PUBLIC DISCLOSURE VERSION

STATE OF GEORGIA

BEFORE THE GEORGIA PUBLIC SERVICE COMMISSION

In Re: Georgia Power Company's 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 JOHN D. WILSON ON BEHALF OF SOUTHERN ALLIANCE FOR CLEAN ENERGY

May 10, 2013

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I. Introduction

Q. Please state your name, position and business address.

A. My name is John D. Wilson. I am Director of Research for Southern Alliance for Clean Energy ("SACE"), and my business address is 1810 16th Street, NW, 3rd Floor, Washington, DC 20009.

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of SACE.

Q. Please summarize your qualifications and work experience.

A. I graduated from Rice University in 1990 with a Bachelor of Arts degree in physics and history. I received a Masters in Public Policy from the John F. Kennedy School of Government at Harvard University in 1992 with an emphasis in energy and environmental policy, and economic and analytic methods. Since 1992, I have worked in the private, non-profit and public sectors on a wide range of public policy issues, usually related to energy, environmental and planning topics.

I became the Director of Research for SACE in 2007. I am the senior staff member responsible for SACE's utility regulatory research and advocacy, as well as energy resource analysis. In this capacity, I am responsible for leading dialogue with utilities and regulatory officials on issues related to resource planning and financial regulation, particularly as they relate to energy efficiency, renewable energy, and conventional generation resources. This takes the form of formal testimony, comments, presentations

and/or informal meetings in the states of Georgia, Florida, North Carolina and South Carolina, and with respect to the Tennessee Valley Authority.

A copy of my resume is included as Exhibit SACE-JDW-1.

Q. Have you previously testified before the Georgia Public Service Commission ("GPSC" or "the Commission")?

A. Yes, I testified in the proceedings on Georgia Power Company's ("Georgia Power" or "the Company") 2010 Integrated Resource Plan ("IRP") and Demand Side Management ("DSM") Plan (GPSC Docket Nos. 31081 & 31082).

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to present to the Commission my review of Georgia Power's 2013 IRP; the analysis I undertook to evaluate the IRP and alternative resource mixes; and my recommendations as to how the Company should modify and improve the IRP. I present the following recommendations for the Commission's consideration:

- The Company should adopt the Enhanced DSM Portfolio, a modified version of the Company's Aggressive DSM Portfolio developed by SACE, rather than its Proposed DSM Portfolio.
- The proposed fuel switch at Plant Gaston Units 1-4 should be denied.
- The Company should expand its solar development.

- The Company should improve its evaluation of renewable energy resources in future IRPs.
- The Company should cure the errors in its IRP analysis.

In so doing, I incorporate the analysis and conclusions of SACE witnesses George W. Evans and Natalie A. Mims, who have also submitted testimony in this docket. (Ms. Mims' testimony also is also being filed in docket no. 36499.)

My testimony also supports many of Ms. Mims' recommendations concerning the certification and implementation of DSM programs, and Mr. Evans' recommendation concerning the Company's request to invest in fuel switching at Plant Gaston Units 1-4.

Q. Are you submitting exhibits along with your testimony?

A. Yes, I am submitting eight exhibits along with my testimony. A list of my exhibits is as follows:

- SACE-JDW-1: Resume of John D. Wilson
- SACE-JDW-2: Bill Impact Model
- SACE-JDW-3: System Financial Data (co-sponsored by Mr. Evans)
- SACE-JDW-4: Enhanced Georgia Solar Portfolio Model
- SACE-JDW-5: Financial Scenario for Georgia Solar Portfolio Model Evaluation
- SACE-JDW-6: Georgia Power Financial Review Energy and Cost Discrepancies
- SACE-JDW-7: System Rate Study

- SACE-JDW-8: DSM Portfolio RePlanner Model: Georgia Power and SACE Portfolios Economic Evaluation

II. Summary of Findings and Conclusions

Q. Please summarize the results of your review of the Company's 2013 IRP and the analysis you have conducted.

A. The Company does not present a plan for meeting forecast requirements in an economical and reliable manner, as required by Georgia law. A stronger commitment to energy efficiency and renewable resources will result in a plan that is:

- Lower cost, resulting in $2.4 billion in potential system savings;
- Lower risk, enhancing the use of zero-fuel resources;
- More flexible, increasing reliance on resources that can be developed incrementally and adjusted in response to market conditions and opportunities;
- Cleaner, offering a lower-cost path to environmental performance; and
- More reliable, maintaining or extending the existing reserve margin.

As such, SACE recommends enhancements to the Company's IRP. Our recommendations also include the correction of several erroneous or unreasonable planning assumptions used by Georgia Power that, among other things, result in a substantially inaccurate forecast of the Proposed DSM Plan's impacts.

Despite these shortcomings, Georgia Power has made commendable progress since its last IRP filing. Specifically, the Advanced Solar Initiative ("ASI"), recent wind power purchases, decision to retire several uneconomic electric generating units (pending Commission approval), and savings achieved by the certified DSM programs are positive developments that improve the Company's resource mix.

Nevertheless, I conclude that the Company's IRP can and should be improved. First, the Company should adopt the Enhanced DSM Portfolio. Second, the Company should not invest in fuel switching at Plant Gaston Units 1-4. Third, the Company should develop an Enhanced Georgia Solar Portfolio to increase its investment in this increasingly cost-competitive resource. Fourth, the Company should improve its evaluation of renewable energy in future IRPs. Finally, related to these improvements, the Company should correct the flaws in its IRP analysis.

Q. Please provide your recommendations concerning the Enhanced DSM Portfolio.

A. An expanded DSM plan provides the largest cost savings opportunity. SACE recommends that the Company adopt the Enhanced DSM Portfolio, which is a modified version of the Company's Aggressive DSM Portfolio. SACE developed the Enhanced DSM Portfolio by modifying the Company's Aggressive DSM Portfolio in three ways. First, we reduced program participation levels to better reflect market opportunities. Second, we reduced customer incentive forecasts to more reasonable levels. These two changes, and the Enhanced DSM Portfolio more generally, are discussed in the direct

testimony of Ms. Mims. Finally, as discussed later in my testimony, we applied corrections to the Company's program economic data, such as its avoided cost rates.

The Enhanced DSM Portfolio would result in lower bills for most Georgia Power Company customers by 2023, based on SACE's bill impact evaluation of all Georgia Power customer classes, including both program participants and non-participants. These bill savings take into consideration both reduced energy use and changes to customer rates, which are compared in SACE's Bill Impact Model, discussed later in my testimony and reported in Exhibit SACE-JDW-2.

The Enhanced DSM Portfolio reduces bills by cutting system costs by about $3.5 billion over the next twenty years, which is $[redacted] more than the cost savings of the Company's Proposed DSM Portfolio. The system benefits are reported in Exhibit SACE-JDW-3. Most of the system benefits take the form of reduced fuel use and related costs. However, the plan also delays or avoids about [redacted] of natural gas plant capacity expansions by 2024, as compared to the Company's Proposed DSM plan.

Q. Please provide your recommendations concerning Plant Gaston Units 1-4.

A. As discussed in Mr. Evans' testimony, the Company's decertification requests are justified, make economic sense for ratepayers and should be approved. However, the Company's request for approval of a switch to natural gas at Plant Gaston Units 1-4 is not in the best interests of ratepayers and we recommend that this request be denied. As Mr. Evans testifies, removing Plant Gaston Units 1-4 from the Georgia Power system would reduce customer costs by about $[redacted] over the next thirty-five years. In fact, the

Company's system model indicates that fuel and other related costs are slightly *lower* without Plant Gaston for 2014-2020; this indicates that the system planning model does not rely on this unit for meeting capacity needs. In the long run, there are far more cost-effective options than converting Gaston Units 1-4 to natural gas and maintaining them far beyond a reasonable lifetime.

Q. Please provide your recommendations concerning the expansion of solar power.

A. Solar power costs are rapidly declining, and the Company's Advanced Solar Initiative is evidence that the Company now appreciates the value and potential of this rapidly-developing technology. Solar energy offers tremendous value to Georgia Power customers. At today's prices, and especially as the Georgia solar installation market matures over the next several years, Georgia Power should be able to acquire additional cost-effective solar resources for its customers.

However, the Company did not analyze solar in its IRP financial models and did not adequately consider solar along with traditional resource options in the IRP. This appears to be inconsistent with the Commission's Order Approving the Advanced Solar Initiative with Modifications (Docket No. 36325).

Given concerns about the volatility of natural gas prices, investment in a greater solar portfolio, such as the 2,000 MW Enhanced Georgia Solar Portfolio described later in my testimony, would help reduce the risk of future increases in fuel cost recovery rates. As modeled, this ten-year portfolio, which includes both distributed and utility-scale resources, delivers cost savings to customers immediately after completing the ten-year

build out. Now is the time for Georgia Power to work on expanding the contribution of solar power to its resource plan, and I will outline the steps that Georgia Power should take later in my testimony.

Q. Please provide your recommendations concerning the Company's consideration of renewable energy resources.

A. The Company did not give significant consideration to renewable energy resource alternatives, including but not limited to solar, in this IRP. Future IRPs would be improved if the Company developed new ways of characterizing and modeling renewable energy resources, such as wind.

Q. Please summarize your other concerns with the Company's IRP analysis.

A. In the course of reviewing the filings, my colleagues and I discovered a number of significant errors and unreasonable assumptions in the Company's analysis. During the hearing on the Company's direct case, I understand that the Company acknowledged some data/assumption discrepancies but suggested that the effect was not significant. To the contrary, the discrepancies and errors I found are quite significant. In fact, the corrections I suggest in my testimony account for much of the savings associated with SACE's IRP recommendations. Future IRPs would be more useful and accurate if the Company addressed these problems.

III. Georgia Power Should Reduce the Cost and Risk of its Resource Mix

Q. How can Georgia Power reduce costs and risks in its IRP?

A. Based on my analysis, I conclude that Georgia Power should adopt an Enhanced DSM Portfolio in lieu of its Proposed DSM Portfolio; cease purchasing power from Gaston Units 1-4 rather than pursue fuel switching; and develop an Enhanced Solar Portfolio instead of failing to include any new solar in its plan after ASI. Together, these changes will reduce system costs by about $2.4 billion.

Q. How would your recommendations reduce system costs by about $2.4 billion?

This cost savings estimate accounts for a wide range of utility costs, most of which derive from the Company's system planning model (Strategist), as described in detail in Exhibit SACE-JDW-3. Table 1 summarizes the Southern Company system costs and savings for the changes I recommend both individually and combined, as compared to the Company's Base Case Plan. Table 1 also summarizes the cost impact of the Company's No DSM sensitivity, as compared to its Base Case.

Table 1: Customer Savings in Alternative Resource Plans

Resource Plan	System Cost $billion	Savings (Cost) Relative to Base Case			
		Production	Capital*	DSM	Total Savings
Base Case	[redacted]				
Alternative Resource Cases:					
No DSM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Enhanced Georgia Solar Portfolio	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Gaston Removal	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Enhanced DSM Portfolio	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SACE Recommended Enhancements:					
Enhanced DSM + Gaston Removal + Enhanced Solar	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

*** Capital costs include Plant Gaston and Solar Portfolio costs, in addition to system capital costs.**

As Table 1 shows, most of the savings that accrue from the recommended changes to the IRP come from production costs, mainly fuel savings. In addition, the following additional findings from this analysis provide important context for my recommendations:

- Solar power is primarily an energy resource. About [redacted] of the system cost savings associated with solar power are fuel and related cost savings. The remaining [redacted] are capital cost savings, roughly equivalent to the cost of the Enhanced Georgia Solar Portfolio. Net rate reductions resulting from the 2,000 MW portfolio could occur as soon as 2023, or even sooner if fuel prices grow faster than forecast by the Company.
- Production costs are actually slightly higher with Plant Gaston Units 1-4 in operation than without those units being available to the model. There is no benefit to the conversion project.

- The additional benefit of our recommended Enhanced DSM portfolio over the Company's Proposed portfolio is substantial. More than 75% of the additional costs, as projected by Ms. Mims, are offset by capital cost savings (unnecessary power plants). This is one reason that rate impacts of our recommendation are so low. Even in the unlikely event that the cost of the portfolio exceeds our projections by 35%, the benefit to customers would continue to be more than double the cost.

In summary, each of the changes we recommend to the system plan offers unique benefits to the Company's present and future customers.

Q. In addition to the system cost savings associated with your recommendations, what other financial benefits could they provide to Georgia utility customers?

A. In addition to saving **about $2.4 billion**, SACE's recommendations would reduce the risks of future, unmanageable price increases that are passed on to customers. Unlike traditional supply-side generation, once installed, neither energy efficiency nor solar energy has significant ongoing operational or maintenance costs, and of course these resources are fuel-free.

Furthermore, because these resources can be built and deployed gradually, the Commission can put in place safeguards to ensure that if costs are higher than expected, the programs can be curtailed while design changes are made. As experience shows, cost overruns at power plants due to design problems can become unmanageable even before the projects deliver any benefit to utility customers. In contrast, because of the modular

and incremental nature of energy efficiency and solar, cost overruns can be more easily controlled and contained.

Energy efficiency and solar power are particularly worthwhile energy investments in this this IRP because Georgia Power has no identified capacity needs for eight or nine years. If costs are higher than anticipated, then program expansion can be scaled back without triggering the need to rush forward plans for new capacity.

Q. What types of risk should Georgia Power analyze when making resource decisions?

A. There are several different types of risk that utilities should consider when evaluating resources. A recent paper[1] by former Colorado PUC Chairman Ron Binz provides an extensive list of the categories of risk that should be considered by electric utilities, in conjunction with cost considerations. The risk categories examined in the report include:

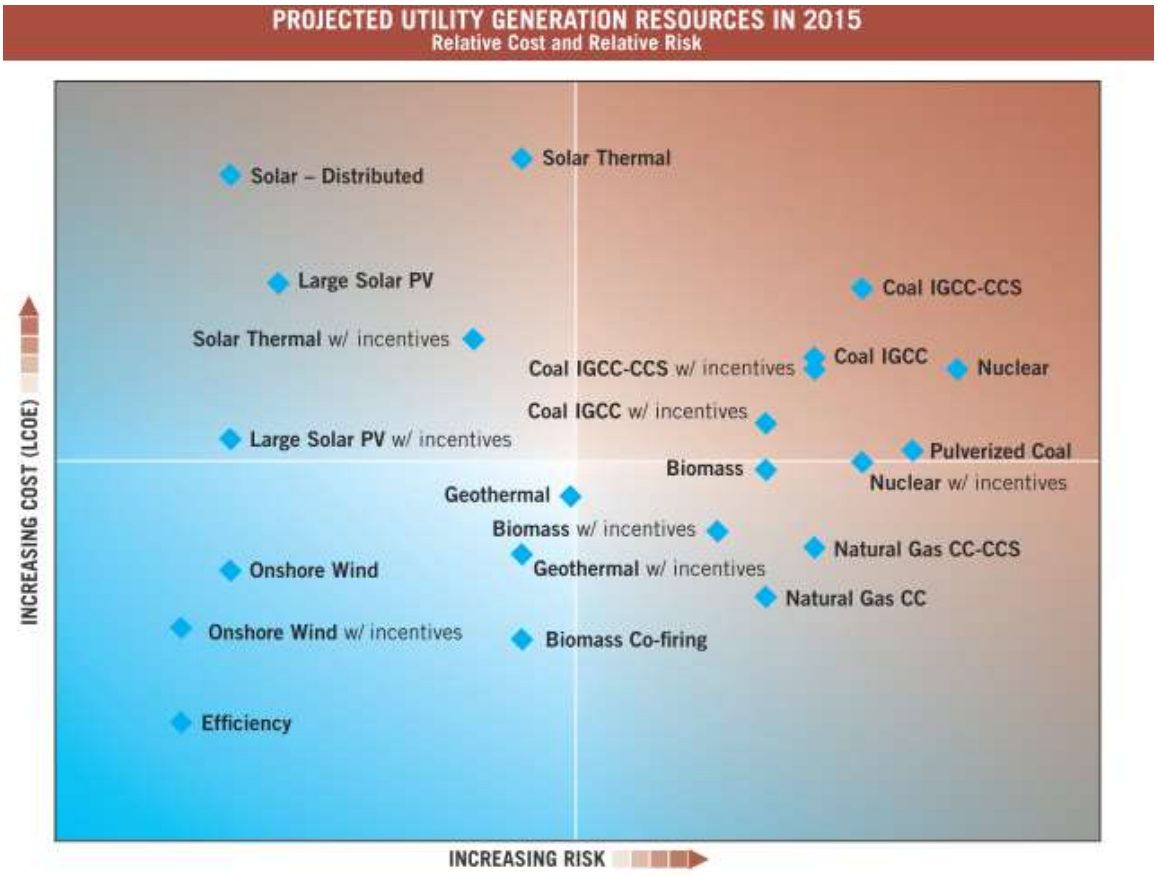
- **Construction Cost Risk**: unplanned cost increases, delays and imprudent utility actions
- **Fuel and Operating Cost Risk**: fuel cost and availability, as well as operation and maintenance cost
- **New Regulation Risk**: air and water quality rules, waste disposal, land use, and zoning
- **Carbon Price Risk**: state or federal limits on greenhouse gas emissions
- **Water Constraint Risk**: availability and cost of cooling and process water
- **Capital Shock Risk**: availability and cost of capital, and risk to firm due to project size
- **Planning Risk**: inaccurate load forecasts, competitive pressure

[1] Binz, Ron et al., *Practicing Risk-Aware Energy Regulation, What Every State Regulator Needs to Know*, Ceres (April 2012).

While the Company's IRP evaluates some of these risks, such as inaccurate load forecasts, others, such as water constraint risk, are omitted.

Furthermore, the Company's risk evaluation is constrained. For example, the role of energy efficiency and renewable energy resources in mitigating these risks is not explicitly considered in the IRP. The report found that energy efficiency and renewable energy resources such as wind and solar power are among the top performing resources when viewed from a perspective of managing both cost and risk, as illustrated in Figure 1. Using a "composite risk score," Binz and his colleagues ranked resources from a combined cost and risk perspective. With scores ranging from 0 (best) to 100 (worst), solar (21-26) and energy efficiency (16) score well. While these calculations reflect a national context, solar power and energy efficiency resources in Georgia Power's service territory are available in quantities and at costs that are better than the national average.

Figure 1: Energy Efficiency and Solar Power Compared to Generation Resources



Binz, Ron et. al., *Practicing Risk-Aware Energy Regulation, What Every State Regulator Needs to Know*, Ceres (April 2012).

Q. **Are you asking the Commission to adopt the risk and cost analysis contained in the *Practicing Risk-Aware Energy Regulation* report?**

A. No. As noted, this report provides an analysis from a national perspective and is not tailored to Georgia Power's service territory. However, this analysis does suggest that a more comprehensive approach to the evaluation and management of risks affecting

electric utilities is warranted. I encourage Georgia Power to expand its evaluation and management of risk through the IRP process, and include a more comprehensive risk analysis in its next IRP.

IV. The System and Customer Benefits of Energy Efficiency

Q. You mentioned earlier in your testimony that an enhanced energy efficiency portfolio would reduce system cost. Please explain how energy efficiency lowers system cost.

For Georgia Power over the next 25 years, energy efficiency would lower system costs mainly by reducing the cost and amount of energy generation. Energy efficiency is inexpensive and, by definition, is perfectly matched to customer demand. Energy efficiency does not raise operational concerns with respect to reliability and does not require costly "turndown" operation.

The overall benefit of the energy efficiency portfolio that SACE recommends would be $3.5 billion in utility cost savings, as illustrated in Table 2.

Table 2: Benefits and Costs of Energy Efficiency for Georgia Power Company

DSM Portfolio	2023 System Impact		Cost of Saved Energy (per kWh)	Utility Cost Savings
	Energy Savings	On-Peak Capacity		
GPC Proposed	[redacted]	**666 MW**	**$ 0.02**	[redacted]
SACE Recommended	[redacted]	**2,190 MW**	**$ 0.03**	**$ 3.5 billion**

Note: Utility cost savings relative to No DSM Case. Sources: IRP Technical Appendix v. 2; SACE-JDW-2; SACE-NAM-2.

The $3.5 billion savings estimate is based on a larger projected cost of saved energy than the Company's current projections in order to avoid overestimating potential savings. However, I would note that energy efficiency is subject to economies of scale as programs ramp up. As such, it would also be reasonable to assume that for larger energy efficiency programs, costs might not increase and may even decline.

In addition to reducing energy generation, energy efficiency helps delay or eliminate the need for power plants. Our recommendation has the potential to eliminate nearly half of the megawatts of power plants projected in the Company's IRP.

Q. How could SACE's recommendation eliminate nearly half of the megawatts of power plants projected in the Company's IRP?

The Company's 10-year planning period for DSM programs ends well before the 25-year IRP planning period. As a result, the IRP includes long-term capacity needs that will not occur (because the DSM programs are likely to be continued beyond 10 years). In order to evaluate the role of energy efficiency over a longer time period, we extended the Enhanced DSM Portfolio for five years, creating the Enhanced+5 DSM Portfolio. In this model case, by 2028, fifteen years of strong energy efficiency program performance eliminate nearly half of the megawatts of power plants projected in the Company's IRP.

Q. You mentioned earlier in your testimony that an enhanced energy efficiency portfolio would reduce customer bills. Please explain how energy efficiency lowers customer bills.

A. Our models suggest that most Georgia Power Company customers could participate in an energy efficiency program by 2023. For these participants, the Enhanced DSM Portfolio would reduce customer bills by an average of 5%, 18%, and 12% for residential, commercial and industrial customers, respectively, as shown in Table 3. In contrast, from the Company's Proposed DSM Portfolio, the vast majority of customers would experience approximately zero bill impact.

Table 3: Bill Savings from Enhanced DSM Portfolio

	Customer Participation	Bill Impacts
Residential	56 %	5%
Commercial	52 %	18%
Industrial	62 %	12%

Source: SACE-JDW-2.

Q. What reason does Georgia Power provide for not investing in greater levels of energy efficiency?

A. The Company does not recommend its Aggressive or Advocacy DSM portfolios because it states that these portfolios would result in additional upward pressure on customers' rates. According to the Company, these plans, "if implemented as analyzed, would increase customers' rates approximately six to eight times more than the Company's recommended Proposed Case, while only increasing the economic efficiency (or TRC

benefits) by about two and a half to three and a half times, respectively, for the same timeframe." IRP at 5-66.

Q. Did the Company calculate rate impacts?

A. Yes, the company has submitted three calculations of rate impacts.

In its Financial Review (IRP Appendix Technical v. 2), the Company reported levelized and real levelized rates for its sensitivity cases, with a percent above reference level (Base Case) comparison for each sensitivity case analyzed by the company in its IRP. For example, the rate impact of the Proposed DSM Portfolio can be inferred as the difference between the No DSM and Reference cases.

In its DSM Program Documentation (IRP Appendix Technical v. 2), the Company reported Ratepayer Impact Measure (RIM) test results for its Proposed DSM and Aggressive DSM portfolios. The results for the Proposed DSM Portfolio are also filed in its DSM Application (Docket No. 36499).

The Company also provided responses to staff data requests which calculate rates using a third method, as discussed in its responses to requests STF-3-33 and STF-16-10 thru 13.

Q. Are the Company's calculations correct?

A. No. The Company's calculations of rate impacts are erroneous and should not be relied upon as reasonable estimates of actual rate impacts. As discussed later in my testimony, all but two of the mistakes I identified tend to exaggerate the rate impacts of energy efficiency programs.

Q. Did you calculate rate impacts?

A. Yes. The Bill Impact Model, Exhibit SACE-JDW-2, includes a calculation of bill impacts on non-participants. Because energy use by non-participants is unaffected by an energy efficiency program, rate impacts are the only component of bill impacts for non-participants.

The Enhanced DSM Portfolio does not lead to large bill (or rate) impacts on non-participants. Bill impacts are about 2.7% for residential and commercial non-participants, and 1.7% for industrial non-participants. Although the Company has not indicated what level of rate impacts it considers acceptable, the system rate impact it indicated for its Base Case is 1.8%.

Furthermore, in her testimony, Ms. Mims discusses the RIM test results for SACE's recommended Enhanced DSM Portfolio, and contrasts it with the Company's Proposed DSM Portfolio. Using this approach, the ratepayer impact would be $759 million for SACE's recommendation, compared to $673 million as filed by the Company for its plan.

Both of these calculations suggest that the Company has significantly overstated the level of rate impacts associated with energy efficiency programs.

Q. Did Georgia Power study bill impacts?

A. No. Although the Company expresses concerns about customers' bills, its analysis appears to be limited to rates, by calculating average rate impacts in model cases and using the RIM test in DSM portfolio evaluation. These metrics highlight the impact of

energy efficiency programs on non-participants, whose bills are affected only by rate impacts and not by energy savings reductions.

A bill impact analysis is a more comprehensive approach to understanding how energy efficiency programs affect customers because it also considers how many participants could save money on their bills.

Q. How did SACE determine that its recommendations would substantially reduce bills for most Georgia Power customers?

A. SACE conducted a bill impact analysis to determine the impact of energy efficiency on the bills of both participants and non-participants. Our analysis covers the Company's Proposed DSM Portfolio and SACE's recommendation, the Enhanced DSM Portfolio.

To study bill impacts, it is essential to use a projection of participation rates in the DSM portfolios. Because the Company's program forecast data did not provide assumptions to show customer adoption of multiple measures in one program, customer participation in multiple DSM programs, or repeat participation in the same program over multiple years, SACE contracted with Synapse Energy Economics to develop an Energy Efficiency Program Participation Model, as discussed in Ms. Mims testimony and Exhibit SACE-NAM-5. The participation model corrects these omissions by estimating the total number of participating and non-participating customers during a specified period of time.

Q. How does the Enhanced DSM Portfolio affect customer participation rates?

A. SACE's recommendation would result in most Georgia Power customers saving energy, across all its customer classes and programs designed for "hard-to-reach" customer segments with the greatest need. In contrast, as illustrated in Table 4, the Company's Proposed DSM Portfolio only benefits 11% and 13% of residential and commercial customers, respectively.

Table 4: Participation Rates in Enhanced DSM Portfolio are Higher than the Company's Proposal

	Program Participation by Portfolio	
	Proposed DSM	Enhanced DSM
Residential	11%	56 %
Commercial	13%	52 %
Industrial	n/a	62 %

Source: SACE-NAM-5.

Q. How did you use the participation projections to calculate bill impacts?

A. We applied the participation projections to forecasts of customer rates and energy savings to calculate bills for each customer segment. The energy savings forecasts were obtained from the Company's Proposed DSM Portfolio and from SACE's Enhanced DSM Portfolio (Exhibit SACE-NAM-2).

Customer rate forecasts consider four factors, as follows:

- **Energy efficiency rate**: As with any energy resource, energy efficiency programs are paid for by customers. In Georgia, customers in eligible classes (currently residential and commercial) pay for the programs offered to their classes. This rate is not billed

to industrial customers since they are not eligible to participate. The energy efficiency rate for each portfolio is based on the portfolio's annual cost, including the additional sum amount, and using Georgia Power's forecast sales, adjusted for demand reduction resulting from the portfolio.

- **Avoided costs:** Avoided costs are calculated by the Company as the reductions in system costs (production and capital) due to reduced energy demand. These are typically lower than lost revenues because rates cover costs that are not "avoidable."

- **Lost revenues:** In the Company's calculations, lost revenues typically exceed all other components of the RIM test. These should be calculated using the rate forecast for the period the energy efficiency measures take effect, and are usually equal to the participant savings.

- **DRIPE rate:** The Demand-Reduction Induced Price Effect ("DRIPE") is the impact of energy efficiency programs on the average price (in a wholesale market) or cost (in a vertically integrated utility) of power. As properly estimated in an avoided cost calculation, energy efficiency programs result in reduced operation of the energy resources that are most expensive to dispatch (e.g., peaking gas plants or inefficient coal plants) as well as the delay or avoidance of the construction of new power plants. This effect *also* results in a rate reduction since fuel and some other variable costs are trued up in an annual proceeding. The Company does not appear to consider the DRIPE when developing its rate forecasts.

The Bill Impact Model is provided in Exhibit SACE-JDW-2.

Q. What conclusions do you reach based on the bill impact analysis?

A. Our analysis demonstrates that the Company's Proposed DSM Portfolio is too small. SACE's recommendation would result in bill savings for five times more customers than the Company's proposal.

In addition to helping most Georgia Power customers save energy and reduce their bills, our recommended approach reaches across all customer classes and includes programs designed for "hard-to-reach" customer segments with the greatest need. Ironically, in its attempt to contain the size of bill impacts, the Company's strategy of curtailing the scale of cost-effective energy efficiency leaves most customers with higher bills than they would have under the Enhanced DSM Portfolio.

V. <u>Proposed Fuel Switch for Plant Gaston Units 1-4</u>

Q. Do you recommend that the Commission approve the Company's decertification requests?

Yes, based on the analysis conducted by Mr. Evans, SACE recommends that the Commission approve the Company's Decertification Application.

Q. Why do you recommend the Commission not approve the Company's request to fuel switch at Plant Gaston Units 1-4?

A. Based on the analysis conducted by Mr. Evans, it is no longer economic for Georgia Power to obtain power from Plant Gaston. My testimony incorporates Mr. Evans' review of Plant Gaston into the context of financial reviews of both the Southern Company

system and Georgia Power over the twenty-year IRP planning period. Using the system planning model, we evaluated Plant Gaston in the context of the Company's recommendations (GPC Base Case), using a more realistic expectation for future operating potential (Base Case – Corrected), and in the context of our other recommendations (Enhanced DSM Portfolio, No Gaston, and Enhanced Georgia Solar Portfolio Case), as reported in Exhibit SACE-JDW-3. The results show that if Plant Gaston is removed from service, Southern Company system costs will be reduced by about $[redacted] over the next twenty years. If Georgia Power discontinues use of Plant Gaston, its customer costs will be reduced by $[redacted] over the next thirty-five years.

Q. Earlier you mentioned that the Company's system model indicates that it would actually cost less to operate without Plant Gaston. How did you determine this?

A. Based on the results of the system model cases provided by Mr. Evans (from Strategist), the system production costs in the Base (Corrected) Case are about $[redacted] more than in the Base (Corrected) – No Gaston Case (see Table 5, Section 3 of Exhibit SACE-JDW-3). In other words, removing Plant Gaston Units 1-4 will save the Southern Company system $[redacted].

Furthermore, the proposed conversion of Gaston Units 1-4 does not result in any system capital cost savings, which is unsurprising because Georgia Power projects that its available capacity will exceed its needs well beyond 2020. In summary, from the system model's perspective, there is no specific benefit to the conversion project, at any cost.

VI. Expansion of Georgia Power's Investments in Solar Power

Q. Why should Georgia Power expand its investment in solar power?

A. At today's prices, and especially as the Georgia solar installation market matures over the next several years, solar energy offers tremendous value to Georgia Power customers. Now is the time for Georgia Power to begin work on expanding the contribution of solar power to its resource plan, to reduce costs and risks for its customers over the twenty-year planning horizon.

As discussed earlier in my testimony, in the context of Georgia Power's current system, solar power is primarily an energy resource. About [redacted] of the system cost savings associated with solar power are fuel and related cost savings. The remaining [redacted] capital cost savings is roughly equivalent to the cost of the Enhanced Georgia Solar Portfolio. For the future Georgia Power system, solar power could leverage existing resources to deliver lower cost power to customers.

Solar power is a particularly worthwhile energy investment in this IRP because Georgia Power has no identified capacity needs for about a decade. If solar power development costs are higher than projected, then program expansion can be scaled back without triggering the need to rush forward plans for new capacity. Conversely, if fuel costs are higher than anticipated, the benefits to customers grow.

Q. Won't increasing solar investment increase rates?

A. While increasing solar power investment could have a moderate rate impact initially, the Enhanced Georgia Solar Portfolio (2,000 MW) that we modeled results in lower rates in 2023 and beyond. Given concerns about the volatility of natural gas prices, investment in such a portfolio would help reduce the risk of future increases in fuel cost recovery rates. This ten-year portfolio, including both distributed and utility-scale resources, delivers cost savings to customers immediately after completing the ten-year build out.

Q. Why did you analyze a 2,000 MW solar portfolio?

A. Ideally, solar power would be evaluated as a system resource and the model would select an optimal amount of solar power. However, as stated earlier, the Company failed to conduct this evaluation in its IRP. To provide a simple, but comprehensive, view of the potential role solar power can play in the future, we modeled a representative 2,000 MW mix of solar technologies deployed across Georgia. The Enhanced Georgia Solar Portfolio Model, provided as Exhibit SACE-JDW-4, includes distributed (residential and commercial) as well as utility-scale (both fixed mount and tracking) systems. The system performance assumptions represent conventional assumptions for solar incidence and system performance.

We selected 2,000 MW as representing a realistic, yet ambitious target for the next ten years. We are aware that renewable energy growth in other regions of the country has often far exceeded even the ambitions of industry advocates, so this may even be a conservative scenario.

Q. What costs did you assume for the Enhanced Georgia Solar Portfolio?

A. The costs are based on a linear extrapolation of current costs to industry goals for 2020. Current costs were based on a review of the Company's testimony and responses to staff data requests, as well as a review of National Renewable Energy Laboratory ("NREL") reports and other data gathered by SACE staff. Industry goals for 2020 were developed using the same sources, in particular the U.S. Department of Energy's SunShot Initiative.

Q. Is the Enhanced Georgia Solar Portfolio a plan that Georgia Power could begin executing?

A. Not without additional steps. In contrast to the Enhanced DSM Portfolio, which was designed around viable program concepts, the Enhanced Georgia Solar Portfolio is a simple scenario. It is not likely that just expanding the existing Advanced Solar Initiative would happen to be the best approach. A number of other details remain to be worked out.

Nevertheless, our financial study of this scenario shows that solar power is poised to play a cost-effective role in Georgia Power's system as an energy resource, as illustrated in Exhibit SACE-JDW-5. Our financial study of the Enhanced Georgia Solar Portfolio shows how solar power could be cost-effective over the twenty-year planning period, reduce customer costs over the next thirty-five years, and reduce customer exposure to the risk of higher electricity rates due to fossil fuel cost increases or regulatory pressures.

Q. What steps should Georgia Power take to develop solar power?

A. In the short term, Georgia Power should continue with implementation of ASI. Again, we commend the Company for this important initiative. However, as part of this IRP, the Commission should also direct Georgia Power to undertake several other near-term actions to advance the schedule for potential expansion of solar opportunities in Georgia.

In particular, Georgia Power should develop the capability to evaluate solar power as a system resource. During the evidentiary hearing on the Company's direct case, the Company acknowledged that it does not model new solar resources in its system planning model (Strategist). Although the Company suggested that more solar can be introduced outside of the IRP process, a better practice would be for the Company to improve its characterization and application of resource planning models to determine what additional solar resources would be cost effective, as I discuss later in my testimony.

Q. What other steps should Georgia Power take to develop solar power?

A. I recommend that the Company prepare a solar power certification application by the end of 2014, including an IRP update and additional sum proposal to the extent applicable. A proceeding on this application would allow the Company and Commission to focus on the financial and technological evaluation of solar power in a single proceeding without waiting for the completion of the Company's ASI, but also allowing for the Company to gain experience from this initiative. The application should include a range of alternatives (self-build, RFPs, standard offers, and market/tariff reform). I encourage the

Company to include a range of viable market structure alternatives in its evaluation, even if the Company does not ultimately recommend those structures.

The certification proceeding should also establish a process by which the Company varies its investment level in response to the evolution of market costs. This approach is more suitable in the context of Georgia Power's current system, in which solar power functions primarily as an energy, not capacity, resource.

VII. Improved Evaluation of Renewable Energy in Future Resource Plans

Q. Earlier, you suggested that solar power should be evaluated in the Company's system planning model. Are other viable renewable energy resources evaluated in this way?

A. No, as with solar power, Georgia Power also failed to model new biomass-fueled or wind resources in its system planning model. Both of these resources are viable and currently being developed to meet energy and capacity needs of utilities in the Southeast.

With respect to biomass, the most cost-effective opportunities are likely to be customer-sited combined heat and power (CHP) facilities or co-firing at the Company's existing plants. SACE's most recent analysis indicates that few stand-alone, biomass-fueled power plant proposals in the Southeast are being advanced through the development process. Better data and consideration of biomass-fueled resources under active market development would improve the Company's IRP.

With respect to wind, Georgia Power's recent announcement of an Oklahoma wind power purchase agreement ("PPA") based on its value as a low-cost energy resource is but one indicator of rapid market and technology development that will make wind a transformative resource in the Southeast in the near and long term.

Q. What are the most promising wind resource development opportunities?

A. Based on our work with wind experts and developers, SACE expects three major wind resource opportunities to grow rapidly in the Southeast over the next five years:

- Southwest Power Pool (SPP) and Midwest ISO (MISO) market region PPAs – for example, Georgia Power's recent wind purchases
- Southeastern wind development – for example, Shinbone Wind Energy project being developed in Cherokee County, Alabama by Pioneer Clean Energy, LLC[2]
- High-Voltage Direct Current ("HVDC") transmission projects – gigawatt-scale direct connections to high-wind regions

In addition, we are optimistic that offshore wind resources will also be developed in the next ten years. The level of wind-related investment and development activity underway in the Southeast is unprecedented.

[2] This project is currently in the process of delivering power to TVA under its Renewable Standard Offer program.

Q. Why have the prospects for wind energy development in the Southeast improved?

A. The expansion of wind energy development interest in the Southeast is due in large part to the improved performance of wind turbines at lower wind speeds, which provides both greater on-peak capacity as well as a higher load factor. Another factor are reports from developers that measured wind resources, particularly on ridge lines and in coastal areas, are often substantially higher or offer more on-peak coincident capacity than NREL wind resource classification data would suggest. Resource evaluations of wind projects based on NREL wind resource data and turbine operating data as recent as 2011 will substantially overestimate the delivered price of wind energy to utility systems in the Southeast.

Q. What impact could proposed HDVC transmission prospects have on wind energy development in the Southeast?

A. There are two major HVDC projects under development which should be evaluated in future IRPs. Pattern Energy's Southern Cross project is planned to connect the ERCOT system to the TVA, Entergy, and Southern Company transmission systems, and is intended, in part, to facilitate utility transactions with wind developers active in west Texas. Clean Line Energy's Plains & Eastern Line would connect wind resource development in west Oklahoma with the TVA transmission system.

Both of these projects would give Georgia Power Company the opportunity to purchase power from regions with some of the highest capacity-factor onshore wind in the United

States, and should offer a good match in terms of on-peak capacity, ability to forecast and plan, as well as cost.

Q. Why should the Company evaluate renewable energy in its IRP?

A. As discussed above, solar power, biopower, and wind power are all resources that Georgia Power is currently investing in, and these resources are becoming more abundant and less costly to Southeastern power markets. The Company should utilize these resources to reduce costs, reduce risks, and pursue a lower cost path to environmental performance.

Yet in spite of the Company's recent activities, none of these resources were systematically evaluated in the Company's resource planning model. The opportunities the Company has pursued are a welcome staring point, but as mature energy resources, the Company is obligated to adequately characterize and model these resources to achieve an optimal resource plan.

Solar and wind resources bring challenges, particularly intermittency, to a resource planning process that emphasizes capacity planning. Yet they also bring advantages, particularly geographic diversity and zero fuel cost. Strategic planning to leverage these advantages can deliver wind and solar resources to utility systems in a way that *increases* utility operational flexibility and even reliability.

Q. How can the Company improve its characterization and modeling of wind and solar power?

A. First, the Company should update its technology assumptions and adopt reasonable forecasts reflecting anticipated cost reductions as wind and solar power continue to mature. The principles of technology development and declining costs can be reliably applied to emerging power technologies. Building resource plans and structuring RFPs and other solar development activities around cost and technology forecasts is reasonable and prudent. While inherently uncertain, cost forecasts such as the one SACE developed for the Enhanced Georgia Solar Portfolio, are an essential part of making good resource planning decisions.

Second, the Company should develop the capacity to evaluate geographic diversity as a characteristic of wind and solar power. The Company's current resource planning process emphasizes natural gas, coal and nuclear fueled power generation. The geographic location of such units is of little, if any, significance in the Company's system resource planning process. In contrast, the output and likely on-peak coincident capacity of a wind or solar power project can vary considerably from location to location.

Also essential is the combined impact of geographically diverse renewable energy resources. For example, Black & Veatch's 2012 *Solar Photovoltaic (PV) Integration Cost Study,* which was prepared for Arizona Public Service, demonstrates how just three solar power projects cumulatively reduce short-term variability related system integration

costs. Companies like Clean Power Research provide utilities with short, medium and long-term capacity planning tools for renewable energy resource "fleets."

In summary, proper characterization of wind and solar power requires consideration of updated technology, economic and geographic-specific performance data. Once the Company develops such a comprehensive characterization, it can then begin giving serious consideration to wind and solar power in its resource models.

Q. What do you recommend to the Commission?

A. I recommend that the Commission continue to encourage Georgia Power to explore further development opportunities for renewable energy resources. Experience is essential to cost-effective renewable energy development.

I also recommend that the Commission encourage Georgia Power to take steps to update its resource characterization and modeling practices for renewable energy. Currently, SACE is participating in an information exchange with TVA related to best practices in characterizing renewable energy resources in anticipation of its upcoming IRP. If the Company follows a research and process improvement strategy similar to TVA's, it could become a national leader in with respect to renewable energy resource planning within just a few years.

Because most system planning models have been historically developed with a focus on capacity planning, the use of those models to optimize resource development to reduce energy costs and risks requires greater attention. SACE would welcome further

conversations with the Company to discuss how it could address these modeling considerations.

VIII. Mistakes in Georgia Power's Analysis

Q. Please summarize the errors and unreasonable assumptions in the Company's analysis.

A. Overall, I found that Georgia Power has not provided a substantially accurate forecast of demand-side resources for either the Proposed, Advocacy or Aggressive Cases. The Company's analysis overstates the rate impact of efficiency, in both its Financial Review and its DSM Plans.

I also found that the Company did not properly model its current and projected solar power resources. In addition to the issues discussed above, the Company's models do not include existing and planned solar resources, including ASI.

Additionally, Ms. Mims identified unreasonably high incentive costs and other planning deficiencies in her review of the Aggressive DSM Portfolio, and Mr. Evans identified a number of additional concerns with the assumptions in the Company's Unit Retirement Study.

Q. Please summarize the errors you found in the Company's Financial Review.

A. I found that the energy forecasts associated with the No DSM, Base, and Aggressive Cases could not be reconciled with the energy savings forecasts presented in the Company's DSM Plan and related exhibits. As illustrated in Exhibit SACE-JDW-6, the

Company substantially underestimated the near-term impacts of its Aggressive DSM Portfolio in its Aggressive Sensitivity Case.

While the Company underestimated near-term DSM impacts, it also over-estimated long-term DSM impacts. The Company assumed continued effectiveness of both its Base and Aggressive DSM portfolios in its model cases, even though its DSM Plan clearly indicates that the cumulative impacts of its programs (in MWh savings) decline over time in a predictable manner.

Furthermore, Exhibit SACE-JDW-6 illustrates that the annual costs represented in the Financial Review cannot be reconciled with the system reports from the Company's production and capital cost modeling plus the costs in the DSM Plan.

Finally, the Financial Review also calculates rates at a Southern Company system-wide level. However, because the Company's DSM portfolio costs are recovered from its customers, it is inaccurate to allocate these costs to the system level.

Q. What steps did you take to correct the errors in the Company's Financial Review in developing your proposed IRP enhancements?

A. Mr. Evans re-ran the Company's No DSM, Base and Aggressive DSM cases in Strategist with corrected load forecasts based on the data included in the Company's DSM Program Documentation (IRP Technical Appendix Volume 2). These "Corrected" cases also reflect the removal of Plant Gaston Units 1-4 in 2020.

I compiled the costs associated with the system plan (results from Strategist), the DSM portfolios, the solar portfolio, and Plant Gaston operation scenarios in Exhibit SACE-JDW-3.

I then prepared a System Rate Study, Exhibit SACE-JDW-7, utilizing these corrected system planning and cost forecasts and applying the costs to the system or Company energy requirements, as appropriate. Because solar is not dispatched, I assumed that solar costs and benefits should be allocated to the Company's customers and not to the system as a whole. DSM portfolio costs are also fully allocated to Georgia Power customers rather than system customers.

As demonstrated by comparing the Company's Financial Review with a corrected System Rate Study, provided in Exhibit SACE-JDW-7, the discrepancies I have identified create a substantially inaccurate impression of the rate impacts of energy efficiency programs.

Q. What errors and unreasonable planning assumptions in the Company's DSM plan cause it to be substantially inaccurate?

A. As discussed above, the Company's DSM Plan overstates the rate impact of its energy efficiency portfolios. There are two large errors or unreasonable planning assumptions in its DSM Plan: use of a uniform escalation rate for avoided costs and lost revenues and use of a single fuel cost recovery ("FCR") rate forecast in DSM portfolio lost revenue calculations. Individually and especially cumulatively, correcting these errors and

adjusting for methodological oversights results in a *much* different picture of how energy efficiency programs affect customer rates.

Q. **How does the use of a uniform escalation rate cause the Company's DSM economic evaluation to be substantially inaccurate**?

A. Georgia Power calculated its economic tests, including the Ratepayer Impact Measure ("RIM") test, using an arbitrary uniform escalation rate for avoided costs and lost revenues. This rate is not derived from the Company's usual system cost forecasts or its usual rate forecasts. If Georgia Power had used its own detailed cost and revenue forecasts, all the RIM test scores would be lower, reflecting reduced rate impacts.

Q. **Is this the first time the problem with the Company's avoided costs calculation has been raised in a proceeding on the Company's IRP**?

A. No, in 2010 I testified that the Company improperly calculated avoided costs for energy efficiency measures using a uniform escalation rate.[3]

Also in 2010, Staff witnesses concluded that the Company's escalation rate methodology for calculating avoided cost "produces a much lower and incorrect value for the avoided cost savings for each energy efficiency and demand response measure" and "[t]he correct methodology would be to use the year by year avoided energy and capacity costs to value the kWh and kW savings of each energy efficiency measure."[4]

[3] Direct Testimony of John D. Wilson at 22-23, Commission Docket No. 31081 (May 7, 2010).
[4] Direct Testimony of Richard F. Spellman, *et al*. at 53, Commission Docket No. 31081 (May 7, 2010).

For this IRP, I found that the Company used the incorrect uniform escalation rate approach for avoided costs *and* lost revenues.

Q. **How does the use of a single FCR rate forecast cause the Company's DSM economic evaluation to be substantially inaccurate**?

A. Georgia Power relied on a single FCR rate forecast for revenue forecasting purposes in its DSM planning tool. This assumption is inconsistent with the results of Georgia Power's system planning tool (Strategist). Results from Strategist indicate that fuel and other production costs will be lower with higher levels of energy efficiency, as illustrated in Table 1, Section 11 of Exhibit SACE-JDW-2.

Q. **What steps did you take to correct the problems with the Company's DSM plan economic summary calculations?**

I developed the DSM Portfolio RePlanner Model, as shown in Exhibit SACE-JDW-8, to use data from Georgia Power's IRP to calculate RIM, Program Administrator, and Cost of Saved Energy economic cost test scores for several DSM portfolios, including those developed by the Company and by SACE. The model also calculates the additional sum values for each of these cases, applying both Georgia Power's proposed additional sum and SACE's recommended additional sum, as discussed in Ms. Mims' testimony..

In order to correct the arbitrary uniform escalation rate for avoided costs and lost revenues, RePlanner uses a correction factor to recalculate avoided costs and lost revenues to a value that more closely reflects the Company's actual system cost and rate

forecasts, as provided by the Company via a sample application of its PRICEM model. The RePlanner corrections result in substantially lower RIM test results, and higher overall system (Program Administrator) cost-effectiveness test results for each of the DSM portfolios included in the model.

In order to calculate lost revenues that reflect FCR rate forecasts that incorporate the impacts of higher demand reductions, RePlanner uses a DRIPE rate correction factor. The DRIPE rate correction factor is an input from the Bill Impact Model.

Q. How does the DRIPE rate impact relate to lost revenues?

A. The DRIPE rate impact counters some, but not all, of lost revenues. Lost revenues occur when sales are reduced, and thus revenues to the Company are reduced. With respect to rates associated with fixed assets, lost revenues may be a factor in causing rates to be increased (affecting all customers) to ensure that the Company recovers sufficient revenues as authorized by the Commission.

However, the DRIPE rate impact shows that with respect to FCR rates, the lost revenues are offset by reduced system costs. Because system FCR costs are trued up in an annual proceeding, failure to recover FCR rate-related costs does not have a permanent impact on lost revenues. Because DRIPE primarily consists of production cost savings (e.g., lower average fuel costs), the rate savings associated with DRIPE is a factor in reducing (or mitigating an increase) in FCR rates. This is how the DRIPE rate effect reduces lost revenues, as calculated with an unadjusted FCR rate forecast.

The Bill Impact Model calculates DRIPE by estimating the cost of power at two levels of demand (base case and aggressive case), and then multiplying the cost savings times the retail sales in the more efficient case. On average, non-participants benefit slightly more than participants from this rate reduction because of higher energy use.

RePlanner uses this DRIPE rate impact as an adjustment to the fuel cost recovery portion of lost revenues. The RePlanner adjustment results in a further reduction in the rate impact (RIM) cost-effectiveness test results for each of the DSM portfolios included in the model.

Q. **How does the DSM Portfolio RePlanner model recalculate additional sum values for each of these cases?**

As discussed above, corrections included in the DSM Portfolio RePlanner Model result in significantly higher estimates of avoided costs than the Company used in its IRP and DSM Application. One implication of this is that the Company's revenue requirement for its proposed additional sum, which is a percentage of avoided costs, could be significantly higher than it forecasts in its DSM Application.

RePlanner includes a recalculation of the Company's proposed additional sum, as well as of SACE's recommended additional sum. The results from these calculations are included in the cost assumptions for DSM portfolios included in each modeling case studied by SACE, as illustrated in Table 5 of Exhibit SACE-JDW-3. The results are also discussed in Ms. Mims' testimony.

Q. Did the Company recalculate the rate impacts of its Proposed DSM Portfolio?

A. Yes, but my concerns remain. The Company's third calculation of DSM plan rate impacts (response to STF-3-33) partially corrects one of the problems I described above, by using a forecast of base rates instead of an arbitrary, uniform escalation rate (as explained in STF-16-10).

However, the Company's new rate impact calculation still utilizes a single FCR rate forecast for all three DSM portfolios studied. As discussed above, this would tend to overestimate the actual FCR rates (and hence the rate impacts) in sensitivities with lower customer energy demand. The Company's response also includes an updated rate forecast, which I reviewed, and it does not alter my conclusions.

Q. How do you recommend that the Commission respond to the Company's erroneous and unreasonable planning assumptions?

A. SACE's analysis in the IRP and DSM dockets reveals several errors in the Company's analysis, which is the main reason why our findings regarding DSM portfolio performance and Plant Gaston Units 1-4's financial impact differ so significantly from the Company's findings.

Georgia Power's rate impact analysis is overstated, with respect to both its RIM test calculations for its Proposed, Advocate and Aggressive DSM Portfolios, as well as with respect to its Financial Review. For its IRP, the Company has not provided a substantially accurate forecast of demand-side resources for its recommended plan, or for

its Aggressive Sensitivity Case. I recommend that the Commission adopt the forecasts developed by SACE for the Base, Aggressive DSM Portfolio, and Enhanced DSM Portfolio Cases and direct the Company to revise its IRP accordingly.

Q. Does this conclude your testimony?

A. Yes.