

Electric Vehicle Charging Workshop

September 6, 2012



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Section 366.94, Florida Statutes

- New Statute created by HB 7117.
- Passed in 2012 General Legislative Session.
- Addresses Electric Vehicle policy:
 - (1) Exempts a non-utility provider of electric vehicle charging from regulation by the Commission
 - (2) Requires DACS to make rules to provide definitions, methods of sale, labeling requirements, and price-posting requirements concerning electric vehicle charging stations
 - (3) Prohibits non-electric vehicle from using electric vehicle charging parking spot



Section 366.94(4), F.S.

- The Florida Public Service Commission (FPSC) is directed to conduct a study of the potential effects of public charging stations and privately owned electric vehicle charging on both energy consumption and the impact on the electric grid in the state.
- The FPSC shall also investigate the feasibility of using off-grid solar photovoltaic power as a source of electricity for the electric vehicle charging stations.
- The FPSC shall submit the results of the study to the President of the Senate, the Speaker of the House of Representatives, and the Executive Office of the Governor by December 31, 2012.



This Workshop

- Morning Session – Technical Presentations
- Afternoon Session – Technical Roundtable Discussion
- Public Comment Period
 - Please sign up to speak during the Public Comment Period
- Post-workshop comments due September 27th to Benjamin.Crawford@psc.state.fl.us
- Workshop materials will be available on FPSC's website



1. Background Data for Electric Vehicles

- a. Types of electric vehicles in Florida
- b. Types of electric vehicle charging stations in Florida
- c. Numbers of electric vehicles and chargers in Florida
- d. Future deployment of electric vehicles and chargers in Florida



Projected Growth of Electric Vehicles in Florida

Number of EVs								
	FPL	PEF	TECO	Gulf	OUC	JEA		TOTAL
2012	3,024	238	1,165	380	750	431		5,988
2013	5,852	1,054	1,808	895	970	651		11,230
2014	10,021	2,361	2,634	1,553	1,430	876		18,875
2015	15,874	4,045	3,479	2,326	1,360	1,104		28,188
2016	23,811	6,274	4,541	3,220	1,650	2,006		41,502
2017	36,510	9,500	5,887	4,201	1,890	2,924		60,912
2018	49,289	13,816	7,407	5,342	2,150	3,860		81,864
2019	65,554	19,337	8,854	6,646	2,430	4,813		107,634
2020	98,332	26,204	10,292	8,117	2,720	5,783		151,448
2021	147,497	34,576	11,699	9,654	2,980	7,583		213,989

Sources: Utility responses to FPSC data request



EV Charger Classes

Charger Level	Load
Level 1 (Home)	1.1-1.8 kW
Level 2 (Home and Work)	3.3 kW
Level 2+ (Unrestricted Location)	6.6-19.2 kW
Level 3 (Refueling Station)	50-150 kW

Electric Vehicle Chargers in Florida

FPL		PEF		TECO		Gulf		OUC		JEA	
Level 1	Level 2	Level 1	Level 2	Level 1	Level 2	Level 1	Level 2	Level 1	Level 2	Level 1	Level 2
490	408	76	198	90	80	8	-	1	108	N/A	N/A

Statewide	
Level 1	Level 2
665	686

- Source: Utility responses to FPSC data request



2. Effects on Energy Consumption

- a. Effect on demand from electric vehicle charging now and in the future
- b. Need for new generation due to electric vehicle deployment
- c. Effect on peak demand from electric vehicles
- d. Effect on rates from electric vehicle charging
- e. Effect of electric vehicles on vehicle fuel consumption

EV Effect on Electric Peak Demand

EV Contribution to Summer PEAK in MW							
	FPL	PEF	TECO	Gulf	OUC	JEA	TOTAL
2012	2.9	0.1	0.4	0.1	0.2	0	4
2013	6.0	0.3	0.6	0.3	0.3	0	8
2014	11.1	0.8	0.9	0.5	0.5	0	14
2015	19.2	1.3	1.1	0.8	0.4	0	23
2016	29.8	2.1	1.5	1.1	0.5	1	36
2017	44.3	3.1	1.9	1.4	0.6	1	52
2018	60.6	4.6	2.4	1.8	0.7	1	71
2019	80.8	6.4	2.9	2.2	0.8	1	94
2020	114.8	8.6	3.4	2.7	0.9	2	132
2021	162.6	11.4	3.9	3.2	1.0	3	185

Derived from Utility responses to FPSC data requests



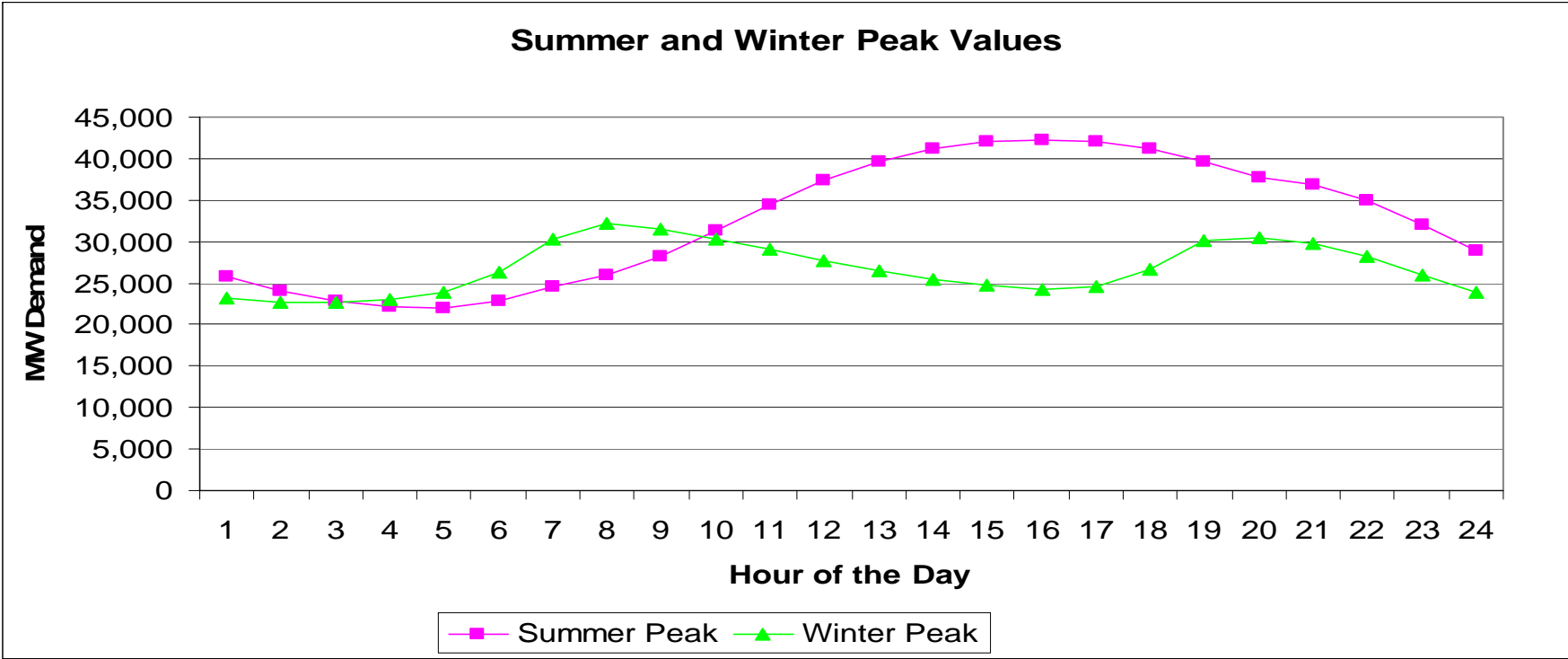
Reserve Margins

Summer Reserve Margin in MW							
	FPL	PEF	TECO	Gulf	OUC	JEA	Total
2012	6238	3081	1019	82	416	739	11,575
2013	6329	3186	949	55	388	734	11,641
2014	6454	3009	910	19	362	698	11,452
2015	6113	2972	874	-12	333	660	10,940
2016	5739	2231	810	-39	295	630	9,666
2017	5281	1999	952	-74	264	691	9,113
2018	5268	1839	912	-110	305	747	8,961
2019	5032	2195	898	-159	273	1078	9,317
2020	4683	2037	856	-208	241	1028	8,637
2021	4572	3068	817	-250	208	973	9,388

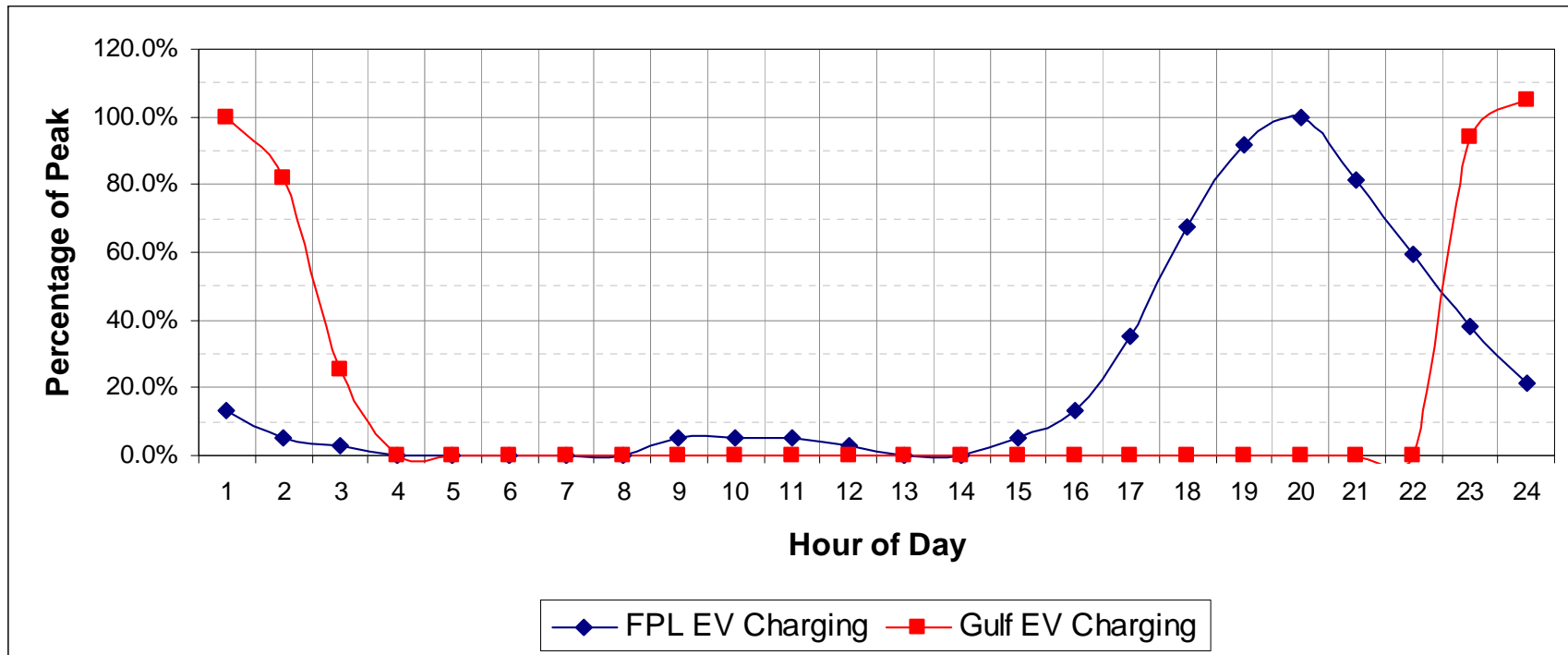
Source: Utility Ten-year site plan data



2011 Typical Florida Electrical Utility System Peak Demand Profiles



EV Charge Profiles with and without Time-of-Use Rates



- Based on FPL and Gulf responses to FPSC data request
- Gulf's charging profile is from a customer using their time-of-use rate
- FPL's charging profile is not based on time-of-use rates



3. Impact on the Electric Grid

- a. Impact of private charging on the transmission and distribution network
- b. Impact on residential transformers from clustering of electric vehicles
- c. Impact of public charging stations, especially quick-charge stations, on the transmission and distribution network
- d. Impacts and differences from at-work charging
- e. Impact on costs or savings to consumers



Clustering of Electric Vehicles

Transformer KVA Class	Number of Chargers Supportable Simultaneously by Transformer Class		
	1.4 kW EV Charger	3.3 kW EV Charger	6.6 kW EV Charger
15	1	1	0
25	2	1	1
50	3	2	1
75	4	2	1
100	5	2	1

- Residential transformers have limited ability at present to support larger chargers, and potentially no ability to support multiple 6.6 kW chargers.
- Derived from PEF data response



“Quick-Charge” Charging Stations

- “Quick-charge” stations capable of charging an electric vehicle in 15 minutes or less
- May draw very high load – 50 kW or more
- Likely to see high usage during evening drive period – summer peak times
- May require three-phase power, limiting potential locations

Challenges to the Distribution System

- Can, and should, electric utilities require EV owners to notify their utility?
- How will electric utilities address EV clustering?
- Who will pay for needed upgrades to the distribution system driven by EVs?
- Can CIAC (Contribution in Aid of Construction) help pay for these upgrades?



4. Feasibility of Solar PV for off-grid charging

- a. Generation needed per station
- b. Potential for energy storage
- c. Relationship between solar production times and charging demand times
- d. Battery swaps as an option



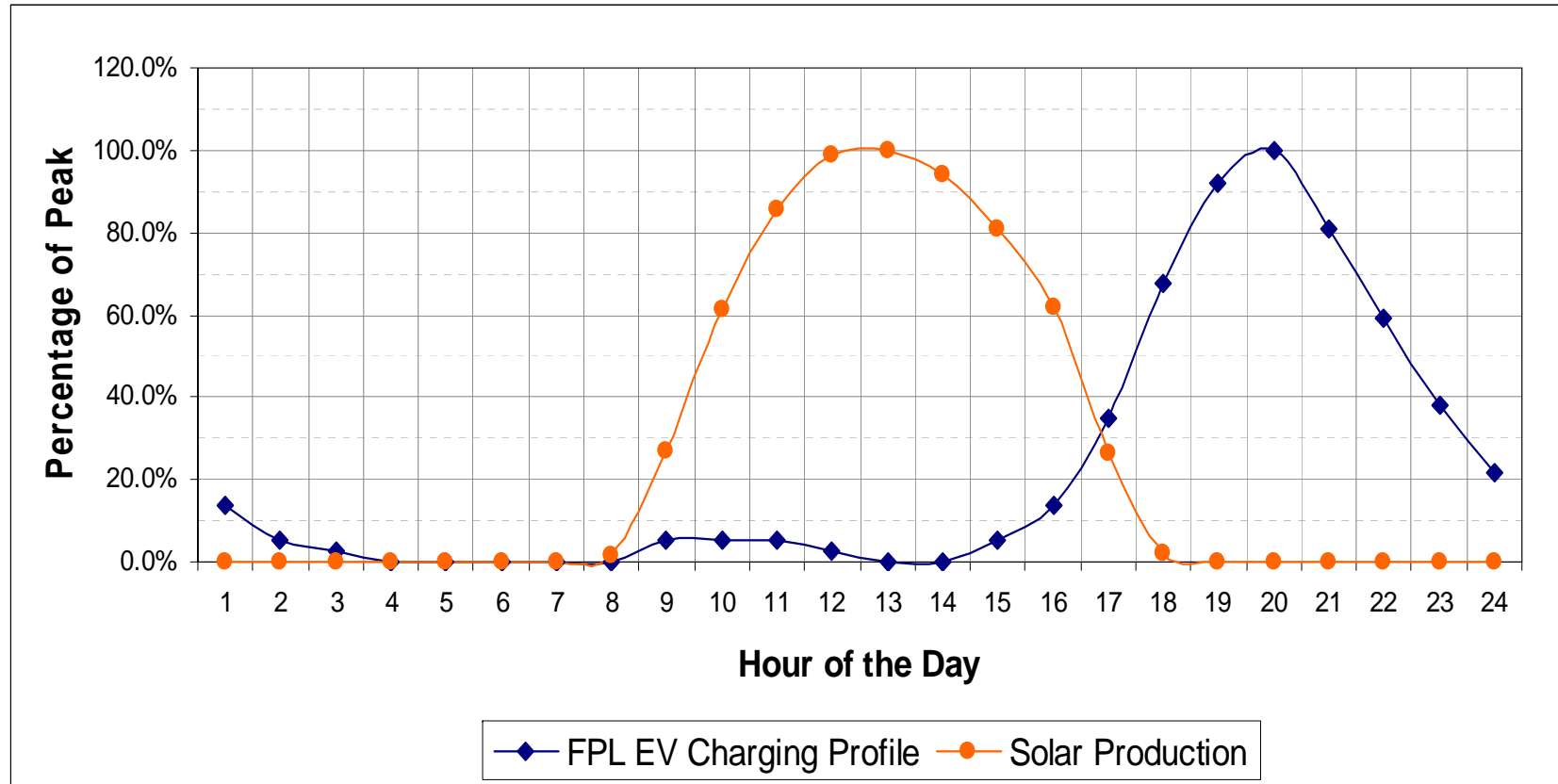
PV Requirements for Charging Stations

Charger Type	220W Panels	Area (Sq Ft.)
1.2 kW	4-6	89
3.3 kW	10-15	213
6.6 kW	20-30	444
10.2 kW	47	835
19.2 kW	88	1563
25 kW	114	2025
50 kW	151-228	3375

- Data based on FPL and OUC responses to FPSC data request



Solar PV Production Cycle



Information We Still Need

- Cost data on energy storage
- Additional data on distribution risks, especially related to “quick-charge” stations
- What size transformers are most common in residential neighborhoods?



Moving Forward

- FPSC Website will have a page for EV Workshop Materials
- Please submit post-workshop comments by September 27th. Send Comments to:
Benjamin.Crawford@psc.state.fl.us
- Draft report tentatively scheduled for consideration by Commissioners at Internal Affairs meeting on November 28th
- Report due to Governor and Legislature by December 31st

