SACE Comments to the Florida Public Service Commission: Solar Energy in Florida
June 23, 2015

Introduction

The Southern Alliance for Clean Energy (SACE) thanks the Florida Public Service Commission (PSC) for this opportunity to provide input on demand-side and supply-side policies and programs to enhance development of solar technologies in the state of Florida. SACE supports well designed programs that encourage meaningful supply-side and-demand side solar energy development in the Sunshine State. The state has a tremendous opportunity to take advantage of clean energy provided by the sun; the Sunshine State is ranked 3rd in the country for solar rooftop potential, and has the best solar resource east of the Mississippi.[1]

However, today that potential remains largely untapped. In 2014, Florida ranked 20th nationally for new solar installations, with just 22 megawatts (MW) added; the 239 MW of solar energy currently installed in Florida ranks the state 14th in the country in total solar capacity.[2] With recent announcements by Gulf Power, Florida Power & Light, and JEA to add 383 MW by 2018, Florida's solar capacity will more than double, but it will still lag far behind other Southeastern states like North Carolina and Georgia, both of which are on track to achieve more than a Gigawatt (1,000 MW) of installations in the same time period.

Florida's solar potential is constrained because its monopoly investor-owned utilities are neither vulnerable to significant market competition, nor subject to any significant Commission oversight with respect to their procurement process. Thus, the Commission's Request for Comments appropriately raises the question of how customer demand for solar energy can be fulfilled, and how the decisions that utilities make with respect to investing in solar energy supplies can be more transparent and subject to more effective oversight. Revising the utility planning progress to incorporate best practices for integrated resource planning and provide opportunities for stakeholder input is crucial to allow solar to compete on a "level playing field."

The Commission also asks whether it has authority to implement the recommended policies, which we interpret to indicate that the Commission intends to evaluate and report on policy suggestions, regardless of whether the Commission currently has adequate authority to implement each policy suggestion. Accordingly, SACE includes policies that are both within and outside the jurisdiction of the Commission in order to provide a comprehensive accounting of policies that can increase solar energy development in Florida.

1. **What policies or programs would be most effective at promoting demand-side solar energy systems?**

With declining solar costs and expanded financing options, the demand side solar market has been growing rapidly nationally. Residential solar costs have dropped 45% since 2010 and now over 600,000 homes and businesses have customer-sited solar power; nearly 200,000 installations were completed in 2014 alone.[3] In Florida, the Floridians for Solar Choice petition has garnered approximately 100,000 signatures to amend the Florida constitution to remove the barrier to third-party solar sales. There is clearly customer desire for solar as a choice in powering homes and businesses. Yet Florida trails other states when it comes to demand-side solar. Of Florida's 9 million electricity customers, a mere 6,600 are net metering solar customers.[4] By comparison, New Jersey has 5 times the rooftop solar systems with half the population of the Sunshine State and a weaker solar resource.[5]

Accordingly, SACE recommends the following demand-side renewable energy policies to support and grow the rooftop solar market in Florida: 1) uphold and strengthen the current net metering policy; 2) exempt renewable energy devices from the tangible personal property tax; 3) eliminate the prohibition of third-party sales for customer-sited solar photovoltaic (PV) systems; 4) implement shared renewable solar energy projects; 5) continue and expand support for customer adoption of solar thermal technologies; 6) interconnection reform; and 7) support for aggregated net metering.

a) **Can the policies or programs be implemented under current Florida statutes?**
b) **Can the policies or programs be implemented under current FPSC rules? If not, what changes or additions to the rules would be needed?**

Maintain and strengthen current net metering policy

Net metering is the cornerstone of the state's renewable energy policy for demand-side solar. It allows residential and commercial customers who generate their own electricity from solar power to feed electricity they do not use back into the grid. Typically, a majority of the power is used onsite and not sent back to the grid. For an investor-owned utility customer, any additional power sent from the solar system to the grid is credited to their bill on a 1:1 kWh basis. After a 12-month period any excess kWh accrued are paid to the customer at a utility's wholesale rate.[6]

Given net metering's importance in driving development of demand-side renewables, it must be supported and strengthened. SACE supports the comments submitted to the Commission by the Interstate Renewable Energy Council (IREC) on net metering policy with emphasis on IREC's recommendation that net metered customers continue to be "allowed access [to solar power at] non-discriminatory rates that do not penalize their decision to install on-site distributed energy."

The foundation for Florida's net metering rule is found in Section 366.91(5), Fla. Stat. for public utilities. It requires all investor-owned utilities to develop a standardized interconnection agreement and net metering program for customer-owned renewable generation. It granted rulemaking

authority to the Commission, which promulgated Rule 25-6.065, F.A.C. The statute also requires municipal and cooperative utilities to develop standardized agreements, although these are not subject to Commission rulemaking. Therefore, the policy is well within Florida law and Commission rules to uphold and strengthen net metering.

Exempt solar energy systems from the tangible personal property tax

SACE supports the removal of onerous taxes on solar energy systems. The tangible personal property tax (TPP) is in essence a business tax on non-real estate property[7]. The TPP has been identified as a tax that significantly impacts the economics of solar development in Florida. Due to constitutional constraints that reserve the right to municipalities to assess and collect taxes at the property's fair market value[8], a constitutional amendment may be the best way to provide a long-term and reliable remedy to the impacts of the tax on solar development statewide. This policy is outside the jurisdiction of the Commission.

Eliminate the prohibition on third-party solar sales in Florida

In the 3rd party power purchase agreement (PPA) model, a solar provider installs a solar PV system on a customer's property, generally at no cost. The solar energy system offsets the customer's electric utility bill, and the developer sells the power generated to the customer at a fixed rate. At the end of the PPA contract term, property owners can extend the contract or potentially buy the solar energy system from the solar provider. In Florida, the prohibition of 3rd party PPAs is evidenced through the definition of a public utility and case law interpreting the definition. "Public utility" means every person, corporation, partnership, association, or other legal entity and their lessees, trustees, or receivers *supplying electricity* or gas (natural, manufactured, or similar gaseous substance) *to or for the public* within this state…. (emphasis added) §366.02, Fla. Stat.

In a seminal 3rd party sales case, *PW Ventures, Inc. v. Nichols*, PW Ventures signed a letter of intent with Pratt and Whitney (Pratt) to provide electric and thermal power at Pratt's industrial complex in Palm Beach County. 533 So.2d 281 (Fla. 1988) PW Ventures proposed to construct, own, and operate a cogeneration project on land leased from Pratt and to sell its output to Pratt under a long-term contract. Before proceeding with construction of the facility that would provide the power, PW Ventures sought a declaratory statement from the Florida Public Service Commission that it would not be a public utility subject to PSC regulation. After a hearing, the PSC ruled that PW Ventures' proposed transaction with Pratt fell within its regulatory jurisdiction. The Supreme Court upheld the Commission's determination finding that the sale of power to even one person constituted a sale "to and for the public."

The Commission could revisit the issue of third party PPA's, but given past Commission precedent, a legislative or a constitutional remedy may be more appropriate. This financing option would help expand the solar option to a greater number of Florida's families and businesses and provide more choice and control over a customer's energy future.

SACE adopts IREC's recommendations on continuing and expanding support for customer adoption of solar thermal technologies; interconnection reform; and supporting aggregated net metering. Moreover, SACE fully supports and adopts IREC's comments on advancing shared renewable energy projects based on the principles below:

- *Shared renewable energy programs should expand renewable energy access to a broader group of energy consumers, including those who cannot install renewable energy on their own properties.*
- *Participants in a shared renewable energy program should receive tangible economic benefits on their utility bills.*
- *Shared renewable energy programs should be flexible enough to account for energy consumers' preferences.*
- *And finally, shared renewable energy programs should be additive to and supportive of existing renewable energy programs.*

Under FEECA, the state's energy efficiency statute enacted in 1980, the Commission has a legal responsibility to promote programs and policies, such as those recommended above, which reduce energy consumption on the customer side of the meter. Its stated intent is to utilize the "most efficient and cost-effective demand-side renewable energy systems and conservation systems in order to protect the health, prosperity, and general welfare of the state and its citizens."[9] It further states that "reduction in, and control of, the growth rates of electric consumption and of weather-sensitive peak demand are of particular importance." Lastly, the statute was amended in 2008 to require the Commission to "adopt goals and approve plans related to the promotion of demand-side renewable energy systems and the conservation of electric energy."[10]

c) What are the impacts of the policies or programs on system reliability?

Given the very low rate of solar penetration in Florida, the impacts, if any, of demand-side solar systems on reliability would be so low as to be non-measurable for the foreseeable future. Today, solar customers represent just 0.07% of all Florida electric customers, and their solar systems account for 0.1% of Florida's power capacity.[11] States with much larger rooftop solar capacity maintain safe and reliable grids while also developing more advanced systems and regulations to accommodate even greater levels of distributed generation. Florida should be seeking ways to enable the development of a 21st century grid system.

A look at other states reveals how unnecessarily cautious Florida is with regards to net metering in the Sunshine State. At the end of 2013, Florida's installed solar net metering capacity was about 60 MW, or 0.1% of Florida's total net summer capacity, compared to New Jersey which had over 860 MW of net metering capacity, accounting for about 4.5% of the state's summer peak capacity. Net metering solar capacity in Florida would have to increase nearly 900% to reach even 1% of the state's peak demand.[12] And yet New Jersey continues to expand distributed generation development through programs such as the Energy Resilience Bank to support distributed energy resources at "critical" facilities.[13]

One utility case study demonstrated that it is practical to obtain about 9% of a utility's electricity from solar without significant costs or compromises in reliability. According to the report, *Integrating Solar PV in Utility System Operations* from Argonne National Labs, the National Renewable Energy Labs, and Lawrence Berkeley National Laboratory, the cost of maintaining short-term system load balancing performance could cost less than $0.002 per kilowatt-hour of solar generation.[14] Furthermore, demand-side solar systems can provide ancillary services including, but not limited to, frequency regulation, frequency response, spinning and non-spinning reserves, voltage and reactive power support if engineered to achieve these goals.

d) What are the impacts of the policies or programs on system fuel diversity?

All of the proposed demand-side policies would have the same impact on system fuel diversity: solar energy would make Florida's current energy mix more diverse and would reduce the use of other fuels. Florida generates over 60% of its electricity from the use of natural gas,[15] which carries a number of risks, in particular the historical and continued volatility of natural gas prices. Based on utility system dispatch models commissioned by SACE or reviewed by SACE, solar will primarily displace generation at combined cycle natural gas plants.

According to co-author of the March 2015 Report, *The Natural Gas Gamble,* senior energy analyst at the Union of Concerned Scientists Jeff Deyette, "Florida has entered the danger zone of relying too much on natural gas. There's a well-documented history of volatility in natural gas prices, including major spikes. In 2012, an increase in the domestic supply of natural gas, combined with the recession and a warm winter, resulted in low natural gas prices around the country. In contrast, we saw prices spike 7-fold in 2005 due to hurricane activity in the Gulf of Mexico. And last winter, when it was bitterly cold in much of the U.S., prices in some regions jumped 10- to 12-times higher than recent lows. These market trends could continue, and consumers in Florida and elsewhere that rely heavily on natural gas will end up paying the price."[16]

Expanding solar power in Florida will help the state reduce dependence on natural gas. Because the fuel for solar is free, it acts as a hedge against future fossil fuel price volatility – insulating Florida's families and businesses from price shocks while providing clean power.

e) Identify the cost-effectiveness of the policies or programs compared to traditional forms of generation.

There are numerous studies commissioned by public utility commissions as well as private and not-for-profit organizations which have analyzed the costs and benefits of distributed generation, and in many cases net metering more specifically. The resulting reports vary greatly in results, due to the various specific state and utility circumstances and the assumptions and methodologies used in developing the analyses. The highly contentious debates that arise from making these determinations are based on both technical grid-related costs and benefits, as well as whether to include externalities such as economic, social, and environmental benefits.

An analysis of 16 PV cost-benefit studies conducted across the country between 2005 and 2013 by the Rocky Mountain Institute found a significant range of estimated value across studies, driven

primarily by differences in local context, input assumptions, and methodological approaches. However, the majority of studies showed a net benefit from distributed PV.[17] Of particular relevance to the Florida situation, a 2013 study analyzed the costs and benefits of both wholesale and distributed solar generation in North Carolina and found that based on the midpoints of the ranges of estimated costs and benefits, the benefits of rooftop solar are 30% greater than the costs.[18] As observed in the study, solar DG reduces the demand for electricity (and therefore for the gas used to produce the marginal kWh of power). These reductions have the broad benefit of lowering prices across the gas and electric markets, to the benefit of all ratepayers. This benefit is also known as the "demand reduction induced price effect" (DRIPE).

In addition, solar power generated by consumers produces other savings that benefit all ratepayers by reducing the need for utilities to invest in expanded infrastructure, and by reducing energy losses along transmission and distribution lines. A 2009 report by the California Solar Initiative estimated that 1 to 1.6 GW per year of solar power generated by consumers would supply the equivalent capacity of adding a new 500kV transmission line, estimated to cost nearly $1.8 billion in capital costs.[19] Demand-side solar systems could be particularly beneficial for heavily congested areas where adding new infrastructure is impractical.

f) Identify specific costs associated with the policies or programs and who will bear these costs.

For demand-side solar systems, the costs of purchase and installation are borne by the solar customer either as an upfront cost, or in the case of a third party PPA, by payments made to the solar provider. Under the 3-tiered system established under PSC Interconnection and Net Metering Rule 25-6.065, no application fees are charged for systems up to 10 kilowatt (kW), and no interconnection fees are charged for systems up to 100 kW. Application review, interconnection for systems larger than 100 kW, installation of bi-directional meters, and ongoing bill administration costs are borne by the utility and subsequently passed through to the body of ratepayers.

Two recent studies by the Center for American Progress[20] looked at which segments of the population are installing rooftop solar systems in six of the country's largest markets[21] – Arizona, California, New Jersey, Maryland, Massachusetts, and New York – and found that in all the states but Maryland, the vast majority of rooftop solar systems were being purchased by households with annual incomes between $40,000-90,000. Every one of these states has a higher median income than Florida, suggesting that this range would be even lower in Florida.[22] By most definitions,[23] this is the American middle class. And, in fact, research conducted for the 2013 National Solar Jobs Census[24] found that by far the greatest reason middle-class Americans are choosing solar is to save money and control their energy costs.

g) Identify how the policies or programs will be fair, just, and reasonable across the general body of ratepayers.

First, it is important to note that the impacts of the proposed demand-side policies on the general body of ratepayers are likely to be small and potentially insignificant. Consider, for example,

what would be an unprecedented outcome in the Southeast of achieving 10% of system capacity being installed by customers as solar energy. As illustrated below for a hypothetical 1,000 MW utility system, the reduction in revenues to the utility under this highly aggressive scenario would be only 3.3%. This 3.3% reduction in revenues does not consider the benefits to the system of avoided fuel costs, avoided capacity costs, and other benefits. Claims about cost-shifting driven by customers installing rooftop solar systems are simply overblown and unjustified.

	Without Demand-Side Solar	With Demand-Side Solar
System Capacity	1,000 MW	900-1,000 MW
Demand-Side Solar Capacity	0 MW	100 MW
System Generation	5,250 GWh	5,075 GWh
Demand-Side Solar Generation	0 GWh	175 GWh
Utility Revenue Reduction		3.3%

To the extent that the Commission may wish to quantify the extent to which demand-side solar systems impact the general body of ratepayers, it must consider specific characteristics of each utility's load shape, system characteristics, and forecast future demand. Associated savings include energy production (especially peaking), environmental compliance, transmission, distribution, generation capacity, fixed and variable operations and maintenance costs, and fuel hedging. Possible costs are related to upgrade needs for transmission lines, substations, and the distribution system. If a utility does experience lost revenues, then during the rate case there is a reallocation of those costs to other customers. However, even under a very high scenario of customer penetration, any net impact on utility revenues is likely to be less than 1 percent, which is fundamentally de minimus and thus reasonable.

The programs and policies we recommend above are about giving customers the freedom to make choices about what they do on their own property, with their own financial resources. The Commission should adopt a presumption that such programs and policies are fair and just. To determine that allowing customers to make choices about what they do on their own property, with their own financial resources, is unfair or represents an injustice, the Commission must find a significant violation of ratemaking principles. While customer cross-subsidization is always to be minimized, some degree of cross-subsidization is in fact a well-established condition enshrined in rates that have been approved by the Commission, and by any utility regulator, for many years.

For example, in its study of how demand-side solar affected rates, the California Public Utilities Commission (PUC) found that prior to installing solar systems, all net metering customers typically paid 133% of the full cost of service (the residential segment had paid 154%).[25] This extremely high cost-of-service cross-subsidization may not be the case in Florida. However, it illustrates that the impact of customer installation can easily be to reduce cross-subsidization, not increase it. That solar systems are likely to reduce cross-subsidization is not particularly surprising. Those customers who have the strongest financial motivation to install a solar system or invest in energy efficient technology are those with the highest bills – those who are most likely to be paying more than their

fair share. The California PUC study found that even after installing their solar systems, net metering customers were not zeroing out their bills, but were in fact still paying 103% of their full cost of service.

The power used onsite by a solar customer, which displaces power that might normally be provided by the utility and thereby reduces demand, is much the same as the reduction in demand that occurs when a customer installs more efficient appliances or lighting to make the home more energy efficient.

- One analysis has shown that LED lighting may shift costs even more than distributed solar, particularly if large commercial customers are included.[26]
- Adopting the practice of turning off lights and appliances that are not in use will result in a shift in costs to other customers.
- Customers that demand more power during peak hours when the most expensive power is generated are being directly subsidized by those who consume most of their power during non-peak pricing periods.
- Customers who live closer to the power plant are subsidizing customers who live further away from the power plant – as those homes require more utility infrastructure to be connected to the grid.
- Florida's so-called snow-birds, who only reside in Florida during the winter, are being subsidized by year-round residents who must pay for the extra capacity to provide power to those residents during the winter months.
- A large industrial customer locating in a utility service territory may advance the need for new generation, resulting in rate increases for all customers sooner than would otherwise have occurred.

There are many choices customers can make that are fair, just and reasonable, but also happen to affect other customers. Accordingly, we would recommend that the Commission evaluate programs or policies in a comparative framework, considering issues of cross-subsidization in a manner consistent with the degree of scrutiny that it may have applied to other circumstances in the past. The Commission should not reject policies and programs on the basis that they might possibly result in a minimal increase in cost-shifting between some customers.

2. What policies or programs would be most effective at promoting supply-side solar energy systems?

Utility-scale solar has the potential to quickly achieve high penetrations of this clean, renewable energy source on Florida's electric grid; however, Florida has no clear and transparent process for the procurement of supply-side solar:

- Effectively, there is no standard offer contract available for small solar projects.
- Solar initiatives by Florida's investor-owned utilities have generally been selected by the utility without any competitive or public process.
- Solar has been historically disregarded in utility integrated resource planning.

- Commission rules do not provide a pathway for Florida's large utilities to identify and select cost-effective solar resources.

Leaving solar energy supply decisions entirely to the discretion of Florida's large utilities is contrary to the intent of Florida utility law.[27] Solar energy benefits Florida by diversifying its resource mix to include a resource that presents no long-term cost risk, providing an important hedge against the likelihood that natural gas fuel prices will increase over time. Furthermore, solar arrays require no water for generation and produce no emissions subject to regulatory abatement. Finally, as the recent Gulf Power military solar projects illustrate, solar energy also offers increased energy security because it is locally generated; the U.S. Department of Defense has set a goal of using renewable energy to generate 25% of all energy consumed by 2025.

The cost of utility-scale solar power is competitive with – often below – the cost to build and operate natural gas power plants. Several major utilities have executed utility-scale solar PPAs in the past few years at prices at or below the utilities' avoided costs.

- Duke Energy Renewables entered into a 20-year PPA with three academic and medical institutions in Washington, DC for a 52 MW solar project located near Elizabeth City, NC. The price has not been disclosed, but it is represented to be "below what they are paying for brown power."[28]
- Tennessee Valley Authority entered into a 20-year contract with NextEra Energy for an 80 megawatt solar facility in northern Alabama for a reported $61/MWh.[29]
- Gulf Power Company entered into 25-year contracts with HelioSage, LLC for three solar facilities with a total capacity of 120 MW in northwest Florida at military bases, as mentioned above. The prices have not been disclosed, but "are projected to produce savings between $2.8 and $17.4 million."[30]
- Georgia Power Company entered into five 30-year contracts, one 25-year contract, and four 20-year contracts for solar facilities with a total capacity of 515 MW. The prices have not been disclosed, but "the ASI winning bids were procured at an average cost of less than 6.5 cents per kilowatt-hour."[31]

These projects may not represent the best available market price: LBNL recently identified four large projects with levelized PPA prices of $41-51 per MWh, including projects in Arizona, New Mexico, and Texas as well as the Alabama project mentioned above.[32] More qualitatively, Xcel Energy determined that its 170 MW solar portfolio in Colorado would cost less than buying power from natural gas plants; and Rocky Mountain Power signed deals for 80 MW of solar for less than gas.[33] Many of these same solar developers are eager to expand the Florida market beyond Southern Company's service territory, and believe that utility-scale systems could now be built for close to avoided cost if the utilities were willing to enter into long term (ideally 20 years or greater) contract terms necessary to secure project financing.

Yet utility-scale solar development has been stalled in peninsular Florida. There have been some recent announcements, but those that represent firm commitments still fall far short of the state's potential. The National Renewable Energy Laboratory (NREL) estimates the technical potential for

urban utility-scale solar development in Florida at 40 gigawatts (GW); for rural utility-scale that total is 2,813 GW.[34] The 239 MW of solar currently installed in Florida ranks the state 14th overall for cumulative solar PV installations, and represents 0.4% of total installed generating capacity.

Florida utilities have announced projects that would more than double installed solar capacity. In addition to the Gulf Power projects discussed above, FPL's Ten-Year Site Plan (TYSP) indicates that the utility will build three 74.5 MW solar facilities. Neither Gulf nor FPL have provided for a competitive solicitation process, although in Gulf Power's case the participation of its military customers in project development does provide a justification for the lack of opportunity for competing projects.

There is a significant and growing opportunity to expand solar development in Florida and bring the state to the forefront of this industry where it belongs, and the Florida Public Service Commission has an important responsibility to facilitate this process in the interest of the state's ratepayers. Therefore, SACE recommends the Commission adopt the following policies: 1) Establish a solar-specific standard offer contract, including a contract avoided cost rate, for solar QFs with capacities up to 5 MW in size; 2) Establish a demonstration program for small utility-scale solar projects; 3) Require FPL to provide for competitive solicitation of its 223 MW in identified solar PV capacity need; 4) Require utilities to study solar as a supply-side resource in the resource planning process; and 5) Conduct a rulemaking to establish a process for selecting cost-effective solar resource projects, including RFPs.

a) Can the policies or programs be implemented under current Florida statutes?
b) Can the policies or programs be implemented under current FPSC rules? If not, what changes or additions to the rules would be needed?

Establish a solar-specific standard offer contract, including a contract avoided cost rate, for solar QFs with capacities up to 5 MW in size.

Unlike many other states, Florida rules and utility practice effectively exclude small solar projects from realizing the benefits of the standard offer contract available to other small power generators under the federal Public Utility Regulatory Policies Act (PURPA). PURPA was enacted in 1978 with a goal of encouraging increased energy independence in the United States[35] by requiring states to establish the prices retail utilities must pay to third-party renewable energy developers, known as qualifying facilities (QF) – thus giving small renewable energy developers a market for their power. Under PURPA, two types of facilities are eligible for QF status: small power production and cogeneration facilities.[36] A small power production facility is a generating facility with capacity of 80 MW or less whose primary energy source is renewable energy, such as hydroelectric, wind, solar, biomass, waste or geothermal resources.[37]

While the Federal Energy Regulatory Commission (FERC) determines QF status, state utility commissions, such as the Florida PSC, have jurisdiction over the terms of QF contracts, including how utilities calculate the avoided cost rate at which QFs are paid for purchased power. In Florida, the avoided cost of energy is each utility's actual hourly avoided energy costs, based on the utility's

incremental fuel, operating and maintenance costs, as well as line losses.[38] Although the utilities provide forecasts of avoided costs on an informational basis, the QFs have no assurance of any minimum rate for utility purchases of power.

For solar developers who choose to obtain status as a QF, Commission rules offer three legal options for sale of power to utilities:

- The simplest and most comprehensive option is the standard offer contract, which is available to renewable generating facilities and small QFs with a design capacity of 100 kW or less.[39] The Florida utilities file continuous standard offer contracts that are approved annually by the Commission. If the QF can defer or avoid the construction of future power plants, it is entitled to a capacity payment in addition to the payment for energy.
- Second, for facilities with capacities greater than 100 kW, a QF may sell energy on an as-available basis without any payment for capacity and without a contract under each utility's Schedule COG-1.
- Third, any facility (regardless of whether it has obtained QF status from FERC) may negotiate a contract with the utility. For QFs with a design capacity greater than 100 kW, the standard offer contracts may form the basis for negotiated PPAs.[40]

In practice in Florida, solar QFs are ineligible for any capacity payment due to the minimum performance standards for the delivery of firm capacity, which the Commission has determined "shall approximate the anticipated peak and off-peak availability and capacity factor of the utility's avoided unit over the term of the contract."[41] For example, Duke Energy Florida requires that the "Capacity of the Facility shall be the minimum average hourly net output in kW" measured over a 24 hour period.[42] The effect of the QF rules and standard offer contracts approved by the Commission is to provide no capacity value to utility-scale solar projects.

Because there is no capacity payment available to solar QFs, there is no financial advantage to a QF that signs a standard offer contract since the payment terms are identical to the as-available energy rate available under schedule COG-1. Thus, for all practical purposes, solar developers are excluded from any meaningful benefit provided by the standard offer contracts. However, this is not the national norm. In a report by Carolyn Elefant, a review of several states' PURPA policies found that outside the Southeast, standard contracts "either do not include minimum capacity availability requirements, or at least do not reduce capacity payments to zero where a QF fails to meet the capacity availability requirements."[43] Ideally, the energy and capacity value of solar would be consistent with findings in a utility integrated resource planning (IRP) analysis.

Even if solar developers had meaningful access to the solar contracts, developers tell us that there is greater interest for projects larger than Florida's 100 kW limit. In fact, it is not unusual for business customers to install, either through a developer or with their own financing, systems larger than 100 kW. However, these business customers may not wish to enter into expensive negotiations with the utility, and will desire a streamlined process such as a meaningful standard offer contract may provide. Accordingly, we recommend Florida consider a larger maximum system size, such as 5 MW, which is similar to those in many other states.

The third option available to a QF, negotiated contracts, is available under Commission rules *at the utility's option*.[44] Rather than being restricted to as-available energy rates and a restrictive capacity payment schedule that assigns no capacity value to solar, the utility may substitute a negotiated, fixed annual rate for the term of the contract. In contrast to the detailed rules and utility contract terms governing the standard offer contracts, the standard of review for negotiated contracts is very general, effectively amounting to whether the utility can make a reasonable demonstration that the contract is expected to be cost-effective.[45]

These negotiated contracts are entirely at the utility's discretion. In fact, there is no legal basis for any party to challenge a utility's decision to refuse a contract, even if it is at the same time negotiating another similar contract at a higher price. Facilities up to 75 MW that do not choose to obtain QF status and negotiate on the basis of a standard offer contract do not have access to a RFP, competitive bidding, or any other process established under Commission rules.

The process for approving a negotiated contract is illustrated by Gulf Power's three recent 25-year solar PPA contracts. In approving these contracts, the Commission agreed with the utility's determination that the contract was expected to be cost-effective. The utility analysis showed that the fixed annual contract energy rates were expected to be less than the utility's energy budget. The Commission Staff Memorandum noted that:

> … the [fixed annual contract energy] rate, in c/kWh, will not change as Gulf Power's avoided energy costs change. This allocates the risk of fuel price fluctuations, which impact avoided energy costs, to Gulf Power's ratepayers.
>
> Although there is a risk that fuel costs may be lower than those forecasted by Gulf Power which would reduce the benefits of the Agreements, other variables not considered in Gulf Power's economic evaluation could increase the benefits. Specifically, staff believes an economic evaluation that considered the potential benefits associated with renewable attributes and potential carbon dioxide (CO2) regulations would increase the benefits of the Agreements.[46]

Even though the Gulf Power PPAs did not include consideration of capacity value in the analysis, Commission rules do allow capacity-related cost avoidance to be considered in the cost-effectiveness determination.[47]

In addition to standard offer contracts, schedule COG-1 rates, and negotiated contracts, Florida law also allows utilities to propose self-build projects up to 75 MW in size without a requirement for certification.[48] For self-build projects, the utility may seek cost recovery in the next base rate case proceeding.[49]

In order to promote supply-side solar development in Florida, the Commission could revise its rules governing QF and other contracts for projects under 75 MW in size. Based on FERC rulings that it is legal for state utility commissions to establish resource-specific avoided cost rates, SACE proposes the following specific changes that have precedent in other states and are thus likely to be authorized under PURPA:

- Establish a solar specific tariff and standard offer contract;
- Set a threshold of 5 MW for standard offer contract eligibility; and
- Provide a fixed annual contract rate (either levelized or escalating) covering both capacity and energy. The rate should be based on a term of 20 years, based on the utility's forecast of avoided energy costs and an appropriate valuation of capacity value over that term.

These policy changes would require a rule-making proceeding.

Establish a demonstration program for small utility-scale solar projects

As discussed above, solar development in Florida has lagged well behind national and regional trends in spite of the state having among the highest annual capacity factors in the Southeast. One reason for this is the lack of market development for small utility-scale projects. While projects in the 5 to 20 MW range may not have the economies of scale offered by larger projects, they are practical to implement swiftly, provide utilities with the opportunity to obtain data on the operating characteristics of such systems, and help grow in-state economic development by establishing a solar development industry.[50]

Florida law provides the Commission with general authority to "establish guidelines relating to the purchase of power or energy by public utilities from … small power producers." In setting the rate, the "full avoided costs" may include avoided capacity costs based on a "statewide avoided unit," and may utilize levelization of these rates. §366.051, Fla. Stat.[51] While "small power producer" is not defined in statute, the Federal Energy Regulatory Commission's Standard Interconnection Agreements and Procedures for Small Generators (Order 792) applies to small generators no larger than 20 MW, providing a useful limitation.

Under this general statutory authority, we would suggest that the Commission establish a demonstration program in which each utility is authorized to issue a competitive solicitation for solar power projects between 5 and 20 MW in size. (We suggest that projects smaller than 5 MW would utilize the standard offer contract discussed above.) The Commission should establish the avoided capacity cost based on a statewide avoided unit[52] utilized for this purpose only. For example, the Commission could determine that a 300 MW natural gas combined cycle unit would best represent the statewide avoided unit, and base the value and capacity cap on that unit. In this example, the Commission would allocate the 300 MW (approximately 0.5% of statewide capacity) proportionately based on utility system load.

Each utility would issue its own competitive solicitation for projects between 5 and 20 MW, potentially at a fixed term of 20 years, with a maximum price based on a levelized forecast of full avoided costs over the term of the contract, utilizing the Commission's avoided capacity cost and the utility's other avoided costs.

Require FPL to provide for competitive solicitation of its 223 MW in identified solar PV capacity need

In its 2015 TYSP, FPL identified a need for approximately 223 MW in solar PV capacity, to be installed at three locations in increments of 74.5 MW. The project sizes are the maximum allowed under Florida law without triggering the requirement for site certification or a need determination by the Commission. In order to self-build or contract for power from a conventional power plant or a solar facility over 75 MW, the utility must obtain certification from the Governor and cabinet sitting as the siting board.

> "Electrical power plant" means, for the purpose of certification, any steam or solar electrical generating facility using any process or fuel, including nuclear materials, except that this term does not include any steam or solar electrical generating facility of less than 75 megawatts in capacity unless the applicant for such a facility elects to apply for certification under this act... §403.503, Fla. Stat.

However, current utility practice and Commission rules do not mandate any oversight over this substantial capacity investment. Notably, in its 2015 TYSP, FPL's only justification for selecting these three particular projects is its assertion of several "cost advantages" such as ownership of land and proximity to FPL generating facilities. FPL also asserts that "only the most cost-advantaged sites for utility-scale PV are projected to be cost-effective on FPL's system at this time." FPL considers these systems to have a firm summer capacity of approximately 116 MW. (p. 52)

FPL projects that these projects will have a cost of $1,835 per kW, or a total of $409 million. In a recent research project, we were advised by several major solar development firms on cost and financial terms for development of similarly-sized projects in another southeastern state. Based on their advice, we used a national project analysis model to determine a total construction cost of approximately $1,690 per kW-AC, about 8% less than FPL's estimate for its "cost-advantaged" site. In an analysis of what cost and terms would support "$50/MWh" solar PPAs currently being signed, LBNL estimated such systems would cost about $1,550 per kW-AC,[53] a figure supported by GTM Research and SEIA, with 2014 system costs estimated to be as low as $1,600 per kW-AC, noting that "Low pricing reflects strong competition in new markets with low labor pricing, such as those in the Southeast U.S."[54] This 8-15% cost difference would represent a savings of $32-64 million.

As discussed below, Florida rules do not currently provide for any specific competitive solicitation process for projects less than 75 MW in size. Even if several projects are proposed collectively and on identical terms with other projects such that the total solar investment provides firm capacity in excess of 75 MW, Florida rules provide no specific guidance to ensure that the projects are the most "cost-advantaged" possible. Nonetheless, the Commission's jurisdiction does provide it with the authority to regulate and supervise each public utility with respect to its rates and service. §366.04, Fla. Stat. We recommend that the Commission direct FPL to conduct a competitive solicitation for the 223 MW of identified solar projects to determine if the market can supply the solar capacity, with similar project performance standards, at a lower price to customers.

FPL has, of course, correctly noted the advantage of building this project in time to obtain federal tax credit benefits. The Commission should certainly weigh this consideration in determining how it responds to our recommendation. Nonetheless, the FPL 223 MW solar investment decision is a clear illustration of how solar energy supply decisions are currently left entirely to the discretion of Florida's large utilities without any pre-construction exposure to market competition or Commission regulatory oversight.

Require utilities to study solar as a supply-side resource in the resource planning process

To establish effective market competition and Commission regulatory oversight of solar energy supply decisions, the Commission needs to reform resource planning rules. Florida's current planning requirements include four steps: the Ten-Year Site Plan (TYSP); Request for Proposal (RFP) process; Need Determination; and Site Certification. As discussed above, solar power projects under 75 MW are effectively exempt from these steps, except for a requirement to revise the TYSP to include those projects (but there is no clear deadline for such revisions as discussed below).

Utility resource plans are required to be described in an annual TYSP, which has extensive information and data requirements. The TYSP is submitted to the Florida PSC annually by electric generation utilities with a generating capacity greater than 250 MW.[55] The Commission reviews the plans within nine months following submission and reports its findings, along with any comments or recommendations, to the Florida Department of Environmental Protection and the utilities filing a plan. The Commission also creates a statewide TYSP from the provided information.

The Commission makes a preliminary study of each plan and classifies it as "suitable" or "unsuitable." It should be noted that "suitability" has not been defined in statute or rule, but unsuitability may be remedied by the utility providing additional data.[56] The Commission may suggest alternatives to the plan. It is recognized that 10-year site plans submitted by an electric utility are *tentative information* for planning purposes only and may be *amended at any time* at the *discretion of the utility*.[57]

For any planned generating unit over 75 MW, the utility initiates regulatory oversight when the unit is identified as the utility's next planned generating unit in a TYSP revision. Until that point, any discussion of a planned generating unit is merely informational and does not appear to have any regulatory significance. Identification of the next planned generating unit is important for a number of reasons, including the practice of basing the avoided capacity rate in standard offer contracts on the next unit (and not, for example, on the opportunity to defer subsequent units or change the type of the next unit). Even more important is that Commission rules identify this unit as the benchmark for the alternative scenario analysis.

The only requirement for a Florida utility to consider alternatives to the next planned generating unit is the Commission's rule requiring a RFP process for projects over 75 MW. According to that rule, "The use of a Request for Proposals (RFP) process is an appropriate means to ensure that a public utility's selection of a proposed generation addition is the most cost-effective alternative

available."[58] The Commission's rules do not provide for any public review of the alternative scenario analysis.

However, by benchmarking alternatives against the "price and non-price attributes of its next planned generating unit," the RFP rule effectively excludes any requirement for the utility to consider alternative configurations of technology that might be more cost-effective in the long-term. FPL's RFP for 1,052 MW (March 16, 2015) provides a good example of how alternative resources are disadvantaged by such a benchmark process. Under the terms of the RFP, any proposed resources are compared to FPL's Next Planned Generating Unit, the Okeechobee Clean Energy Center, a 1,622 MW combined cycle natural gas plant.[59]

According to the RFP, the "firm capacity and energy proposed" must be "fully dispatchable under the operational control of FPL" which would operationally exclude solar PV resources from providing even a portion of the energy, not to mention any firm summer capacity.[60] In short, the RFP process is not capable of evaluating any alternative that is not a one-for-one replacement of the company's next planned generating unit and thus does not ensure that the selected resource is the most cost-effective means to meet the utility's identified resource needs.

Of course, Florida's utilities do undertake a more comprehensive analysis of resource needs beyond that in the RFP, utilizing what is *presumed* to be a thorough integrated resource plan (IRP) analysis including consideration of resource alternatives through a computer model optimization process. However, this process is not available to the public for review during either the TYSP or the RFP process. It is only when the results of the RFP process are made known,[61] and a request for a need determination is made, that the utility's assumptions and methods for considering alternatives can be evaluated by interested parties and the Commission.

This review is ill-timed. By the time that a utility files a request for a need determination, the utility has likely waited until what it views as the last possible moment for building the power plant. At this point, the utility has constrained its options due to schedule and potentially missed opportunities. While significant changes can and have been made, they are typically substitutions of like resources, such as the recent Duke Energy Florida substitution of a purchase of an existing combined cycle gas plant for construction of a new combined cycle gas plant.

The final step in the process, certification by the siting board, may revisit issues from earlier steps in the process but generally does not raise new issues of special relevance to the questions considered in the Commission's present "Solar Energy in Florida – Request for Comments."

Together these policies form a less than coordinated state planning process. The assumptions used in the utility resource planning process are only revealed through intervention and discovery in a need determination (or FEECA) proceeding. Moreover, the Ten Year Site Plan process does not provide opportunities for stakeholder input of the type found in other Southeastern states' integrated resource planning (IRP) processes. The benefit of an IRP is that it allows for meaningful stakeholder involvement and the consideration of alternate planning scenarios, which tends to place all resources on a "level playing field." Hence, Florida customers may be shouldering unnecessary costs from a less than optimal resource planning process, and the policies and programs

recommended here would help to ensure that utilities are pursuing the most effective, least-cost options for electricity generation.

In order to promote the development of supply-side solar systems, the Commission could initiate a rulemaking to revise the Ten-Year Site Plan process to incorporate best practices for integrated resource planning.[62] Of particular interest would be the opportunity to ensure that the characterization of the cost and performance of solar resources is reasonable and unbiased, that the study methods are also themselves free of unreasonable bias, and that the Company leverages the resource planning process to properly evaluate a variety of market-supplied and self-build resource alternatives. To effectuate such reforms, the Commission could revise its rules to require a periodic review of the utility's entire IRP (such as every two years) or could require a utility to submit its IRP for review at least two years in advance of an anticipated certification proceeding.

Establish a process for selecting cost-effective solar resource projects, including RFPs

Even if a Florida utility determines that solar resources are the most cost-effective available, it is not clear under what Commission rules a utility would request a determination of need. As discussed above, for any solar facility 75 MW or greater, §403.503, Fla. Stat. requires a determination of need by the Commission. However, Commission rules only prescribe the content of petitions for "Fossil, Integrated Gasification Combined Cycle, or Nuclear Fuel Electric Plants."[63]

SACE recommends that the Commission initiate a rulemaking proceeding to revise Chapter 25-22 to incorporate a process for a need determination for renewable energy resources, particularly solar, taking into consideration differing performance characteristics. For example, a utility may reasonably wish to seek a determination of need for a large solar (or other renewable resource) facility solely on the basis that the capital investment will result in a more cost-effective method of supplying electricity to its customers, even in the absence of a need for capacity. The investment may help to defer fuel, operating and maintenance costs, or free up energy for resale to other utilities during peak periods, resulting in an overall cost savings.

We also recommend that the Commission identify best practices, such as long-term contracts, similar to the Gulf Power solar PPAs discussed above, that ensure the competitive solicitation process results in the most cost-effective outcome. For example, in order to meet a need (or cost-effective opportunity) for solar power in excess of 75 MW, a utility might choose a reverse auction mechanism to, as SEIA describes it, "ensure that developers are paid a price that is sufficient to bring projects online, but also provide ratepayer protection against "overpayment."[64]

Furthermore, we would recommend that the Commission make this RFP process available, and encourage its use, for all utility-scale solar projects. Economies of scale for utility-scale projects are often achieved at 20 MW, and few projects are constructed over 100 MW in scale (particularly in a landscape with as much land use variety and constraint as Florida). Thus, the 75 MW threshold for a need determination is an unwieldy threshold for triggering the opportunity to utilize a RFP process or obtain clear approval from the Commission for the costs and prudence of a substantial generation facility.

c) What are the impacts of the policies or programs on system reliability?

See answer for Question 1. Utility-scale projects, in particular, provide a more certain on-peak capacity resource. Across the Southeast, utility-scale solar facilities provide 40-70% of their nameplate capacity during the hours in which power is most needed. FPL, for example, estimates that its 223 MW of new solar capacity will have a firm summer capacity rating of 52%.[65] In fact, SACE analysis demonstrates that as system load approaches the utility's peak demand, solar energy resources tend to have higher output and less variability than during hours in which load is not as close to peak demand.

Some commentators have raised concerns about winter peak demand. FPL estimates that its planned 223 MW of solar capacity will have zero firm winter capacity value. However, even if winter peaks do occur, from a regional perspective Florida utilities have a more ample reserve margin cushion in the winter than in the summer. Hence, the potential need for solar capacity is greatest in the summer, when of course its output is greatest.[66]

Furthermore, utility-scale PV plants provide a variety of ancillary services associated with traditional fossil sources including frequency regulation, dynamic voltage and power factor regulation, and ramp rate controls. Thus, when included as part of a balanced energy portfolio, utility-scale PV contributes to the peak resource demands, stability and reliability of the grid.

d) What are the impacts of the policies or programs on system fuel diversity?

See answer for Question 1.

e) Identify the cost-effectiveness of the policies or programs compared to traditional forms of generation.

The policies proposed put solar on a level playing field with other resources, allowing solar to compete in the Florida market on the basis of a straight-up resource evaluation.

In addition, solar technologies typically do not require pipelines, coal transport, or the associated production and processing infrastructure needed by the coal and gas industries. Installing supply-side solar has the potential to save immense costs for ratepayers as the energy infrastructure in the U.S. ages and requires repairs.

f) Identify specific costs associated with the policies or programs and who will bear these costs.

To extent that utilities use levelized contracts (which are typical in the Southeast) or rate base, utility-scale solar development can result in current customers paying somewhat more and future customers paying somewhat less on their electricity bills. With a levelized contract or rate basing of costs, the revenue requirement is constant through the length of the contract or escalates annually at pre-determined rate. For many of the specific contracts cited above, the initial revenue requirement

may exceed avoided costs, but as avoided cost rates increase the solar facility places downward pressure on customer rates.

Florida has ample experience with the timing of such costs and benefits. For example, nuclear power plants, such as Crystal River and Turkey Point, currently require pre-construction revenues from customers, and once operational, may take a decade or more before they are projected to result in annual cost savings. In contrast, a key benefit of solar projects procured through PPAs is that customers only pay for energy that is actually produced – unlike nuclear power plants where customers are bear the burden of costs for facilities that underperform or that are never brought online, such as the $1 billion spent on the Levy plants that now will never be built.

g) Identify how the policies or programs will be fair, just, and reasonable across the general body of ratepayers.

Both the costs and benefits of supply-side solar accrue equally across the general body of ratepayers. Utility-scale solar systems function like any large power plant to produce energy for the grid, and as such the energy would be indistinguishable from energy supplied by other forms of generation. Because of the many benefits provided by solar that will ultimately reduce customer costs – including costs associated with infrastructure development, line losses, fuel price increases, compliance costs, etc. – it is crucial that Florida begin to tap this vast resource on behalf of all the state's citizens.

3. Are there any other policies or programs that could promote the development and deployment of solar energy systems in Florida?

We recommend three additional topics for Commission consideration. First, time of use rates would help promote the development and deployment of solar energy systems in Florida. This would be of benefit if applied to customers who choose to self-supply with solar energy, as well as if applied to all customers.

The benefits of a time of use rate for solar customers who self-supply can be significant. By establishing a rate structure that allocates energy costs to the hours in which the costs are incurred, solar customers are encouraged to optimize the size and orientation of their systems to an appropriately designed rate structure.

As solar is developed to scale on a utility's system, the hours in which the utility needs to dispatch its fossil units will shift. To the extent that its customers are familiar with time of use rates and responding to the economic incentives provided by those rates, then the utility can easily revise those price signals to correspond to its new generation structure.

However, given that customers are not as familiar with these rate structures, some consideration as to the proper method for introducing these rates should be given. The Commission should also consider the extent to which the costs of implementing time of use rates or other rate structures

intended to better align customer payments with utility costs are cost effective. For example, FPL's customer meters are not compatible with time-of-use rates.

Second, utilities could analyze their systems regarding the impact of solar systems on line losses and other electric system performance characteristics. Optimal siting of distributed generation systems within distribution networks can reduce line losses at above-average rates (and conversely, suboptimal siting can increase line losses.).[67] Economic incentives such as rate differentials or other public guidance could help ensure that customer-sited solar generation is complementary rather than occasionally troublesome to the utility grid operator.

Third, the Commission should initiate additional investigation into the advances in battery and other storage technologies, as cost trends suggest that these technologies may play a substantial role in utility system resources within the next decade.

Attachment 1: Endnotes

[1] Lopez, et al, *US Renewable Energy Technical Potentials*, NREL, July 2012, at http://www.nrel.gov/docs/fy12osti/51946.pdf

[2] Solar Energy Industries Association, *Florida Solar*, at http://www.seia.org/state-solar-policy/florida

[3] Solar Energy Industries Association, Solar Market Insight Reports, 2014 Q4

[4] Florida Public Service Commission, *Reporting requirement for Interconnection and Net Metering of Customer-Owned Renewable Energy Generation,* at: http://www.floridapsc.com/utilities/electricgas/customerrenewable/2013/2013%20Net%20Metering%20Summary%20Spreadsheet/2013%20Net%20Metering%20Chart.pdf

[5] National Renewable Energy Laboratory, Status of Net Metering: Assessing the Potential to Reach Program Caps, September 2014, at: http://www.nrel.gov/docs/fy14osti/61858.pdf

[6] R. 25-6.065, F.A.C

[7] Section 192.001(11)(d), F.S. ("Tangible personal property" means all goods, chattels, and other articles of value… capable of manual possession and whose chief value is intrinsic to the article itself. 'Construction work in progress' consists of those items of tangible personal property commonly known as fixtures, machinery, and equipment when in the process of being installed in new or expanded improvements to real property and whose value is materially enhanced upon connection or use with a preexisting, taxable, operational system or facility. Construction work in progress shall be deemed substantially completed when connected with the preexisting, taxable, operational system or facility…."

[8] Fla. Const., Article VII, Section 4.

[9] §366.82, Fla. Stat.

[10] Id.

[11]Florida Public Service Commission, *Reporting requirement for Interconnection and Net Metering of Customer-Owned Renewable Energy Generation*, at: http://www.floridapsc.com/utilities/electricgas/customerrenewable/2013/2013%20Net%20Metering%20Summary%20Spreadsheet/2013%20Net%20Metering%20Chart.pdf; Energy Information Administration, State Profiles, at http://www.eia.gov/electricity/state/Florida/

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[15] US Energy Information Administration, *Florida State Profile and Energy Estimates*, at: http://www.eia.gov/state/?sid=FL

[16] Union of Concerned Scientists Press Release, March 10, 2015, at: http://www.ucsusa.org/news/press_release/florida-residents-businesses-vulnerable-to-electricity-price-spikes-0476#.VYmvlhNVikp

[17] Rocky Mountain Institute, *A Review of Solar PV Benefit and Cost Studies*, 2013, at: http://www.rmi.org/knowledge-center/library/2013-13_elabdercostvalue

[18] Crossborder Energy, *The Benefits and Costs of Solar Generation for Ratepayers in North Carolina*, October 18, 2013, at: http://c.ymcdn.com/sites/www.energync.org/resource/resmgr/Resources_Page/NCSEA_benefitssolargen.pdf

[19] Itron, *California Public Utilities Commission, 2009 Impact Evaluation*, June 2010, at: http://www.cpuc.ca.gov/NR/rdonlyres/70B3F447-ADF5-48D3-8DF0-5DCE0E9DD09E/0/2009_CSI_Impact_Report.pdf
[20] See Center for American Progress, *Solar Power to the People: The Rise of Rooftop Solar Among the Middle Class*, at: https://cdn.americanprogress.org/wp-content/uploads/2013/10/RooftopSolar-4.pdf
[21] The three largest markets in the country are CA, NJ, and AZ: Solar Energy Industries Association, *Solar Market Insight Report 2014*, at http://www.seia.org/research-resources/solar-market-insight-report-2014-q1
[22] United States Census, *State Median Income*, at http://www.census.gov/hhes/www/income/data/statemedian/.
[23] Philip Bump, Who is the Middle Class? Washington Post, January 22, 2015, at http://www.washingtonpost.com/blogs/the-fix/wp/2015/01/22/what-is-the-middle-class-it-depends-whos-using-the-term-and-why/.
[24] Solar Foundation. National Solar Jobs Census 2013. February 2014.
[25] Wellinghoff, Tong, *A Common Confusion Over Net Metering is Undermining Utilities and the Grid*, Utility Dive, January 22, 2015, at: http://www.utilitydive.com/news/wellinghoff-and-tong-a-common-confusion-over-net-metering-is-undermining-u/355388/
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[27] §366.91, Fla. Stat.
[28] Jennifer Runyon, "Huge North Carolina Solar Project Could 'Move the Needle' for Solar's Possibilities," *Renewable Energy World* (July 10, 2014). (http://www.renewableenergyworld.com/rea/news/article/2014/07/huge-north-carolina-solar-project-could-move-the-needle-for-solars-possibilities)
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[31] Georgia Power Co., *Application for the Certification of the 2015 and 2016 Advanced Solar Initiative Prime Power Purchase Agreements and Request for Approval of the 2015 Advanced Solar Initiative Power Purchase Agreements*, Georgia Public Service Commission Docket No. 38877 (Oct.10, 2014).
[32] Mark Bolinger et al., *Is $50/MWh Solar for Real? Falling Project Prices and Rising Capacity Factors Drive Utility-Scale PV Toward Economic Competitiveness*, LBNL-183129 (May 2015).
[33] Steve Lacey, *Georgia is the Latest State to Procure Dirt Cheap Solar Power*, Greentech Media, October 15, 2014, at http://www.greentechmedia.com/articles/read/how-cheaply-can-georgia-power-buy-solar-for-6.5-cents
[34] Lopez, et al, *US Renewable Energy Technical Potentials*, NREL, July 2012, at http://www.nrel.gov/docs/fy12osti/51946.pdf
[35] 16 U.S.C. § 824a-3(d). In keeping with PURPA requirements, § Section 366.051, Fla. Stat. states that a utility must purchase power from small power producers at the utilities' "full avoided cost." (Avoided cost is defined in PURPA as "the cost to the electric utility of the electric energy which, but for the purchase from such cogenerator or small power producer, such utility would generate or purchase from another source).
[36] 16 U.S.C. § 824a-3(a).
[37] 16 U.S.C. § 796(17)(A).
[38] R. 25-17.0825(2), F.A.C.
[39] R. 25-17.250(1), F.A.C.

[40] R. 25-17.0825(1)(b), FAC (Those qualifying facilities wishing to negotiate a contract for the sale of firm capacity and energy with terms different from those in a utility's standard offer contract may do so pursuant to subsection 25-17.0832(2), F.A.C. Where parties cannot agree on the terms and conditions of a negotiated contract, either party may apply to the Commission for relief pursuant to Rule 25-17.0834, F.A.C.). Additionally, R. 25-17.0825(6), F.A.C., requires consideration of cost effectiveness and any adverse impacts to electric service that may be caused by a purchased power agreement.
[41] R. 25-17.0832(4)(e), F.A.C.
[42] Duke Energy Florida, Standard Offer Contract for the Purchase of Firm Capacity and Energy from a Renewable Energy Producer or Qualifying Facility Less than 100 kW.
[43] Carolyn Elefant, *Reviving PURPA's Purpose: The Limits of Existing State Avoided Cost Rulemaking Methodologies in Supporting Alternative Energy Development and a Proposed Path for Reform* (2011).
[44] For QFs between 75 MW and 80 MW, the availability of negotiated contracts is unclear due to the need determination and RFP requirements established in the Florida Power Plant Siting Act.
[45] R. 25-17.0832, F.A.C. and R. 25-17.240, F.A.C.
[46] Florida Public Service Commission, Staff Recommendation, *Petition for approval of energy purchase agreements between Gulf Power Company and Gulf Coast Solar Center I, LLC, Gulf Coast Solar Center II, LLC, and Gulf Coast Solar Center III, LLC*,Docket No. 150035-EI, p. 5, April 2, 2015.
[47] R. 25-17.0832, F.A.C. and R. 25-17.240, F.A.C.
[48] FPL has proposed 3 utility scale solar projects at 74.5 MW each to be in service by the end of 2016. (FPL Ten Year Site Plan, April 2015, p. 80).
[49] §366.06, Fla, Stat.
[50] For example, FPL's 5 MW-DC "C&I Solar Partnership Pilot Program" is intended to "examine the effect of high DG PV penetration on FPL's distribution system and to determine how best to address any problems that may be identified." (FPL 2015 TYSP, p. 82)
[51] Note that this authority is broader than the more specific authority for standard offer contracts. §366.91(3)-(4), Fla. Stat.
[52] Potentially differentiating between FRCC and SERC utilities if determined to be appropriate.
[53] Mark Bolinger et al., *Is $50/MWh Solar for Real? Falling Project Prices and Rising Capacity Factors Drive Utility-Scale PV Toward Economic Competitiveness*, LBNL-183129 (May 2015).
[54] GTM Research and Solar Energy Industries Association (SEIA), *U.S. Solar Market Insight* (2015).
[55] R. 25-22.071, F.A.C. Pursuant to Rule 25-22.071(1), F.A.C., only generating electric utilities with an existing capacity above 250 megawatts (MW) or a planned unit with a capacity of 75 MW or greater are required to file with the Commission a Ten-Year Site Plan, at least once every two years. In 2014, 11 utilities met these requirements and filed a Ten-Year Site Plan, including 4 investor-owned utilities, 6 municipal utilities, and 1 rural electric cooperative. The investor-owned utilities, in order of size, are Florida Power & Light Company (FPL), Duke Energy Florida, Inc. (DEF), Tampa Electric Company (TECO), and Gulf Power Company (GPC). The municipal utilities, in alphabetical order, are Florida Municipal Power Agency (FMPA), Gainesville Regional Utilities (GRU), JEA (formerly Jacksonville Electric Authority), Lakeland Electric 8 (LAK), Orlando Utilities Commission (OUC), and City of Tallahassee Utilities (TAL). The sole rural electric cooperative filing a 2014 Plan is Seminole Electric Cooperative (SEC). Collectively, these utilities are referred to as the Ten-Year Site Plan Utilities (TYSP Utilities).
[56] Id.
[57] § 186.801(2), Fla. Stat.
[58] R. 25-22.082, F.A.C.
[59] Florida Power & Light Company, *2015 Request for Proposals to Meet Generation Capacity Needs Beginning in 2019*, p. 40.
[60] Id., p. 5.

[61] A utility's IRP analysis may also be obtained during the goal-setting proceeding under the Florida Energy Efficiency and Conservation Act (FEECA), which occurs every five years. However, utility-scale solar generation is not within the scope of that proceeding.
[62] Rachel Wilson and Bruce Biewald, *Best Practices in Electric Utility Integrated Resource Planning: Examples of State Regulations and Recent Utility Plans*, Regulatory Assistance Project (June 2013).
[63] R. 25-22.081, F.A.C.
[64] Solar Energy Industries Association website. For example, California Public Utilities Commission's Renewable Auction Mechanism.
[65] FPL Ten Year Site Plan, April 2015, p. 80.
[66] In 2014, the Florida Reliability Coordinating Council (FRCC) measured the reserve margin (without load management and interruptible power) as 20% in the summer and 35% in the winter. FRCC, *2014 Regional Load & Resource Plan* (July 2014).
[67] Nazari, M. H. and Ilic, M., *Potential for Efficiency Improvement of Future Electric Energy Systems with Distributed Generation Units*, IEEE PES General Meeting (July 2010); and *Enhancing Efficiency and Robustness of Modern Distribution Systems* (presentation dated June 2010).