BEFORE THE PUBLIC SERVICE COMMISSION

STATE OF GEORGIA

In Re:	:	
Georgia Power Company's Application for Approval of its 2013 Integrated Resource Plan And Application for Decertification of Plant Branch Units 3 and 4, Plant McManus Units 1 and 2, Plant Kraft Units 1-4, Plant Yates Units 1-5, Plant Boulevard Units 2 and 3, and Plant Bowen Unit 6	: : : : : :	DOCKET NO. 36498

DIRECT TESTIMONY OF

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Presented on behalf of
The Georgia Solar Energy Industries Association

MAY 10, 2013

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I. INTRODUCTION

Q. State your name, business name and address.

A. My name is Karl R. Rábago. I am the principal of Rábago Energy LLC, a Texas limited liability corporation, located at 9512 Vera Cruz, Austin, Texas. I am appearing here as an expert witness on behalf of the Georgia Solar Energy Industries Association ("GSEIA").

Q. Summarize your experience and expertise in the fields of electric utility regulation and renewable energy.

A. I have worked for more than 20 years in the electricity industry and its related fields. My work experience is set forth in detail on my resume, attached as Exhibit KRR-1. My previous government experience includes service as a Commissioner with the Texas Public Utility Commission and Deputy Assistant Secretary with the U.S. Department of Energy. In private industry, I served as Vice President of Austin Energy, and I was a Director of AES Corporation, among others. I also served as Chairman of the Board of Directors of the Center for Resource Solutions ("CRS").

Q. What is CRS?

A. CRS is a not-for-profit California corporation that offers certification services to green pricing and green power products throughout the U.S., under the certification mark "Green-e®."

Q. Does Georgia Power Company ("Georgia Power" or "the Company") have a green energy program certified by CRS?

A. Yes. The Company's Green Power Program is certified under the Green-e Energy program. Georgia Power pays a fee to CRS for use of the Green-e® certification mark. I have no direct involvement with the certification of programs under the Green-e® Energy program, and I have no involvement with matters directly relating to the Company's certification. Consistent with the conflict of interest policy adopted by the CRS Board, I have notified my fellow board members of my participation in this proceeding as an expert witness.

Q. What is your role in this proceeding?

A. I am testifying on behalf of GSEIA to review the Company's Integrated Resource Plan as it relates to solar energy. In my testimony, I offer my conclusions and recommendations regarding incorporation of distributed solar energy resources in its plan.

Q. State the purpose of your testimony.

A. In my testimony, I address the deficiencies in the Company's IRP related to renewable energy, distributed solar in particular. I identify the major analytical weaknesses underlying the Plan – that the Company fails to recognize the value of distributed solar and that the value of solar is not reasonably reflected in the prices paid for solar energy.

I also propose that the Company improve and increase market opportunities for distributed solar technology in its service territory through adoption of improved resource valuation methodologies in the Company's IRP and other processes, as appropriate.

Q. How do you define distributed solar?

A. For purposes of my testimony, distributed solar means solar photovoltaic systems producing electrical energy that are imbedded within the distribution system.

Q. What materials did you review in preparing this testimony?

A. Through GSEIA counsel and after execution of a non-disclosure agreement, I reviewed relevant portions of the Company's filings in this proceeding, along with laws and other materials referenced in those documents. I also reviewed a wide range of studies, reports, and articles which are listed on Exhibit KRR-2.

Q. What are the key points in your testimony?

A. My testimony makes the following key points:

1. The goal of integrated resource planning is ultimately the procurement of the most cost-effective and economically efficient portfolio of resources to meet the demand for electricity services. In order to properly compare alternative resources, each resource must be valued correctly. Under-valuation of resources, like over-valuation, results in suboptimal resource procurement across the portfolio.

2. Valuation techniques for distributed solar energy resources have significantly improved over time and with decades of deployment experience, allowing utilities, regulators, and policy makers to make better-informed decisions about how much distributed solar maximizes benefits to the utility and ratepayers. Though the price paid by utilities to purchase solar generated electricity has dropped dramatically over the past ten (10) years -- a

trend that is expected to continue -- this is only part of the equation. The "value" of distributed solar to the Company and ratepayer is now well documented.

3. Numerous published solar valuation studies confirm that distributed solar resources offer cumulative energy, capacity, and ancillary services valued in the range of $163/MWh, or $0.16/kWh. These studies show that in addition to the energy-related value, distributed solar offers financial and security benefits of about $82/MWh, environmental services benefits of about $167/MWh, and economic developments of an additional $57/MWh.

4. Based on research available on the value of solar ("VOS"), the Company should be directed (in the short term) to implement programs to procure additional solar resources in its generation portfolio. The market price and experience indicates that the cost of solar in Georgia to the Company is already below the value the Company receives from solar deployment. Between the implementation of the Company's Advanced Solar Initiative ("ASI") and the expansion that I recommend, the Company can identify and benefit from the true resource potential for distributed solar by purchasing electricity from distributed solar resources at a price well below its solar value.

THE IMPORTANCE OF PROPER RESOURCE VALUATION IN THE IRP.

Q. Is it important to properly value generation resources in the Company's integrated resource plan?

A. Yes. O.C.G.A. §§ 46-3A-1 and 46-3A-2 require that the Company's IRP adequately demonstrate the economic, environmental, and other benefits to the state and to customers of the utility associated with all generation supply and demand-side resources suitable for meeting the demand for electricity. These statutory requirements envision an objective and comprehensive comparison of resources with a view to maximizing the cost-effectiveness and economic efficiency of the utility's resource portfolio. The law properly casts a wide net to be used in assessing benefits (and costs) of each resource in order to facilitate meaningful comparison among resource options.

Q. What is the benefit of comprehensive value analysis?

A. Full and updated evaluation of resource value improves the chance that a forward-looking resource plan will strike the economically efficient balance in crafting a robust and least-cost resource portfolio. If a generation resource is under-valued by the IRP, it will be under-selected and under-utilized in the plan by the Company. If the plan under-values a resource with greater value and lower cost, there is an unnecessary upward pressure on rates because the next best resource with lower value and/or greater cost will be selected. Likewise if the plan over-values a resource with lower value and higher cost, there is also unnecessary upward pressure on rates. Updating value calculations of generation resources on a frequent basis enables regulators and the Company to capture changes in technology, performance, costs, and risks. This is especially important in rapidly evolving market segments.

Q. How do utilities typically assess the value of distributed solar resources?

A. Distributed solar resources have historically not fared well in traditional utility ratemaking systems which often have a financial bias toward large, capital-intensive projects owned by the utility. These projects, if successful, tend to maximize profits at the expense of the lowest cost for customers. Traditionally utilized preferences tend to assign higher value to dispatchable generation options with low capacity cost, while undervaluing several increasingly valuable and important components, such as: fuel price volatility, regulatory (especially environmental) risk, water supply and price risk, transmission infrastructure requirements, and other risks. Traditional avoided cost methodologies, designed to set energy payments based on current costs, can reduce the value of low- or zero-risk resources and long run marginal cost and risk reductions.

Q. Does this traditional process properly address renewable resources?

A. No. This traditional process has not addressed renewable resources properly. Renewable energy resources such as solar and wind power have zero fuel costs and concomitantly high capacity costs. Essentially, the capacity cost "pre-pays" for a lifetime of fuel. The Company's avoided cost methodologies, to the extent they can be discerned in the current absence of transparent information on calculation methodology and quantification, do not work well with this kind of resource.

Q. Can you elaborate further?

A. Yes. For example, the Company asserts zero capacity value for solar energy in its solar avoided cost calculation. Yet, it derives an energy value in the absence of fuel or short-run marginal costs for solar energy. The Company also continues to assign zero value to the greenhouse gas benefits of solar energy as well as the reduced risk of environmental regulation that solar energy provides – very real economic risks – even in the absence of current control costs. Traditional avoided cost calculations tend to ignore all manner of risk, including fuel price and environmental regulation risks. However, the Company's position on this latter issue is somewhat confused, as it appears to argue for the reduced emissions benefits of nuclear and wind power in its discussions about portfolio diversity.

Q. How has distributed solar valuation evolved?

A. As the U.S. Department of Energy reported to Congress in 2007,

> "Calculating [distributed generation] benefits is complicated, and ultimately requires a complete dataset of site-specific operational characteristics and circumstances. This renders the possibility of utilizing a single, comprehensive analysis tool, model, or methodology to estimate national or regional benefits of [distributed generation] highly improbable. However, methodologies exist for accurately evaluating "local" costs and benefits (such as [distributed generation] to support a distribution feeder). It is also possible to develop comprehensive methods for aggregating local [distributed generation] costs and benefits for substations, local utility service areas, states,

regional transmission organizations, and the Nation as a whole."[1]

Over the past decades, a number of local studies have been conducted to calculate the benefits of distributed solar. Today, VOS analysis rests on a solid foundation of data that, if applied, can significantly improve the Company's resource planning process and the economic efficiency of its proposed resource portfolio through increased reliance on distributed solar energy.

VOS ANALYSIS

Q. What is VOS analysis?

A. Value of Solar (VOS) analysis identifies and characterizes the value attributes of solar energy generation. Numerous VOS studies published over the past decade share a common general approach and fairly common general structure. A representative list of these studies is included in Exhibit KRR-2. While results vary depending on methodologies, local energy markets and other factors, research consistently demonstrates that distributed solar energy has value that significantly exceeds the Company's and utility ratepayers' cost. That value should be, but is not reflected in comparative resource valuation approaches

[1]U.S. DOE, "The Potential Benefits of Distributed Generation and the Rate-Related Issues That May Impede Its Expansion: Report Pursuant to Section 1817 of the Energy Policy Act of 2005," June 2007.

such as the Company's IRP.

Q. What are the basic elements of distributed VOS analysis?

A. VOS analysis is a full avoided cost approach with a long term valuation perspective that involves two steps: benefits and costs are identified and grouped, then the benefits are quantified. These steps are essentially the same as traditional ratemaking functions inherent in cost of service analysis. But, the focus is on the net benefits, or value, that distributed resources bring to grid operations.

Q. Is the calculation of VOS market driven?

A. Yes. Solar valuation studies are, at heart, avoided cost calculations that embrace a full range of costs avoided by distributed solar generation, including savings over the life of the solar generation system. Solar valuation studies offer improved market pricing signals over traditional avoided cost calculations which ignore long-term risk, especially fuel price and environmental regulatory risk. My own experience with Austin Energy's VOS methodology is that the calculated value of solar better reflects market conditions and the value of solar investments than base rates and short-term avoided cost calculations.

Q. Are you aware that the Company has previously calculated a "solar avoided cost"?

A. Yes. I have reviewed materials from Docket No. 16573 as well as the Company's most recently filed projection of solar avoided costs. I cannot find a publicly available document that describes how the solar avoided cost is calculated. It does not appear that the Company's approach for a solar avoided cost captures much more than the short-term avoided energy cost for generation with an added component related to solar energy's favorable coincidence factor. Therefore, I cannot make a meaningful comparison between the two.

Q. What are the benefits and costs studied in VOS analysis?

A. The benefits and costs are those that accrue to the utility and its ratepayers as a result of the satisfaction of the demand for electricity services from a distributed solar facility in lieu of the Company's use of its current and planned system resources to meet that demand. The value of solar to the Company, as a renewable distributed generation resource, must be calculated in a very different manner from the historical capital intensive projects that I referenced earlier in my testimony.

The costs and benefits to the Company and ratepayers associated with distributed solar energy generation systems include:

1. Energy: The basic electrical energy created by the distributed solar system, plus a credit for line-loss savings that accrue because distributed solar displaces generation from remote, central station plants.

2. Capacity: Also referred to as "demand." Capacity values capture the avoided capital investments in generation, transmission and distribution that flow from distributed solar generation units.

3. Grid Support (Interconnected Operations Services): Often referred to as "ancillary services." These benefits include affirmative provision of services and avoidance of costs related to a range of services inherent in maintaining a reliable, functioning grid network. Grid support or ancillary services include, at both the transmission and distribution level, reactive supply and voltage control, regulation and frequency response, energy and generator imbalance, scheduling, forecasting and system control and dispatch.

4. Customer benefits: Customers accrue a number of benefits from hosting and operating distributed solar systems including reputational, community participation, bill management and stability, and efficiency support benefits. While some of these benefits do not accrue to the utility, some do, like reduced bad debt and collection costs that accompany self-generation.

5. Financial and security: These benefits generally reduce both the cost and risk associated with maintaining reliable electric service for customers, especially in the face of variable regulatory, economic, and grid security conditions. These benefits include utility fuel price volatility control, and costs associated with emergency customer power and outages, as well as more rapid and less costly recovery from outage events.

6. Environment: Distributed solar creates benefits in reducing the supply portfolio costs associated with control of criteria pollutants, greenhouse gas emissions, water use, and land use. Where control regimes exist, these costs may be reflected in the cost of operating polluting resources. Distributed solar valuation goes beyond traditional avoided cost approaches in recognizing that these resources also affirmatively reduce financial risks associated with compliance with future control

regimes.

7. Social: Distributed solar also generates social benefits associated with net job growth benefits compared to "conventional" generation options, increased local tax revenues, reduced occupational safety costs (such as black lung insurance), and others.

Q. How are these benefits and costs quantified?

A. As I noted earlier, VOS analysis is essentially a more detailed and accurate avoided cost analysis. It examines the costs and benefits that are displaced by the operation of the solar generator on the grid, both today and for the life of the distributed solar resource. For greatest accuracy, the ideal integrated resource plan would calculate the avoided costs and benefits for each generation and demand-side resource based on analysis of each factor above. Ideally, this analysis would extend into the system to identify high- and low-value locations within the grid. VOS analysis typically also calculates a present value based on a levelized stream of benefits and costs over the solar system lifetime. VOS is especially indicative of market conditions because it calculates an "indifference price" that distributed solar providers would (in a perfect world) seek and receive for the benefits of their generation systems.

Q. Have any studies quantified the value of solar in the Company's service territory?

A. I am not aware of any value of solar studies in Georgia, though a strong body of research exists on this topic nationally. Among the more prominent researchers, Richard Perez led a team that published a study titled "The Value of Distributed Solar Electric Generation to New Jersey and Pennsylvania."[2] That study modeled the value of a 15% peak load penetration of distributed solar electric generation at seven locations in the region. The model addressed the following values:

- Market Price Reduction
- Environmental Value
- Transmission and Distribution Capacity Value
- Fuel Price Hedge Value
- Generation Capacity Value

The study found that the total value of distributed solar ranged from $0.256 to $0.318 per kWh. A citation and link to the complete study is listed on Exhibit KRR-2 and is offered as an indicator of how a comprehensive distributed

[2] Perez, Norris and Hoff, Nov. 2012, prepared by Clean Power Research.

VOS study can and should be conducted.

Q. What distributed VOS is established in the published literature?

A. A meta-analysis of the published studies on the value of solar reveals substantial value in each of the categories described below.

- Grid services from solar energy, which includes energy, capacity and grid support benefits, are worth about $0.163/kWh
- Financial and security services add another $0.0821/kWh
- Environmental, land, and water services adds another $0.167/kWh
- Social services, including jobs and tax base benefits, adds another $0.057/kWh

In all, solar value analysis studies suggest that distributed solar would be worth about $0.469/kWh.[3] This number is substantially higher than the Company's solar avoided cost or the avoided cost for conventional generation. If environmental, land, water, jobs, and tax benefits are excluded – a more conservative approach – the

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[3] Not all the studies took the same approach to the data they reported. Some analysis and interpretation was required in order to derive an average value for each of the categories.

studies demonstrate that distributed solar offers a value to the Company and its ratepayers of approximately $0.25/kWh.

Q. What uncertainties remain in the VOS methodology?

A. These studies were not based on specific data from the Company's service territory. Given the diversity of the data sets from which the studies are drawn, and relatively high importance of energy costs in the estimation, it is reasonable to conclude that the value delivered by distributed solar in the Company's service territory is comparable to $0.25/kWh, as these studies show.

Q. Do these uncertainties limit the usefulness of the results of the studies?

A. Not significantly for purposes of this IRP and my recommendations. Utility-specific data is always better than general studies. But, enough research is complete to the point that general application is reasonable. Georgia Power would have to be a true outlier for the research data to be irrelevant in Georgia. That is unlikely. I describe the solar valuation approach in greater detail below.

Q. How does VOS relate to the price paid by the Company (or any utility) when it purchases electricity generated by solar from a third party?

A. The calculated value of solar should serve as a benchmark for the price the utility pays for third-party solar energy when that price is derived from the market. As with the theory behind avoided cost calculation, VOS analysis quantifies the value equal to what it would cost either the utility or a third party to provide solar energy to the point where the energy does its work. In practice in the Company, however, there appears to be no value-based analysis that underlies the avoided cost, the solar avoided cost, or the solar payment price set by the Company. This is evident in the way that the Company has had to make adjustments to its avoided cost in order to set any value at which solar providers respond to requests for proposals.

Q. What is the relationship between the calculation of VOS and the analysis of solar resources as a factor in retail rates paid by ratepayer?

A. Because the VOS approach improves on the Company's traditional avoided cost methodology, it indicates a compensation level that can be used to ensure net positive benefits to ratepayers. That is, once the value of solar is fully and accurately known, the Company can be assured that distributed solar enabled at a lower payment will generate excess value for the Company and its ratepayers. At volume, these cumulative excess benefits will certainly exert downward pressure on rates, reflecting the value-to-price differential.

The Company's practice today is not grounded in value analysis. Such practice provides no assurance of value in excess of cost. More likely, the Company's solar payment rates, constrained as they are by traditional avoided cost methodologies, probably systematically under-value distributed solar, and deny customers the benefits of increased reliance of the resource.

Q. How does a distributed solar value of $0.25/kWh fit with the Company's estimates in its IRP?

A. It does not. Again, the Company provides no value analysis for distributed solar in its plan. The plan provides for no new acquisitions of or support for distributed solar. According to the plan, the contracted price at which the Company will purchase electricity from solar resources already planned for construction will be substantially less than $0.25/kWh. This suggests that at the PPA prices paid by the Company, solar energy puts substantial downward pressure on rates over its useful operating life by delivering value substantially in excess of its cost. Had the Company estimated the VOS as part of its plan development, it would have reasonably concluded that more distributed solar development should be included in the plan.

Q. Isn't there sufficient information in the Company's filings to assess the economic feasibility of distributed solar?

A. According to the Company's response to Data Request No. STF-5-8, there is not. There, the Company stated that:

> "The Company has not conducted any economic feasibility studies of small rooftop solar photovoltaic generation, supplemental solar augmented generation projects, and solar water heating. To date, the Company's demonstration projects have focused primarily on assessing technical feasibility."

Q. Does the Company propose any new renewable generation in its IRP?

A. No, it does not. As to solar generation, the Company is currently implementing ASI – a process that will continue for the next two (2) years. After ASI, the Company does not propose to add any solar (or other renewable for that matter) to its generation portfolio.

Despite the economic benefit, the Company's plan apparently proposes to cap renewables at current levels – which are very small. Even after the Company projects it will need new capacity, renewables are ignored even in the Company's most expensive projected cost scenario. The Company is well aware of the continued projected declines in the cost of solar generation and the advances in storage technologies that will occur over the next ten (10) years, and its IRP totally fails to propose action based on the knowledge in its resource planning.

Q. Should additional solar deployment come from the Company or its customers and third parties by means of PPAs?

A. Distributed solar installation by the Company's customers and through third party contracts substantially reduces costs and risks to the utility and its ratepayers. The customer or third party assumes responsibility for financing, maintenance, and insurance requirements. With this kind of solar development, the utility obtains energy generation at or near the point of consumption, maximizing the value of solar to the system.

Q. In summation, what should the Commission and the Company reasonably conclude based on the many published distributed VOS studies?

A. From VOS research, the Commission and the Company can and should reasonably conclude that:

1. Distributed solar systems in the Company’s service territory have value that will exceed the payment required to facilitate wider deployment of solar as a generation resource.

2. Because distributed solar value exceeds the cost to facilitate deployment, increased deployment of distributed solar will put downward pressure on rates.

3. Market solicitations can confirm the cost-effectiveness of distributed solar, that is, the availability of distributed solar at costs that are less than its value and that are less than the planned cost of nuclear or other capacity additions.

4. It is therefore reasonable that the Company should be ordered both to undertake such solicitations and to facilitate the development of all such cost-effective distributed solar identified in the solicitations.

5. As a result of that solicitation and the market data obtained thereby, it is also reasonable for the Commission and the Company to develop a comprehensive

distributed solar valuation based on Georgia Power's Company-specific costs that will result in a suitable, cost-effective VOS.

In sum, distributed solar value analysis enables the Commission and the Company to benchmark the resource value of the distributed solar option and to conclude that the Company should move forward with a market-based approach to advancing the deployment of distributed solar in the Company's service territory.

VOS AND AVOIDED COST

Q. Earlier in your testimony, you discussed avoided cost methodology. Can you distinguish between VOS and the Company's general avoided cost calculations?

A. Yes. The Company's avoided cost analysis differs from VOS analysis in two key ways. First, Georgia Power's avoided cost analysis is not a "full avoided cost" calculation. Second, the Company's traditional avoided cost analysis differs from more far-reaching, forward-looking analyses used to evaluate new resource additions.

A major difference between the two relates to risk. Not all resources bear the same risks. Risk is not well addressed even in full avoided cost methodologies. A resource that depends on long-term availability of fuel at an affordable price is very different from distributed solar, which has no fuel cost, now or in the future. This risk of price volatility is not captured in the Company's avoided cost calculations. Risk, therefore, is either ignored or undervalued in avoided cost methodologies, including Georgia Power's.

Undervaluing fuel volatility risk means that a resource option like distributed solar is seen to avoid less cost than it actually does. This results from adjustments made to traditional ratemaking and cost recovery decades ago. Utilities increased their dependence on generation run on fuels with volatile pricing patterns. They sought pass-through cost recovery mechanisms for fuel costs in fuel cost reconciliation charges or "fuel riders," as they are often called. Generally, regulations approved the addition of fuel costs recovery riders on customer bills, over and above basic rates for electricity.

As a result, utility finances were largely immunized from the deleterious impacts of regulatory lag in fuel cost recovery, but also less sensitive to fuel price volatility than even their customers. The Company's "peaker" approach to avoided cost calculations confirms this – it is a methodology that essentially gives no value to resources that reduce fuel price volatility and instead affirmatively favors resources with low capacity costs, even if the long-run fuel and capacity costs of the resource are extremely variable. By undervaluing distributed solar, the Company therefore procures or supports solar at a sub-optimal level in its generation portfolio, systematically rejecting resources that reduce portfolio exposure to fuel price volatility risk.

A similar undervaluation arises when security risk and vulnerability to disruptions due to natural and man-made events are considered, as well as risks associated with obtaining water at affordable prices. Economic efficiency is maximized by an analysis that quantifies the full future stream of benefits and costs avoided over the full operational life of distributed solar and expressly addresses the volatility associated with all costs over the life of each resource option. There is significant value in a generation resource that has no fuel or water cost over its entire life – a value currently ignored in the Company's planning process.

Q. Are there future costs and/or benefits that should be included in evaluating the value of distributed solar, but which are not finitely quantifiable?

A. Some costs and benefits are not precisely quantifiable. There is a symmetrical analytical risk in valuation. Undervaluing one option is the same as overvaluing the incumbent or reference unit. Both deny ratepayers the benefits of reduced rates. Overvaluing an option might impose costs on ratepayers that could inflate rates. It is appropriate to reach a reasonable level of confidence about a value estimate before using it in resource evaluation decision. But, the field is hardly static. Avoided cost methodologies have improved over the past several decades. There are also some values that, while difficult to quantify, should be reviewed qualitatively as part of the process of resource plan development. For example, while the tax base and job creation benefits of distributed solar market penetration might not yet lend themselves to discrete quantification in a utility resource plan or explicit reflection in utility rates, the relative job creation and other economic development benefits should be expressly reviewed in the resource planning exercise. Such factors often have a strong impact on market and regulatory risk.

Q. Does this Commission have the authority to scrutinize and/or modify the Company's avoided cost methodology?

A. Yes. The Federal Energy Regulatory Commission ("FERC") grants broad and increasing latitude to states to account for all the costs avoided when energy from a qualifying facility (QF) displaces a unit of system energy. FERC's regulations allow consideration of numerous factors in determining avoided costs. I recommend that these factors should be considered the starting point in setting rates for qualifying facilities that are connected to the grid, especially at the distribution level.[4] These factors include:

- Savings from reduced line losses by virtue of purchases from the QF;
- Ability to install smaller increments of capacity with shorter lead times;
- Value of QF capacity and energy on a utility's system;
- Ability to avoid or defer costs due to QF production;
- Ability to dispatch QF output, the expected or

[4] See: "Unlocking DG Value: A PURPA-Based Approach to State Policy Design," Keyes, Fox & Wiedman LLP, for Interstate Renewable Energy Council (May 2013).

demonstrated reliability of the output, and the usefulness of QF production during system emergencies;

- Environmental benefits and renewable attributes of QF power; and
- Duration and enforceability of QF contracts.

Revising the Company's avoided cost methodology to include these components would allow more accurate evaluation of alternatives through development of a more full-featured methodology. As set out above, more accurate valuation contributes to overall economic efficiency.

Q. How would forward-looking resource evaluation further improve the evaluation of alternatives?

A. Avoided cost methodologies are an appropriate means for comparing the cost avoided when a single unit of energy from a QF is introduced into the grid. Distributed solar systems, however, are long-lived, with high availability and low output degradation. This is why integrated resource planning takes a longer view than avoided cost calculation. Levelized cost of energy calculations and production cost modeling exercises are explicitly focused on a resource's capability to meet the demand for energy over the life of the resource. They are not limited to traditional marginal cost calculations such as the Company uses in setting avoided cost rates. The amount paid to stimulate the construction and operation of a new distributed system will likely yield 30 years of continued energy generation and benefit creation. The most common and appropriate way to account for this stream of benefits is to adjust a full avoided cost calculation by iterating it over the entire expected operating life of the system and then calculating a levelized present value of that stream of benefits.

Q. How does a levelized present value of a stream of full avoided costs calculation potentially impact ratepayers?

A. The approach of both conducting a full avoided cost calculation and then adjusting it for the forward looking stream of value puts evaluation of the resource alternative on a level evaluation playing field with other resources and with planned additions to the system. More importantly, it sets a benchmark for the price above which the utility and ratepayers would be adversely impacted, and below which both the utility and its ratepayers would benefit. It sets a fair level for testing for "indifference." It is important to note that unlike utility-owned assets, distributed solar systems owned and operated by customers and third parties create no long term stranded cost risk for the utility. Performance or production payments at or below the full value of distributed solar are calculated to minimize such risk by only paying when energy is generated.

Q. When did the Commission establish the Company's current avoided cost methodology?

A. According to the materials I reviewed, the Company's avoided cost methodology was established in 1994.

Q. Are you proposing a revision to the avoided cost methodology for Georgia?

A. Given the increasing diversity of options for meeting the demand for electricity services, it is my opinion that the Commission should undertake a fundamental reexamination of its avoided cost methodologies as well as the evaluation methods used by the Company in comparing options in its IRP. I base this recommendation on the increasing body of evidence that resources like distributed solar offer real value that is not accounted for in the current avoided cost approach and IRP evaluation process and which were not available in 1994. I further recommend that in order to properly account for rapid changes in technology, market, and policy conditions, such review should occur on a repeating basis every few years. However, I do not think that completion of such a review is possible in the regulatory timeframe of this proceeding.

COMMERCIAL/RESIDENTIAL VOS

Q. Does the VOS have implications for commercial and residential distributed solar deployment?

A. Yes. Most of my testimony to this point addresses the full range of distributed solar systems. However, there are significant implications for application of VOS in a commercial/residential environment. An empirically established VOS would assist the Company in developing a reasonable and forward-looking value based rate.

Q. What is a "value-based" rate?

A. As introduced above, a value-based distributed solar rate uses utility-specific data to calculate the value of solar energy to the utility and to its ratepayers. The approach calculates what a kilowatt-hour of solar energy generated at or near the point of consumption would be worth to the utility. It is a benchmark of the value at which the utility (and its ratepayers) would be economically indifferent to whether the customer generates the energy or whether the utility provides solar or solar-equivalent energy to the customer.

Q. Can the values you describe be used in constructing a distributed solar rate for commercial/residential customers?

A. Yes. Austin Energy used its VOS analysis as the basis for a new residential solar rate that went into effect for existing and future residential solar customers in October 2012. Some key documents related to the Austin Energy's development of its Value of Solar tariff are included in Exhibit KRR-2.

Q. Briefly describe the Austin Energy "Value of Solar" Tariff.

A. The Austin Energy VOS tariff fundamentally redesigned the structure of net metering. The tariff design has two basic components:

a. The tariff relies on a conservatively calculated value of solar that is updated annually and designed to reveal the value to the utility of a unit of generated solar energy which essentially sets the price at which the utility is neutral to the solar energy; and

b. The tariff reconfigures the netting process to ensure that the utility recovers its full cost of serving the solar customer before any credit for solar generation is applied.

These two steps result in a residential solar rate that is fairer to the solar customer, the utility, and other utility customers.

Austin Energy's VOS calculation generates a 30-year levelized value of solar in cents per kilowatt/hour, based on five components: energy, capacity, transmission capacity, transmission and distribution losses, and environmental value. The goal of the VOS calculation is to estimate the total value of a unit of solar energy generated in the distribution grid, at or very near the point of consumption, that is the conservative estimate of the cost that the utility would face in seeking to fill an order for a unit of energy with the same character as that generated from a local solar facility. Once Austin Energy decided that the value of solar was an appropriate foundation for a residential solar rate, it was incorporated into a tariff.

Q. What are the benefits of Austin Energy's approach?

A. Under the new rate, customers have a strong incentive to use energy efficiently in order to maximize the economic value they receive -- making more on-peak energy available to the utility. Because the value is recalculated each year, both the customer and the utility are treated fairly as solar and general system costs change. In the event that the system fails to generate as expected, the netting methodology ensures that the utility always recovers its costs of serving the customer. To the extent that the value of solar credit to the customer creates a loss of revenue to the utility (above and beyond the revenue charged for gross consumption), it would be fair to include that incremental loss in a power system cost recovery factor or fuel adjustment factor, as appropriate.

Q. Why did Austin Energy undertake the development of a new VOS rate?

A. Austin Energy wanted to provide an alternative to net metering that would continue to promote solar energy development while being fair to both participating and non-participating customers and protecting the financial concerns of the utility.

Q. Should Georgia Power develop a value of solar rate?

A. In my opinion, the Company should develop a VOS tariff to replace the old Solar Purchase Price for commercial and residential solar systems.

RECOMMENDATIONS

Q. In light of your testimony, how should the Commission and the Company move forward?

A. In my opinion, efforts of the Commission and the Company to seed the development of a solar energy market have borne fruit. Coupled with substantial cost reductions experienced in solar generation and initiatives, such as ASI, the Commission and the Company have tapped an infant, but increasingly viable market for distributed solar in the State of Georgia. For this reason, I propose that the Commission direct the Company to immediately prepare an RFP to obtain market validation that the cost of bringing additional distributed solar to the grid is less than the value that solar brings to the Company and its ratepayers.

Q. Doesn't ASI address the market opportunity for distributed solar?

A. No. ASI did not take full advantage of the value of distributed solar. ASI includes several unnecessary limits that reduce the value to the Company and ratepayers that can be derived from increased deployment of distributed solar systems. The total program size should be dictated by cost-effective solar available at or below total value, not an artificial limit. The payment should be set to a market price – at or below the full value of solar – and not to the artificial and somewhat arbitrary current payment of $0.13/kWh. The contract price should be market driven, at or below a VOS calculation as described below. Application fees should be waived for residential systems below 10 kW. Customers should be given the option to provide their own compliant solar meters.

In sum, I recommend that the Commission use this IRP to order the Company to remove the artificial constraints on distributed solar market development contained in ASI and move to a market and value-based approach to distributed solar.

Q. What other recommendations do you have for the Company and the Commission?

A. I further recommend that in the course of conducting its review of the full range of costs avoided as a result of energy production from distributed solar facilities, the Company should be directed to develop a new value of solar rate in lieu of the current "solar avoided cost" and to replace the previously abandoned Solar Purchase Price. The Company should be directed to establish a commercial/residential distributed VOS rate, as I described above, to be offered initially to those customer classes.

However, this effort should not deter or delay further solar deployment based on its true market value. The Company's data already (and without the benefit of further study) supports greater deployment of solar generation in its resource portfolio.

Q. Why should the Commission and the Company act on these recommendations at this time?

A. As acknowledged by the Company in Section 10.3 of its Plan, solar technology has seen an extended period of decline in costs allowing increasing solar deployment without upward pressure on rates. Numerous projections predict this trend to continue through the end of the decade.[5] Current data forecast commercial solar prices with further reductions in price to $0.03/kWh. The same study cites a potential for 10-30 GW of solar PV for Georgia by 2030, and 30-50 GW by 2050.

In order to maximize the potential for economically efficient and cost-effective deployment of distributed solar in Georgia within the remainder of this decade and over the planning horizon of the current IRP, it is essential that the Company understand and fully account for all the impacts – including both costs and benefits – of distributed solar. The many published solar valuation analysis reports now available and the consensus emerging about the value of distributed solar to the utility and its customers enable the Company to launch these market support initiatives at this time.

Q. Will these initiatives impose a management burden on the Company?

A. The actions recommended will require some effort on the part of the Company, but they are not significantly greater than those already required in the proposed plan. Competitive suppliers bear the greatest burden in market

[5] SunShot Vision Study, U.S. Department of Energy, February 2012.

solicitations, and consultants are available with experience to manage competitive solar support programs. Distributed solar systems are typically owned and operated by third parties or customers, minimizing utility administrative burdens.

Q. What are the advantages of moving forward to support the development of cost-effective distributed solar at this time?

A. Solar markets are largely driven by economies of manufacturing scale, that is, the more systems that are deployed, the faster the market moves to lower prices and greater value. The Company's proposal to slow the development of the distributed solar market in this plan is headed in precisely the wrong direction. In addition, encouraging third party distributed solar in the Company's service territory can help improve on the Company's less than ideal 50% project failure rate reflected in its "Planning Adjustment Factor."[6] Finally, moving to market based initiatives improves market efficiency and increases transparency in energy services pricing.

[6] See: Company response to STF-12-1.

Q. Does this conclude your testimony?

A. Yes.