STATE OF GEORGIA

BEFORE THE

GEORGIA PUBLIC SERVICE COMMISSION

In Re:

Georgia Power Company's	**)**	**Docket No. 44160**
2022 Integrated Resource Plan	**)**	

AMENDED DIRECT TESTIMONY OF THE GEORGIA LARGE SCALE SOLAR ASSOCIATION AND ADVANCED POWER ALLIANCE

May 20, 2022

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Q1. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS AFFILIATION

A1. My name is Ryan Sanders. I am Chairman of the Georgia Large Scale Association located at 191 Peachtree Street, Suite 2900, Atlanta, GA 30303.

Q2 MR. SANDERS, PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE

A2 I hold a MBA from Emory's Goizueta School of Business, a Master's degree from Georgia Tech's Sam Nunn School of International Affairs, and two Bachelor degrees from the University of Georgia. I am a founding partner of Beltline Energy, a regional leader in renewable energy development which specializes in solar project origination and land acquisition. Prior to joining Beltline Energy, I developed Georgia's first greenfield distributed solar facility for the Georgia Power Company ("GPC") in Upson County. I then worked on the development of the State's first utility scale solar facility in Mitchell County, GA as part of GPC's first solar RFP: the Large-Scale Solar ("LSS") initiative. Beltline has originated projects in each of Georgia Power Company's three Advanced Solar Initiative ("ASI") procurements, and in both the 2016 Renewable Energy Development Initiative ("REDI") and the 2019 Customer Renewable Subscription ("CRSP") solicitations in both the Utility Scale and Distributed Generation ("DG") programs.

I am a member of the Georgia Solar Energy Association ("GSEA") and a founding member and Chairman of the Georgia Large Scale Solar Association ("GLSSA"). GLSSA is a collection of utility scale solar developers, EPC's, independent power producers, and public utility companies that advocate for the development of a cost-efficient Georgia solar market. They leverage the State's resource advantages in solar

insolation, abundant agricultural land, and skilled labor to deliver reliable, low-cost solar energy to the GA Ratepayer.

Q3. WHAT IS YOUR ROLE IN THIS PROCEEDING?

A3. I am the Chairman of the Georgia Large Scale Solar Association ("GLSSA") and my role is to promote the responsible expansion of the utility-scale solar and energy storage industry in Georgia in collaboration with the Georgia Power Company ("Georgia Power" or "Company") and with the leadership of the Georgia Public Service Commission ("PSC" or "Commission").

Q4. HAVE YOU PREVIOUSLY TESTIFIED IN THE PUBLIC UTILITY COMMISSION PROCEEDINGS?

A4. Yes, I acted as an expert witness in the Georgia 2016 and 2019 IRP proceedings, as well as the 2020 Georgia Power Avoided Cost docket.

Q5. MR. MOLLER, PLEASE STATE YOUR NAME, TITLE, AND BUSINESS AFFILIATION.

A5. My name is Lucas Moller. I work for Recurrent Energy and am Head of Energy Storage. My business address is: 123 Mission St., 18th Floor, San Francisco, CA 94105.

Q6. MR. MOLLER, PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A6. I graduated from Stanford University in 2010 with a Bachelor of Science in Earth Systems: Energy Science and Technology. Since 2010, I have worked entirely in the power, energy, and utilities industry. I worked for more than four years for PowerAdvocate, a power and

energy consultancy, where I helped numerous major utilities implement large procurements, new programs, and realize cost savings.

In 2015, I joined Recurrent Energy to source and negotiate Engineering, Procurement, and Construction ("EPC") agreements and Operations and Maintenance ("O&M") partnerships for solar facilities, as well as manage energy storage supplier relationships and technology diligence. I currently lead the energy storage group at Recurrent Energy and am responsible for energy storage business development across North America. I have personally executed on 750 MW and 3,000 MWh of battery energy storage projects currently operating or under construction.

Q7. WHAT IS YOUR ROLE IN THIS PROCEEDING?

A7. I am speaking on behalf of the Georgia Large Scale Solar Association ("GLSSA") to promote the responsible expansion of the utility-scale solar and energy storage industry in Georgia in collaboration with the Georgia Power Company ("Georgia Power" or "Company") and with the leadership of the Georgia Public Service Commission ("PSC" or "Commission").

Q8. HAVE YOU PREVIOUSLY TESTIFIED IN PUBLIC UTILITY COMMISSION PROCEEDINGS?

A8. I have not previously testified in a Public Utility Commission proceeding.

Q9. MR. HOLMAN PLEASE STATE YOUR NAME, TITLE, AND BUSINESS AFFILIATION

A9. My name is Blan Holman. I am the Vice President for Regulatory Affairs of PineGate Renewables located at 130 Roberts Street, Ashville, NC 28801.

Q10. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A10. I graduated from the University of North Carolina and the University of Virginia School of Law. I lead Pine Gate's work before state regulatory commissions. Previously, I had 20 years as senior attorney with the Southern Environmental Law Center's Energy, directing clean energy matters in South Carolina and leading a national regulatory litigation initiative. I was a principal NGO drafter of South Carolina's landmark 2014 pro-solar legislation and negotiated settlements implementing that law with regulators and utilities. I have litigated numerous contested utility commission matters and has practiced before federal and state courts at all trial and appellate levels.

Q11. WHAT IS YOUR ROLE IN THIS PROCEEDING?

A11. I am speaking on behalf of the Georgia Large Scale Solar Association ("GLSSA") to promote the responsible expansion of the utility-scale solar and energy storage industry in Georgia in collaboration with the Georgia Power Company ("Georgia Power" or "Company") and with the leadership of the Georgia Public Service Commission ("PSC" or "Commission").

Q12. HAVE YOU PREVIOUSLY TESTIFIED IN PUBLIC UTILITY COMMISSION PROCEEDINGS?

A12. I have not previously testified in a Public Utility Commission proceeding.

Q13. MR. OLSON, PLEASE STATE YOUR NAME, TITLE, AND BUSINESS AFFILIATION.

A13. My name is Arne Olson. I am a senior partner at Energy and Environmental. Economics, Inc. (E3), located at 44 Montgomery Street, Suite 1500, San Francisco, CA 94104.

Q14. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A14**.** I have over 28 years of experience in the energy industry, specializing in the areas of transmission planning, rate and tariff design, wholesale market design, integrated resource planning and renewable energy planning – including renewable energy procurement, program design and transmission assessment, and energy policy analysis. I have consulted extensively for utilities, government agencies, transmission system operators, renewable energy project developers, transmission project developers, and large consumers regarding renewable and clean energy policy, planning and procurement. I hold a Master of Science degree in International Energy Management and Policy from the University of Pennsylvania and Bachelor of Science degrees in Statistics and Mathematical Sciences from the University of Washington. I have previously been retained as an expert and have provided expert testimony in front of the California Energy Commission, the California Public Utilities Commission, the Alberta Utilities Commission, the Oregon Public Utilities Commission, the Colorado Public Utilities Commission, the New Mexico Public Regulatory Commission, the South Carolina Public Service Commission, the Nova Scotia Utility and Review Board, and the Ontario Court of Justice. I have provided expert testimony to legislative committees in Washington and California, and I recently spoke at U.S. Federal Energy Regulatory

Commission Technical Conferences on Carbon Pricing and Ancillary Services by invitation of the Chair.

I have served as the lead investigator in developing integrated resource plans for utilities and state agencies across North America. Much of my resource planning work has focused on helping utilities analyze the impacts of higher penetrations of variable renewable resources on their operations and investment decisions. Some examples of current and past projects include:

- I am a co-author of the 2016 Report Number 6 of the Lawrence Berkeley National Laboratory's "Future Electric Utility Regulation Series," entitled "The Future of Integrated Resource Planning."
- I led a team that provided technical and stakeholder support for Nova Scotia Power's 2020 Integrated Resource Plan focusing on the provincial goal of achieving net zero carbon emissions by 2050.
- I led a team in 2020 that evaluated load and resource options for achieving net zero carbon emissions in New England by 2045, in collaboration with former U.S. Energy Secretary Dr. Ernest Moniz's Energy Futures Initiative.
- In 2020 I led a team that evaluated policy options for achieving deep carbon emission reductions in the PJM region, sponsored by the Electric Power Supply Association (EPSA).
- I was the primary author of the energy market design report *Scalable Markets for the Energy Transition: A Blueprint for Wholesale Market Design Reform*, partly sponsored by EPSA and published in 2021.

- For the Sacramento Municipal Utilities District, I led the development of their 2018 IRP which considered scenarios and resource portfolios for meeting California's and SMUD's own aggressive renewables goals including 100% renewables by 2040.
- For Xcel Energy, I led an effort to support development of Northern States Power's 2018-19 IRP examining high renewable scenarios within the context of the company's stated goal of completely decarbonizing their electric resource portfolio by 2050.
- For a group of utilities in the Pacific Northwest, I led studies in 2017 and 2018 that examined scenarios achieving 50% renewables and up to 100% carbon reductions across the region, focusing on policy mechanisms to achieve the goals at least cost and on the nature and quantity of complementary resources that are needed to maintain reliable electric service.
- I have led several studies of the means to ensure resource adequacy under high renewable power systems, including a 2019 study of the California system entitled "Long-Run Resource Adequacy under Deep Decarbonization Pathways Scenarios for California", funded by the Calpine Corporation, and a 2018 study entitled "Resource Adequacy in the Pacific Northwest" funded by a coalition of 13 publicly-owned and investor-owned utilities. I am also supporting the Northwest Power Pool's ongoing effort to develop a regional resource adequacy program in the Pacific Northwest.

- In 2018, I led a study of the value of partially- and fully-dispatchable solar and solar + storage power plants on the Tampa Electric Company (TECO) system. The study was funded by First Solar but it involved extensive participation by a wide range of TECO staff and included detailed TECO power system data. First Solar and TECO jointly received a "2018 Top Innovators" award from Public Utilities Fortnightly in conjunction with the study and TECO was selected as a finalist for a 2019 Platts Global Energy Award in the "Grid Edge" category.
- For a group comprising the five largest utilities in California (Los Angeles Department of Water and Power, Pacific Gas and Electric Company, Sacramento Municipal Utilities District, San Diego Gas & Electric Company, and Southern California Edison), I led a landmark 2014 study of the feasibility, cost implications and complementary measures for achieving 50% renewables by 2030.
- I have participated in several other E3 resource planning studies of achieving very high renewable penetrations for the Hawaiian Electric Company, the New York State Energy Research and Development Authority, and Arizona Public Service Company.
- I lead a team at E3 that supports the California Public Utilities Commission staff in administering California's Integrated Resource Planning process, developing a Reference System Plan for California and designing and implementing integrated resource planning standards for California load serving entities.

- In 2020-2021 I led a team that developed a machine learning model for calculating dynamic operating reserve requirements based on the instant characteristics of electric load, wind generation and solar generation, partly funded by a grant from the PERFORM program of the ARPA-E division of the U.S. Department of Energy. The model is used by several utilities to calculate reserve requirements for various levels of wind and solar penetration, which is a key input into the calculation of wind and solar integration costs.
- I have overseen several projects calculating integration costs for wind, solar, and solar plus storage projects for U.S. utilities.

Q15. HAVE YOU PREVIOUSLY TESTIFIED IN FRONT OF THE GEORGIA PUBLIC SERVICE COMMISSION?

A15. Yes. In 2019, I testified before the Georgia Public Service Commission, on behalf of the Georgia Large Scale Solar Association, on Georgia Power's 2019 IRP. My testimony focused on recommendations to improve system planning processes in order to treat different types of resources on a level playing field. I also testified in front the GPSC in 2020 regarding Georgia Power's Capacity and Energy Payments under Docket NO. 4822.

Q16. CAN THE PANEL PROVIDE A SUMMARY OF YOUR TESTIMONY AND PROVIDE YOUR KEY POINTS?

A16. The Georgia Large Scale Solar Association (GLSSA) and Advanced Power Alliance (APA) appreciate the opportunity to present our testimony to the Georgia Public Service Commission (Commission) to underscore the benefits that utility scale solar can provide

Georgia Power ratepayers as a competitively priced, reliable, and local source of clean energy. Solar energy benefits Georgia Power Company (Georgia Power or Company) ratepayers by:

- Reducing the avoided cost of energy;
- Creating a more diverse generation portfolio that delivers added operational capabilities;
- Decreasing the impact of volatility in fossil fuel energy markets by procuring locally produced solar energy;
- Acting as a hedge against inflation because the lifetime fuel price of solar is included in the original construction cost and built into the PPA price;
- Allowing companies in the Commercial and Industrial (C&I) sector to gain access to the low-cost clean energy they increasingly demand from electricity suppliers;
- Providing access to renewable energy to Georgia Power retail customers, which is the preferred generation source of a majority of Georgians;[1] and
- Providing economic benefit to rural Georgia communities through land leases and expansion of the local tax bases.

The testimony provided by GLSSA and APA will demonstrate the continued value that can be delivered by utility scale solar and that the aforementioned solar value is driven by the following factors:

[1] Conservatives for Clean Energy, Georgia Statewide Clean Energy Survey (March 2019). https://www.cleanenergyconservatives.com/wp-content/uploads/2019/02/Georgia-Statewide-Clean-Energy-Survey-March-2019.pdf

- Utility scale solar benefits the ratepayer by continuing to be a low-cost energy resource. Additionally, with advancement in technology (*i.e.*, advanced system controls and energy storage) utility scale solar can be both a flexible and dispatchable generation resource.
- Solar development greatly benefits the Georgia economy through lease payments to landowners, tax revenue for local governments, and increased economic activity resulting from the construction and ongoing operation of the solar projects. Solar development creates jobs in Georgia.
- Procurement of Solar + Battery Energy Storage Systems (BESS) by the Company allows ratepayers to benefit from the application of the solar investment tax credit to cost of the BESS.
- The deployment a fleet level BESS that improves overall system flexibility also facilitates a larger deployment of utility scale solar thereby creating dual benefits of increased system reliability from energy storage paired with lower overall system cost by supporting larger levels of utility scale solar deployment.
- Continuance of supply side, competitive bid utility scale solar procurements that include long-term standard offer contracts for renewables.

However, this testimony provided by GLSSA and APA will also demonstrate that the value that can be delivered by utility-scale solar is predicated on the following factors:

- Accelerated construction of a north-south transmission improvements needed to transport power from areas of Georgia with the lowest cost solar resources.
- Timely realignment of solar industry supply chain, regulatory, labor, and tax policy issues that are currently being experienced by the U.S. solar industry.

- Company afforded the flexibility needed to work around short-term solar market misalignment but to also avoid significant delays in procurement while transmission congesting is addressed.
- Improved engagement with market participants such that repeated program deficiencies are cured in advance of program certification.
- Resolution of existing solar and BESS valuation problems that negatively impact Georgia Power solar market.
- Redesign of existing all source procurement program guidelines that unfairly disadvantage renewable energy generators.

Q17. BASIS OF GLSSA AND APA DIRECT TESTIMONY

A17. GLSSA and its consultant, Energy and Environmental Economics, LLC (E3), reviewed the Georgia Power 2022 IRP filings, the Georgia Power 2022 direct written testimony, the Company's in-person direct testimony, responses to data requests, and cross-examination responses. We also examined data provided by S&P Global Market Intelligence about Georgia Power's system and operating units, which aggregates information and data from numerous sources including the Energy Information Administration, the U.S. Environmental Protection Agency, and the Federal Energy Regulatory Commission. GLSSA, APA, and E3 also drew on other industry experience and recent industry data regarding avoided cost methodologies, resource planning and evaluation techniques, and variable renewables integration.

Q18. PLEASE DESCRIBE THE STATUS OF THE GEORGIA SOLAR MARKET

A18. The Commission, Staff and, Company have made a concerted, consistent effort to develop a cost competitive supply side solar market in Georgia to the benefit of the Company and

ratepayers. The utility has developed and conducted five unique solar programs that have each built upon the lessons learned of the previous program. The Commission deserves recognition for their leadership that is serving the state well in this period of unprecedented inflation and fuel price volatility. The Company deserves praise for the time and effort they have contributed to implementing the Commission's renewable energy strategy in Georgia. There are hundreds of distributed generation projects and upwards of 25 utility scale projects that are grid connected or under construction that have been integrated in the last decade. The growth of Georgia Power contracted renewable energy in Georgia is impressive and the correct response to the market conditions that have existed during this time period.

Included below is a table listing the Commission approved supply-side solar procurement. All the Commission approved supply-side, market-based procurements have been required solar projects to produce energy at or below the avoided cost of energy and all have been fully subscribed. Each subsequent solar solicitation made incremental improvements to procurement format, power purchase agreement structure, and program rules. Each new program was incrementally expanded such that the industry has matured in a measured, responsible manner and the technology was adopted by the Company at a comfortable pace. Additionally, each subsequent market-based solar procurement produced projects with progressively lower pricing until the Customer Renewable Subscription program that has largely been administered in a period of constant market disruption. Disruptions began with the Covid 19 pandemic and the resulting supply chain, inflation, and labor shortage issues, and were further compounded by a pending trade case that limits the supply of solar panels to the US market. These market disruptions put significant pressure on both CRSP

utility scale RFPs. The first CRSP RFP was conducted at the very onset of the Covid 19 pandemic before utility scale bidders were aware of future increases in the cost to deploy solar. These projects are challenged to deliver bid pricing established in ideal market conditions in the midst of the current disruption. The second CRSP RFP was conducted at a time where bidders were aware of pandemic related market conditions that increased the installed cost of solar and priced these increased costs into their bids. Bidders were unaware that the Department of Commerce would initiate an investigation into one Company's allegations of solar cell import restriction violations. As a result, the bid prices were higher than expected in this RFP and now bidders have to make to make tough decisions about whether to participate in the second round of the CRSP utility scale procurement and commit to awarded projects before the resolution of the pending trade case. The Commission and Company have been strong partners and have made best efforts to work with utility scale market participants within the constraints imposed by independent RFP monitor.

PROGRAM NAME	Year Approved	Type	Approved # of MWs	AC/DC	Docket #
Large Scale Solar Initiative	2011	US	60	DC	34229
Advanced Solar Initiative	2012	US	120	AC	36325
Advanced Solar Initiative	2012	DG	90	DC	36325
Advanced Solar Initiative Prime	2013	US	425	AC	36325
Advanced Solar Initiative Prime	2013	DG	100	50DC/50AC	36325
Renewable Self-Build Projects (GPC owned)	2007, 2014, 2016	US	366	AC	24505 & 39028
Renewable Energy Development Initiative + C&I	2016	US	1,200	AC	40161
Renewable Energy Development Initiative	2016	DG	150	100AC/50DC	40161

Renewable Energy Development Initiative	2018	US	558.5	AC	40706 & 40161
Customer Renewable Subscription Program	2019	US	*2,000*	AC	42311
2020 DG Programs	2019	DG	*210*	160AC/50DC	42311
			5,279.5		
SOURCE: 2016 and 2019 GA POWER IRP MAIN DOC					

Q19. PLEASE DESCRIBE THE COSTS TRENDS TO INTEGRATE SOLAR IN THE UNITED STATES?

A19. From the time Georgia Power was directed by the Commission to begin procuring significant amounts of solar generation in 2014 until 2021, the growth of solar energy both nationally and globally has helped to drive the overall cost of energy from solar resources down, which in turn driven advancements in cell module technology. As a result, solar costs declined annually by 11% on average from 2000 to 2017.[2] The levelized costs to install utility scale solar dropped below $36/MWh the U.S.[3] in 2018/19 and on average, the overall capital expenditures for utility scale solar installations in the U.S. for 2018 was $1.10/watt.[4]

However, supply chain issues, inflation, labor shortages, tax reform, and regulatory uncertainty have aligned coming out of the 2020 pandemic and under the current administration to interupt, in the short-term, the continued decline in utility scale solar

[2] Barbose, G. and Darghouth, N. 2018. "Tracking the Sun: Installed Price Trends for Distributed Photovoltaic Systems in the United States – 2018 edition." Lawrence Berkeley National Laboratory, 18 (Sept. 2018). https://emp.lbl.gov/sites/default/files/tracking_the_sun_2018_edition_final_0.pdf

[3] Lazard. 2021. "Lazard Levelized Cost of Energy Analysis – Version 15.0." https://www.lazard.com/perspective/levelized-cost-of-energy-levelized-cost-of-storage-and-levelized-cost-of-hydrogen/

[4] BNEF. 2018. US Renewable Energy Outlook 2H 2018

installed costs. As it has with previous brief market disruptions,[5] the utility scale solar market will need time to realign so that developers can continue the downward trajectory of utility scale solar cost that the Commission and Company have come to expect. Market realignment is expected to occur in the near term. While still beholden to general inflation and the increased cost of commodities and labor in the US marketplace, supply chain issues, tax reform concerns, and federal trade cases are transitory concerns that will resolve in the near term. Regardless of specific outcomes on any of these transitory issues, the utility scale solar market will realign to drive costs down as it has done in the past. However, even as the decline in cost for utility scale solar pauses as result of current disruptions, the installed cost is still materially below the levelized cost of energy for other likely daytime peaking resources such as natural gas combustion turbines.[6] The value proposition of solar is well demonstrated by the recent dramatic increases in natural gas pricing, with a likely continuation of elevated natural gas prices as the market for U.S. natural gas continues to expand globally.

Q20. WOULD THE GLSSA PANEL DESCRIBE THE VALUE THAT UTILTY SCALE SOLAR CAN DELIVER TO THE GEORGIA POWER COMPANY RATEPAYERS?

A20. Utility scale solar puts downward pressure on the avoided cost of energy, diversifies Georgia Power's generation portfolio, and increases operational capabilities to the grid, while reducing the impact of volatility in fossil fuel energy markets and overall inflationary

[5] See, e.g. the 2016 "ITC cliff" disruption: https://www.greentechmedia.com/articles/read/4-ways-to-blunt-the-solar-tax-cliff

[6] Lazard. 2021. "Lazard Levelized Cost of Energy Analysis – Version 15.0." https://www.lazard.com/perspective/levelized-cost-of-energy-levelized-cost-of-storage-and-levelized-cost-of-hydrogen/

pressures given that the lifetime fuel price of solar is fixed and included in the original construction cost and built into PPA pricing.

The integration of BESS facilitates deeper penetration levels of solar generation and produces a synergistic benefit when paired with utility scale solar. Utility scale solar allows existing and new Georgia Power C&I customers access to low cost, renewable energy, which is also the preferred generation source of a majority of Georgians. Finally, utility scale solar provides significant economic benefit to rural Georgia communities through land lease revenues and expansion of the local tax bases.

Q21. WOULD THE GLSSA PANEL DESCRIBE AREAS OF ALIGNMENT BETWEEN THE COMPANY, THE RATEPAYER, AND THE INDUSTRY?

A21. Yes, there are numerous areas of alignment between the Company, ratepayers, and the utility scale solar industry. Foremost, all three stakeholders benefit from a healthy Georgia utility scale solar market. A healthy solar market creates downward pressure on the Company's avoided cost, delivers significant investment into Georgia communities, and provides careers and a vital, new renewable energy economy in the State. As discussed, due to our state's resource endowment, Georgia is 'better' at utility scale solar than a majority of other states in the nation. A healthy solar market can create more benefit for Georgia than it can for a vast majority of other states because Georgia has a competitive advantage in utility scale solar. Other points of alignment include providing the Company needed procurement flexibility in the 2022 IRP that will enable the utility to work around current market disruptions and transmission congestion. This will perpetuate the steady, positive trajectory of the Georgia solar market and allow ratepayers to continue to access

and benefit from renewable energy. Fundamentally, we believe there is alignment around the competitive bid procurement format that is currently serving the state so well.

At the project level, GLSSA and APA see alignment around the long-term, standard offer power purchase agreements that are the norm here in Georgia. These are a key to low-cost financing that has been critical to the hyper competitive pricing received by the Company in renewable energy solicitations. These contracts allow utility scale solar projects to make long term, risk mitigated investments in Georgia communities. GLSSA also believes the two-to-one ratio proposed by the Company in the 2022 IRP of two solar MWs to every one MW of four-hour storage yields a substantial generation diversity benefit and enables solar and storage together to serve a much larger portion of the territory peak load demand. This two-to-one solar to storage ratio is healthy for the market and will allow the ratepayers, the Company and stakeholders to benefit from the continued steady growth of the Georgia solar market.

Q22. ARE THERE ELEMENTS IN THE 2022 GEORGIA POWER DIRECT TESTIMONY THAT WERE PREVIOUSLY RECOMMENDED IN GLSSA'S FILED TESTIMONY IN OTHER IRP OR AVOIDED COST DOCKETS?

A22. Yes, there are a number of elements in the 2022 GPC Direct Testimony that were recommended in our 2019 IRP Direct Testimony, most notably GLSSA voiced support for grid-flexible, dispatchable solar, we advocated for significant procurement of BESS, and our quantitative consultant E3 recommended that Georgia Power use the AURORA model to perform optimal capacity expansion modeling considering solar and battery storage as candidate resources.

Q23. DOES GLSSA CONTINUE TO SUPPORT GRID-FLEXIBLE, DISPATCHABLE SOLAR? WHAT BENEFITS CAN GRID-FLEXIBLE, DISPATCHABLE SOLAR PROVIDE A GRID OPERATOR?

A23. GLSSA voiced support for grid-flexible, dispatchable solar and continues to support its deployment, describing how the operational model provides benefits for solar developers, Georgia Power, and ratepayers, alike. In 2019, GLSSA testified:

> [M]ost [utility scale] solar resources are being operated to maximize the production of energy. What has not yet been leveraged is the capability of solar plants to operate as flexible, dispatchable resources. Smart controls on inverter-based technology give operators a mechanism to hold back and release energy as needed. In other words, solar can be used to create cost-effective, flexible dispatch that supports supply and demand balancing. More specifically, the controls allow for the retention of headroom (upward ramping ability) that provides the grid operator additional generation availability that provides the grid operator additional generation availability that can be released to the grid when demand is greater. This added flexibility allows large-scale solar to provide grid reliability services, such as frequency regulation, to out-perform conventional generation sources. Such capabilities enable operators to more effectively manage resources to maintain grid balance during daytime and early evening transitions.[7]

As GLSSA noted at the time, both a grid operator and ratepayers can benefit from grid-flexible, dispatchable solar, citing an economics study conducted by E3 in conjunction with Tampa Electric Company (TECO):

[7] Direct Testimony of John Sterling, Johan Vanhee, and Lynnae Willette, Docket Nos. 423110 423110, at 17-18, April 24, 2019.

> [Demonstrations have] show[n] that when solar plants are operated in a flexible and dispatchable manner, there is less overall curtailment and increased production cost savings. … In modeling fully dispatchable utility scale solar projects on TECO's system, the study showed that integrating utility scale solar at higher penetration levels into a grid operator's dispatch stack would allow the operator to both commit fewer thermal units and operate the remaining committed thermal units more efficiently.
>
> The modeling conducted by E3 demonstrated that allowing for up- and down-dispatch by the operator resulted in less actual curtailment of solar resources than would result under today's operational paradigm. This counter-intuitive outcome showed that curtailment is not an inevitable attribute of solar power plants; rather, the level of curtailment is a function of how solar power plants are operated. Importantly, the TECO study showed that changing operating parameters to make solar plants dispatchable generated measurable cost savings for the overall system. Said another way, while still economic under lower solar penetration scenarios, curtailment of solar resources resulted in lower system cost savings than would result from operating those resources to prioritize dispatch flexibility. Further, curtailed solar showed a decline in cost savings at higher solar penetration rates, whereas dispatchable solar showed an increase in cost savings at higher solar penetration rates.[8]

GLSSA's 2019 technical recommendations regarding grid-flexible, dispatchable solar continues to be an economically advantageous path for Georgia Power to incorporate

[8] *Id*. At 20-21

higher penetrations of utility scale solar on its grid while accruing cost-savings for rate payers and reducing Georgia Power's emissions from traditional thermal resources, benefitting all Georgians.

Q24. HAS GEORGIA POWER DEVELOPED AND IMPLEMENTED THE TOOLS NECESSARY TO DEPLOY GRID-FLEXIBLE SOLAR?

A24. In part, yes. To successfully procure and operate grid-flexible solar from independent power producers, a grid operator must both (1) provide for the appropriate technical specifications for a solar plant to respond to grid dispatch controls and (2) provide an appropriate contracting structure that compensates the project for both the energy delivered and the flexibility provided the grid operator.

In its January 21, 2022, request for proposals under the Customer Renewable Supply Procurement (CRSP) authorized under its 2019 Integrated Resource Plan (2019 IRP), Georgia Power required bidders submitting a proposal without battery storage to be capable of complying with Georgia Power's automatic generation control (AGC) protocols as a common criteria.[9] When incorporated with a solar plant's design, such AGC operational protocols and associated equipment allow for a plant to provide grid-flexible solar.

In connection with its AGC protocols, Georgia Power modified the compensation framework under its 2023/2024 Pro Forma PPA – Energy Only Without Storage Device (2023/2024 PPA). Provided that a seller maintains both specified status performance and setpoint response requirements, the PPA compensates sellers for Georgia Power Curtailed Energy for energy that is curtailed but could have otherwise been delivered by the project.

[9] Georgia Power Company's 2023/2024 Request for Proposals For Utility Scale Renewable Generation at 4 (January 21, 2022).

The 2023/2024 PPA provides Georgia Power with the flexibility to utilize curtailed energy to support to reliable grid operations. This contracting structure is viable in that it allows solar developers to accurately model projected revenues and popular because the Company manages the flexible operations of the solar facility. Importantly, the AGC contracting structure provides Georgia Power with the operational flexibility to economically dispatch both renewables alongside traditional thermal resources and provides ratepayers with cost-savings of grid-flexible solar.

However, in its 2022 IRP proposal, Georgia Power did not adopt flexible solar modeling, as noted by GLSSA expert witness Arne Olson,[10] despite the benefits noted by GLSSA in its 2019 testimony and the aforementioned provisions in Georgia Power's January 22, 2022, CRSP RFP. With a nod to the bid option equivalency discussion that takes place later in our testimony, we would note that better defining generation curtailment would support flexible solar modelling efforts.

Q25. WHAT ADDITIONAL STEPS SHOULD GEORGIA POWER TAKE TO ENCOURAGE GRID-FLEXIBLE SOLAR?

A25. As it did following its 2019 IRP and in its January 21, 2022, CRSP RFP, Georgia Power should continue to invite projects in future RFPs, both energy only and solar + storage bid options, to incorporate AGC capabilities in the project design and bid submissions. Additionally, the Commission should request metrics regarding the amount of curtailment exercised under such PPAs, system cost-savings and emissions reductions through Georgia Power's optimization of its generation stack. And, in regards to AGC included with Solar

[10] Evidence of Arne Olson, Senior Partner Energy and Environmental Economics, Inc., Docket No. 44160, at 20, May 6, 2022.

+ Storage bid options, the Company should be careful that the PPA structure properly assigns curtailment and performance risk (ramping, shaping, volume) to the Company. The objective being to mirror energy + toll agreements that are routinely used in other markets, and for the Company to realize all values energy storage provides.

Q26. WILL THE GLSSA PANEL DESCRIBE THE BENEFITS THAT THE COMPANY'S PROPOSED BESS PROCUREMENT WILL DELIVER TO THE RATEPAYER AND THE IMPACT THIS PROCUREMENT WILL HAVE ON THE TRANSMISSION GRID?

A26. Utility scale BESS provides a wide range of benefits to the transmission grid. BESS facilities utilize inverter technology to convert DC power into AC power. Inverter technology is highly flexible in its ability to quickly ramp generation up or down, and is capable to provide more dynamic voltage, frequency, and reactive power support than traditional generation resources. Fast ramping capabilities of a BESS also come with low marginal cost of dispatch, enabling BESS to be the first in the dispatch stack to mitigate frequency and voltage issues, rather than ramping traditional flexible units which incur higher variable costs. This capability lowers total operating costs for the transmission grid and ratepayers. Further, inverter-based resources also use a modular design, so an outage impacting a single inverter has a minimal impact on the overall facility availability, decreasing capacity outage and redispatch costs. This contrasts with traditional fossil generation resources, in which a single issue is more likely to impact the availability of the entire generator, resulting in a full outage.

Q27. CAN BESS PLAY A ROLE IN REDUCING TRANSMISSION CONGESTION?

A27. Grid operators often have several options available to resolve transmission congestion issues, including transmission switching and generation redispatch. Generation curtailment can be considered as a subset of generation redispatch. However, when applied to solar resources, curtailment results in lost generation that has no fuel cost, which ultimately hurts ratepayer value. Energy storage provides a more effective solution than traditional congestion management tactics by capturing otherwise curtailed energy and making it available for use at a later time. Related, some transmission congestion issues can be resolved through increasing generation in certain electrical locations of the grid (rather than curtailing generation as in the prior example). The flexibility of energy storage allows it to act as a fully dispatchable generator, or as a dispatchable load, and can provide both generation and load benefits to reduce congestion.

Q28. CAN YOU DESCRIBE THE ANCILLARY BENEFITS OF BESS?

A28. Battery storage is unique from many other generation resource types, given its ability to always be synchronized to the grid, its nearly unlimited ramp rates, and its flexibility to act as both a generator and a load as needed to manage grid reliability. The ability to serve multiple applications is also a key feature. For example, a 50 MW battery can provide an effective range of operation from – 50 MW to + 50 MW (i.e. a 100 MW range) whereas a traditional generator of the same size is limited to 50 MW. This can provide incremental benefits to grid operators in managing the balance of real time generation and load on the grid. Because of the BESS capabilities described in the prior responses, these ancillary benefits can be provided more quickly, for shorter periods of time, with greater frequency, and lower cost than from traditional generators. Energy storage can also provide twice the

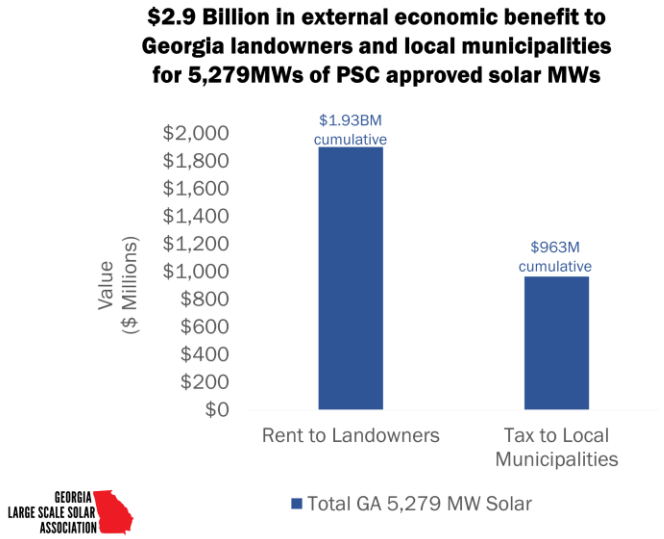
range of voltage and frequency support on the grid as compared to traditional generators of the same nameplate capacity, and can do so at all times, whereas traditional generator must be online and generating to provide these services.

Q29. CAN YOU PROVIDE A DESCRIPTION OF THE VARIOUS CASES THAT BESS CAN PROVIDE VALUE TO THE COMPANY?

A29. Capacity value (resource planning value) is a key value for all generation resource types including energy storage. Additionally, in real time grid operations, the flexibility of generation resources matters with regards to how efficiently the grid can be operated, which will in turn impact ratepayer costs. For example, when a large generation unit is lost, the utility must make up for that lost generation within a certain period of time to meet NERC requirements. If the grid only has slower ramping, less flexible generation online and available to respond, a utility may be put in a situation in which they must startup more expensive peaking units to meet these requirements; such units may incur high startup costs, and are often less efficient units that also must be run a minimum amount of time. When more flexible resources such as storage are used in their place, they can help bridge the time needed for the slower, less flexible generation that are online to respond, and can do so at a lower cost vs. using the fossil peaking generations. Energy storage also serves to balance system lambda hour to hour, day to day, and season to season. Like short duration ancillary benefits, energy storage has low marginal costs to provide these shifting or balancing services, thus lowering operating costs of other resources and providing cost avoidance to ratepayers. Moreover, all three values (capacity, ancillary, and shifting or balancing) can be provided from any energy storage unit.

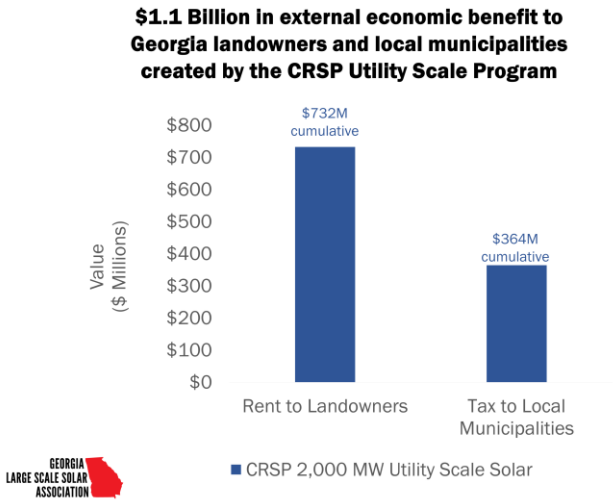
Q30. CAN YOU DESCRIBE THE ECONOMIC BENEFITS OF SOLAR TO GEORGIA COMMUNITIES?

A30. The counties where utility scale solar projects are being built benefit significantly through economic investments, tax revenues, and job creation. Local landowners also benefit from long-term lease payments or land sales for large-scale solar projects. The expected 5,279 MWs of supply side solar that the Commission has approved in Georgia was estimated to create $1.93B in cumulative lease revenue to Georgia landowners and a potential $963 million in tax revenue to local municipalities.



The 2,000-utility scale MWs approved in 2019 for the CRSP program are expected to generate $732 million in cumulative lease revenue and a potential $364 million in tax revenue to local municipalities.[11]

[11] GLSSA Estimate based on number of MWs, 31.75 GA millage rate, 10 acre per MW build size, and $1.05 per MW build cost.



Further, the net present value of the ratepayer savings generated by the CRSP utility scale solar program was expected be an estimated $900 million if the CRSP standard offer contracts are executed at $32 per MWh.[12]

However, the 2,000 MW of utility scale solar approved in the 2019 IRP are at risk of being undersubscribed due to market and regulatory disruptions that the renewable energy industry and to some extent the nation are currently experiencing. The 1,200 MW included in the second CSRP RFP are especially at risk because bidders may choose not to participate in this solicitation because of the current market condition. If so, these MWs would not create the projected benefit until they are included in a future statewide RFP procurement. The Company anticipated in its modelling in advance of the 2022 IRP that the 2,000 MW included in the IRP would reach commercial operation. To the extent that the CRSP program is undersubscribed, transmission congestion would be less acute than the grid that was modelled for the 2022 IRP filings. GLSSA and APA encourage the roll-

[12] GLSSA- DN 42310 & 42311 – Direct Testimony E3

over of any unsubscribed CRSP MW into CARES and purchased at the next availability without concern for the completion of the north – south transmission line.

Q31. CAN YOU DESCRIBE HOW LOCALLY DEVELOPED UTILITY SCALE SOLAR CAN ACT AS A HEDGE AGAINST FUEL PRICE VOLATILITY AND EXTERNAL GEOPOLITICAL DISRUPTIONS?

A31. Utility scale solar projects have no fuel costs, and if executed as a power-purchase agreement, have a fixed price per unit of energy produced. That means the price of energy from a constructed solar facility does not fluctuate with commodity prices moves, unlike fossil fuel units such as gas plants, whose production costs are greatly impacted by volatility in gas prices. Recent experience shows the impact of gas price volatility on customers, as utilities across the country have passed along increased costs through pass-through fuel riders. Because solar production costs do not fluctuate, they act as a hedge against volatility and protect consumers against dramatic, uncontrollable prices increases. The current war in Ukraine darkly underscores this concern. As noted by Ivan Penn referencing U.S. Energy Information Administration data, "the war in Ukraine has driven up the already high cost of natural gas, which is burned to produce about 40 percent of America's electricity." As a result, the national average residential electricity rate was up 8% in 2021 and has already increased another 4% in 2022[13]. Unexpected macro level political events have the ability to undermine the local utility planning process. As noted by E3 expert witness Arne Olson, "due to recent disruptions to a low-cost natural gas supply caused by geopolitical tensions and the Covid-19 pandemic. Natural gas prices for

[13] New York Times, "High Electric Bills" Ivan Penn 5/3/2022 U.S. Energy Information Administration, U.S. Energy Data

the first three months of 2022 are higher than those from recent years, almost as high as the prices Georgia Power used as a high gas price sensitivity in the IRP.[14]" Solar is not reliant on fuel as typical fossil fuel generators are, as such, solar energy generation insulates utilities and ratepayers from external shocks. Otherwise described, home grown, utility scale solar in Georgia gives our state energy independence from foreign geopolitical concerns.

Q32. CAN YOU DESCRIBE HOW INSTALLED SOLAR ACTS AS HEDGE AGAINST INFLATION?

A32. Operating solar facilities are an excellent hedge against inflation because they have very low operation and maintenance expenses compared to any other source of power production. Because they have no fuel costs, power from the facilities will not become more expensive due to inflationary fuel supply and transportation costs. Financing costs are fixed and year-to-year expenses are not heavily dependent on commodity price fluctuations as compared to thermal generators. Further, because solar facilities have fewer "moving parts" than a fossil-fuel or nuclear power plant – and do not include pressurized, high velocity, or combustion operations – operating and maintenance costs are lower and thus less exposed to inflationary pressure.

[14] U.S. Energy Information Administration, "Henry Hub Natural Gas Spot Price (Dollars per Million Btu)", May 2022, https://www.eia.gov/dnav/ng/hist/rngwhhdM.htm; U.S. Energy Information Administration, U.S. Energy Information Administration, Annual Energy Outlook 2022 Table 1. Total Energy Supply, Disposition, and Price Summary, May 2022, https://www.eia.gov/outlooks/aeo/data/, DollarTimes "Inflation Calculator", May 2022, Inflation Calculator (dollartimes.com)

Q33. IS THERE DEMAND FROM NEW AND EXISTING COMMERCIAL AND INDUSTRIAL CUSTOMERS FOR RENEWABLE ENERGY? DOES THIS DEMAND TURN RENEWABLE ENERGY GENERATION INTO A BUSINESS DEVELOPMET TOOL FOR THE STATE?

A33. Commercial and industrial customers are increasingly demanding renewable energy from their electricity providers for three primary reasons. First and foremost large electric users want to ensure their operations are supplied by low-cost electricity, and at this point in time renewable energy is among the lowest cost resources that electric suppliers in the southern U.S. can provide. Second, large electric customers want to have electric rates that are a predictable as possible, with the least amount of risk of unexpected cost increases due to fuel supply needs. The recent increase in natural gas prices due to the war in Ukraine, and other factors, is a timely example of the risk customers are exposed to from fuel price volatility. Finally, many large electric customers have corporate guidance which directs their facilities to consume energy in ways that reduces the environmental, social, and economic impacts associated with the combustion of fossil fuels, including to generate electricity.

According to the Clean Energy Buyer's Association, the rate at which large C&I electric customers in the U.S. have directly procured renewable energy has increased 100-fold over the past 10 years.[15] In 2021 clean energy buyers procured over 11 GW of clean electricity either directly or through their electric provider. Companies that are buying renewable energy include many of the largest employers in the U.S. and in Georgia, such as Amazon, Coca-Cola, Wal Mart, Cargill, McDonald's, and Microsoft.[16] Electricity costs are de facto

[15] Clean Energy Buyers Association Deal Tracker: https://cebuyers.org/deal-tracker/
[16] For a full list of Clean Energy Buyers Association members: https://cebuyers.org/about/ceba-members/

a major cost input to any large electric buyer and the availability of low- and predictably-priced renewable energy is thus an important consideration in employers' decisions regarding where to sustain and explore facilities.

Q34. IS IT CORRECT THAT RENEWABLE ENERGY IS THE PREFFERED TYPE OF GENERATION OF THE MAJORITY OF GEORGIANS? DOES UTILITY SCALE SOLAR HELP PROVIDE RENEWABLE ENERGY TO GEORGIA POWER RETAIL CUSTOMERS?

A34. According to a 2019 statewide survey of clean energy support among Georgians, "there is nearly unanimous consent that the renewable energy industry is important to Georgia, with two-thirds saying it is very important." Support for renewable energy in Georgia is both politically and geographically diverse with over 95% of Georgians agreeing that the renewable energy industry is important to Georgia. Utility scale solar allows Georgia Power to provide renewable energy to retail customers as a part of their overall generation portfolio. To the extent that Georgia Power procures additional solar resources it allows the Company to provide even more renewable energy to their customers.

Q35. THERE IS A LOT TO BE OPTIMISTIC ABOUT IN THIS GEORGIA RENEWABLE ENERGY MARKET, IS THAT CORRECT?

A35. Yes, there is much cause for optimism in regard to the Georgia solar market, as evidenced by past successes and the 2022 Integrated Resource Plan, indicating the future of solar energy in Georgia. The long-standing engagement between the Company, Staff, and the industry has been witness to the growth and steady maturation of the Georgia solar market. Never has solar played a more mature, essential role in the Georgia Power generation mix.

As mentioned previously in our testimony, GLSSA and APA believe the significant BESS procurement proposed in this IRP is positive and cause for optimism. The continuation of competitively bid solar procurement is positive. We are encouraged by regionally targeted RFPs that should help the Company purchase generation in geographies the provide enhanced value to the Company and Ratepayers. GLSSA and APA agree the Company should procure utility scale solar where they see value in buying solar generation; so long as, the solicitations are targeted within a single RFP only measured economically within that region. GLSSA and APA recognize these regionally targeted procurement efforts are the Company exploring interim solutions that may allow continued, measured procurement until north-south transmission issues can be resolved.

The maturing solar industry that has developed here in Georgia and lays the foundation for continued, Georgia-grown renewable energy in the State is cause for optimism. A mature Georgia solar market allows more value to be captured by Georgia service providers, stakeholders, and market participants and not leave the Georgia economy because industry resources are more available in other markets. The magnitude or size of the investment that has been made by utility scale solar in Georgia creates critical mass and momentum that is noteworthy and has caused utility scale solar to become valuable part of the State's economic ecosystem. Lastly, the collective effort of Company, Commission, Staff, and stakeholders has caused Georgia to catapult in national rankings to become a leader in the U.S. renewable energy sector, which is appropriate given our resource endowment and the corresponding competitive advantage in solar energy generation our state enjoys.

Q36. DESPITE ALL THE POSITIVE PROGRESS AND CAUSE FOR OPTIMISM, ARE THERE SOME AREAS OF MARKET CONCERN THAT SHOULD BE

ADDRESSED SO THAT UTILITY SCALE SOLAR CAN CONTINUE TO BE SUCCESSFUL?

A36. Yes, GLSSA has numerous concerns that we would like to address collaboratively and constructively with the Company and Staff to the benefit of the ratepayer.

Q37. DOES GLSSA HAVE CONCERNS ABOUT TRANSMISSION CONGESTION AND THE NEED TO BUILD ADDITIONAL NORTH SOUTH TRANSMISSION CAPACITY THAT COULD TAKE UP TO 6 YEARS TO COMPLETE?

A37. The key to a stable, strong solar market is continuity and predictability. Solar facilities take years to originate, finance, interconnect, and build. Large procurement gaps (*i.e.*, years in which solar is not being procured) can make each of those steps more challenging, and if they occur over long periods can disrupt a market and cause projects to lapse and developers to leave, which in turn reduces competition. This can also occur where RFPs fail to elicit strong bids or result in projects that actually come into fruition, or where interconnection and transmission costs and timelines make projects uneconomic.

Those issues are present in the current IRP. While the Company recognizes the great value of solar energy to ratepayers, it has proposed to procure that power in tranches starting with a large procurement in northern Georgia, followed by a later RFP for projects in southern Georgia. This approach appears to be justified by the stated need to construct north-south transmission improvements to address generation congestion in southwest Georgia caused, in part, by the extensive deployment of solar facilities in that region, where the state's resource endowment is optimal for solar development. This conclusion was supported by expert Witness Robinson during his defense of the Georgia Power 2022 IRP Direct Testimony we he noted about the north Georgia RFP, "we think it is very important to

target North Georgia first to buy us time to study, develop, and build that transmission to ensure that we can continue developing South Georgia[17]."

While GLSSA and APA applaud the Company for exploring interim solutions that may allow continued, systematic utility scale solar procurement, we have concern over the urgency in which the Company is pursuing the north-south transmission improvement needed to allow additional solar procurement in geographies where Georgia enjoys a competitive resource advantage for solar.

The improvements contemplated in the North Georgia Reliability and Resilience Action Plan are vitally important to optimal renewable energy deployment in Georgia. As stated by Witness Robinson, "transmission has to be built to accommodate that date in the future, in 2035, when we look at 6,000 megawatts of additional renewables"[18]. This testimony is not consistent with the steady, measured approach to renewable procurement the Commission has historically adopted in the state. By the end of the 2022 IRP, 2035 will be 12 years way. The steady, measured approach to renewables that has historically served the solar market well, recognizes that to achieve 6,000 MWs by 2035 you need to integrate 1,000 MWs every two years. To the extent that a North Georgia RFP is undersubscribed, and solar procurement is delayed up to six years or more to implement north-south transmission improvements, you risk a situation where the Company needs to grid integrate 6,000MWs in 6 years to achieve stated objectives. The difficulty in integrating this volume of solar megawatts would be compounded by the harm caused to the market by an extended stall or delay in utility scale solar procurement.

[17] Witness Robinson_2022 IRP Georgia Power Cross Examination Transcript Volume Pg261 lines 23-27.
[18] Witness Robinson_2022 IRP Georgia Power Cross Examination Transcript Volume pg 260/1, lines 25-2

Q38. WHAT IS THE CONCERN WITH PROCURING SOLAR IN NORTHERN GEORGIA WHILE WAITING SIX YEARS FOR A NORTH-SOUTH TRANSMISSION SOLUTION?

A38. For the industry there are two concerns. First is that choking off solar development in southern Georgia with the best solar resource endowment will disrupt projects and developers already active in the area who intend to bring economically competitive projects to market. The second concern is that a northern Georgia RFP runs the risk of failing to deliver cost-effective proposals, which would mean ratepayers would not enjoy the full cost savings from competitive solar that the Company's own modeling indicates is essential to a least-cost generation plan.

Q39. DOES THE INDUSTRY HAVE AN ALTERNATIVE IT WOULD LIKE TO SEE PURSUED?

A39. We do. First, we believe the north-south transmission improvements referenced by Georgia Power expert Witness Robinson in his defense of the Georgia Power 2022 IRP Direct Testimony should be studied and the transmission improvements expedited for approval. As stated by Witness Robinson, "we need time, as I mentioned before, to build the transmission, those highways, to the get megawatts from the South Georgia to North Georgia so that we can continue development in South Georgia[19] ." To put a finer point on this, we believe that the process by which this transmission problem is addressed should be clear and the timeline to solve the problem be expedited by the Commission and Company to the fullest extent possible.

[19] Witness Robinson_2022 IRP Georgia Power Cross Examination Transcript Volume Pg394 lines 16-20.

GLSSA and APA's urgency to solve this transmission problem is warranted because the lack of capacity to transmit low-cost power from areas that have the optimal resource endowment for solar generation to areas of need on the Southern Company transmission grid could lead to a material stall in the utility scale solar market that will prevent ratepayers from accessing low-cost renewable energy and will put upward pressure on the statewide avoided cost of energy. A stall in the utility scale solar market will harm the rapidly maturing utility scale solar market in Georgia. Site control agreements and interconnection queue positions held by developers will be allowed to expire, and the market stall will in-turn lead to a reduction in the availability of skilled construction labor needed to achieve the competitively low-cost pricing the market has enjoyed in the recent past. This provides a strong basis for accelerating the proposed north-south transmission improvements to ensure that ratepayers experience the cost savings reflected in Georgia Power's capacity expansion modeling. It is also consistent with best practices of coordinating transmission planning with least-cost renewable generation planning. A second suggestion we would make is to not put all the near-term RFP eggs in the North Georgia basket. For example, GPC has indicated that near-term procurements in the south are not feasible due to busbar screens that showed no viable injection points for 300MW injections in the south. However, there may be cost-competitive projects smaller than 300MW in the south and removing that region entirely from near-term procurement artificially removes those cost-saving projects from consideration.

Q40. DOES GLSSA-APA HAVE A CONCERN ABOUT THE ABILITY OF RENEWABLE ENERGY INDUSTRY TO DELIVER VALUE TO THE

RATEPAYER IN THE NEAR TERM DURING THIS TRANSITORY PERIOD OF SOLAR INDUSTRY MISALIGNMENT.

A40. Yes, GLSSA and APA have significant concerns about the ability of the utility scale solar industry to deliver value to ratepayers. Like other industries, the utility scale solar industry is facing turbulent waters when it comes to supply lines and inflation. The exact magnitude and duration of the disruption caused by trade disputes is unknown and will depend on forthcoming decisions by the Department of Commerce but also, in the long term, policies set by Congress to encourage renewable energy and production of solar panels in the United States. The industry is confident that the long-term prognosis for solar power remains strong and that the competitive innovation that has brought the industry where it is today will ensure that solar generation remains a least-cost resource for resource planning purposes. It is important to understand as well that the production of solar modules is an increasingly global business, with production centers emerging in nations like India, so that the long-term prospects for sufficient production are strong.

At the same time, short-term supply chain disruptions are a cause for concern and in the resource planning context counsel for additional flexibility and diligence when it comes to solar procurement. For example, prudent planning should take into account the potential need to have back-up or rolling procurements to ensure that temporary challenges do not result in long-term failure to procure the large volumes of solar that GPC's modeling shows are in ratepayers' interests.

Q41. DOES GLSSA HAVE CONCERNS ABOUT THE LACK OF MEANINGFUL STAKEHOLDER ENGAGEMENT BETWEEN COMPANY AND MARKET PARTICIPANTS?

A41. Yes. Failure of the Company to engage effectively with market stakeholders has caused the solar industry to intercede in the certification of the last two CRSP PPAs. GLSSA was compelled to intercede in the certification of the first CRSP PPA to ensure key contract items that had been present in REDI utility scale PPAs and removed from the CRSP contract were included in the final, approved contract version. GLSSA was again compelled to intercede in advance of the second CRSP RFP when material changes were made to the bid options offered to program participants in the middle of the CRSP procurement. These changes created cost uncertainty to ratepayers and made it more attractive for bidders to pursue energy-only PPA contracts. Because there was cost uncertainty in the energy-only PPA, there is no way to evaluate whether the energy only contract provides the greatest value to ratepayers. However, concern with renewable program issues extend back further than the CRSP program, the REDI program had significant design flaws that created difficulties for bidders, Staff, and Company. GLSSA requested a meeting with the Company and provided extensive REDI program feedback to the Company[20]. Most, if not all, of the issues identified in the feedback would have been easy to fix in advance of the program certification if there had been opportunity to meaningfully engage with the Company and Staff while the program was being designed and before the program was certified and the third party monitor engaged. GLSSA has also been forced to address renewable energy market concerns in front of the Commission

[20] Georgia Power-GLSSA, REDI Feedback *Comments and Requested Changes to the Georgia Power REDI Power Purchase Agreement*. 3.20.2018

regarding the design of Capacity procurements and the issues surrounding interconnection rights and contract terms. All of these instances where GLSSA was compelled to intervene and bring utility scale solar issues to the attention of the Commission were avoidable and inefficient. The anecdotal concerns listed in this testimony speak to a larger problem. The process by which the Company seeks feedback from market participants is not effective and as a result, the Company consistently advances renewable energy programs that are fundamentally flawed to the detriment of the ratepayer, the industry, and also to Staff and the Commission because interceding before the Commission to resolve programmatic issues is time consuming, inefficient, and not the appropriate venue to work through program design concerns.

Despite repeated claims by the Company that the stakeholder processes currently utilized are effective, the repeated deficiencies in solar programs or renewable energy related procedures brought to the Commission for certification speak to the ineffectiveness and dysfunction of current stakeholder engagement processes utilized in this Georgia market. The Georgia solar market would significantly benefit if the Commission took steps to improve the stakeholder feedback processes currently employed by the Company in advance of filing any solar program or process documents approved in the 2022 IRP.

Q42. DOES THE SOLAR INDUSTRY HAVE CONCERN ABOUT THE RENEWABLE COST BENEFIT FRAMEWORK?

A42. Since the Company developed and implemented the Renewable Cost Benefit (RCB) Framework used to value solar generation to the ratepayer after the 2016 IRP, the RCB framework has never been publicly litigated despite being flagged repeatedly for known

problems with the valuation methodology. In the 2019, it was part of the IRP docket, in this proceeding, even though there was not sufficient discovery data provided to replicate the RCB model, Staff and other intervenors submitted direct testimony related to the RCB. Georgia Power chose not to cross examine Staff or intervenors on testimony related to the RCB framework. As such, constructive dialogue around the RCB framework was avoided altogether by the Company.

As part of the stipulated agreement in Docket 42311, Section 6 of the Supply Side plan suggested that Company and Staff 'would work collaboratively to resolve concerns raised by PIA Staff…. And work to resolve the issues by the next IRP." Company updated the RCB unilaterally and sent data sets to PIA Staff to confirm the update was appropriate.

Material concerns amongst intervenors and industry participants remain regarding whether the quantitative methodology of the RCB framework appropriately values solar generation in Georgia because there has never been an opportunity to publicly litigate the RCB model to ensure it is calibrated correctly.

GLSSA and APA engaged quantitative consultant E3 in the 2019 IRP, the 2020 Avoided Cost docket, and again in this current 2022 IRP docket. E3 has consistently informed the market that:

1) Based on information provided, some elements of the RCB are not being calculated correctly. Issues have been identified in the calculation of solar deferred capacity costs as well as the calculation of support capacity. These issues should be addressed.

2) The discovery data provided by the Company is insufficient to recommend detailed corrections to the framework. For example, ten-minute load data would be

necessary to properly calculate the regulating requirement component of support capacity. Georgia Power has indicated this data is not available to be provided to intervenors[21].

This lack of transparency and data access is problematic because it prevents the RCB framework from being properly calibrated and creates potential inefficiencies in the market. All solar approved by the Commission in the RFPs created by the renewable energy carve outs they have approved since 2012 are prohibited from causing upward pressure on Georgia Power rates. The RCB framework is the tool used to value solar energy generation. This tool determines if solar projects will create net benefit to ratepayers or if the solar projects will cause upward pressure on rates. In effect, this model governs the solar market in Georgia and determines which projects can be selected by the Company and which projects must be rejected.

If the RCB framework is calibrated correctly, the Company will be able to continue adding solar to the grid until the optimal amount of solar is achieved to maximize value to the Georgia Power ratepayers. If the RCB framework is calibrated incorrectly, it is impossible to determine the optimal amount of solar to be procured to the benefit of the Georgia Power ratepayers.

Q43. THERE WAS SIGNIFICANT DEBATE AROUND BID OPTION EQUIVALENCY PRIOR TO PPA CERTIFICATION FOR THE SECOND CUSTOMER SUBSCRIPTION RENEWABLE PROGRAM (CRSP) UTILITY SCALE RFP. DOES CONCERN STILL EXIST AROUND THIS ISSUE?

[21] Georgia Power Direct Testimony Rebuttal, 2020 Avoided Cost docket 4822

A43. Yes, the lack of bid option equivalency in the most recent CRSP Utility scale RFP is still an area of concern. As mentioned previously, in the second solicitation tranche, GPC revised the CRSP Utility Scale Energy Only PPA to allow uncapped, AGC, or GPC controlled curtailment to achieve smoothing of non-intermittent solar output. GLSSA and APA applaud this positive progress in grid management, however because the energy only PPA does not define the amount of curtailment that will be used to achieve smoothing there is no way to compare the cost of smoothing achieved by curtailment with the defined, known cost of smoothing achieved with a BESS.

To provide a more detailed description of the issue, the changes made by the Company in the second CRSP RFP allow solar projects that enter into energy only PPAs with AGC to be compensated for energy that is curtailed and not delivered to the ratepayer. The cost of this curtailed energy is borne by the ratepayer. There is no defined limit for how much GPC can curtail the solar energy generation to achieve non-intermittent output smoothing, as such ratepayers bear the burden of potentially large curtailments. The non-intermittent output smoothing that occurs within the Energy Only PPA is a neutral event for the solar Project because the Project is reimbursed for any energy curtailment that may take place for the life of the 30-year PPA.

Unlike the CRSP energy only PPA, in CRSP solar + storage PPAs, the solar project bears the cost of non-intermittent output smoothing in the Solar + Storage PPA because the cost of the BESS is built into the bid price. The specific performance requirements for the generation smoothing BESS is clearly defined in the PPA and, as such, has a definitive cost to deliver. Energy only smoothing of generation output does not have a defined cost

because the curtailment is undefined and impossible to compare against the defined cost of smoothing with a BESS.

Q44. THE INDUSTRY RAISED CONCERN ABOUT THE FORMAT OF THE MOST RECENT ALL SOURCE, CAPACITY RFP. DO THESE CONCERNS STILL EXIST?

A44. Yes, this is an area of concern for utility scale solar in the Georgia Power energy market that our members feel unfairly disadvantages renewable energy. In the most recent Georgia Power Capacity RFP, the excess or unscheduled energy, which is characterized as Alternative Interchange Energy Rate (AIER), or the price paid for unscheduled renewable energy delivered to the grid, is paid at 15% of avoided cost value, which puts renewable energy generation at a pronounced disadvantage in the Capacity RFP solicitation.

The design of the Capacity RFP prevents renewables from addressing this issue by prohibiting solar + storage projects between 30MW and 100MW. This prevents solar + storage projects from achieving scale at 75-80 MW, filing a FERC Form 556 to become a Qualifying Facility, and becoming eligible for the full avoided cost for delivered AIER energy. The battery configuration required by Capacity RFP guidelines prohibits solar + storage facilities from capturing the federal investment tax credit and reducing cost for the storage by up to 30%.

The RFP requires the storage device always be charged to 100% so this requires the solar + storage energy generator to effectively bid a project with two batteries, twice the size specified in the bid. One battery is deployed, while the other is being charged so that, combined, the battery is 100% charged at all times.

i) Example: a 40MW battery bid would require an 80MW battery.

Another result of the 100% battery charge requirement is that the solar piece of the solar + storage configuration must be oversized to charge the batteries effectively. This leads to significant unscheduled delivery of energy, or AIER energy. If the delivered AIER energy is only getting 15% of value, the economics of the bid become non-viable. When storage is paired with a renewable resource, which is being operated as a capacity resource, AIER should be valued at 100% of the RCB-determined avoided cost or at the value of the scheduled energy rate of the standard offer contract.

Q45. DOES GLSSA/APA HAVE RECOMMENDATIONS THAT SHOULD BE CONSIDERED FOR INCLUSION IN THIS 2022 IRP?

A45. In the 2022 the Commission should direct the company to make the following changes in the 2022 IRP Filing:

Total Number of MWs:

1. Total number of utility scale solar MWs included in this IRP should be commensurate with the total number of MWs approved in the 2019 IRP so that the market continues on its successful trajectory. The total number of storage MWs included should be ratio of two solar MWs to one MW of four hour storage in order to maximize the diversity benefit of solar + storage combination:

   (1) 2,000MWs of Storage (x) 4,000+ MWs of solar.

2. 4,000 new MWs included in this IRP + all unsubscribed WMs from the CRSP program roll forward to the CARES program

Timing of solar MW procurement:

3. Utility should be given the flexibility to procure solar MWs when the solar market is aligned and able to deliver value, but also obligated to procure new utility scale generation in the volume and regularity to avoid a damaging market 'stall'.
   (1) North GA RFP should maintain the current trajectory, 2023 RFP and 2025 COD, despite market disruptions
      (a) Regional solicitations should be targeted within a single RFP only measured economically within that region.
      (b) Unsubscribed MWs from the N GA solicitation should roll to a statewide RFP conducted after or in parallel with completion of north-south transmission improvement.
   (2) Unsubscribed MWs from the CRSP RFP # 2 should be rolled into a statewide RFP conducted in 2023 with 2025 COD.
   (3) Remaining 2022 approved MWs should be included in a statewide RFP to be conducted before 2030.
      (a) Company should continue to monitor and evaluate for interim solutions that may allow continued, systematic procurement.
      (b) Significant portion of the approved WMs may need to be purchased after or in parallel with the completion of north-south transmission line.
   (4) This timeline should be reduced on a one for one basis if the Commission directs the Company to complete the North-South transmission line earlier than the currently contemplated 6-year time period.

BESS Procurement Timeline:

4. Storage Procurement & Integration should be 75% complete by EOY 2025
5. Storage valuation practices should be revised according to suggestions made by E3:
   (1) Use of seasonal reserve margin when annual reserve margin is more appropriate
   (2) Use of software that is able consider effective load carrying capacity (ELCC)
   (3) Utilization of capacity expansion optimization software to determine optimal future resource mix

BESS procurement Format:

6. Should be competitively bid through "build-transfer" RFPs,
   (1) To the extent GPC be allowed to "self-build," the reason for not being able to competitively bid and final integration pricing should be clearly and publicly stated.
7. Fleet level & Solar + Storage
   (1) Battery Energy Storage Systems (BESS) should be designed to accomplish multiple use cases so that Ratepayers to maximize value created by BESS

Bid Option Equivalency:

8. AGC should be included in Solar + Storage bid options, but the PPA structure should properly assigns curtailment and performance risk (ramping, shaping, volume) to the Company.
9. AGC max curtailment should be defined in all use cases
   (1) AGC is technology worth incorporating for all bids (not just solar only bids). The value and cost (curtailment) of AGC should be incorporated for all bid types (those with and without storage). The curtailment cost offsets to the value (credit)

should be incorporated by defining the maximum curtailment amount and using the curtailment max cap as the assumed amount of curtailment multiplied by the PPA price.

Special CARES Break Out Session:

10. A breakout session should be scheduled after IRP so that Company can receive market feedback and integrate into definitive CARES program guidelines and program documents such that renewable energy program development is completed without having to solicit Commissioner intervention.

North South Transmission Improvements:

1. North Georgia Reliability & Resilience Action Plan should be prioritized and expedited.
   (1) Action Plan should explicitly include transmission line upgrades in certain corridors, anticipating future renewable growth in solar resource endowed South Georgia.
2. Approval of Action Plan transmission improvements to alleviate congestion should be expedited and completed in 4 years.
   (1) This would avoid prolong solar market disruption and lead to additional solar value captured by Ratepayers.
   (2) Would allow Solar developers to begin siting new project locations in parallel to the physical completion of the transmission improvement because interconnection congestion will be addressed in planning prior to project filing interconnection request.

Capacity RFP:

3. AIER Energy should be valued at 100% of Avoided Cost Value