STATE OF GEORGIA

BEFORE THE GEORGIA PUBLIC SERVICE COMMISSION

Georgia Power Company's 2019 Integrated Resource Plan and Application for Certification of Capacity from Plant Scherer Unit 3 and Plant Goat Rock Units 9-12 and Application for Decertification of Plant Hammond Units 1-4, Plant McIntosh Unit 1, Plant Estatoah Unit 1, Plant Langdale Units 5-6, and Plant Riverview Units 1-2	)	**DOCKET NO. 42310**

DIRECT TESTIMONY OF MARK D. DETSKY ON BEHALF OF SOUTHERN ALLIANCE FOR CLEAN ENERGY AND SOUTHERN RENEWABLE ENERGY ASSOCIATION

April 25, 2019

I. <u>Introduction</u>

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

A. My name is Mark D. Detsky. I am an Attorney and Partner at Dietze and Davis, P.C. in Boulder, Colorado. My business address is 2060 Broadway, Suite 400, Boulder, CO 80302.

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

A. I am testifying on behalf of the Southern Alliance for Clean Energy ("SACE").

Q. Please summarize your qualifications and work experience.

A. A copy of my resume is included as **EXHIBIT SACE-MDD-1**.

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

A. No, this is my first time testifying before the Commission.

Q. What is the purpose of your testimony?

A. There are two purposes of my testimony:

First, I testify to bring perspective to the Commission from Colorado, which is similarly situated to Georgia and Georgia Power Company ("GPC") in several ways. Colorado is not part of an organized market but relies on its Electric Resource Planning ("ERP") rules of the Colorado Public Utilities Commission (the "Colorado Commission"). The state's largest investor-owned utility, Public Service Company of Colorado, d/b/a Xcel Energy ("Xcel"), touches nearly every county and serves approximately 65% of the state. Xcel serves approximately 1.5 million customers with a peak load, including its reserve margin, of nearly 7,500 MW.[1] Xcel has used the Strategist capacity expansion modeling software since 2007 and for its last three ERP cycles, including its most recent ERP that tested the economics of continuing to run or decommissioning two coal units. Xcel also employs the same Independent Evaluator ("IE") as GPC, Accion, and has an approved customer-facing renewable subscription program along the lines of GPC's Customer Renewable Supply Procurement ("CRSP"), known as Renewable Connect. Xcel serves an area with a growing economy and clean energy goals in line with those announced by Southern Company.

Where Xcel and GPC differ in their respective resource planning processes is the use of its capacity expansion model to evaluate an all-source technology bidding process. The all-source competitive acquisition process for Xcel has engendered a robust market in Colorado for Independent Power Producers ("IPPs"), and has resulted in large utility-scale acquisitions of renewable energy at the lowest prices in the nation thanks to market certainty created by the Colorado Commission's competitive acquisition principles, above and beyond that required by Colorado's Renewable Energy Standard ("RES"). I explain the competitive process in Colorado further in my testimony.

Second, I provide recommendations for the Commission based on my review of the GPC Integrated Resource Plan ("IRP") in order to implement an all-source bidding process for GPC in 2020. I conclude that there is low risk and high upside for the Commission to direct GPC to hold an all-source request for proposals ("RFP") process in 2020. This is

[1] Public Service Company of Colorado Annual Progress Report, Colorado Public Utilities Commission Proceeding 16A-0396E, dated October 31, 2018.

because 1) the capacity need in 2022 is driven by the economic retirement of the Plant Bowen Units 1-2 and not a short overall capacity position, which does not occur until 2028, and GPC proposes that retirement decision be based on the quality of bids received; and 2) the early capacity need is from plants that produce significant energy to the system and are not "peaking" units. The Plant Bowen Unit 1-2 retirements would cause both a large capacity and energy need that can be met by renewable energy generators, if given the chance to compete. If an all-source RFP in 2020 is successful in allowing the Plant Bowen Units 1-2 to economically retire, GPC could model future RFPs around its experience in with that first all-source process.

Renewable energy resources, despite their tremendous market growth, are treated in the IRP as value-added resources primarily benefitting customers that pay extra in the CRSP program. Meanwhile, in many areas of the country, including Colorado, renewable resources are the most cost-effective system additions available, and that trend is expected to continue.[2] Here, however, GPC's acquisition plans for renewable energy have essentially been pulled out of thin air.

The "Base Case" modeling forming GPC's acquisition plan are based on screening-out generic technology representations that should be tested by the real-world market. The way to test the best fit resources to meet GPC's system need is to hold an all-source RFP and use the Strategist model to optimize among submitted bids; that is to assemble

[2] *See e.g.,* Rocky Mountain Institute, *The Economics of Clean Energy Portfolios* (May 2018). "RMI's analysis finds that, because of recent innovation and rapid cost declines in renewable energy and DER technologies, clean energy portfolios can often be procured at significant net cost savings, with lower risk and zero carbon and air emissions, compared to building a new gas plant."

portfolios for the Commission's review and approval based on bids evaluated. When IPPs perceive a large and transparent market opportunity, they will sharpen their pencils to compete against one-another.

Q. What qualifies you as an expert in Strategist modeling?

A. I am neither an engineer nor a modeler. However, I have 15 years of legal practice before the Colorado Commission over approximately eight ERPs for various Colorado utilities, not including those of non-regulated utilities in Colorado. My practice includes the representation of IPP trade associations and individual developers in such ERPs. As a result, I have had experience with investigating and sometimes critiquing the Strategist model used in resource planning decisions. As relevant to my testimony, I have experience with how the model is used in the all-source bidding process in the Colorado ERP and speak from that experience. My testimony does not comment on the veracity of specific modeling inputs, rather the policy supporting the IRP's requests as based on its modeling decisions.

Q. Are you submitting exhibits along with your testimony?

A. Yes, I am submitting six exhibits along with my testimony, as follows:

- SACE-MDD-1: Resume of Mark D. Detsky;
- SACE MDD-2: GPC Discovery Response STF-DEA-1-5;
- SACE-MDD-3: GPC Discovery Response STF-DEA-1-6;
- SACE-MDD-4: GPC Discovery Response STF-DEA-1-8;
- SACE-MDD-5: GPC Discovery Response STF-DEA-1-10;
- SACE-MDD-6: Schedule showing GPC plant data derived from EIA database.

II. Summary of Recommendations

Q. Please summarize your recommendations for the Commission in approving the Company's 2019 IRP.

A. My recommendations are as follows:

1. <u>Conduct an All-Source RFP for Capacity and Energy</u>. Direct GPC to conduct an All-Source RFP in 2020 open to any generation technology to meet the capacity and energy need approved by the Commission for 2022, including verifying the economics of decommissioning Plant Bowen Units 1-2.
    a. Allow bids above 20 MW capacity to be submitted for either renewable/intermittent, renewable with storage, and fully dispatchable generation;
    b. After screening for fatal flaws, input cost-effective bids from renewable, renewable plus storage, and gas technologies to be advanced to the Company's capacity expansion model for optimization;
    c. Use the capacity expansion model for bid evaluation purposes either in lieu of or in addition to the Renewable Cost Benefit ("RCB") Framework.
        i. Leverage the capabilities of the capacity expansion model to optimize among bids of all technologies to fill the approved system energy need during the resource acquisition period (*i.e.* through 2028).

ii. Create and compare multiple bid portfolios with Plant Bowen Units 1-2 offline and online[3], such that the model can create portfolios that represent outcomes comparable on a net present value of revenue requirements ("NPVRR") basis.

iii. Certain inputs from the RCB Framework, such as support capacity costs, should be included as cost adders (or deductions) in the capacity expansion model for the all-source evaluation. Critical to this recommendation, capacity values for renewables (calculated as incremental capacity equivalents), should be used as assumptions in the capacity expansion model to allow a reasonable fraction of renewable and storage capacity to meet the capacity need.

d. After soliciting comments on the bid evaluation report from parties, the Commission can approve or modify a resource portfolio to meet the capacity and energy need.

e. Allow the 1000 MW CRSP procurement to go forward separately to meet the customer driven criteria set forth by GP on an avoided energy and variable O & M basis – perhaps informed by all-source bids, however allow the all-source RFP to meet the capacity and energy need established for resource adequacy purposes.

[3] As suggested by SACE witnesses Mssrs. Wilson and Jacob, the Commission may elect to see a similar review for the Plant Wansley units.

2. Development of Alternative Resource Portfolios. In its report on the all-source RFP bid evaluation, require GPC to present alternative portfolios responsive to criteria included in the Commission's order to give the Commission market-driven alternatives to fill both the energy and capacity need driven by Plant Bowen Units 1-2, and Plant Wansley, rather than constraining the Commission's review.

   a. The Commission should require alternative portfolios be optimized. Optimized means that the capacity expansion planning model is allowed to select from submitted bids to formulate different portfolio combinations of resources around defined parameters. For example, alternative portfolios can be optimized to select: a) the utility's preferred cost-effective plan with and without the Plant Bowen Units 1-2 in service, b) a "least cost" portfolio on an NPVRR basis, c) increased renewable resources versus gas resource portfolios, or d) increased semi-dispatchable renewable resources such as solar plus storage versus gas portfolios. In this manner, the IRP can meaningfully evaluate economics of alternatives to replacing the Plant Bowen Units 1-2 based on the market's overall bid pool.

   b. GPC should be directed to select the top performing optimized portfolios to use the Strategist production cost model to then run sensitivities similar to the nine crafted for the Generation Mix study, which will provide more valuable information than in the IRP Generation Mix study.

3. Issues for modeling and bid evaluation. Should the Commission adopt an all-source RFP, it should be mindful that modeling should be fair and transparent and based on agreed upon assumptions, as follows:

    a. Allow the capacity values developed in the RCB Framework to be assigned to renewable technology bids to allow the same to compete to fill a part of the system capacity based on the risk-adjusted, yet "apples to apples" basis already used by GPC;

    b. Modeling assumptions for storage should include benefits not captured in the capacity expansion planning model, such as sub-hourly voltage support and regulation reserves.

III. Overview of Colorado ERP Process and 2016 Xcel ERP

Q. Please describe the purpose of this section.

A. The purpose of this section is to inform the Commission regarding the all-source RFP process employed in Colorado as relevant to how and whether Georgia may replicate similar low cost, clean energy results in its IRP through all-source competitive bidding. To be clear, my goal is not to tout Colorado's process as superior to Georgia's, rather to provide the Commission a perspective on how a jurisdiction with similar characteristics undertakes all-source resource acquisitions with successful results.

Q. Please provide an overview of the Colorado ERP process.

A. Like Georgia, Colorado relies heavily on modeling in its ERP process, which utilities must bring forward every four years. Capacity expansion modeling such as Strategist is the backbone, and there are analogous studies for renewable effective load carrying capacity ("ELCC"), renewable integration costs and limits, load growth, and fuel costs, among others. Demand-side management ("DSM") and retail scale distributed generation are approved in separate applications from an ERP, and the approved capacity and energy need take into account the results of those proceedings.

Q. How is the ERP decided by the Commission?

A. The ERP is bifurcated into two phases. In Phase 1, the utility presents an application similar to the IRP. Modeling runs and input studies provide indicative information that feeds into the Colorado Commission's determination of the resource need. The litigation in Phase 1 centers on the modeling assumptions that will be used to conduct the all-source RFP bid evaluation, including the capacity need, the approved studies, modeling of sensitivities, the RFP documents as well as model contracts, and other policy matters. The capacity need to be filled in the Xcel RFP is measured on an annual basis for a summer peaking system. However, no decisions are made in Phase 1 as to the technologies that would fill that capacity need.

The Commission reviews the studies and base case model runs, and then approves a resource need to be targeted for acquisition. The Commission issues its Phase 1 Decision, directing the utility to conduct the all-source RFP within the parameters defined by that decision.[4]

Q. How is the capacity expansion model configured to attribute firm capacity values to renewable resources?

A. The ELCC studies for renewables are used for the model to assign a firm capacity credit or reliability contribution to each renewable resource technology. In the 2016 Xcel ERP, the ELCC values varied for incremental additions based on geographic location and technology between 8.4 – 14 percent for wind energy and 27 – 52 percent for solar energy.[5] The ELCC represents a risk-adjusted figure for capacity based on the 8760 hourly analysis that is studied. There is not a performance guarantee associated with renewable resources, because capacity values are factored into the total system capacity and not singled out for reliability on a one-off basis. There are contractual remedies for performance in the agreements ultimately reached with winning bidders.

Q. What occurs in Phase 2 of an ERP?

A. In Phase 2, the utility issues the all-source RFP, and files its bid report 120 days after bids are received (the "Phase 2 Report"). The 2016 Xcel RFP included separate bidding forms for intermittent, dispatchable and semi-dispatchable resources. These separate forms facilitate the initial screening process, in which bids are categorized by resource and reviewed for minimum eligibility criteria and a "fatal flaw" analysis. The initial economic

[4] Colorado Public Utilities Commission, *Phase I Decision Granting, with Modifications, Application for Approval of 2016 Electric Resource* Plan, Decision No. C17-0316, Proceeding No. 16A-0396E, p. 44.
[5] These values are taken from the technical appendices to Xcel's 2016 ERP application.

screening also consists of calculating an "all-in" levelized energy cost ("LEC"), meaning all costs and benefits included. GPC testified to a similar screening process that was applied, though to generic representations only.

From that initial review process, bidders are notified whether their projects will proceed to the modeling phase and, if so, the assumptions that will apply to their project for its review and possible dispute within a limited time window. Pursuant to ERP Rules, and contingent upon the existence of sufficient bids passing through bid eligibility and due diligence screening, the Company sends to the portfolio development phase a sufficient quantity of bids across the various generation resource types such that alternative resource plans can be created. These alternative plans conform to the range of scenarios for assessing the costs and benefits from the potential acquisition of increasing amounts of renewable energy resources or as specified in the Phase 1 decision.

The Company then develops multiple portfolios using its capacity expansion plan modeling. Typically, the modeling would include a large number of projects. For example, in 2016, Xcel 160 selected bid alternatives for modeling evaluation. The Commission then receives comments from parties on the Phase 2 Report and subsequently issues its Phase 2 Decision, usually without a hearing.

Q. How does Xcel use Strategist in the optimization process?

A. Generally, Xcel will conduct many model optimization runs to concoct various portfolios that address the resource need and any requirements of the Phase 1 Decision. Strategist's PROVIEW module has the ability to process large mixes and matches of portfolios of various technologies based on the criteria it is "fed". That is to say, PROVIEW will build models and select from the bids available to meet reserve margin and other criteria, for example bids that are mutually exclusive because they are the same bid with different in-service dates. Once it has the guidelines and rules, PROVIEW will build the scenarios and the model's "GAF" function provides production cost dispatches of the existing generation fleet plus the portfolio. Strategist may create hundreds of different optimized portfolios, ranked by NPVRR.

In the 2016 Xcel ERP, the Company described the process as follows: "Strategist will be used in developing portfolios of proposals/bids that are advanced to this stage of the competitive acquisition. The modeling framework Public Service will employ in the Phase II portfolio analysis is the same as that used to develop alternative plans that are discussed in ERP Volume 1 … except… actual bids are used to meet RAP needs instead of generic estimates…"[6]

Q. What are the contents of a Phase 2 Report?

A. The contents are not dictated by rule.[7] However, they center on the capacity expansion modeling and bid evaluation exercise, as described in the 2016 Xcel ERP Phase 2 Utility Report on the results and analysis of the all-source RFP.[8]

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[6] *See,* Attachment AKJ-2 to Xcel 2016 ERP application, at page 2-224.
[7] Note that there is a pending Notice of Public Rulemaking regarding the ERP rules. The Colorado Commission has proposed a more formal process regarding the contents of a Phase 2 Report, among other reforms.
[8] Xcel Energy Colorado, *2016 Electric Resource Plan, 120-Day Report*, CPUC Proceeding No. 16A-0396E (June 6, 2018).

Xcel presents a representative sample of the top performing portfolios that it has selected from its capacity expansion modeling in its Phase 2 Report. These portfolios are optimized for different criteria, include the utility's preferred portfolio, a least-cost NPVRR portfolio, and other portfolios that address including increasing amounts of renewables and other alternatives to the preferred portfolio. These portfolios are those selected by the model and are optimized; they are also presented at Xcel's discretion, with the model run data provided to Staff.

Using the optimized portfolios, Xcel will then run the GAF, or production cost, module of Strategist and change certain assumptions reflect various future scenarios - these are the "sensitivity analyses" where the model can use different assumption inputs for fuel, load growth, carbon e.g. The GAF module cannot "optimize" or select bids, and thus the sensitivity analyses are run on the portfolios selected from the PROVIEW runs. The sensitivities are similar to the GPC IRP, including high carbon cost, high and low gas forecast, load growth, etc. The Commission receives comments from parties and a reply by the utility, as well as the IE Report (which in Colorado is focused on process more than vetting the model results).

Q. How did the all-source bidding process work in the most recent ERP?

A. In the 2016 Xcel ERP, the company proposed to retire two coal fired generating units with a total capacity of 660 MW.[9] There was a native load growth and reliability

[9] Due to the timing of the proposal, an additional hearing was conducted on the proposed retirement process.

capacity need established at 450 MW. As a result, the Commission approved Xcel's capacity need to procure 1100 MW of additional capacity resources during the resource acquisition period in its all-source RFP.[10] The bidding was divided by intermittent RFP, dispatchable RFP, semi-dispatchable RFP, and then among power purchase agreement ("PPA") or build transfer agreement ("BTA") proposals. All of the bid proposals were evaluated together, however, using Strategist.

Q. What were the results of the all-source RFP?

A. The Commission approved Xcel's preferred portfolio of 1100 MW annual firm capacity need. Pursuant to that need, Xcel acquired the 2458 MW of nameplate capacity resources as the preferred portfolio from its all-source RFP:

- 1,100 MW wind[11]
- 700 MW solar
- 275 MW battery storage, paired with solar
- 383 MW gas CTs through re-contracting or purchase

Q. At what prices were these resources acquired?

A. The prices are not yet publicly available, but will be by May 22, 2019 per Colorado Commission rule. The indicative pricing in the Phase 2 Report states that Xcel's

[10] Xcel Energy Colorado, *2016 Electric Resource Plan, 120-Day Report*, CPUC Proceeding No. 16A-0396E (June 6, 2018), pp. 8-9. Because the resource acquisition period ended in 2023, Xcel deferred some capacity need due to the proposed retirement of the Comanche 2 Unit in 2025.

[11] Colorado Public Utilities Commission, *Phase II Decision Approving Retirement of Comanche Units 1 and 2; Approving Resource Selection in Colorado Energy Plan Portfolio; Setting Requirements for Applications for Certificates of Public Convenience and Necessity; and Setting Requirements for the Next Electric Resource Plan Filing*, Decision No. C18-0761, Proceeding No. 16A-0396E (August 27, 2018).

preferred portfolio included "[u]nprecedented low pricing across a range of generation technologies including wind at levelized pricing between $11-18/MWh, solar between $23-$27/MWh, solar with storage between $30-$32/MWh and gas between $1.50 - $2.50/kW-mo."[12]

Xcel has since described its final contract prices for renewable energy as the lowest in the nation. The Colorado Commission found that the preferred portfolio could save ratepayers more than $200 million in NPVRR savings over the portfolios term versus that of continuing to run the candidate plants for decommissioning in that ERP on an economic basis. Follow on applications of Certificates for Public Convenience and Necessity were required for resources that were to be utility-owned and new transmission facilities, but Xcel was otherwise free to move forward to contract with facilities that were in the selected portfolio.

Q. Turning to the projects received in the all-source, what was the scope of the bids received by Xcel?

A. Xcel received 416 bids from 238 distinct projects. Of the 417 total eligible bids, 160 bids for 79 distinct projects were advanced to computer-based modeling.[13] This was approximately three times that amount the utility had advanced for modeling in the 2013

[12] Xcel Energy Colorado, *2016 Electric Resource Plan, 120-Day Report*, CPUC Proceeding No. 16A-0396E (June 6, 2018), p. 52.
[13] *Id.* at 85.

Xcel ERP RFP. The large resource need, and the open competition to fill that need from both a capacity and energy basis, attracted nationwide attention to the Xcel RFP.[14]

Q. How did Xcel handle such a large amount of competitive bids?

A. The sheer number of bids resulted in Xcel adopting a two-step screening process before allowing Strategist to build portfolios.[15] This process was done in coordination with the IE (that GPC also uses). Xcel worked with the IE to establish a more extensive initial screening procedure in order to winnow down the pool to the resources that it felt could compete the best to represent different technologies and geographic areas of the state.

Q. How were so many renewable resources selected to fill the capacity need?

A. There were of course environmental considerations for lower emissions, but renewables were ultimately selected because they were "in the money". Colorado's RES requirement had long since been achieved by Xcel among other Colorado utilities. As a result, the energy from renewables, including with storage, was cheaper than that of either new build natural gas or the going forward variable O & M of the reviewed coal facilities. The capacity acquired considered the ELCC of the renewable resources as being firm, and acquired a modest amount of gas to firm such resources. In addition, battery storage was selected to meet part of the dispatchable need.

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[14] *See e.g., "Xcel solicitation returns 'incredible' renewable energy, storage bids,* Utility Dive, dated Jan. 8, 2018, *available at* https://www.utilitydive.com/news/xcel-solicitation-returns-incredible-renewable-energy-storage-bids/514287/

[15] *Id.* at 89.

In other words, capacity was viewed by the model's analysis of the entire system and was not selected on a 1-to-1 nameplate basis. Rather, the model selected the most cost-effective way to replace both the energy and the peaking needs of the system. The underlying renewable acquisition requirement of the RES did not play a role.

Q. Did the approved portfolio require transmission investment?

A. Yes, approximately $200 M of transmission upgrades were included in the overall portfolio cost of the approved resources.

Q. How was the Commission assured of reliability considerations in approving the resource portfolio?

A. Xcel's transmission planning department ran reliability studies associated with the selected portfolios in the Phase 2 Report for transmission considerations. Xcel also conducted studies regarding its maximum renewable integration and loss of load probability in its Phase 1 ERP, but not as against the selected portfolio.

Q. Did the IPP market believe the bid evaluation process was fair and transparent?

A. On the whole, I would opine yes. Although there were of course some aggrieved bidders, both the IE and the Colorado Commission concluded that the bid evaluation process was consistent with the parameters approved in the Phase 1 Decision. Selected portfolio projects to be acquired ranged in size from 76 MW (solar) to 500 MW (wind) of nameplate capacity. These resources were awarded partial firm capacity credit by the model. A diverse geographical mix and mix of IPP companies was selected. Although a stipulation had allowed Xcel to own up to 50% of renewable resources and 75% of other resources, Xcel ended up only owning about 25% of the bids selected based on the modeling results. The members of the IPP trade association I represent, the Colorado Independent Energy Association, concluded that IPPs were generally satisfied with Colorado market conditions.

Q. Did the evaluation of storage resources present a challenge for Strategist?

A. Yes, according to testimony filed by intervenors and by Xcel, Strategist could not fully capture sub-hourly benefits of storage, as well as arbitrage benefits. This is described in the testimony of Xcel chief modeler Kent Scholl.[16] Mr. Scholl's testimony illustrates how Xcel proposed to handle the issue of storage benefits by adding imputations to represent storage projects in Strategist. Xcel proposed, and received Commission approval, for the following changes:

1. Portfolios that include storage proposals receive energy arbitrage value, avoided spinning reserve credit, and avoided generation capacity credit.

2. Xcel assigned storage projects based on the project's duration generation capacity credit to energy storage bids consistent with the results published in an Institute of Electricity and Electronics Engineers ("IEEE") journal article titled "A Dynamic Programming Approach to Estimate the Capacity Value of Energy Storage," as follows:

[16] Corrected Revised Rebuttal Testimony and Attachments of Kent L. Scholl, *In the Matter of the Application of Public Service Company of Colorado for Approval of its 2016 Electric Resource Plan* (January 30, 2017), Proceeding No. 16A-0396E.

Table KLS-1

Duration (hours)	ELCC (% of Nameplate MW)
1	40%
2	55%
4	75%
8	95%
10	98%

In addition, Xcel used the following adders for storage value, including:

- wind integration cost savings;
- $0.20/kW-mo for 30-minute start capability and $0.22/kW-mo for 15 minute start capability.

Q. Should the GPSC utilize these same parameters the Colorado Commission approved for consideration of storage bids in the IRP?

A. Perhaps, but I defer to Commission Staff as to the specific numbers necessary for Georgia. The Commission should direct Staff and GPC to review Xcel's testimony and to make adjustments to the model that is specific to GPC and the Georgia electric system using the Xcel adjustments for guidance. In hindsight, we know that for Xcel a record amount of low cost storage resources were selected by the capacity expansion model with these assumptions in place, which Xcel characterized as conservative based on the IEEE report.

Q. What are your conclusions from the 2016 Xcel ERP for the Commission?

A. Using an all-source RFP approach and an optimized capacity expansion model for bid evaluation for Xcel resulted in an open and transparent market opportunity that attracted record numbers of bids and the lowest prices available in the country for new generation.

The need to be filled was in large part driven by retiring uneconomic coal resources. The Strategist input assumptions for a fractional firm capacity credit to wind and solar resources allowed the model to select projects that deliver cheap and clean energy with some capacity benefit to fill the retirement of a large coal unit in significant part. Additionally, existing gas units that re-bid were re-contracted or purchased. The result was a win for both ratepayers and clean energy. Xcel Energy's rates in Colorado are now approximately 36% below the national average.[17]

Q. You testified that the model had to be tweaked for storage, and then had to impute assumptions for capacity and integrations costs. Does that suggest the model is inherently flawed?

A. Not in my opinion. While modeling has inherent issues to solve, which were partially addressed for storage in this instance, using the Strategist model to develop resource portfolios out of bids produced a substantially different - and better for ratepayers - mix of resources than had Xcel used the costs of generic resources that it had included as placeholders or indicative results in its ERP application.

Q. Did the capacity expansion model "Base Case" that Xcel used in its Phase I ERP predict the resources acquired through the all-source RFP?

A. No. The mix resulting from the RFP was substantially different than predicted by Strategist for the generic resources selected in the Base Case ran for the ERP Phase 1 Decision. This was also true in prior Xcel ERPs. Xcel's base gas had not predicted any

[17] Statement of Alice K. Jackson, President of Public Service Company of Colorado, before Colorado General Assembly on April 17, 2019.

storage resources would be selected, for example, and the level of wind generation that was achieved was primarily due to the low-cost bids received. When real world competition was brought to bear, the resource mix was different than Xcel or parties had anticipated, both in terms of the generation units selected and the cost of that mix.

IV. Analysis of GP IRP in Support of Recommendations

Q. Please explain the purpose of this section.

A. In this section, I demonstrate how the evidence in this IRP supports the policy determination from the Commission directing GPC to conduct an all-source RFP process to fill the capacity and energy need identified in the IRP.

Q. What are GPC's proposals for the Capacity RFP bid processes?

A. GPC testified that "any resource capable of meeting the capacity and reliability requirements specified in the RFP, as determined by the Company in conjunction with the independent evaluator and Commission Staff, will be eligible to participate in the Capacity RFP. The Company anticipates that potential resources will include combined cycle units, combustion turbines, and renewable resources combined with storage providing sufficient capacity and duration."[18] During the hearing, GPC declined to elaborate on what would constitute "sufficient" firmness for this determination. (Tr. 392-

[18] Direct Testimony of Jeffrey R. Grubb, Narin Smith, Michael A. Bush, and Jeffrey B. Weathers On behalf of Georgia Power Company, Docket Nos. 42310 & 42311, at p. 40.

393). Renewable resources, on the other hand, will be separately evaluated in the RCB Framework. The Company's witness panel did not make it clear, but it is apparent from the record that other than solar plus storage, GPC does not intend to allow renewable resources to be included as stand-alone bids for evaluation alongside the Capacity RFP pre-selected technologies. (Tr 564-569).[19]

Q. At a high level, what are your chief conclusions regarding the IRP?

A. I have identified two overarching policy concerns: First, the IRP application presents a "Base Case" generic analysis that did not allow the capacity expansion model to optimize among different technologies, which is Strategist's primary functionality in this type of process. This approach pre-supposes the RFP outcome to certain gas-fired resources.

Second, this constrained Base Case evaluation is then relied upon to inform the RFP to occur to replace Plant Bowen Units 1-2 and the 2028 capacity need. This result artificially limits the market for GPC ratepayers, presenting the Commission with fewer and likely less cost-effective options for its review. Georgia Power's modeling also may lead to market offers that are smaller and less cost-effective than they could be, and that could mean higher costs for ratepayers.

[19] *See e.g.,*Tr at 566:3-11 ("We're not allowing the asset to compete head-to-head with some of these other supply-side resources…").

A. <u>Factors have aligned to present a low-risk opportunity for the Commission to shift to an all-source model.</u>

Q. Has GPC identified any particular risks with an all-source RFP?

A. GPC first claims that the capacity RFP must be for firm, or "guaranteed," generation and that renewable plants cannot serve that purpose. (Tr. 564-566). GPC therefore has expressed a reliability concern associated with renewable energy.

Second, GPC has also intimated that it may be too difficult "for the model to run" as a justification for a "technology selection process" that was used to eliminate the possibility of modeling renewable technologies as bids either for the "Base Case" or the RFP. (Tr. 628)

Q. Do you agree with these conclusions of GPC?

A. No. First, the Commission should find that capacity expansion models are designed for the specific purpose of evaluating many different bids to analyze the most cost-effective resource compilation. This is standard fare for Strategist.

Second, the IRP data belies GPC's contention regarding "sufficient firmness" as a qualification for the capacity RFP. GPC and Staff have extensively analyzed renewable capacity values to provide firm capacity contributions over an 8760 hour basis. These values are reflected in the ICE methodology for the RCB Framework. GPC's own detailed studies identify firm capacity contributions for renewable resources based on GPC and Commission Staff data analysis. These are firm capacity values that have been determined by rigorous analysis and that should count as "firm" and "guaranteed". In the real-world, even a gas plant that is "guaranteed" to be available at a certain hour of the year maybe unavailable due to a forced outage. Thus, there is no merit to the argument that renewable resources should not be allowed to compete to meet the resource need due to a concern over firm capacity.

Third, the modeling done for the all-source bid evaluation can be done iteratively. The Strategist model can be given subsets of choices based on the lowest cost renewable resources, for example. If the model continually selects the low-cost renewable resources made available to it, then subsequent model runs can continue to increase renewable options available to be selected.

Q. How does GPC describe the nature of its capacity needs?

A. GPC states that the capacity shortfall to meet load growth and its relatively high reserve margin is not until 2028.[20] In addition, GPC proposes to decommission the Plant Bowen Units 1-2 that have a capacity of 1,450 MW, and SACE witnesses suggest Plant Wansley should also be subject to the same type of evaluation. GPC states that even though it may decertify 1,450 MW of Plant Bowen, it may only need 1,000 MW of replacement capacity that may result in a capacity need in 2022.[21] The 2028 capacity need is already attenuated in time, and at that it is not a certain capacity need.

[20] Direct Testimony of Jeffrey R. Grubb, Narin Smith, Michael A. Bush, and Jeffrey B. Weathers On behalf of Georgia Power Company, Docket Nos. 42310 & 42311, at p. 38. "The planned and committed resources included in the 2019 IRP provide for adequate reserves until 2028 at which point the Company is currently projected to have a capacity need based on projected load growth, expiration of PPAs, and the decertifications requested in this IRP."
[21] *Id.*

In addition, the Plant Bowen Units 1-2 produce a lot of energy. In 2017, Plant Bowen Units 1-2 generated *5.3 million MWh*, according to data filed by Georgia Power with the U.S. Energy Information Administration ("EIA") in Form 923. This represents an annual combined capacity factor of 42% (51% for Unit 1 and 33% for Unit 2), again based on a comparison with EIA data, which is typical of these units since 2012.[22]

Thus, a large part of the Company's need to replace Plant Bowen Units 1-2 will be energy. Renewable resources can fill that gap and, as the RCB Framework demonstrates, contribute to part of the capacity need. The Strategist model will select units that meet both the energy and capacity need created by the retirement of Plant Bowen Units 1-2.

Q. What are the primary factors in the IRP that present a "low-risk" opportunity for the Commission in your opinion?

A. The two primary factors that mitigate any perceived risks of GPC associated with an all-source RFP are: 1) the significant time until a peak capacity shortfall has been identified for the GPC system, and 2) the large energy need that accompanies the potential first tranche of capacity required to economically replace the generation provided by Plant Bowen Units 1-2. That distinction is critical because Plant Bowen Units 1-2 provide

[22] SACE recalculated the capacity factors provide by EIA data based on 725 MW per unit, rather than the values reported to EIA, for consistency with the 1450 MW value given by witnesses for the two units together. On information and belief, Georgia Power allocates capacity between the units in such fashion. *See,* **EXHIBIT-SACE-MDD-6**.

capacity and energy, and therefore the only way to test whether there are economic alternatives is to let the market provide those economic metrics in the form of bids.

Q. Is there an opportunity for renewable resources to provide replacement energy for the loss of that provided by Plant Bowen Units 1-2?

A. Without question. The IRP states that those units could continue to generate if economic bids are not received to allow it to be decommissioned. Thus, the clear opportunity is to allow the most economic bids to provide both, or each of, capacity and energy to replace the Bowen Units. An all-source RFP will maximize the bid pool and, as explained below, provide critical evaluation for the Bowen retirement analysis.

Q. Do GPC's assumptions in the IRP present risks to ratepayers?

A. Almost certainly. First, GPC testified that "[i]n the event the market cannot provide adequate and economic capacity during the 2022-2023 RFP, the Company intends to preserve the ability to continue operating Plant Bowen Units 1-2."[23] However, GPC is artificially limiting the market and therefore handicapping the ability of the model to satisfy GPC's stated criteria, which could lead to the uneconomic units remaining online.

GPC identified in the hearing that there were gas plants coming off contract that could deliver low cost bids to meet the capacity need. SACE research shows the Commission approved some 1000 MW of approved large gas CT PPAs expiring in the

[23] *Id.*

relevant time period.[24] Assuming these are the units GPC referred to, there is no doubt that these projects could re-bid at the same or even lower cost pricing in the ERP to meet the capacity need associated with decommissioning of the Plant Bowen Units.

However, these combustion turbine units should not be called upon to meet the ***energy*** formerly generated by the Plant Bowen Units 1-2. Gas CT energy is among the most costly resources to be dispatched; usually only for reliability and ancillary services at very limited utilization rates. For example, the 2017 capacity factors for the three expiring PPAs, calculated from data reported in EIA Form 923, were far below those reported for Plant Bowen Units 1-2.

- MPC Generating: 0.5%
- Walton County Power: 7%
- Washington County Power: 4%

If gas CT's are called upon more often for energy requirements, that will cause higher costs for ratepayers.

Q. How would the Commission test whether that was a problem?

A. In an all-source RFP, renewable projects and storage facilities would be available for the model to select to meet the system capacity and energy needs in a certain year. The

[24] The expiring peaking combustion turbine PPAs: MPC Generating - 301 MW GT; Walton County Power - 436 MW GT; Washington County Power - 302 MW GT. *See,* Stipulation in Docket No. 22528-U, dated Nov. 2, 2006.

capacity expansion model would compile and rank portfolios that would likely involve a combination of gas capacity, battery storage, and renewable energy to meet the overall need. Based on what I have observed in Colorado, the capacity expansion model would not select a portfolio that was primarily or exclusively gas peaking CT units, which would result in increased utilization and fuel costs above the cost to operate existing coal facilities – unless it had no choice. Under high gas or carbon price scenarios, these differences would become more pronounced. This is how renewable resources can complement gas resources to fill the capacity need.

B. Evidentiary basis for changes to IRP to move to an all-source RFP.

Q. Please explain the purpose of this section.

A. In the section above, I illustrated the policy and economic reasons why this IRP presents more potential upside to GPC and ratepayers under an all-source process than the risks that GPC has identified. In this section, I show where the IRP evidence elucidates the benefits of holding an all-source RFP.

Q. What is your criticism of the IRP's requested approvals to fill the need identified by the Strategist Base Case?

A. GPC determined the units to be acquired in the Base Case by eliminating renewable resources from consideration through its screening process, creating assumed units for the forthcoming CRSP RFP and populating the model with those assumptions, and then allowing the model to select only certain gas-fired technologies.[25] For the Plant Bowen and Wansley analyses, GPC did not rely on the model, but rather created a spreadsheet analysis that again did not optimize among available technologies.

This means that the expensive and sophisticated Strategist model is not being employed for its chief attribute, which is to select bids to populate an expansion model based on their real-world *i.e.* bid, characteristics. In this manner, GPC has bypassed the primary attributes of the model, which is to select from a variety of resources based on their project assumptions, based on its characterizations of renewable resources.

Q. Isn't the Resource Mix Study reliant upon Strategist?

A. Yes, it is, but the misleading methodology GPC uses is to first limit the Base Case optimization by eliminating a wide section of the market, and then characterize the Base Case optimization run to be a transparent "conclusion" of the resources to be acquired.[26]

The Resource Mix study describes Strategist capability as follows[27]:

> PROVIEW uses dynamic programming techniques to develop the optimum resource mix (see Appendix E for a description of the algorithm). This technique allows PROVIEW to evaluate, in every year, each combination of generation additions that satisfy the reserve margin constraint. For each combination, annual operating costs are simulated and are added to the construction costs required

[25] GPC claims that solar plus storage may perhaps bid into the Capacity RFP, though it was not a selectable resource in the IRP base case. IRP at Resource Mix Study, at 1.3 ("Combined cycle ("CC"), CC with carbon capture and compression ("CCC"), combustion turbines ("CT"), and CT with Selective Catalytic Reduction ("SCR") were the technologies selected for the mix analysis.")
[26] *Compare,* IRP at p. 27 ("Intermittent resources, such as solar and wind, were not included as selectable technologies for the expansion planning model…") *with* Resource Mix Study at B-108 ("The conclusion of this study, based upon the results of the base case…is that additional generation capacity requirements will involve a mixture of combustion turbine generation…with SCR…combined cycle generation…with CCC.")
[27] 2019 Resource Mix Study, at 1-4.

> to build that particular combination of resource additions. A least cost resource plan is developed only after reviewing many construction options.

However, the Report then details that renewable resources were not available even to the generic model: "Intermittent resources **were not included** as technologies for the model to select due to model limitations associated with the inclusion of intermittent resources but instead were reflected in the model as planned and committed resources."[28] (Emphasis added.) This leads the Base Case combinations to be flawed.

Q. Does the Resource Mix study defend or elucidate what the limitations of the model were related to renewable resources?

A. Not to my review.

Q. Are you aware of any such limitations in your experience?

A. No. As mentioned above, there are inputs to Strategist in Colorado for integration costs for wind and solar, but not limitations on the model's ability to evaluate renewable resources. While the Resource Mix study adequately describes Strategist optimization module, the model was not relied upon by GPC to examine the scope of resources available or the economic analysis to evaluate the Plant Bowen or Wansley retirements. The IRP Base Case is therefore fatally flawed in its having constrained, rather than allowing, the model to perform its primary function.

[28] *Id.* at 17.

Q. Does the IRP present a basis for its selected renewable additions through the REDI and CRSP initiatives?

A. No, it does not. GPC's proposed renewable additions are 1) arbitrarily selected number without study, 2) for 950 MW, paid for by customer subscription and therefore present different costs and benefits than system resources, 3) have been sequestered from modeling for the actual resource need. At the hearing, GPC admitted that no studies were performed to determine the appropriate amount of renewable resources to acquire. (Tr. 195). To the contrary, GPC testified that the level of renewable resources selected was based on GPC's thought that 1,000 MW "keeps the pace" of acquisitions. (Tr. 197). In discovery, GPC was asked about how it decided on its acquisition level, and its answer was that the number was "strategic".[29] Incredibly, this strategic decision was made with "no analysis" whatsoever, including no data to support the number that was selected.[30]

This demonstrates arbitrary and subjective decision making that was done under the shadow of sophisticated modeling software which could have provided guidance to GPC and the Commission. These decisions also pre-suppose the outcome of the RFP in defiance of market principles. Renewable resources are not modeled in Strategist, but in the stand alone RCB Framework which separates, yet duplicates, some facilities of capacity expansion planning.

[29] **EXHIBIT SACE-MDD-2**, Discovery Response STF-DEA-1-5.
[30] **EXHIBIT SACE-MDD-3**, Discovery Response STF-DEA-1-6.

Q. Should the CRSP additions be deemed sufficient for the IRP?

A. No, as GPC answered, "Customers participating in the CRSP program will fully cover all costs associated with the program during their contract terms, thereby reducing risk to non-participating customers."[31] As a result, the CRSP program is a product sold to certain customers that adds renewables to create system benefits but cannot affect the capacity need based on its treatment in the Base Case as being "baked into" the model.

Q. How did GPC testify as to its ability to model wind and solar bids?

A. GPC stated Strategist can "properly model" wind and solar "when we're evaluating bids". (Tr. 627)

Q. Did GPC testify that it would accept "hybrid" bids, meaning bids that include both solar plants and gas plants?

A. GPC suggested that a hybrid solar and gas model could be evaluated based on firmness. (Tr. 565) However, GPC went on to clarify that "although we're not allowing the asset to compete head-to-head with some of these other supply side resources…we are evaluating the asset against our reference supply side case." (Tr. 566) Rather than having GPC make these choices as to "firmness", the model is fully capable of evaluating the bids on a head-to-head basis. GPC is putting its thumb on the scale here.

The concept that GPC might accept a solar bid if it was paired with gas illustrates how customer value could be diminished under the proposed RFP. If a solar project could only be evaluated in the capacity RFP if it were paired with a gas plant, such co-

[31] **EXHIBIT SACE-MDD-4**, Discovery Response STF-DEA-1-8

located facilities would not necessarily provide any economic value that is different from that of solar bid on its own to be selectable by the model. To the contrary, requiring solar plant bids to be co-located with a gas plant may negatively affect its value based on land availability, aspect, terrain variability and shading, or transmission.

Q. Do the Base Case sensitivities present relevant decision points for the Commission?

A. The Base Case shows one possible future scenario, while foreclosing others from review. The sensitivities performed on the Base Case are likewise constrained to the gas resources that comprised the model's choices. The sensitivities reflect futures with high or low gas cost, or high or low carbon cost, yet only different gas plants were analyzed! The sensitivity runs must include the caveat that no renewable resources were available for the model to consider. As a result, the sensitivity runs do not give the Commission information regarding whether portfolios selecting more renewable resources might mitigate the risks the sensitivities are meant to address, *e.g.* different gas price futures.

Q. What are the risks associated with GPC's approach to the capacity RFP?

A. GPC's approach creates an artificial market constraint. The market opportunity will be smaller for renewables, which creates less market interest. This can result in less competition and higher costs to ratepayers. A second risk is reduced potential for customer savings because the inability to allow the projects to compete head-to-head by technology and the failure of the model to be able to rely in part on renewables for capacity may mean capacity is over-procured.

Q. But aren't you ignoring the RCB Framework and its review of renewable resources that do allow for capacity credit?

A. I do not have direct experience with the RCB Framework. However, my understanding is that the RCB Framework will be applied to CRSP and will not be applied to the capacity RFP. Additionally, the CRSP resources will be included in the model as assumptions and not as selectable products. Thus, the RCB Framework provides a capacity credit but does not let renewable resources compete to fill actual system capacity needs.

Q. Please explain the distinction between the RCB Framework capacity credit and that required to allow an all-source competition.

A. My understanding is that the RCB Framework includes functions that are available with Strategist model optimization, but is itself conducted outside of that optimization. The capacity expansion model tracks and reports capital costs (and the associated revenue requirements), operations and maintenance costs, fuel costs, emissions and associated costs, and integration costs for solar and wind costs. If a plant such as Bowen or Wansley is run both "on" and "off" in the model, the resulting view will show the reduction in fuel and variably O&M associated with that plant. But the RCB analysis will not be available to the model to apply in those runs, thus sequestering its results.

Instead, the ICE factors in the RCB that determine firm capacity values for renewable resources should be used as bid evaluation assumptions for renewable resources in an all-source RFP. GPC defines the ICE methodology as follows:

> [ICE] establishes a capacity value based on a resource's capacity worth across the entire year, not just a few hours. This method

> approximates the reliability of a renewable resource relative to the reliability of a dispatchable CT resource as opposed to just determining the peak load carrying capability.[32]

Thus, the ICE factor is the result of substantial study and collaboration between GPC and Staff. Its specific data-driven values should determine the firm capacity credit allowed by the Strategist model to assign to renewable resource bids. This is not only consistent with all-source bid evaluation; it is consistent with GPC's testimony.

Q. Does the RCB Framework provide a firm capacity credit?

A. It does, in the form of a deferred capacity credit. GPC defines the term as follows: "This item represents generation capacity costs that are deferred because a portion of the load is being served by a renewable resource."[33] In other words, the capacity of a resource defers the need for new capacity, which is the same thing as capacity. *All* capacity defers additional capacity. The Company admitted this in discovery: "The Company's viewpoint is that providing capacity and deferring the need for future capacity describe the same capacity benefit of a generating resource."[34] As a result, GPC should consent to attributing partial capacity credit to renewable resources in an all-source RFP.

[32] GPC, *A Framework for Determining the Costs and Benefits of Renewable Resources in Georgia*, Revised: 1/17/19, at pp. 12-13.
[33] *Id.*
[34] **EXHIBIT SACE-MDD-5**, Discovery Response STF-DEA-1-10

Q. Turning to GPC's Capacity need, what does GPC request?

A. GPC determines that it requires capacity in the years 2028 and possibly 2022. The 2022 need is dependent on GPC's review of bids as against the economics of continuing to run Plant Bowen Units 1-2 and is not driven by load growth.

Q. Are there flaws to that approach to the capacity RFP?

A. Yes. Although the decommissioning of Plant Bowen Units 1-2 would cause a reduction in system capacity, that capacity is not peaking capacity typically provided by CTs. It is primarily intermediate load, though perhaps at times baseload, capacity. As mentioned above, in the generation data reported by GPC to EIA, set forth in EXHIBIT SACE-MDD-6, the availability numbers suggest that the units are not providing "guaranteed" system capacity as far as meeting the system peak. As a result, replacing these intermediate load facilities with high energy output with gas peaking units or combined cycle units is not justified based on a guaranteed firm capacity rationale. The only way we can test this capacity distinction is through an all-source RFP.

Q. Could the capacity need be different if renewable resources were simultaneously considered by the model?

A. Absolutely. GPC has 31 dispatchable gas or diesel CT units, only three of which have seasonal usage restrictions.[35] Most of these units have very low utilization, according to a review of EIA Form 923 data. Ten of those plants have some utilization, but at capacity

[35] IRP at 15, 37.

factors of 1-10%. It is possible that GPC has potential slack in its system capacity that Strategist could identify. The point of this analysis is not to draw hard conclusions about the state of GPC's system. Rather, these questions highlight areas that are appropriate for inquiry via an all-source RFP.

Q. Does the RCB Framework allow the Commission to review whether renewable resources can be competitive with gas-fired units?

A. It does not. The use of the RCB Framework means that CRSP renewables are assumptions input into the capacity expansion plan, and thus not analyzed by the model to determine whether they can benefit the integrated electric system better or worse than a gas unit in a given year under the model's parameters. The RCB Framework therefore cannot substitute from the evaluation of an all-source RFP within Strategist.

V. <u>Recommendations if all-source is employed</u>

Q. Please explain the purpose of this section.

A. The purpose of this section is to provide guidance to the Commission should it choose to adopt an all-source RFP.

Q. What assumptions and inputs should the Commission monitor if an all-source RFP is employed?

A. Many of the assumptions have been discussed in the IRP, or in this testimony. The model used by GPC has already incorporated assumptions on load growth, fuel cost forecasts, wind and solar integration costs, emissions, operating characteristics of various plants, including curtailments for wind or air permit constraints for gas, DSM and DR values, seasonal capacity purchases, gas transportation costs, and revenue information associated with the utility's capital structure and weighted average cost of capital. This list is not exhaustive, but should demonstrate that a lot of the heavy lifting has been done.

Q. If the heavy lifting has been done, what should be the Commission's concern?

A. First, bid resources must be modeled according to their bids and without external cost factors applied to them that are not approved by the Commission. Second, bid resources must also have their benefits accounted for in the model. For example, Colorado applies a "Surplus Capacity Credit" in the model for the period up to the year in which the Company's loads and resources table shows firm generation capacity in excess of the planning reserve margin (i.e. the periods in which the Company is currently long capacity).[36] In Georgia, my understanding is that model would not give credit for potential short-term off-system sales of firm capacity.

Q. Does Strategist have limitations with respect to storage?

A. Yes, at least the Colorado Commission has so recognized based on the testimony in the 2016 Xcel ERP referenced above. Should the Commission adopt an all-source RFP, I

[36] In those years, surplus capacity over the need is credited $2.79/kW-mo up to an excess of 200 MW in the Phase I alternative plan analysis and during Phase II portfolio creation. The surplus capacity credit price is based on bids received in an RTO market for seasonal capacity for a prior summer season. This credit is applied for the four summer months of June through September.

suggest the Commission also adopt similar storage assumptions to those used in the 2016 PSCO ERP Phase 1 Decision.[37]

Q. Does Strategist have limitations with respect to renewable resource integration?

A. My understanding is that Strategist is dependent on input assumptions that comprise the all-in costs of each project, including interconnection costs and ancillary services requirements. The RCB Framework is a starting point for developing such assumptions. Other witnesses may comment on what those final inputs should reflect. My addition is that such inputs should be adopted into Strategist for the purposes of bid evaluation.

Q. Is modeling a panacea versus the standalone RCB Framework approach to bid evaluation?

A. It is definitely not a panacea. The Commission should be conscious that modeling offers requires vigilance to protect the market. Here, modeling offers a clear, and unwisely curtailed, opportunity to bring renewable energy resources on par with all other available resources to meet the resource need. The renewable resource development industry has become low cost and includes sophisticated market players. The market can and will rise to the challenge of an all-source RFP. GPC's adoption of the Strategist model gives the Commission that opportunity. Based on my experience, that can have positive results for ratepayers.

[37] Colorado Public Utilities Commission, *Phase I Decision Granting, with Modifications, Application for Approval of 2016 Electric Resource* Plan, Decision No. C17-0316, Proceeding No. 16A-0396E

VII. Conclusion

Q. Does the lack of an all-source RFP harm the market for resources in Georgia?

A. There is no reason to believe it has harmed the market, but in my opinion it may cause reduced interest in the market from IPPs. The GPC renewables market is being artificially constrained in the IRP to customer-supported products despite the clear market growth and lower costs being developed nationwide. Whereas the CRSP is a nameplate capacity 950 MW RFP, the Plant Bowen Units 1-2 need may be several gigawatts of renewable capacity, based on a partial capacity credit (for example, at 50% capacity credit it would require 2 GW of solar to achieve 1,000 MW of capacity). The size of that market opportunity will attract nationwide attention. Renewable resource economies of scale can drive down bid prices significantly.

Q. Do you draw any other conclusions for the Commission's consideration?

A. Yes. I recommend the Commission rely on market-based solutions to deliver price discipline and technological innovation to benefit ratepayers by replacing the energy and capacity needs on the system in an economic fashion. Without an all-source RFP, ratepayers are potentially leaving money on the table. The GPSC and GPC have the tools to allow this market fix, and the time horizon to give it a chance to work in practice.

Q. Does this conclude your testimony?

A. Yes, it does. Thank you.

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Dietze and Davis, P.C. — *07/09- present*

- Public Utilities law:
    - Public Utilities Commission (PUC) practice, including representation of gas and water utilities, consumer advocates, independent power producers and demand side management trade associations, developers of utility scale renewable energy and natural gas projects. I have expertise in ratemaking, electric resource planning, power purchase agreements and resource acquisitions, transmission issues, energy efficiency law and policy; legislative affairs and strategy, as well as public policy;
    - Federal Energy Regulatory Commission (FERC) practice including transmission development and FERC Order 888 open access and transmission issues, transmission interconnection and LGIP; hydroelectric facility licensing and exemptions; Public Utilities Regulatory Policy Act (PURPA) issues involving Qualified Facilities (QFs); and municipalization-related issues.
- Colorado Water Rights:
    - Adjudication of absolute and conditional water rights, changes of water rights, and augmentation plans as both applicant and opposition;
    - Purchase and sale of water rights, including title opinions;
    - Representation of mutual irrigation ditch companies as general counsel, in easement disputes and crossing agreements, as well as corporate governance;
    - Representation of governmental and quasi-governmental entities, including strategic water planning.

- Endorsed as expert witness in water matters before bankruptcy court.

- Energy Project Development: Practice in issues related to power project development, including development strategy and marketing, purchase and sale of power projects, transmission issues, land use permitting and agreements, and corporate matters.
- Real estate, public land and environmental issues, including negotiating agreements and permitting issues with US Forest Service, BLM and Bureau of Reclamation, experience in endangered species, water quality and easement rights.
- Corporate matters, including entity organization and formation.
- Representative clients: Energy Outreach Colorado, Energy Efficiency Business Coalition, Colorado Independent Energy Association, Durango Mountain Utilities, Prospect Mountain Water Company, TradeWind Energy, Invenergy, LLC, Strata Solar, EnerNOC, County of Park, Colorado, Greeley Irrigation Company, Strawberry Park Hot Springs Resort, Pine View Farms, LLC, Upper Yampa Water Conservancy District, Woodchuck Ditch Company.

Mark D. Detsky, Esq. — *Boulder, CO*
Private practice — *08/08-07/09*

- Practice in energy and water related matters while traveling the Americas. I also learned to speak Spanish during this period.

Associate Attorney — *Longmont, CO*
Bernard, Lyons, Gaddis, and Kahn, P.C. — *01/05- 08/08*

- Colorado Water Rights: Practice in all aspects of water resources in Colorado. Water rights litigation, transactions, real property and water disputes. Adjudication of tributary and nontributary water rights and plans for augmentation, changes and exchanges. Work with numerous ditch companies, private users and governmental entities in a specialized water practice.
- Energy: PUC regulatory practice, including policy work, corporate matters, real estate/easement matters, wind, solar and energy efficiency.
- Real estate, with a focus on easement agreements and disputes; Corporate governance; transactions and contracts.
- Representative clients: Upper South Platte Water Conservancy District, Headwater Authority of the South Platte, Fruitland Water Company, Greeley and Loveland Irrigation Company, County of Crowley, City of Arvada, Penrose Water District, Town of Dillon, Crestone View Farms, Highland Ditch Company, Lake McIntosh Reservoir Company, Lee and Baugh Ditch Company, EnCompass Wind, LLC.

Staff Attorney - Energy — *Denver, CO*
Environment Colorado — *01/04-12/04*

- Lead counsel for successful defense of ballot initiative certification for Amendment 37 (Renewable Energy Standard) before the Colorado Supreme Court. Representation, public speaking (including debates), press outreach, fundraising outreach for successful renewable energy standard ballot initiative in Colorado (first such public referendum in the U.S.).
- Lead counsel for PUC resource planning proceedings and comprehensive settlement negotiations with Public Service Company of Colorado.

United States Department of Justice Wildlife and Natural Resources Division Denver, CO
Interstate water litigation section *9/02- 1/03*

PROFESSIONAL AFFILIATIONS

- Member of Board of Advisors – Energy Innovation Center at Getches-Wilkinson Natural Resources, Energy and the Environment at Colorado School of Law.
- 2010 Colorado Water Leaders Program selection - Colorado Foundation for Water Education
- Pro bono attorney- Boulder County Legal Services, serving Spanish speaking clients.
- Chair, Natural Resources Sect. of the Boulder County Bar Assoc. (BCBA) 2006 – 08
- BCBA Board Nominating Committee 2006 – 2007
- Member – Colorado Renewable Energy Society, American Wind Energy Association.
- Colorado Water Congress – 2015 Chair of Professional Outreach Committee

SELECTED PUBLICATIONS

- *Electric Vehicles: Rolling Over Barriers and Merging With Regulation,* William and Mary Environmental Law and Policy Review, Vol. 40, No. 2 (March 2016).
- *Getting Into Hot Water: the Law of Geothermal Energy in Colorado,* The Colorado Lawyer Vol. 39, No. 9 (September 2010).
- with Jeffrey J. Kahn, *Current Issues with Changes of Water Rights Involving Shares of Mutual Ditch Companies*, in DITCH COMPANY HANDBOOK , Ditch and Reservoir Company Alliance (September 2007).
- *Against the Wind: Implementing Renewable Energy in Colorado*, Boulder County Bar Newsletter (May 2006).
- with Jeffrey J. Kahn, *Ditch Rights: The Law of Irrigation Easements and Rights of Way*, in COLORADO WATER LAW BENCH BOOK, Colorado Bar Association (2006).
- Comment, *The Murky Sea over the Magnificent Whale,* Colo. Journal Int. Env. L. Policy 2002 Yearbook (Summer 2003).
- Note, *The Global Light: Lessons for US Solar Policy*, 14 Colo. Journal Int. Env. L. Policy 301 (Spring 2003).

EDUCATION

University of Colorado School of Law, Boulder JD 5/2003

- Associate Editor, Colorado Journal of International Environmental Law and Policy
- President, Environmental Law Society
- New Law Building Design Committee (head of Green Building Committee)
- Bernard Seeman Scholarship (2000)

University of Michigan, Ann Arbor BA Political Science 5/1997

- Class honors (1996, 1997)
- Writing Excellence Recognition (9/1993)

London School of Economics and Political Science London, UK 1996

STF-DEA-1-5

Question:

How did the Company decide on the 950 MW target for the Utility Scale Renewable Energy Procurement?

Response:

The 950 MW target for utility-scale procurement reflects the Company's strategy of maximizing value for all customers with an emphasis on the deployment of renewable resources that provide the most benefits. The Company's overall 1,000 MW renewable proposal reflects nearly a one-third expansion of its projected 2021 renewable portfolio, demonstrating a consistent commitment to responsibly growing renewables.

Contact: Jeff Grubb

STF-DEA-1-6

Question:

Please provide all analyses and workpapers behind the selection of a 950 MW target for the Utility Scale Renewable Energy Procurement. Please provide all spreadsheets as working files with formulas intact.

Response:

There are no analyses specific to the selection of the 950 MW target for the proposed Utility Scale RFP. See response to STF-DEA-1-5.

Contact: Jeff Grubb

Docket Nos. 42310 & 42311
Georgia Power Company's 2019 IRP and 2019 DSM Application
STF-DEA Data Request Set Number 1

STF-DEA-1-8

Question:

Please provide the analysis and workpapers behind the decisions to offer existing large customers the opportunity to subscribe to a portfolio of 500 MW of renewable resources and to offer new customers with load additions greater than 25 MW the opportunity to subscribe to a portfolio of 450 MW of renewable resources. What cost risks would this program have to non-participating customers?

Response:

Please see the Company's responses to STF-DEA-1-5 and STF-DEA-1-22 for information regarding the decisions to offer existing large customers the opportunity to subscribe to a portfolio of 500 MW of renewable resources and to offer new customers with load additions greater than 25 MW the opportunity to subscribe to a portfolio of 450 MW of renewable resources.

Customers participating in the Customer Renewable Supply Procurement ("CRSP") program will fully cover all costs associated with the program during their contract terms, thereby reducing risk to non-participating customers. These costs include the supply costs of the utility-scale renewable resources procured during each of the two requests for proposals and any other program administration costs. In addition, current renewable pricing continues to be competitive when compared to forecasted projections of long-term avoided cost and provides some reasonable assurance as to the value of this program to all retail customers.

Contact: Jeff Grubb

STF-DEA-1-27

Question:

Please refer to the Renewable Cost Benefit Framework (Technical Appendix Vol. 2), p. 12. Please explain the Company's viewpoint when it considers conventional thermal generation capacity as providing capacity and renewable energy-based generation as only deferring the need for future capacity

Response:

The Company's viewpoint is that providing capacity and deferring the need for future capacity describe the same capacity benefit of a generating resource. The deferred generation capacity costs referenced on page 12 of the Renewable Cost Benefit Framework is not unique to renewable resource evaluations and is consistent with how capacity credit is provided for thermal resources.

Contact: Jeff Grubb

Georgia Power Owned or Contracted Fossil Plants, US EIA Form 923, Calculated Capacity Factors

Unit	Fuel	Prime Mover	2010	2011	2012	2013	2014	2015	2016	2017
E C Gaston-U0001u	Coal	Steam Turbine	29%	63%	33%	23%	21%	14%	4%	0%
E C Gaston-U0002u	Coal	Steam Turbine	38%	66%	36%	23%	18%	20%	5%	0%
E C Gaston-U0003u	Coal	Steam Turbine	54%	62%	35%	18%	30%	13%	5%	0%
E C Gaston-U0ST4u	Coal	Steam Turbine	50%	62%	33%	40%	44%	8%	3%	0%
Bowen-U0001u	Coal	Steam Turbine	67%	57%	38%	41%	47%	27%	46%	46%
Bowen-U0002u	Coal	Steam Turbine	81%	41%	22%	13%	47%	46%	45%	31%
Bowen-U0003u	Coal	Steam Turbine	83%	52%	34%	59%	50%	49%	49%	56%
Bowen-U0004u	Coal	Steam Turbine	71%	52%	30%	40%	63%	44%	64%	48%
Hammond-U0001u	Coal	Steam Turbine	39%	25%	18%	24%	13%	5%	6%	0%
Hammond-U0002u	Coal	Steam Turbine	11%	34%	18%	21%	16%	4%	8%	-1%
Hammond-U0003u	Coal	Steam Turbine	45%	28%	30%	28%	17%	5%	6%	1%
Hammond-U0004u	Coal	Steam Turbine	38%	40%	14%	1%	12%	20%	15%	10%
Harllee Branch-U0001u	Coal	Steam Turbine	30%	31%	31%	26%	34%	21%	0%	0%
Harllee Branch-U0002u	Coal	Steam Turbine	27%	35%	11%	26%	0%	0%	0%	0%
Harllee Branch-U0003u	Coal	Steam Turbine	46%	35%	8%	11%	15%	4%	0%	0%
Harllee Branch-U0004u	Coal	Steam Turbine	40%	39%	12%	22%	19%	17%	0%	0%
Jack McDonough-U0001u	Coal	Steam Turbine	33%	48%	3%	0%	0%	0%	0%	0%
Jack McDonough-U0002u	Coal	Steam Turbine	44%	69%	0%	0%	0%	0%	0%	0%
Mitchell (GA)-U0003u	Coal	Steam Turbine	7%	3%	0%	0%	5%	3%	0%	0%
Yates-U0001u	Coal	Steam Turbine	37%	17%	2%	0%	0%	0%	0%	0%
Yates-U0002u	Coal	Steam Turbine	34%	32%	25%	13%	1%	2%	0%	0%
Yates-U0003u	Coal	Steam Turbine	36%	30%	33%	25%	1%	2%	0%	0%
Yates-U0004u	Coal	Steam Turbine	35%	22%	4%	1%	1%	0%	0%	0%
Yates-U0005u	Coal	Steam Turbine	34%	18%	1%	1%	1%	0%	0%	0%
Yates-U0006u	Coal	Steam Turbine	50%	47%	31%	23%	15%	10%	0%	0%
Yates-U0007u	Coal	Steam Turbine	50%	33%	17%	12%	3%	0%	0%	0%
Kraft-U0002u	Coal	Steam Turbine	56%	0%	0%	0%	54%	87%	0%	0%
Kraft-U0003u	Coal	Steam Turbine	46%	33%	0%	0%	15%	11%	0%	0%
Kraft-U0NGST	Coal	Steam Turbine	0%	0%	3%	0%	0%	0%	0%	0%
Kraft-U0ST1u	Coal	Steam Turbine	59%	0%	0%	0%	45%	95%	0%	0%
Wansley-U0001u	Coal	Steam Turbine	48%	50%	26%	8%	33%	23%	34%	22%

 Georgia Power Owned or Contracted Fossil Plants, US EIA Form 923, Calculated Capacity Factors

Unit	Fuel	Prime Mover	2010	2011	2012	2013	2014	2015	2016	2017
Wansley-U0002u	Coal	Steam Turbine	60%	43%	32%	16%	25%	31%	22%	23%
McIntosh-U0001u	Coal	Steam Turbine	15%	4%	-1%	4%	17%	6%	1%	1%
Scherer-U0001u	Coal	Steam Turbine	82%	59%	64%	60%	68%	47%	52%	30%
Scherer-U0002u	Coal	Steam Turbine	83%	61%	68%	64%	60%	57%	49%	53%
Scherer-U0003u	Coal	Steam Turbine	63%	78%	63%	54%	60%	41%	51%	40%
Jack McDonough-U0CC04	Gas	Combined Cycle	0%	2%	81%	82%	77%	81%	78%	74%
Jack McDonough-U0CC05	Gas	Combined Cycle	0%	0%	81%	82%	77%	81%	78%	74%
Jack McDonough-U0CC06	Gas	Combined Cycle	0%	0%	81%	82%	77%	81%	78%	74%
E B Harris Electric Generating Plant-U0CC01	Gas	Combined Cycle	0%	0%	0%	0%	0%	0%	53%	46%
E B Harris Electric Generating Plant-U0CC02	Gas	Combined Cycle	37%	49%	57%	41%	42%	65%	53%	46%
Mid-Georgia Cogeneration Facility-UCCchp	Gas	Combined Cycle	6%	9%	13%	3%	7%	9%	17%	5%
Wansley Combined Cycle-U0CC06	Gas	Combined Cycle	51%	56%	63%	40%	55%	72%	65%	80%
McIntosh Combined Cycle Facility-U0CC10	Gas	Combined Cycle	64%	68%	62%	66%	61%	63%	73%	74%
McIntosh Combined Cycle Facility-U0CC11	Gas	Combined Cycle	64%	68%	62%	66%	61%	63%	73%	74%
Jack McDonough-U000GT	Gas	Gas Turbine	0%	0%	0%	0%	0%	0%	0%	0%
Boulevard-U000GT	Gas	Gas Turbine	0%	0%	0%	0%	0%	0%	0%	0%
Kraft-U000GT	Gas	Gas Turbine	0%	0%	0%	0%	0%	0%	0%	0%
McIntosh-U000GT	Gas	Gas Turbine	0%	0%	0%	0%	1%	1%	1%	1%
Robins-U000GT	Gas	Gas Turbine	1%	0%	0%	0%	0%	0%	1%	1%
Dahlberg-U000GT	Gas	Gas Turbine	4%	2%	5%	2%	4%	6%	7%	4%
Intercession City-U000GT	Gas	Gas Turbine	7%	4%	3%	2%	2%	3%	4%	3%
Tenaska Georgia Generation Facility-U000GT	Gas	Gas Turbine	1%	2%	4%	0%	1%	2%	1%	1%
Walton County Power LLC-U000GT	Gas	Gas Turbine	8%	9%	9%	3%	5%	8%	8%	6%
Edward L. Addison Generating Plant-U000GT	Gas	Gas Turbine	0%	0%	0%	0%	0%	6%	7%	5%
Washington County-U000GT	Gas	Gas Turbine	4%	3%	4%	2%	1%	3%	2%	2%
E C Gaston-U0001u	Gas	Steam Turbine	0%	0%	0%	0%	0%	0%	0%	11%
E C Gaston-U0002u	Gas	Steam Turbine	0%	0%	0%	0%	0%	0%	0%	17%
E C Gaston-U0003u	Gas	Steam Turbine	0%	0%	0%	0%	0%	0%	0%	17%
E C Gaston-U0ST4u	Gas	Steam Turbine	0%	0%	0%	0%	0%	0%	0%	16%
Yates-U0001u	Gas	Steam Turbine	0%	0%	0%	0%	0%	2%	0%	0%
Yates-U0006u	Gas	Steam Turbine	0%	0%	0%	0%	0%	0%	7%	5%

Georgia Power Owned or Contracted Fossil Plants, US EIA Form 923, Calculated Capacity Factors

Unit	Fuel	Prime Mover	2010	2011	2012	2013	2014	2015	2016	2017
Yates-U0007u	Gas	Steam Turbine	0%	0%	0%	0%	0%	4%	7%	9%
Kraft-U0002u	Gas	Steam Turbine	0%	40%	37%	47%	0%	0%	0%	0%
Kraft-U0003u	Gas	Steam Turbine	0%	0%	30%	30%	0%	0%	0%	0%
Kraft-U0NGST	Gas	Steam Turbine	0%	0%	0%	4%	0%	0%	0%	0%
Kraft-U0ST1u	Gas	Steam Turbine	0%	44%	40%	39%	0%	0%	0%	0%
E C Gaston-U000GT	Oil	Gas Turbine	0%	0%	0%	0%	0%	0%	0%	0%
Bowen-U000GT	Oil	Gas Turbine	0%	0%	0%	0%	0%	0%	0%	0%
Jack McDonough-U000GT	Oil	Gas Turbine	0%	0%	0%	0%	0%	0%	0%	0%
McManus-U000GT	Oil	Gas Turbine	0%	0%	0%	0%	0%	0%	0%	0%
Mitchell (GA)-U000GT	Oil	Gas Turbine	0%	0%	0%	0%	0%	0%	0%	0%
Boulevard-U000GT	Oil	Gas Turbine	0%	0%	0%	0%	0%	0%	0%	0%
Kraft-U000GT	Oil	Gas Turbine	0%	0%	0%	0%	0%	0%	0%	0%
Wansley-U000GT	Oil	Gas Turbine	0%	0%	0%	0%	0%	0%	0%	0%
Wilson-U000GT	Oil	Gas Turbine	0%	0%	0%	0%	0%	0%	0%	0%
McManus-UIntComb	Oil	Int Comb Engine	0%	0%	0%	0%	0%	0%	0%	0%
Wilson-UIntComb	Oil	Int Comb Engine	0%	0%	0%	0%	0%	0%	0%	0%
McManus-UPetLq	Oil	Steam Turbine	0%	0%	0%	0%	0%	0%	0%	0%