEV drivers may be challenged in finding an EVSP willing to provide service.

4. Planning installations with the electricity capacity available.

Proper installation of EVSE requires that the outlets, conduits, circuit breakers, electrical panels, and electrical service have sufficient capacity – or upgrades will be required. To avoid costly upgrades, the electrician may suggest load calculations or load monitoring to prove that sufficient capacity exists.[163] Alternatively, lower cost installation plans could also be considered.

[161] For reference, an average Nissan Leaf owner who drives 1,000 miles in a month and charges exclusively at home would consume about 340 kWh of electricity. Depending upon the HOA's utility rate, this could cost approximately $34 per month.
[162] Peterson, David "Addressing Challenges to Electric Vehicle Charging in Multifamily Residential Buildings."
[163] Peterson, David "Addressing Challenges to Electric Vehicle Charging in Multifamily Residential Buildings."

Possible solutions:

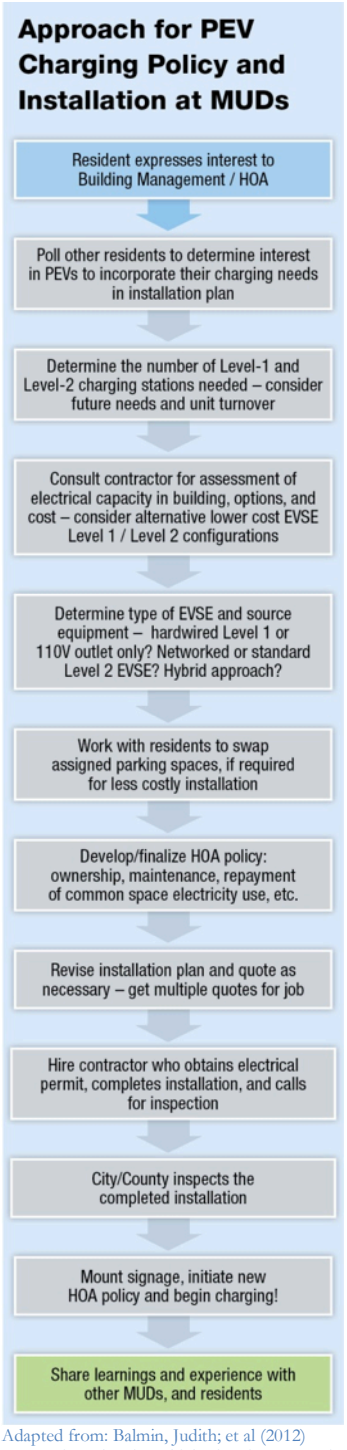
- Two to four times as many AC Level-1 charging outlets can be added for the same electrical capacity as one AC Level-2 charging station. Because cord sets come standard with PEVs, only an electrical outlet is required for AC Level-1 charging.
- Consider upgrading other electrical equipment to free electrical capacity for the EVSE. For example, inefficient lighting in common areas of older buildings could be upgraded to more efficient lighting products, freeing electrical capacity.
- Plan for future growth – it is often less expensive to account for charging needs and make the upgrades at one time, realizing economies of scale and reducing overall installation expenses.

5. Reassigning parking spaces for lower installation costs.

The least pricey installation is one where the parking space is in close proximity to an electrical panel with excess capacity. In contrast to single-family homes, multi-unit dwellings have large parking areas, which can mean parking spaces are hundreds of feet from the electrical panel. And while some multi-unit dwelling residents are fortunate to have electrical outlets already installed nearby, most do not.

Possible solutions:

- Parking spots can be reassigned to residents, with PEV parking located as close as possible to the electrical panel – if residents are willing to break often inflexible parking arrangements.
- PEV charging stations can be located in some of the multi-unit dwelling's shared parking spaces, since they are usually located closer to the structure – if zoning and other requirements permit.



Adapted from: Balmin, Judith; et al (2012) "Increasing Electric Vehicle charging Access in Multi-unit Dwellings in Los Angeles." UCLA Luskin Center for Innovation and the UCLA Anderson School of Management July 2012.

Conclusion

Because access to home charging is critical for widespread PEV adoption, it is important to help residents of multi-unit dwellings work with their HOA and building management teams to develop charging solutions. Communications strategies are included in the Creating Education & Outreach Opportunities section of this report (p. 6-116).

Given the challenges associated with charging at these dwellings, the Region's stakeholders are also working to identify locations for charging outside the home. These public-charging locations can serve as multi-unit dwelling residents' primary charging spots, in the absence of home charging. The following sections detail the various semi-public (workplace) and public charging locations, or residents could consider joining a PEV car-share program such as the one detailed in Volume II of this plan.

Semi-Public – Workplace Charging

The workplace is considered semi-public because, while it limits charging activities to employees, it does possess certain characteristics of public charging. Next to residential and fleet charging, workplace charging is an important location for infrastructure development. That is because the workplace often serves as one of the longer daily trip distances, and the cars are parked for considerable durations, allowing time for adequate charging at lower levels.

For those with limited electric range, PHEVs in particular, workplace charging can maximize the number of electric-only miles, which allows full realization of the myriad of benefits of electric transportation – including reduced commuting time from access to Florida's HOV lanes.[164] For employees who live in multi-unit dwellings and are unable to charge at home, workplace charging can serve as their primary charging location, allowing them to purchase a PEV when it might not have been practical otherwise.

How can workplace charging benefit my business?

- Enhances brand as socially and environmentally responsible.
- Provides valuable employee incentive.
- Differentiates the company or agency from its peers.
- Can earn LEED points for facility.

Companies that provide workplace charging can differentiate themselves from other employers – demonstrating a commitment to their employees, as well as support of national priorities and the environment. Plus, installation of EVSE may also help building owners attain "Leadership in Energy and Environmental Design" (LEED) certification points.[165]

PEV owners express strong interest in workplace charging, and many businesses and employers nationwide see the value of installing charging stations.[166] For example, Sony Pictures is even offering employees cash incentives for the purchase of PEVs through its "eco-incentives" program.[167]

Issues and Decisions for Implementation of a Workplace Charging Policy

In spite of the myriad of benefits of workplace charging for both the employee and the company, there are numerous issues to consider and decisions to make when implementing a workplace charging policy.

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[164] Florida High Occupancy Vehicle (HOV) Lane Exemption: Eligible vehicles have access to an HOV lane at any time, regardless of the number of passengers, and may also use any HOV lane designated as a HOV toll lane without paying the toll. The vehicle must display a Florida Division of Motor Vehicles issued decal, which is renewed annually. (Reference Florida Statutes 316.0741). Point of Contact: Florida Department of Highway Safety and Motor Vehicles, (850) 617-2000.

[165] A number of LEED points can be awarded if alternative fuel vehicle refueling stations are provided to a certain percentage of the employee population. Refer to https://new.usgbc.org/ for more information.

[166] Pike Research indicates that 74 percent of respondents indicate a strong interest in workplace charging. For more information: Pike Research. "Executive Summary: Electric Vehicle Consumer Survey. Consumer Attitudes, Preferences, and Price Sensitivity for Plug-in Electric Vehicle and EV Charging Stations." 4Q 2011. Online. Available: http://www.pikeresearch.com/wordpress/wp-content/uploads/2011/12/EVCS-11-Executive-Summary.pdf. Accessed: July 2012.

[167] Sony Pictures. "Employee Involvement." Sony Pictures, a Greener World. eco-incentive Program. Online. Available: http://www.sonypictures.com/green/act/employee-involvement/employee-involvement.php. Accessed: October 2012.

1. Determining a workplace charging approach at leased facilities.

In cases where the employer leases the facilities, implementation of a workplace charging policy and installation of charging stations can get complicated. In fact, many of the issues are similar to those faced by multi-unit dwelling residents – including coordination among numerous stakeholders, policy development for billing and payment, parking space allocation, and access issues. Refer to the section above on Multi-Unit Dwellings for additional information and suggestions for overcoming those common issues.

Additional potential solutions:

- Set up an advisory committee of interested parties who will be involved in each decision.
- If multiple tenants lease space in one facility, determine their level of interest and involve them in discussions.
- Consider partnering with a nearby public parking lot owner or a nearby business with adjacent parking to develop a cooperative PEV charging program for employees.

2. Determining whether employees should pay for workplace charging.

While many employers have opted to provide free charging for their employees, others have weighed the advantages and risks and opted to charge employees a nominal fee for charging access. This practice avoids potential issues with non-PEV-driving employees and the Internal Revenue Service (IRS).

Advantages of offering free employee charging:

- Helps promote adoption of PEVs.
- Benefits employees.
- Helps differentiate a company from its peers.
- Permits use of lower-technology and lower-feature charging equipment, which reduces costs.
- Allows a more simplified employee charging policy and reduces administrative time and expense.

Risks of offering free employee charging:

- Unclear how the IRS will ultimately treat free charging.[168]
- May create dissatisfaction among other employees, who are not compensated for gasoline costs.

Process adapted from: Plug-In Electric Collaborative. "Workplace Charging: Why and How?" Online. Available: http://www.pevcollaborative.org/sites/all/themes/pev/files/Comm_guide7_122308.pdf. Accessed: October 2012.

[168] See Appendix B-5: IRS Treatment of Workplace Charging (p. 179).

- If PEV adoption grows rapidly, the company may not be able to maintain the free charging policy – which could be perceived as a "take away" by legacy users.
- Provides no means for a company to recoup initial investments or ongoing costs.
- No access controls limiting charging only to employees.
- Employees may choose to charge only at work since it is free, which should not be encouraged.

3. Determining how employees should pay for charging access (if applicable).

Some businesses may want users to pay for charging services to cover all or a portion of initial and ongoing expenses – and to avoid some of the risks associated with free charging.

Potential solutions:

- Charge a flat monthly subscription fee, and provide an authorization sticker for the vehicle.
  - This does not require "smart" charging equipment.
  - Charging access should be periodically patrolled unless access-controlled charging equipment is used.
  - This does not account for exact monthly usage, rather it is a rough estimate applied to all users.
- Bill for exact usage with smart charging equipment.
  - Fairly allocates costs to users.
  - Requires more expensive smart charging equipment, which may also have recurring network fees.
- Engage a third-party electric vehicle service provider (EVSP) – potentially avoiding out-of-pocket expenses for the employer. The EVSP would pay for the installation and maintenance of charging equipment and then charge employees a fee.

4. Determining the appropriate charging levels at the workplace.

There is no single approach that makes sense for every workplace. However, a prudent principle is to consider how long cars are typically parked and how depleted batteries will be upon arrival and then select the lowest charging type needed to satisfy employees' needs. Some businesses also need to consider the impact of PEV charging on utility demand (kW) or time-of-use (TOU) charges, if applicable.

Possible solutions:

- Install AC Level-1 charging as a cost-effective and practical approach to meet the needs of most employees. Many employees are parked for long durations, with reasonable commute lengths. PEVs gain from three to five miles of range per hour of charge – or about 25 to 40 miles per workday.
  - Make 120-volt outlets accessible to designated parking spaces. Employees could then use the AC Level-1 cord set that comes with their vehicle.
  - Install permanent hardwired Level-1 charging stations so employees do not need to use their vehicles' portable cord set. This option adds cost, but provides considerable convenience to employees and lessens the potential issue of theft, vandalism, or excessive wear on cord sets.
  - Install AC Level-1 charging stations at a 1:1 ratio – one electrical outlet or AC Level-1 EVSE to every one PEV, as PEVs will likely be parked and charging all day long.
- Install AC Level-2 EVSE for employees and visitors who commute extensive distances or only stay for short durations. A single AC Level-2 charging station may serve multiple vehicles each day.

- Policies should be implemented to ensure cars are moved when fully charged. Unless a valet service is offered, employees would need to leave their desks to move their vehicle.
- This approach may hamper productivity and create potential conflict among employees who do not have adequate access to charging or notifications when charging is available.

- Consider a hybrid approach using both AC Level-1 and AC Level-2 charging for a facility with employees and visitors with varying needs – with the majority of charging access AC Level-1.

5. Determining the appropriate equipment features at the workplace.

EVSE are available with many features and options. Before selecting the appropriate equipment, employers need to determine their installation plan, priorities, and employee policy – including whether or not they will restrict access, require payment, or implement other regulations. Based on those decisions, employers can select the equipment that best helps them meet their objectives. The Equipment Selection section of this report includes additional detail about the various features and options available for charging equipment. Also see, Tools & Resources A-1: Equipment Selection Worksheet (p. 134).

Possible solutions:

- Select low-feature/low-cost equipment.
  - 120-volt outlet.
  - Minimal-feature AC Level-1 and AC Level-2 EVSE.
  - Low-technology equipment can be added, such as keypads to restrict access or accept payment.
- Select smart EVSE, which is often more costly with recurring network fees.[169] Refer back to the Selecting Charging Equipment section of the report (p. 6-60) for options in smart charging, including the ability to notify employees of completed charging status or to speak directly to the facility's energy-management system.

It is also important to keep in mind that workplace charging infrastructure can go hand-in-hand with the onset of PEV fleet adoption; employees can charge their personal vehicles during the day, while fleet vehicles can access vacant EVSE stations to "refuel" at night.

6. Planning installations with the electrical capacity available.

Proper installation of EVSE requires that the outlets, conduits, circuit breakers, electrical panels, and electrical service have sufficient capacity. If the inspector doubts that the system has sufficient capacity, some components may need to be upgraded.[170] Furthermore, alternative installation plans should be considered; while some install scenarios are prohibitively expensive, there are less costly alternatives.

Possible solutions:

- Rely on AC Level-1 charging for the majority of employees' charging needs.
- If extensive electrical upgrades are required due to panel capacity constraints, consider upgrading other electrical equipment to free capacity for the EVSE. For example, inefficient lighting could be upgraded, potentially freeing panel capacity for EVSE. This creative approach can help the facility realize its energy efficiency goals – and offset some PEV electricity consumption.

[169] If networked charging stations are selected, employers should ensure that reliable Wi-Fi or cellular coverage is available in the desired parking location.
[170] Peterson, David. "Addressing Challenges to Electric Vehicle Charging in Multifamily Residential Buildings."

- Plan for future growth – it is often less expensive to account for future needs at one time, realizing economies of scale to reduce installation expenses – especially when trenching is required.

Public Charging

The majority of PEV charging happens at home overnight, offering drivers convenience and predictably low, stable electric rates.[171] However, residential charging alone is not enough. Some strategically-placed public charging options can contribute to the long-term commercial success of PEVs. It can:

- Increase the visibility of PEVs among the general public.
- Allow drivers of PHEVs and EREVs to maximize the number of electric-only miles, reducing gasoline consumption.
- Allow BEV drivers to travel beyond their standard range.
- Provide a primary charging location for multi-unit dwelling residents who may be unable to charge at home or at work.

Public charging locations include: major destinations and attractions, major transportation corridors and intercity routes, public lots and garages, and local retail establishments. A list of public charging in the Region is available in Appendix B-2: Public Charging (p. 172).

Some public locations are more critical than others in terms of where they are most needed to extend the range and usability of plug-in vehicles. Others merely serve as "opportunity" charging locations for users to "top off."

Hosts at these locations should consider a number of factors covered in other sections of the report – especially the Quantity and Concentration of Charging Infrastructure section. Other key considerations for public charging are described below.

Destination Venues and Major Attractions

Characteristics – Destination venues are places that tend to attract visitors from near and far due to the unique characteristics of the venue – with few nearby competitors. Examples include:

- Major sporting/concert arenas.
- Casinos.
- Commuter universities.
- Hotels/convention centers.
- Museums.
- Downtown areas, shopping and dining districts.
- Regional airports.
- Major parks and recreation sites.
- Cruise ship terminals.
- Major public beaches.
- Specialty or outlet malls.

Public Charging: Benefits to the Host

Customer Attraction, Retention

Customers with a PEV say they are more likely to shop/dine – and linger longer and spend more – at an establishment that offers them free or low-cost charging.

Employee Attraction, Retention

Workplace charging differentiates an employer from others, and may attract and retain employees who value the benefits of commuting in a PEV and charging while at work.

Added Revenue from Fees

Certain sites are ideal for fee-based PEV charging, providing hosts with revenue growth opportunities, from subscription-based, pay-per charge, or pay-for-parking policies.

Corporate Branding

Hosting a charging station is a highly visible way of demonstrating commitment to the environment, support of U.S. energy independence, and providing a valuable service to visitors and residents.

Advertising Opportunities

Some charging stations offer digital screens that can display advertising messages, electronic coupons, or other marketing materials. Ad space can also be sold to other companies.

Contribution to LEED

Installation of charging stations may contribute to a facility earning LEED points and certification.

[171] 96 percent of recorded charging events and 97 percent of electricity consumed by PEVs happen at home. From: The EV Project, ECOtality North America. "Q4 2011 Report: the EV Project."

Importance – High – While a portion of visitors likely live near the destination and do not necessarily need to charge their cars, a larger portion will have to drive considerable distances and will require charging access to return home – especially BEV drivers. Without it, they would need to find alternative transportation to and from the site, which limits the usability of their vehicles.

Charging Levels – Varied – Destination charging hosts have a number of users to consider in their site plans. Different charging levels meet the needs of different drivers and site characteristics.

AC Level-1:

Suitability:

- Employees (workplace charging).
- Overnight guests (hotels).
- Long-term parking (airports, cruise ports).

AC Level-2:

Suitability:

- Short-term parking (airports).
- Visits lasting 2-6 hours (shopping, dining, events, meetings, recreation, etc.).

DC-Fast Charging:

Suitability:

- Only if managed by a valet service. Otherwise, it is impractical for drivers to wait or return to move their vehicle at most destination locations.

Payment Models – Fee-based – A fee-based model generally makes sense at destination locations as a means of controlling usage and helping to ensure adequate charging infrastructure is available for those who need it most. For example, if a regional specialty mall offered free AC Level-2 charging for visitors, it is likely that even visitors who live nearby would use it as a primary charging source (or even nearby multi-unit dwelling residents). This causes a potential shortage of charging stations. Fewer charging stations can be installed if there is a means of controlling usage and encouraging vehicle turnover.

In locations using AC Level-1 charging for long-term parking – such as airports and hotels – fees can be covered by existing parking charges and processes.

Ownership models – Self-funded or by EVSP – Destination charging hosts may opt to pay for the equipment, installation, and maintenance themselves. Or, they can enlist the services of an EVSP to manage all facets of PEV charging at the site, sharing a portion of the revenue.

A public AC Level-2 EV charging station at the Fontainebleau Miami Beach. Photo courtesy: Car Charging Group, Inc./Fontainebleau Miami Beach/Moris Moreno 2012

Along Major Arteries and Corridors

Characteristics – Charging along major routes and corridors serves the needs of commuters, vacationers, and other people driving longer-than-average distances outside the electric range of their vehicles, including:

- Highway/Turnpike rest areas.
- Truck stops.
- Restaurants, in close proximity to highway exits.

Importance – High – Provides charging access to travelers going outside their vehicle's range. For BEV owners, access to route/corridor charging can make travel between metropolitan areas feasible, while PHEV drivers can maximize their electric miles.

Charging Levels – Primarily faster charging – Most travelers stop at rest stops to eat, use the restrooms, and refuel – not to linger. DC-Fast Charging is optimal, although AC Level-2 can serve drivers wishing to top off at sites with sit-down restaurants.

Truck Stop Electrification:

- Single or dual systems to enable trucks to run off of the electric grid while drivers rest.

AC Level-1:

Suitability:

- Employees (workplace charging).

AC Level-2:

Suitability:

- Can top off PHEVs and EREVs.

DC-Fast Charging:

Suitability:

- Most practical. Can recharge a PEV in the time it takes a driver to use the restroom and grab a bite to eat.
- Most PEVs in the near future will likely be capable of accepting a fast charge – even PHEVs.

Payment Models – Varied –

- Fee: A fee-based model generally makes sense at highway rest areas since they tend to be owned and managed by government entities and cost-recovery is a consideration.
- Free: Private restaurants or shops in close proximity to highway exits may choose to offer free charging to attract patrons – however, highway signage would be critical to alert travelers of the availability.

Ownership models – Varied – The cost of charging station equipment and installation at major service centers could potentially be paid for from some existing federal and state transportation grants and funding mechanisms. Otherwise, sites can enlist the services of an EVSP to manage all facets of PEV charging at the site, sharing a portion of the revenue. Or operators can opt to self-fund charging station installation – particularly in the case of off-highway restaurants using PEV charging as a means of attracting customers.

Public/Government-Owned Locations

Characteristics – Government locations can fit the characteristics of other charging locations, and therefore, have similar needs. Operators should look at the site characteristics and determine whether they're most like a destination location, major artery/corridor, or seem to serve a more local population, similar to retail. Examples include:

- Downtown areas, shopping and dining districts.
- City/county parking garages, lots.
- Public libraries.
- Mass transit parking facilities.
- Airports and seaports.
- Park-and-ride lots.
- Major parks and recreation sites.
- Major public beaches.
- Commuter universities.
- Courthouse/government buildings.
- Convention centers.

Importance – Moderate/Varied – Site operators need to consider the characteristics of the majority of visitors to determine the criticality of offering public charging. Depending upon the location and the size of the region served, some users may live nearby and not necessarily need PEV charging access. Others may

drive some distance and need charging. County and city employees may also be served by charging on public property near their workplace.

Charging Levels – Varied – Hosts have a number of users to consider in their site plans, depending upon the characteristics of the location.

AC Level-1:

Suitability:

- Employees (workplace charging).
- Long-term parking (city lots/garages, mass transit lots).
- Airports/seaports.

AC Level-2:

Suitability:

- Short-term parking.
- Visits lasting 2-6 hours (downtown areas, beach, recreation areas, etc.).

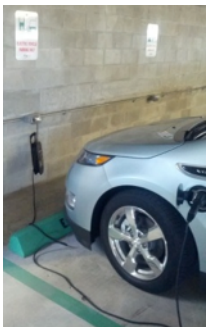
DC-Fast Charging:

Suitability:

- Areas with a high density of nearby high-rise multi-family units.
- Major urban areas with significant number of nearby destinations where there is a demand for public charging.
- Service plazas and rest areas along major roadways.

Payment Models – Fee-based – Although governments install charging stations to benefit their citizens rather than to earn profits, charging fees is a way to offset the cost of the charging station and ensure the costs are fairly allocated to those using the EVSE.

Ownership models – Varied – Government charging station sites tend to be self-owned and operated; however, enlisting the services of an EVSP to manage all facets of PEV charging at the site is an option. Government-operated charging locations may also be paid for using public dollars, grants, and other standard funding sources.



A PEV charging in a public garage using portable Level-1 EVSE on 120-volt outlets.
Photo credit: Miami-Dade County.

Retail/Local Locations

Characteristics – Retail, shopping, dining, and similar locations tend to serve local customers, who do not necessarily *need* to charge their vehicle to return home. Local retail charging is typically considered "opportunity" charging where users take advantage of the chance to simply top off their batteries.[172] The exception to this is in areas where there is a high density of multi-unit dwelling residents who may rely on public or workplace charging. Examples of local/retail charging locations include:

- Big box stores/local malls.
- Grocery stores.
- Local libraries.
- Movie theaters.
- Churches/community centers.
- Restaurants/coffee shops.
- Strip malls.
- Drug stores.
- Hardware/home stores.

[172] Charging at local/retail locations is typically offered free to attract customers to the establishment. Many drivers will avoid paying for charging at local/retail because it is nearby their home, where they likely have access to charging – with predictably low electricity rates.

Importance – Low – Since most users drive few miles to these locations, charging is not essential. However, charging at busy retail locations is very visible. This can lead to broadening PEV awareness among the public. It also helps sooth "range anxiety" by making public charging visible and accessible.

Charging Levels – Varied – Hosts have a number of users to consider in their site plans, depending upon the characteristics of the location.

AC Level-1:

Suitability:

- Not practical.

AC Level-2:

Suitability:

- Visits lasting 1-3 hours.

DC-Fast Charging

Suitability:

- Areas with a high density of nearby multi-family units.
- Major urban areas with many nearby destinations creating demand for public PEV charging.

Payment Models – Varied –

- Free: Local retail and restaurant locations can reap many benefits discussed earlier in this section, including customer attraction and retention, branding, and image-building – making the charging station a marketing expense.[173] This is primarily true at sites where users live locally and have access to home charging – after all, these drivers have no reason to pay for public charging when they can charge at home for less.
- Fee: In some cases, it makes sense for a local retail establishment to charge a fee. An example is a grocery store located in an area with a high density of multi-unit dwellings, whose residents use the charging station on a routine basis. Another fee-based local retail model is at any establishment offering DC-Fast Charging. This business case only works in areas with a high expected need for it.[174]

Ownership models – Self-funded or by EVSP – Retail charging sites are typically self-owned and operated, or they can enlist the services of an EVSP.

Payment Models/Establishing Fees

Payment models vary – as indicated above. For some, the charging stations are meant to attract and retain customers, and therefore, the initial and ongoing costs are seen as marketing expenses and gladly absorbed. These business owners recognize that early PEV drivers are a highly sought-after demographic with higher disposable incomes and other desirable characteristics.[175] Other site hosts impose a fee for charging to recoup their initial investment and ongoing costs, and/or to help manage charging station usage and encourage vehicle turnover. This is especially important in locations with long parking durations but short charging durations – resulting in cars sitting at charging stations for considerably longer than required for charging. If the charging station has a time-based fee attached to it (rather than by kWh usage alone), drivers will most likely move the car when fully charged or pay for the service for the entire time parked.

[173] View Appendix B-6: Profile of Early PEV and HEV Drivers (p. 180) to see the profile of an early PEV buyer. Many business owners view a PEV driver as an ideal demographic to attract to their establishment, and see EVSE as a means of drawing and retaining these buyers.
[174] See the "selecting charging levels" section for more information about DC-Fast Charging and its effects on a site host's electricity demand charges. A high volume of charging events lowers cost per vehicle charged.
[175] View Appendix B-6: Profile of Early PEV and HEV Drivers (p. 180).

Some preliminary work has been done elsewhere in the nation on price sensitivity of charging at various locations and various scenarios. However, additional research needs to be done before there is a definitive guideline on the amount PEV drivers are willing to pay at public AC Level-1, AC Level-2, and DC-Fast Charging stations. Much will depend on whether or not the charge is critical for their driving purpose (such as driving between two metropolitan areas in a BEV), versus simply topping off near their primary charging location.

In addition, site operators need to consider the fact that the majority of PEVs on the road today – and for some time in the future – are PHEVs and EREVs, not BEVs.[176] That means that the bulk of PEV owners will have the choice to plug in to maximize their electric miles or to drive home on gasoline when their electric range is spent. Therefore, a good rule of thumb is to keep the cost of public charging on par with or considerably less than the equivalent cost of gasoline. If the cost of a charging station is too high, many PEV drivers will opt to skip it and rely on gasoline until they can find a less costly public station or reach their home charging station. Plus, the fuel efficiency of today's PHEVs/EREVs is considerably better than the average internal combustion engine vehicle, making the choice to drive home on gasoline a financial win when the cost of charging is too high.[177]

The table below details a gasoline-equivalent hourly price at various charging levels, along with the expected hourly electricity cost. Charging station hosts and EVSPs should aim to keep hourly charging and connection fees (or 15-minute increment fees) at or below the gasoline-equivalent price, if possible, in order to maximize the number of PEV drivers willing to use it.

Of course, the viability of the business case for each site host will vary depending upon their objectives, needs, and the cost of equipment and installation – along with the price PEV drivers are willing to pay.

Table 6: Guidelines for Selecting Charging Fees Based on Price of Gas

	AC Level-1	AC Level-2 @ 3.3 kW	AC Level-2 @ 6.6 kW
Miles gained per hour of charging a PEV	3 to 5 miles	10 to 14 miles	20 to 25 miles
Gasoline Equivalent* per Hour of Charge	$0.43	$1.29	$2.36
Cost of Electricity** per Hour of Charge	$0.17	$0.30	$0.59
Fee Target:	Less than $0.43 per hour or $0.11 per 15 minutes	Less than $1.29 per hour or $0.32 per 15 minutes	Less than $2.36 per hour or $0.59 per 15 minutes

*Assumes gasoline price of $3.75 per gallon and 35 miles per gallon fuel efficiency for a PHEV or EREV running on gasoline
**Assumes electricity rate of $0.09 per kilowatt-hour, with no impact to demand charges

[176] Today, approximately 75 percent of the PEV market is EREV/PHEVs. BEVs are expected to gain some market share over the next decade. More information on the Region's forecast can be found Appendix B-7: PEV and Charging Infrastructure Forecast (p. 182).
[177] Granted, many early EREV drivers have reported feeling "gas anxiety" and choose to charge their vehicles whenever possible to maximize their electric miles and realize the full environmental and societal benefits of electric transportation.

Quantity and Concentration of Charging Infrastructure

As of yet, there is no definitive formula for estimating the number and concentration of public charging stations needed in the U.S. or within each region.[178] However, what is clear is that there should be adequate placement in the *right* locations, where they are needed most. Getting a number of strategically placed charging stations installed is arguably more important than getting vast numbers of stations installed everywhere.[179]

Some industry insiders say that very little public infrastructure is needed once PEV drivers become comfortable with the technology and their usage habits, while others suggest that a lot of public infrastructure will be required. Given the cost and uncertainty still involved during these early years, it is suggested that the Southeast Florida Region prudently install public charging infrastructure in higher priority locations, while continuing to monitor the progression of the industry. This provides an opportunity to grow and adapt to residents' needs over time, without expending resources before market needs are fully understood.

The highest priority locations include fleet and residential (including at multi-unit dwellings), workplaces, major destination locations, and along major intercity routes and corridors. Focusing efforts in these critical areas should give adequate coverage for PEV charging in the Region for some time.

A public charging plan should be somewhat flexible to adapt to market needs. In other words, a slow adoptive rollout of infrastructure that is based on changing market conditions is more prudent than an aggressive build-out all at once.

Figure 13: Charging Infrastructure Priorities

[178] See Appendix B-7: PEV and Charging Infrastructure Forecast (p. 182). This provides a projection of PEVs and charging stations in the Southeast Florida Region. Note: the charging station projection is highly speculative and based upon a number of assumptions, which are likely to radically change as the market is better understood and evolves.

[179] Data from the EV Project (www.theevproject.com) shows relatively little usage of public charging stations to date – with an average station usage of once every three days. This will continue to evolve.

Table 7: Public Charging Summary

Priority	Location	Charging Level		Equipment Type	Payment Models	Installation Funding Sources
High	Workplace Charging	Level-1:	For employees and visitors parked for a full-shift or day	120V electric outlet only or hard-wired Level-1 charging station	· Free – employee benefit · Small fee – flat monthly access	· Employer / owner · Landlord / owner
		Level-2:	For employees and visitors parked short durations or with high mileage	Smart charging station or basic one with parking meter	Fee – usage and/or time	· Employer / owner · Landlord / owner · Third-party EVSP
	Destination Venues, Major Attractions	Level-1:	For venue employees or visitors parked all day, overnight, or longer	120V electric outlet only or hard-wired Level-1 charging station	Free or small fee	· Employer / owner · Landlord / owner
		Level-2:	For short parking durations or high mileage	Smart charging station or basic one with parking meter	Fee – usage and/or time	· Employer / owner · Landlord /owner · Third-party EVSP
		DC-Fast Charging	Where there are high volumes of users – managed by a valet service	Smart charging station or basic one with valet service	Fee – usage and time	· Employer · Landlord / owner
	Major Arteries, Corridors, Routes	Level-1:	Less practical, except for employees	120V electric outlet only or hardwired Level-1 charging station	· Free – Employee benefit · Small fee – flat monthly access	· Landlord / owner · Business owner · Third-party EVSP · Public funding sources, grants, transportation funding
		Level-2:	Practical for PHEV users wanting to extend battery range	Smart charging station or basic one with parking meter	· Free – at restaurants near highway looking to attract diners · Fee – usage and/or time	
		DCFC:	Most practical; users can charge in time it takes to grab a snack	Smart charging station or standard with valet service	Fee – usage and time	
Varied	State, County, or City-Owned Government Locations	Level-1:	For employees or visitors who will be parked for full day	120V electric outlet only or hardwired Level-1 charging station	Low Fee: Parking meter or included in existing parking rate	· Public funding sources, grants, transportation funding, etc. · Third-party EVSP
		Level-2:	For short parking durations or high mileage	Smart charging station or basic one with parking meter	Fee – usage and/or time	
		DCFC:	Not practical, except in locations with high multi-unit dwelling density, or high-volume of users	Smart charging station or standard with valet service	Fee – usage and time	
Lower	Local Retail Opportunity Charging	Level-2:	For patrons who tend to stay for up to three hours	Smart charging station or basic one with parking meter	· Free – to attract customers · Small fee – if local residents use the lot	· Business owner · Landlord · Third-party EVSP
		DCFC:	Only practical in locations with high density of multi-unit residential dwellings and areas with high expected usage	Smart charging station or standard with valet service	Fee – usage and time	· Business owner · Third-party EVSP

Ensuring Supportive Codes, Policies, and Ordinances

The rate of electric vehicle adoption in Florida and its southeastern Region can be aided or impeded by the ease with which individuals, as well as the public and private sector, can install charging infrastructure. The provision of adequate infrastructure to reduce range anxiety and the ability of individuals to obtain necessary approvals for the installation of charging equipment will have a bearing on the demand for and adoption of PEVs.[180]

The permitting and approval of charging infrastructure is guided by laws, regulations, codes, and ordinances at the federal, state, and local levels. These include federal energy policy and signage legislation; National Electrical Code; Florida Building Code; Florida Accessibility Code; and local planning, zoning, and permitting requirements. The provision of charging infrastructure also can also be affected by state and local incentives.

As noted previously, states and local governments around the country have recognized the importance of consistent guidelines and information for consumers and service providers regarding electric vehicle infrastructure (or EVSE) incentives and regulations. This has lead to the development of policies and procedures that promote – rather than impede – the deployment of charging infrastructure.

The review and assessment of the efforts undertaken by states, counties, and cities around the country were applied to an analysis of the laws and regulations guiding the permitting and siting of EVSE in the State of Florida, and specifically the Region of Southeast Florida. The issues identified during this process can be grouped into categories; however, they are not mutually exclusive. The categories are:

1. Comprehensive planning.
2. Zoning – including parking, signage, and accessibility.
3. Permitting.
4. Electric and building codes.

Going forward, based on the recommendations below, uniform policy requests should be crafted for local, state, and federal government policy packages.

Comprehensive Planning

Planning in Florida

The State of Florida employs a "top-down" integrated planning and growth management system that establishes policy direction at the state government level to be implemented at the regional and local levels through a vertical-consistency requirement, comprehensive planning structure. Chapter 187, Florida Statutes (FS), codifies the state comprehensive plan. Florida's 11 regional planning councils must adopt Strategic Regional Policy Plans (SRPP) consistent with state comprehensive plan. County and municipal local governments adopt their comprehensive plans based on the requirements of Chapter 163, FS, that are consistent with the SRPP governing their jurisdiction and consistent with the state comprehensive plan.

The local government comprehensive plans provide a policy basis for local land-use controls, such as subdivision regulations and zoning that address all development. All development must meet the

[180] Roland Berger Strategy Consultants and Rocky Mountain Institute. "PEV Readiness Study." Troy, Michigan, 2010. Online. Available: http://www.rmi.org/Content/Files/Electric%20Vehicles%20in%20America.pdf.

requirements of the land-development controls or regulations and, by definition, be consistent with the local comprehensive plan.

Lack of Consistent Standards and Guidelines Across the State: The lack of consistent standards and guidelines in Florida's counties and municipalities could adversely affect consumer demand for PEVs. Florida has 67 counties and 410 municipalities that are authorized to set community-specific standards that can affect the approval of charging infrastructure.

Currently, a lack of consistency across the state for regulations and zoning codes with respect to EVSE infrastructure deployment means that infrastructure approvals could happen on a case-by-case or community-by-community basis, lengthening the approval process – and creating additional hurdles for PEV adoption. Consistent, state-wide land-use policies adopted in states like Washington could be used as an example for the State of Florida when considering amendments to its Community Planning Act, which regulates land development and zoning. Additionally, when it comes to zoning, states like Oregon and California could serve as examples for the Southeast Florida Region, which currently has no EVSE-specific zoning codes – a factor that hampers charging infrastructure deployment.

Efforts by Other State Governments to Enhance Consistency: The issue of consistency among regulations, streamlining processes, and educating citizens and contractors are among the various steps that have been taken by states, regions, and local governments as well as public-private partnerships. In 2009, Washington State passed House Bill 1481, which preempted local government regulation of electric vehicle infrastructure and directed local governments in counties with populations greater than 500,000 to:

- Require all proposed new commercial and multifamily development with adjacent on-street parking install appropriate circuitry to support electric vehicle infrastructure in all adjacent spots and active charge spots in 10 percent of adjacent parking spaces that are directly related to the vehicular transportation needs generated by the proposed development;
- Require as a condition of development that all additions to commercial and multifamily development above 4,000 square feet with adjacent on-street parking install appropriate circuitry to support electric vehicle infrastructure in all adjacent spots and active charge spots in ten percent of adjacent parking spaces that are directly related to the vehicular transportation needs generated by the proposed development; and
- Allow battery recharging stations as a permitted use and battery exchange stations as a permitted use in all mixed-use and nonresidential zones.[181]

In addition, the Washington State Land Planning Agency was required to develop model land-development regulations, ordinances, and siting guidelines that could be used by local governments.[182] It should be noted that Washington, like Florida, is considered one of the "growth-management" states, with requirements that all cities and counties adopt and implement comprehensive plans that meet standards established by the respective legislatures.[183]

Recommendation for the State of Florida: Given Florida's "top-down" planning and growth-management system, it's important that the state takes a leadership role and incorporates specific PEV and EVSE policies into the state comprehensive plan. The state comprehensive plan can elevate the importance of PEV

[181] State of Washington. House Bill 1481. 2009. Online. Available: http://apps.leg.wa.gov/documents/billdocs/2009-10/Pdf/Bills/House%20Bills/1481.pdf.
[182] Roland Berger Strategy Consultants and Rocky Mountain Institute. "PEV Readiness Study." Troy, Michigan, 2010. Online. Available: http://www.rmi.org/Content/Files/Electric%20Vehicles%20in%20America.pdf.
[183] Virginia Preservation. "State Growth Management Summaries." Online. Available: http://www.vapreservation.org/growth/state1.htm.

infrastructure planning across state departments and establish the standard by which regional and local plans will be evaluated for consistency.

- **Recommendation:** Amend Chapter 163, Part II, Florida Statutes (Fla. Stat.), sometimes referred to as the "Community Planning Act," to encourage cities and counties in Florida to allow charging stations within industrial, civic, residential, commercial, and recreational land use and their associated zoning districts. These charging stations should be outright permitted uses within all other land-use and zoning districts.

Recommendation for Local Governments: A local government comprehensive plan is a general policy guide for growth and development of the municipality. It acts as a long-range guide, intended to show the future use of land at some point during the planning period, which could project as far ahead as 20 years or more.

A municipality's comprehensive plan can elevate the importance of PEV-infrastructure planning across multiple departments, highlighting the need for coordination among land-use, capital facilities, and transportation planning efforts. The plan should provide specific language encouraging the implementation of PEV charging infrastructure and general guidance on where PEV charging stations should be allowed, where they should be actively promoted, and where they should be discouraged or prohibited. Once adopted, the comprehensive plan is implemented through appropriate zoning regulations.

- **Recommendation:** With regard to the above, the Drive Electric Florida team recommends topics to be considered in amendments to local government comprehensive plan goals, objectives, and policies include:
    - By a certain date, the county's EVSE will be able to support a certain number of PEVs.
    - Direct land-development regulations to be amended to allow EVSE in all zoning districts as-of-right or as ancillary use and/or as conditional use.
    - Direct the permitting process to be streamlined for EVSE.

EVSE Land Development Regulations (LDR) in Florida

Land-development regulations (LDR) are an additional component of the PEV-planning framework. LDRs include the local government zoning code and its implementing ordinances. The LDRs define specific guidelines by which developers must abide to ensure the safety, accessibility, and standardization of PEV charging installments, parking, and signage.

Design standards to address the Americans with Disabilities Act (ADA) accessibility requirements are needed to ensure that PEV charging stations can serve all customers. Additionally, guidance on reducing tripping hazards, electrical hazards, and vandalism or theft of PEV charging stations will increase the safety of PEV infrastructure for the public. Consistent signage for PEV charging spaces may also be defined in municipal codes, ensuring that PEV charging stations are not only accessible and safe, but also easily identified.

Status of EVSE LDRs in Florida: As part of this report, a review of LDRs related to electric vehicle infrastructure was conducted to determine how local government zoning codes are addressing EVSE. The review was conducted online using the Municipal Code Corporation's Muni Code. Muni Code is a national, legal publisher that codifies local government codes. Specifics on the code-review methodology undertaken for the Region can be found in Appendix C-1: Regional Code Review Methodology (p. 198).

No Florida Local Governments Include Specific EVSE Zoning Code: A review of the land development codes in the Southeast Region, codified by the Municipal Code Corporation, determined no local governments have included EVSE as an explicit allowable use. In general, when an activity is not listed in a community's zoning code as permitted, secondary, special exception, and/or conditional use, it isn't allowed. While the omission of charging infrastructure in the zoning code may not affect the installation of AC Level-1 or AC Level-2 equipment within the garage of a single-family residence, it may affect permitting of installations external to a residential structure – including multi-unit dwellings, commercial, retail, industrial, or other uses.

In comparison, the State of Oregon allows EVSE to be installed within existing parking spaces on property that has been developed.[184] The State of California recommends revising zoning codes to allow AC Level-1 and Level-2 and DC Level-2 charging stations as an accessory to the principal outright permitted use within low- and high-density residential and recreational zoning districts. These facilities would be outright permitted uses within mixed-use, commercial, industrial, and institutional zoning districts.[185]

- **Recommendation:** With regard to allowed use in the LDRs, the Drive Electric Florida team recommends the seven counties and 121 municipalities in Southeast Florida amend their land development regulations to allow AC Level-1 and AC Level-2 stations as an accessory to the principal permitted use within recreational land use and their associated zoning districts. These facilities should be as-of-right permitted uses within industrial, civic, commercial, and residential land-use and zoning districts. Furthermore, DC-Fast Charging stations should be permitted, as-of-right, in industrial and commercial land uses and associated zoning districts. The land development regulations would also need to be amended to include appropriate terms which are listed in the "Glossary" section of this report, including:

  120-volt AC outlet; 240-volt AC outlet; Battery Electric Vehicle (BEV); CHAdeMO; Charging station; Commercially available; Coupler; DC Fast Charging (DCFC); Electric Vehicle (EV); Electric Vehicle Service Provider (EVSP); Electric Vehicle Supply Equipment (EVSE); Fuel Cell Electric Vehicle; Hybrid Electric Vehicle (HEV); Inlet; Internal Combustion Engine; J1772 Connector; Kilowatt; Kilowatt-hour; Level-1 charging; Level-2 charging; Modular unit; Motor Vehicle; Motorized Bicycle; Mounting style; National Electrical Code (NEC); National Electrical Manufacturers Association (NEMA); Neighborhood Electric Vehicle (NEV); Off-peak charging; Plug-in Hybrid Electric Vehicle (PHEV); SAE International; Time of Use Metering (TOU); Underwriters Laboratories (UL); Zero Emissions Vehicle (ZEV).

Allowed Use, Parking, Signage, and Accessibility: The major categories of the LDRs are allowed use, parking requirements, signage, and accessibility. In regard to the last three categories – parking requirements, signage, and accessibility – there is much detail to consider. A discussion of each of these categories and specific recommendations follows in next section.

Zoning: Parking, Signage, and Accessibility

Currently, the Institute for Transportation Engineers (ITE), as well as local governments across Florida, have not developed parking space allocation requirements or standards for PEVs. Fortunately, other states, as well

[184] Electric Transportation Engineering Corporation. "Electric Vehicle Charging Infrastructure Deployment Guidelines for the Oregon I-5 Metro Areas of Portland, Salem, Corvallis and Eugene." April 2010. p. 48.
[185] Association of Bay Area Governments, et. al. "Ready, Set, Charge, California." November 2011. pp. 18-19.

as industry organizations, like the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED), can be looked at to provide examples of parking standards.

Parking Guidelines: Determining the Number of PEV Parking Spaces to Allocate

Parking requirements are often contained within a city or county's zoning codes.[186] Most local governments include a process to calculate the number of parking spaces that will be required as a condition of development approval for all types of development activities. One of the prominent sources for these calculations is the Institute for Transportation Engineers (ITE). ITE produces trip-generation data for land uses and zoning districts, which is then used to generate the number of parking spaces that will be needed.[187] ITE has not developed standards for calculating parking spaces for PEVs.

In response to recommendations of a code review project funded by the DOE, Miami-Dade County has drafted an ordinance that would require new developments provide electric vehicle parking and charging infrastructure. The ordinance for electric vehicle parking spaces would not require any additional spaces; rather, it would set-aside a certain number of required off-street parking spaces for new developments with more than 150 parking spaces.

Uniform Guidelines for Allocating PEV Parking Spots Do Not Exist: A review of local government ordinances that include parking spaces for PEVs determined that a uniform standard for calculating parking requirements for electric vehicles does not presently exist. But some states are making progress in this area.

Washington State PEV Parking Regulation: For example, Washington State requires the installation of appropriate circuitry to support electric vehicle infrastructure in all adjacent spots and active charge spots in 10 percent of adjacent parking spaces that are directly related to the vehicular transportation needs generated by the proposed development.[188] The standard was established by the Washington State Legislature. In July 2011, the City of Mountainlake Terrance, WA, adopted the parking requirements in the following table for developments that are 10,000 square feet or greater and when any of the following occurs:

- A new building or a new off-street parking facility is developed.
- An addition or improvement to an existing building is made that meets a certain threshold.
- The parking capacity of an existing building, site, or parking facility is increased by more than 50 percent.

Table 8: Parking Space Requirements for PEVs, City of Mountainlake Terrance, Washington

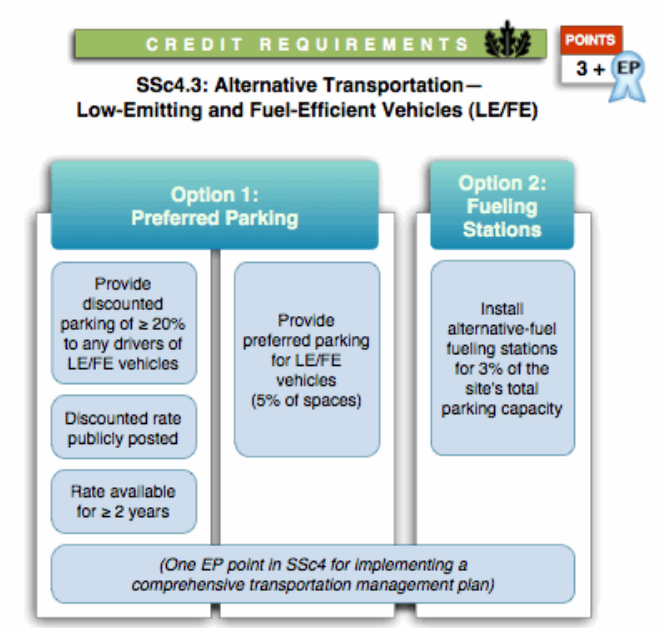
Land Use Type	Percentage of Parking Spaces
Multi-household residential	10%
Lodging	3%
Retail, eating and drinking establishments	1%
Office, medical	1%
Industrial	1%
Institutional, Municipal	3%
Recreational/Entertainment/Cultural	1%

Source: Association of Bay Area Governments. "Ready, Set, Charge, California. A Guide to EV-Ready Communities." November 2011. p. 20.

[186] Institute for Transportation and Development Policy. "U.S. Parking Policies: An Overview of Management Strategies." Online. Available: http://www.itdp.org/documents/ITDP_US_Parking_Report.pdf. p. 6.
[187] Institute for Transportation and Development Policy. "U.S. Parking Policies: An Overview of Management Strategies." p. 7.
[188] State of Washington. House Bill 1481.

LEED as a Potential Source of Parking Guidelines: A potential source for developing PEV parking guidelines is the Leadership in Energy and Environmental Design (LEED) Green Building Rating System. A developer can receive LEED credits if EVSEs are installed. LEED also provides guidance regarding the percentage of parking spaces that are reserved for alternative fuel vehicles.[189] As illustrated by the following image, up to three points are available based on the following LEED guidelines.

Figure 14: LEED Point Allocation – Alternative-Fuel Parking Allocation



Source: LEED User. "CS-2009 SSc4.3: Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles." Online. Available: http://www.leeduser.com/credit/CS-2009/SSc4.3.

Recommendations for Parking:

- **Recommendation 1:** When formulating the parking standards, the Drive Electric Florida team recommends local governments consider the following items:
  - **Provide charging and parking incentives.** Local agencies may consider adopting policies and enabling ordinances that promote installation of charging infrastructure, charging, or parking incentives for PEVs.
  - **Reduce parking requirements for EVSE implementation.** Local agencies are encouraged to explore a range of incentives that result in reduced parking requirements for developers where significant investments for PEV charging stations and/or PEV car-sharing agreements are being implemented.
  - **Incentivize EVSE installations in existing parking lots.** Local agencies are encouraged to adopt zoning amendments that incentivize the installation of EVSE in large existing parking facilities.
  - **Enforce hours on PEV charging.** Local agencies are encouraged to adopt zoning amendments that limits the misuse of an EVSE parking space as a long term parking space, and allows for more PEV cars to be charged.

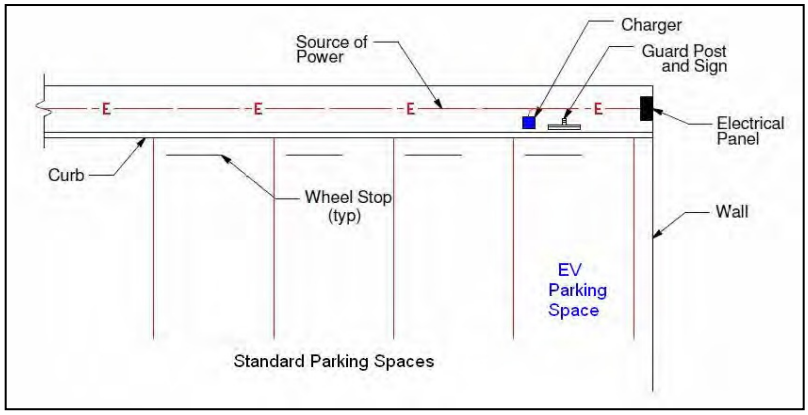
[189] Electric Transportation Engineering Corporation. "Electric Vehicle Charging Infrastructure Deployment Guidelines for the Oregon I-5 Metro Areas of Portland, Salem, Corvallis and Eugene." April 2010. p. 29.

- **Number of parking spaces.** Local agencies need to consider the number of parking spaces that would be dedicated to PEVs. Determination also needs to be made whether these spaces would count towards minimum parking requirements.
- **Consider location of EVSE.**
  - Local agencies are encouraged to consider the location of EVSE, such that it is optimally located for end users including ADA accessibility.
  - A preliminary assessment of existing electric panels, breakers, and conduits should be considered prior to deciding on the location of EVSE to be cost effective.

- **Recommendation 2**: Local government land-development regulations should require that some percentage of designated parking spaces at newly constructed multifamily dwellings be equipped with electrical infrastructure for PEV charging.
- **Recommendation 3**: Building Code should be revised to require that new multifamily construction be equipped with electrical infrastructure to accommodate PEV charging.

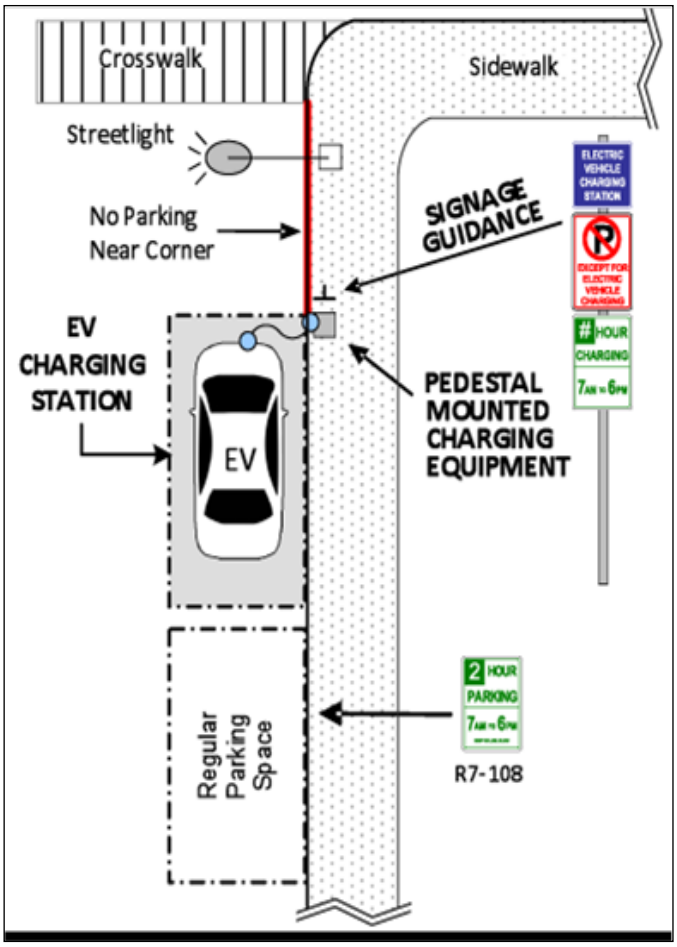
An example of a LDR parking regulation is included in Appendix C-2: Examples of Parking Regulation (p. 199). Examples of on-street and off-street PEV parking layouts are shown in the figures on the following page.

Figure 15: Example of Off-Street EVSE and PEV Parking



Source: Curtis + Rogers Design Studio, 2012.

Figure 16: Example of On-Street EVSE and PEV Parking



Source: Electric Vehicle Infrastructure - A Guide for Local Governments in Washington State, Puget Sound Regional Council, September 2010.

Signage

There are several key considerations regarding signage for PEV parking spaces. These include: (1) whether to provide designated spaces for electric vehicles that are not actively charging; (2) whether to provide designated spaces for electric vehicles that are actively charging; (3) whether electric vehicle owners will pay for parking spaces; and (4) the content and design of signage that informs the public about how parking spaces are to be used.

The Federal Highway Administration's (FHWA) *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD) defines the following: "the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic. The MUTCD is published by the Federal Highway Administration (FHWA) under 23 Code of Federal Regulations (CFR), Part 655, Subpart F."[190]

These standards are usually adopted by states and local governments. The Florida Department of Transportation (FDOT) is required by the Florida Legislature to compile and publish a manual of uniform traffic control devices.[191] The MUTCD (2009 Edition) was adopted by FDOT as Rule 14-15.010, F.A.C.[192] The size of a sign, its color scheme, and shape are governed by the message, whether international symbols are used, and the type of roadway on which the sign will be deployed.

In this report, signs are grouped into three categories: (1) general, (2) permissive, and (3) regulatory.

General – Way-Finding Signage: General signs provide guidance to the charging station locations. These signs are also referred to as way-finding signs. The MUTCD has established a way-finding sign for electric vehicles (D9-11b). The sign is a modification of the Gas General Service symbol (D9-7).

Figure 17: Way-Finding Sign for Electric Vehicles

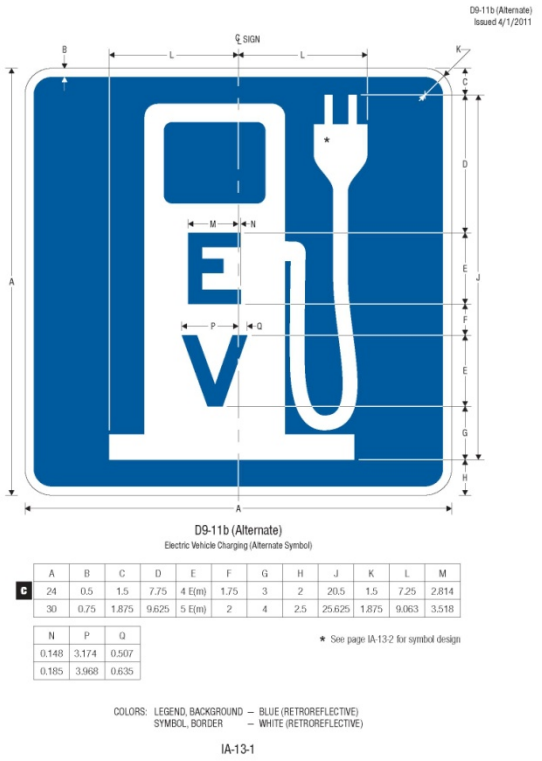
D9-11b

Established by the MUTCD.

[190] U.S. Department of Transportation. "Manual on Uniform Traffic Control Devices." Federal Highway Administration. Online. Available: http://mutcd.fhwa.dot.gov/.
[191] State of Florida. "The 2012 Florida Statutes." Section §316.0745. Fla. Stat.. Official Internet Site of the Florida Legislature. Online. Available: http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0300-0399/0316/Sections/0316.0745.html.
[192] Florida Department of Transportation. "Operations - Manual on Uniform Traffic Control Devices." State Traffic Engineering and Operaitons Office. Online. Available: http://www.dot.state.fl.us/trafficoperations/Operations/MUTCD.shtm.

The states of Oregon and Washington requested FHWA consider an alternative to the approved electric vehicle way-finding sign based on their determination that the fuel pump and hose image could cause confusion since the image combinations are similar to those for traditional fuel pumps. On April 1, 2011, the FHWA provided interim approval of Oregon's and Washington's request, authorizing the use of D9-11b (alternate).[193] The FHWA will grant interim approval for the use of D9-11b (alternate) to any jurisdiction that submits a written request. A state may request approval for all its jurisdictions.[194]

Figure 18: Approved Alternate Way-Finding Sign for PEVs



Established by the FHWA. D9-11b (alternate).

Regulatory Signage – Prohibitive and Permissive: Regulatory signs are required in order to enforce the time of duration and days that electric vehicles are permitted to charge or park, or to restrict internal combustion engine vehicles from occupying the space. A regulatory sign can be prohibitive or permissive, and there are requirements for the colors used on regulatory signs. Green and white regulatory signs are permissive; red, black, and white signs are prohibitive. The federal MUTCD does not currently contain regulatory signs for PEV charging parking spaces; however, the following signs – courtesy of "Ready, Set, Charge, California" – have been developed for testing in Oregon and Washington, as well as a regulatory sign approved for use in Michigan.[195]

[193] Lindley, Jeffrey A. "Interim Approval for Optional Use of an Alternative Electric Vehicle Charging General Service Symbol Sign." U.S. Department of Transportation, Federal Highway Administration Memorandum, April 1, 2011. Online. Available: http://mutcd.fhwa.dot.gov/resources/interim_approval/ia13/index.htm.

[194] Lindley, Jeffrey A. "Interim Approval for Optional Use of an Alternative Electric Vehicle Charging General Service Symbol Sign."

[195] Association of Bay Area Governments. "Ready Set Charge California. A Guide to EV-Ready Communities." November 2011. Online. Available: http://www.rmi.org/Content/Files/Readysetcharge.pdf. p. 31.

Figure 19: Prohibitive Sign Developed for Testing (Active Charging Not Required)

Figure 20: Prohibitive Sign Developed for Testing (Active Charging Required)

Figure 21: Permissive Sign (Active Charging Required)

Figure 22: Permissive Sign (Active Charging Not Required)

Recommendation for Signage:

- **Recommendation**: The Florida Department of Agriculture and Consumer Services (FDACS) has been tasked by the Florida Legislature to develop guidelines for PEV signage in the State of Florida. This task will culminate in the adoption of signage standards via administrative rule. Drive Electric Florida should continue to work with FDACS to request use of the D9-11b (alternate) way-finding signs. FDACS should also coordinate with the States of Michigan, Oregon, and Washington to review their data regarding regulatory signs for PEV parking spaces.

Accessibility

According to the *Florida Accessibility Code,* "the 1993 Florida Legislature enacted the 'Florida Americans with Disability Accessibility Implementation Act,' which incorporated the architectural accessibility requirements of the Americans with Disabilities Act of 1990, Public Law No. 101-336, 42 U.S.C. Section 12101 et. seq."[196] While the *Florida Accessibility Code* does not explicitly address PEVs, it does contain requirements regarding fuel dispensers.

Applicable Accessibility Standards Regarding Fuel Dispensers: Applicable provisions from of the *Florida Accessibility Code* for fuel dispensers should be adopted to incorporate PEV charging stations. Language from the code can be found in Appendix C-3: *Florida Accessibility Code* Considerations for PEV Charging Stations (p. 201). The code covers the following basic accessibility categories:

- Maximum and minimum height of reach.
- Obstructions in the path of reach.
- Maximum reach distance from fuel dispenser to vehicle.
- Ease of use of operable parts.
- More. See Appendix for code language.

Applicable Accessibility Standards for Automatic Teller (ATM) and Fare Machines: PEV charging stations may also need to address the accessibility standards related to automatic teller machines and fare machines. Language from the code can be found in Appendix C-3: *Florida Accessibility Code* Considerations for PEV Charging Stations (p. 201). The code covers the following basic accessibility categories:

[196] Florida Accessibility Code (2010). p. 1.

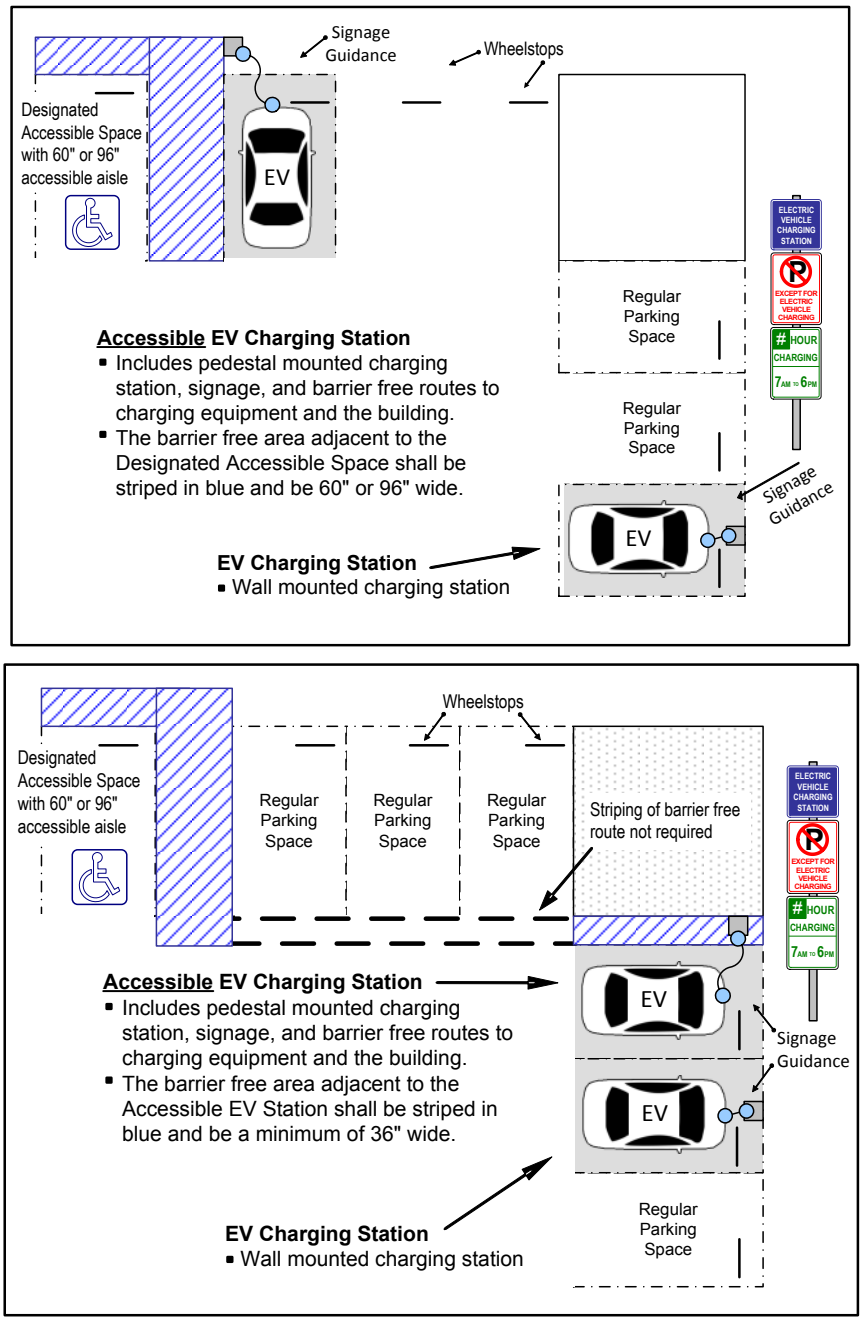
- Location of installation paths/routes.
- Reach for insertion of token devices, cards, or coins.
- Floor clearance and ground space.
- Ease of use of operable parts, including sound or touch differentiation.
- Privacy.
- Speech output, user control, and volume control.
- Guidelines on placement of numeric symbols.
- Visibility, including adequate contrast on screens to aid in vision.
- Tactilely discernible input control, including Braille symbols and guidelines.
- Compliance for function keys.
- More. See Appendix for code language.

The Florida Building Commission was contacted regarding accessibility issues for EVSE. Building Commission staff indicated the Florida Accessibility Code mirrors the Americans with Disability Act and interpretation is made by the U.S. Department of Justice, which governs enforcement. In addition to the aforementioned accessibility issues, the Department of Justice should be consulted to determine how the ADA will affect PEV parking spaces, specifically path of travel, parking space widths, minimum number of spaces, and the distance from the parking spaces to entrances.

Recommendations for Accessibility:

- **Recommendation 1**: The State of Florida should formally petition the various agencies responsible for ADA enforcement to determine whether electric vehicle charging infrastructure should be governed by the standards for "Depositories, Vending Machines, Change Machines, Mail Boxes, and Fuel Dispensers" and "Automatic Teller Machines and Fare Machines."
- **Recommendation 2:** When formulating accessibility standards, the Drive Electric Florida team recommends local governments consider the following items:
    - EVSE should comply with ADA Accessibility guidelines.
    - A minimum five-foot clear area to turn a wheel chair near the accessible chargers is desired in existing public parking facilities and should be provided in new construction.
    - Bollards should not encroach upon the minimum clear width of three feet. Accessible controls, and/or the cord handle, should be installed above the parking surface in front of the charger to be a level height for wheelchair access.
    - An accessible route should be provided from an accessible PEV parking space to the accessible EVSE.
    - An accessible PEV charging station should connect to an accessible route to the accessible building entrance.
    - Access aisles must take into consideration use from either side to accommodate differences in location of charging inlets across vehicles. The differences in charging inlets across vehicle and the design of the vehicles may require the driver, both able bodied or with a disability, to back into the parking space.
    - In new parking facility construction, the first charging station should be fully accessible and be designed to accommodate wheelchair lift equipment in an adjacent access aisle.

Figure 23: Examples of ADA-Compliant EVSE



Source: Electric Vehicle Infrastructure - A Guide for Local Governments in Washington State, Puget Sound Regional Council, September 2010.

National Electrical Code and Florida Building Code

The National Electrical Code (NEC), which is formally known as the NFPA's 70, provides standards that guide the design, installation, and inspection of electrical products.[197] The National Electric Code has been adopted by all 50 states and addresses "the installation of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment, and raceways; and optical fiber cables and raceways in commercial, residential, and industrial occupancies."[198]

The relevant articles, codes, and statutes related to building and electrical codes from the NEC, NFPA, Florida Building Commission, Society of Automotive Engineers (related to standards), and Underwriters Laboratory (related to testing and approval guidelines for charging infrastructure) can be found in Appendix C-4: Relevant Electric and Building Codes, Articles, Statutes, and Standards (p. 205).

The Status of EVSE Permitting

The State of Florida lags behind other areas of the country in addressing permitting issues related to PEV charging infrastructure. A review of activities related to permitting PEV charging infrastructure by other states and their local governments make it clear that a primary goal for the State of Florida should be reducing the amount of time it takes for an applicant to receive approval for an installation permit. Numerous governmental agencies outside of Florida have instituted processes to educate consumers regarding permitting and installation of EVSE.

It has been noted in California, "variables in the permitting process can significantly affect residential EVSE installation cost, timing, and complexity."[199] The California experience notes that residential EVSE, which will account for more than 80 percent of consumer charging needs, can have installation costs that range from $300 to $1,900, with permitting fees accounting for 5 to 20 percent of that cost.[200] In Oregon, the residential permitting cost has ranged from $2,000 to $2,500.[201] The public sector should strive to limit increases in installation costs, which result from government regulation.

How Other States and Communities are Addressing Permitting

In other areas of the country – such as the states of California, Massachusetts, New Jersey, and Oregon, as well as the cities and counties of Atlanta, GA, New York, NY, Raleigh, NC, and Sonoma County, CA – published guidebooks are available, discussing permitting and inspection issues and providing recommendations for regulatory uniformity and streamlining. Summaries and links to some of these guidebooks can be found in Appendix A-3: Examples of Permitting and Inspection Guidebooks (p. 161).

Other examples of how states and communities are educating consumers and business about permitting issues include:

- San Francisco, CA, developed a checklist that the permitting office posted on the city's website.[202]

[197] National Fire Protection Association. "NFPA 70: National Electric Code®." 2011. Online. Available: http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=70
[198] National Fire Protection Association. "NFPA 70: National Electric Code®."
[199] California Plug-In Electric Vehicle Collaborative. "Streamlining the Permitting and Inspection Process for Plug-In Electric Vehicle Home Charger Installations." July 2012. p. 16.
[200] California Plug-In Electric Vehicle Collaborative. p. 22.
[201] Electric Transportation Engineering Corporation. "Electric Vehicle Charging Infrastructure Deployment Guidelines for the Oregon I-5 Metro Areas of Portland, Salem, Corvallis and Eugene." p. 16.
[202] Toraya, Jules. "Electric Vehicle Deployment: Municipal Best Practices Study." Atlanta, Georgia, City of Atlanta, May 2011. Online. Available: http://www.plugingeorgia.com/pdf/bppaper05.13.11.pdf.

- Raleigh, NC, developed a chart that explains each step of the process and created a YouTube video on the single-family application process.[203]
- Raleigh also provides training for contractors and inspectors. The City's Office of Sustainability plans to provide the names of contractors completing the course to car dealers who sell PEVs.[204]
- Oregon has a program that allows certified contractors to install eligible equipment without going through the traditional permitting process of having every installation inspected. Contractors can obtain minor-label permits and provide documentation of installation online.[205]
- Washington State has model installation guides for installing EVSE in a single-family and commercial or employee parking lot.[206] More information is available online in the report titled "Electric Vehicle Infrastructure. A Guide for Local Governments in Washington State": http://www.psrc.org/assets/4325/EVI_full_report.pdf.

Another area where local governments have addressed the permitting process is through an expedited process. This has been accomplished by: developing and implementing a permit application that is specific to PEVs; developing online permit applications with the ability to immediately schedule installation, using a template-based form in order to ensure the proper documentation for the permit is provided; and allowing inspections to occur without the electrician being present.[207]

The State of Florida and its Southeast Florida communities should adopt similar processes to reduce the time for permit approval.

Single-Family and Multi-Unit Dwelling Permitting Considerations: As previously noted, land-use and zoning code requirements will usually not affect the permitting of EVSEs within the structure (i.e., the garage of a single-family home or in multi-unit dwellings). However, an increase in a home's residential load, whether AC-Level-1 or AC Level-2, will require an electrical permit. In some jurisdictions, the addition of an outlet requires an electrical permit. However, experience from California indicates that an unused electric-dryer circuit in the garage (perhaps from switching to a gas dryer) can be used for the EVSE.[208]

There are additional considerations that will need to be addressed as part of an electrical permit application including:

- Minimizing the distance from the EVSE to the vehicle inlet.
- Avoiding tripping hazards.
- Addressing ventilation requirements.[209]

More information on infrastructure siting can be found in Considerations for Siting PEV Charging of this report (p. 6-55). Some additional details specific to multi-unit dwellings can be found in the section on PEV Charging at Multi-Unit Dwellings (p. 6-68).

It should be noted that additional considerations arise regarding carports. The outdoor aspect of carports will necessitate considerations of precipitation and the potential for pooling water, temperature extremes,

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[203] Toraya, Jules. "Electric Vehicle Deployment: Municipal Best Practices Study."
[204] Toraya, Jules. "Electric Vehicle Deployment: Municipal Best Practices Study."
[205] Toraya, Jules. "Electric Vehicle Deployment: Municipal Best Practices Study."
[206] Washington State Department of Labor and Industries. Trades and Licensing. Online. Available: http://www.lni.wa.gov/tradeslicensing/.
[207] California Plug-In Electric Collaborative. pp. 26-27.
[208] California Plug-In Electric Collaborative. p. 34.
[209] Electric Transportation Engineering Corporation. "Electric Vehicle Charging Deployment Guidelines for the Oregon I-5 Metro Areas of Portland, Salem, Corvallis and Eugene." p. 19-20.

adequate lighting, and vandalism protection. Experiences in California have indicated that EVSEs are safe in pooling water, but homeowners may have concerns about safety.[210]

Permitting Issues for Single-Family and Multi-Unit Dwellings and Commercial, Retail, Office, Industrial, and Other Public/Semi-Public Locations: The potential impacts of the lack of explicit authorization of EVSE within local government land use and zoning designations pose additional challenges in Southeast Florida. As noted previously, when an activity is not listed in a community's zoning code as permitted, secondary, special exception, and/or conditional use, it generally isn't allowed. In Florida, any substantially affected person may challenge the approval of a development order that is deemed to be inconsistent with the comprehensive plan and/or land development regulations.[211] The lack of explicit authorization of EVSE within a zoning code could subject the applicant and approving local government to a challenge under §163.3213, Fla. Stat.

EVSEs are generally placed external to single-family and multi-unit detached residential units. In addition to the determination that the EVSE is a permitted, secondary, special exception, and/or conditional use, the approval process would need to also address adopted local parking space requirements and state and federal accessibility guidelines. The parking and accessibility guidelines are addressed earlier in this section of the report.

The goal of the PTRG was to create a streamlined EVSE permit process requiring fewer documents to be submitted, a reduced application fee, and an expedited review process.

EVSE Permitting Case Study and Recommendations

To ease the deployment of charging stations, there is a need to streamline EVSE installation, permitting, and inspection. To address this need, the Drive Electric Florida Team engaged key stakeholders to form the Permitting Technical Review Group (PTRG). The goal of the PTRG was to create a streamlined EVSE permit process requiring fewer documents to be submitted, a reduced application fee, and an expedited review process. The Miami-Dade County permitting process was used as the basis for the case study. The analysis and recommendations that follow in this section was undertaken with the input and guidance of many stakeholders who participated in the PTRG. Members of the PTRG who participated in shaping this section without formally endorsing the recommendations include those professionals in the following table.

[210] Association of Bay Area Governments. "Ready Set Charge California. A Guide to EV-Ready Communities." November 2011. Online. Available: http://www.rmi.org/Content/Files/Readysetcharge.pdf. p. 21.

[211] "It is the intent of the Legislature that substantially affected persons have the right to maintain administrative actions which assure that land development regulations implement and are consistent with the local comprehensive plan." (Section 163.3213(1), Fla. Stat.: http://leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0163/SEC3213.HTM&Title=->2006->Ch0163->Section%203213#0163.3213.)

Table 9: Permitting Technical Review Group

Name		Organization
Tom	Marko	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Stuart	Bazerman	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Flavio	Gomez	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Michael	Goolsby	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Mike	Lugo	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Oriol	Haage	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Vladimir	Markoski	Miami-Dade County, Permitting, Environment & Regulatory Affairs
Lorenzo	Aghemo	Palm Beach County, Planning Director
Andy	Kinard	CarCharging, President
Suzanne	Tamargo	CarCharging, Director of Marketing & Public Relations

Several meetings and interim telephone conversations were held with the members of the PTRG. An initial project introduction and general issues meeting was conducted. This was followed by an EVSE permit dry-run meeting in which the technical requirements for EVSE and various parking scenarios for PEVs were reviewed by the PTRG. Key issues identified in the EVSE permit dry-run meeting were:

1. For all new EVSE, conduct an analysis of the capacity of the existing service to support the proposed electrical load. If service or equipment upgrades are required, calculations and specification need to be included in the application.
2. A pre-approval meeting for any EVSE project is recommended. If existing service and facilities have capacity for the proposed EVSE, the pre-approval meeting will not require an electrical review.
3. Design of EVSE should be detailed in the application, including whether the equipment will be installed as overhead, underground or from an existing building. Details on whether the installation would require a foundation, including depth and height would need to be included in the application.
4. Application drawing should include site plan, location of EVSE, ADA compliance, equipment specifications, and any other pertinent information needed to make a determination. For example, if the charger requires mechanical ventilation, a mechanical plan would need to be provided.
5. Parking space assignment for PEVs would be regulated by existing zoning standards, and would need to be approved by the Zoning Department prior to approval of the permitting.
6. All spaces would need to comply with Florida Accessibility Code.
7. All signage would be regulated by the zoning code.
8. For solar integration with EVSE, a photovoltaic permit would be needed. This would be processed separately through the county's solar permitting process.

Permitting Process for EVSE

The PTRG also examined the current permit review process and made suggestions for a refined EVSE review process. Currently, an EVSE application would be filed under a general residential or general commercial category, depending on the proposed end user. The general category requires review by all departments. As interest in PEVs increases, and a larger volume of EVSE applications are processed, a *special electrical category* could potentially be developed. This category would have limited departmental review, and would consequentially have lesser impact fees. A sample application for Installation of EVSE is included in Appendix C-5: Sample Application for Installation of Electric Vehicle Charging Equipment (p. 206).

Potential Future Permitting Process for EVSE

The county's current permit process requires submittal of a completed Permit Application identifying the Building Permit Category as 01 (Commercial) or Category 02 (Residential). These two categories are considered general categories and are used for permits that don't fall into any specific sub-category and for which there is not enough volume to create a dedicated application category.

All general permit applications will be reviewed by the following county departments:

- Building.
- Zoning.
- Public Works.
- Structural.
- Mechanical.
- Electrical.
- Plumbing.
- Impact Fees.
- Fire.
- Water and Sewer.
- Permitting, Environment & Regulatory Affairs Concurrency.

A fee is associated with each reviewing department, and is included with other administrative fees when the application is initially submitted.

Potential Future Permitting Process for EVSE

Developing a streamlined and expedited permitting application process for EVSE could encourage greater adoption. Such a permitting process necessitates pre-approval of the equipment to be installed. Pre-approval requires submittal of a typical set of drawings and specifications of the EVSE, a completed application, and check for the review fee. Once submitted, all the county departments review the drawings and specifications, make comments and request changes (if needed), and approve a master document for the particular EVSE submitted.

Approval of the master document establishes a refined review process and fee for future permit applications for the pre-approved EVSE. The refined review process will identify county departments that need not review subsequent applications for the specific EVSE type and departments, which will review future permit applications for a given EVSE type. Following pre-approval, the county may create a separate building permit category, depending on the expected permitting volume for the EVSE. Once the equipment is pre-approved, the applicant would submit an application referencing the master approval, pay the revised application fee, and wait for the application to move through the streamlined review process.

Pre-approval will likely establish that departments that *do not need* to review any EVSE permits include:

- Mechanical.
- Plumbing.
- Impact Fees.
- Water and Sewer.
- Permitting, Environment & Regulatory Affairs Concurrency.

It is likely permit applications for single-family residential would only require review by:

- Building.
- Structural.
- Electrical.

Multi-family residential and commercial would likely be reviewed by:

- Building.
- Zoning.
- Public Works.
- Structural.
- Electrical.
- Fire.

Recommendation for Permitting:

- **Recommendation**: Local government permitting departments should undertake pre-approval of electric vehicle supply equipment (EVSE) to establish a master file and specifications. Pre-approval would limit the number of required internal reviews for subsequent permits submitted for EVSE installation as those reviews would be undertaken in the pre-approval process. Pre-approval would streamline the process and shorten time of review for EVSE permits.

Facilitating Fleet Adoption

A fleet is a group of vehicles owned or leased by a business or public/government agency – rather than an individual or a family.

Public/government and private vehicle fleets play a key role in positively influencing consumers about mobility choices. As people learn about and consider new vehicle models that are cleaner and reduce petroleum usage, it can be reassuring to observe increasing numbers of PEVs traversing local roads and major arterials. Many large companies and government agencies are stepping up the portion of their fleets that are electric, with smaller fleets and private consumers taking notice.

For example, General Electric publicized last year that by 2015, the company will purchase 25,000 PEVs. Coca-Cola also plans to add to its PEV fleet in 2013, citing the compatibility of PEVs with service-delivery patterns – combined with environmental stewardship as factors in the company's decision. In November 2012, the mayor of Chicago announced that Smith Electric Vehicles will be opening a new manufacturing facility in the city. In a related statement, FedEx Express announced the beginning of an additional 100 Smith vehicles to be deployed, adding to its PEV fleet in the U.S.[212]

While some large fleets are required to reduce their petroleum usage, other fleets do so to enhance their public image. This type of community leadership[213] is being encouraged by the DOE through its Clean Cities Coalitions, and one of the key efforts of Drive Electric Florida is to reduce perceived barriers through supporting more widespread fleet adoptions.

Other Benefits of PEVs for Fleets

Protect the Environment
Even when emissions from power plants are taken into consideration, battery electric vehicles (BEVs) release 70 percent fewer emissions than internal combustion engine vehicles in South Florida.

Greater Energy Independence
Widespread adoption of electric vehicles will reduce our nation's dependence on foreign oil. PEVs are fueled with electricity generated from predominantly domestic sources of fuel.

Enhances Your Company's or Agency's Image
Your fleet is a visible way of communicating your values and gaining goodwill.

Fun to Drive – and More!
Your drivers will appreciate the smooth and quick acceleration. And many PEVs are equipped with advanced telematics to enhance your fleet's analytics.

Barriers and Benefits

Fleet managers experience similar concerns about and attractions to PEVs as those of consumers, as described in the overview section of this report (p. 3-13). Limited range, limited public charging infrastructure, higher vehicle purchase costs, lengthy charging times, and limited styling are barriers that fleet managers consider when examining the case for PEVs. Additional concerns specific to fleets include the following:

- Fleet mechanics generally are not familiar with PEV maintenance needs or repairs, and fleet managers recognize the need for special mechanic training.

[212] City of Chicago. "Mayor Emanuel Announces Smith Electric Vehicles to Open Manufacturing Facility in Chicago." Chicago, Illinois: The City of Chicago Official Site, November 28, 2012. Online. Available: http://www.cityofchicago.org/city/en/depts/mayor/press_room/press_releases/2012/november_2012/mayor_emanuel_announcessmithelectricvehiclestoopenmanufacturingf.html. Accessed: December 2012.
[213] DOE, EERE. "Plug-In Electric Vehicle Handbook for Fleet Managers." DOE/GO-102012-3273, April 2012. Online. Available: http://www.afdc.energy.gov/pdfs/pev_handbook.pdf. Accessed: November 2012.

- Similar to concerns of some consumers, it is not yet known how long the battery life will be in various models and what types of conditions will shorten battery life.
- The impacts to local utility distribution networks may be of concern to some fleet managers, but this concern will probably not be founded in Florida.
- A primary concern for public and private fleet managers is whether PEVs can actually meet the company's or agency's operational needs.
- Finally, lack of incentives in the State of Florida at this time does not facilitate fleet conversions to electric. [214]

Those concerned about the higher upfront purchase price of PEVs, or the lack of financial state incentives, may opt to take advantage of lease agreements offered on many PEVs. This is especially beneficial for fleets that are not eligible for federal tax credits.

Even without strong financial incentives for fleet conversion in the state, the case for PEVs is strong in Florida, which is the second ranked state in the nation for PEV sales – as of November 2012 – comprising 6.6 percent of the PEV market, according to Edmunds.com.[215] This is a powerful message to public and private fleet managers of the importance of maintaining the momentum and their role as community leaders in adopting this new technology.

As with private consumers, fleet managers can look forward to the electric portion of their fleets having significantly lower fuel costs, lower operating and maintenance costs, reduced emissions, cutting-edge technology that enhances safety and reliability for their drivers, and greater convenience – not to mention providing vehicle operators with the speed, torque, and quiet operation of electric-drive technology.

In emergency situations, operators of conventional fleets can find themselves facing a diesel or gasoline shortage – especially during a natural disaster – compromising productivity. Access to reliable electricity in the Region could help keep an electric fleet on the road, even when fossil fuels are unavailable – a real benefit in Southeast Florida during extreme weather events.[216]

Managers who take the step towards electric transportation can be satisfied that their companies and agencies are assisting utility companies to optimize their current power generation capacity. Additionally, gasoline and diesel price volatility is diminished as national security is heightened through reducing petroleum usage. Companies and public agencies that own large fleets with PEVs will find it easier to comply with energy requirements like those in EPAct 1992 and 2005. [217]

Large Fleets and the EPAct of 199 and 2005

The National Energy Policy Act of 1992 (EPAct) and 2005 and other amendments include a requirement that certain federal state, and private fleets acquire alternative fuel vehicles.[218] According to the DOE, "EPAct 1992 defines 'alternative fuels' as: methanol, ethanol, and other alcohols; blends of 85% or more of alcohol with gasoline (E85); natural gas and liquid fuels domestically produced from natural gas; propane; hydrogen;

[214] Electrification Coalition. "Fleet Electrification Roadmap, Revolutionizing Transportation and Achieving Energy Security." November 2010. Online. Available: http://www.prtm.com/uploadedFiles/Thought_Leadership/Articles/External_Articles/EC-Fleet-Roadmap-print.pdf. Accessed: November 2012.
[215] Le Sage, Jon. *Green Auto Market, The Business of Green Cars, Fuels & Technologies*. Electronic newsletter. November 2012.
[216] During "Super Storm Sandy," PEV owners noted they were able to readily charge their cars, while many owners of traditional cars faced gas shortages. See: Berman, Bradley. *The New York Times*. "Electric Car Owners Unfazed by Storm." Automobiles, November 2, 2012. Online. Available: http://wheels.blogs.nytimes.com/2012/11/02/electric-car-owners-unfazed-by-storm/. Accessed: 15 November 2012.
[217] DOE, EERE. "Plug-In Electric Vehicle Handbook for Fleet Managers."
[218] DOE, EERE, Alternative Fuels Data Center. "Energy Policy Act of 1992." Key Federal Legislation. Online. Available: http://www.afdc.energy.gov/laws/key_legislation#epact92.

electricity; biodiesel (B100); coal-derived liquid fuels; fuels, other than alcohol, derived from biological materials; and P-Series fuels, which were added to the definition in 1999."[219]

Per the EPAct, a "state and alternative fuel provider fleets are considered covered fleets if they own, operate, lease, or otherwise control 50 or more **non-excluded** light-duty vehicles (less than or equal to 8,500 lbs) and if at least 20 of those vehicles are used primarily within a single Metropolitan Statistical Area/Consolidated Metropolitan Statistical Area and are capable of being centrally fueled."[220]

There are several such fleets in Florida. All state-department fleets located in Miami-Dade, Broward, and Palm Beach Counties are covered by EPAct, including: Florida Departments of Transportation; Health, Children & Families; Agriculture & Consumer Services; Environmental Protection; and Florida Highway Safety and Motor Vehicles. Four other EPAct-covered fleets are also operated in the Southeast Florida Region: Florida Atlantic University, Boca Raton; Florida International University, Miami; Florida Power & Light Company (FPL), Riviera Beach; and Florida Public Utilities Company, West Palm Beach.[221]

The Drive Electric Florida team recommends providing technical assistance to fleets in the Southeast Region to ensure attainment of national alternative fuel vehicle goals.

Fleet Outreach

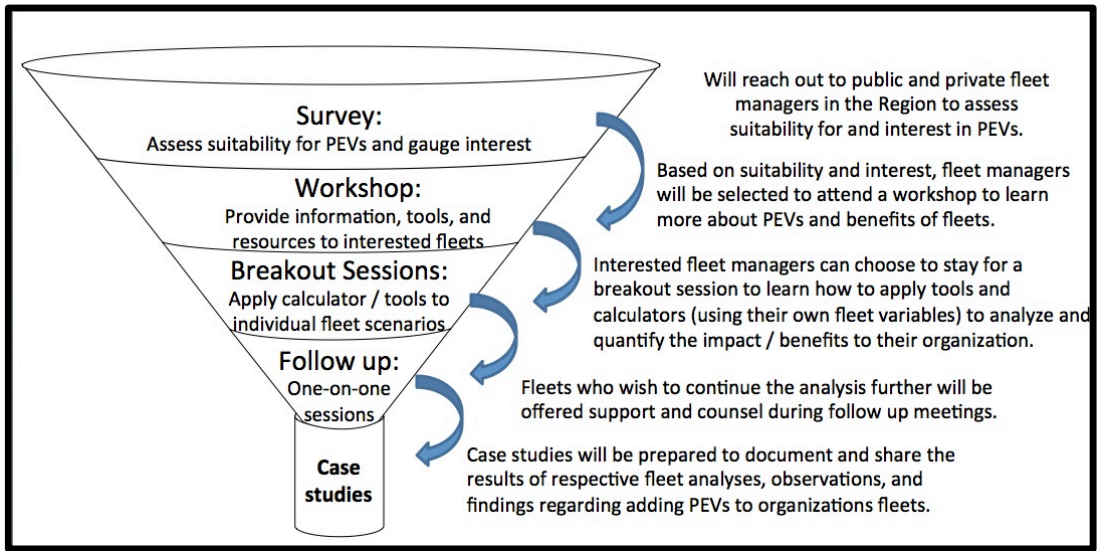
Methodology

The Southeast Florida Region, with a population of more than 6 million people, is the fourth largest urbanized area in the nation.[222] As the southernmost hub of U.S. commerce, the Region contains four major seaports, three major airports, and hundreds of public and private fleets of vehicles. With this in mind, the Drive Electric Florida team developed the following methodology for reaching out to fleet managers:

- Create an electronic survey to assess suitability for PEVs and gauge interest.
- Email survey to lists of fleet managers obtained from the:
  - National Association of Fleet Administrators (NAFA), Sunshine Chapter.
  - Florida Association of Government Fleet Administrators (FLAGFA).
  - Fleet Owner's FleetSeek, an internet-based source of contact information for private fleets.
  - Local government listings – over 100 municipalities.
  - Fleet managers affiliated with the Southeast Florida Clean Cities Coalition.
- Assess survey results to select those fleet managers interested in learning more about PEVs.
- Host three morning workshops in northern, central, and southern locations of the Region to provide information, tools, and resources to fleet managers interested in PEVs – conducting breakout sessions in the afternoons immediately following each morning workshop for those who express continued interest and teaching the use of lifecycle-analysis tools to analyze and quantify the impacts and benefits for their individual fleets.
- Provide one-on-one sessions in follow-up to the workshop, offering support and counsel.
- Prepare selected case studies.

[219] DOE, EERE, Alternative Fuels Data Center. "Energy Policy Act of 1992."
[220] DOE, EERE. "State and Alternative Fuel Provided Covered Fleets." EPAct Transportation Regulatory Activities. Online. Available: http://www1.eere.energy.gov/vehiclesandfuels/epact/covered_fleets.html.
[221] DOE, EERE. "State and Alternative Fuel Provided Covered Fleets."
[222] United States Bureau of the Census. 2010 Census Data. Online. Available: http://www.census.gov/2010census/data/.

Figure 24: Fleet Manager Outreach Metholdology



Fleet Survey Instrument

An electronic survey instrument was designed to:

- Gather demographic information about the private company/public agency and fleet manager.
- Determine whether the fleet manager has the authority to make vehicle purchasing decisions.
- Collect information about:
  - Fleet size.
  - Percentage of vehicles driven less than 70 miles per each 24-hour period, and:
    - If those vehicles are parked at the company/agency at least 6 hours per 24-hour period;
    - The number of vehicles that are light duty; and
    - The nature of the route.
- Establish whether the company/agency plans to purchase vehicles over the next 18 months.
- Ascertain the fleet manager's key consideration when purchasing a vehicle.
- Determine the fleet manager's level of interest in exploring the feasibility of converting a portion of the fleet to electric.

Outreach Results

The Fleet Manager Survey was emailed to all local government fleet managers, members of NAFA, members of the FLAGFA, and fleet managers already affiliated with the Southeast Florida Clean Cities Coalition with valid email addresses. A deadline for completion was provided after which the survey was re-sent to non-responders.

While the survey was emailed to approximately 200 fleet managers, less than 20 responded. Of those responses, 11 fleet managers indicated interest in exploring the feasibility of converting a portion of their fleet to electric. While the response rate may have been disappointing, the purpose of the survey was not to collect statistically reliable and valid research data. Rather, it was to locate fleet managers around the Region with an

interest in PEV fleet conversions. Regarding the proposed methodology, above, it was not necessary to host meetings in various sections of the Region since the response rate was so low.

It should be noted that the NAFA local chapter listing of members only included a small number of fleets compared to the actual number in the Region; whereas, the listing of public fleet managers, based on FLAGFA and Regional Planning Council records, was comprehensive. One of the lessons learned is that the Coalition will need to continue compiling a list of private fleets – a task that will be long term and very fluid.

Also noted is that in the three northern counties (Indian River, St. Lucie, and Martin), there are relatively few public or private fleets. In order to ascertain contact information about fleet managers in county and municipal governments, phone calls were made, and this had the effect of personalizing the outreach effort. Therefore, a larger proportion of fleet managers in the northern region responded to the survey.

More information on the following can be found in Appendix D: Fleet Strategies (starting on p. 209):

- Fleet Manager Survey.
- Survey Instructions.
- Survey Response Table.
- Regional Map, pinpointing locations of fleet managers who responded to the survey indicating interest in PEVs.

Toolkit

Just as the fleet team analyzed factors necessary for successful fleet conversion when designing the Fleet Outreach Survey described above, fleet managers also need to conduct a similar evaluative process as they assess their fleets' suitability for PEV adoptions. In some cases, fleet managers understand that they will need to be able to justify their decisions with top management within their firms or agencies. When determining whether electric fleets make sense for their business needs, fleet managers should:

- Analyze how their vehicles are used.
- Assess how many miles per day the vehicles are driven, the length of time those vehicles are not in use during a 24-hour period, and where those vehicles are located when they are not being driven.
- Determine suitability of PEVs for their operations.
- Calculate total cost to own over expected life of the vehicle.
- Select appropriate models.

Generally, when analyzing a fleet's lifetime cost, the manager will need to have the following information:

- The current vehicle make and model being considered for replacement.
- The number of such vehicles being considered for replacement, and of those:
    - The number of such vehicles driven 70 miles or less in a 24-hour period;
    - The number of these vehicles parked for six or more hours in a 24-hour period on company property;
    - Similarity of daily/nightly route (same, similar, or wide variance).

For those managers who completed the survey and met with the Drive Electric Florida fleet team, a toolkit was provided to assist in the above actions. Contents of the toolkit can be found in Tools & Resources B-1: p. 146.

Tools for Calculating Costs

A number of tools also exist online to help fleet managers conduct cost assessments, emissions calculations, vehicle searches and more when planning – or deciding – to make the transition to electric fleet vehicles. Here is a list of some of those tools:

- Fleet info – planning to reduce petroleum tool: http://www.afdc.energy.gov/prep/.
- Green fleet emissions calculator: http://greet.es.anl.gov/carbon_footprint_calculator.
- EDF fleet calculator: http://business.edf.org/projects/fleet-vehicles/fleet-calculator.
- Model-base buying for fleet managers: http://www.fleetcarma. com/offer (30-day trial period).
- Vehicle cost calculator: http://www.afdc.energy.gov/calc/.
- Light duty vehicle search: http://www.afdc.energy.gov/vehicles/search/light/.
- Heavy duty vehicle search: http://www.afdc.energy.gov/vehicles/search/heavy/.
- EDTA-compiled fleet news: http://electricdrive.org/index.php?ht=d/Items/cat_id/27119/pid/27124/sortby/date/direction//paginateItems/5/paginateItemsPage/1/.

Fleet Case Studies

The Fleet Team met one-on-one with a number of fleet managers to determine next steps for fleet conversion and to develop case studies. Two complete narrative case studies are included below, with the remaining four case studies provided in Appendix D-5: Fleet Case Studies (p. 216). Each of these case studies includes the following:

- Nature of the business, including whether it is:
  - Public or private.
  - Large, mid-size or small.
  - Regional, state, or national.
- Fleet description, including:
  - Fleet size.
  - Vehicle types.
  - Miles driven per day.
  - Vehicle location while not driven.
  - Local, regional, statewide, or national route.
- Suitability, including:
  - Company or government incentives.
  - Lifecycle cost analysis.
- Outcome, including whether the business opted to:
  - Begin conversion steps.
  - Delay conversion steps.
  - Reject conversion steps.

Fleet Case Study #1: Palm Tran Mass-Transit Department

Background: Palm Tran is a mass-transit department located in West Palm Beach, FL, and is Palm Beach County's mid-size public agency that provides countywide public bus service. The department's fleet includes 151 mass transit buses (primarily 40-foot long) that span the largest county in the U.S., east of the Mississippi River, and includes some regional connectivity with Broward and Martin counties to the south and north of Palm Beach.

In addition to its buses, the Palm Tran fleet includes a large group of sedans that are used primarily by bus drivers when changing work shifts. These sedans are driven to points along a bus route where the driver begins his/her work shift and replaces the driver ending his/her work shift; the sedan is then returned to the bus depot.

There are nearly 80 such support vehicles, including Ford Taurus and Ford Focus sedans, in the agency's fleet. The Palm Tran Manager of Maintenance is the Fleet Manager (FM). He plans to replace 15 of the Taurus sedans in the near future. The vehicles, which are driven an average of 42 miles per day for six days per week, are parked for more than 14 hours during each 24-hour period at one of the two bus facilities. These cars are driven 52 weeks per year and are driven only about 5 percent of the time on the interstate highway or state turnpike systems.

Meeting Details: A two-hour meeting was held on January 8, 2013, at the Palm Tran offices in West Palm Beach with the Palm Tran Manager of Maintenance (FM), who makes fleet replacement and purchase decisions for the agency. The Southeast Florida Clean Cities Coordinator and Project Manager of the EV Community Readiness grant, FPL's Electric Vehicle Program Manager, and FPL's Manager of Vehicle Acquisition & Fuel comprised the grant team members who met with the FM.

These team members provided information about the grant, their roles in the grant, and the benefits of converting a portion of the Palm Tran fleet to electric. The FM then described his agency's operations, his interest in replacing some of the support vehicles with PEVs, and the nature of Palm Tran's vehicle-acquisition process. Following the meeting, the team accompanied the FM on a test drive of an FPL-owned Chevy Volt, explaining again some of the many operations and maintenance cost savings provided by PEVs and demonstrating the similarities between operating vehicles with internal combustion engines and those with electric batteries. The FM and team concluded their morning with an inspection of the Palm Tran parking area, which includes electrical outlets and a fueling station.

Potential for Conversion to Electric: The FM is interested in receiving more information about transit bus conversions to PEVs, and he cited one bus route that could be ideal for such a conversion. However, his primary interest in the immediate future remains in replacing some of the Ford Taurus support sedans with PEVs. Because these sedans are driven well under 70 miles daily and are parked at night on agency property at the two public bus depots, the all-electric Nissan Leaf is considered to be a good candidate for the Taurus replacements.

The FM indicated that purchase prices on transit-bus vehicle acquisitions are set by the Federal Transit Administration (FTA), and that the FTA provides 80 percent of the purchase-price funding for fleet acquisitions. His agency's primary interest when purchasing buses is, therefore, low operating and maintenance costs. For support vehicles that could include PEVs, however, Palm Tran uses the vehicle

purchase list published by the Florida Sheriffs Association, Florida Association of Counties, and Florida Fire Chiefs' Association.[223]

Fleet Case Study #2: City of Stuart, Martin County

Background: The city of Stuart is situated beside the Atlantic Ocean in Martin County between Palm Beach and St. Lucie counties. With a population of 15,600, the city has a public fleet of more than 150 vehicles that vary in size, from the size of a small golf cart to larger equipment, like waste disposal trucks.

The Public Works Director and Assistant Director are interested in replacing a 2000 Ford Taurus used for code enforcement, a 2006 Chrysler PT Cruiser used for parking enforcement, and four SUVs in the near future. The city's SUVs must be replaced with SUVs, and if there were plug-in SUV models on the market, the city might be interested in such models. They are not interested in plug-in conversion SUVs. Replacement of the Taurus and PT Cruiser with PEVs could be seriously considered, and city officials were impressed with a recent presentation from FPL on electric vehicles that included a Nissan Leaf.

Meeting Details: A 90-minute meeting was held on January 16, 2013, at the city of Stuart's offices with the city's Public Works and Assistant Public Works directors. While the directors make fleet-replacement and purchase decisions, those decisions are subject to approval by the City Commission. The Florida Clean Cities Coordinator, who is the Project Manager of the EV Community Readiness grant, met with the directors and provided information about the grant, as well as the benefits of converting a portion of this fleet to electric vehicles.

The directors then described their agency's operations, their interest in replacing some of the support vehicles with PEVs, and the nature of city's vehicle-acquisition process. They explained that the city of Stuart has a 100,000-mile, 10-year replacement policy. Like the Palm Tran Mass-Transit Department and Indian River County (see Appendix D-5: Fleet Case Studies, p. 216), the directors use the vehicle-purchase list of the Florida Sheriffs' Association, Florida Association of Counties, and Florida Fire Chiefs' Association.[224] Both men agreed that as a community leader, the city would have an interest in demonstrating reduced petroleum usage and responsible transitioning to alternative fuels. A first step could be replacing the above-mentioned Ford Taurus and Chrysler PT Cruiser.

The Ford Taurus, which is used for code enforcement, is driven about 5,000 miles per year, averaging 20 miles per day; however, there may be occasions when the vehicle would be driven over 70 miles per day. It is driven five days per week, 52 weeks per year, with about 10 percent of its travel on highways. The vehicle is housed at the city, and the length of time parked overnight varies.

The PT Cruiser, used for parking enforcement, is also driven approximately 5,000 miles per year and averages 20 miles per day, with very little chance of exceeding 50 miles per day. It is driven five days per week, 50 weeks per year, and is only driven on local city streets. This vehicle is housed at the city for more than 12 hours per night.

The Coalition's coordinator described the benefits of fleet conversions to electric and discussed the lifecycle cost calculations performed prior to the meeting. She then explained that these calculations would be updated with more accurate information attained during the meeting so that the directors would have the most

[223] The entire vehicle purchase list of the Florida Sheriffs Association, Florida Association of Counties, and Florida Fire Chiefs' Association is available at the following link: https://www.flsheriffs.org/uploads/12-20-0905%20Bid%20Award%281%29.pdf. This list is typically used by local government fleet managers. Sedans – both conventional and electric – are listed from pages 146 through 258.
[224] The entire vehicle purchase list of the Florida Sheriffs Association, Florida Association of Counties, and Florida Fire Chiefs' Association is available at the following link: https://www.flsheriffs.org/uploads/12-20-0905%20Bid%20Award%281%29.pdf. This list is typically used by local government fleet managers. Sedans – both conventional and electric – are listed from pages 146 through 258.

accurate information possible when making their decisions and discussing the conversion with city officials. She also assured the directors that FPL staff would be happy to bring a Chevy Volt or Nissan Leaf to the city in the near future for the directors to ride and drive. At that time, the city's parking area can be inspected to determine the ease with which EVSE can be installed.

Potential for conversion to electric: The directors' primary interest in the immediate future is to replace the Ford Taurus with a Chevy Volt and the PT Cruiser with a Nissan Leaf. Because there are occasions when Code Enforcement may drive in excess of 70 to 80 miles in a day, the Volt could be a reasonable vehicle, as it is a PHEV that provides the option of significantly extending its total range with gas. Vehicle replacement for Parking Enforcement, however, could be accomplished with a Nissan Leaf. The directors liked the idea of piloting two different types of PEVs.

Purchase price is an important factor to be considered, and the lack of a tax credit in fleet acquisitions creates a longer time frame before an overall cost savings can be expected from a PEV. The city will also evaluate and consider the pros and cons of both leasing and purchasing PEVs. With the city of Stuart's 2014 budget year beginning in October 2013, the initial outcome assessment is to begin steps to prepare for conversion of these two sedans to electric.

In a follow-up visit on February 5, 2013, the Project Manager and FPL staff brought a Nissan Leaf and Chevy Volt to the city so that the directors could test-drive each vehicle. They remain committed to replacing two vehicles with PEVs. However, the directors have decided to maintain continuity in their fleet by ordering a Ford Fusion Energi and/or a Ford Focus Electric model in the upcoming fiscal year budget since the majority of their fleet is from Ford.

The remaining four case studies are provided in Appendix D-5: Fleet Case Studies (p. 216).

Continued Fleet Adoption Facilitation

The completion of this grant is the beginning of the Drive Electric Florida fleet outreach campaign as the Coalition and other interested stakeholders continue to educate fleet managers who are leveraging the expanding influence of large PEV fleets, regional knowledge gained, and tools developed that will support this continued mission.

During the fleet manager meetings, cited earlier in this text and in the appendix, it was apparent that public fleet managers are typically required to order vehicles from purchasing lists. It is critical for publishing agencies to maintain updated lists of vehicle models so that fleet managers can select from the growing number of PEVs available on the market.

Initial vehicle costs are generally a primary factor as fleet managers seek to justify their purchase preferences. How vehicles are funded can also impact a fleet manager's vehicle-selection process. For example, when purchasing mass-transit buses, 80 percent of the purchase cost may be covered by the Federal Transit Administration (FTA), which equates to less emphasis being placed on the initial purchase price and greater emphasis on overall vehicle lifetime cost and operating/maintenance costs. Large fleet operators that belong to EPAct may need to balance initial vehicle cost constraints with the requirement for 75 percent of their vehicle purchases to be alternative-fuel purchases. The Southeast Florida Clean Cities Coalition is committed to continued and active support of fleet managers as they determine when and how to introduce PEVs into their fleets.

Tactics that are part of the Creating Education & Outreach Opportunities (p. 6-116) section of this report will help support this ongoing fleet engagement. Efforts include:

- Newsworthy updates of fleet conversions, both regionally and nationally, posted on the Drive Electric Florida webpage and in email messages to fleet managers.
- Team Leads of this grant effort will attend selected upcoming fleet manager conferences and meetings, staffing informational booths with fleet-adoption toolkits that will be given away to managers completing the Fleet Manager PEV Survey described above.
- One-on-one site visits that include lifecycle cost analyses with fleet managers will continue to be scheduled by the Coalition. Fleet mechanic training opportunities will be sought to support PEV adoptions.
- As the Drive Electric Florida campaign continues, the Coalition and FPL will begin to work with other interested parties in Florida, including other Clean Cities Coalitions in Florida, to take the message statewide, seeking state incentives for PEVs and charging infrastructure.

Creating Education & Outreach Opportunities

One of the largest barriers to plug-in electric vehicle (PEV) adoption is lack of broad consumer awareness and understanding of PEV technology, as well as understanding and education among key stakeholder groups that will implement the infrastructure and policy enabling PEVs to flourish. The plan below provides a strategy for creating awareness, education, and enthusiasm for PEVs in the Region.

Communications Goals and Objectives

Goal: Communications will support the project goals of: increasing adoption of PEVs and deploying related (charging) infrastructure and policies within Southeast Florida – including a future demonstration project along the U.S.-1 mass-transit corridor (Miami-Dade U.S.-1 Clean Transportation Corridor Project).

Objectives: Messaging and tactics will address the full spectrum of communications needs – from generating awareness, to closing technology information gaps, and providing specific education and training. Objectives include:

- Create broad awareness, enthusiasm, and acceptance for PEVs among Region's drivers – ultimately increasing PEV trials and test drives and acceptance of the U.S.-1 Corridor Project.
- Educate businesses and organizations responsible for implementing public and semi-public charging infrastructure – including the homeowners' associations (HOAs) and property managers of multi-unit dwellings, large employers, business owners, and local/state government officials and agencies.
- Educate and train public officials and local governments on favorable zoning, coding, and permitting policies for charging infrastructure, as well as first response to PEV or electric vehicle supply equipment (EVSE) accidents.
- Educate key stakeholders – particularly government and consumers – about progress and benefits of the U.S.-1 Corridor Project and how it supports their respective goals and initiatives.

Target Audiences

Target Region: Like the rest of this plan, the project area is defined by Monroe, Miami-Dade, Broward, Palm Beach, Martin, St. Lucie, and Indian River Counties (Region), representing 33 percent of Florida's population.

Key Audiences and Stakeholder Organizations Within the Region: Communications will focus on audiences necessary for driving broad PEV adoption and EVSE implementation. The table matrix below outlines key audiences, as well as examples of important stakeholders that will enable the project team to reach key audiences. These stakeholder organizations are *in addition to* existing channels available through the Southeast Florida Electric Vehicle and Infrastructure Alliance (Alliance Partners).

Table 10: Education and Outreach Plan: Target Audiences & Examples of Key Stakeholders

Audiences Defined	Examples of Stakeholder Organization Targets
Consumers/General Public: To drive broad PEV adoption, consumers must understand PEV basics, understand and embrace PEV benefits, have knowledge of available incentives (including tax rebates and HOV lane/preferred parking access), and have easy access to information addressing barriers to PEV adoption and technology information gaps.	-**Florida Power & Light** (project partner): 4.6 million customer accounts in Florida. -**Other utilities in the Region**: Vero Beach Electric, Ft. Pierce Utility Authority, Florida Municipal Electric Association, Lake Worth, and others. - **Southeast Florida Regional Partnership's Seven50: Southeast Florida Prosperity Plan:** Comprised of 200 public and private organizations; many have newsletters that can be leveraged as communications vehicles. -**City/county governments.** -**Elementary and secondary schools** within the Region.
Large Employers (Workplace Site Hosts): While most PEV owners will charge at home (if accessible), workplace charging is necessary to help consumers overcome "range anxiety," and maximize electric miles for plug-in hybrid electric vehicle (PHEV) and extended-range electric vehicle (EREV) owners. Because of the complexities of offering workplace charging, a good deal of outreach must be conducted among local employers and businesses. The Region's largest employers, including local colleges and universities, will be targeted.	-**U.S. Green Building Council**: To reach LEED businesses. -**Florida Educational Facilities Planners' Association, Inc.** (http://www.fefpa.org/mission.html): To reach educational facilities' planners. -**Building Owners and Managers Association (BOMA) – Fort Lauderdale/Palm Beaches** (http://www.bomaftlpb.org/): Targeting commercial building owners. -**Associated Builders and Contractors, Inc. (ABC of Florida)** (http://www.abcflorida.com/About_Us.aspx): To influence commercial and industrial construction. -**Local Chambers of Congress**: South Florida, Miami-Dade, Hollywood, Pompano Beach, and Broward all have local chapters. -**South Florida Commuter Services**: Regularly speak with employers in the Region regarding car-sharing programs, and could serve as a resource for outreach. -*Business Journal of South Florida:* Public relations vehicle for reaching 50,000+ business leaders through paid lists and media relations efforts.
Fleets/Fleet Managers: Fleets are groups of motor vehicles owned or leased by a business, manufacturing facility, or government agency for official/business purposes. Converting fleets is one of the best ways to meet the team's goal of driving broad PEV adoption in the Region. The Drive Electric Florida team has already engaged many fleets in the development of this report.	-**Florida Association of Governmental Fleet Administrators** (FLAGFA). -**National Association of Fleet Administrators** (NAFA) local chapter. -**South Florida Manufacturers' Association.** -**Volusia Manufacturers Association.** -**Florida Department of Transportation.** -**South Florida Regional Transportation Authority.** -**Local/city governments.** -**Other state-level government departments** (included in plan below).

Homeowners' Associations/Property Managers (Multi-Unit Dwellings/Residential Site Hosts): Most PEV owners will charge their vehicles at home, and given that southeast Florida has such a high percentage of residents living in multi-unit dwellings (more than 40 percent), charging infrastructure is necessary for renters and condo dwellers. This audience includes property managers, HOAs, builders of new multi-unit dwelling construction, and residents.	**-Community Association Institute**: Provides education and resources to those governing community associations. **-Construction Executives Association** (South Florida) (http://www.constructionexecutives.org/): Reaching South Florida builder executives. *Monthly educational meetings.* ***Florida Community Association Journal:*** Vehicle for reaching HOAs/community managers. **-U.S. Green Building Council – South Florida Chapter**: For outreach to existing LEED rental/condo buildings.
Government/Public Officials – *Related to Zoning, Coding, Policies, and Permitting*: Public officials – at the city, county, and state level – will be engaged to ensure best practices pertaining to coding, permitting, policies, and zoning are in place to facilitate PEV adoption. Public officials at the local level who are responsible for the training of "first responders" will also require training. Additionally, fleet information will also be shared with government.	-**City governments** (100 cities) via Clean Cities organization. -**County governments.** -**State-level departments**, including: Florida Department of Agriculture, Florida Department of Transportation, Florida Department of Environmental Protection, and others (see below). -**Regional agencies**, including Southeast Florida Regional Transportation Council and the South Florida Regional Transportation Authority. -**Metropolitan Planning Organizations (MPOs).** -**Local government grant offices**, to be alerted for implementation funding.
Government/Public Officials – *Related to US-Corridor 1 Project:* Stakeholders for this project extend beyond government, including consumers, academic organizations, local businesses, and more, but a strong foundation is dependent on support from key government organizations – especially on the coding, zoning, and permitting components.	-**Miami-Dade County.** -**Key City Governments**: City of Miami, City of Coral Gables, City of South Miami, Village of Pinecrest, and others (see below). -**Florida Department of Transportation** (District 6). -**Miami-Dade Metropolitan Planning Organization.**

Communications Strategy

The strategy will leverage a variety of newly created content that can be repurposed, along with "free" or currently available resources, audience contacts, experts, events, and communications channels to reach key audiences, leveraging material from reputable sources when possible (see Appendix E-2: Examples of Third-Party Communications Resources to Leverage in Outreach, p. 224). The Tools section of this report also provides examples of fact sheets to targeted audience groups.

Leveraging the Project Partner Community to Reach Key Audiences

The existing Southeast Florida Electric Vehicle and Infrastructure Alliance project team (the Alliance partners) – made up of the South Florida Regional Planning Council and its Southeast Florida Clean Cities Coalition, in partnership with FPL and a number of organizations and individuals – has a broad network and many key stakeholder partners and connections, including organizations like the Southeast Florida Partnership that is already committed to supporting planning for PEVs and EVSE in the Region. Alliance partner channels that will be leveraged to reach multiple audience segments include, but are not limited to:

- FPL e-newsletters, print publications, and social media channels.
- Clean Cities email distributions of over 60 private members stakeholders and hundreds of interested parties, including state government, counties, municipalities, universities, companies and businesses, utilities, and vehicle providers.
- South Florida Regional Planning Council (SFRPC) email outreach.
- SFRPC's Seven50: Southeast Florida Prosperity Plan newsletters sent from SFRPC, reaching more than 200 public/private organizations.

Outreach Through Key Stakeholder Groups

The plan will rely on communications and relationships with key stakeholder groups that have strategic influence over audience segments as outlined in the table above. In addition to customized communication outreach by audience, a general presentation and press release will be created upon the completion of this plan to encourage broad distribution of the findings and elements within this report.

Creating Communications Materials with the Greatest Mileage

Communications tactics and materials will be created so they can be repurposed in/at a myriad of events and channels.

Reinforcing National PEV Campaign Messaging

The Electric Drive Transportation Association (EDTA), a national organization working to advance adoption of PEVs across America, is developing a national education and awareness campaign based on research and membership input.[225] The EDTA messaging will be incorporated into outreach materials where relevant.

Tactics and Communications Channels, by Audience Group

Communications tactics will be designed to:

- Broadly communicate benefits of PEVs and public charging infrastructure – closing technology-information gaps among key audiences and stakeholders.
- Directly address barriers and concerns related to adoption of PEVs and EVSE.
- Provide details, next steps, and training tips for individuals and organizations looking to purchase PEVs, implement a PEV fleet, or deploy public-charging infrastructure.

The summary table on the following page provides an overview of tactics by audience.

[225] Electric Drive Transportation Association (EDTA). National Education Campaign. Online. Available: http://electricdrive.org/index.php?ht=d/Items/pid/29114/xcids/28604. Accessed: October 2012.

Table 11: Summary of Outreach Tactics and Channels by Target Audience Segment

Tactic	Channels	Target Audiences						
		Consumer	MUD – HOA	Employer	Builder	Fleets	Policy/Govt	Site Hosts
Fact Sheets/Brochures	Web Events Email Outreach Partner/ Stake-holder channels							
MUD Charging		X	X					X
Workplace Charging		X		X				X
Siting			X	X	X	X	X	X
Equipment Selection			X	X	X	X	X	X
Fleets						X	X	
Facts & Myths		X	X	X	X	X	X	X
Overview/Benefits		X	X	X	X	X	X	X
Codes, Policies, Ordinances							X	
Public Charging Priorities			X	X	X		X	X
Articles/Canned Content								
PEV owner testimonials	Newsletters Journals Partner/Stake-holder channels	X	X				X	
Site host testimonials			X	X	X		X	X
PEV benefits		X	X	X	X	X	X	X
PEV incentives		X	X			X		
Facts & myths		X				X	X	
Audience-specific			X	X	X	X	X	X
Presentations								
Multi-unit Dwelling Charging	Direct outreach Events Conferences	X	X					X
Workplace Charging		X		X				X
Siting			X	X	X	X	X	X
Equipment Selection			X	X	X	X	X	X
Fleets						X	X	
Overview/Benefits		X	X	X	X	X	X	X
Policy, incentive changes							X	
School Package		X						
U.S.- Corridor-1 Updates							X	
Display and Promotional Items								
Booth signage	Web Events	X	X	X	X	X	X	X
Table cloth		X	X	X	X	X	X	X
Stickers/shirts/hats		X						
Web								
Website	Web	X	X	X	X	X	X	X

The below communications plan is broken down into **two parts for each audience group**:

1. Communications tactics.
2. Communications channels for distribution.

Audience 1: Consumers/Public

Consumer Tactics:

These PEV "101" tactics will create awareness of PEVs and the U.S.-1 Corridor Project, providing a foundation to build from when developing materials for all audience groups.

- ***Website*** (www.DriveElectricFlorida.org and www.FPL.com/EV, under development), serving as an informational hub. DriveElectricFlorida.org will include:
  - **Home page**: Project overview and goals, highlighting PEV benefits.
  - **PEV benefits and features**: For consumers, businesses, fleets, and government, including information on incentives.
  - **Charging infrastructure:** Types, public/private, features, and options.
  - **Audience-specific pages**: Workplace/employer, multi-unit dwelling, fleet, government, and consumer.
  - **U.S.-1 Corridor Project**: Information, updates, and how to get involved.
  - **About**: Project background and details on partner organizations and the grant.
  - **Frequently asked questions (FAQs)**: General FAQs.
  - **Resources:** Links to industry resources and partner sites, including tools, like cost/maintenance calculators for consumers and fleets.
  - **Contact info page/next steps.**
- ***PEV 101 Overview Presentation*:** A PEV overview presentation for multiple venues, also serving as a starting point for presentations for each individual audience listed above.
- ***Education Presentation:*** With age-appropriate, interactive content to be used in local schools.
- ***Siting and Equipment Selection Presentation – Across Audiences*:** In addition to audience-facing presentations, siting and equipment selection will be relevant for multiple audiences.
- ***Brochures/Fact Sheets***: These will be shared with all other audiences. They can be found in the Tools section of this report (Tools and Resources, p. 133).
  - **Overview fact sheet:** Benefits, incentives, and more.
  - **PEVs myths versus facts fact sheet:** Addressing common misconceptions with truth.
  - **Priorities and considerations for public charging.**
  - **Siting considerations for charging stations.**
  - **Audience-specific fact sheets**:
    - Workplace charging.
    - Multi-unit dwelling charging.
    - Fleet adoption of PEVs.
- ***Public Relations (PR):*** PR campaign to announce key project milestones. For example:
  - Final report submission to Department of Energy (DOE) with relevant details (Spring 2013).
  - Website launch (2013).
  - Community events, such as National Plug-In Day or Ride-and-Drive Events.
  - Customer testimonials.
  - U.S.-1 Corridor Project updates.
- ***Articles, Blog Posts, Testimonials ("Canned Content"):*** Articles and news stories for web and newsletter placement in partner, stakeholder, and news channels (~200 words), including the following pieces developed as part of this grant project:

  - An introduction to PEVs and benefits.
  - Myths and facts.
  - Federal/state/local incentives available.
  - Updates on the U.S.-1 Corridor Project and how to get involved.
  - PEV owner testimonials (see examples of current testimonials now available online in Appendix E-5: Examples of Current PEV Communications Content, p. 232).
- ***Venue Signage, Displays, and Promotional Items/Giveaways***: For various events, focused on key PEV benefits, including:
  - Signage and tablecloths.
  - Giveaways: Stickers, shirts, and hats – potentially to sell in support of ongoing work.
- ***Electronic Communications Toolkit***: To provide as email/HTML to project partners and key stakeholders with links and downloads to communications resources.
- ***Test Drives*:** While not a tactic, per se, events will be leveraged to provide PEV test drives.
- ***Informational Kiosk***: Touchscreen, informational kiosks to be used along highway (U.S.-1 Corridor Project) to educate consumers interested in learning more about PEVs. This would be dependent, long-term, on whether the project obtains implementation funding.

Consumer Communication Channels:

- ***Community Events***. The Alliance partners participate in more than 50 community events annually, which can be leveraged – along with other partner events – to drive PEV awareness and test-drives. Events include:
  - Clean Cities Coalition Meetings.
  - Ride-and-Drive Events.
  - National Plug-In Day.
  - Miami International Auto Show.
  - And others – such as fairs, home shows, and the like. For the working 2013 event list, please see Appendix E-1: Sample of Community Events for Audience & Stakeholder Outreach (p. 220).
- ***Partner Communication and Key Stakeholder Channels***: Alliance partners and key community stakeholders will be sent a Communications Toolkit (described above) and encouraged to use relevant pieces and distribute through their internal and external communications channels.
- ***Florida Driver Touch-Points*:**
  - **Local car rental companies**: Alliance partners will leverage existing relationships.
  - **Department of Motor Vehicles (DMV) locations:** Leverage South Florida Regional Planning Council's relationships with DMVs in cities/counties that are part of the Southeast Florida Clean Cities Coalition, and provide brochures, collateral, and posters touting PEV benefits to generate awareness. DMVs have been willing in the past to play looped videos for other campaigns.
  - **Turnpike Rest Stops**: Generate awareness with collateral and posters.

Audience 2: Employer Site Hosts – Workplace Charging

Employer Tactics:

- ***Workplace Charging Fact Sheet*:** Covering the rationale for workplace charging infrastructure; issues, decisions, and solutions; and approaches for installation and policy. A variation for academic organizations will also be developed.
- ***Infrastructure/Fleet Fact Sheets*:** Applying to multiple groups, these fact sheets include:
  - Charging infrastructure siting fact sheet.
  - EVSE equipment and feature selection fact sheet.
  - Vehicle fleet fact sheet (more information below).
  - Developed fact sheets are available in the Tools & Resources section of this report (p. 133).
- ***Articles and Testimonials***:
  - **Testimonials**: FPL plans to compile workplace charging testimonials and case studies from the community to disseminate through customer-communications channels.
  - **Articles**: Workplace charging article on value of workplace charging and key steps for getting started on charging initiative – for use in business channels.
- ***Workplace Charging Presentation*:** For use with major employers.
- ***Website Section***, including:
  - Benefits and rationale for offering workplace charging.
  - Details on incentives and funding opportunities that exist.
  - Links to information on how to plan for installing workplace-charging infrastructure.
  - Downloadable fact sheet(s).
  - Contact information for help getting started.

Employer Outreach Channels:

- ***Ongoing Stakeholder/Partner/Employer Outreach***: This includes outreach to stakeholders listed in the table above (Table 10: Education and Outreach Plan: Target Audiences & Examples of Key Stakeholders). Additionally, project partners will identify and reach out to key business contacts with charging information, resources, and invitations for one-on-one meetings. Targets will be identified through the following, as a starting point:
  - Department of Transportation, which has a list of employers owning PEVs.
  - South Florida Commuter Services.
  - Florida Power & Light.
  - South Florida Regional Planning Council.
  - Southeast Florida Clean Cities Coalition.
- ***One-on-One/Face-to-Face Meetings/Workshops***: Conducted on-site for employers interested in establishing a workplace charging program or policy.
- ***Third-Party Events – Speaking Engagements/Exhibits***: For example:
  - **Florida Education Facility Planners Association Meeting**: Provides an avenue for exhibiting and speaking on benefits of university-charging infrastructure.
  - **South Florida Building & Facility Maintenance Show:** Focused in its reach to building and facilities managers on topics of energy efficiency, technology, and sustainable and green buildings. Website: http://www.fb-fm.com/index.html.
  - **South Florida Chamber of Commerce 2013 Business Expo**: This event – with 21,000 exhibitors and many more attendees – provides a way to engage with a broad audience and create "mass market" exposure with an exhibit space.

  - **South Florida Business Journal Business Growth Expo (exhibiting), put on by *South Florida Business Journal***: Business networking event targeting executive-level leadership in community. Website: http://www.bizjournals.com/southflorida/event/73971.
  - **Florida Energy Summit, put on by Florida Department of Agriculture**. In addition to hosting government employees/attendees, the Summit provides valuable information to local employers and provides a venue for Alliance partners to present information related to PEV charging at the workplace: http://www.floridaenergysummit.com/agenda.html.
- ***Public Relations***: Reach business publications (i.e. *South Florida Business Journal*), business sections of local newspapers, and stakeholder channels with news, resources, and articles related to workplace charging.

Audience 3: Multi-Unit Dwelling Site Hosts: HOAs/Property Managers

Multi-Unit Dwelling Tactics*:*

- ***Charging Fact Sheet*:** Covering rationale for supplying multi-unit dwelling charging infrastructure; issues, decisions, and solutions; and approaches for installation and policy.
- ***Infrastructure Fact Sheets*:** These also apply to multi-unit dwellings:
  - Charging infrastructure siting fact sheet.
  - EVSE equipment and feature selection fact sheet.
  - Overview fact sheets – benefits and myths and facts.
  - Fact sheets are available in the Tools & Resources section of this report (p. 133).
- ***Articles and Testimonials***:
  - **Articles**: Focused on value of offering multi-unit dwelling charging and steps for getting started.
  - **Testimonials**: Testimonials and case studies from apartments, condos, and other multi-unit dwellings currently offering charging infrastructure to residents.
- ***Charging Presentation*:** For HOA and community manager meetings.
- ***Toolkit:*** In addition to testimonials, this online toolkit will include examples of resident agreements, surveys, and building guidelines from multi-unit dwellings with charging infrastructure already in place.
- ***Website Section***, including:
  - Benefits and rationale for offering charging at multi-unit dwellings.
  - Planning, policy, and infrastructure information.
  - Links to valuable multi-unit dwelling charging resources – including existing training materials, like EVSE installation and training videos from Clean Cities (examples in Appendix E-2: Examples of Third-Party Communications Resources to Leverage in Outreach, p. 224).
  - Downloadable fact sheet(s).
  - Contact information for help getting started.

Outreach Channels:

- ***Key Stakeholder/Partner Outreach – Ongoing***: Including community manager associations, construction organizations, etc. – listed in Table 10: Education and Outreach Plan: Target Audiences & Examples of Key Stakeholders (above).
- ***Direct Outreach to HOAs and Community-Management Associations***: Reach out with information, resources, and invitations to participate in face-to-face meetings.

- ***Face-to-Face Meetings at HOA***: For those interested in multi-unit dwelling charging programs or policies.
- ***Public Relations***: Outreach to editors, niche publications (i.e. *Florida Community Association Journal*), and association newsletters with news, articles, and resources.
- ***Third-Party Events – Speaking Engagements/Exhibits*:**
    - For example, the **South Florida Condo and HOA Expo – Miami Beach Convention Center, April 11, 2013:** Targeting condo and HOA board members – to generate awareness and follow-up meetings. Website: http://www.condohoaexpo.com/request_info.aspx.

Audience 4: Fleets and Fleet Managers

A good deal of work has been done to engage fleets within the Region already. This includes a survey sent to 200 Regional fleet managers in August 2012. An outcome of this work was the development of six case studies, as well as key lessons that can be leveraged in communications work going forward, including:

- The development of a targeted outreach list of 200 fleet managers.
- Insights on the most effective means for reaching fleet managers – including direct outreach by phone.
- And more. Details are available in the Facilitating Fleet Adoption section of this report.

Proposed Tactics and Current Materials Underway:

- ***Electric Fleet Fact Sheet*:** For use with Regional fleets, including key benefits, resources, links to tools for calculating ROI, costs, benefits, and tips for getting started (See Tools & Resources B-2: Fleet Fact Sheet, p. 149).
- ***Infrastructure Fact Sheets*:** Applying to multiple groups and applicable to fleets:
    - Charging infrastructure siting fact sheet.
    - EVSE equipment and feature selection fact sheet.
- ***Fleet Toolkit*:** This toolkit includes resources to help fleet managers:
    - Analyze how their vehicles are used.
    - Assess how many miles per day the vehicles are driven, the length of time those vehicles are not in use during a 24-hour period, and where those vehicles are located when they are not being driven.
    - Determine suitability of PEVs for their operations.
    - Calculate the lifecycle cost.
    - Select appropriate models.
    - Links to the full contents of this toolkit can be found in Tools & Resources B-1: Electric Vehicle Fleet Conversion Toolkit (p. 146).
- ***Completed Case Studies*:** Six completed case studies, referenced and included in the Facilitating Fleet Adoption section above, as well as in Appendix D, will be shared with fleet managers throughout the Region.
- ***Fleet PEV Presentation*:** For use in presentations/events involving fleets.
- ***Articles***: Covering the benefits of converting vehicle fleets to PEVs – for relevant channels.
- ***Website Section***, including:
    - Benefits and rationale for converting vehicle fleets to PEVs.
    - Links to fleet resources and information online.
    - Downloads of case studies, testimonials, and fact sheets.

Fleet Outreach Channels:

- *Key Stakeholder Outreach – Ongoing*: Key outreach to the fleet stakeholders identified above (Table 10: Education and Outreach Plan: Target Audiences & Examples of Key Stakeholders).
- *Direct Outreach*: The Coalition will continue to reach out to fleets with relevant PEV information (including the developed case studies), PEV surveys, and the fleet toolkit. In addition to ongoing outreach to the existing list of 200 Regional fleet managers – compiled from contacts at the National Association of Fleet Administrators (NAFA), members of the Florida Association of Government Fleet Administrators (FLAGFA), fleet managers already affiliated with the Southeast Florida Clean Cities Coalition, and others – an ongoing effort will also be made to reach additional private fleets. Outreach will be conducted to fleet managers via:
  - Florida Department of Transportation.
  - South Florida Regional Transportation Authority.
  - County and local government fleets in the Region, including police, fire, and parks departments.
  - Private fleets including UPS, Hertz, Enterprise, and others.
- *Public Relations*: Outreach to relevant trade association/stakeholder newsletters and business publications with fleet information, announcements, and articles/resources.
- *Third-Party Events – Speaking Engagements/Exhibits*: For example:
  - **Florida Association of Governmental Fleet Administrators 2013 conferences**.
  - **South Florida Manufacturers' Association Annual Meeting and Symposium** (an event supported by FPL currently).
  - **Volusia Manufacturers Association Expo/Showcase** (an event supported by FPL currently).

Audience 5: Government/Public Officials

The purpose of government outreach is three-fold:

(1) To communicate and drive necessary changes based on Drive Electric Florida's findings related to EVSE-supportive codes, policies, ordinances and incentives, targeting:
   a. **State-level government**: Related to uniform codes (signage and accessibility), favorable PEV and EVSE policies for the state, and statewide incentives.
   b. **County governments**: Related to PACE financing.
   c. **County/local governments**: Related to streamlining the permitting process.
   d. **County/local governments**: Related to revising land-development regulations regarding charging stations allowed as-of-right in all zoning districts, parking space allocation, ADA accessibility, signage, and permitting.
   e. **County/local governments:** Related to utilization of eligible PEV, EVSE, and car-sharing credits when encouraging or seeking sustainable green building certification.

(2) To continue government engagement for the U.S.-1 Corridor Project.

(3) To share information on first response and safety training with local/county governments responsible for providing emergency services.

Proposed tactics and outreach channels are listed on the following pages.

(1) Communication Tactics and Outreach – Codes, Policies, Ordinances, and Incentives

Government outreach is directly tied to the recommendations outlined in the Summary of Recommendations in this report (starting on page 7).

Tactics: The best approach with government officials is often face-to-face meetings; therefore, the most effective communications materials will include those that facilitate and support meetings, such as: outreach letters, presentations, and leave-behinds (i.e. fact sheets). Tactics and communications materials are based directly on recommendations in this report. Recommendations include the following, with audience details in *italics,* if appropriate:

- **Presentations and accompanying fact sheets/leave-behinds related to**:
  - Suggested new financial and non-financial incentives for PEVs and EVSE implementation, as outlined in the report – *to be used with Florida State Legislature.*
  - Suggested revisions to existing local land-development regulations (LDR) – *to be used with local governments and the Florida State Legislature, as appropriate.*
  - Educational presentation and materials on permitting to help streamline the processes for the approval of EVSE permits at the local/county level – *for local (city/county) permitting offices to provide to consumers and contractors.*
  - Information on PACE Funding – *to be shared with seven counties in the Region to encourage use.*
  - Information for local governments to utilize, and encourage developers to utilize, in regard to eligible PEV, EVSE, and car-sharing credits when seeking LEED and/or Florida Green Building Council (FGBC) certification – *for use with city/county governments.*
  - Encouraging national standards for accessibility, based on the Americans' with Disability Act (ADA).
- **Dedicated pages on website**: Including information related to necessary policy, codes, and ordinances to facilitate PEV and EVSE adoption with downloadable fact sheets and presentations, as relevant.

Proposed outreach channels: While the best and most impactful approach will be to continue conducting direct outreach, broader channels – including events and a web presence – will also enhance communications effectiveness. The following outreach activities are proposed:

- *Direct Outreach – Email/Mail/Phone*: For project updates and to set up face-to-face meetings.
- *Face-to-Face Meetings*: With interested government officials.
- *Annual Stakeholder Summit – for Government VIPs*: Building off the 2011 summit hosted by FPL. This summit will aim to share best practices and lessons learned related to policy, zoning, and permitting with government VIPs in high-impact positions that can help drive favorable policy and regulation, including:
  - Florida Department of Agriculture.
  - Florida Department of Transportation.
  - Florida Department of Environmental Protection.
  - Major county and city governments, including the City of Miami.
  - A summary of the 2011 summit is located in Appendix E-4: Outcomes from Fall 2011 PEV Stakeholder Summit (p. 229).

- *Third-Party Events – Speaking Engagements/Exhibits*:
  - **The Florida Energy Summit, hosted annually by the Florida Department of Agriculture**. The Drive Electric Florida team members will share best practices and lessons learned related to policy, zoning, and permitting with government officials in attendance. More details on the conference are available here: http://www.floridaenergysummit.com/agenda.html.

(2) Tactics and Outreach – U.S.-1 Corridor Project

Information on the U.S.-1 Corridor Project can be found in the following section of this report and in Volume II, available at www.DriveElectricFlorida.org.

The U.S.-Corridor 1 team will provide updates on project planning and how it supports government's current goals and initiatives. The policy and incentives information above will also be relevant to the U.S.-1 Corridor Project and will be shared as appropriate.

Tactics:

- **U.S.-1 Corridor Project Presentation**: For use in one-on-one meetings and at events.
- **Dedicated Pages on Website:** With updates, milestones, and how to get involved.

Outreach: Outreach will primarily be via one-on-one meetings with key organizations and government stakeholders necessary for getting this project off the ground. These include:

- Miami-Dade County Board of County Commissioners.
- Miami-Dade Transit staff.
- Miami-Dade County Department of Regulatory and Economic Resources.
- Miami-Dade Metropolitan Planning Organizations.
- Miami-Dade County Planning Department.
- Miami-Dade County Public Works staff.
- Miami-Dade Internal Services Department staff.
- Florida Department of Transportation, District 6 staff.
- City of Miami Commission and staff.
- City of Miami Parking Authority.
- City of Coral Gables Commission and staff.
- City of South Miami Commission and staff.
- Village of Pinecrest Council and staff.
- Village of Palmetto Bay Council and staff.
- Town of Cutler Bay Council and staff.
- Interested car-sharing operators.
- Interested EVSE providers/operators.

(3) Tactics and Outreach – Safety Training

Very simply, links to available training materials will be provided to the appropriate contacts within local/city governments. Information on available safety training can be found in Appendix E-2: Examples of Third-Party Communications Resources to Leverage in Outreach (p. 224).

Executing Education and Outreach Tactics

Fact sheets, articles, and presentations that have been created will be leveraged by the Drive Electric Florida team and Alliance partners in their respective communications channels, at events in the community, and through key stakeholder organizations as outlined above.

Developing Plans for Miami-Dade U.S.-1 Clean Transportation Corridor Project

Volume II of this plan, available at www.DriveElectricFlorida.org, details a future demonstration project designed to accelerate large-scale adoption of clean-transportation technologies.

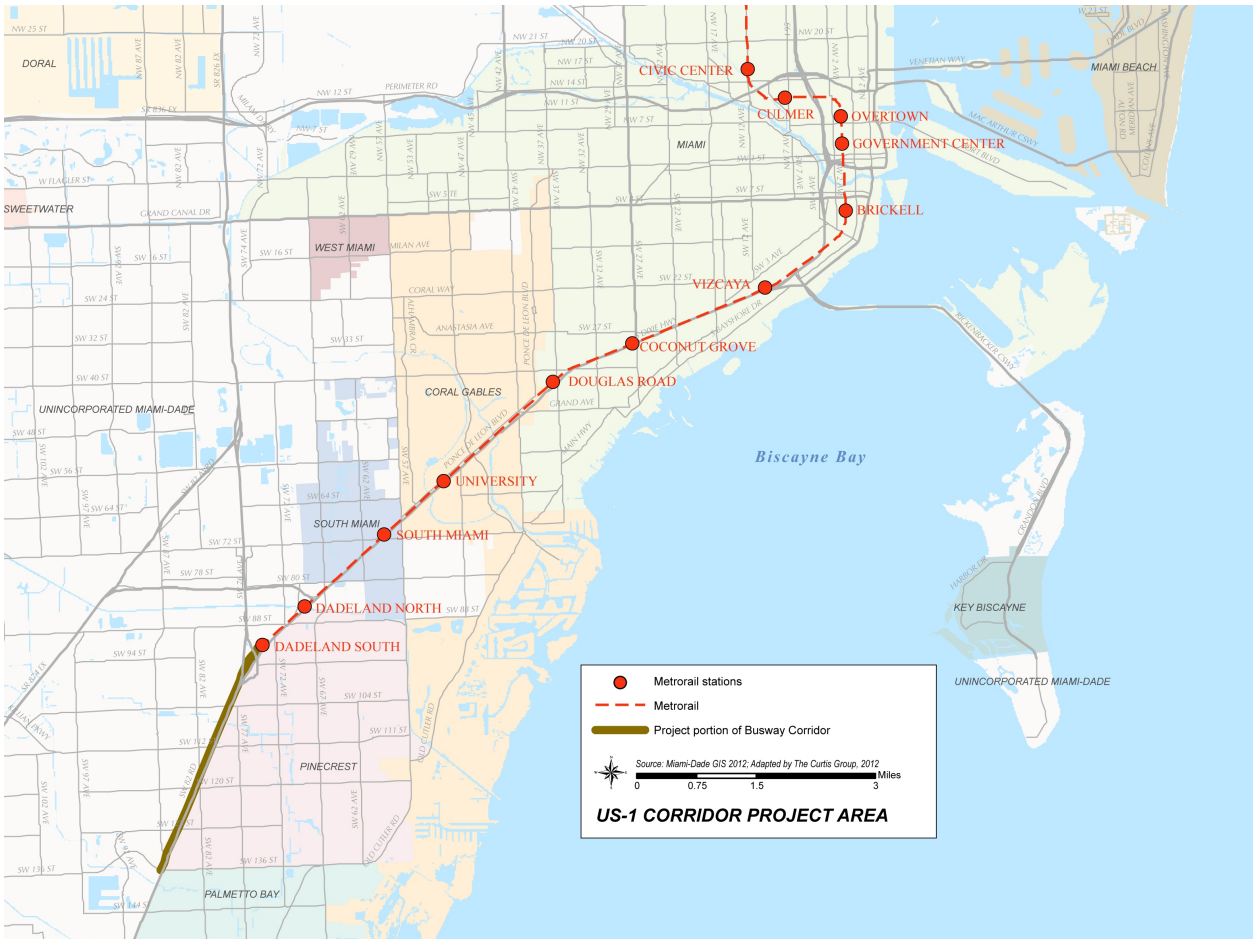
The Miami-Dade U.S.-1 Clean Transportation Corridor Project (U.S.-1 Corridor Project) is also funded through a DOE grant to the South Florida Regional Planning Council and its Southeast Florida (Gold Coast) Clean Cities Coalition. The Master Plan reflects the instrumental input and guidance of PEV and EVSE industry experts, car-share practitioners, U.S.-1 Corridor stakeholders, and local government staff.

This future demonstration project is designed to accelerate the large-scale adoption of PEVs and EVSE in a major metropolitan area in the southeastern United States. This plan is designed to capitalize on, and extend, the area's existing mass-transit footprint. The intention is to expose up to 55,000 commuters per day to self-service rental/car-share and electric vehicle charging opportunities. The project has been designed to explore whether low-cost commuter access to electric vehicles and infrastructure can accelerate the adoption of these technologies and/or create incentives for increased use of regional transit services. Fundamental to the approach is the use of car sharing to advance PEV adoption by addressing user adoption barriers including:

- *Purchase, Depreciation, and Maintenance Cost*: PEV car-sharing programs allow consumers to directly use PEVs only for the trips that they need personal transportation for and in which all PEV fixed costs are converted to variable per-hour costs. Barriers of higher purchase cost, uncertain depreciation, and uncertain maintenance costs are not experienced by consumers.
- *Obsolescence*: PEV car-sharing programs, by definition, do not require long-term vehicle ownership and provide consumers with exposure to the technology and allows the opportunity for consumers to assess if technological improvements are on the horizon.
- *Range Anxiety*: Car sharing provides the opportunity for consumers to use a PEV only for trips that they are comfortable with, thereby allowing them to gain PEV range experience with their own trip patterns, weather conditions, and traffic conditions.
- *Recharging Convenience*: Placement of neighborhood and commercial district EVSE in visible locations, along with car sharing placements, is important to gaining a critical mass of EVSE and allaying consumer range anxiety.
- *Product Experience*: PEV car sharing provides convenient real-world product experience for consumers with their own trip patterns, weather conditions, and traffic conditions.

The Master Plan identifies potential PEV car-sharing and public charging station locations at Metrorail stations within the U.S.-1 Corridor. The U.S.-1 Corridor project area is a well-travelled corridor in the Region, connecting Dadeland south to downtown Miami. The corridor intersects the municipalities of the City of Miami, City of Coral Gables, City of South Miami, Village of Pinecrest, and unincorporated Miami-Dade County. A dedicated Busway starting from Dadeland South Station forms the southern extension of this transit system. An assessment of the Busway segment from Dadeland South to SW 136 Street is included in the Master Plan to evaluate future possibilities of efficacy to meet PEV and EVSE adoption, energy, and environmental benefits.

Figure 25: U.S.-1 Corridor Project Area



The Master Plan for future PEV and infrastructure deployment along this portion of the U.S.-1 Corridor includes:

- Project-specific siting criteria.
- PEV and EVSE requirements, including quantities and locations, and systems integration opportunities.
- Applicable codes, standards, and necessary approvals, and recommendations for amendments.
- Identification of opportunities for smart grid and solar integration.
- Data collection and consumer survey program descriptions.

The full text of the Master Plan (Volume II) is available at www.DriveElectricFlorida.org.

Chapter 7 – Conclusion

The research, findings, and recommendations outlined in this report point to a market in the Southeast Florida Region with tremendous potential for PEV adoption and associated benefits. The current rate of PEV ownership exceeds that of most states in the nation; the market characteristics point to favorable purchase trends going forward; and the electric-fuel supply strengthens the environmental and economic benefits of PEV ownership for consumers, businesses, government agencies, and fleets.

It is clear, though, that great potential alone is not enough to ensure a Region full of satisfied PEV drivers in the long-term. Over time, the Drive Electric Florida team is confident that the benefits of PEV technologies will become clear to drivers – through education and outreach efforts outlined in this report, through word of mouth rooted in the enthusiasm of early adopters, and simply through the many benefits of plug-in technologies that essentially "speak for themselves," perhaps most significantly the dramatic decrease in operating costs compared to traditional vehicles.

However, without adequate public and private charging infrastructure, natural market growth could be hampered – just as the market for traditional vehicles would significantly weaken without readily available gas stations. Therefore, the strategies and recommendations that have been outlined in Volume I of this report were developed to be two-fold in their purpose:

- To create market pull by generating awareness and excitement around PEV benefits – which will, ideally, spur charging infrastructure implementation through market demand.
- To gently push the supporting stakeholders – including government, businesses/employers, homeowners' associations and property managers, and the like – to prepare for this increase in PEV ownership by implementing processes and plans for deploying (or streamlining the process of deploying) charging infrastructure throughout the Region.

Volume II takes this even farther, exploring whether low-cost commuter access to PEVs and charging infrastructure – through a car-sharing program along the U.S.-1 mass-transit corridor – can accelerate mainstream adoption of these technologies and/or create incentives for increased use of regional transit services. The project would also provide mobility options to those without vehicles.[226]

As these strategies are executed, some of the most common barriers to widespread PEV adoption and charging infrastructure implementation can be overcome – creating a more enjoyable user experience for current PEV owners, encouraging the purchase of PEVs by general consumers and fleet managers, and smoothing the process for implementing private, semi-public, and public charging stations.

Moving forward, members of the Southeast Florida Electric Vehicle and Infrastructure Alliance will continue to collaborate with one another – along with other Clean Cities organizations throughout the state – to implement the recommendations outlined within this report, integrating and establishing methods for regularly measuring progress. The Education and Outreach section of this plan helps to operationalize many of the report's recommendations into a strategy for delivering the report's findings into the hands of key stakeholder audiences.

The individuals and organizations that comprise this public-private Alliance and partnership are committed to ensuring that Southeast Florida is PEV-ready so that it may serve as a valuable resource for other communities – in the state and across the country – seeking guidance on PEV market development.

[226] See www.DriveElectricFlorida.org for the complete Volume II report.

Tools and Resources

Table of Tools & Resources

Tools and Resources A: Infrastructure Tools

Tools & Resources A-1: Equipment Selection Worksheet

The following is a checklist that can help site hosts select charging equipment with features and options to best meet their needs.

Charging Level

AC Power
___ Level-1
___ Level-2

DC Power
___ Level-1
___ Level-2

Mounting Style

___ Pedestal
___ Ceiling

___ Post
___ Pole
___ Wall

Type

___ Modular (portable)
___ Hardwired (permanent)

Access Controls

___ None
___ Restricted
- ___ RFID Card
- ___ Key code
- ___ Credit Card/Card Swipe
- ___ Other: _____

Smart Features

___ Customizable displays
___ Reporting
___ Remote software upgrades
___ Two-way smart grid communications with utility
___ Status notifications
___ User reservation services
___ Fee collection and user authorization
___ Advertising display, electronic coupons, etc.
___ Other:_____

Other

___ Customized charging station wrap, branding
___ Cord type
- ___ Standard
- ___ Coil
- ___ Retractable
- ___ Overhead
- ___ Other: _____
- ___ Circuit reclosure

Tools & Resources A-2: Infrastructure Fact Sheets

The below fact sheets were created as part of the Strategies for Education and Outreach effort and have been developed to align with content and suggestions in the infrastructure section of this report. Fact sheets include:

- Selecting the Right Plug-In Electric Vehicle Charging Equipment.
- Siting Plug-in Electric Vehicle Charging.
- Public Charging: Priorities, Characteristics and Considerations.
- Providing Workplace Charging for Your Employees' Plug-In Electric Vehicles.
- Getting Apartments and Condos Ready for Plug-in Electric Vehicle Charging.

The downloadable and printable versions of these fact sheets that can be used for distribution will be available on www.DriveElectricFlorida.org.

www.FPL.com/electricvehicles
www.DriveElectricFlorida.org

Selecting the Right Plug-in Electric Vehicle Charging Equipment

Plug-in electric vehicle (PEV) owners and charging-site hosts have a lot to consider when selecting electric vehicle supply equipment (EVSE) – including site characteristics, budgets, and expected usage patterns. Below is information on the most common EVSE levels, features and options available today.

Selecting the Right Charging Level

A practical approach for selecting the appropriate charging level is to match charging speed with expected user needs. Relatively low mileage and/or long parking durations are suitable for AC Level-1 charging. AC Level-2 charging should be matched with shorter parking durations of one to four hours and/or longer mileage, and DC-fast charging Levels 1 and 2 belong with high expected mileage and very short parking durations.

Charging Levels

	AC Charging – Home and Public Use		DC Charging – Public and Large Fleet Use	
Type	Level 1	Level 2	Level 1	Level 2
Power	120V, 1.4 kW @ 12 amp 120V, 1.9 kW @ 16 amp	240V, up to 19.2 kW (80 amp)	200–500V, up to 40 kW (80 amp)	200–500V, up to 100 kW (200 amp)
Charge Time (Miles of range per hour charged)	3 to 5 miles	3.3 kW – 10 to 14 miles 6.6 kW – 20 to 25 miles 9.6 kW – 40 to 45 miles 19.2 kW – up to 60 miles	40 kW – up to 120 miles	100 kW – up to 300 miles

AC Level-1 Charging

AC Level-1 EVSE can recharge the battery of an electric car within four to eight hours if it is driven less than 30 miles per day. Drivers plug their cars into a standard electrical outlet (NEMA 5-15R or 20R) using the portable Level-1 EVSE cord set that comes standard with the car. Alternatively, site hosts can purchase and install hardwired Level-1 charging equipment that is permanently affixed to the building or post-mounted at the parking space. AC Level-1 charging is the least expensive and most available charging option since 120-volt outlets are so readily available, and the portable/modular equipment comes standard with the vehicle.

AC Level-2 Charging

AC Level-2 EVSE can recharge the batteries of most PEVs two- to four-times faster (or more) than Level-1. Level-2 charging is appropriate for battery-electric vehicle (BEV) drivers who routinely surpass 40 miles per day. It is also practical in certain public venues, where users are typically parked for relatively short durations – while shopping, dining, attending events, etc.

Depending upon the venue and typical mileage of users, a PEV could be parked at a Level-2 charging station for many more hours than is necessary to charge the car. This is suboptimal and can be avoided by using Level-1 charging equipment in locations with long park times. Alternatively, policies can encourage vehicle turnover at a Level-2 charging station, such as charging a fee based on time connected or providing a valet service.

DC-Fast Charging – Levels 1 and 2

DC-fast charging can recharge PEVs in minutes; most vehicles capable of a DC-fast charge today can refuel 80 percent in 30 minutes or less. DC-fast charging is a practical choice along major highway corridors, allowing BEVs to travel beyond their range and plug-in hybrid electric vehicle (PHEV) or extended-range electric vehicle (EREV) drivers to maximize their electric

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range, while minimizing gasoline consumption. DC-fast charging can also be practical in major destination locations, such as sporting arenas, theme parks or in major downtown areas where there is a high concentration of multi-unit dwellings (where residential/home charging is a challenge, if not impossible). Because of the high installation and ongoing electrical demand charges, DC-fast charging locations should be carefully selected based on an expected high volume of usage.

Equipment Features and Options

EVSE come with many features and options depending upon the needs and requirements of the site.

Modular vs. Hardwired

AC Level-1 and Level-2 EVSE are available as:

- **Modular or portable charging equipment**, which is plugged into an electrical outlet dedicated for that purpose. Most PEVs on the market today come equipped with a portable AC Level-1 EVSE.
- **Permanent or hardwired units**, which are affixed to the home or business' electrical system. These have the capability of coming with more advanced features.

Dual and Quad Units

Some EVSEs can connect up to four cars at once – even at different charging levels. While power requirements are the same, savings are achieved on the equipment, mounting and installation costs.

Cord System

Cords need to be put away for safety reasons when not in use. Most EVSE installed today have a hook or bracket for hanging/wrapping the cord. Some manufacturers offer retractable or suspended cords – which also present fewer safety hazards (i.e. tripping).

Network Communications – Smart Charging Equipment

Smart and networked charging equipment features can include:

- Advanced, customizable displays
- Notifications and reports to site operators
- Remote software upgrades
- Two-way communications with utility
- Charging status notifications
- User reservation services
- Fee collection and user authorization
- Advertising and marketing displays

Lighted Screens

Some EVSE offer lighted display screens, which is a good feature if adequate parking lot or garage lighting is unavailable. However, not all lighted screens are suitable for direct sunlight.

Circuit Reclosure

Some charging stations offer a reclosure circuit that automatically restarts charging after a power interruption.

Questions? For additional information and resources on vehicle siting, please visit:
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Email: electric-vehicles@FPL.com | Help@DriveElectricFlorida.org

Equipment Selection Checklist

Charging Level

AC Power	DC Power
☐ Level-1	☐ Level-1
☐ Level-2	☐ Level-2

Mounting Style

☐ Pedestal ☐ Pole
☐ Ceiling ☐ Wall
☐ Post

Type

☐ Modular (portable)
☐ Hardwired (permanent)

Access Controls

☐ None: open access
☐ Restricted
- ☐ RFID Card
- ☐ Key code
- ☐ Credit Card/Card Swipe
- ☐ Other

Smart Features

☐ Customizable displays
☐ Reporting
☐ Remote software upgrades
☐ Status notifications
☐ User reservation services
☐ Fee collection
☐ User authorization
☐ Advertising display, messages
☐ Other

Other

☐ Customized wrap, branding
☐ Cord type
- ☐ Standard
- ☐ Coil
- ☐ Retractable
- ☐ Overhead

☐ Circuit reclosure

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Siting Plug-in Electric Vehicle Charging

There are a number of factors to consider for siting charging equipment – including connecting with the electrical power, ensuring available electrical capacity and integrating into existing site structures, as well as environment, safety and accessibility considerations. Some of these factors are listed below, but site hosts are strongly encouraged to consult with licensed contractors or electricians who are experienced and trained for installation of electric vehicle supply equipment (EVSE). This professional experience and qualification is particularly important in charging locations that will serve the general public; sites are unique and can have a number of different installation plans to lower costs, improve usability and reduce potential hazards.

Key Considerations:

Visibility and Lighting:

Charging stations should be located in areas with high visibility and foot and vehicle traffic to make them easy to find and less prone to vandalism. Well-lit areas also enhance safety and improve user operation. Refer to your jurisdiction's codes and standards for illumination requirements.

Proximity to Power Source:

By minimizing the charging stations' distance to the electrical panel or transformer, you will save money and encounter fewer barriers.

Surroundings:

Minimize disruption of your surroundings. For example, avoid installation under trees or in areas requiring trenching or landscaping.

Parking Space Size:

Provide spaces that are large and long enough to: prevent damage to equipment from vehicle impact; enable easy maneuvering; and prevent cord damage. A 3-foot by 3-foot space around the charging station is optimal. Ensure local zoning requirements are met.

Weather and Climate:

Be sure you select equipment rated for outdoor use – and use outlets with weatherproof coverings – when installing EVSE outside or under partially covered areas (i.e. under car ports). Also, be sure to install EVSE in well-drained locations – avoiding standing water, areas subject to rising sea levels, or areas prone to salt-water erosion. The National Electrical Code requires a ground fault circuit interrupter for outdoor AC Level-1 charging installations.

Selecting the Right Contractor Matters

Licensed
Ensure your contractor is a licensed electrician, in good standing.

Certified
Check to see if the manufacturer of your selected charging equipment (or vehicle) recommends using an electrician that has been certified to install its brand of EVSE. Some manufacturers offer a list of contractors who have met their criteria and understand how to assemble, install and connect the charging station to the network (if applicable).

Experienced
Select an electrician experienced with electric vehicle charging equipment installations. A contractor with prior experience (particularly at public venues), will often be able keep costs down by identifying creative siting solutions. They should also know what to look for and avoid in terms of tripping hazards and optimally locating charging equipment.

Permitting and Inspections
Be sure that your contractor pulls the appropriate permit(s) for the job and arranges for inspection. This process helps to ensure your job has been done safely and is up to code – not something to be taken lightly.

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Electrical Safety:

The best way to ensure safety is to choose an experienced and licensed electrician; select equipment approved for use by the Underwriters Laboratory (UL) or similar nationally-recognized, independent lab; follow the manufacturer's operating instructions; and ensure all appropriate permits are pulled and inspections conducted.

Cord Safety:

Minimize the risk of injury to the user and pedestrians by installing charging stations such that cords do not hinder walking paths, providing hooks or brackets for cord storage, and ensuring cords are the appropriate length – no longer than 25 feet.

Ventilation:

Refer to operating manuals and equipment labeling to determine ventilation requirements for indoor charging. While most batteries used in plug-in electric vehicles emit no hydrogen gas in dangerous quantities, some do require ventilation. Section 625.29(D) of the National Electric Code (NEC) has requirements for ventilation for single and multiple vehicles and Section 625.15(B)&(C) provides ventilation-labeling requirements for EVSE.

Orientation of Charging Equipment within the Parking Space:

Locating charging stations in proximity to the parking space is determined by the parking type (pull-in or parallel), parking aisles and pedestrian facilities. Charging inlets are on the front or side of most vehicles and the EVSE must be within easy reach. For pull-in spaces, install equipment at the front – either centered or between two pull-in parking spaces. For parallel-parked vehicles, EVSE should be installed in the front third of the spot, based on the direction of traffic flow.

Mounting:

Mounting options for charging infrastructure include: floor or ground with a post or pedestal; wall-mounted units; existing poles, columns and posts; and overhead units that can help prevent tripping on cords. Using existing walls and poles is less expensive than installing a new post or pedestal.

Protective Barriers:

Ensure charging stations are protected from vehicle collision without presenting a tripping hazard. Protective barriers may include wheel stops, bollards, curb protection or wall-mounted barriers for wall-mounted EVSE.

ADA Accessibility:

Ensure public charging meets accessibility requirements. For example, suitable sites for persons with disabilities should be firm, level and smooth, and in close proximity to the building entrance. Disabled persons may need additional room to maneuver, and care should be taken to avoid barriers that present challenges.

Signage:

Recognizable and readable signs to locate, identify and provide charging station rules (i.e. time limits and costs) are critical for public-charging locations. It is best to check with the Manual on Uniform Traffic Control Devices, the Federal Highway Administration, and the Florida Department of Agriculture and Consumer Services for the latest standards.

Maintenance:

While there are few EVSE maintenance requirements, site operators should store cords to prevent damage, check parts periodically for wear and vandalism, keep the charging station clean, and hire a qualified electrician for periodic inspection, testing, and preventative maintenance.

Questions? For additional information and resources on vehicle siting, please visit:
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Public Charging: Priorities, Characteristics and Considerations

While the majority of plug-in electric vehicle (PEV) charging happens overnight at home, strategically placed public charging infrastructure will support the long-term success of PEVs.

Prioritizing Public Charging – By Venue Type

High Priority

- **Workplace charging:** The workplace can serve as a primary charging location for those who can't charge at home, in addition to serving those with lengthy commutes.
- **Destination venues and major attractions:** Destinations like sporting arenas, airports, beaches and regional shopping malls bring visitors and employees from near and far, making charging infrastructure necessary for battery electric vehicles (BEVs) that rely solely on electric power – and need the charge to return home.
- **Along major arteries and corridors:** Charging infrastructure at and along highways, including rest areas, service plazas, restaurants and truck stops serve drivers traveling outside their PEV's range. This makes city-to-city travel possible for BEVs and extends plug-in hybrid electric vehicle (PHEV) electric range.

Varied Priority

- **Government locations:** Locations like local libraries, courthouses and mass transit facilities are similar to other public locations. The importance of public charging at these locations depends upon whether they are regional destinations or serve a more locally-based population.

Lower Priority

- **Local establishments:** Retail and dining areas often serve locals who do not necessarily *need* to charge their vehicle, but who may "top off" – also known as opportunity charging. Charging at local destinations can attract customers and encourage them to stay longer and spend more.

Benefits of Public Charging to the Site Host:

Customer Attraction, Retention
PEV customers say they are more likely to shop/dine – and linger longer and spend more – when free/low-cost charging is offered.

Employee Attraction, Retention
Workplace charging differentiates an employer from others.

Added Revenue from Fees
Certain sites are ideal for subscription-based, pay-per charge, or pay-for-parking PEV charging.

Corporate Branding
Charging stations are a visual way to show commitment to customers, the environment and energy independence.

Advertising Opportunities
Some charging stations offer digital screens that can display advertising, coupons and more.

Contribution to LEED
Charging stations may contribute to LEED points and certification.

Guidance on Charging Levels, Ownership and Fees

- **Charging level:** Charging speed should be matched with user needs. Low mileage and long parking durations can be met by AC Level-1 charging; Level-2 and DC-Fast Charging (DCFC) are suitable for longer mileage and shorter parking durations.
- **Ownership/funding models:** There are a number of models today for who owns, operates and assumes the expenses of public charging stations – (1) owned and operated by the site host; (2) a third-party electric vehicle service provider (EVSP), which assumes all installation and maintenance costs and charges a fee to users; and (3) government grants and funding.
- **Fee structures:** Some locations may offer free PEV charging to attract and retain customers, or as an employee benefit. Other site hosts charge a fee for PEV charging – a time-based and/or kilowatt-hour (kWh) fee. Time-based fees help ensure users will move their vehicle when the battery is charged, rather than leaving it parked for long durations, beyond what's needed to charge the vehicle. Fees should remain lower than the equivalent cost of gas; otherwise PHEV drivers will opt to use gasoline until a more reasonably-priced electric vehicle charging station is located. The following table provides suggested range of fees for AC Level-1 and AC Level-2 charging based on today's gasoline price.

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Fee Guidelines:

	AC Level-1	AC Level-2 @ 3.3 kW	AC Level-2 @ 6.6 kW
Miles gained per hour of charging a PEV	3 to 5 miles	10 to 14 miles	20 to 25 miles
Gasoline Equivalent* per Hour of Charge	$0.43	$1.29	$2.36
Cost of Electricity** per Hour of Charge	$0.17	$0.30	$0.59
Fee Target:	Less than $0.43 per hour or $0.11 per 15 minutes	Less than $1.29 per hour or $0.32 per 15 minutes	Less than $2.36 per hour or $0.59 per 15 minutes

*Assumes gasoline price of $3.75 per gallon and 35 miles per gallon fuel efficiency for a PHEV or EREV running on gasoline
**Assumes electricity rate of $0.09 per kilowatt-hour, with no impact to demand charges

Summary of Recommendations:

Priority	Location	Charging Level		Equipment Type	Payment Models	Installation Funding Sources
High	Workplace Charging	Level-1:	For employees and visitors parked for a full-shift or day	120V electric outlet only or hard-wired Level-1 charging station	· Free – employee benefit · Small fee – flat monthly access	· Employer / owner · Landlord / owner
		Level-2:	For employees and visitors parked short durations or with high mileage	Smart charging station or basic one with parking meter	Fee – usage and/or time	· Employer / owner · Landlord / owner · Third-party EVSP
	Destination Venues, Major Attractions	Level-1:	For venue employees or visitors parked all day, overnight, or longer	120V electric outlet only or hard-wired Level-1 charging station	Free or small fee	· Employer / owner · Landlord / owner
		Level-2:	For short parking durations or high mileage	Smart charging station or basic one with parking meter	Fee – usage and/or time	· Employer / owner · Landlord /owner · Third-party EVSP
		DC-Fast Charging	Where there are high volumes of users – managed by a valet service	Smart charging station or basic one with valet service	Fee – usage and time	· Employer · Landlord / owner
	Major Arteries, Corridors, Routes	Level-1:	Less practical, except for employees	120V electric outlet only or hardwired Level-1 charging station	· Free – Employee benefit · Small fee – flat monthly access	· Landlord / owner · Business owner · Third-party EVSP · Public funding sources, grants, transportation funding
		Level-2:	Practical for PHEV users wanting to extend battery range	Smart charging station or basic one with parking meter	· Free – at restaurants near highway locking to attract diners · Fee – usage and/or time	
		DCFC:	Most practical; users can charge in time it takes to grab a snack	Smart charging station or standard with valet service	Fee – usage and time	
Varied	State, County, or City-Owned Government Locations	Level-1:	For employees or visitors who will be parked for full day	120V electric outlet only or hardwired Level-1 charging station	Low Fee: Parking meter or included in existing parking rate	· Public funding sources, grants, transportation funding, etc. · Third-party EVSP
		Level-2:	For short parking durations or high mileage	Smart charging station or basic one with parking meter	Fee – usage and/or time	
		DCFC:	Not practical, except in locations with high multi-unit dwelling density, or high-volume of users	Smart charging station or standard with valet service	Fee – usage and time	
Lower	Local Retail Opportunity Charging	Level-2:	For patrons who tend to stay for up to three hours	Smart charging station or basic one with parking meter	· Free – to attract customers · Small fee – if local residents use the lot	· Business owner · Landlord · Third-party EVSP
		DCFC:	Only practical in locations with high density of multi-unit residential dwellings and areas with high expected usage	Smart charging station or standard with valet service	Fee – usage and time	· Business owner · Third-party EVSP

Questions? For additional information and resources on vehicle siting, please visit:
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Providing Workplace Charging for Your Employees' Plug-in Electric Vehicles

High plug-in electric vehicle adoption expected in Florida

Thousands of Floridians have purchased plug-in electric vehicles (PEVs) already, and industry analysts predict the state will continue to have among the highest PEV registrations in the nation.

PEV owners have strong interest in workplace charging

Nearly three quarters of PEV owners have expressed strong interest in workplace charging. And for employees who live in condominiums or other multi-unit dwellings, where it's often impossible to charge at home, workplace charging could serve as their primary charging location.

Prepare your workplace – differentiate your company

With high PEV adoption rates expected in Florida, companies may consider workplace charging as a positive differentiator from other employers – or for points towards Leadership in Energy and Environmental Design (LEED).

Development of a workplace charging policy takes consideration

Employers who wish to provide workplace charging for employees face a number of issues to consider and decisions to make - including possible tax implications, employee morale issues, administrative and capital costs, and parking regulations and requirements. However with high PEV adoption expected in Florida, making PEV charging accessible at the workplace should be a priority among the state's progressive employers.

Issues and decisions for developing a workplace charging policy

1. Negotiating with a landlord – if the facility is not owned by the employer

Common issues when the facility is leased include coordination among numerous stakeholders, policy development for billing and payment, parking space allocation and access issues

- Set up an advisory committee of interested parties – including other tenants
- Partner with a nearby parking lot owner or business to develop a cooperative PEV charging program, if an agreement with landlord cannot be reached

2. Determining whether employees should pay for charging

Advantages of offering free charging

- Offers an incentive to employees, helps promote PEV adoption
- Permits use of lower-technology/lower-feature charging equipment, which reduces costs
- Allows a more simplified employee charging policy and reduces administrative time and expense

Risks of offering free employee charging

- Unclear how the IRS will ultimately treat workplace charging
- May create dissatisfaction among non-PEV-owning employees, who are not compensated for gasoline costs

What's the appeal of PEVs?

1. Cost 80 percent less to operate
2. Release 70 percent fewer emissions
3. Help our nation achieve energy independence by drastically reducing oil consumption
4. FUN to drive – with quick, quiet and smooth acceleration, sophisticated displays and smart phone applications

How can workplace charging benefit my business?

- Enhances brand as socially and environmentally responsible
- Provides valuable employee incentive
- Differentiates the company or agency from its peers
- Can earn LEED points for facility

Think about it –

Does your company/agency have a fleet of PEVs which recharge onsite each night? If so, consider offering workplace charging for employees during the day.

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- Could become prohibitively expensive if PEV adoption expands significantly among employees
- Provides no means for controlled access to charging infrastructure
- Employees with access to home charging may opt to charge only at work – for free

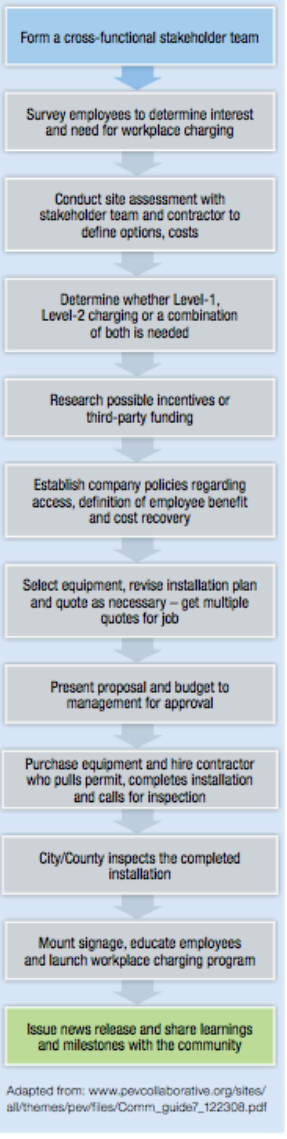
3. **Determining how employees pay for charging (if applicable)**
   - Bill for exact usage to fairly allocate costs - requires pricier equipment
   - Charge a flat monthly fee to users - based on estimated usage
   - Use third-party electric vehicle service provider that handles installation, maintenance and employee billing
4. **Determining appropriate charging levels with the electric capacity available**
   - Install Level-1 charging as a cost-effective and practical approach to meet the needs of employees who are parked for long durations. Options include:
     - Making accessible 120v outlets, requiring employees to use their portable Level-1 cord sets
     - Installing hardwired Level-1 charging stations, for added convenience
   - Install Level-2 charging stations for employees and visitors who need a faster charge
     - Level-2 charging stations may serve multiple vehicles daily with policies to ensure PEVs are moved when fully charged
   - Consider a hybrid approach with Level-1 serving the needs of most employees, and one or two pay-per-use Level-2 charging stations available for those that need a quicker charge
   - Look for ways to lower your facility's overall electrical consumption, such as upgrading inefficient lighting, to free panel capacity for PEV charging
   - Account for future growth – which is often less expensive than adding infrastructure later
5. **Determining the appropriate equipment features to support the policy**
   - Offer a number of low-feature/low-cost Level 1 or 2 charging equipment or 120v outlets
   - Select smart or networked charging stations with features to support the workplace charging policy including fee collection, reservations, display advertising, reporting, etc.

Did you know? A 30-mile commute in a PEV would cost about $1 worth of electricity and can be recharged on a standard 120-volt outlet during the workday.

($0.10 per kWh, vehicle rated at 34kwh/100 miles)

Questions? For additional information about electric vehicles and charging at the workplace:
Web: www.DriveElectricFlorida.org | www.FPL.com/electricvehicles
Email: Help@DriveElectricFlorida.org | electric-vehicles@FPL.com

Approach for Workplace Charging Policy Development



Adapted from: www.pevcollaborative.org/sites/all/themes/pev/files/Comm_guide7_122308.pdf

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Getting Apartments and Condos Ready for Plug-in Electric Vehicle Charging

High plug-in electric vehicle adoption is expected in Florida

Thousands of Floridians have purchased plug-in electric vehicles (PEVs) already, and industry analysts predict the state will continue to have among the highest PEV registrations in the nation.

The majority of owners prefer to charge their PEVs at home

Most PEV drivers prefer the low cost and high convenience of charging at home – using a standard household outlet or a Level-2 charging station. It takes just a few seconds to plug in and there's no need to wait around while the car recharges.

Residents of multi-unit dwellings (MUDs) encounter unique challenges

PEV buyers who live in MUDs can face a number of roadblocks to gaining access to charging. There are numerous stakeholders involved and more complex physical structures, often with unique parking configurations. Since more than 40 percent of Southeast Florida's dwellings are MUDs, with particularly high concentrations in Miami-Dade and Broward Counties, this is an important challenge to address. However, if MUD charging issues cannot be overcome, residents might try encouraging their employer to provide workplace charging access.

Prepare your multi-unit dwelling – differentiate your property

With higher than average PEV adoption rates expected in Florida, it is time for MUDs to get prepared! Here's what you need to know:

Overcoming the five biggest barriers to PEV charging access at multi-unit dwellings

1. **Gaining approval from building management and the homeowners' association**
   - » Set up an advisory committee of interested residents
   - » Reach out to experienced third-parties for help along the way. This includes residents of MUDs who have successfully implemented charging policies or PEV industry experts in your region, such as your local Clean Cities Coalition or FPL
2. **Determining who is responsible for equipment and installation costs**
   - » Poll residents to gauge their PEV purchase intent and charging needs
     - – Widespread interest may help justify the HOA or building management assuming the costs
     - – Alternatively, the interested residents could pool their resources for a bundled installation
     - – Lesser interest or significant opposition may indicate that it is best for the interested resident(s) to assume all costs

What's the appeal of PEVs?

1. Cost 80 percent less to operate
2. Release 70 percent fewer emissions
3. Help our nation achieve energy independence by drastically reducing oil consumption
4. They're FUN to drive – with quick, quiet and smooth acceleration, sophisticated displays and smart phone applications

Are PEVs practical?

Yes. Most people drive less than 40 miles per day, which is well within the range of today's electric vehicles. Or choose a plug-in hybrid electric vehicle and enjoy the benefits of driving electric – with the ability to extend your driving range by using gasoline.

Did you know?

Driving a PEV 1,000 miles per month and charging exclusively at home would impact an electric bill by about $34, while reducing or eliminating gasoline consumption related expenses.

($0.10 per kWh, vehicle rated at 34kwh/100 miles)

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- » Engage the services of a third-party electric vehicle service provider (EVSP) to avoid out-of-pocket installation and equipment costs
  - – Instead, users would pay the EVSP per charging session, or by the kilowatt-hour consumed

3. **Determining the most equitable payment system for electricity consumption**
   - » Connect charging station to the residents' existing electricity service meter. However, many MUD configurations may not allow this
   - » Connect charging stations to the building's common area meter – devising a system to account for payment and usage
     - – Bill users precisely for usage – through smart charging equipment or metering devices
     - – Charge users a flat monthly fee for PEV charging – estimating usage
     - – If an EVSP is selected for installation of charging equipment, users would pay the EVSP directly and the EVSP would reimburse the HOA or building management for electricity consumption
4. **Planning the most cost-effective installations with the electricity capacity available**
   - » Install Level-1 charging to maximize the amount of charging stations that can be added with existing electrical capacity. Plus, Level-1 requires no additional equipment other than a 120-volt outlet
   - » Consider a hybrid approach with Level-1 serving the needs of most residents, and one or two pay-per-use Level-2 charging stations available in common area parking spaces for residents and visitors
   - » Look for ways to lower your building's overall electrical consumption, such as upgrading inefficient lighting, to free electrical panel capacity for PEV charging
5. **Facilitating potential changes to assigned parking for lower cost installations**
   - » Reassign parking spaces, putting PEV charging as close as possible to the electrical panel to avoid prohibitively expensive installations
   - » Alternatively, locate PEV parking spots in the MUD's shared spaces
   - » Consider accessibility of PEV charging or disabled visitors and residents

Did you know?
More and more PEV-owners are choosing Level-1 charging at home. That's because it's sufficient to charge a PEV overnight after a typical day's driving.

Questions? For additional information about electric vehicles and charging at multi-unit dwellings:
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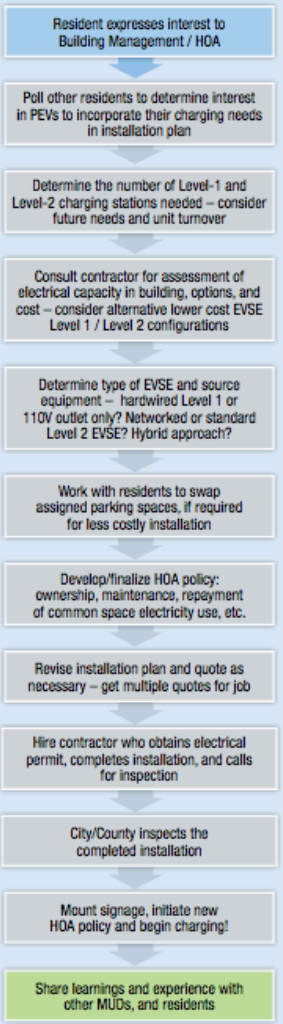
Email: electric-vehicles@FPL.com | Help@DriveElectricFlorida.org

Approach for PEV Charging Policy and Installation at MUDs



Adapted from: Balmin, Judith; et al. (2012) "Increasing Electric Vehicle Charging Access in Multi-Unit Dwellings in Los Angeles." UCLA Luskin Center for Innovation and the UCLA Anderson School of Management. July 2012

Tools & Resources B: Fleet Toolkit

Tools & Resources B-1: Electric Vehicle Fleet Conversion Toolkit

The toolkit provided to fleet managers includes the following materials:

- *Hybrid and Plug-In Electric Vehicles*, U.S. Department of Energy: http://www.afdc.energy.gov/pdfs/52723.pdf.
- *Plug-In Electric Vehicle Handbook for Fleet Managers*, U.S. Department of Energy: http://www.afdc.energy.gov/pdfs/pev_handbook.pdf.
- *Clean Cities Vehicle Technologies Program*, U.S. Department of Energy: http://www.afdc.energy.gov/uploads/publication/clean_cities_overview.pdf.
- *Top 10 Things You Didn't Know About Electric Vehicles*, U.S. Department of Energy: http://energy.gov/articles/top-10-things-you-didn-t-know-about-electric-vehicles.
- Florida Gold Coast Sustainable Community Planning for Electric Vehicle Charging and Infrastructure Abstract (see pages below).
- Southeast Florida Clean Cities Coalition Fact Sheet (see pages below).
- *Building the Case – Fleet Conversion to Plug-In Electric Vehicles*, Grant Team Leads (fact sheet included in Tools section of this report).
- Vehicle Cost Calculator: http://www.afdc.energy.gov/calc.

Introduction

Background

The Clean Cities program began in Florida in 1993 with the creation of the Southeast Florida Clean Cities Coalition by Executive Order of the Governor and the subsequent designation by the U.S. Department of Energy. The Coalition is managed by the South Florida Regional Planning Council, which is a regional public agency whose mission is to work with South Florida's public, private, non-profit, and civic leadership to create a better future for the region.

The Southeast Florida Clean Cities Coalition is a public-private partnership composed of local representatives of government and the private sector concerned with alternative fuel technology and programs. The role of the Coalition is to provide a fuel-neutral policy direction to maximize the use of vehicles operating on clean, alternative fuels throughout the region of nearly six million people living in Broward, Miami-Dade, Monroe and Palm Beach Counties that hug the nation's Southeastern Atlantic coastline.

Key Stakeholders:

Amerigas
Broward County
Car Charging Group
Cherokee Enterprises
Clean Energy Fuels
City of Boca Raton
City of Boynton Beach
City of Coconut Creek
City of Cooper City
CNG Energy Solutions
Crown Electric
Enterprise Fleet Mgmt.
Ferrellgas
Florida Atlantic University
Florida City Gas
Florida Natural Gas
Florida Power and Light
Florida Public Utilities
Gaiergy
General Electric
Greenberg Traurig, P.A.
Greenwave Biodiesel, LLC
City of Dania Beach
Knapheide Truck Equipment Company
Miami-Dade County
Monroe County
NoPetro
Palm Beach County
Ryder
State of Florida Dep't. of Environmental Protection
TECO Energy
Ultra Green Energy Services
Wise Gas, Inc.

Southeast Florida Clean Cities Coalition

Chair: Patricia Asseff
Coordinator: Christine Heshmati

2012 Emerald Sponsor:
TECO Energy

Jurisdiction
Broward County
Miami-Dade County
Monroe County
Palm Beach County

http://www.floridagoldcoastcleancities.com/

Drive Electric Florida

Through the support of a U.S. Department of Energy planning grant, the South Florida Regional Planning Council and its Southeast Florida Clean Cities Coalition are partnering with Florida Power & Light Company to create a community-based electric vehicle (EV) infrastructure readiness plan. This effort will help prepare for successful and accelerated deployment of plug-in EVs and infrastructure in the seven-county region of SE Florida and beyond.

The plan will:

- Establish criteria to select, site and prioritize public EV infrastructure (EVSE),
- Analyze fleet life cycle costs for potential EV fleet conversions and deployment,
- Identify ways to address regulatory and permitting barriers to EV and EVSE deployment,
- Create communications strategies for educational and outreach purposes, and
- Develop a master plan for future EV and EVSE deployment along a portion of the US-1 Corridor in Miami-Dade County

Findings will be publically-releasable and will be consistent with the US Department of Energy Clean Cities' goal to reduce US petroleum usage by 2.5 billion gallons per year by 2020.

Recent and Upcoming Activities:

- September 2012: Alternative Fuel Vehicle Road Shows in Miami Overtown and Delray Beach produced by AdVentures and in partnership with Miami-Dade County and the City of Delray Beach
- October 2012: National Alternative Fuel Vehicle Day Odyssey Celebration with breakfast sponsored by the Miami International Auto Show
- November 2012: Participation in the "greening" of the Miami International Auto Show
- January 2013: Biennial Awards Breakfast
- Continued outreach to public & private fleet managers

Florida Gold Coast Sustainable Community Planning for Electric Vehicle Charging and Infrastructure
Project Summary / Abstract File

Applicant Identification: Christine Heshmati, Project Director, South Florida Regional Planning Council 3440 Hollywood Boulevard, Suite 140, Hollywood, Florida, 33021

Objective: To support the goal of putting 1 million electric drive vehicles on the road in the US by 2015, the proposed planning effort aims to prepare the Region's communities for successful and accelerated deployment of plug-in electric drive vehicles (EVs) and infrastructure.

Major Participants: The major participants include the South Florida Regional Planning Council and its Florida Gold Coast Clean Cities Coalition in alliance with Florida Power & Light Company (FPL), its partners (The Curtis Group, Hertz, General Motors and CALSTART), and stakeholder local governments. The project area is defined by Monroe, Miami-Dade, Broward, Palm Beach, Martin, St. Lucie, and Indian River Counties (Region). All seven counties, plus the Broward Metropolitan Planning Organization (MPO) and the cities of Boynton Beach, Coral Springs, Delray Beach, Miami Beach, Port St. Lucie, Stuart, West Miami, and West Palm Beach, committed in-kind staff services.

Description: This project will develop plans aimed to address technical, commercial, market and regulatory barriers to a supportive EV infrastructure and vehicle adoption. Key planning efforts will be undertaken by five teams (plus a steering committee) using a variety of resources including multiple data sources and best practices analysis to:

- identify opportunities to standardize/streamline local and state government policy, regulations and permitting to facilitate EVSE deployment;
- targetlargepublicandprivatefleetoperatorsto analyze life-cycle costs for conversions of their fleets and accelerated deployment of electric vehicles. Team will also develop best practices and policies for workplace charging in the Region;
- establish criteria to select, site and prioritize public EVSE – including range-extenders along major transportation corridors. In addition team will develop best practices and recommendations for EVSE policy for multi-family residences;
- develop education and outreach plans for large fleet operators, elected officials, permitting officials, consumers and other key stakeholder groups. In addition the team will develop the branding and "look and feel" that will unite the Region's EV-related communication efforts;
- plan for a future demonstration project along the US-1 mass transit corridor in Miami-Dade County involving the deployment of self-serve rental/car share EVs, mass transit EVs and charging infrastructure, public charging stations, and integrated smart grid and renewable solar technologies.

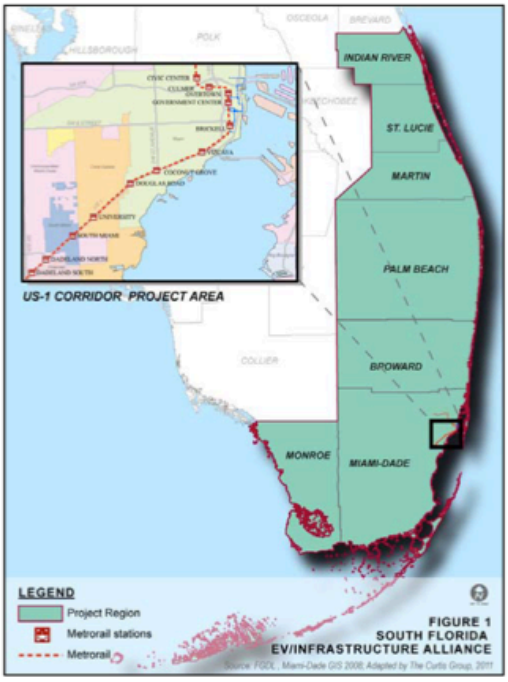


FIGURE 1
SOUTH FLORIDA
EV/INFRASTRUCTURE ALLIANCE

These efforts are consistent with the US Department of Energy Clean Cities' goal to reduce US petroleum use by 2.5 billion gallons per year by 2020. In particular, the proposed planning effort is aligned with building reliable alternative fueling infrastructure and developing alternative fuel infrastructure corridors. Funds awarded will be used solely for planning purposes and not for the purchase and/or installation of any charging infrastructure.

Project Impact: The project is expected to result in comprehensive plans, policies and other recommendations, which are readily releasable to inform, facilitate and expand the penetration of EVs and charging infrastructure in this Region and beyond.

Tools & Resources B-2: Fleet Fact Sheet

The downloadable and printable version of this fact sheet that can be used for distribution will be available on www.DriveElectricFlorida.org.

www.FPL.com/electricvehicles
www.DriveElectricFlorida.org

Building the Case: Fleet Conversion to Plug-in Electric Vehicles

There are many factors for a business or public agency to consider when purchasing new fleet vehicles: price, fuel efficiency, environmental impact, maintenance costs, space, styling and more. Included below are information and tools demonstrating the value of converting internal combustion engine (ICE) fleets to plug-in electric vehicle (PEV) fleets.

Bottom line savings

PEVs cost considerably less to operate and maintain than traditional ICE vehicles. They may also qualify for certain tax incentives to help offset a higher initial purchase price.

- **Lower fuel costs:** Electricity is far cheaper than gasoline or diesel – particularly here in the Sunshine State. PEVs can cost as much as 80 percent less to fuel than ICE vehicles.
- **Lower maintenance and repair costs:** PEVs have far fewer moving parts than their ICE counterparts, and they "burn" considerably cooler. These factors translate into fewer maintenance requirements and repairs – and, therefore, lower costs. Battery electric vehicles:
  - Will save an estimated 35 percent on maintenance[1] and 30 percent on repairs[2].
  - Often have regenerative brake systems that typically last longer than traditional brake systems[3].
- **Purchase incentives:** The government offers a federal tax credit up to $7,500 for qualifying PEVs, lowering the overall cost of your new vehicle. Alternatively, automakers have offered attractive lease deals – as low as around $200 per month for some models.

Adding it up: lower total cost of ownership

Savvy fleet operators will look beyond a higher upfront purchase price because PEVs tend to have lower operating costs. In the example below[4], the out-of-pocket expenses for the PEV are about $12,000 less over five years than a typical fleet sedan and the PEV is approximately $4,000 less to own, when including expected depreciation.

	Out of Pocket Expenses		Loss in Value - Depreciation	5-Year Cost to Own
2013 Ford Taurus SE 	Fuel	$13,460	$18,194	$44,401
	Insurance	$6,355		
	Financing	$1,648		
	Maintenance	$2,665		
	Repairs	$2,079		
	Total	$26,207		
2013 Chevy Volt 	Fuel	$3,114	$26,538	$40,471 (15,000 miles per year, 2.9% APR with $3,791.10 down)
	Insurance	$4,420		
	Financing	$2,574		
	Maintenance	$1,680		
	Repairs	$2,160		
	Total	$13,948		

[1] http://www.plugincars.com/study-electrics-35-less-costly-maintain-comparable-ice-vehicles-125755.html
[2] GE Capital data and PRTM estimates. Cited in figure 3M, "% Improvement over ICE Maintenance and Repair Costs," p. 104. "Fleet Electrification Roadmap," Electrification Coalition, November 2010.
[3] DOE. "Plug-In Electric Vehicle Handbook for Consumers."
[4] www.kbb.com – total cost to own calculator and comparison tool. Accessed December 20, 2012

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Predictability and convenience:

Beyond the dollars and cents, converting your fleet to PEVs can provide your business with some certainty and added convenience.

- **Stable fuel prices:** The cost of gasoline and diesel can fluctuate dramatically throughout the year. This can make meeting an annual budget challenging for many fleet managers. In contrast, electricity prices are stable – typically only adjusting once or twice annually – allowing fleet managers the ability to better predict their expenses.
- **More time on the road:** Since PEVs require less maintenance over their lifetimes, this translates to less down-time. That means your PEVs will spend more time on the road, meeting your business' daily needs.
- **Priority lanes and parking:** PEVs can qualify for high-occupancy vehicle (HOV) lane access in Florida, regardless of how many passengers are in the vehicle. In addition, more establishments are now offering priority parking to PEVs and other alternative-fuel vehicles. This reduces the time your employees spend in traffic and parking.
- **Convenient fueling:** At the end of your vehicles' route, they can be refueled at your business's site with no need to visit a gasoline station. PEVs can be recharged using standard electrical outlets, or if faster charging is needed, AC Level-2 charging stations can be installed. In either case, the PEV will be ready for its next shift with a "full tank" – virtually eliminating the need for frequent side-trips to the gasoline station.

Selecting the right PEV

Fleet owners should purchase the most appropriate size and class of vehicle based on intended use. Having "too much vehicle" for the job is costly and a waste of financial and environmental resources. Purchase decisions should be based on the *typical* use of the vehicle rather than on an occasional need, which can be met by alternative means – such as temporarily swapping vehicles within a fleet.

- **Size:** Select the smallest class of vehicle capable of meeting typical needs. Smaller vehicles are usually less expensive to operate.
- **Range:** Choose the vehicle that meets the *typical* daily mileage requirements – not the maximum miles needed for very infrequent trips. Also consider whether there will be opportunities to recharge during a shift.
- **Type:** Consider the various types of PEVs available for purchase and determine which technology best meets your fleet's needs. Battery electric vehicles can maximize the benefits of electric transportation – offering zero tailpipe emissions and low operating costs. Plug-in hybrid and extended-range electric vehicles have a smaller electric range, but offer the flexibility to also operate on gasoline.

Other Benefits of PEVs

Protects the environment

Even when emissions from power plants are taken into consideration, battery electric vehicles (BEVs) release 70 percent fewer emissions than ICE vehicles in South Florida.

Greater energy independence

Widespread adoption of electric vehicles will reduce our nation's dependence on foreign oil. PEVs are fueled with electricity generated from predominantly domestic sources of fuel.

Enhances your company or agency's image

Your fleet is a visible way of communicating your values and gaining goodwill.

Fun to drive and more!

Your drivers will appreciate the smooth and quick acceleration. And many PEVs are equipped with advanced telematics to enhance your fleet's analytics.

A number of PEV models to choose from

There are more than a dozen PEVs commercially available in the United States at the end of 2012 – with many more expected to launch over the next few years. While only a fraction of these models are available in Florida, some fleet operators have purchased or leased their PEVs out-of-state – an option that may, however, impact service availability locally, depending on the manufacturer.

Types of PEVs:

PEV: Plug-in electric vehicles get all or part of their power from the electric grid. These include BEVs, PHEVs, and EREVs.

BEV: Battery-electric vehicles (BEV) run entirely on grid-charged batteries.

PHEV: Plug-in hybrid electric vehicles have batteries recharged from the electric grid, and also contain internal combustion engines fueled by gasoline.

EREV: Extended-range electric vehicles have a gas engine that powers an electric generator for several hundred additional miles after the car's battery is fully discharged.

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Passenger vehicles

Plug-In Electric Vehicles

2013 Chevy Volt (EREV)

- Engine: 4 cyl, 1.4 L; Motors: 111 kW traction + 54 kW generator
- 35 kWh per 100 miles
- MPGe: 98, MPG: 37
- 38 mile electric range
- 380 mile total range
- MSRP: $39,145
- Tax credit: $7,500

Photo credit: General Motors

2013 Ford C-Max Energi (PHEV)

- Engine: 4 cyl, 2.0 L; Motor: 68 kW
- 34 kWh per 100 miles
- MPGe: 100, MPG 43
- 21 mile electric range
- 620 mile total range
- MSRP: $32,950
- Tax credit: $3,750

Photo credit: Ford

2013 Ford Fusion Energi* (PHEV)

- Engine: 4 cyl, 2.0 L; Motor: 68 kW
- MPGe: 100, MPG 47
- 21 mile electric range
- MSRP: $39,495
- Tax credit: $3,751

*note, estimates only. Ratings not yet published by the U.S. Dept. of Energy

Photo credit: Ford

2012 Nissan Leaf (BEV)

- 80 kW electric motor
- 73 mile electric range
- 34 kWh per 100 miles
- MPGe: 90
- MSRP: $35,200
- Tax credit: $7,500

Photo credit: Nissan

2013 Toyota Prius Plug-in

- Engine: 4 cyl, 1.8 L; Motor: 18 kW
- 29 kWh per 100 miles
- MPGe: 95, MPG 50
- 11 mile electric range
- 540 mile total range
- MSRP: $32,000
- Tax credit: $2,500

Photo credit: Toyota

2013 Ford Focus Electric (BEV)

- 107 kW electric motor
- 32 kWh per 100 miles
- MPGe: 105
- 76 mile electric range
- MSRP: $39,200
- Tax credit: $7,500

Photo credit: Ford

2013 Mitsubishi i-MiEV (BEV)

- 49 kW electric motor
- 30 kWh per 100 miles
- MPGe: 112
- 62 mile electric range
- MSRP: $29,125
- Tax credit: $7,500

Photo credit: Mitsubishi

2013 CODA Automotive (BEV)

- 100 kW electric motor
- 46 kWh per 100 miles
- MPGe: 73
- 88 mile electric range
- MSRP: $37,250
- Tax credit: $7,500

Photo credit: Adrian Gaut

2013 Tesla Model S – (85kWh BEV)

- 270 kW electric motor
- 265 mile electric range
- 38 kWh per 100 miles
- MPGe: 89
- MSRP: $57,400; $77,400 - 85 kWh model
- Tax credit: $7,500

Photo credit: Teslas Motors

2012 Fisker Karma (EREV)

- Engine: 4 cyl, 2.0 L; Motors: 2 @ 150 kW (300 kW total)
- 62 kWh per 100 miles
- MPGe: 54, MPG 20
- 33 mile electric range
- 240 mile total range
- MSRP: $102,000
- Tax credit: $7,500

Photo credit: Fisker

2013 Honda Fit EV (BEV)

- 92 kW electric motor
- 82 mile electric range
- 29 kWh per 100 miles
- MPGe: 118
- MSRP: not available

Photo credit: Honda

2013 Smart fortwo (BEV)

- 55 kW electric motor
- 32 kWh per 100 miles
- MPGe: 107
- 68 mile electric range
- MSRP: not available

Photo credit: Smart

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Other fleet vehicles

SUVs, Pickup Trucks, Vans, Delivery Trucks, Transit Buses

- Plug-in electric powertrains for popular brands of light trucks, vans and SUVs, as well as specialty fleet vehicles, including trucks, busses, delivery vans, etc.
- Some vehicles can be equipped with onboard exportable power – like an onboard generator for the worksite.
- There are a number of companies offering these products – including, but not limited to:
  - Via Motors
  - Proterra Inc.
  - Daimler AG
  - Enova Systems
  - Balgon
  - Zero Truck
  - Electric Vehicles International
  - Quantum Technologies
  - Smith Electric Vehicles
  - Navistar
  - GGT Electrical
  - DesignLine Corp.

Photo credit: Via Motors

Photo credit: Proterra Inc.

Resources and tools:

There are a number of resources available for fleet operators looking for more information about electric transportation. These resources range from basic information about available technologies, to online calculators comparing the cost and savings of ICE vehicles versus PEVs.

- **Clean Cities tools:** For a variety of tools to help fleet managers save money and select the right equipment. Visit: **www.afdc.energy.gov/tools**, or **www.fueleconomy.gov/feg/evsbs** to compare vehicles.
  - Light Duty Vehicle Search
  - Heavy Duty Vehicle Search
  - Vehicle Cost Calculator
- **Case studies and publications:** For information on and examples of how businesses, fleets, government agencies and others have successfully deployed alternative fuels and advanced vehicles.
  - Publications (**www.afdc.energy.gov/publications**)
  - Plug-in Electric Vehicle Handbook for Fleet Managers (**www.afdc.energy.gov/pdfs/pev_handbook.pdf**)
  - Case Studies Search (**www.afdc.energy.gov/case**)

Questions? For additional information and resources on vehicle siting, please visit:
Web: www.FPL.com/electricvehicles | www.DriveElectricFlorida.org
Email: electric-vehicles@FPL.com | Help@DriveElectricFlorida.org

Tools & Resources C: Education and Outreach

The downloadable and printable versions of these fact sheets that can be used for distribution will be available on www.DriveElectricFlorida.org.

Drive ELECTRIC Florida

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Get Charged Up!

About plug-in electric vehicle cost, environmental and energy-security benefits

Today's plug-in electric vehicles (PEVs) offer a number of benefits for both consumers and fleet managers – providing environmental, cost and energy security benefits that far exceed those of traditional gas-powered cars. The outlook is even brighter in the Sunshine State, where electricity costs are lower than the national average. Some key benefits include:

1. Save Money – On Fuel and Maintenance:

Fuel Savings – the equivalent of 100 miles per gallon: Dependent on a driver's usage patterns, some battery electric vehicles (BEVs) today are rated at the equivalent of about 100 miles per gallon (100 MPGe)[1] – which is essentially equal to fueling up for a few cents per mile. Compare this to a gas-powered car, which costs an average of 14 cents per mile to drive. Traveling 15,000 miles per year in a battery-electric vehicle (BEV), or PEV in all-electric mode, could save owners more than $1,700 in annual fuel costs.

Maintenance and Operating Savings: Driving an all-electric vehicle means that the owner no longer has to worry about oil changes, maintenance on exhaust and transmission systems, and repair work on many of the other moving parts contained within a conventional vehicle. It's estimated that over conventional vehicles, BEVs will save:

- 35 percent on scheduled maintenance.[2]
- 30 percent on repairs.[3]

Additionally, with regenerative braking, brake systems in PEVs will often last longer than those in traditional vehicles.[3]

2. Reduce Emissions – For a Brighter Future

Even when emissions from electricity-producing power plants are taken into consideration, BEVs contribute to significantly less greenhouse gasses than gas-powered vehicles. The stats are impressive:

- PEVs powered by FPL's electricity have 70 percent fewer emissions than gas-powered vehicles – making them an especially feel-good option for car buyers in the region.
- Electric vehicles could reduce greenhouse gas emissions by more than 450 million metric tons annually in 2050 – that's the equivalent of taking 82.5 million passenger cars off the road.[4]

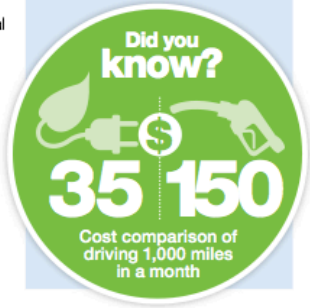
Quick guide to PEV types:

PEV: Plug-in electric vehicles get all or part of their power from the electric grid and include BEVs, PHEVs, and EREVs.

BEV: Battery-electric vehicles (BEV) run entirely on grid-charged batteries.

PHEV: Plug-in hybrid electric vehicles have batteries recharged from the electric grid, and also contain internal combustion engines fueled by gasoline.

EREV: Extended-range electric vehicles (EREVs) also have gas engines that power electric generators for several hundred additional miles after car batteries are fully discharged.



Did you know?

Most people drive less than 40 miles per day – well within the range of today's electric vehicles.

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3. Lower Your Fossil-Fuel Reliance: For Greater Energy Independence and Security

Today, the U.S. imports more than 60 percent of the petroleum it consumes; two-thirds of those imports are used for the transportation sector.[5] By electrifying the nation's light-duty vehicle fleet, which accounts for roughly 45 percent of total U.S. oil consumption,[6] the U.S. would reduce oil imports by more than three million barrels per day in 2030.[7]

4. Enjoy Cutting-Edge Technology, Safety and Reliability

The fun factor: PEVs provide drivers with significant fun – offering cutting-edge technologies, quick and smooth acceleration, advanced displays and sophisticated mobile applications that provide drivers with more information and control. Plus, the satisfaction of knowing they are among the first to adopt this exciting new technology.

Advanced safety: PEVs produced by major auto manufacturers are held to the same safety standards as conventional vehicles set by the National Highway Traffic and Safety Administration (NHTSA). Additionally, PEVs must also meet the electrical and safety standards set by the Society of Automotive Engineers, the National Electric Vehicle Infrastructure Working Council and others, while charging equipment must be tested by independent and certified labs – such as Underwriters Laboratories, CSA International and Edison Testing Laboratories.

5. Experience Greater Convenience

PEVs offer owners a number of improved conveniences over traditional vehicles, including:

- Less regularly scheduled maintenance.
- The benefit of home charging – often while PEV owners are asleep – meaning they can avoid additional stops on their commute for refueling at a gas station.
- In the future, PEV owners may also enjoy the added benefit of back-up power from their charged batteries during a blackout or power outage to help them keep important electronic devices – like refrigerators and household lighting – operating until utility power is restored.

A Number of PEV Models to Choose From

As PEVs grow in popularity, more choices will be available for consumers. At the end of 2012, there were 14 PEVs available in the U.S. market, including:

- 10 BEV models.
- Three PHEV models and one extended-range model.

Automakers have announced that 25 additional PEVs will be available by 2015; and of these, nine are BEVs and 16 are PHEVs. These include sports cars, family sedans, SUVs, crossovers, etc.

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[1] DOE. "Plug-In Electric Vehicle Handbook for Consumers."
[2] www.plugincars.com/study-electrics-35-less-costly-maintain-comparible-ice-vehicles-125775.html
[3] GE Capital data and PRTM estimates. Cited in figure 3M, "% Improvement over ICE Maintenance and Repair Costs," p. 104. "Fleet Electrification Roadmap," Electrification Coalition, November 2010.
[4] DOE. "Plug-In Electric Vehicle Handbook for Consumers."
[5] Electric Power Research Institute, Natural Resources Defense Council & Charles Clark Group, Environmental Assessment of Plug-in-Hybrid Electric Vehicles, Volume 1: Nationwide Greenhouse Gas Emissions. July 2007.
[6] DOE. "Plug-In Electric Vehicle Handbook for Consumers."
[7] US Department of Energy, Energy Information Administration.
[8] Inter-Industry Forecasting Project at the University of MD, Keybridge Research LLC & Electrification Coalition. Economic Impacts of the Electrification Roadmap. April 2010

Questions? For additional information and resources on vehicle siting, please visit:
Web: www.FPL.com/electricvehicles | www.DriveElectricFlorida.org
Email: electric-vehicles@FPL.com | Help@DriveElectricFlorida.org

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Setting the Record Straight: The Facts About Electric Vehicles

There are a number of myths floating around today about plug-in electric vehicles (PEVs). It's time to clear the air.

Quick guide to PEV types:

PEV: Plug-in electric vehicles get all or part of their power from the electric grid and include BEVs, PHEVs, and EREVs.

BEV: Battery-electric vehicles (BEV) run entirely on grid-charged batteries.

PHEV: Plug-in hybrid electric vehicles have batteries recharged from the electric grid, and also contain internal combustion engines fueled by gasoline.

EREV: Extended-range electric vehicles (EREVs) also have a gas engine that powers an electric generator for several hundred additional miles after the car's battery is fully discharged.

MYTH: PEVs can only support short trips, not my daily commuting needs.

FACT: The average daily commute of most Americans is less than 40 miles and can be supported – and exceeded – by the certified range of commercially available electric vehicles on the road today. Mainstream battery-electric vehicles (BEVs) are targeting at least a 100-mile range on a full charge – which is more than adequate for over 90 percent of all U.S. household trips.[1] For people who regularly exceed the range of today's BEVs, plug-in hybrid electric vehicles (PHEVs) can go even farther – up to 300 miles or more, including gasoline range.[2]

MYTH: PEVs are far more expensive than the average car.

FACT: While the cost of a PEV is higher than most comparable traditional cars, the PEV's total cost of ownership must be taken into account. Consider the following:

- Federal tax incentives – such as the federal income tax credit of up to $7,500 – may lower the total cost of PEV ownership.[3]
- Compared to gas-powered cars, BEVs could save owners 100 percent on oil; 35 percent on scheduled maintenance;[4] and 30 percent on repairs.[5]
- Driving 15,000 miles per year in a BEV, or a PEV in "all-electric" mode, could save you more than $1,700 in annual fuel costs.

MYTH: A PEV will make my energy costs go way up!

FACT: Higher electric bills are always offset by savings at the gas pump. Dependent on driving patterns, many BEVs today exceed the equivalent of 100 miles per gallon (or, MPGe).[6] This would be like "filling up" for a few cents per mile, compared to the average 14 cents per mile in a traditional car.[7] For example, Florida Power & Light Company customers who drive 1,000 miles in a month and charge exclusively at home would see their electric bill impacted by about $35 per month – this is in stark contrast to what would have been spent at the gas pump.

MYTH: PEVs aren't "clean." Instead of burning gas, they run off of dirty power plants.

FACT: Even when emissions from power plants are taken into consideration, BEVs contribute to significantly less greenhouse gasses than traditional cars. The stats are impressive:

- PEVs powered by FPL's electricity have 70 percent fewer emissions than gas-powered vehicles making them an especially feel-good option for PEV buyers in the region.
- Electric vehicles could reduce greenhouse gas emissions by more than 450 million metric tons annually in 2050 – that's the equivalent of taking 82.5 million passenger cars off the road.[8]

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MYTH: Charge times are just too long – what a major inconvenience!

FACT: Plugging in takes just a few seconds and then your car "refuels" while you're off doing other things. In fact, the majority of PEV charging happens overnight at home. A 120-volt, Level-1 charge provides an average of 2 to 5 miles of range per hour. Since the average American drives less than 40 miles a day, Level-1 charging with a standard household outlet is sufficient for most owners who charge at night. A 240-volt, Level-2 charge provides 10 to 20 (or more) miles of range per hour for those seeking a faster "fuel up."

MYTH: There's nowhere to charge when I'm on the road, making PEVs totally impractical.

FACT: Fortunately, a Level-1, 120-volt charge at home is more than adequate for most drivers with an average daily commute of 40 miles. For those needing PEVs for longer trips, more public and semi-public (i.e. the workplace) charging options are becoming available and will continue to be implemented as PEV adoption increases. Currently, more than 5,000 public stations are installed in the U.S. – and increasing daily. You can visit http://www.afdc.energy.gov/fuels/electricity_locations.html or use a smart phone app to find your closest charging station. If range is a major concern, PHEVs and EREVs can supplement battery power with gasoline power for longer trips – only if you need it – allowing you to benefit from electric power most of the time.

MYTH: PEV batteries don't last long enough and are very expensive to replace.

FACT: It is true that the advanced technology batteries used in PEVs are expensive – however the costs have been coming down and are expected to continue to drop in the coming years. Plus, buyers can feel confident knowing that most major automakers are offering warranties on the batteries covering eight years, or 100,000 miles of driving.

MYTH: Car batteries are an environmental hazard and can't be recycled.

FACT: More than 50 percent of the lithium-ion battery – which is used in many PEVs – can be recycled.[9] Furthermore, when lithium-ion batteries can no longer be used in vehicles, they are often left with 70–80 percent of their charge capacity – making them reusable for other storage needs, including projects supporting clean, renewable power.

MYTH: PEVs are not as safe as traditional, gas-powered cars.

FACT: PEVs offer safety and reliability benefits equal to, or better than, traditional vehicles. In fact, all PEVs produced by major auto manufacturers are held to the same safety standards as conventional vehicles set by the National Highway Traffic and Safety Administration (NHTSA). Additionally, PEVs must also meet the electrical and safety standards set by the Society of Automotive Engineers, the National Electric Vehicle Infrastructure Working Council and others, while charging equipment must be tested by independent and certified labs – such as Underwriters Laboratories, and Edison Testing Laboratories. And the odds of being injured in a crash are 25 percent lower for people in hybrid than in non-hybrid vehicles.[10]

MYTH: The power grid can't handle broad PEV adoption.

FACT: The nation's grid has a lot of excess, unused generating capacity – or power. In fact, the existing electrical infrastructure could currently fuel 84 percent of U.S. cars, pickup trucks, and SUVs (198 million vehicles) for a daily commute of about 33 miles.[11]

[1] Department of Energy (DOE). Office of Energy Efficiency and Renewable Energy. "Plug-in Electric Vehicle Handbook for Consumers." September 2011.
[2] Chameides, Planet Green, Dave. "12 Myths About Electric Vehicles" 06 December 2011. HowStuffWorks.com. http://auto.howstuffworks.com/myths-electic-cars-vehicles.htm. 07 December 2012.
[3] DOE. Energy Efficiency & Renewable Energy. "Federal Tax Credits for Electric Vehicles Purchsed in or after 2010." http://www.fueleconomy.gov/feg/taxevb.shtml. Accessed October 2012.
[4] www.plugincars.com/study-electrics-35-less-costly-maintain-comparible-ice-vehicles-1257775.html
[5] GE Capital data and PRTM estimates. Cited in figure 3M, "% Improvement over ICE Maintenance and Repair Costs," p. 104. "Fleet Electrification Roadmap," Electrification Coalition, November 2010.
[6] DOE. "Plug-in Electric Vehicle Handbook for Consumers."
[7] DOE. "Plug-in Consumers Electric Vehicle Handbook for Consumers."
[8] Electric Power Research Institute, Natural Resources Defense Council & Charles Clark Group, Environmental Assessment of Plug-in-Hybrid Electric Vehicles, Volume 1: Nationwide Greenhouse Gas Emissions. July 2007.
[9] Lee, Henry & Lovelette, Grant. Harvard Kennedy School Belfer Center for Science and International Affairs. "Will electric cars transform the U.S. vehicle market?" July 2011.
[10] Highway Loss Data Institute. "Hybrid models have lower injury odds than their conventional counterparts." http://electricdrive.org/index.php?ht=a/GetDocumentAction/id/29985. 17 November 2011
[11] Pacific Northwest National Laboratory (PNNL). "Impacts Assessment of Plug-In Hybrid Electric Vehicles on Electric Utilities and Regional U.S. Power Grids. Part 1: Technical Analysis." http://energytech.pnnl.gov.

Questions? For additional information and resources on vehicle siting, please visit:
Web: www.FPL.com/electricvehicles | www.DriveElectricFlorida.org
Email: electric-vehicles@FPL.com | Help@DriveElectricFlorida.org

Appendices

List of Appendices

Appendix A: Regional Snapshot, Policy, and Incentives

Appendix A-1: Southeast Florida Demographical Data: Selected Characteristics of Residents

Southeast Florida Selected Characteristics of Residents 2006 10										
Characteristic	**United States**	**Florida**	**Monroe**	**Miami Dade**	**Broward**	**Palm Beach**	**Martin**	**St. Lucie**	**Indian River**	**SE Florida**
2010 Resident Population (POP100)	308,745,538	18,801,310	73,090	2,496,435	1,748,066	1,320,134	146,318	277,789	138,028	6,199,860
2010 Housing Units (HU100)										
2010 Land Area (GCT-PH1)	3,531,905.43	53,624.76	983.28	1,897.72	1,209.79	1,969.76	543.46	571.93	502.87	7,678.81
2010 Water Area (GCT-PH1)	264,836.79	12,132.94	2,754.24	533.47	113.08	413.25	209.36	116.18	114.13	4,253.71
Total Area (Square Miles)	**3,796,742.22**	**65,757.70**	**3,737.52**	**2,431.19**	**1,322.87**	**2,383.01**	**752.82**	**688.11**	**617.00**	**11,932.52**
Population Density in 2012	**90**	**357**	**74**	**1,339**	**1,454**	**680**	**272**	**501**	**280**	**819**
Population (EDR, Mar/2012)										
Population 2012	316,265,537	19,128,190	72,373	2,541,014	1,759,158	1,339,070	148,016	286,498	140,742	6,286,871
Population 2022	347,803,053	21,916,358	70,726	2,777,370	1,854,150	1,521,312	167,302	376,011	166,731	6,933,602
% Growth 2012-22	**9.97%**	**14.58%**	**-2.28%**	**9.30%**	**5.40%**	**13.61%**	**13.03%**	**31.24%**	**18.47%**	**10.29%**
Educational Attainment (B15002)										
Total 25 years and older	199,726,659	12,788,471	56,634	1,655,557	1,194,763	929,594	108,901	188,029	100,521	4,233,999
Bachelor's degree or higher	55,726,999	3,313,411	16,278	434,574	353,884	295,333	32,053	33,541	26,870	1,192,533
% Bachelor's degree or higher	27.90%	25.91%	28.74%	26.25%	29.62%	31.77%	29.43%	17.84%	26.73%	28.17%
Household Income (B19001)										
Total Households	114,235,996	7,152,844	29,791	827,556	668,898	523,150	59,203	103,103	57,560	2,269,261
$75,000 or more	37,947,669	2,073,704	10,174	225,785	222,273	182,848	21,146	25,446	16,243	703,915
% $75,000 or more	33.22%	28.99%	34.15%	27.28%	33.23%	34.95%	35.72%	24.68%	28.22%	31.02%
$100,000 or more	23,850,374	1,253,066	6,580	142,501	142,673	121,200	14,295	14,135	10,615	451,999
% $100,000 or more	20.88%	17.52%	22.09%	17.22%	21.33%	23.17%	24.15%	13.71%	18.44%	19.92%
$125,000 or more	14,903,234	764,956	4,244	89,815	90,914	80,696	9,973	7,306	6,821	289,769
% $125,000 or more	13.05%	10.69%	14.25%	10.85%	13.59%	15.43%	16.85%	7.09%	11.85%	12.77%
Median Household Income (B19013)										
Median Household Income	$51,914	$47,661	$53,821	$43,605	$51,694	$53,242	$53,210	$45,196	$47,341	$48,439
Per Capita Income (B19301)										
Per Capita Income	$27,334	$26,551	$35,516	$22,957	$28,631	$33,610	$35,772	$23,296	$31,918	$27,490
Occupied Housing Units (B25032)										
Total occupied housing units/households	114,235,996	7,152,844	29,791	827,556	668,898	523,150	59,203	103,103	57,560	2,269,261

Occupied units that are multi-family	25,841,636	1,897,363	6,008	393,198	295,109	193,198	15,526	13,201	10,131	926,371
% of occupied units that are multi-family	22.62%	26.53%	20.17%	47.51%	44.12%	36.93%	26.23%	12.80%	17.60%	40.82%
Owner-occupied units	76,089,650	4,986,629	19,210	480,532	463,511	384,995	47,063	78,340	44,186	1,517,837
Owner-occupied units that are multi-family	6,918,297	783,108	2,203	152,209	162,183	113,390	10,062	6,241	5,722	452,010
% of owner-occupied units that are multi-family	9.09%	15.70%	11.47%	31.68%	34.99%	29.45%	21.38%	7.97%	12.95%	29.78%
Renter-occupied units	38,146,346	2,166,215	10,581	347,024	205,387	138,155	12,140	24,763	13,374	751,424
Renter-occupied units that are multi-family	18,923,339	1,114,255	3,805	240,989	132,926	79,808	5,464	6,960	4,409	474,361
% of renter-occupied units that are multi-family	49.61%	51.44%	35.96%	69.44%	64.72%	57.77%	45.01%	28.11%	32.97%	63.13%
Building Permits, 2004-07 - Total Units	**7,462,711**	**848,932**	**1,647**	**77,075**	**26,309**	**38,517**	**4,795**	**25,280**	**12,404**	**186,027**
Single Family	5,653,540	612,891	1,571	29,319	13,697	25,708	3,617	21,931	11,272	107,115
2 to 4 Units	310,546	21,721	23	2,132	812	672	169	510	331	4,649
5+ Units	1,498,625	214,320	53	45,624	11,800	12,137	1,009	2,839	801	74,263
Building Permits, 2008-11 - Total Units	**2,716,993**	**177,410**	**782**	**10,690**	**6,825**	**7,590**	**767**	**1,901**	**1,665**	**30,220**
Single Family	1,882,511	127,259	553	3,613	3,896	5,526	652	1,469	1,521	17,230
2 to 4 Units	98,630	3,979	114	452	237	196	44	31	4	1,078
5+ Units	735,852	46,172	115	6,625	2,692	1,868	71	401	140	11,912
Building Permits, Avg 2004-11 - Total Units	**1,272,463**	**128,294**	**304**	**10,971**	**4,142**	**5,764**	**696**	**3,398**	**1,759**	**27,034**
Single Family	942,006	92,519	266	4,117	2,199	3,904	534	2,925	1,599	15,544
2 to 4 Units	51,147	3,213	17	323	131	109	27	68	42	717
5+ Units	279,310	32,562	21	6,531	1,812	1,751	135	405	118	10,773
Employment (County Business Patterns, 2010)										
Private Non-Farm Employment	111,970,095	6,626,558	26,334	802,109	593,373	425,427	47,045	51,918	37,302	1,983,508
Private Non-Farm Establishments	7,396,628	491,150	3,501	73,410	55,541	41,710	4,981	4,881	3,868	187,892
Number with 50 employees or more	371,877	20,336	85	2,593	2,121	1,494	174	166	127	6,760
% with 50 employees or more	5.03%	4.14%	2.43%	3.53%	3.82%	3.58%	3.49%	3.40%	3.28%	3.60%
Number of Vehicles Available (B25044)										
Total Households	114,235,996	7,152,844	29,791	827,556	668,898	523,150	59,203	103,103	57,560	2,269,261
Households with no vehicle available	10,113,266	462,112	2,399	91,558	47,710	32,330	2,706	4,599	3,140	184,442
% of households with no vehicle available	8.85%	6.46%	8.05%	11.06%	7.13%	6.18%	4.57%	4.46%	5.46%	8.13%
% of households with vehicle available	91%	94%	92%	89%	93%	94%	95%	96%	95%	92%

Appendix A-2: Factors that Could Impact PEV/ PHEV Sales

The following factors should be considered over the next few years as they could significantly impact the PEV sales forecast.

Fuel Price: The price of gasoline will impact sales of PEVs. Sustained highs or volatile spikes in fuel prices will make PEVs more attractive to buyers. HEVs experienced an increase in sales during the last gas spike. Falling gasoline prices will likely have the opposite effect. By comparison, electricity tends to have far less price volatility (electric rates are normally adjusted annually, versus daily at the gas pump) and is a far less expensive automobile fuel.

Subsidies and incentives: Subsidies can significantly lower PEV purchase price and make them more cost competitive with ICE vehicles. These subsidies are particularly effective in the early years when production costs are at their highest.

Infrastructure development: PEVs will necessitate changes to the infrastructure – strategically placed public charging stations, adequately sized electric transformers, etc. If the infrastructure is not developed, PEVs become much less viable and attractive.

Production delays: Vehicles cannot be sold if they are not manufactured. Production delays early could push adoption or impede adoption beyond early adopters. The Ford Focus Electric (among others), for example, has had several launch delays.

Technology improvements: If a new technology (e.g. fuel cells, hydrogen, etc.) develops to the point of being cost effective ahead of PEV, sales / demand of PEVs could be impacted. Conversely, improvements in PEV and battery technologies could lower the price or increase the range of PEVs, making them more attractive to a wider group of buyers.

Production costs: If manufacturers can achieve economies of scale that significantly drop production costs, PEVs become much more cost competitive and profitable. Should material and production costs remain high, demand could be dampened.

Material shortages: There are some concerns over the amount of lithium available for batteries. A battery shortage could significantly impede sales.

Energy independence: If the political priority for energy independence in the US increases sufficiently, PEV sales could increase as a way to lower the need for foreign oil.

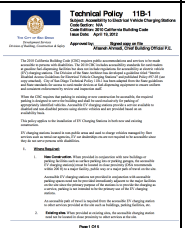
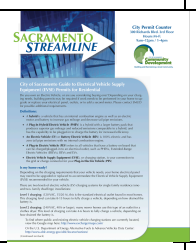
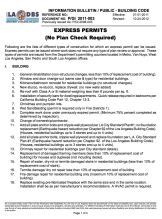
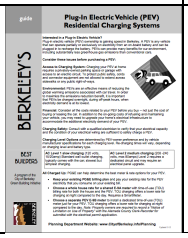
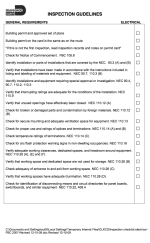
Culture and mindset: People must change their current mindset related to: refueling a vehicle every day, versus once depleted; fueling at home; having a smaller vehicle range to suit daily driving habits, versus having a vehicle to suit occasional needs for longer distance travel.

Environmental regulations: Strong emissions reduction goals could increase the demand (or requirement) to produce PEVs. The establishment of more stringent national air pollution standards or change in attainment of these standards could trigger mandatory and voluntary programs that would increase PEV demand.

China or India: If India or China develops a mass-produced, successful PEV, it could have a huge impact given their large consumer-base. This market driver could either force prices down, should they export their vehicles, or drive prices up by producing shortages in materials or components.

Appendix A-3: Examples of Permitting and Inspection Guidebooks

Below is a table with the names of, and links to, permitting and inspection guidebooks from other cities that can be used as a reference for the Southeast Florida Region.

City/Direct Link to Doc		Guidebook Title	Where to Download (copy and paste link into browser)
San Diego, CA		Technical Policy 11B-1 (Memo) Subject: "Accessibility to Electrical Vehicle Charging Stations" (City of San Diego)	https://www.sandiego.gov/development-services/pdf/industry/tpolicy11b1.pdf
Sacramento, CA		"City of Sacramento Guide to Electric Vehicle Supply Equipment (EVSE) Permits for Residential" (City of Sacramento)	http://www.cityofsacramento.org/dsd/customer-service/documents/CityofSac_ElectricVehiclePermitGuidePacket_Oct_20_11.pdf
Los Angeles, CA		Information Bulletin / Public – Building Code. "Express Permits (No Plan Check Required)" (LA Department of Building and Safety)	http://ladbs.org/LADBSWeb/LADBS_Forms/InformationBulletins/IB-P-GI2011-003ExpressPermits.pdf
Berkeley, CA		"Plug-In Electric Vehicle (PEV) Residential Charging Systems" (City of Berkeley)	http://www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/PEV%20guide.pdf
Miami-Dade Electrical Inspection Checklist		Checklist: "Inspection Guidelines: General Requirements, Electrical." (Miami-Dade County)	http://www.miamidade.gov/building/library/checklists/electrical-inspection.pdf

Appendix A-4: The History of Alternative-Fuel Vehicle Policies in Florida

The following is a brief history of policies related to alternative-fuel transportation in the State of Florida.

The Early Goals of the 1980s

As part of Florida's State Comprehensive Plan, which was adopted in 1985 by the Legislature as §187.201, Fla. Stat., there were some high-level, outlined goals and policies related to alternative fuel transportation:

- *Goal 10. Policy 4*: Encourage the use of alternative energy resources that do not degrade air quality.
- *Goal 11. Policy 4*: Ensure energy efficiency in transportation design and planning and increase the availability of more efficient modes of transportation.

Executive Order of 2005

Not until 2005 were alternative-fuel vehicles addressed in a minor way again, and this time by executive order. On November 10, 2005, then Governor Jeb Bush issued Executive Order #05-241, which:

- Encouraged all departments and agencies of state government to develop and implement long-term conservation initiatives – for example, investments in energy efficient equipment and hybrid electric or alternative fuel.
- Directed the State of Florida, through the Secretary of the Department of Environmental Protection (DEP), to develop a comprehensive energy plan by evaluating Florida's current and future energy supply and demand.
- Directed DEP to develop a State Energy Plan that considers:

  "all relevant topics, including, but not limited to the following…traditional and alternative fuel vehicles, consumer access to alternative fuels, the current and projected costs to consumers for traditional and alternative fuels, and the current and projected infrastructure needs for the production and supply of alternative fuel vehicles and the relative costs and benefits of any said alternatives vehicles."[227]

State Energy Plan of 2006 Offers PEV-related Recommendations

Resulting from the above executive order, the DEP published a State Energy Plan on January 17, 2006. The Energy Plan contains the following recommendations regarding alternative fuel vehicles:

- Recommendation #4: Raise public awareness for alternative fuel vehicles through public programs. Encourage public entities, including school districts and local governments, to use biofuels in fleets. (Department of Environmental Protection).
- Recommendation #5: Provide grant funding for applied research and demonstration projects associated with the development and implementation of alternative fuel vehicles and other emerging technologies. By 2007, the grant portfolio should realize an aggregate return on investment greater than two to one. (Department of Environmental Protection).

[227] Florida Executive Order #05-241, Section 2.E.

- Recommendation #7: Provide corporate sales and income tax incentives to improve production, develop distribution infrastructure and increase availability of clean fuels, including biodiesel and ethanol. (Department of Environmental Protection, Department of Revenue).

Florida Energy and Climate Protection Act and Executive Orders of 2007

In 2006 and 2007, two pieces of legislation that touched upon PEVs were enacted. Unfortunately, they did little to accelerate implementation of PEVs in Florida – with one piece of legislation simply a tangent to renewable energy policy, and the other a requirement for state agencies to procure vehicles with the greatest fuel efficiency:

- In 2006, the Florida Legislature enacted the Florida Renewable Energy Technologies and Energy Efficiency Act, which was amended in 2007 and renamed the Florida Energy and Climate Protection Act,[228] tangentially addressing PEVs if the electricity used is renewable, defined as: "hydrogen, biomass, solar energy, geothermal energy, wind energy, ocean energy, waste heat, or hydroelectric power."[229]
- In 2007, Governor Charlie Crist signed Executive Order #07-126, with the intent to establish climate change leadership by example and reduce the public sector's greenhouse gas emissions[230] -- directing the Department of Management Services and all agencies under the Governor to procure vehicles with the greatest fuel efficiency. In addition, the Executive Order requires documentation of alternative fueling facilities (hydrogen, compressed natural gas, biofuels, and electrically charged batteries) used by the state to be accessed by the public.[231]

[228] Sections 377.801-806, Fla. Stat. http://leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&URL=Ch0377/part03.htm&StatuteYear=2006&Title=%2D%3E2006%2D%3EChapter%20377%2D%3EPart%20III

[229] Section 377.803(6), Fla. Stat. http://leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0377/SEC803.HTM&Title=->2006->Ch0377->Section%20803#0377.803

[230] Executive Order 07-126. http://edocs.dlis.state.fl.us/fldocs/governor/orders/2007/07-126-actions.pdf

[231] Executive Order 07-126. http://edocs.dlis.state.fl.us/fldocs/governor/orders/2007/07-126-actions.pdf

Appendix A-5: Building Incentives – LEED, FGBC, and Green Local Government Certification Program

The columns to the far right identify the relevance of the LEED rating system to the components of this plan, and offer recommendations for increasing these types of projects within new construction and major renovation.

Eligible Credits for PEVs, EVSE, and Car-Sharing by the LEED Rating System								
LEED Rating System	**Credit**	**Option**	**Description**	**# of credits**	**Relationship to plan components**			**Opportunities/ Recommendations**
					EV	EVSE	CS	
New Construction (NC)	Sustainable Sites Credit 4.3	Option 1	Preferred parking1 (5% of total spaces) for low emission or fuel efficient vehicles or discounted parking (20%) for minimum 2 years	3		X		
		Option 2	Install alternative-fuel fueling stations for 3% of the total vehicle parking capacity		X			1. Recommend to USGBC adding "or charging" after fueling. It is not clear from the credit description that electric vehicle charging infrastructure is an eligible option. 2. Provide county project managers with permitting guides/checklists and consider establishing a policy to prioritize this option.
		Option 3	Provide low-emitting and fuel-efficient vehicles for 3% of full-time equivalent (FTE) occupants. Provide preferred parking.			X		
		Option 4	Provide building occupants access to a low-emitting or fuel-efficient vehicle-sharing program.				X	
	Sustainable Sites credit 4.4 Alternative Transportation – Parking Capacity	Option 1 for Residential Projects and Residential Components of Mixed Use Projects	…Provide infrastructure and support programs to facilitate shared vehicle use such as carpool drop-off areas, designated parking for vanpools, car-share services, ride boards and shuttle services to mass transit.				X	Explore highlighting this credit for affordable housing developments subject to the Miami-Dade County's Sustainable Building Ordinance. This could serve as an incentive to developers. Give developers more confidence in TODs due to availability of car sharing services.

Eligible Credits for PEVs, EVSE, and Car-Sharing by the LEED Rating System								
LEED Rating System	**Credit**	**Option**	**Description**	**# of credits**	**Relationship to plan components**			**Opportunities/ Recommendations**
					EV	EVSE	CS	
Healthcare	Sustainable Sites Credit 4.4	Case 2, Option 1	Provide infrastructure and support programs to facilitate shared vehicle use, such as carpool drop-off areas, designated parking for vanpools, car-share services, ride boards and shuttle services to mass transit.	1			X	Partner with healthcare facilities that may be working towards this credit.
Existing Buildings (EB)	Sustainable Sites Credit 4.0 Alternative Commuting Transportation		Reduce the number of commuting round trips made by regular building occupants using single occupant, conventionally fueled vehicles. Alternative transportation includes … low-emitting, fuel-efficient or alternative-fuel vehicles… Potential Technologies & Strategies preferred parking, access to alternative-fuel refueling stations, and incentives for using alternative transportation	1-15 1 point for 10% increasing increment ally to 15 points for 75% of trips.	X	X	X?	Consider expanding Sustainable Building Ordinance to Existing Buildings.
Bonus Points	Regional Priority		Earn 1 of the 6 Regional Priority Credits (credits identified by the USGBC Regional Councils and Chapters as having additional regional environmental importance). https://www.usgbc.org/RPC/RegionalPriorityCredits.aspx?CMSPageID=2435	1				Recommend to regional council/chapter adding Sustainable Sites Credits 4.0, 4.3, and/or 4.4 as regional priority
	Innovation in Design or Innovation in Operations Credits		Path 3. Pilot credit (1-4 points) Available for all Building Design & Construction rating system and Existing Buildings: Operations & Maintenance rating systems. Pilot Credit Library at www.usgbc.org/pilotcreditlibrary. Pilot Credit 56: EA - Renewable Energy-Distributed Generation Installation of photovoltaic technologies on the roof for minimum 250 kW Capacity: http://www.usgbc.org/ShowFile.aspx?DocumentID=10403	1-4	X			

[1]*For the purposes of this credit "preferred parking" refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped persons) or parking passes provided at a discounted price. To establish a meaningful incentive in all*

potential markets, the parking rate must be discounted at least 20%. The discounted rate must be available to all eligible customers (i.e. not limited to the number of customers equal to 5% of the vehicle parking capacity), publicly posted at the entrance of the parking area, and available for a minimum of 2 years.

[2]For the purposes of this credit, low-emitting vehicles are defined as vehicles that are classified as Zero Emission Vehicles (ZEV) by the California Air Resources Board. Fuel-efficient vehicles are defined as vehicles that have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide.

The columns to the far right identify the relevance of the FGBC rating system to the components of this plan, and offer recommendations for increasing these types of projects within new construction and major renovation.

Summary of FGBC Green Building Program							
FGBC Building Standard	**Credit**	**Description**	**# of credits**	**Relationship to plan components**			**Opportunities/ Recommendations**
				EVSE	**EV**	**CS**	
Commercial Building Standard	S8.4 Low-Emitting, Fuel-Efficient and High Occupancy Vehicles	Provide preferred parking for 3% of the parking capacity for the use of low-emitting, fuel efficient and high occupancy vehicles. Preferred parking spaces may also include charging stations for electric vehicles.	1	X	X		Provide county project managers with permitting guides/checklists and consider establishing a policy to prioritize this option.
Hi-Rise Residential Standard	**Category 3: SITE** Credit 4.3 Alternative Transportation Alternative Fuel Refueling Stations	Provide alternative fuel vehicles (includes hybrids) for 3% of building occupants AND provide preferred parking for these vehicles, OR install alternative-fuel refueling stations (hybrids not included because they do not require alternative fuel) for 3% of the total vehicle parking capacity of the site. Liquid or gaseous fueling	1	X	X	X	1. Recommend to FGBC to modify language to include EV. Also recommend modifying fueling language to include electric vehicle charging infrastructure. 2. Provide county project managers with permitting guides/checklists and consider establishing a policy to prioritize this option.

Summary of FGBC Green Building Program							
FGBC Building Standard	**Credit**	**Description**	**# of credits**	**Relationship to plan components**			**Opportunities/ Recommendations**
				EVSE	**EV**	**CS**	
		facilities must be separately ventilated or located outdoors. **Technologies & Strategies:** Provide transportation amenities such as alternative fuel refueling stations and carpool/vanpool programs. Consider sharing the costs and benefits of refueling stations with neighbors.					

Additionally, the FGBC provides a Green Local Government certification program for which Miami-Dade County recently received the Gold-level certification. This program provides local governments a step-by-step toolkit for developing and implementing sustainability plans that encourage the adoption of environmentally friendly practices across all government functions. The table below provides details on the points available towards certification.

Green Local Government Certification Program							
Section	**Option**	**Approach**	**# of points**	**Relationship to plan components**			**Opportunities/ Recommendations**
				EVSE	**EV**	**CS**	
Reduce Greenhouse Gas Emissions	Alternative Fuel Vehicle (AFV) purchase	For 1 point, purchase at least 1 alternative fuel vehicle (AFV) for local government use and evaluate performance such that similar vehicles can be purchased in the future. For 2 points, utilize AFV for 25% of all local government owned passenger vehicles. For 3 points, utilize	1-3				

		AFV for >50% local government owned passenger vehicles.					
Emergency Management / Public Safety Lead by example	a) Use of AFV and/or bicycle patrol for urban/ neighborhood areas	Police departments / neighborhood watch employ alternative fueled vehicles (AFV) and/or bicycles for light duty patrols.	1		X		
	b) Use renewable energy as backup/ emergency power	Shelters and roving disaster assistance employs photovoltaics for some percentage of backup power rather 100% supplied by fossil fuel generators.	1	X			Could be expanded to include solar.
Lead by example O1 Reduce greenhouse gas emissions.	a) Utilize alternative fuels for fleet	Operate and maintain a fleet that runs on an alternative fuel such as CNG or biodiesel.	2		X		
	b) Institute a bicycle sharing program.	Develop and maintain a free bicycle-sharing program for select areas of the community.	1				Could be expanded to include car-sharing programs.
	d) Engage in carpool/van-pool assistance.	Provide a service that facilitates ride sharing within the city/county, such as carpool assistance or a park and ride express bus.	1				Could be modified to include car sharing programs

Appendix A-6: About PACE Financing

Florida PACE Funding Agency

Property Assessed Clean Energy

How Will The Florida PACE Funding Agency Help My County?

PROGRAM DETAILS

- **Provides property owners with a funding source for qualifying property improvements**
- **Qualifying improvements include:**
  - Renewable Energy
  - Wind Resistance
  - Energy Efficiency
- **Funding repayment is made through a special property tax assessment**
- **Creates local job opportunities**
- **Stimulates local economic growth**

ADVANTAGES

- **The ONLY State Wide Program**
  - Economies of Scale
  - Program Consistency
- **Professionally Managed**
  - No cost for local government
  - No local government staff time
  - No local government liability
- **Low Cost Provider**
- **$2 Billion in Bonds Validated**
- **Scale Allows Best Financing Rates**
- **Provide a Strong Voice to Resist FHFA Resistance to PACE**
- **No Federal, State or County Funding Required**

For more information about subscribing to our PACE Program,
PLEASE CONTACT:

Hamilton McLean
Director of Business Operations
Florida PACE Funding Agency
HAMILTON.S.MCLEAN@saic.com
407.648.3528 x13528

or:

Jonathan Schaefer
Contractor Representative
Florida PACE Funding Agency
JONATHAN.F.SCHAEFER@saic.com
407.648.3570


RENEWABLE ENERGY


WIND RESISTANCE


ENERGY EFFICIENCY

Appendix B: Infrastructure Strategies

Appendix B-1: PEV Sales in Florida and the Region

Through August 2012

REGION	VOLT	FOCUS	KARMA	iMEV	LEAF	TESLA R	TOTAL
OUT OF STATE	21	–	2	–	9	1	33
Miami Dade	90	1	22	–	31	11	155
Palm Beach	117	–	37	1	28	9	192
Broward	101	2	17	1	24	8	153
St. Lucie	12	–	–	–	4	–	16
Indian River	5	–	3	1	1	4	14
Monroe	5	–	1	–	–	1	7
Martin	6	–	1	–	5	4	16
TOTAL	357	3	83	3	102	38	586

FLORIDA							
County	VOLT	FOCUS	KARMA	iMEV	LEAF	TESLA R	TOTAL
OUT OF STATE	62	–	5	–	27	3	97
Miami Dade	90	1	22	–	31	11	155
Duval	27	–	–	–	7	–	35
Hillsborough	91	–	12	–	27	3	133
Pinellas	69	–	18	–	15	4	106
Polk	25	–	2	–	8	1	36
Palm Beach	117	–	37	1	28	9	193
Orange	79	–	8	–	75	3	165
Volusia	29	–	2	4	5	1	41
Escambia	18	–	1	–	2	–	21
Broward	101	2	17	1	24	8	153
Alachua	8	–	–	1	5	1	15
Lake	11	–	1	–	3	–	15
Leon	11	–	1	–	8	1	21
Marion	5	–	1	–	5	1	12
Manatee	24	–	2	–	9	2	37
Sarasota	30	–	7	–	5	4	46
Seminole	24	–	3	–	9	1	37
Lee	41	–	4	–	9	8	62
Brevard	32	–	2	1	13	3	51
St. Johns	7	–	–	–	5	1	13
Gadsden	1	–	–	–	1	–	2
Putnam	2	–	–	–	–	–	2
Bay	6	–	–	1	1	–	8
St. Lucie	12	–	–	–	4	–	16
Jackson	1	–	–	–	–	–	1
Osceola	7	–	–	–	4	–	11
Highlands	4	–	–	–	2	–	6

Pasco	25	–	–	–	5	–	30
Indian River	5	–	3	1	1	4	14
Santa Rosa	12	–	–	–	2	2	16
Walton	1	–	–	–	1	–	2
Monroe	5	–	1	–	–	1	7
Levy	2	–	–	–	1	–	3
Hernando	6	–	–	–	5	–	11
Nassau	1	–	1	–	–	–	2
Martin	6	–	1	–	5	4	16
Okaloosa	6	–	–	–	1	1	8
Sumter	2	–	1	–	1	–	4
Bradford	1	–	–	–	–	–	1
Jefferson	0	–	–	–	1	–	1
Citrus	2	–	–	–	2	–	4
Clay	11	–	–	–	1	–	12
Hendry	3	–	–	–	–	–	3
Baker	1	–	–	–	–	–	1
Charlotte	9	–	–	–	5	1	15
Gilchrist	2	–	–	–	–	–	2
Flagler	5	–	–	–	2	–	7
Lafayette	1	–	–	–	–	–	1
Collier	20	–	8	–	7	8	43
Wakulla	1	–	–	–	1	–	2
Gulf	1	–	–	–	–	–	1
FL	1	–	–	–	6	–	7
TOTAL	1063	3	160	10	379	86	1703

Source: Division of Motorist Services, Data Listing Unit, Query August 8, 2012

Through February 2013

	Chevy Volt	Nissan Leaf	Fisker Karma	Tesla Roadster	Tesla S	Prius PH	Mitsubishi iMEV	Focus Electric	WHeeGO	Total
Palm Beach	200	43	44	8	38	12	1	4	1	352
Miami-Dade	160	48	31	8	51	5	3	3	-	309
Broward	182	53	25	5	30	5	4	1	-	305
St. Lucie	17	8	-	0	3	4	1	-	-	33
Indian River	9	1	3	3	3	2	5	-	1	27
Monroe	9	2	1	1	3	1	-	1	-	18
Martin	14	8	1	3	4	1	-	-	-	32
All other Florida	1231	417	108	146	8	49	63	2	3	2027
Total Region	591	163	105	28	132	30	14	9	2	1074
Total Florida	1822	580	213	174	140	79	77	11	5	3101

Source: Division of Motorist Services, Data Listing Unit - February, 2013

Appendix B-2: Public Charging

The following lists the *known* public charging stations in the region – with numbers from August 2012 and February 2013. Site operators are encouraged to submit information about their public, private, or workplace charging stations to their local Clean Cities Coordinator or directly to the DOE's Alternative Fuels Data Center.[232] This information is added to the national database so they are more likely to be found and used.

August 2012 Totals

Public and Semi Public Charging Stations August 2012						
Host	**Address**	**City**	**Network**	**Cost**	**L1**	**L2**
BROWARD						
USA Parking	123 NE 20th Ave	Deerfield Beach	Charge Point	$0.49/kWh	1	1
Dania Beach City Hall	49 SE Park St	Dania Beach	Charge Point	$0.49/kWh	4	4
AutoNation Building	200 SW 1st Ave	Ft. Lauderdale	Charge Point	$0.49/kWh	1	1
Walgreens	1680 SE 17th St	Ft. Lauderdale	Charge Point	$0.49/kWh		1
Maroone Nissan Fort Lauderdale	1051 S Federal Hwy	Ft. Lauderdale				1
Weston Nissan	3650 Weston Rd	Davie				2
Weston Nissan - Service Center	3650 Weston Rd	Davie				2
CarCharging Inc.	201-251 S 20th Ave	Hollywood	Charge Point	$0.49/kWh		1
CarCharging Inc.	250 N 19th Ave	Hollywood	Charge Point	$0.49/kWh		1
CarCharging Inc.	1617 N Surf Rd	Hollywood	Charge Point	$0.49/kWh		1
Maroone Nissan of Pembroke Pines	8890 Pines Blvd	Pembroke Pines				1
Whole Foods Market	14956 Pines Blvd	Pembroke Pines				
Oceanside Condominiums	1 N Ocean Blvd	Pompano Beach	Charge Point	$0.49/kWh	1	
Pompano Nissan	1345 Federal Hwy	Pompano Beach				1
Walgreens	4600 Coconut Creek Pkwy	Coconut Creek	Charge Point	$0.49/kWh		1
Coral Springs Nissan	9350 W Atlantic Blvd	Coral Springs				1
Coconut Creek Mitsubishi	4950 North State Rd 7	Coconut Creek				
Coconut Creek Casino	5550 NW 40th Street	Coconut Creek				
				TOTAL	**7**	**19**
INDIAN RIVER						
Vero US-1 Nissan	946 S US Highway 1	Vero Beach				1
				TOTAL		**1**
MARTIN						
Wallace Nissan	4313 S Federal Hwy	Stuart				1
				TOTAL		**1**

[232] DOE, EERE. Alternative Fuels Data Center. "Electric Vehicle Charging Station Locations." Online. Available: http://www.afdc.energy.gov/fuels/electricity_locations.html.

MIAMI-DADE						
Host	**Address**	**City**	**Network**	**Cost**	**L1**	**L2**
Aventura Mall - Bloomingdale's Garage - Currently Unavailable	19501 Biscayne Blvd	Aventura	Charge Point	$0.49/kWh	1	1
Aventura Mall - Nordstrom Garage	19501 Biscayne Blvd	Aventura	Charge Point	$0.49/kWh	1	1
CarCharging Inc.	2950 NE 188th St	Miami	Charge Point	$0.49/kWh	1	1
Baptist Health	2660 Brickell Ave	Miami	Charge Point	Free		1
Esserman Nissan	16725 NW 57th Ave	Miami				1
CarCharging Inc.	1301 Collins Ave	Miami Beach	Charge Point	$0.49/kWh		2
Baptist Health	5900 University Dr	Miami	Charge Point			1
Maroone Nissan of Kendall	17305 S Dixie Hwy	Palmetto Bay				1
Four Seasons Hotel	1435 Brickell Ave	Miami	Charge Point	$0.49/kWh		1
Sun Electronics	511 NE 15th St	Miami			2	2
Maroone Nissan of Miami	3345 SW 8th St	Miami				1
Overtown Transit Village Parking Garage	701 NW 1st Ct	Miami			6	
Fontainebleau Miami Beach	4441 Collins Ave	Miami Beach	Charge Point	$0.49/kWh		1
Element Miami International Airport	3525 NW 25th St	Miami	Charge Point	Free	1	1
Baptist Health	6200 SW 73rd St	South Miami	Charge Point			1
Bill Seidle's Nissan	10500 NW 12th St	Miami				1
Baptist Health	8900 N Kendall Dr	Miami				1
Baptist Health South Florida	9555 SW 162nd Ct	Miami	Charge Point	Free	1	
				TOTAL	**13**	**18**

MONROE						
Niles Sales & Service	3500 N Roosevelt Blvd	Key West				1
				TOTAL		**1**

PALM BEACH						
City of West Palm Beach - Clematis Garage Level 3	500 Clematis St	West Palm Beach	Charge Point	Free		2
Peninsular Electric Distributors - Currently Unavailable	1301 Okeechobee Rd	West Palm Beach	Charge Point	Free	1	
Delray Professional Center	1300 NW 17th Ave	Delray Beach	Charge Point	$0.49/kWh	1	1
Banker's Row Parking Lot	200 NE 1st Ave	Delray Beach				3
Delray Beach Tennis Center	201 W Atlantic Ave	Delray Beach				3
Old School Square Garage - Arts Garage	95 NE 1st Ave	Delray Beach				4
Maroone Nissan of Delray	2200 S Federal Hwy	Delray Beach				1
Bermudiana Shopping Center	4575 Military Tr	Jupiter				2
Jupiter Town Hall Complex	210 Military Trail	Jupiter				2
Napleton Nissan	3870 Blue Heron Blvd	Riviera Beach				1
Royal Palm Nissan	9405 Southern Blvd	Royal Palm Beach				1
				TOTAL	**2**	**20**

ST. LUCIE						
Host	**Address**	**City**	**Network**	**Cost**	**L1**	**L2**
Fort Pierce Nissan	4815 S US Highway 1	Ft. Pierce				1
				TOTAL		**1**
			TOTAL IN SEVEN-COUNTY AREA		**22**	**61**

February 2013 Totals

Public and Semi-Public Charging Stations - February 2013						
Host	Street Address	City	Network	Level 1	Level 2	Total
Broward						
City of Hollywood	300 Connecticut St	Hollywood	ChargePoint Network		1	
Walgreens	4600 Coconut Creek Pkwy	Coconut Creek	ChargePoint Network		1	
AutoNation Building	200 SW 1st Ave	Fort Lauderdale	ChargePoint Network	1	1	
USA Parking	123 NE 20th Ave	Deerfield Beach	ChargePoint Network	1	1	
Dania Beach City Hall	49 SE Park St	Dania Beach	ChargePoint Network	4	4	
Oceanside Condominiums	1 N Ocean Blvd	Pompano Beach	ChargePoint Network	1		
Whole Foods Market	14956 Pines Blvd	Pembroke Pines	ChargePoint Network	2	2	
20th Avenue Garage	201-251 S 20th Ave	Hollywood	ChargePoint Network		1	
Charnow Park Garage	1617 N Surf Rd	Hollywood	ChargePoint Network		1	
Hollywood Shopping Center	250 N 19th Ave	Hollywood	ChargePoint Network		1	
Walgreens	1680 SE 17th St	Fort Lauderdale	ChargePoint Network		1	
Maroone Nissan Fort Lauderdale	1051 S Federal Hwy	Fort Lauderdale			1	
Maroone Nissan of Pembroke Pines	8890 Pines Blvd	Pembroke Pines			1	
Coral Springs Nissan	9350 W Atlantic Blvd	Coral Springs			1	
Pompano Nissan	1345 Federal Hwy	Pompano Beach			1	
Weston Nissan	3650 Weston Rd	Davie			2	
Weston Nissan - Service Center	3650 Weston Rd	Davie			2	
Seminole Coconut Creek Casino	555 NW 40th Street	Coconut Creek		3	3	
				12	25	37
Indian River						
Vero US-1 Nissan	946 S US Highway 1	Vero Beach			1	
				0	1	1
Martin						
Wallace Nissan	4313 S Federal Hwy	Stuart			1	
				0	1	1
Miami-Dade						
Aventura Mall - Bloomingdale's Garage	19501 Biscayne Blvd	Aventura	ChargePoint Network	1	1	
Aventura Mall - Nordstrom Garage	19501 Biscayne Blvd	Aventura	ChargePoint Network	1	1	
City of Miami Beach - Municipal Parking Garage	1301 Collins Ave	Miami Beach	ChargePoint Network		2	
Hampton Inn & Suites Garage	50 SW 12th St	Miami			2	
Whole Foods Market	1021 Alton Rd	Miami Beach	ChargePoint Network	1		
Baptist Health	2660 Brickell Ave	Miami	ChargePoint Network		1	
Bill Seidle's Nissan	10500 NW 12th St	Miami			1	
Esserman Nissan	16725 NW 57th Ave	Miami			1	
Maroone Nissan of Miami	3345 SW 8th St	Miami			1	
Maroone Nissan of Kendall	17305 S Dixie Hwy	Palmetto Bay			1	
Overtown Transit Village Parking Garage	701 NW 1st Ct	Miami		6		
Element Miami International Airport	3525 NW 25th St	Miami	ChargePoint Network	1	1	
Fontainebleau Miami Beach	4441 Collins Ave	Miami Beach	ChargePoint Network		1	
Sun Electronics	511 NE 15th St	Miami		2	2	
Four Seasons Hotel	1435 Brickell Ave	Miami	ChargePoint Network	1	1	
Baptist Health	5900 University Dr	Miami	ChargePoint Network		1	
Baptist Health	9555 SW 162nd Ct.	Miami	ChargePoint Network	1		
Baptist Health	6200 SW 73rd St.	South Miami	ChargePoint Network		1	
Baptist Health	8900 N Kendall Dr	Miami	ChargePoint Network		1	
				14	19	33

Monroe						
Niles Sales & Service					1	1
					1	1
Palm Beach						
Delray Professional Center	1300 NW 17th Ave	Delray Beach	ChargePoint Network	1	1	
American Bancard	1081 Holland Dr	Boca Raton	ChargePoint Network	1	1	
Banker's Row Parking Lot	200 NE 1st Ave	Delray Beach			3	
Peninsular Electric Distributors	1301 Okeechobee Rd	West Palm Beach	ChargePoint Network	1		
City of West Palm Beach - Clematis Garage Level 3	500 Banyan Blvd	West Palm Beach	ChargePoint Network		2	
Jupiter Town Hall Complex	210 Military Trail	Jupiter			2	
Maroone Nissan of Delray	2200 S Federal Hwy	Delray Beach			1	
Napleton Nissan	3870 Blue Heron Blvd	Riviera Beach			1	
Royal Palm Nissan	9405 Southern Blvd	Royal Palm Beach			1	
Old School Square Garage - Arts Garage	95 NE 1st Ave.	Delray Beach			4	
Delray Beach Tennis Center	201 W. Atlantic Blvd	Delray Beach			3	
Bermudiana Shopping Center	4575 Military Tr	Jupiter			2	
				3	21	24
St. Lucie						
Fort Pierce Nissan	4815 S US Highway 1	Fort Pierce			1	
				0	1	1
Total Charging Stations in Region				**29**	**68**	**97**

Appendix B-3: About Utility Demand Charges

What is Demand?

Demand is a term to describe how much electricity is used at any given moment. Most businesses have a meter that tracks and records the highest 30-minute level of electricity demand for each billing period. Demand is measured in kilowatts (kW), while the total amount of electricity used is measured in kilowatt-hours (kWh).

Let's compare electricity used between two customers, as an example. Both customers use the same amount of kilowatt-hours (kWh) – 20,000 kWh – over the course of a month. The first customer uses a steady amount of electricity over the 30-day period, while the second customer uses most of the 20,000 kWh over a few days, then levels off for the rest of the month. Although both customers used the same amount of electricity, the second customer would be charged more for placing greater demand on the electrical system during the few days when electrical use peaked.

Why do electric utilities charge for demand?

If your business requires large peaks of electricity, your utility must be able to supply the electricity and have the infrastructure in place to deliver it to you. To supply the increased electricity, utilities must build power plants and add equipment to their distribution and transformer networks to meet customers' needs. These additional costs are passed onto users with large peaks in demand in the form of demand charges.

How can I lower my demand charges?

Here are some ways to manage or lower your demand charges:

1. First, schedule a business energy evaluation. Business energy experts will visit your business and make recommendations based on your needs.
2. Second, your Business Energy Evaluation can help you determine if you qualify to move to a different rate class. Electricity use is charged differently depending on the rate class. Ask about contract rates and options regarding your rate class' minimum demand charges.
3. Third, many utilities allow customers to be billed under annual or seasonal time-of-use rates. Think of it this way – the greatest energy demands are often in the hottest hours of the day during summer. If your business can shift its greatest energy use to off-peak times, you can save money.

Appendix B-4: EVSE Manufacturers Websites

The following lists AC Level-1, Level-2, DC-Fast Charging, and inductive charging equipment manufacturers. The list is neither comprehensive, nor an endorsement of any particular manufacturer. Site operators are encouraged to research these and other brands of charging equipment to select the EVSE that meets their requirements. The Advanced Energy and Go Electric Drive websites have interactive EVSE selection tools, which may assist in product selection.

EVSE Manufacturers				
Manufacturer	**AC**	**DC**	**Wireless**	**Website**
AeroVironment, Inc.	✓	✓		www.avinc.com
ABB	✓	✓		www.abb.com/evcharging
Andromeda Power		✓		http://andromedapower.com/
Blink, ECOtality, Inc	✓	✓		www.ecotalityna.com
ClipperCreek	✓			www.clippercreek.net
Coulomb Technologies	✓			www.coulombtech.com
DBT USA, Inc.	✓			www.dbtus.com
Eaton Corp.	✓	✓		www.eaton.com
Efacec		✓		http://www.efacecusa.com/Transportation.aspx
EV Charge America	✓			www.EV-ChargeAmerica.com
EVSE LLC, CMI	✓			http://evse.controlmod.com/
EVoCharge	✓			www.EVoCharge.com
Fuji Electric		✓		www.americas.fujielectric.com/
Garage Juice Bar, LLC	✓			www.freejuicebar.com
GE Energy Industrial Solutions	✓			www.ge-energy.com
GRIDbot	✓			www.gridbot.net
LeGrand	✓			www.legrand.us
Leviton	✓			www.leviton.com
Opt-Connect	✓			www.opconnect.com
ParkPod	✓			http://us.parkpod.com
PEP Station	✓			www.hubbell-wiring.com/energy
Plugless Power*			✓	www.pluglesspower.com
Qualcomm*			✓	www.qualcommhalo.com/index.php/wevc-trials.html
NRG - EvGo	✓	✓		www.evgonetwork.com
Schneider Electric	✓	✓		www.schneider-electric.us
SemaConnect, Inc.	✓			www.semaconnect.com
ShorePower Tech.	✓			www.shorepower.com
Siemens	✓			www.usa.siemens.com/evi
SPX	✓			www.evse.spx.com
WiTricity*			✓	www.witricity

*Check for commercial availability.

Appendix B-5: IRS Treatment of Workplace Charging

It is advisable for employers who are considering instituting a workplace charging policy to consult with their tax attorneys on how to address it from a tax perspective. The IRS does not specifically address PEV charging in its "Employer's Tax Guide to Fringe Benefits for use in 2012."[233] Until a definitive guideline is published, companies and tax lawyers remain in limbo.

Many early adopters of workplace charging are offering workplace charging for free – interpreting it as a *de minimis* benefit, not subject to tax. Other early adopters are taking a more conservative policy and are offering a fee-based workplace charging policy for employees. Below are direct excerpts from relevant IRS sections.

De Minimis (Minimal) Benefits

You can exclude the value of a *de minimis* benefit you provide to an employee from the employee's wages. A *de minimis* benefit is any property or service you provide to an employee that has so little value (taking into account how frequently you provide similar benefits to your employees) that accounting for it would be unreasonable or administratively impracticable. Cash and cash equivalent fringe benefits (for example, use of a gift card, charge card, or credit card), no matter how little, are never excludable as a *de minimis* benefit, except for occasional meal money or transportation fare. Examples of *de minimis* benefits include the following:

- Personal use of an employer-provided cell phone provided primarily for business purposes.
- Occasional personal use of a company copying machine.
- Holiday gifts, other than cash, with a low fair market value.
- Group-term life insurance payable on the death of an employee's spouse or dependent if the face amount is not more than $2,000.
- Occasional meals.
- Occasional parties or picnics for employees and their guests.
- Occasional tickets for theater or sporting events.
- Transportation fare.

De Minimis Transportation Benefits

You can exclude the value of any *de minimis* transportation benefit you provide to an employee from the employee's wages. A *de minimis* transportation benefit is any local transportation benefit you provide to an employee if it has so little value (taking into account how frequently you provide transportation to your employees) that accounting for it would be unreasonable or administratively impracticable.

Qualified Transportation Benefits

This exclusion applies to the following benefits:

- A ride in a commuter highway vehicle between the employee's home and work place (up to $125 per month).
- A transit pass.
- Qualified parking (up to $240 per month).
- Qualified bicycle commuting reimbursement.

[233] U.S. Department of Treasury. Internal Revenue Service (IRS). "Employers Tax Guide to Fringe Benefits." Publication 15-B. Online. Available: http://www.irs.gov/pub/irs-pdf/p15b.pdf. Accessed: July 2012

Appendix B-6: Profile of Early PEV and HEV Drivers[234]

Early Buyer Profile for Plug in Electric Vehicles		
Total Family Pre-Tax Income	Nissan LEAF	Chevrolet VOLT
Median	$148,346	$133,228
	$143,000	$154,000
Education		
Grade School Grad, No High School	0.27%	0.00%
Some High School	0.35%	0.00%
High School Graduate	1.02%	3.12%
Some College	11.41%	18.33%
College Graduate	30.72%	28.00%
Some Post-Grad	11.62%	12.53%
Post-Graduate Degree	43.68%	37.05%
Other (Trade School)	0.93%	0.98%
Age Bracket		
Median	50	57
Location Of Residence		
Metropolitan City	24.47%	13.78%
Suburban Community Of A Large City	62.81%	58.60%
Small Town Or Rural City	10.88%	25.26%
Farming Area	1.84%	2.37%
Most Important Purchase Reason		
	Nissan LEAF	Chevrolet VOLT
	Environmentally Friendly 60.76%	Fuel Economy 35.48%
	Fuel Economy 14.98%	Technical Innovations 31.18%
	Technical Innovations 14.49%	Environmentally Friendly 26.36%
	Value For The Money 3.51%	Fun To Drive 1.61%
	Expected Operating/Repair Costs 2.67%	Reliability 1.15%
	Discount/Rebate/Incentive 1.24%	Country of Manufacture 0.96%
	Fun To Drive 0.37%	Exterior Color 0.96%
	Ease Of Entry/Exit 0.37% 0.29%	Vehicle's Image 0.57%
	Leasing Terms	Expected Operating/Repair Costs 0.57%
	Vehicle's Image 0.29%	Interest Rate, Credit Terms 0.57%
Opinion of Vehicle		
	Nissan LEAF	Chevrolet VOLT
Completely Satisfied	51.28%	73.03%
Very Satisfied	43.24%	23.14%
Fairly Well Satisfied	4.50%	3.00%
Somewhat Dissatisfied	0.97%	0.83%
Very Dissatisfied	0.00%	0.00%

[234] PEV Buyer Profile: Email from Nissan (Jun 21, 2012); email from General Motors (May 21, 2012). HEV Buyer Profile: www.hybridcars.com/hybrid-drivers/profile-of-hybrid-drivers.html (accessed May 2012).

Early Buyer Profile for Plug in Electric Vehicles		
Home Charging Behavior	Nissan LEAF	Chevrolet VOLT
Level 1	15.00%	50%
Level 2	85.00%	50%
Primary charging location is Home	70.00%	
Use public charging "often"	30.00%	
Hybrid Electric Vehicle Owner Demographics		
Avg. Income		
HEV buyer	$100,000	71% earn more than 100,000 per year
Avg new car buyer	$85,000	
Age		
HEV drivers	50	Only 2% of HEV owners are 24 or younger, 29% between 45-54, and 33 percent are 55 and older
Avg new car buyer	40	
Education		
HEV drivers significantly higher educated		
Lifestyle		
HEV drivers are twice as likely to go skiing, hiking, practice yoga		
HEV drivers consume more organic food, yogurt and decaffeinated coffee than the general population		
HEV drivers have above-average technical skills (email, computers, mobile devices, video, etc.		
HEV drivers' online activities favor news and information, auctions, shopping		
HEV drivers are 14 percent Republican, 38 percent Democrat, 34 percent Independent		
Psychographic reasons for HEV ownership		
Expresses vision of a better world and their desire for a society where people work together for common goals. "makes a statement about me"		
Emotional rationale outnumbers rational reasons of fuel economy, lower emissions, styling or tax incentives		
Satisfaction with their Purchase		
	HEV	Other
Buy same make on next purchase	47%	35%
Buy same model on next purchase	18%	12%

Appendix B-7: PEV and Charging Infrastructure Forecast[235]

Task

Forecast current and future number of public and private charging stations in Region based on predicted number of PEVs in the region.[236]

Deliverables

1.) Total number of PEVs.
2.) Number of PHEV/EREV and BEVS.
3.) Number of private (home, fleet) charging stations (AC Level-1, Level-2).
4.) Number of public/ semi-public (workplace) charging stations.

Forecast Overview

A forecast of plug-in electric vehicle (PEV) penetration in the Region will help identify the scope needed for public and private infrastructure development over time. For example, over-development of public infrastructure too early during market development is expensive and can cause public backlash as charging stations sit idle. Under-development of infrastructure, on the other hand, would impede the industry since potential PEV buyers with "range anxiety" are concerned about the ability to recharge their vehicles when and where they need to.

Therefore, a solid Regional forecast provides one factor into a community's decision-making regarding concentration of public charging infrastructure needed over time.

Dozens of entities, including the U.S. government, consulting firms, utilities, non-profits, and others have been forecasting the sales and demand of PEVs. Forecasts range from aggressive, with early and high penetration, to conservative, with low and slow sales growth. Many of these forecasts have already been inaccurate, based on actual first-year sales of the first mass-market PEVs.

There are many factors that have influenced and will continue to influence sales of PEVs in the U.S. market, including the price of fuel, availability of subsidies, battery technology alternatives or advancements, production costs and delays, education campaigns, and others. Any one of these factors can drastically impact the future of the PEV market. Please see Appendix A-2: Factors that Could Impact PEV/ PHEV Sales (p. 160) for a discussion of potential market influencers.

PEV Forecast Methodology and Assumptions

Range – upper and lower limits:

Given the variety and complexity of all the market influences driving PEV adoption over time, and the inaccuracies of some of the earliest PEV published forecasts, the team opted to build a forecast range, providing an upper and lower limit, along with a most likely forecast scenario. This should provide enough

[235] Refer to Appendix B-8: Sources Used in Developing PEV and Charging Infrastructure Forecast. This provides background on the materials used to develop this section.
[236] Forecast Assumptions: Results are sensitive to a number of input assumptions, some of which are highly speculative and simple "back-of-the-envelope" values. Additional empirical data would improve this analytic approach. The team suggests the forecast be evaluated and updated annually.

granularity for planning purposes, while providing some leeway to account for any number of unpredictable market influencers.

Time – 10-year forecast:

The team opted to concentrate on a 10-year forecast, to the year 2022. Anything beyond that is wildly speculative and unlikely to change most of the immediate planning actions. The team recommends that the forecast be reviewed and refined on an annual basis to continue supporting community-planning efforts.

National adoption rate:

Adoption rate curves can vary dramatically based on the product or technology. For example, it is very unlikely the PEV adoption curve would resemble that of mobile phones, which has grown faster than any technology and is now nearing total world market penetration. Since the mobile phone was made commercially available in 1983, the market grew to 5.6 billion subscriptions in 2011 – penetrating all income levels.[237] A more conservative rate of adoption can be expected for PEVs. Looking at the growth rate of the HEVs over the past decade can give a reasonable basis for what PEV sales may achieve over the next 10 years.

Three scenarios were selected to create a forecast range of national PEV adoption.

1.) The most conservative, lower-limit forecast scenario exactly mirrors the first 10 years of HEV sales in the U.S.
2.) The most likely forecast scenario is based on the fact that first-year actual PEV sales were nearly double (1.9016761) first year HEV sales and assumes this multiplier will continue over the next decade.
3.) An upper-limit forecast scenario assumes that influencers, like gas prices, government incentives, and technology improvements, create a more positive market for PEVs, and it applies a 20 percent increase on the "most likely" forecast line.

Florida adoption rate:

4.) Assuming an equal distribution of PEVs across all states in the nation would grossly under estimate the number that would be sold in Florida. That's because certain demographics, psychographics, and other characteristics of a region and its population (including state and local legislation, incentives, size, etc.) will drive adoption.
5.) Florida has had a higher than average number of HEV registrations - 5.3 percent of total - third only behind California, New York, and Texas. And more than half of all states have less than one percent of the hybrid fleet sold between 2007-2009.[238] We can assume this higher HEV penetration rate in Florida is a proxy for likely PEV market share.
6.) We can also assume that state populations are growing at different rates, and so we have applied a predicted population growth factor in Florida.

Regional and county adoption rates:

7.) Similarly, we have applied population growth factors to each of the counties in the study region.

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[237] Gartner. "Gartner Says Worldwide Mobile Connections Will Reach 5.6 Billion in 2011 as Mobile Data Services Revenue Totals $314.7 Billion." Stamford, Connecticut, August 4, 2011. Press release. Online. Available: http://www.gartner.com/it/page.jsp?id=1759714. Accessed: 2012.
[238] Center for Automotive Research. "Deployment Rollout Estimate of Electric Vehicles." Ann Arbor, Michigan, January. 2011. Page 14.

8.) Some counties are likely to have a higher penetration rate of PEVs than others, based on the needs and characteristics of its residents. To derive a 'propensity factor' we analyzed the registration rate of the most popular HEV (Toyota Prius) by county as a proxy for a likely indicator for a propensity for PEV adoption.

Share of PEV technologies - PHEV/EREV and BEVs

Industry experts seem to agree that plug-in hybrid electric vehicles and extended range electric vehicles (PHEV/EREV) will dominate market share during initial market phase in the United States. Battery-electric vehicles (BEVs) will gradually pick up steam as consumers become more comfortable with the technology and overcome "range anxiety." Furthermore, it is expected that technology will improve (improved range and battery efficiency), and costs will come down to make BEVs a more appealing purchase in the future. Of course, policy decisions, technological breakthroughs, and infrastructure development could dramatically accelerate acceptance.

In the meantime, PEVs with a gasoline back-up (PHEVs and EREVs) have a generally lower purchase price and will serve as a bridging technology to dominate the early years. Based on 2012 sales to date and the reports of industry analysts, the forecast applies a 75 percent market share to PHEV / EREV and then gradually increases the share of BEVs to 55 percent by 2021. Note the figures used are based on cumulative cars on the road, not annual sales percentages.

EVSE Forecast Methodology and Assumptions

1.) BEV owners adopt Level-2 home charging stations more frequently than PHEV / EREV owners.

Early data from the automakers show that BEV and PHE/EREV consumers adopt Level-2 charging stations at significantly different rates. Nissan has reported that about 85 percent of LEAF buyers (a BEV) opt to install Level-2 charging stations at home. General Motors reports that about half of VOLT customers (an EREV) install Level-2 charging stations in their homes.

Automakers have noted that those adoption rates are likely artificially elevated by today's availability of federal, state and local grant, pilot and incentive programs, which offer free or reduced cost charging equipment and installation. Some industry-insiders and analysts have predicted that as these programs dry up, and as consumers become more comfortable with the technology and their driving habits, they will realize that Level-1 charging at home will meet their needs the majority of the time, while offering the lowest upfront capital cost. In the event they need a faster charge, Level-2 or DC-Fast Charging (DCFC) can be obtained in public / semi-public locations on an as-needed basis.

Even if battery technology advances and vehicles with 200+ miles of range become the norm, consumer driving patterns and typical usage will not change. That means that people will still generally drive their vehicles less than 40 miles per day, which can be recharged overnight using a standard household outlet and Level-1 EVSE. In this scenario, the availability of faster public charging could be used to recharge vehicles on the occasions when a driver depletes his / her battery completely and a faster recharge is needed.

For this forecast, we assumed that 85 percent of BEV owners would install home Level-2 charging stations. This factor remained consistent over the forecast period, though time will certainly tell if analysts are correct, and a higher percentage will opt to use Level-1 only. We also assume that 50 percent of EREV / PHEV buyers will opt for Level-2 charging in the first year – based on the data provided by General Motors. However, as PHEVs with smaller battery sizes join the Volt on sale in the Region, it is assumed that significantly fewer than 50 percent of those buyers will opt for Level-2, since the recharge time is significantly less for PHEVs. Therefore, the overall percentage drops the first five years of the forecast and then remains a steady 30 percent the remainder of the decade.

2.) Home charging is and will remain the primary location for PEV recharging, and only a small percentage of early buyers will rely exclusively on public or workplace charging.

Almost all early PEV buyers charge their vehicles at home and use public and semi-public charging locations to supplement their needs. This trend is expected to continue since home charging is the most convenient, and it is cheaper than for-pay public charging. However as more public and workplace charging become available, would-be buyers, who do not have access to home charging, will be able to purchase and easily charge their vehicles. These buyers include people who live in high-rise condos or other buildings without off-street parking, or residents of multi-family buildings struggling with getting HOA support for a charging policy.

With an absence of specific data on the number of early buyers who exclusively charge away from the home, it is assumed that the number is around 1 percent today and will gradually increase to 2.6 percent over the decade. The reason we expect the number to increase over time is because the number of public charging stations will increase over time – particularly DCFC locations or workplace charging. This gives people alternatives for their primary charging location. This is an important consideration in regions (such as ours) with a relatively large number of would-be PEV buyers who live in high-rise condominiums and other challenging home-charging situations.

3.) Public charging should be installed at a higher proportion in the early years and installations should be scaled back over time as a critical mass is achieved. However, the location of public charging is perhaps more critical than the quantity of them.

How many charging stations should be installed? That's the question everyone seems to be asking in the industry these days and there are no clear-cut answers. However, what is clear is that it is imperative to have charging stations installed in the critical locations. Charging station locations is a topic covered in the Public Charging section of this report (p. 6-78). The team did not forecast the mix of AC Level-1, AC Level-2, and DC-Fast Charging percentages among public charging locations. Given that workplace charging is a critical location and AC Level-1 charging makes sense for most workplace charging applications, AC Level-1 will become an important part of the public / semi-public charging plan – perhaps even more important than once predicted. AC Level-2 and DC-Fast Charging are also important in locations suited for a faster charge.

Assumption: The first few years will require a higher proportion of public stations

A higher charging station-to-vehicle proportion is needed in the first few years until a critical mass is reached. This is important for a few reasons:

- With such a relatively small quantity of charging stations, adequate geographical coverage is hard to achieve, making it a challenge to find a station when / where it is needed. Therefore, until a point of critical mass is achieved, the ratio of charging stations to vehicles needs to be higher than what will be optimal during market maturity – simply to get adequate initial coverage.
- The availability of public charging stations can encourage market growth. Consumers are more likely to buy a vehicle if they believe they can readily recharge it. Anecdotally, people report that a perceived lack of public charging infrastructure inhibits purchase of PEVs. Therefore, a perceived belief in adequate availability of public infrastructure could spur sales of vehicles.

The downside of a high public charging station to vehicle ratio is that the overall usage of the stations will be low. Case in point, the EV Project is currently running a 1.3 EVSE per vehicle total (or about 3.5 PEVs per every public charging station). The usage statistics on the public charging stations are very low – only about 0.3 charging events per day, per charging station. That means that on average, each charging station gets used once every three days! Furthermore, these public stations are largely free to use, which should elevate usage even more.

This overall low usage of public charging stations could create a public backlash, as premium parking spaces are reserved for PEV use, yet largely remain empty. Furthermore, it is expensive to install charging stations – particularly before there is a concrete need for them!

So, in the early years of adding a higher proportion of public charging stations, it is even more critically important to put them where they will likely be used the most by early PEV drivers. Fortunately, our Region has high population density, meaning that charging station locations will also be in densely located areas, lowering the overall proportion needed as compared with more sparsely populated regions in the country.

Latter half of decade: scale back proportion of public EVSE investment as critical mass is achieved and DC-Fast Charging Stations emerge

After some point of critical mass is achieved, and there is some geographic coverage of public charging stations, the ratio of public charging stations to vehicles can decline. This point will likely take place around 2017 and then continue to decline further over time. There are a number of reasons why this is likely to occur:

- That year is the expected tipping point when the market will shift and a larger number of people will drive electric, and a large selection of PEV options should be available.
- People will be more comfortable with the concept of driving electric, routinely charging at home and not need the visibility of public charging stations.
- DC-Fast Charging stations are becoming more available by then, and the majority of PEVs available for purchase, including PHEVs, will have DCFC capability.

- Penetration of DCFCs will eliminate the need for an abundance of Level-2 charging stations, assuming they are strategically placed.
- EPRI forecasts that between one and five DCFC are needed per 1,000 BEVs to optimize electric miles and increase the percentage of drivers whose needs would be met by a BEV.

EVSE Forecast Methodology and Calculations

1. Take PEV forecast for each year through 2021.
2. To determine total number of BEVs and PHEVs / EREVs each year: Multiply total cars by forecasted percent BEV, PHEV / EREV
3. To determine the number of cars without access to home charging: Multiply PEV totals by forecasted percentage without home charging
4. To determine number of home Level-1 and Level-2 charging: Multiply PHEV and BEV by the forecasted percentage of Level-2 and Level-1 and then subtract half each of the cars without home charging
5. To determine total number of home charging stations: Add results of private Level-2 and Level-1 for each year.
6. To determine the total number of charging stations: Multiply PEV by EVSE per PEV factor.
7. To determine the total public charging stations: Subtract home EVSE from total EVSE.
8. To determine the number of cars per public charging station: Divide cars by public charging stations.

PEV and EVSE Forecast – by Region and Each County

REGION		PEV Forecast			Home/Private				Public	ALL	PEV per Public
		Total	BEV	PHEV/EREV	None	L1	L2	Total Home			
2012	Low	443	111	332	4	181	258	439	93	532	4.76
	Mod	844	211	633	8	344	492	836	177	1,013	
	High	1,010	253	758	10	412	588	1,000	212	1,212	
2013	Low	777	218	559	12	334	431	765	152	917	5.13
	Mod	1,480	414	1,066	22	637	821	1,458	289	1,746	
	High	1,773	496	1,277	27	763	983	1,746	346	2,092	
2014	Low	1,492	463	1,029	22	676	794	1,470	276	1,746	5.41
	Mod	2,836	879	1,957	43	1,285	1,509	2,793	525	3,318	
	High	3,402	1,055	2,347	51	1,541	1,810	3,351	629	3,980	
2015	Low	2,761	939	1,822	44	1,303	1,414	2,717	458	3,175	6.02
	Mod	5,245	1,783	3,462	84	2,476	2,685	5,161	871	6,032	
	High	6,291	2,139	4,152	101	2,969	3,221	6,190	1,044	7,235	
2016	Low	5,864	2,170	3,694	100	2,862	2,903	5,764	862	6,626	6.80
	Mod	11,143	4,123	7,020	189	5,438	5,516	10,954	1,638	12,592	
	High	13,368	4,946	8,422	227	6,524	6,617	13,141	1,965	15,106	
2017	Low	9,691	3,876	5,815	174	4,564	4,952	9,517	1,337	10,854	7.25
	Mod	18,414	7,366	11,048	331	8,673	9,410	18,083	2,541	20,624	
	High	22,093	8,837	13,256	398	10,406	11,290	21,695	3,049	24,744	
2018	Low	15,021	6,459	8,562	300	6,812	7,909	14,721	1,427	16,148	10.53
	Mod	28,549	12,276	16,273	571	12,947	15,031	27,978	2,712	30,690	
	High	34,243	14,724	19,519	685	15,529	18,029	33,558	3,253	36,811	
2019	Low	19,790	9,103	10,687	455	8,619	10,716	19,335	1,544	20,878	12.82
	Mod	37,600	17,296	20,304	865	16,375	20,360	36,735	2,933	39,668	
	High	45,116	20,753	24,363	1,038	19,648	24,430	44,078	3,519	47,597	
2020	Low	24,183	11,850	12,333	580	10,121	13,482	23,603	1,669	25,271	14.49
	Mod	45,946	22,514	23,432	1,103	19,228	25,615	44,843	3,170	48,014	
	High	55,132	27,015	28,117	1,323	23,073	30,736	53,809	3,804	57,613	
2021	Low	28,331	14,732	13,599	708	11,375	16,248	27,623	1,700	29,323	16.67
	Mod	53,825	27,989	25,836	1,346	21,611	30,869	52,479	3,230	55,709	
	High	64,588	33,586	31,002	1,615	25,932	37,041	62,973	3,875	66,849	
2022	Low	32,394	17,817	14,577	842	12,455	19,096	31,552	1,814	33,366	17.86
	Mod	61,545	33,850	27,695	1,600	23,664	36,281	59,945	3,447	63,391	
	High	73,853	40,619	33,234	1,920	28,396	43,536	71,933	4,136	76,069	

Miami-Dade		PEV Forecast			Home/Private				Public	ALL	PEV per Public
		Total	BEV	PHEV/EREV	None	L1	L2	Total Home			
2012	Low	105	26	79	1	43	61	104	22	126	4.76
	Mod	202	51	152	2	82	118	200	42	242	
	High	241	60	181	2	98	140	239	51	289	
2013	Low	185	52	133	3	80	103	182	36	218	5.13
	Mod	353	99	254	5	152	196	348	69	417	
	High	423	118	305	6	182	235	417	82	499	
2014	Low	355	110	245	5	161	189	350	66	415	5.41
	Mod	675	209	466	10	306	359	665	125	790	
	High	809	251	558	12	366	430	797	150	947	
2015	Low	655	223	432	10	309	335	645	109	753	6.02
	Mod	1,244	423	821	20	587	637	1,224	207	1,431	
	High	1,492	507	985	24	704	764	1,468	248	1,716	
2016	Low	1,387	513	874	24	677	687	1,363	204	1,567	6.80
	Mod	2,635	975	1,660	45	1,286	1,304	2,590	387	2,978	
	High	3,161	1,170	1,991	54	1,543	1,565	3,107	465	3,572	
2017	Low	2,288	915	1,373	41	1,078	1,169	2,247	316	2,563	7.25
	Mod	4,348	1,739	2,609	78	2,048	2,222	4,270	600	4,870	
	High	5,216	2,086	3,130	94	2,457	2,665	5,122	720	5,842	
2018	Low	3,543	1,523	2,020	71	1,607	1,865	3,472	337	3,809	10.53
	Mod	6,732	2,895	3,837	135	3,053	3,544	6,597	640	7,237	
	High	8,076	3,473	4,603	162	3,662	4,252	7,914	767	8,682	
2019	Low	4,665	2,146	2,519	107	2,032	2,526	4,558	364	4,922	12.82
	Mod	8,864	4,077	4,787	204	3,860	4,800	8,660	691	9,352	
	High	10,635	4,892	5,743	245	4,632	5,759	10,390	830	11,220	
2020	Low	5,698	2,792	2,906	137	2,385	3,177	5,561	393	5,954	14.49
	Mod	10,827	5,305	5,522	260	4,531	6,036	10,567	747	11,314	
	High	12,991	6,366	6,625	312	5,437	7,242	12,679	896	13,576	
2021	Low	6,673	3,470	3,203	167	2,679	3,827	6,506	400	6,907	16.67
	Mod	12,679	6,593	6,086	317	5,091	7,271	12,362	761	13,123	
	High	15,214	7,911	7,303	380	6,108	8,725	14,834	913	15,746	
2022	Low	7,627	4,195	3,432	198	2,933	4,496	7,429	427	7,856	17.86
	Mod	14,492	7,971	6,521	377	5,572	8,543	14,115	812	14,927	
	High	17,390	9,565	7,826	452	6,686	10,251	16,938	974	17,912	

Broward		PEV Forecast			Home/Private				Public	ALL	PEV per Public
		Total	BEV	PHEV/EREV	None	L1	L2	Total Home			
2012	Low	120	30	90	1	49	70	119	25	144	4.76
	Mod	228	57	171	2	93	133	226	48	274	
	High	274	69	206	3	112	160	271	58	329	
2013	Low	210	59	151	3	90	116	207	41	248	5.13
	Mod	228	64	164	3	98	126	225	44	269	
	High	274	77	197	4	118	152	270	53	323	
2014	Low	401	124	277	6	182	213	395	74	469	5.41
	Mod	761	236	525	11	345	405	750	141	890	
	High	914	283	631	14	414	486	900	169	1,069	
2015	Low	737	251	486	12	348	377	725	122	848	6.02
	Mod	1,400	476	924	22	661	717	1,378	232	1,610	
	High	1,681	572	1,109	27	793	861	1,654	279	1,933	
2016	Low	1,556	576	980	26	759	770	1,530	229	1,758	6.80
	Mod	2,957	1,094	1,863	50	1,443	1,464	2,907	435	3,341	
	High	3,549	1,313	2,236	60	1,732	1,757	3,489	522	4,010	
2017	Low	2,561	1,024	1,537	46	1,206	1,309	2,515	353	2,868	7.25
	Mod	4,866	1,946	2,920	88	2,292	2,487	4,778	672	5,450	
	High	5,840	2,336	3,504	105	2,751	2,984	5,735	806	6,541	
2018	Low	3,953	1,700	2,253	79	1,793	2,081	3,874	376	4,249	10.53
	Mod	7,511	3,230	4,281	150	3,406	3,955	7,361	714	8,074	
	High	9,014	3,876	5,138	180	4,088	4,746	8,834	856	9,690	
2019	Low	5,193	2,389	2,804	119	2,262	2,812	5,074	405	5,479	12.82
	Mod	9,866	4,538	5,328	227	4,297	5,342	9,639	770	10,409	
	High	11,840	5,446	6,394	272	5,156	6,411	11,568	924	12,491	
2020	Low	6,329	3,101	3,228	152	2,649	3,528	6,177	437	6,614	14.49
	Mod	12,025	5,892	6,133	289	5,032	6,704	11,736	830	12,566	
	High	14,431	7,071	7,360	346	6,039	8,045	14,085	996	15,080	
2021	Low	7,397	3,846	3,551	185	2,970	4,242	7,212	444	7,656	16.67
	Mod	14,053	7,308	6,745	351	5,642	8,059	13,702	843	14,545	
	High	16,865	8,770	8,095	422	6,771	9,672	16,443	1,012	17,455	
2022	Low	8,438	4,641	3,797	219	3,244	4,974	8,219	473	8,691	17.86
	Mod	16,031	8,817	7,214	417	6,164	9,450	15,614	898	16,512	
	High	19,238	10,581	8,657	500	7,397	11,341	18,738	1,077	19,815	

Palm Beach		PEV Forecast			Home/Private				Public	ALL	PEV per Public
		Total	BEV	PHEV/EREV	None	L1	L2	Total Home			
2012	Low	147	37	110	1	60	86	146	31	176	4.76
	Mod	279	70	209	3	114	163	276	59	335	
	High	335	84	251	3	137	195	332	70	402	
2013	Low	258	72	186	4	111	143	254	50	304	5.13
	Mod	490	137	353	7	211	272	483	96	578	
	High	588	165	423	9	253	326	579	115	694	
2014	Low	496	154	342	7	225	264	489	92	580	5.41
	Mod	942	292	650	14	427	501	928	174	1,102	
	High	1,131	351	780	17	512	602	1,114	209	1,323	
2015	Low	920	313	607	15	434	471	905	153	1,058	6.02
	Mod	1,747	594	1,153	28	825	894	1,719	290	2,009	
	High	2,097	713	1,384	34	990	1,074	2,063	348	2,412	
2016	Low	1,960	725	1,235	33	956	970	1,927	288	2,215	6.80
	Mod	3,723	1,378	2,345	63	1,817	1,843	3,660	547	4,207	
	High	4,468	1,653	2,815	76	2,180	2,212	4,392	657	5,049	
2017	Low	3,245	1,298	1,947	58	1,528	1,658	3,187	448	3,634	7.25
	Mod	6,164	2,466	3,698	111	2,903	3,150	6,053	851	6,904	
	High	7,398	2,959	4,439	133	3,484	3,780	7,265	1,021	8,286	
2018	Low	5,038	2,166	2,872	101	2,285	2,653	4,937	479	5,416	10.53
	Mod	9,570	4,115	5,455	191	4,340	5,039	9,379	909	10,288	
	High	11,485	4,939	6,546	230	5,208	6,047	11,255	1,091	12,346	
2019	Low	6,645	3,057	3,588	153	2,894	3,598	6,492	518	7,010	12.82
	Mod	12,623	5,807	6,816	290	5,497	6,835	12,333	985	13,317	
	High	15,149	6,969	8,180	348	6,597	8,203	14,801	1,182	15,982	
2020	Low	8,128	3,983	4,145	195	3,402	4,531	7,933	561	8,494	14.49
	Mod	15,440	7,566	7,874	371	6,462	8,608	15,069	1,065	16,135	
	High	18,529	9,079	9,450	445	7,754	10,330	18,084	1,279	19,363	
2021	Low	9,530	4,956	4,574	238	3,826	5,465	9,292	572	9,864	16.67
	Mod	18,104	9,414	8,690	453	7,269	10,383	17,651	1,086	18,738	
	High	21,726	11,298	10,428	543	8,723	12,460	21,183	1,304	22,486	
2022	Low	10,906	5,998	4,908	284	4,193	6,429	10,622	611	11,233	17.86
	Mod	20,719	11,395	9,324	539	7,966	12,214	20,180	1,160	21,341	
	High	24,864	13,675	11,189	646	9,560	14,657	24,218	1,392	25,610	

Martin		PEV Forecast			Home/Private				Public	ALL	PEV per Public
		Total	BEV	PHEV/EREV	None	L1	L2	Total Home			
2012	Low	22	6	17	0	9	13	22	5	26	4.76
	Mod	41	10	31	0	17	24	41	9	49	
	High	48	12	36	0	20	28	48	10	58	
2013	Low	38	11	27	1	16	21	37	7	45	5.13
	Mod	72	20	52	1	31	40	71	14	85	
	High	85	24	61	1	37	47	84	17	100	
2014	Low	73	23	50	1	33	39	72	14	85	5.41
	Mod	138	43	95	2	63	73	136	26	161	
	High	164	51	113	2	74	87	162	30	192	
2015	Low	135	46	89	2	64	69	133	22	155	6.02
	Mod	255	87	168	4	120	131	251	42	293	
	High	304	103	201	5	143	156	299	50	350	
2016	Low	286	106	180	5	140	142	281	42	323	6.80
	Mod	542	201	341	9	264	268	533	80	612	
	High	648	240	408	11	316	321	637	95	732	
2017	Low	473	189	284	9	223	242	464	65	530	7.25
	Mod	896	358	538	16	422	458	880	124	1,004	
	High	1,073	429	644	19	505	548	1,054	148	1,202	
2018	Low	733	315	418	15	332	386	718	70	788	10.53
	Mod	1,390	598	792	28	630	732	1,362	132	1,494	
	High	1,666	716	950	33	756	877	1,633	158	1,791	
2019	Low	966	444	522	22	421	523	944	75	1,019	12.82
	Mod	1,832	843	989	42	798	992	1,790	143	1,933	
	High	2,197	1,011	1,186	51	957	1,190	2,146	171	2,318	
2020	Low	1,181	579	602	28	494	658	1,153	81	1,234	14.49
	Mod	2,240	1,098	1,142	54	937	1,249	2,186	155	2,341	
	High	2,687	1,317	1,370	64	1,125	1,498	2,623	185	2,808	
2021	Low	1,384	720	664	35	556	794	1,349	83	1,432	16.67
	Mod	2,626	1,366	1,260	66	1,054	1,506	2,560	158	2,718	
	High	3,150	1,638	1,512	79	1,265	1,807	3,071	189	3,260	
2022	Low	1,583	871	712	41	609	933	1,542	89	1,630	17.86
	Mod	3,004	1,652	1,352	78	1,155	1,771	2,926	168	3,094	
	High	3,604	1,982	1,622	94	1,386	2,125	3,510	202	3,712	

Monroe		PEV Forecast			Home/Private				Public	ALL	PEV per Public
		Total	BEV	PHEV/EREV	None	L1	L2	Total Home			
2012	Low	9	2	7	0	4	5	9	2	11	4.76
	Mod	16	4	12	0	7	9	16	3	19	
	High	19	5	14	0	8	11	19	4	23	
2013	Low	15	4	11	0	6	8	15	3	18	5.13
	Mod	28	8	20	0	12	16	28	5	33	
	High	33	9	24	0	14	18	33	6	39	
2014	Low	28	9	19	0	13	15	28	5	33	5.41
	Mod	52	16	36	1	24	28	51	10	61	
	High	62	19	43	1	28	33	61	11	73	
2015	Low	51	17	34	1	24	26	50	8	59	6.02
	Mod	95	32	63	2	45	49	93	16	109	
	High	113	38	75	2	53	58	111	19	130	
2016	Low	105	39	66	2	51	52	103	15	119	6.80
	Mod	198	73	125	3	97	98	195	29	224	
	High	237	88	149	4	116	117	233	35	268	
2017	Low	171	68	103	3	81	87	168	24	192	7.25
	Mod	324	130	194	6	153	166	318	45	363	
	High	388	155	233	7	183	198	381	54	435	
2018	Low	262	113	149	5	119	138	257	25	282	10.53
	Mod	497	214	283	10	225	262	487	47	534	
	High	595	256	339	12	270	313	583	57	640	
2019	Low	342	157	185	8	149	185	334	27	361	12.82
	Mod	650	299	351	15	283	352	635	51	686	
	High	778	358	420	18	339	421	760	61	821	
2020	Low	415	203	212	10	174	231	405	29	434	14.49
	Mod	789	387	402	19	330	440	770	54	825	
	High	945	463	482	23	395	527	922	65	988	
2021	Low	483	251	232	12	194	277	471	29	500	16.67
	Mod	918	477	441	23	369	526	895	55	950	
	High	1,100	572	528	28	442	631	1,073	66	1,139	
2022	Low	549	302	247	14	211	324	535	31	565	17.86
	Mod	1,043	574	469	27	401	615	1,016	58	1,074	
	High	1,250	688	563	33	481	737	1,218	70	1,288	

Indian River		PEV Forecast			Home/Private				Public	ALL	PEV per Public
		Total	BEV	PHEV/EREV	None	L1	L2	Total Home			
2012	Low	17	4	13	0	7	10	17	4	20	4.76
	Mod	33	8	25	0	13	19	33	7	40	
	High	39	10	29	0	16	23	39	8	47	
2013	Low	30	8	22	0	13	17	30	6	35	5.13
	Mod	58	16	42	1	25	32	57	11	68	
	High	69	19	50	1	30	38	68	13	81	
2014	Low	58	18	40	1	26	31	57	11	68	5.41
	Mod	112	35	77	2	51	60	110	21	131	
	High	134	42	92	2	61	71	132	25	157	
2015	Low	109	37	72	2	51	56	107	18	125	6.02
	Mod	209	71	138	3	99	107	206	35	240	
	High	250	85	165	4	118	128	246	42	288	
2016	Low	234	87	147	4	114	116	230	34	264	6.80
	Mod	447	165	282	8	218	221	439	66	505	
	High	536	198	338	9	262	265	527	79	606	
2017	Low	389	156	233	7	183	199	382	54	436	7.25
	Mod	742	297	445	13	349	379	729	102	831	
	High	890	356	534	16	419	455	874	123	997	
2018	Low	607	261	346	12	275	320	595	58	653	10.53
	Mod	1,155	497	658	23	524	608	1,132	110	1,242	
	High	1,386	596	790	28	629	730	1,358	132	1,490	
2019	Low	803	369	434	18	350	435	785	63	847	12.82
	Mod	1,527	702	825	35	665	827	1,492	119	1,611	
	High	1,832	843	989	42	798	992	1,790	143	1,933	
2020	Low	984	482	502	24	412	549	960	68	1,028	14.49
	Mod	1,871	917	954	45	783	1,043	1,826	129	1,955	
	High	2,245	1,100	1,145	54	940	1,252	2,191	155	2,346	
2021	Low	1,156	601	555	29	464	663	1,127	69	1,196	16.67
	Mod	2,197	1,142	1,055	55	882	1,260	2,142	132	2,274	
	High	2,637	1,371	1,266	66	1,059	1,512	2,571	158	2,729	
2022	Low	1,325	729	596	34	509	781	1,291	74	1,365	17.86
	Mod	2,518	1,385	1,133	65	968	1,484	2,453	141	2,594	
	High	3,023	1,663	1,360	79	1,162	1,782	2,944	169	3,114	

St. Lucie		PEV Forecast			Home/Private				Public	ALL	PEV per Public
		Total	BEV	PHEV/EREV	None	L1	L2	Total Home			
2012	Low	23	6	17	0	9	13	23	5	28	4.76
	Mod	45	11	34	0	18	26	45	9	54	
	High	54	14	41	1	22	31	53	11	65	
2013	Low	41	11	30	1	18	23	40	8	48	5.13
	Mod	80	22	58	1	34	44	79	16	94	
	High	96	27	69	1	41	53	95	19	113	
2014	Low	81	25	56	1	37	43	80	15	95	5.41
	Mod	156	48	108	2	71	83	154	29	183	
	High	188	58	130	3	85	100	185	35	220	
2015	Low	154	52	102	2	73	79	152	26	177	6.02
	Mod	295	100	195	5	139	151	290	49	339	
	High	354	120	234	6	167	181	348	59	407	
2016	Low	336	124	212	6	164	166	330	49	380	6.80
	Mod	641	237	404	11	313	317	630	94	724	
	High	769	285	484	13	375	381	756	113	869	
2017	Low	564	226	338	10	266	288	554	78	632	7.25
	Mod	1,074	430	644	19	506	549	1,055	148	1,203	
	High	1,288	515	773	23	607	658	1,265	178	1,443	
2018	Low	885	381	504	18	401	466	867	84	951	10.53
	Mod	1,685	725	960	34	764	887	1,651	160	1,811	
	High	2,021	869	1,152	40	917	1,064	1,981	192	2,173	
2019	Low	1,176	541	635	27	512	637	1,149	92	1,241	12.82
	Mod	2,238	1,029	1,209	51	975	1,212	2,187	175	2,361	
	High	2,685	1,235	1,450	62	1,169	1,454	2,623	209	2,833	
2020	Low	1,448	710	738	35	606	807	1,413	100	1,513	14.49
	Mod	2,754	1,349	1,405	66	1,153	1,535	2,688	190	2,878	
	High	3,304	1,619	1,685	79	1,383	1,842	3,225	228	3,453	
2021	Low	1,708	888	820	43	686	980	1,665	102	1,768	16.67
	Mod	3,248	1,689	1,559	81	1,304	1,863	3,167	195	3,362	
	High	3,896	2,026	1,870	97	1,564	2,234	3,799	234	4,032	
2022	Low	1,966	1,081	885	51	756	1,159	1,915	110	2,025	17.86
	Mod	3,738	2,056	1,682	97	1,437	2,204	3,641	209	3,850	
	High	4,484	2,466	2,018	117	1,724	2,643	4,367	251	4,619	

Appendix B-8: Sources Used in Developing PEV and Charging Infrastructure Forecast

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in the necessary infrastructure, remove the regulatory barriers, and create the local incentives to support deployment of advanced vehicles at critical mass.)

Appendix C: Codes, Policies, and Ordinance Strategies

Appendix C-1: Regional Code Review Methodology

The review of codes in the Region was undertaken using the following methodology:

- The municipalities in Broward, Miami-Dade, and Palm Beach Counties were subdivided into three categories:
    - Population less than 25,000;
    - Population 25,000-70,000; and
    - Population greater than 70,000.
- The municipalities were listed in alphabetical order and assigned a consecutive number. The listed communities were referenced against the Municipal Code Corporation's Muni Code ("Muni Code" database) to determine if they were a subscriber. Non-subscribers were removed from the list, and the remaining alphabetized communities were reassigned a consecutive number. A random number generator was used to select three communities within the three population tiers for review of their land-development codes.[239] A subsequent direct contact with the communities was conducted to field-truth the preliminary results. This process was used because each of these three counties has at least 30 municipalities, and resources were not available for a review of all communities.
    - The three communities in the less than 25,000 category: Lighthouse Point, Southwest Lakes, and West Park (Broward County); Golden Beach, Opa-locka, and Pinecrest (Miami-Dade County); and Belle Glade, Magnolia Park, and Palm Beach Shores (Palm Beach County).
    - The three communities in the 25,000 to 70,000 category: Dania Beach, Oakland Park, and Tamarac (Broward County); Aventura, North Miami, and North Miami Beach (Miami-Dade County); and Delray Beach, Palm Beach Gardens, and Riviera Beach (Palm Beach County).
    - The three communities in the greater than 70,000 category: Davie, Fort Lauderdale, and Sunrise (Broward County); Hialeah, Miami Beach, and Miami Gardens (Miami-Dade County); Boca Raton, Wellington, and West Palm Beach (Palm Beach County).
- All municipalities in Indian River (Fellsmere, Indian River Shores, Orchid, Sebastian, Vero Beach), Martin (Jupiter Island, Ocean Breeze Park, Sewall's Point, and Stuart), Monroe (Islamorada, Key Colony Beach, Key West, Layton, and Marathon), and St. Lucie (Port St. Lucie, St. Lucie Village) counties were included for review of their land-development codes. A subsequent direct contact with the communities was conducted to field-truth the preliminary results.
- All counties were included for review of their land-development codes. A subsequent direct contact with the communities was conducted to field-truth the preliminary results.

[239] Research Randomizer: http://www.randomizer.org/form.htm.

Appendix C-2: Examples of Parking Regulation

Off-Street Parking: Electric Vehicles
22511. (a)( )1 A local authority, by ordinance or resolution, and ( )2 a person in lawful possession of an off-street parking facility may designate stalls or spaces in an off-street parking facility owned or operated by that local authority or person for the exclusive purpose of ( )3 charging and parking a vehicle that ( )4 is connected for electric charging purposes. ( )5

(b) If posted in accordance with subdivision (d) or (e), the owner or person in lawful possession of a privately owned or operated off-street parking facility, after notifying the police or sheriff's department, may cause the removal of a vehicle from a stall or space designated pursuant to subdivision (a) in the facility to the nearest public garage if ( )6 the vehicle is not connected for electric charging purposes.

(c) If posted in accordance with subdivision (d), the local authority owning or operating an off-street parking facility, after notifying the police or sheriff's department, may cause the removal of a vehicle from a stall or space designated pursuant to subdivision (a) in the facility to the nearest garage, as defined in Section 340, that is owned, leased, or approved for use by a public agency if ( )6 the vehicle is not connected for electric charging purposes.

(d) The posting required for an off-street parking facility owned or operated either privately or by a local authority shall consist of a sign not less than 17 by 22 inches in size with lettering not less than one inch in height ( )7 that clearly and conspicuously states the following: "Unauthorized vehicles not ( )8 connected for electric charging purposes will be towed away at owner's expense. Towed vehicles may be reclaimed at
_____ or by telephoning
(Address)
_____."
(Telephone number of local law enforcement agency)

The sign shall be posted in either of the following locations:

(1) Immediately adjacent to, and visible from, the stall or space.

(2) In a conspicuous place at each entrance to the off-street parking facility.

(e) If the parking facility is privately owned and public parking is prohibited by the posting of a sign meeting the requirements of paragraph (1) of subdivision (a) of Section 22658, the requirements of subdivision (b) may be met by the posting of a sign immediately adjacent to, and visible from, each stall or space indicating that a vehicle not meeting the requirements of subdivision (a) will be removed at the owner's expense and containing the telephone number of the local traffic law enforcement agency.
(f)( )9 This section does not interfere with existing law governing the ability of local authorities to adopt ordinances related to parking programs within their jurisdiction, such as programs that provide free parking in metered areas or municipal garages for electric vehicles.

ARTICLE IIB. - PARKING SPACES FOR ELECTRIC VEHICLES

Sec. 30-451. Penalty for misuse of specially marked parking spaces.

It is unlawful for any person to stop, stand, or park a vehicle within any parking space designated for electric vehicle charging unless such vehicle is actively charging. Whenever a law enforcement officer or a parking enforcement specialist finds a vehicle in violation of this section, that officer or enforcement specialist shall:
(1) Have the vehicle in violation removed to any lawful parking space or facility or require the operator or other person in charge of the vehicle immediately to remove the unauthorized vehicle from the parking space. Whenever any vehicle is removed by a law enforcement officer, parking enforcement specialist, or agency to a storage lot, garage, or other safe parking space, the cost of such removal and parking shall be a lien against the vehicle, or
(2) Charge the motor vehicle owner in violation with a noncriminal traffic infraction.
(a) Whenever evidence shall be presented in any court of the fact that any automobile, truck, or other vehicle was found to be parked in a specially designated parking space in violation of this section, it shall be prima facie evidence that the vehicle was parked and left in the space by the person, firm, or corporation in whose name the vehicle is registered and licensed according to the records of the Division of Motor Vehicles.
(b) Violators of this article shall be punished by the maximum fine for a non-moving violation pursuant to Chapter 318, Florida Statutes.

Sec 33-122.5. Requirement of Electric Vehicle Charging Stations.

Parking spaces specifically designed for charging of Electric Vehicles (EV) shall be required for all uses other than single-family, duplex, townhouse and properties with a current CU and occupancy for church. Such spaces shall be equipped with charging stations capable of providing a full charge within eight hours. The number of parking spaces designated for the charging of electric vehicles shall be as follows:
(a) Quantity of Electric Vehicle Charging Stations required:

Total Number of Off-Street Parking Spaces	*Required Number of EV Spaces*
Up to 150	*0*
151 to 500	*2*
501 to 1,000	*3*
Over 1,000	*One (1) additional EV space for each 300 parking spaces over 1,000*

(b) Parking spaces equipped with electric vehicle charging stations shall count toward required off-street parking requirements, however, in no event shall the provision of such spaces reduce the number of parking spaces for the physically handicapped and/or disabled below the quantity required by the Florida Building Code.

(c) Fees. The operator of an electric vehicle charging station may charge a usage fee.

(d) Signage and markings. All EV parking spaces shall be prominently designated with a permanent above-ground sign which shall conform to the figure entitled "Electric Vehicle Charging Station Sign" hereby incorporated in this section. The property owner may establish the hours and length of charging time provided the information is depicted in the manner shown in the figure below. The bottom of the sign must be at least five (5) feet above grade when attached to a building, or seven (7) feet above grade for a detached sign.

Electric Vehicle Charging Station Sign

Appendix C-3: Florida Accessibility Code *Considerations for PEV Charging Stations*

Provisions for Fuel Dispensers

308.3 Side Reach.
308.3.1 Unobstructed. Where a clear floor or ground space allows a parallel approach to an element and the side reach is unobstructed, the high side reach shall be 48 inches (1220 mm) maximum and the low side reach shall be 15 inches (380 mm) minimum above the finish floor or ground.
EXCEPTIONS: 1. An obstruction shall be permitted between the clear floor or ground space and the element where the depth of the obstruction is 10 inches (255 mm) maximum.
2. Operable *parts* of fuel dispensers shall be permitted to be 54 inches (1370 mm) maximum measured from the surface of the vehicular way where fuel dispensers are installed on existing curbs.

308.3.2 Obstructed High Reach. Where a clear floor or ground space allows a parallel approach to an element and the high side reach is over an obstruction, the height of the obstruction shall be 34 inches (865 mm) maximum and the depth of the obstruction shall be 24 inches (610 mm) maximum. The high side reach shall be 48 inches (1220 mm) maximum for a reach depth of 10 inches (255 mm) maximum. Where the reach depth exceeds 10 inches (255 mm), the high side reach shall be 46 inches (1170 mm) maximum for a reach depth of 24 inches (610 mm) maximum.
EXCEPTIONS: 1. The top of washing machines and clothes dryers shall be permitted to be 36 inches (915 mm) maximum above the finish floor.
2. *Operable parts* of fuel dispensers shall be permitted to be 54 inches (1370 mm) maximum measured from the surface of the vehicular way where fuel dispensers are installed on existing curbs.

309 Operable Parts
309.1 General. *Operable parts* shall comply with 309.
309.2 Clear Floor Space. A clear floor or ground space complying with 305 shall be provided.
309.3 Height. *Operable parts* shall be placed within one or more of the reach ranges specified in 308.
309.4 Operation. *Operable parts* shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate *operable parts* shall be 5 pounds (22.2 N) maximum.
EXCEPTION: Gas pump nozzles shall not be required to provide *operable parts* that have an activating force of 5 pounds (22.2 N) maximum.

Provisions for Automatic Teller and Fare Card Machines

206.3 Location. *Accessible* routes shall coincide with or be located in the same area as general *circulation paths*. Where *circulation paths* are interior, required *accessible* routes shall also be interior.

For transportation *facilities* subject to Department of Transportation regulation 49 CFR 37.21, *elements* such as *ramps*, elevators, or other circulation devices, fare vending or other ticketing areas, and fare collection areas shall be placed to minimize the distance which *wheelchair* users and other persons who cannot negotiate steps may have to travel compared to the general public.

220 Automatic Teller Machines and Fare Machines
220.1 General. Where automatic teller machines or self-service fare vending, collection, or adjustment machines are provided, at least one of each type provided at each location shall comply with 707. Where bins are provided for envelopes, waste paper, or other purposes, at least one of each type shall comply with 811.

707 Automatic Teller Machines and Fare Machines
Advisory 707 Automatic Teller Machines and Fare Machines. Interactive transaction machines (ITMs), other than ATMs, are not covered by Section 707. However, for entities covered by the ADA, the Department of Justice regulations that implement the ADA provide additional guidance regarding the relationship between these requirements and elements that are not directly addressed by these requirements. Federal procurement law requires that ITMs purchased by the Federal government comply with standards issued by the Access Board under Section 508 of the Rehabilitation Act of 1973, as amended. This law covers a variety of products, including computer hardware and software, websites, phone systems, fax machines, copiers, and similar technologies. For more information on Section 508 consult the Access Board's website at www.access-board.gov.

707.1 General. Automatic teller machines and fare machines shall comply with 707.

Advisory 707.1 General. If farecards have one tactually distinctive corner they can be inserted with greater accuracy. Token collection devices that are designed to accommodate tokens which are perforated can allow a person to distinguish more readily between tokens and common coins. Place accessible gates and fare vending machines in close proximity to other accessible elements when feasible so the facility is easier to use.

707.2 Clear Floor or Ground Space. A clear floor or ground space complying with 305 shall be provided.
EXCEPTION: Clear floor or ground *space* shall not be required at drive-up only automatic teller machines and fare machines.

707.3 Operable Parts. *Operable parts* shall comply with 309. Unless a clear or correct key is provided, each *operable part* shall be able to be differentiated by sound or touch, without activation.
EXCEPTION: Drive-up only automatic teller machines and fare machines shall not be required to comply with 309.2 and 309.3.

707.4 Privacy. Automatic teller machines shall provide the opportunity for the same degree of privacy of input and output available to all individuals.

Advisory 707.4 Privacy. In addition to people who are blind or visually impaired, people with limited reach who use wheelchairs or have short stature, who cannot effectively block the ATM screen with their bodies, may prefer to use speech output. Speech output users can benefit from an option to render the visible screen blank, thereby affording them greater personal security and privacy.

707.5 Speech Output. Machines shall be speech enabled. Operating instructions and orientation, visible transaction prompts, user input verification, error messages, and all displayed information for full use shall be *accessible* to and independently usable by individuals with vision impairments. Speech shall be delivered through a mechanism that is readily available to all users, including but not limited to, an industry standard connector or a telephone handset. Speech shall be recorded or digitized human, or synthesized.
EXCEPTIONS: 1. Audible tones shall be permitted instead of speech for visible output that is not displayed for security purposes, including but not limited to, asterisks representing personal identification numbers.
2. Advertisements and other similar information shall not be required to be audible unless they convey information that can be used in the transaction being conducted.
3. Where speech synthesis cannot be supported, dynamic alphabetic output shall not be required to be audible.

Advisory 707.5 Speech Output. If an ATM provides additional functions such as dispensing coupons, selling theater tickets, or providing copies of monthly statements, all such functions must be available to customers using speech output. To avoid confusion at the ATM, the method of initiating the speech mode should be easily discoverable and should not require specialized training. For example, if a telephone handset is provided, lifting the handset can initiate the speech mode.

707.5.1 User Control. Speech shall be capable of being repeated or interrupted. Volume control shall be provided for the speech function.
EXCEPTION: Speech output for any single function shall be permitted to be automatically interrupted when a transaction is selected.

707.5.2 Receipts. Where receipts are provided, speech output devices shall provide audible balance inquiry information, error messages, and all other information on the printed receipt necessary to complete or verify the transaction.
EXCEPTIONS:
1. Machine location, date and time of transaction, customer account number, and the machine identifier shall not be required to be audible.
2. Information on printed receipts that duplicates information available on-screen shall not be required to be presented in the form of an audible receipt.
3. Printed copies of bank statements and checks shall not be required to be audible.

707.6 Input. Input devices shall comply with 707.6.
707.6.1 Input Controls. At least one tactilely discernible input control shall be provided for each function. Where provided, key surfaces not on active areas of display screens, shall be raised above surrounding surfaces. Where membrane keys are the only method of input, each shall be tactilely discernable from surrounding surfaces and adjacent keys.
707.6.2 Numeric Keys. Numeric keys shall be arranged in a 12-key ascending or descending telephone keypad layout. The number five key shall be tactilely distinct from the other keys.

Advisory 707.6.2 Numeric Keys. Telephone keypads and computer keyboards differ in one significant feature, ascending versus descending numerical order. Both types of keypads are acceptable, provided the computer-style keypad is organized similarly to the number pad located at the right on most computer keyboards, and does not resemble the line of numbers located above the computer keys.

707.6.3 Function Keys. Function keys shall comply with 707.6.3.

707.6.3.1 Contrast. Function keys shall contrast visually from background surfaces. *Characters* and symbols on key surfaces shall contrast visually from key surfaces. Visual contrast shall be either light-on-dark or dark-on-light.
EXCEPTION: *Tactile* symbols required by 707.6.3.2 shall not be required to comply with 707.6.3.1.

707.6.3.2 Tactile Symbols. Function key surfaces shall have tactile symbols as follows: Enter or Proceed key: raised circle; Clear or Correct key: raised left arrow; Cancel key: raised letter ex; Add Value key: raised plus sign; Decrease Value key: raised minus sign.

707.7 Display Screen. The display screen shall comply with 707.7.
EXCEPTION: Drive-up only automatic teller machines and fare machines shall not be required to comply with 707.7.1.

707.7.1 Visibility. The display screen shall be visible from a point located 40 inches (1015 mm) above the center of the clear floor *space* in front of the machine.

707.7.2 Characters. *Characters* displayed on the screen shall be in a sans serif font. *Characters* shall be 3/16 inch (4.8 mm) high minimum based on the uppercase letter "I". *Characters* shall contrast with their background with either light *characters* on a dark background or dark *characters* on a light background.

707.8 Braille Instructions. Braille instructions for initiating the speech mode shall be provided. Braille shall comply with 703.3.

Appendix C-4: Relevant Electric and Building Codes, Articles, Statutes, and Standards

NEC's Article 625

The NEC's Article 625 (Electric Vehicle Charging System) governs automotive-type vehicle charging and was first introduced in 1995[240] and has been amended as follows:

- 2002: Allowed longer cable lengths with cable management systems & options for ventilation indoors; [241]
- 2005: Included neighborhood electric vehicles (low-speed vehicles), addressed loss of primary power (back feed), and interactive systems;[242]
- 2008: Clarified requirements for disconnecting means;[243] and
- 2011: Addressed equipment to recharge PEV batteries, and the electrical loads they'll power.[244]

NFPA 505

NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations* (2005), applies to "fork trucks, tractors, platform lift trucks, motorized hand trucks, and other specialized industrial trucks powered by electric motors or internal combustion engines."[245] Issues related industrial and fleet conversion are addressed in greater detail in the Fleet Section of this report.

Florida Building Code / Florida Building Commission Rule

The Florida Building Code is authorized by §553.73, Fla. Stat., and adopted by Florida Building Commission as Rule 61G20-1.001, Florida Administrative Code. The Building Code affects the installation of any charging infrastructure within a structure. According to the Florida Building Commission, the Florida Building Code adopts NFPA 70, the National Electrical Code for electrical requirements in Chapter 27 of the Florida Building Code, Building and NFPA 70A, The National Electrical Code Requirements for one- and two-family dwellings, in Chapter 33 of he Florida Building Code, Residential.[246]

Relevant Standards

The Society of Automotive Engineers (SAE) has set J1772 S*AE Electric Vehicle Conductive Charge Coupler* as the standard that is being used by automotive suppliers in the United States.[247] In addition, the Underwriters Laboratory (UL) has established testing and approval guidelines for charging infrastructure.[248] It should be noted that the National Electrical Code (NEC) definitions correlate with the following industry standards SAE J1772, *SAE Electric Vehicle Inductively Coupled Charging*; UL 2231-1 *Standard for Personnel Protection Systems for Electric Vehicle Supply Circuits: General Requirements*; and UL 2231-2 *Standard for Personnel Protection Systems for Electric Vehicle Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems.*

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[240] Idaho National Laboratory. "Electric Vehicle Charging Levels and Requirements" December 2010.
[241] Idaho National Laboratory. "Electric Vehicle Charging Levels and Requirements" December 2010.
[242] Idaho National Laboratory. "Electric Vehicle Charging Levels and Requirements" December 2010.
[243] Idaho National Laboratory. "Electric Vehicle Charging Levels and Requirements" December 2010.
[244] http://eetweb.com/news/NEC-EV-article625-21012/
[245] NFPA 505, 1.1.1. http://www.stgmfg.com/biaozhun/%20NFPA505-2005.pdf.
[246] http://www.floridabuilding.org/fbc/thecode/NFPA.html.
[247] Electric Transportation Engineering Corporation. "Electric Vehicle Charging Infrastructure Deployment Guidelines for the Oregon I-5 Metro Areas of Portland, Salem, Corvallis and Eugene." 2010.
[248] Electric Transportation Engineering Corporation. "Electric Vehicle Charging Infrastructure Deployment Guidelines for the Oregon I-5 Metro Areas of Portland, Salem, Corvallis and Eugene." 2010.

Appendix C-5: Sample Application for Installation of Electric Vehicle Charging Equipment

NOTICE: The system must be installed in compliance with NFPA 70, National Electric Code, Article 625 or applicable Electrical Code currently adopted and enforced within the jurisdiction of installation. All associated work with circuits, electrical service and meters shall be completed in compliance with NFPA 70, national electric code, or applicable electrical code currently adopted and enforced within the jurisdiction of installation.

Section 1: Permit Applicant Information

Name:			
Installation Street Address (P.O. box not acceptable):	Contact Person:	Phone Number: ( ) -	
City:	County:	State:	ZIP Code:
Owner Name:	Street Address:	Phone Number: ( ) -	
City:	State:	ZIP Code:	
Submitter's Name/Company	Street Address:	Phone Number: ( ) -	
City:	State:	ZIP Code:	
General description of equipment to be installed:			

Section 2: Permit Code Information

Requirements for wiring the charging station shall comply with the 2011 edition of the National Electrical Code® (NEC) ® NFPA 70, Article 625 Electric Vehicle Charging System, and all applicable sections of the 2011 Florida Building Code. Reference to the 2011 NEC may be made at www.nfpa.org/70, and the 2010 Florida Building Code may be made at http://ecodes.biz/ecodes_support/Free_Resources/2010Florida/2010Florida_main.html .

NEC© Chapter or Article	**DESCRIPTION**
Chapter2 and 3	**Branch Circuit** A new electrical box added on a branch circuit shall comply with NFPA 70 National Electrical Code® Chapter 2 Wiring and Protection and Chapter 3 Wiring Methods and Materials and all administrative requirements of the NEC or the electrical code in effect in the jurisdiction

625.4	**VOLTAGES** Unless other Voltages are specified, the nominal AC system voltages of 120, 120/240, 208Y/120, 240, 480Y/277, 480, 600Y/347, and 600 Volts shall be used to supply equipment
625.5	**LISTED OR LABELED** All electrical materials, devices, fittings, and associated equipment shall be listed or labeled.
625.9	**WIRING METHODS** The electric vehicle coupler shall comply with 625.9(A) through (F). (A) Polarization. The electric vehicle coupler shall be polarized unless part of a system identified and listed as suitable for the purpose. (B) Non-interchangeability. The electric vehicle coupler shall have a configuration that is non-interchangeable with wiring devices in other electrical systems. Nongrounding-type electric vehicle couplers shall not be interchangeable with grounding-type electric vehicle couplers. (C) Construction and Installation. The electric vehicle coupler shall be constructed and installed so as to guard against inadvertent contact by persons with parts made live from the electric vehicle supply equipment or the electric vehicle battery. (D) Unintentional Disconnection. The electric vehicle coupler shall be provided with a positive means to prevent unintentional disconnection. (E) Grounding Pole. The electric vehicle coupler shall be provided with a grounding pole, unless part of a system identified and listed as suitable for the purpose in accordance with Article 250. (F) Grounding Pole Requirements. If a grounding pole is provided, the electric vehicle coupler shall be so designed that the grounding pole connection is the first to make and the last to break contact.
625.13	**ELECTRIC VEHICLE SUPPLY EQUIPMENT** Electric vehicle supply equipment rated at 125 volts, single phase, 15 or 20 amperes or part of a system identified and listed as suitable for the purpose and meeting the requirements of 625.18, 625.19, and 625.29 shall be permitted to be cord-and-plug-connected. All other electric vehicle supply equipment shall be permanently connected and fastened in place. This equipment shall have no exposed live parts.
625.14	**Rating** Electric vehicle supply equipment shall have sufficient rating to supply the load served. For the purposes of this article, electric vehicle charging loads shall be considered to be continuous loads.
625.15	**Markings** The electric vehicle supply equipment shall comply with 625.15(A) through (C). (A) General. All electric vehicle supply equipment shall be marked by the manufacturer as follows: FOR USE WITH ELECTRIC VEHICLES (B) Ventilation Not Required. Where marking is required by 625.29(C), the electric vehicle supply equipment shall be clearly marked by the manufacturer as follows: VENTILATION NOT REQUIRED The marking shall be located so as to be clearly visible after installation. (C) Ventilation Required. Where marking is required by 625.29(D), the electric vehicle supply equipment shall be clearly marked by the manufacturer, "Ventilation Required." The marking shall be located so as to be clearly visible after installation.
625.16	**Means of Coupling** The means of coupling to the electric vehicle shall be either conductive or inductive.

	Attachment plugs, electric vehicle connectors, and electric vehicle inlets shall be listed or labeled for the purpose.
625.17	**Cable** The electric vehicle supply equipment cable shall be Type EV, EVJ, EVE, EVJE, EVT, or EVJT flexible cable as specified in Article 400 and Table 6-400.4. Ampacities shall be as specified in Table 6-400.5(A)(1) for 10 AWG and smaller, and in Table 6-400.5(A)(2) for 8 AWG and larger. The overall length of the cable shall not exceed 7.5 m (25 ft) unless equipped with a cable management system that is listed as suitable for the purpose. Other cable types and assemblies listed as being suitable for the purpose, including optional hybrid communications, signal, and composite optical fiber cables, shall be permitted.
625.18	**Interlock** Electric vehicle supply equipment shall be provided with an interlock that de-energizes the electric vehicle connector and its cable whenever the electrical connector is uncoupled from the electric vehicle. An interlock shall not be required for portable cord-and-plug-connected electric vehicle supply equipment intended for connection to receptacle outlets rated at 125 volts, single phase, 15 and 20 amperes.
625.19	**Automatic De-Energization of Cable** The electric vehicle supply equipment or the cable-connector combination of the equipment shall be provided with an automatic means to de-energize the cable conductors and electric vehicle connector upon exposure to strain that could result in either cable rupture or separation of the cable from the electric connector and exposure of live parts. Automatic means to de-energize the cable conductors and electric vehicle connector shall not be required for portable cord-and-plug-connected electric vehicle supply equipment intended for connection to receptacle outlets rated at 125 volts, single phase, 15 and 20 amperes.
625.30	**Outdoor Sites** Outdoor sites shall include but not be limited to residential carports and driveways, curbside, open parking structures, parking lots, and commercial charging facilities. (A) Location. The electric vehicle supply equipment shall be located to permit direct connection to the electric vehicle. (B) Height. Unless specifically listed for the purpose and location, the coupling means of electric vehicle supply equipment shall be stored or located at a height of not less than 600 mm (24 in.) and not more than 1.2 m (4 ft) above the parking surface.

Section 3: Certification Statement

I hereby certify that the electrical work described on this permit application shall be/has been installed in compliance with the conditions in this permit. Furthermore, all associated work with circuits, electrical service and meters shall be/has been completed in compliance with NFPA 70, National Electrical Code , and the 2011 Florida Building Code. By agreeing to the above requirements, the licensee or owner shall be permitted to install and operate the charging station. The licensee also insures that appropriate load calculations have been done to insure that the location has adequate electrical capacity to support electric vehicle charging equipment.

Signature of Licensee: Date:
Signature of Owner: Date:

Appendix D: Fleet Strategies

Appendix D-1: Fleet Manager Survey

EV Survey

Exit this survey

***1. Please provide the following contact information.**

Name:	
Company:	
Address:	
Address 2:	
City/Town:	
State:	-- select state --
ZIP:	
Email Address:	
Phone Number:	

2. Do you have the authority to make decisions about fleet purchases for your organization?

- ○ a. Yes
- ○ b. No

c. If no, who makes that decision in your organization

3. How many vehicles are in your fleet? (Please include light-, medium-, and heavy duty).

- ○ a. 100 +
- ○ b. 50 to 99
- ○ c. 10 to 49
- ○ d, Less than 10

4. What percentage of the vehicles in your fleet are driven less than 70 miles in a 24-hour period?

- ○ a. 100%
- ○ b. 75%-99%
- ○ c. 50%-74%
- ○ d. 25%-49%

- ○ e. 1%-24%
- ○ f. None

5. For the following questions, 5-10, please respond for those vehicles that are driven 70 miles or less during each 24-hour period:

5. Do the vehicles in your fleet park for six or more hours in a 24-hour period on your company's property?

- ○ a. Yes
- ○ b. No

6. How many vehicles in your fleet are sedans, SUVs, vans, and pick-up trucks?

- ○ a. 100 +
- ○ b. 50 to 99
- ○ c. 10 to 49
- ○ d. Less than 10

7. Do vehicles in your fleet typically use:

- ○ a. Same daily/nightly route
- ○ b. Similar daily/nightly route with similar mileage
- ○ c. No specific route for some; specific route for others
- ○ d. Route varies greatly from one day/night to the next

8. Is your organization planning to purchase or lease vehicles in the next 18 months?

- ☐ a. Yes, very likely
- ☐ b. Yes, somewhat likely
- ☐ c. Not likely
- ☐ d. No, will not purchase or lease vehicles within the next 18 months

9. What is your most important consideration when purchasing vehicles for your fleet?

- ○ a. Purchase price

- ○ b. Low operating and maintenance costs
- ○ c. Total cost of ownership
- ○ d. Environmental impact
- ○ e. Features and options to suit the job
- ○ f. Addressing EPAct credits

g. Other (please specify)

10. Would you be interested in working with us to explore the feasibility of adding some plug-in electric vehicles to your fleet?

- ○ a. Very interested
- ○ b. Somewhat interested
- ○ c. Not interested

Done

Appendix D-2: Survey Instructions

Subject: A Really Simple Electric Vehicle FLEET Survey for SE Florida Counties of Indian River, St. Lucie, and Martin Counties

Attachments: Rev Abstract 11-28-11.pdf

Dear Fleet Administrator:

Your assistance is needed. Please take a brief online survey – it should only take about 5 minutes of your time. The information you provide will help us understand the needs and plans of our Region's fleet managers. Secondly, it will help us identify the fleets which may be suitable for transition to plug-in electric vehicles over the next few years and help us plan for the infrastructure requirements. Kindly submit your response by Monday, August 20.

Please click HERE to go directly to the survey.

If you are not the person that has the information, please forward this email to the correct person.

Your assistance is truly appreciated! Thank you in advance - -

Sincerely,

Christine Heshmati
Coordinator, Florida Gold Coast Clean Cities Coalition
South Florida Regional Planning Council
3440 Hollywood Boulevard, Suite 140
Hollywood, Florida 33021
(954) 985-4416
cheshmati@sfrpc.com

Funded by: U.S Department of Energy/Clean Cities grant to assist in preparing communities, local governments and private industry for plug-in electric vehicle deployment.

Appendix D-3: Survey Response Table

Survey Results of Fleet Managers Interested in Plug-In Electric Vehicle Adoptions

Of the sixteen fleet managers responding to the survey, twelve (12) managers indicated interest in electric vehicles. Their survey responses are as follows:

Do you have the authority to make decisions about fleet purchases for your organization?

a.	Yes	10	83%
b.	No	2	17%

How many vehicles are in your fleet?

a.	100+	12	100%
b.	50 – 99	0	
c.	10 to 49	0	
d.	Less than 10	0	

What percentage of the vehicles in your fleet are driven less than 70 miles in a 24-hour period?

a.	100%	0	
b.	75%-99%	3	25%
c.	50%-74%	3	25%
d.	25%-49%	2	17%
e.	1%-24%	4	33%
f.	None		

For the following questions, please respond for those vehicles that are driven 70 miles or less during each 24-hour period.

Do the vehicles in your fleet park for six or more hours in a 24-hour period on your company's property?

a.	Yes	10	91%
b.	No	1	9%
[No Response		1]	

How many vehicles in your fleet are sedans, SUVs, vans, and pick-up trucks?

a.	100+	6	50%
b.	50 to 99	5	42%
c.	10 to 49	1	8%
d.	Less than 10	0	

Do vehicles in your fleet typically use:

a.	Same daily/nightly route	0	
b.	Similar daily/nightly route with similar mileage	4	33%
c.	No specific route for some specific for others	4	33%
d.	Route varies greatly from one day/night to the next	4	33%

Survey Results of Fleet Managers Interested in Plug-In Electric Vehicle Adoptions (continued)

Is your organization planning to purchase or lease vehicles in the next 18 months?

a.	Yes, very likely	5	42%
b.	Yes, somewhat likely	7	58%
c.	Not likely	0	
d.	No, will not purchase or lease vehicles within the next 18 months	0	

What is your most important consideration when purchasing vehicles for your fleet?

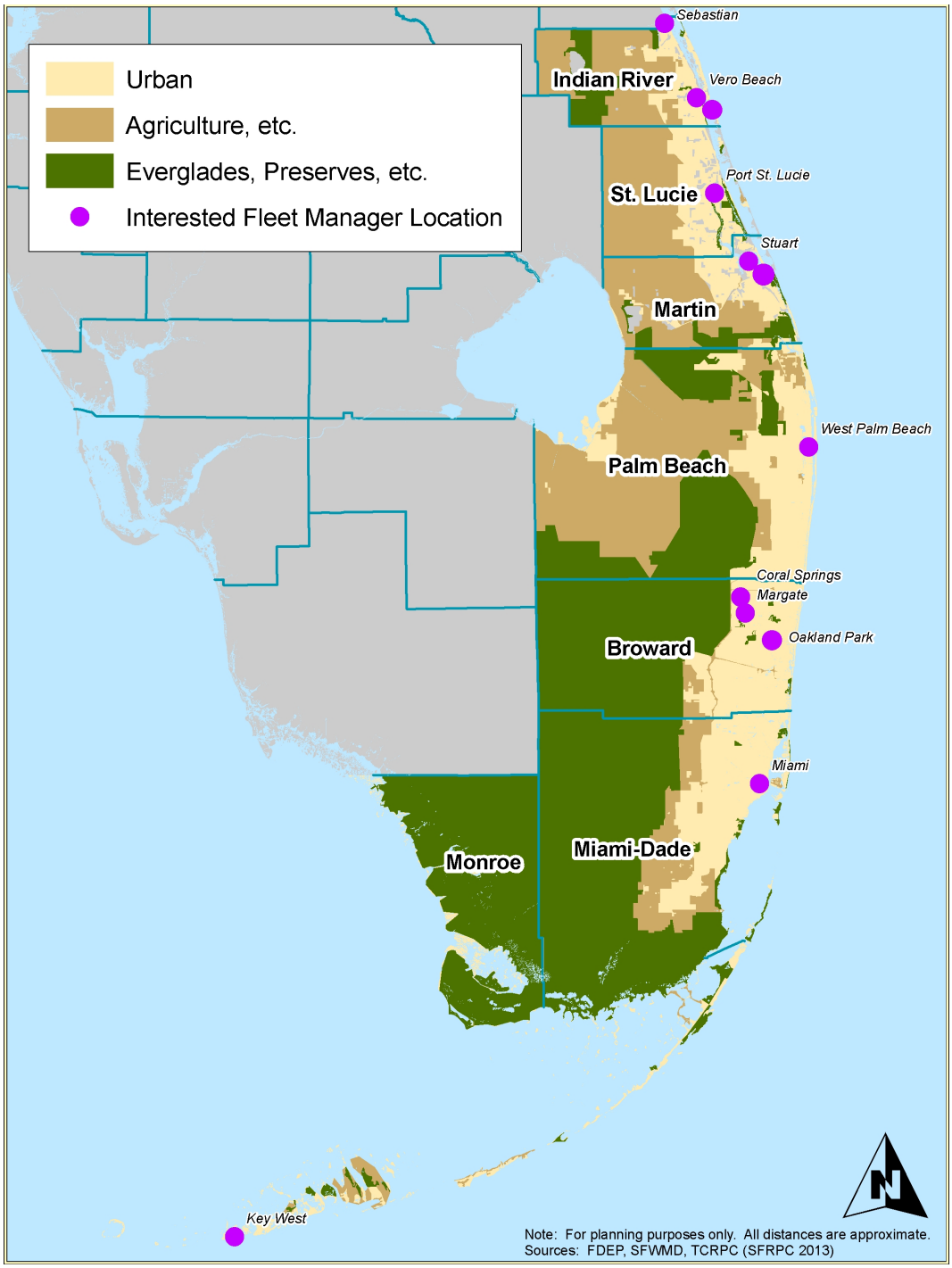
a.	Purchase price	3	25%
b.	Low operating and maintenance costs	1	8%
c.	Total cost of ownership	5	42%
d.	Environmental impact	0	
e.	Features and options to suit the job	3	25%
f.	Addressing EPAct credits	0	
g.	Other (please specify)	0	

Would you be interested in working with us to explore the feasibility of adding some plug-in electric vehicles to your fleet?

a.	Very interested	3	25%
b.	Somewhat interested	9	75%
c.	Not interested	0	

Appendix D-4: Regional Map – Fleet Managers Interested in PEVs

The below map represents locations of fleet managers – who responded to the Fleet Manager Survey – interested in PEVs.



Appendix D-5: Fleet Case Studies

Case Study # 3: Indian River County Sheriffs Office

Background: With nearly 200 police vehicles, the Indian River County Sheriffs Department fleet includes an additional 30 sedans, approximately, that are used by detectives and civil processors. These vehicles are generally driven to the homes of the employees at night, and the schedule and miles driven per day vary greatly.

There are five Chevy Malibu sedans used by detective and civil processors that need to be replaced in the near future. These cars are driven five days per week, 50 weeks per year, with annual mileage of about 17,500.

Meeting: A 90-minute meeting was held on January 10, 2013, with the Indian River County Sheriffs Department Fleet Manager (FM) in Vero Beach. The Southeast Florida Clean Cities Coordinator and Project Manager of the EV Community Readiness Grant, FPL's Electric Vehicle Program Manager, and the Central Florida Clean Cities Coordinator, whose region includes Indian River County, provided information about the grant, their roles in the grant, and the benefits of converting a portion of this fleet to electric. The FM then described his agency's operations, his interest in replacing some of the administration vehicles with PEVs, and the nature of Indian River County's vehicle-acquisition process.

The police cars are primarily Crown Victoria sedans and Ford Tahoe SUVs with high mileage that would make conversions to electric vehicles more challenging. It was agreed that concentrating on gradual transitions to the administrative fleet would be the best approach. Because the mileage varies a great deal with the administration's vehicles and can easily run greater than 70 miles per day, the grant team suggested that Chevy Volts replacing older Chevy Malibu sedans was the most feasible approach. The FM indicated that vehicles are purchased from the Florida Sheriffs Association, Florida Association of Counties, and Florida Fire Chiefs' Association listing.[249]

Following the meeting, the FM test drove an FPL Chevy Volt, while the grant team explained, again, some of the many operations and maintenance cost savings provided by PEVs and demonstrating the similarities between operating vehicles with internal combustion engines and those with electric batteries. Following the meeting, the FM indicated that he is very interested in introducing five Chevy Volts into the administration fleet, which includes those sedans used by civil processors. The Grant Project Manager assured the FM that she would run updated lifecycle cost and emission calculations for his review, comparing 2012 Chevy Malibu and Chevy Volt models.

Potential for Conversion to Electric: The county's 2013-14 fiscal year begins in October 2013, and the FM had started preparing the budget for vehicle replacement. In speaking with the FM a few weeks later, the grant team learned that the county's Sheriff had determined the only vehicles that could be replaced in the upcoming budget were selected police sedans with high mileage. Although conversion steps are delayed at this time, the FM remains very interested in introducing electric vehicles to his fleet in the following 2014-15 fiscal year. He and the grant team will stay in close communication over the coming months.

Case Study #4: Keys Energy Services

Background: Keys Energy Services is the local utility company that serves the lower Keys of Monroe County, from Key West north to the Seven-Mile Bridge just south of Marathon, FL. This municipal power

[249] The entire vehicle purchase list of the Florida Sheriffs Association, Florida Association of Counties, and Florida Fire Chiefs' Association is available at the following link: https://www.flsheriffs.org/uploads/12-20-0905%20Bid%20Award%281%29.pdf. This list is typically used by local government fleet managers. Sedans – both conventional and electric – are listed from pages 146 through 258.

company is overseen by a five-member local utility board, and its fleet includes over 100 vehicles, four or five of which are used for meter reading and one for mail delivery. In 2006, following Hurricane Wilma, much of the fleet was replaced due to vehicular damage from a storm surge. Although interested in PEVs, the Fleet Manager (FM) does not anticipate further fleet replacement for the next 1½ to 2 years.

Most of the fleet is comprised of standard regular-cab, short-wheelbase Ford F-150 and Chevy 1500 series pick-up trucks. There is one Ford Explorer Sport SUV used for mail delivery and meter reading. While some of the vehicles travel exclusively within Key West, others traverse the U.S.-1 roadway north to the Seven Mile Bridge, which is about 45 miles each way. The FM indicated the average daily driving distance is 40 miles, five days per week, 50 weeks per year. Only about 5 percent of the mileage is at highway speeds.

Prior to the meeting, the Electric Vehicle Fleet Conversion Toolkit was sent electronically to the FM. An example of this toolkit is included on page 146.

Meeting: This 90-minute meeting was conducted as a conference call with the FM and Grant Team members that included the Southeast Florida Clean Cities Coordinator/EV Planning Grant Project Manager and the FPL Electric Vehicle Program Manager. Information was provided to the FM about the DOE-funded grant, objectives being carried out, and the benefits of converting a portion of this fleet to electric. The FM then described his company's operations, his interest in replacing some of the support vehicles with PEVs or PHEVs, and his role as fleet manager.

The Grant Team briefly discussed the preliminary lifecycle cost analysis that was calculated prior to the meeting. Using the DOE AFDC calculator, a comparison was made between the Chevy Volt, Chevy Silverado C15 2WD pick-up truck, and Ford F150 2WD pick-up truck, and a Ford Explorer Sport Trac 2WD SUV. The Team suggested that all-electric vehicles (also known as BEVs) could be considered by the company for some of the fleet since most vehicles are driven 40 miles or less each day.

Discussion ensued about the culture change that some utility companies, like FPL, are experiencing as staff are weaned from pick-up trucks to smaller sedans. One interesting finding is that many employees enjoy the challenge of determining ways to increase the efficiency of their new PEVs, using information on the dashboard to guide some of their driving habits. The FPL fleet manager has found that selecting staff members who are receptive to these conversions assists in the transition. Benefits of PEV and PHEV ownership were then discussed. Another suggestion included the practice of meeting the typical needs of a fleet, then swapping out to a smaller number of vehicles with traditional internal combustion engines when more miles or cargo space are needed on occasion. The FM described the company's Green Committee, which seeks to explore environmentally sound changes in Keys Energy operations.

Potential for Conversion to Electric: The FM is interested in continuing discussions with the Grant Team about gradual fleet conversions to electric. Revised lifecycle cost calculations, to include the Nissan Leaf and the Ford Focus BEV, were included and sent electronically to the FM following the meeting. Like many local governments in Florida, Keys Energy uses the list of the Florida Sheriffs Association, Florida Association of Counties, and Florida Fire Chiefs' Association when ordering vehicles.[250]

The FM indicated his interest in Grant Team members attending an upcoming Green Committee meeting, which the company's CEO is a member of. With the support of the Committee, there is a possibility that PEVs and/or PHEVs could be introduced to the fleet sooner than the two year originally estimated. The Grant Team will try to bring an FPL Chevy Volt to Key West for the Grant Team to inspect, and following

[250] The entire vehicle purchase list of the Florida Sheriffs Association, Florida Association of Counties, and Florida Fire Chiefs' Association is available at the following link: https://www.flsheriffs.org/uploads/12-20-0905%20Bid%20Award%281%29.pdf. This list is typically used by local government fleet managers. Sedans – both conventional and electric – are listed from pages 146 through 258.

the presentation before the Committee, an assessment of the fleet parking area would be conducted to determine potential placement of EVSE.

Case Study #5: St. Lucie District Schools County School District

Background: With a population of nearly 278,000, St. Lucie County lies north of Martin County and south of Indian River County. Its School District has 388 full-size school buses. The School District also has several sedans that are used for security purposes, at times to transport students when out of school buses.

The Fleet Manager (FM) is interested in replacing a few Ford Crown Victoria sedans and Chevy Impalas with Chevy Volts. It is also possible that two vehicles used by school district management, a V6 Ford Taurus and a FWD V8 Ford F150 pickup truck, could be replaced with electric FWD pick-up trucks.

Meeting: A 75-minute meeting was held on February 5, 2013 at the main school district offices in the City of Port St. Lucie with the County's FM. The Florida Clean Cities Coordinator, who is the Project Manager of the EV Community Readiness grant, and the FPL Electric Vehicle Program Manager met with the FM and provided information about the grant and the benefits of converting a portion of the sedans used for security in the fleet to electric. The Fleet Manager EV Toolkit was referenced and a general discussion about the benefits of fleet conversions to electric ensued. An example of this toolkit is included in this appendix on page 146.

The Coalition's coordinator assured the FM that she would run lifecycle cost and emissions calculations to determine the benefits of gradually transitioning to electric.

The director described his agency's operations and the nature of the school district's vehicle-acquisition process. He explained that vehicles are generally purchased through the list of the Florida Sheriffs Association, Florida Association of Counties, and Florida Fire Chiefs' Association,[251] while school buses are purchased through the Florida Department of Education at a substantial discount over retail prices. The purchase list for school buses may be viewed at: http://www.fldoe.org/transportation/pdf/1314PricingOrderingGuide.pdf. The director further indicated that as a community leader, the city might have an interest in demonstrating reduced petroleum usage and piloting a couple electric vehicles.

Potential for Conversion to Electric: Purchase price is an important factor to be considered, and the lack of a tax rebate in fleet acquisitions does create the need to proceed carefully in determining whether to convert and how the timing of the purchases could be most attractive. The school district's 2014 budget year begins July 1, 2013, and the grant team will stay in touch with the FM as he considers the benefits of conversion and whether to proceed or delay the process.

Case Study #6: Florida Department of Transportation, District Four

Background: The Florida Department of Transportation (FDOT) oversees the state's transportation system and is divided into eight geographic districts. FDOT's District Four is based in Broward County, which is populated by approximately 1,748,000 people, or 10 percent of the state population. Its jurisdiction, however, encompasses Broward County, but also Palm Beach, Martin, St. Lucie, and Indian River counties, as well. The district has approximately 650 vehicles in its fleet, including sedans, pickup trucks, and larger vehicles used in roadway construction.

[251] The entire vehicle purchase list of the Florida Sheriffs Association, Florida Association of Counties, and Florida Fire Chiefs' Association is available at the following link: https://www.flsheriffs.org/uploads/12-20-0905%20Bid%20Award%281%29.pdf. This list is typically used by local government fleet managers. Sedans – both conventional and electric – are listed from pages 146 through 258.

Meeting: A meeting was held on February 8, 2013, at the District Four Florida Department of Transportation headquarters in Fort Lauderdale. The Florida Clean Cities Coordinator, who is the Project Manager of the EV Community Readiness grant, and the FPL Electric Vehicle Program Manager met with the District Maintenance Engineer (ME), Fleet Manager (FM), and a District Four employee who is personally leasing a Chevy Volt. As the FM distributed the purchase list[252] used by the state, he and the ME explained some of the challenges they face when ordering vehicles. The ME explained that while the district is interested in purchasing PEVs, two factors are very challenging when analyzing the feasibility of doing so: (1) initial cost and (2) the purchase list published by the Department of Management Services (DMS).[253]

There is a federal mandate that 75 percent of the vehicles ordered for use in Palm Beach and Broward counties be alternatively fuelled. However, FDOT Districts throughout the state are required to order vehicles only from the DMS purchase list. This purchase list may be in need of an update because models, such as the Ford Focus Electric, Ford C-Max, Chevy Volt, and Nissan Leaf are listed, but they are not classified as alternative fuel vehicles. Purchasing these vehicles is costlier initially and does not contribute to the 75 percent mandate.

The rules regarding vehicle purchases are very strict in order to protect taxpayer investments, and justifications are even required when ordering such extras as rubber floor mats and plastic, rather than cloth-covered, seats. The process is now further complicated through the downsizing of the fleet. In recent years, districts have been downsizing the number of vehicles in their fleets, and District Four is reducing its vehicle orders by about 80 annually, now ordering only about 15 vehicles each year. From a budget of approximately $1.3 million in 2002 to $495,000 in 2012, the District estimates a 60 percent reduction in expenditures.

The grant team described the benefits of fleet conversions to electric and discussed the lifecycle cost calculations performed prior to the meeting. The team then explained that these calculations would be updated with more accurate information attained during the meeting so that the ME and FM would have the most accurate information possible when making their decisions and discussing the conversion with district officials. This information would include models to be replaced, revisions about how the vehicles are driven, pricing on the DMS purchase list, and district-paid gasoline price estimates, which are considerably lower since fuel taxes are not assessed on state vehicles.

Potential for Conversion to Electric: The district's FM provided names and phone numbers of state officials who might be able to provide additional explanation of the alternative-fuel classification of electric vehicles. The Grant Program Manager will be contacting these officials regarding alternative-fuel vehicle (AFV) mandates, vehicles that qualify as AFVs on the purchase list, gasoline pricing for state fleets, and so forth. The district was also interested in exploring leasing options since the opportunity to receive $7,500 in credits could be averaged into the monthly lease rates, and following the lease, the state would have the option of leasing new models with such technological advances as smaller, less expensive lithium batteries. Due to the initial cost of PEVs, coupled with the challenge of complying with EPAct mandates with a state purchase list that doesn't include PEVs as alternative fuel vehicles, District Four staff cannot begin steps to purchase electric vehicles at this time. They do, however, understand the importance of FDOT's community leadership role and are very interested in pursuing PEV purchases when it becomes a viable option. Steps to convert are delayed at this time while all parties work toward satisfactorily aligning mandates, pricing, and the benefits of utilizing PEVs in large governmental fleets.

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[252] This list is available at the following link on Florida's Department of Management Services website: http://www.dms.myflorida.com/business_operations/state_purchasing/vendor_information/state_contracts_agreements_and_price_lists/state_term_contracts/motor_vehicles/pricing.

[253] This list is available at the following link on Florida's Department of Management Services website: http://www.dms.myflorida.com/business_operations/state_purchasing/vendor_information/state_contracts_agreements_and_price_lists/state_term_contracts/motor_vehicles/pricing.

Appendix E: Education and Outreach Strategies

Appendix E-1: Sample of Community Events for Audience & Stakeholder Outreach

Below are examples of events that FPL participated in last year (2012), and a calendar of planned events in 2013. PEVs were discussed and promoted at these events. Please note, however, that while these events supported the mission of Drive Electric Florida, participation was not funded with DOE grant dollars.

A Sample of 2012 Attended Events – Florida Power & Light

Name of Event	Location
Edison Festival of Light in Lee County "The Day of Discovery"	Ernesto
Nissan Leaf "Drive Electric Tour"	Miami
Audubon BOD meeting	Martin Plant
Martin County Fair	Stuart
Airport Energy Efficiency Forum	West Palm Beach
Edison Fest Parade	Fort Myers
Arti Gras	Jupiter
Boy Scouts Car Show	Palm Beach Gardens
West Palm Beach Home Show	West Palm Beach
City of West Palm Beach - Sustainability Summit	West Palm Beach
Leadership Ride/Drive	Miami
DOE Ride/Drive	Hollywood
Daytona Beach Home Show	Daytona
Lee County Race for the Cure	Lee County
Miami Home Design & Remodeling Show	Miami
Transportation Day	Oviedo
Pine Jog Environmental Expo	Palm Beach
PBSC Earth Day	Palm Beach Gardens
Turtlefest	Loggerhead Marinelife Center - Juno
Earth Day Southwest FL	Sarasota
Earth Fest Coral Gables	Coral Gables
Earth Day at Ryder	Doral
Leadership Boca Environmental Awareness Day	Boca
FPL Safety EXPO	Juno Beach
Dunbar HS & Ft. Myers MS	Fort Myers

SunFest	West Palm Beach
Estero HS	Fort Myers
Bonita Beach MS	Fort Myers
S Ft. Myers HS	Fort Myers
Lee County Schools Admin Building	Fort Myers
Ft. Myers Fire Dept.	Fort Myers
Sustainability Event - Environmental	Boca
Boynton Elementary School-Sunset Palm	Boyntom Bch
Shareholder Meeting	Juno Beach
Ft. Lauderdale Home Design & Remodeling Show	Fort Lauderdale
Cooper City's Touch a Truck Day	Fort Lauderdale
Delray Beach " 4th Event"	Delray Beach
Daytona Garden Home Show	Daytona
AFV (Alternative Fueled Vehicle Roadshow) - Delray Beach	Delray Beach
AFV (Alternative Fueled Vehicle Roadshow) - Miami	Miami
Profitability Through Sustainable Practices	Boca Raton
AFV (Alternative Fueled Vehicle Roadshow)	Tallahassee
2012 National Plug In Day	Sarasota
AFV (Alternative Fueled Vehicle Show) - Venice	Sarasota
AFV (Alternative Fueled Vehicle Roadshow) - Daytona	Daytona
South Florida Manufacturers Association	Ft. Lauderdale
PB Zoo, Girl Scout Event	West Palm Beach
Volusia Manufacturers Showcase	Daytona
Jupiter Beach Clean-Up	Jupiter
Bonita Middle School Presentation	Lee County
2012 Learn GREEN - Dreyfoos School Presentation	PB County
Clean Cities Meeting	Broward
Falcon Nest Solar Energy Dedication Ribbon Cutting Ceremony	Miami
Sustainable Communities Workshop in Sarasota	Sarasota
Sarasota/Manatee Chamber Event	Sarasota
Stuart Air Show	Stuart, FL
Miami Auto Show Display & EV RIDE	Miami
Veterans Day Parade in Palmetto	Palmetto
NASCAR Homestead races - Ford	Homestead, FL
FIU Tech Focus	Miami
Fort Myers Middle School	Lee County
4th Annual SE FLA Regional Climate Leadership Summit	Jupiter
Martin Plant Presentation, Tour	Indiantown

A Sample of 2013 Events – Florida Power & Light (Tentative)

Name of Event	Location
Volusia County Home & Garden Show	Daytona
Miami Spring Home Show	Miami
Edison Festival of Light in Lee County	For Myers
Sarasota/Bradenton Home Show	Sarasota
South Florida Fair West Palm Beach	WPB Fairgrounds
YATC: Cool Wheels Car Show 2013	Deerfield Beach
Go SOLAR Fest	Broward County Convention Center
AESP Business Show	Orlando
Martin County Fair	Stuart
Stuart Energy Fest	Stuart
Arti Gras	Jupiter
Edison Fest Parade	Fort Myers
City of WPB - Sustainability Summit	West Palm Beach
Boy Scouts Car Show	
Autism Speaks Walk	West Palm Beach
WiE Learn n'Ride	Juno Beach
Miramar Conservation Day	Miramar
EEI Spring National Account Workshop	Orlando
Lee County Race for the Cure	Fort Myers
Daytona Beach News Journal Home Show	Daytona
Sarasota Bradenton Home Show	Sarasota
Miami Home Design & Remodeling Show	Miami
Pine Jog Environmental Expo	West Palm Beach
Florida Gulf Coast University Solar-Electric Car Challenge	Miami Beach Convention Center
South Florida Condo and HOA Expo (tent)	Miami Beach Convention Center
PBSC Earth Day	Juno Beach
FPL Safety EXPO	Juno Beach
PB State College Earth Day	North Palm Beach
Turtlefest	Juno Beach
Earth Day Southwest FL (tent)	
Earth Fest Coral Gables (tent)	Coral Gables
Earth Day at Ryder (tent)	
Take your child to work day (Juno Beach)	Juno Beach
Take your child to work day (GO)	Miami
Dunbar HS & Ft. Myers MS	Fort Myers
SunFest	West Palm Beach
Estero HS	Ft. Myers
Sustainability Event - Environmental	

NextEra Energy Shareholder Meeting vehicle display	Juno Beach
Florida Green, Energy & Climate Conference	WPB
Ft. Lauderdale Home Design & Remodeling Show	Ft. Lauderdale
EDTA Conference Speaker Invitation	Washington, DC
Cooper City's Touch a Truck Day	Cooper City
Fl. Association of Counties	Tampa
Delray Beach " 4th Event"	Delray
Fl. Education Facility Planners Assoc.	
Fl. Health Care Association	
FL League of Cities	
Daytona Garden Home Show	Daytona
Florida Energy Summit	Orlando
Miami Home Design & Remodeling Show	Miami Beach Convention Center
Profitability Through Sustainable Practices	
FL Restaurant & Lodging Assoc.	
South Florida Manufacturers Association	
Fl. Healthcare Engineering Assoc.	
Florida Association of Governmental Fleet Administrators	
PB Zoo, Girl Scout Event	West Palm Beach
Volusia Manufacturers Showcase	Daytona
Jupiter Beach Clean-Up	Jupiter
EEI Fall National Account Workshop	
Daytona Beach News Journal Home Show	Daytona
Offshore Powerboat Races Palm Beach, LLC	Palm Beach
Falcon Nest Solar Energy Dedication Ribbon Cutting Ceremony	
Stuart Air Show	Stuart
Sarasota/Manatee Chamber Event	Sarasota
SF Auto Show	Miami Beach Convention Center
Veterans Day Parade in Palmetto	
NASCAR Homestead races	Homestead
FIU Tech Focus	
SE FLA Regional Climate Leadership Summit	

Appendix E-2: Examples of Third-Party Communications Resources to Leverage in Outreach

Consumer Tools and Resources

A number of free resources are available online that will be included in communications materials for consumers.

- **Federal /state incentives**: http://www.afdc.energy.gov/laws/.
- **Charging station locator**: http://www.afdc.energy.gov/locator/stations/results?utf8=%E2%9C%93&location=&filtered=true&fuel=ELEC&owner=all&payment=all&ev_level1=true&ev_level2=true&ev_dc_fast=true&radius_miles=5.
- **EVs by the numbers (Electric Drive Transportation Association):** http://electricdrive.org/ht/a/GetDocumentAction/id/28569.
- **News and facts on PEV benefits (EDTA):** http://electricdrive.org/index.php?ht=d/Items/cat_id/27120/pid/27125/sortby/date/direction//paginateItems/5/paginateItemsPage/1/.

Fleet Communications Resources

A number of free resources are available online that will be included in communications materials for fleets.

- **Fleet information – planning to reduce petroleum tool**: http://www.afdc.energy.gov/prep/.
- **Green fleet emissions calculator**: http://greet.es.anl.gov/carbon_footprint_calculator.
- **Environmental Defense Fund fleet calculator**: http://business.edf.org/projects/fleet-vehicles/fleet-calculator.
- **Vehicle cost calculator**: http://www.afdc.energy.gov/calc/.
- **Light duty vehicle search**: http://www.afdc.energy.gov/vehicles/search/light/.
- **Heavy duty vehicle search**: http://www.afdc.energy.gov/vehicles/search/heavy/.
- **Electric Drive Transportation Association (EDTA)-compiled fleet news**: http://electricdrive.org/index.php?ht=d/Items/cat_id/27119/pid/27124/sortby/date/direction//paginateItems/5/paginateItemsPage/1/.

Government: First Response and Safety Training Information

A number of resources are available online for free or a small fee to help first responders prepare for accidents involving PEVs. The below information will be shared with appropriate government contacts and first responders as part of community outreach initiatives.

Electric Vehicle Safety Training from the National Fire Protection Association

Electric Vehicle Safety Training (http://www.evsafetytraining.org/), a project of the National Fire Protection Association (NFPA), offers manuals and a video classroom courses for a small fee. "Before the NFPA project, literature and training materials specific to electric vehicles seemed to be a gap," according to ECOtality North America, which prepared the "EV Project: First Responder Training" report to the DOE.

A number of free resources on the site include:

- A comprehensive resource of downloadable safety manuals and emergency response guides, by manufacturer: http://evsafetytraining.org/Resources.aspx
- PEV safety research: http://evsafetytraining.org/Resources/Research.aspx
- Newsletters: http://evsafetytraining.org/Resources/Newsletter.aspx
- A number of videos: http://evsafetytraining.org/Resources/Videos.aspx

Available training products and courses (as of January 2013), including:

- Electric Vehicle Emergency Field Guide (book and PDF, $72; PDF, $45; Book, $45).[254]
- EV Safety for Emergency Responders Online Course videos (http://www.nfpa.org/catalog/product.asp?pid=EVT001, $19 for non-members).

A free preview video is available at: http://www.youtube.com/watch?v=t_p58g244-s.

Electric Vehicle Safety Training from the National Alternative Fuels Training Consortium

According to NAFTC's website, its "First Responder Safety Training features a suite of modern technology products and training for biofuel, gaseous fuel, hydrogen, and electric drive vehicles. Participants learn important information needed to safely respond to accidents involving these vehicles. These topics include key vehicle and fuel properties and characteristics, vehicle components, vehicle identification and recommended first responder procedures."

Products include:

- Instructor manuals.
- Participant manuals.
- Quick reference guides.
- Mobile applications (free), providing access to information on alternative-fuel vehicles at the accident scene, available for download at: https://itunes.apple.com/ie/app/qrg/id466857863?mt=8.

[254] Please check NFPA's site for updated costs.

- Online training (for electric drive), including "First Responder Safety Training Electric Drive Vehicles Online Course," currently being offered at no cost to a limited number of participants in 2013: http://naftcfreefirstresponder.eventbrite.com/#. More information and details below.
- First responder video library: http://afvsafetytraining.com/.

NAFTC offers free online course in 2013. From NAFTC's website:

NAFTC First Responder Safety Training Electric Drive Vehicles Online Course

National Alternative Fuels Training Consortium (NAFTC)
Tuesday, January 15, 2013 at 8:30 AM - Thursday, August 8, 2013 at 5:00 PM (EST)
Morgantown, WV

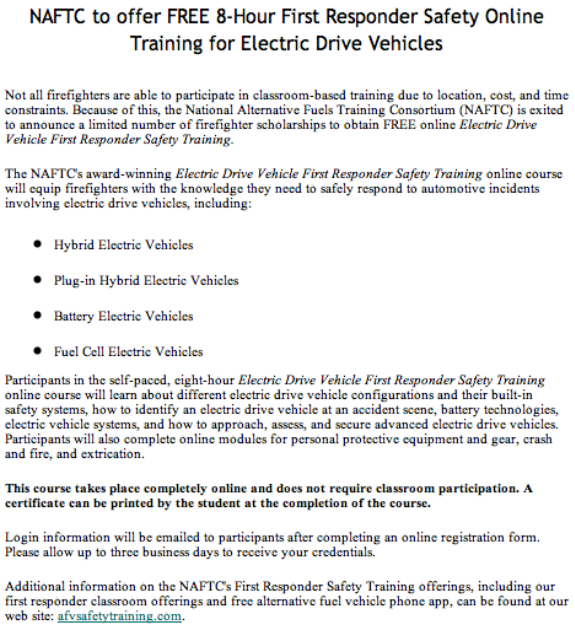
Registration Information

TYPE	END		QUANTITY
Free Online Scholarship	Aug 8, 2013	Free	1

Register

SHARE THIS EVENT Email Share Tweet Like 18 people like this. Be the first of your friends.

Email from NAFTC regarding free course:
The following email was sent January 13, 2013.



NAFTC to offer FREE 8-Hour First Responder Safety Online Training for Electric Drive Vehicles

Not all firefighters are able to participate in classroom-based training due to location, cost, and time constraints. Because of this, the National Alternative Fuels Training Consortium (NAFTC) is exited to announce a limited number of firefighter scholarships to obtain FREE online *Electric Drive Vehicle First Responder Safety Training*.

The NAFTC's award-winning *Electric Drive Vehicle First Responder Safety Training* online course will equip firefighters with the knowledge they need to safely respond to automotive incidents involving electric drive vehicles, including:

- Hybrid Electric Vehicles
- Plug-in Hybrid Electric Vehicles
- Battery Electric Vehicles
- Fuel Cell Electric Vehicles

Participants in the self-paced, eight-hour *Electric Drive Vehicle First Responder Safety Training* online course will learn about different electric drive vehicle configurations and their built-in safety systems, how to identify an electric drive vehicle at an accident scene, battery technologies, electric vehicle systems, and how to approach, assess, and secure advanced electric drive vehicles. Participants will also complete online modules for personal protective equipment and gear, crash and fire, and extrication.

This course takes place completely online and does not require classroom participation. A certificate can be printed by the student at the completion of the course.

Login information will be emailed to participants after completing an online registration form. Please allow up to three business days to receive your credentials.

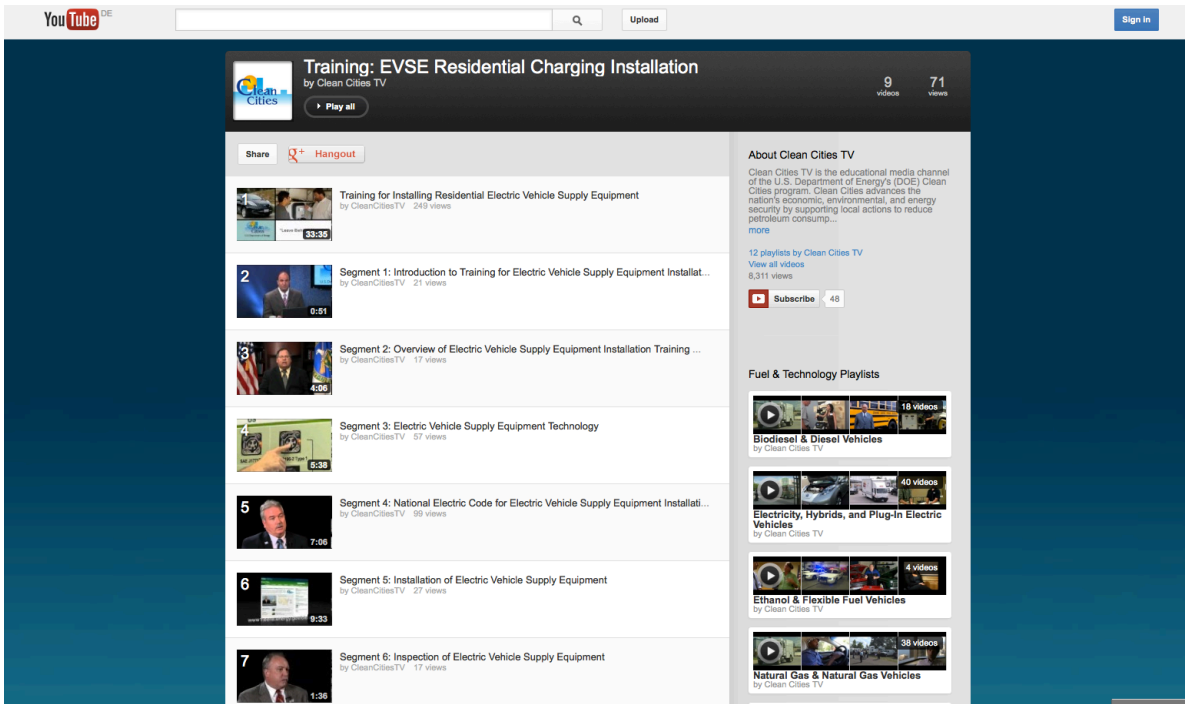
Additional information on the NAFTC's First Responder Safety Training offerings, including our first responder classroom offerings and free alternative fuel vehicle phone app, can be found at our web site: afvsafetytraining.com.

Electric Vehicle Supply Equipment Training Resources: Multiple Audiences

The Clean Cities YouTube playlist, as part of its channel, that offers a variety of training videos related to the safe installation of EVSE, including:

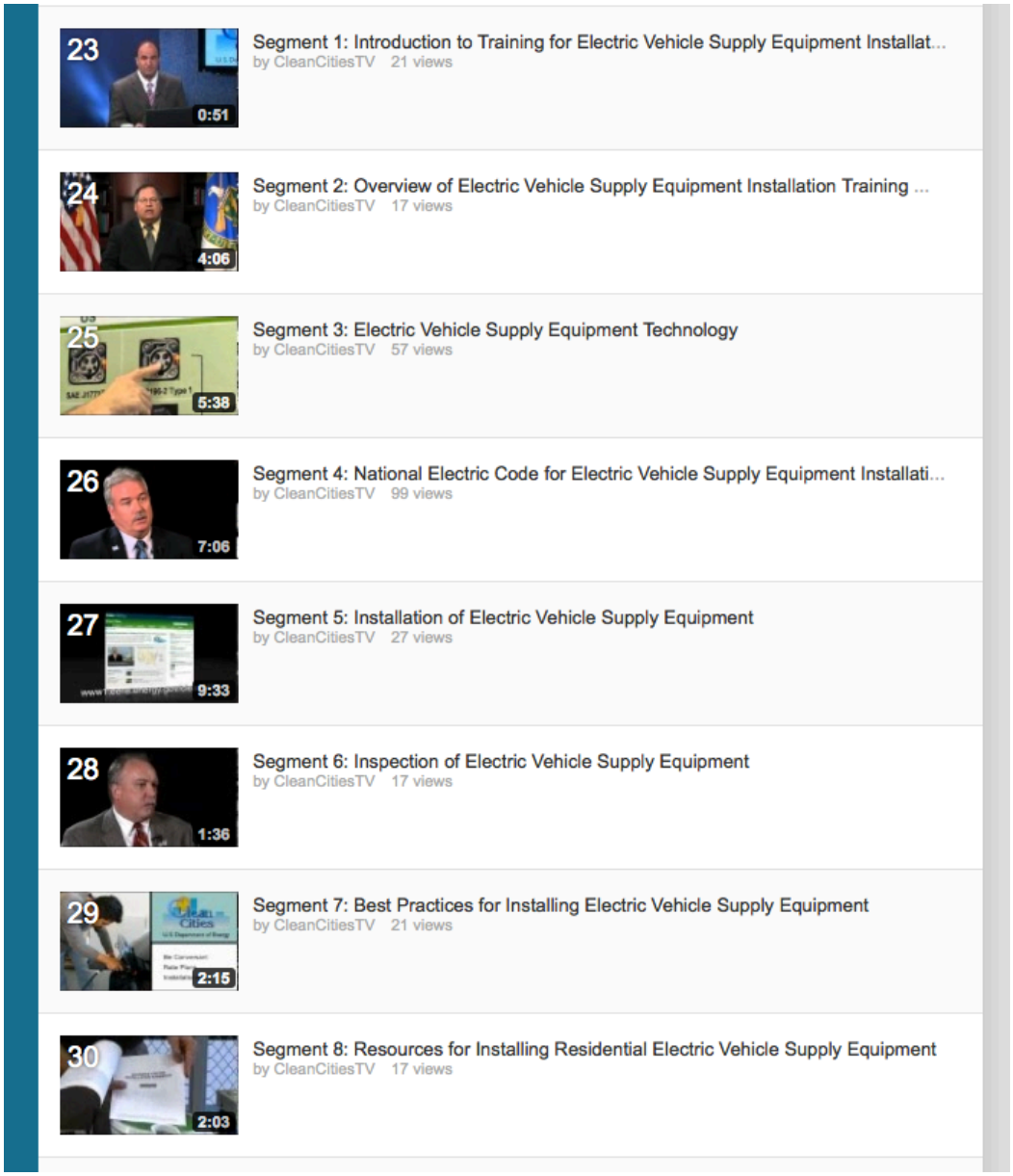
- Overviews;
- Best practices;
- Inspections;
- Installation resources; and
- More. Link to playlist: http://www.youtube.com/playlist?list=PLTTHf6mU88syVztERNF6iw088IWHZ11k4

Clean Cities: EVSE Residential Charging Installation



Clean Cities: General EVSE Videos

This screen shot demonstrates the types of EVSE technology videos available from Clean Cities. These are available at: http://www.youtube.com/playlist?list=PLTTHf6mU88szn1VIqVo-H_KeSa9403CXU.



Appendix E-3: Reaching Multi-Unit Dwellings and HOAs

The following organizations can be leveraged to help reach multi-unit dwellings, HOAs, and property managers within the Region.

- Greater Fort Lauderdale REALTOR® (Realtor Edge Monthly publication).
- Miami Realtors Association – Broward Council.
- South Broward Board of Realtors (Board Newsletter).
- Hollywood Landlords Association.
- Broward County Landlords Association.
- Community Associations Institute – Southeast Chapter (Broward, Dade and Monroe Counties) – with more than 3,600 members in Florida (seasonal newsletter).
- Community Association Management Company (http://www.cams-propmgmt.com/).
- *Florida Association Journal.*
- Florida Community Association Professionals.

Appendix E-4: Outcomes from Fall 2011 PEV Stakeholder Summit

Overview:

On October 6, 2011, FPL co-hosted the Electric Vehicle (EV) Stakeholder Summit with the South Florida and Treasure Coast Regional Planning Councils and the Gold Coast Clean Cities Coalition at the Fort Lauderdale Marriott – Coral Springs.

Objective:

Educate Florida stakeholders about electric vehicles and related issues and encourage collaboration among them and major industry players to ensure a smooth transition to electric transportation in Florida.

Content:

A who's who of the electric vehicle industry, presented key EV topics including:

- *Moderator:* FPL's Director of In Home Technologies and Electric Vehicles kicked off the day with the history and benefits of electric vehicles and then served as master of ceremonies for the remainder of the event
- *Automaker rollout plans and observations:* Senior-level representatives from Nissan, General Motors, and Ford each discussed their plans and shared their observations of the best practices of the early rollout markets
- *Fueling EVs, charging overview*: Executive Director, Clean Cities Atlanta, covered the basics of charging, including the different types, technical and safety criteria, and the best locations for public charging
- *Community readiness and planning*: This segment covered the local government's role in getting EV-ready, including streamlining and standardizing the permitting and inspection processes, building codes, and financial and non-financial incentives, such as HOV lane access.
- *Multi-unit dwellings*: Electric Transportation Manager of San Diego Gas & Electric (SDG&E) explained the unique challenges of installing charging equipment in multi-unit dwellings (MUDs) and shared some best practices for coordinating the process.
- *Education and outreach*: Vice President of the Electric Drive Transportation Association (EDTA) explained how education will be critical to move the market past the early adopters and into the mainstream.

- *Utility role*: FPL's EV Program Manager discussed the general utility perspective, including implications for generation, transmission and distribution, a penetration forecast for Florida, and FPL's EV program.
- *Panel discussion*: Each speaker participated on a panel where audience members asked questions.
- *Closing remarks*: The South Florida Regional Planning Council's Executive Director discussed the opportunity before us and the importance of this effort to our communities. He also spoke about the importance public/private partnerships and the DOE Clean Cities Community Readiness and Planning for Electric Vehicles and Charging Infrastructure Grant.

Attendees:

More than 140 of Florida's PEV stakeholders, including:

- *Elected officials*: Patricia Asseff, Vice Mayor of the City of Hollywood and Southeast Florida Clean Cities Chair, Phyllis Smith, and Councilwoman of the City of North Miami Beach. In addition, Broward County Commissioner Stacy Ritter conducted interviews during the event and test-drove a PEV.
- *Public sector employees*: City managers, sustainability managers, county employees, etc.
- *Fleet operators*: public and private fleet operators considering converting to electric transportation
- *Utilities:* Progress Energy, TECO, and a few municipalities.
- *Components and charging manufacturers*: Azure Dynamics and locally based EVSE companies, like Recharge Solutions, Car Charging Inc., OpConnect, etc.
- *Clean Cities members*: active members from the Southeast Florida chapter.

Media

Some of the reporters that were expected didn't come to the event due to the passing of Steve Jobs and the media coverage that required. However, we're pleased with the following positive coverage that has helped drive awareness of PEVs in the community:

- Radio Green Earth.
- Third-party social media:
  - 39 mentions (through Oct. 10) on various social media sites including:
    - Broward County Commissioner Stacy Ritter's Blog, YouTube Video and Twitter
    - http://www.youtube.com/watch?v=Da-Sb2irV2M.
  - Coverage of Ritter's blog on Red Broward:
    - http://redbroward.com/2011/10/10/stacy-ritter-drives-an-electric-vehicle-not-a-golf-cart/.
- FPL's Social Media – data through Oct. 10, 2011:
  - Facebook – 7,633 impressions.
  - YouTube – 199 views.
  - FPLBlog – 28 views.
- FPL employee channels:
  - EWeb – story about the event.
  - ENews – November.

Additional Outcomes

- Video about the event.
- Availability of video and presentations on the web: www.FPL.com/EVSummit2011.
- Follow-up communications with participants.

Photos

Link to 104 photos of the event. Password is ev:
2011 Electric Vehicle Stakeholders Summit Photos

Appendix E-5: Examples of Current PEV Communications Content

Vehicle Owner Testimonials

Below are two examples of owner testimonials from FPL's blog. Each of these blogs is then linked to in FPL's monthly newsletter for residential customers: *Energy News* (http://www.fpl.com/news/news_and_notes/contents/energy_news.shtml).

The Electric Vehicle: "The Greatest Thing Since the Invention of the Tire"

By Anne-Louise Seabury
Published: February 25, 2013

Passionate words from an FPL customer and owner of a Nissan LEAF

At Florida Power & Light, we are passionate about plug-in electric vehicles (PEVs), and so are our customers. With PEVs' ability to lower fuel costs by 80 percent, while emitting 70 percent fewer emissions compared to gas-powered cars in FPL's service territory, we certainly believe these vehicles live up to their hype and excitement.

I recently spoke with an FPL customer who is so hooked on his all-electric Nissan Leaf that he plans to own one for the rest of his life. After transitioning to a Leaf from a Lincoln Navigator, which he says got about 12 miles to the gallon, **David Douglas** shared his enthusiasm with us in this brief interview:*

For the full article and Q&A, visit: http://www.fplblog.com/energy-efficiency/the-electric-vehicle-the-greatest-thing-since-the-invention-of-the-tire/.

Getting a charge out of driving an electric vehicle

By Anne-Louise Seabury
Published: June 27, 2012

EV Ownership: In a Customer's Words

At Florida Power & Light (FPL), we believe in the benefits of electric vehicles (EVs), and we love hearing from customers who feel the same way. So, when FPL customer Brett Circe described to us his favorite EV features, we couldn't resist sharing his insights with all of our customers in this special blog post:*

> *"What do I love most about my Chevy Volt?*
>
> *I don't get asked this a lot, but when I do, it's a difficult question to answer.*
>
> *The Volt is arguably the most innovative car to come out of Detroit in a generation. And it's a high-tech gadget. It connects to my iPhone, I can send Google Maps from my laptop to the GPS in my car with a click, it texts me if I forget to plug it in. I do love all those features.*
>
> *And I love how much fun the car is to drive – especially when I know I have plenty of battery to spare. I like to drop the car into L and put it in Sport Mode, that's a blast.*

FPL Customer Brett Circe with his Chevy Volt, Fort Lauderdale Beach

The full article is available at: http://www.fplblog.com/uncategorized/getting-a-charge-out-of-driving-an-electric-vehicle/.

Drive ELECTRIC Florida

Getting Southeast Florida Plug-in Ready

Prepared by the Southeast Florida Electric Vehicle and Infrastructure Alliance

March 2013

Material is based upon work supported by the U.S. Department of Energy under Award Number DE-EE0005561.

www.DriveElectricFlorida.org
www.FPL.com/EV