Georgia Power

Bin 10230,
241 Ralph McGill Boulevard, NE
Atlanta, GA 30308-3374

March 31, 2023

Ms. Sallie Tanner
Executive Secretary
Georgia Public Service Commission
244 Washington Street, SW
Atlanta, GA 30334-5701

Re: Georgia Power Company's Environmental Compliance Strategy 2023 Update; Docket No. 44160

Dear Ms. Tanner:

Enclosed for filing in compliance with the Georgia Public Service Commission's ("Commission") July 29, 2022 Order Adopting Stipulation As Amended in Georgia Power Company's (the "Company") 2022 Integrated Resource Plan in Docket No. 44160, is the Company's Environmental Compliance Strategy 2023 Update ("Report").

This filing is being made in accordance with the Commission's Alternative Electronic Filing Procedures issued on March 17, 2020.If you have any questions, please call Cheryl Johnson at 404-506-6837.

Sincerely,

/s/ Kelley Balkcom

Kelley Balkcom
Director, Regulatory Affairs
Georgia Power Company

Enclosures

Environmental Compliance Strategy

Update for 2023

Georgia Power Company

FORWARD-LOOKING STATEMENT CAUTIONARY NOTE

Certain information contained in this report is forward-looking information based on current expectations and plans that involve risks and uncertainties. Forward-looking information includes, among other things, statements concerning environmental regulations and related compliance plans and estimated expenditures. Georgia Power cautions that there are certain factors that can cause actual results to differ materially from the forward-looking information that has been provided. The reader is cautioned not to put undue reliance on this forward-looking information, which is not a guarantee of future performance and is subject to a number of uncertainties and other factors, many of which are outside the control of Georgia Power; accordingly, there can be no assurance that such suggested results will be realized. The following factors, in addition to those discussed in Georgia Power's Annual Report on Form 10-K for the fiscal year ended December 31, 2022 and subsequent securities filings, could cause actual results to differ materially from management expectations as suggested by such forward-looking information: the impact of recent and future federal and state regulatory changes, including tax, environmental, and other laws and regulations to which Georgia Power is subject, as well as changes in application of existing laws and regulations; the extent and timing of costs and legal requirements related to coal combustion residuals; current and future litigation or regulatory investigations, proceedings, or inquiries; the ability to control costs and avoid cost and schedule overruns during the development, construction and operation of facilities or other projects; the ability to construct facilities in accordance with the requirements of permits and licenses and to satisfy any environmental performance standards and the requirements of tax credits and other incentives; advances in technology, including the pace and extent of development of low- to no-carbon energy and battery energy storage technologies and negative carbon concepts; state and federal rate regulations and the impact of pending and future rate cases and negotiations, including rate actions relating to cost recovery mechanisms; catastrophic events such as fires, earthquakes, explosions, floods, tornadoes, hurricanes and other storms, droughts, pandemic health events, political unrest, wars or other similar occurrences; and the effect of accounting pronouncements issued periodically by standard-setting bodies. Georgia Power expressly disclaims any obligation to update any forward-looking information.

2023 Environmental Compliance Strategy Executive Summary

Georgia Power's 2023 Environmental Compliance Strategy ("ECS") continues to utilize a comprehensive annual process to review, refine, and/or update the 10-year outlook for environmental control plans. The goals of the Company's strategy are to ensure compliance and provide cost effective solutions for the generating fleet that are in the best interests of customers. The Company has made considerable progress on implementation plans for new and upcoming requirements, while maintaining compliance with requirements that are already in effect. With a high degree of uncertainty in the outcomes of future environmental policies, the ECS process remains important to maintain a diverse and flexible generation fleet to serve customers. In particular, the 2023 ECS includes the highlights that follow.

- ***With new or revised rules expected in each of the key environmental compliance areas over the next year, the Company remains focused on maintaining compliance, progressing towards upcoming compliance deadlines, and managing risk related to regulatory uncertainty.***

Federal environmental regulatory activity is expected to increase significantly in the coming months, as the Environmental Protection Agency ("EPA") has advanced its reviews of rules covering various environmental areas over the last couple of years. Of particular note, in March 2023, EPA proposed more stringent Effluent Limitations Guidelines ("ELG"), marking yet another potential shift in a rule that has already been revised multiple times in the last eight years. In addition, EPA is expected to propose and/or finalize revisions to the Coal Combustion Residuals ("CCR") rule and to various air quality and emissions standards all within the next 12 months. With the compliance strategy that has been implemented thus far or that is in progress, all Georgia Power coal-fired generating units operate a full suite of emission controls, employ closed cycle cooling, operate dry/closed-loop ash handling, and are in the midst of implementing scrubber wastewater treatment technologies and closing ash ponds. While the Company's generation fleet is well controlled and environmental compliance plans are robust, the ultimate outcomes of these rule changes are not yet known. As new information becomes available, Georgia Power will utilize the environmental compliance strategy planning and review process to evaluate new requirements and incorporate any needed updates.

- ***The Company's compliance strategy in the 2023 ECS remains consistent with the approved 2022 Integrated Resource Plan ("IRP") and ECS.***

Considering the significant regulatory uncertainty, the Company continues to plan and sequence work strategically in implementing ELG and CCR projects to ensure progress continues as required by upcoming compliance deadlines, while also adjusting the schedule for certain activities to account for uncertainty where possible. While the environmental compliance strategy anticipated potential regulatory updates, no new final environmental requirements applicable to Company generating facilities have been issued yet, and there is a range of possible outcomes for future rules. As such, the environmental compliance strategy remains consistent with the ECS approved in the 2022 IRP.

With the retirement of Plant Wansley, just two coal plants remain that must install scrubber wastewater treatment to comply with the existing ELG requirements. Plant Bowen continues preparations for installation of physical-chemical-biological scrubber wastewater treatment by the end of 2025, while Plant Scherer continues to pursue the Voluntary Incentives Program ("VIP") through installation of membrane scrubber wastewater treatment technology by the end of 2028.

As updated and approved in the 2022 IRP and ECS, the CCR compliance strategy includes 20 ash ponds to be closed by removal and 9 ash ponds to be closed in place by various deadlines determined by the size of the ash ponds. Since the 2022 ECS Update filed in April 2022, the Company received five final permits from the Georgia Environmental Protection Division ("EPD") for the Plant Mitchell Ash Pond

closure, Plant Bowen Landfill, Plant Branch Landfill, Plant McIntosh Landfill No. 3 and Plant Wansley Landfill, bringing the total number of issued final permits to 13. The Company continues to comply with Georgia EPD's permitting requirements, while monitoring ongoing discussions between Georgia EPD and the EPA related to certain CCR Units.

- ***The Company's comprehensive update of the CCR compliance strategy cost and schedules resulted in the nominal program cost remaining consistent with the previous forecast; however, changes in inflationary projections result in a decrease in the escalated total cost.***

Georgia Power recently updated the CCR compliance strategy schedules and estimates based on the latest available project and forecasted economic information. The current forecast applicable to retail customers for the CCR Asset Retirement Obligation ("ARO") program over the coming decades is approximately $7.94 billion, including around $1.1 billion in actual costs previously incurred. While the nominal cost forecast remained consistent with the Company's previous forecast, this $7.94 billion total is approximately $950 million lower than the last update due to a change in the expected future escalation rates which are applied based on generally accepted accounting principle ("GAAP") requirements for AROs. While the inflation currently being experienced in the market remains high due to the economy's response to the COVID-19 pandemic and with an increased demand for goods and a strained supply chain, the trends in forecasted rates signal that, over the long-term, the effect of inflation on prices is not expected to be as high, increase as quickly, or stay elevated as far into the future as was previously forecasted.

- ***As national climate policy grows in scope, the Company continues to use long-term planning processes for responsibly transitioning toward cost-effective, low-carbon resources with focus on reliability in the best interests of customers.***

Considering the improving cost-effectiveness and availability of low- and zero-carbon resources and evolving legislative and regulatory requirements, Georgia Power must continue to plan strategically within its state regulatory framework to transition the generation fleet to reduce carbon emissions risk for the benefit of customers while meeting reliability and resiliency needs. In 2023, EPA is expected to propose greenhouse gas emission standards for both new and existing power plants. Congress is expected to continue to evaluate and propose climate legislation in the future, including carbon taxes and clean energy standards. In addition, other governmental agencies, such as the Council on Environmental Quality ("CEQ"), the Federal Energy Regulatory Commission ("FERC"), and the Securities and Exchange Commission ("SEC"), have been considering climate and greenhouse gas emissions in setting policies in their respective areas. Finally, Georgia Power's customers are also increasingly demanding low- or zero-carbon electricity. With considerable uncertainty and increasing carbon pressures, the Company's broad approach to capturing a range of policy outcomes remains the best way to evaluate potential financial impacts and allow for long-term planning to mitigate risks to customers. Meanwhile, the Company will continue to proactively monitor and assess the outcome of any executive, legislative, and regulatory climate actions and remains ready to shift to policy-specific or plant-specific evaluations, as appropriate, when more information becomes available.

As the Company progresses with implementation of the environmental compliance strategy, the ECS process remains critical to responding to and mitigating system reliability and cost risks related to environmental regulatory uncertainty. Adherence to the process has resulted in environmental compliance investments that have enabled the Company to maintain and operate a diverse generation mix to serve customers in a reliable and economical manner. In doing so, Georgia Power has reduced its environmental footprint, while responsibly transitioning its generation fleet. Through the ECS and the long-term planning process, the Company remains committed to providing clean, safe, reliable, and affordable energy for its customers and the communities it serves.

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1.0 Introduction

Georgia Power Company ("Georgia Power" or the "Company" or "GPC") is committed to meeting its environmental compliance obligations while also providing customers with clean, safe, reliable, and affordable energy. The Company's Environmental Compliance Strategy ("ECS") seeks to continually optimize compliance plans in an increasingly dynamic regulatory environment. The comprehensive annual strategy development process considers existing and potential legislative and regulatory requirements and determines plant-specific compliance options. These options are evaluated based on available technology, cost, schedule, impact to plant operations, the environment, and surrounding communities. This iterative approach is designed to provide the Company the necessary flexibility to develop and refine compliance plans that are in the best interests of customers.

The ECS process has resulted in environmental compliance investments that have enabled the Company to cost-effectively maintain and operate a diverse generation mix to serve customers. In doing so, Georgia Power has achieved nitrogen oxides ("NO_x") and sulfur dioxide ("SO_2") emission reductions of more than 95 and 99 percent, respectively, since 1990 and mercury emission reductions of more than 98 percent since 2007. Georgia Power has reduced carbon dioxide ("CO_2") emissions by more than 60 percent between 2007 and 2022 through the transition of the generation fleet, including the retirement of over 5,400 megawatts of coal and oil capacity, the addition of 2,500 megawatts of natural gas-fired combined cycle units, and the addition of over 3,300 megawatts of renewable resources. The Company remains committed to serving customers and the community as it responsibly transitions its generation fleet toward cost-effective, low-carbon resources.

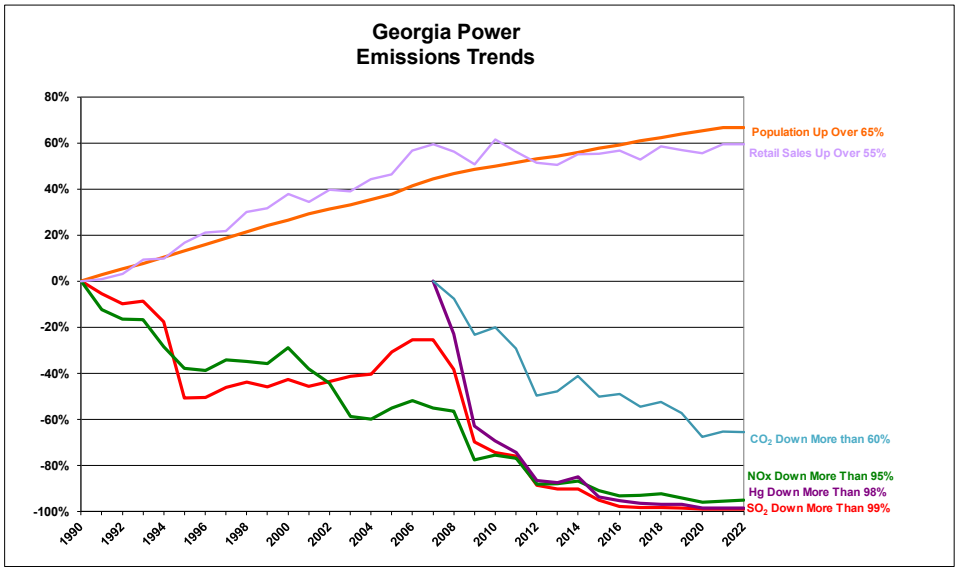


Figure 1 Georgia Power Emissions

Further, Georgia Power has decreased water withdrawals by 90% since 2003 with the transition of the generation fleet. In addition, requirements for additional wastewater treatment and ash pond closures have resulted in the installation of 14 wastewater treatment systems and the installation of dry or zero discharge ash handling equipment for all coal facilities. In 2022, the Company secured beneficial use of more than 85 percent of the coal combustion residuals ("CCR") generated from operations, significantly reducing waste streams for the benefit of customers and the environment.

As provided in the Georgia Public Service Commission ("PSC" or "Commission") Rule 515-3-4-.04(1)(c), the Company's ECS includes a detailed overview of current and proposed environmental regulations, existing

environmental law, and potential legislation applicable to electric generating plants, as well as a comprehensive and cost-effective strategy for compliance. Georgia Power's environmental compliance strategy process is designed to adapt to changing regulations and assure compliance with robust control plans that are in the best interests of customers.

1.1 Strategy Process

The process for developing the environmental compliance strategy includes the comprehensive involvement of a number of organizations within the Company. In general, this integrated process includes four steps as discussed below.

1. **Anticipating and integrating the outcome of new environmental requirements**. The first step involves gathering all available knowledge about current and potential future local, state, regional, and federal environmental requirements, whether through legislation, rulemaking, permitting, or other processes. Some rules may require participation in an allowance-based cap and trade program over a regional or national scale, and others may mandate specific requirements on specific plants or assets. For many rules, the possibility that litigation will result in further changes creates additional uncertainty.

2. **Developing assumptions on federal and state levels.** In order to anticipate the impacts of federal and state environmental requirements on generating plants, the Company engages in a robust integrated resource planning process. This process evaluates the economic and reliability impacts of numerous generating resource decisions across a range of scenarios. The scenarios include a range of assumptions that appropriately consider future regulatory and market uncertainty and risk.

3. **Applying generating unit-specific control technology options.** The application of control technology requirements in the process is performed on a unit-by-unit basis. In some cases, the plant or unit's environmental control requirements are mandated, such as a plant-specific limit to meet the National Pollutant Discharge Elimination System ("NPDES") permit requirements. In other cases, such as the cap-and-trade program for SO_2 established to address acid rain, utilities can choose the most cost-effective of multiple options, such as fuel switching, applying a control technology, or purchasing emission allowances. As discussed in Appendix C, Research and Development ("R&D") continues to be an integral part of the overall Georgia Power environmental strategy and compliance plan. Through research, development, and demonstration, technologies are evaluated, and selected for possible implementation to meet compliance with applicable environmental requirements. Technology-related decisions are made based on compliance alternatives, technical review (often following actual testing), schedules, equipment vendor price quotes, total costs over the useful life, specific unit issues, and performance guarantees. The process reviews the cost, control effectiveness, regulatory timing requirements, system reliability impacts, and operational considerations of the applicable options in developing a unit-specific decision on the application of environmental control technologies. **Figure 2** illustrates possible control technologies and applications for coal-fired boilers.

4. **Determining and evaluating the financial requirements of the strategy.** The final step is to determine the cost and financial impacts of the environmental compliance strategy. If environmental controls are mandated for a specific unit, then both the economic and system reliability value of the generating asset's continued operation must be considered in the Company's integrated resource planning process with application of the cost of the control technology. The Company makes a triennial filing with the Georgia PSC seeking approval of the IRP, which includes economic evaluations of generating plants that consider load growth, compliance costs, and other economic pressures.

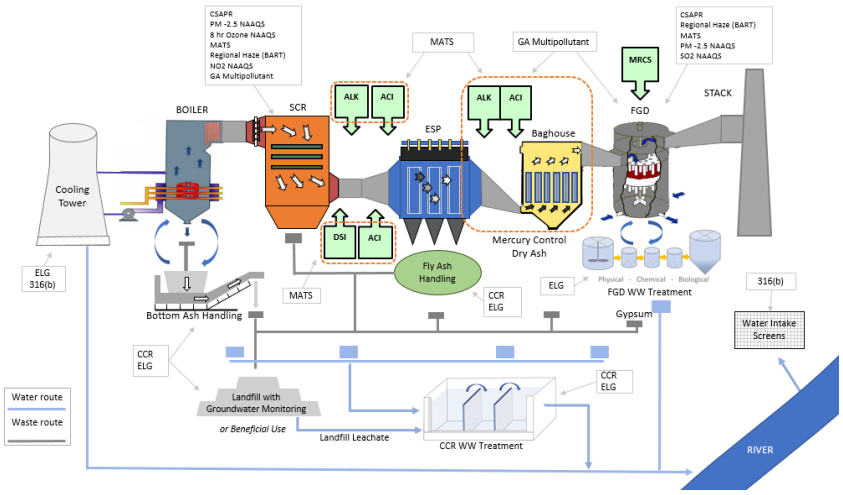


Figure 2 Possible Environmental Control Technologies for Coal-Fired Boilers

One major goal of the environmental compliance strategy process is to maintain flexibility in compliance options and operations across the generating fleet. A key advantage of this process is that it allows decision-making on an incremental basis. While the strategy includes environmental control plans for the next 10 years, final decisions on specific projects are not made until the Company has sufficient information to complete the necessary technical and economic analyses. This process is a balanced approach to providing cost-effective solutions to environmental regulations on behalf of customers.

The uncertainty surrounding the legislative and regulatory environment reinforces the need for a flexible, robust compliance strategy. Accordingly, the strategy balances the need to make decisions on certain timelines, considering factors such as the lead time required for fuel and equipment purchases, with the need for more information relative to regulatory, reliability, and economic drivers. The analysis will be updated to determine the most cost-effective compliance decisions while maintaining future flexibility and preserving system reliability in the strategy.

1.2 Strategy Assumptions

As a result of the ECS process, the ten-year outlook for environmental compliance strategy projects is summarized in **Figure 3** below, while the timeframes for ash pond and landfill closure timeframes are summarized and in **Table 1** and **Table 2**. Details on the compliance requirements that drove this strategy and the Company's decision-making process are provided in Section 2, along with discussion of existing installed controls that continue to operate to maintain compliance.

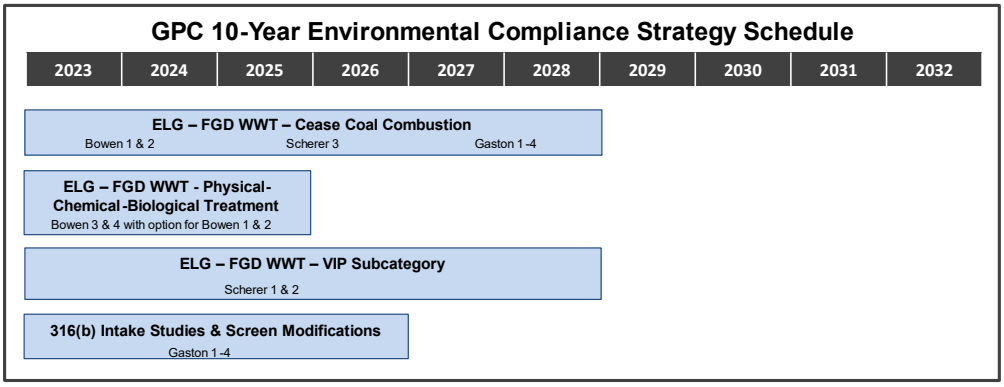


Figure 3 Georgia Power 10-year Environmental Compliance Strategy Schedule

Table 1 Ash Pond Estimated Closure Construction Timeframes

	Closure by Removal	Closure in Place	Total	Estimated Closure Construction Completion[1]
Bowen		1	**1**	**2034**
Branch	5		**5**	**2036**
Hammond	3	1	**4**	**2032**
Kraft	1		**1**	**2016** [A]
McDonough	1	3	**4**	**2024**
McIntosh	1		**1**	**2022** [A]
McManus	1		**1**	**2020** [A]
Mitchell	3		**3**	**2030**
Scherer		1	**1**	**2032**
Wansley	1		**1**	**2032**
Yates	5	2	**7**	**2023**
	20	9	**29**	

[1] *For those sites with multiple ash ponds, the date above reflects the last pond's estimated closure construction completion date for the site in total. The "Estimated Closure Construction Completion" date reflects the estimated end of closure construction and estimated completion of major restoration activities that may go beyond the submittal of the Closure Certification Report or the Certification of Removal Report.*

[A] *Denotes actual closure construction completion date.*

Table 2 Landfill Estimated Closure Construction Timeframes

	Existing CCR Landfills	Future, New Permitted Landfills	Total	Estimated Closure Construction Completion[1]
Arkwright	3	1	**4**	**2031**
Bowen	1		**1**	**2039**
Branch		1	**1**	**2037**
Hammond	1		**1**	**2032**
Kraft	1		**1**	**2020** [A]
McIntosh	2		**2**	**2022** [2]
Scherer	1		**1**	**2046**
Wansley	1		**1**	**2033**
Yates	2		**2**	**2023**
	12	2	**14**	

[1] *For those sites with multiple landfills or landfill cells, the date above reflects the last cell's estimated closure construction completion date for the site. The "Estimated Closure Construction Completion" date reflects the estimated end of closure construction and estimated completion of major restoration activities, which may go beyond the submittal of the Closure Certification Report or the Certification of Removal Report.*

[2] *A request was approved by EPD to allow for the episodic disposal of CCR at Plant McIntosh.*

[A] *Denotes actual closure construction completion date.*

2.0 Regulatory and Strategy Updates

The Company routinely monitors and evaluates environmental legislation and regulation applicable to electric generating units as a part of the environmental compliance strategy process. This includes federal requirements stemming from the Clean Water Act ("CWA"), Resource Conservation and Recovery Act ("RCRA"), Clean Air Act ("CAA"), or other legislation, as well as relevant state rules and permitting requirements. These policy and regulatory reviews and the associated compliance strategy that results from the ECS process are categorized into water, CCR, and air topics in the subsections that follow.

2.1 Water Regulatory and Strategy Updates

The water compliance strategy considers a variety of regulations related to water quality and use, including both nationwide standards as well as state requirements for the use and discharge of water. Based on currently available information, the strategy to meet water compliance requirements is summarized in **Table 3**. The areas of legislation, regulation, permitting, or other actions that set or are anticipated to set critical water compliance requirements are discussed below.

Table 3 Cooling Type / Wastewater Treatment / ELG Technologies

Unit	Cooling Type	316(b)	Low Volume Wastewater	Bottom Ash	Fly Ash	Scrubber Wastewater
Bowen 1 & 2	Closed-Cycle	Flow Monitoring	Physical-Chemical	Remote Mechanical Drag Chain	Dry Handling	Retirement by 12/31/2028 or Physical-Chemical-Biological
Bowen 3 & 4	Closed-Cycle	Flow Monitoring	Physical-Chemical	Remote Mechanical Drag Chain	Dry Handling	Physical-Chemical-Biological
Gaston 1 – 4*	Once-Through	Intake Screens	Physical-Chemical/ Pond	Retirement by 12/31/2028	Dry Handling	N/A
McDonough 4 – 6	Closed-Cycle	Flow Monitoring	N/A	N/A	N/A	N/A
McIntosh 10 & 11	Closed-Cycle	Intake Pump Modification/ Flow Monitoring	Pond	N/A	N/A	N/A
Scherer 1 & 2	Closed-Cycle	Flow Monitoring	Physical-Chemical	Magaldi Ash Cooler	Dry Handling	Membranes
Scherer 3	Closed-Cycle	Flow Monitoring	Physical-Chemical	Magaldi Ash Cooler	Dry Handling	Retirement by 12/31/2028

** Note that ash handling systems for Gaston 1-4 are only required for limited operation on coal as a backup fuel.*

2.1.1 Waters of the United States (33 CFR 328 and 40 CFR 120)

The regulatory definition of "waters of the United States" ("WOTUS") outlines the scope of waters federally regulated under the Clean Water Act. The definition affects all CWA programs that rely on this

definition, including the NPDES permit program, the dredge-and-fill permit program, and oil spill prevention and response programs. Regulation regarding WOTUS is administered by the EPA and the USACE ("the Agencies").

In August 2015, the Agencies issued a final rule re-defining WOTUS to exert very broad jurisdiction over water features, including features that have not previously been regulated, such as ephemeral drainages and isolated ponds at industrial facilities. Then, in April 2020, the Agencies finalized the Navigable Waters Protection Rule ("NWPR") to repeal the 2015 definition, effectively restoring the regulatory text that existed prior to the 2015 rulemaking.

In 2021, the Agencies, in response to court order, announced they halted implementation of the NWPR and were interpreting WOTUS consistent with the pre-2015 regulatory regime until further notice. The Agencies completed review of the NWPR under the Biden Administration's Executive Order 13990 and determined the rule would be replaced. In December 2021, EPA proposed a rule revision intended to repeal the 2020 NWPR and to purportedly restore regulations defining "waters of the United States" that were in place prior to 2015 but with updates to be consistent with relevant Supreme Court decisions.

New Regulatory Updates

- On January 18, 2023, EPA published and finalized the updated WOTUS definition ("Phase I WOTUS") proposed in 2021. The final rule has been challenged by multiple parties, including the State of Georgia, in several courts across the U.S. These court proceedings may result in legal or regulatory developments leading up to or after the March 20, 2023, effective date of the rule.

2.1.2 Cooling Water Intake Structures (40 CFR 122 and 125)

Section 316(b) of the CWA ("316(b)") requires that the location, design, construction, and capacity of any cooling water intake structure ("CWIS") reflect Best Technology Available ("BTA") to minimize adverse impacts from impingement and entrainment of fish, shellfish, and other aquatic organisms. In August 2014, EPA published a final 316(b) rule that established impingement mortality and entrainment requirements for existing power generating facilities and manufacturing and industrial facilities that are designed to withdraw more than 2 million gallons per day from WOTUS and use at least 25 percent of the water they withdraw exclusively for cooling purposes.

Facilities subject to the rule must comply with one of seven options identified for impingement mortality, which include modified traveling screens and closed-cycle recirculating cooling. For entrainment, the rule relies on the determination of BTA requirements by the permitting authority on a site-specific basis.

316(b) Compliance Strategy

For purposes of 316(b) rule compliance, Plants Bowen, McDonough, McIntosh, Scherer, and Yates employ closed-cycle cooling, which has been determined by EPD to comply with the impingement and entrainment BTA requirements of the rule. After the retirement of Plant McIntosh Unit 1 in 2019, Georgia EPD issued a final NPDES permit that also required reducing entrainment related to the remaining units at the site by replacing the existing intake pumps. The intake pump modification allowed for smaller pumps appropriately sized with the water intake needs and operation of the cooling towers for the combined cycle Units 10 and 11. This project was successfully completed in 2021. Otherwise, for all sites with closed-cycle cooling, the only additional requirement EPD has or is expected to add to NPDES permits is the addition of intake flow monitoring equipment, where not already installed, or an alternative flow calculation method, to demonstrate effective operation as a closed-cycle cooling facility.

Plant Gaston's strategy for 316(b) compliance includes intake screen modifications with a fish friendly return system to reduce impingement and entrainment of aquatic species. The final 316(b) compliance strategy will be determined through the NPDES permit process by the Alabama Department of Environmental Management ("ADEM"). The timing of the installation is dependent on the permit issuance with a current projected compliance date of 2026.

2.1.3 Steam Electric Effluent Limitations Guidelines (40 CFR 423)

The effluent limitation guidelines ("ELG") for steam electric power generating facilities establish technology-based effluent limitations for wastewater discharges. In November 2015, EPA updated the steam electric ELG for the first time since 1982, requiring compliance as soon as November 1, 2018, but no later than December 31, 2023, as determined by the NPDES permitting authority. Final technology-based standards affecting coal ash management included a "zero liquid discharge" limit for bottom ash and fly ash transport water and new limits for direct discharges of "legacy wastewater," which includes water remaining in the Georgia Power ash ponds. In addition, the 2015 Rule distinguished combustion residual leachate (wastewater collected from lined landfills) from low volume wastewater and set limits for scrubber wastewater for mercury, arsenic, selenium, and nitrate-nitrite. The rule also established a voluntary incentive program ("VIP") for scrubber wastewater providing additional time for plants willing to meet even more stringent scrubber wastewater limits based on evaporation technology, considered an advanced treatment at the time. For the VIP option, the permitting authority was required to allow facilities up to December 31, 2023, to comply.

With pending legal challenges and petitions for reconsideration, in 2017, the EPA Administrator took actions that pushed out the earliest compliance dates specifically for bottom ash transport water and scrubber wastewater by two years to November 1, 2020, to provide time for EPA to reconsider the standards for those waste streams. In addition, in April 2019, the U.S. Court of Appeals for the Fifth Circuit vacated aspects of the 2015 Rule related to legacy wastewater and combustion residual leachate, determining that EPA should have considered more advanced technology in setting the standards and requiring EPA to consider revising these portions of the rule.

In October 2020, EPA finalized revisions to the ELGs for steam electric power generating facilities ("ELG Reconsideration Rule") for scrubber wastewater and bottom ash transport water, providing a two-year extension of compliance time frames to no later than December 31, 2025, for these waste streams. For bottom ash transport water, the rule established a case-by-case permitting mechanism to recognize that some systems may require a limited purge rate, rather than a blanket no discharge limit as established in the 2015 Rule. For scrubber wastewater, the ELG Reconsideration Rule established standards based on wastewater treatment technology consisting of a combination of chemical precipitation followed by biological treatment (also referred to as physical, chemical, biological treatment or "phys-chem-bio"). As compared to the 2015 Rule, the scrubber wastewater limits were slightly less stringent for arsenic and selenium and significantly more stringent for mercury and nitrate-nitrite.

The ELG Reconsideration Rule also revised or established subcategories with tailored limits and applicability dates. The revised VIP subcategory for scrubber wastewater, provides until December 31, 2028, for plants to achieve more stringent ELGs for mercury, arsenic, selenium, nitrate-nitrite, bromide, and total dissolved solids based on membrane filtration. A new subcategory was established that provided a compliance exemption for electric generating units that will permanently cease the combustion of coal (through retirement or repowering) no later than December 31, 2028. For the cessation of coal combustion subcategory and for the VIP subcategory, a Notice of Planned Participation ("NOPP") was required to be submitted by the facility to the permitting authority by October 2021. Two other new

subcategories, high scrubber flow plants and electric generating units with capacity factor of less than 10 percent, do not apply to Georgia Power operations.

In 2020, the ELG Reconsideration Rule was challenged by environmental groups and consolidated in the U.S. Court of Appeals for the Fourth Circuit, with industry groups intervening in the case. In 2021, the court granted EPA's motion to put the case on hold while the agency reviewed the ELG Reconsideration Rule. EPA subsequently announced on August 3, 2021, its decision to initiate a new rulemaking, while also clarifying that permitting authorities should continue to implement the current ELG Reconsideration Rule requirements during the process.

New Regulatory Updates

- EPA published the proposed ELG Supplemental Rule on March 29, 2023, while also taking direct final action to provide an additional 90-day window for existing coal-fired power plants to submit a NOPP for the permanent cessation of coal combustion subcategory. The proposed ELG Supplemental Rule would set a more stringent zero liquid discharge requirement for scrubber wastewater based on membrane technology wastewater treatment. The proposed rule also addresses new requirements for combustion residual leachate based on physical-chemical treatment and legacy wastewater based on case-by-case determinations by the permitting authority. Under the proposal, the VIP option, however, remains unchanged. While EPA specifies a preferred option, there are a total of four different options in the proposal, including one that reflects maintaining the existing requirements in the ELG Reconsideration Rule. In the proposal, EPA states that facilities should continue to pursue their compliance plans that are currently in progress, despite the fact that the proposal represents a significant change from current requirements. The public comment period for the proposal is 60 days. A final rule is expected by early 2024, creating significant regulatory uncertainty in the meantime.

ELG Compliance Strategy

The Company's strategy for compliance for ELG for fly ash and bottom ash waste streams necessarily considered the state and federal CCR rules as well as ELG requirements. To meet the timing requirements for the CCR rules, fly ash and bottom ash handling projects were completed by 2019 in order to cease ongoing use of the ash ponds. For fly ash, projects included conversions to pneumatic (dry handling) systems that convey ash via vacuum/blowers to collection hoppers and silos for beneficial reuse or disposal at Plants Bowen, Scherer, and Wansley. Compliance options to meet zero discharge of bottom ash included either an under-boiler or remote system. The technology decision for each site was primarily determined by space availability and headroom constraints under the boiler. The Company's strategy for bottom ash transport water compliance was installation of "dry" handling Magaldi Ash Coolers ("MACs") at Plant Scherer and "wet" remote mechanical drag chains ("RMDCs") at Plants Bowen and Wansley.

Compliance with the ELG Reconsideration Rule for scrubber wastewater is a site-specific effort that requires a tailored design for the facility's water chemistry and water volume needs, as well as site-specific logistics and space availability. With the site-specific evaluation needs, uncertainty in the final requirements of the ELG Supplemental Rule, and the lack of widespread deployment of scrubber wastewater treatment systems in the U.S., the Company continues review of the regulatory requirements while leveraging its R&D capability to develop a cost-effective and reliable compliance strategy.

After evaluation of the different compliance pathways allowed by the ELG Reconsideration Rule, the Company filed NOPPs with Georgia EPD by the required October 13, 2021, deadline. These filings notified Georgia EPD of the Company's intent to permanently cease coal combustion no later than December 31, 2028, for Plant Bowen Units 1 and 2, Plant Scherer Unit 3, and Plant Wansley Units 1 and 2; to pursue ELG

compliance for Plant Scherer Units 1 and 2 through the VIP subcategory with a compliance deadline of December 31, 2028; and to comply with the generally applicable requirements for Plant Bowen Units 3 and 4 by December 31, 2025. For Plant Gaston Units 1-4, a NOPP was submitted to ADEM indicating the intent to permanently cease coal combustion through retirement by December 31, 2028.

In the 2022 IRP, the Commission approved the retirements of Plant Scherer Unit 3, Plant Wansley Units 1 and 2, and Plant Gaston Units 1-4. While Plant Wansley Units 1 and 2 were retired in August 2022, Plant Scherer Unit 3 and Plant Gaston Units 1-4 continue to operate but are planned to retire no later than December 31, 2028. The Commission deferred the decision for retirement of Plant Bowen Units 1 and 2 to the 2025 IRP. While the Company's NOPP for Bowen Units 1 and 2 has not changed from the cessation of coal combustion by 2028, Georgia EPD ultimately must consider the PSC's decision-making related to the operation of these units in its compliance determination for the units. In addition, due to the site-specific water balance, the Company's scrubber wastewater treatment strategy also provides the flexibility to include those units in the common system of treatment with Units 3 and 4.

The Company's R&D and testing of water treatment technologies, as further discussed in Appendix C, has included phys-chem-bio treatment systems as well as membrane-based treatment systems. Based on this research and testing, the Company selected a physical-chemical-biological treatment system for Plant Bowen Units 3 and 4 to be in commercial operation by December 31, 2025. Based on plant-specific equipment and operational characteristics, the Company has selected a membrane-based technology system to meet the VIP compliance subcategory requirements for Plant Scherer Units 1 and 2 by December 31, 2028. The unique and site-specific water quality and quantity characteristics at Plant Scherer make it the only site where a VIP pathway is expected to be both a feasible and cost-effective option. The benefits of the additional time provided by the VIP compliance path include the ability to perform further research and development, evaluate future regulatory changes, and provides the flexibility to adjust course should conditions change.

With the uncertainty resulting from EPA's proposed ELG Supplemental Rule, the Company continues to evaluate the executable timeline for final engineering and subsequent procurement and construction of these ELG projects. The uncertainty created by the new rulemaking has added additional risk considerations to units that have existing economic and regulatory pressures. These considerations, as well as system reliability risks, will be evaluated, and the Company will use the ECS process to review and update the ELG compliance strategy as needed and as more information becomes available.

2.2 Coal Combustion Residuals Regulatory and Strategy Updates

The CCR environmental compliance strategy focuses on regulations related to ash pond closures and CCR management, including both federal and state requirements. The strategy focuses on all active and inactive facilities that previously used ash ponds as water treatment facilities and on management of CCR such as coal ash and gypsum. The Company's strategy to meet CCR compliance requirements (as approved in the 2022 IRP) is summarized in **Table 4**. The areas of legislation, regulation, permitting, or other actions that set or are anticipated to set critical CCR compliance requirements are discussed below.

Table 4 Georgia Power's Ash Ponds and Existing CCR Landfills

	Ash Pond Closure Method			Existing CCR Landfills
	Closure by Removal	Closure in Place	Total	
Arkwright				**3**
Bowen		1	**1**	**1**
Branch	5		**5**	
Hammond	3	1	**4**	**1**
Kraft	1		**1**	**1**
McDonough	1	3	**4**	
McIntosh	1		**1**	**2**
McManus	1		**1**	
Mitchell	3		**3**	
Scherer		1	**1**	**1**
Wansley	1		**1**	**1**
Yates	4	3	**7**	**2**
	20	9	**29**	**12**

Federal CCR Rule Revisions (40 CFR 257 and 261)

Ash ponds were designed, installed, and operated to function as a treatment system for power plant wastewaters, and they effectively served in this capacity for decades in compliance with NPDES permits under which they were regulated. Regulation of ash ponds and CCR changed in April 2015, when EPA published the Coal Combustion Residuals Final Rule ("Federal CCR Rule") that provided a comprehensive set of requirements for the disposal of CCR as a solid waste under RCRA. This final rule was the result of extensive study by EPA of the effects of CCR on human health and the environment and represented a decision by EPA to uphold decades of previous Agency determinations that coal ash should be regulated as non-hazardous waste. The Federal CCR Rule was issued as a "self-implementing" rule that set national minimum standards for management of coal ash and gypsum.

The 2015 Federal CCR Rule set standards for certain CCR units and provided exemptions for others. Those units subject to the Federal CCR Rule include the following: new and existing CCR landfills and surface impoundments (ash ponds), including any lateral expansions of such units, and inactive surface impoundments located at active electric generating facilities.

The Federal CCR Rule included exemptions from all or portions of the requirements for various units or activities, including CCR landfills that ceased receiving CCR prior to October 19, 2015; practices that meet the definition of a beneficial use of CCR; municipal solid waste landfills that receive CCR; inactive surface impoundments that closed within three years (the "three-year closure" exemption); and CCR units located at sites that ceased generating electricity, regardless of the fuel type, as of October 19, 2015.

For regulated CCR units, the federal rules established a comprehensive set of compliance requirements related to location and siting criteria, design and operating criteria, groundwater monitoring and corrective action requirements, structural integrity requirements, closure and post-closure care requirements, a range of reporting and recordkeeping requirements, and posting of information to the internet. Failure to demonstrate compliance with certain criteria by specified deadlines results in required closure of the CCR unit, with specific requirements around closure timeframes and methods. The Federal CCR Rule explicitly authorizes both closure in place and closure by removal as options, with each option

subject to its own set of closure performance criteria. The rule incorporates options that allow for extensions for surface impoundments to continue to receive CCR for a limited amount of time if alternative options are not available without the existence of that CCR unit.

Since the original publication of the Federal CCR Rule, there have been several developments related to litigation, administration policy changes, or legislative actions that amended the requirements or changed how the rule is enforced, as discussed below.

Federal CCR Rule Revisions: 2015 Litigation and 2016 Settlement Agreement

In December 2015, several parties, including industry and environmental groups filed legal challenges to the Federal CCR Rule. In June 2016, the D.C. Circuit Court approved a settlement addressing several, but not all, issues that were raised in the CCR litigation. As part of the settlement, the court vacated the three-year closure exemption for inactive surface impoundments. This meant that inactive CCR units that were pursuing the three-year closure exemption would be subject to the same rule requirements as existing CCR surface impoundments, except on a revised schedule. Additionally, as part of the settlement, EPA agreed to finalize rulemaking to address a number of technical issues. For the three-year closure exemption, in August 2016, EPA finalized a roughly 1.5-year extension of certain compliance dates for ash ponds that intended under the 2015 Federal CCR Rule to close within 3 years.

Federal CCR Rule Revisions: 2017 Petition for Reconsideration, Phase One and Two Amendments

In September 2017, EPA granted a Petition for Reconsideration of the Federal CCR Rule filed by the Utility Solid Waste Activities Group ("USWAG"). In November 2017, EPA outlined a phased approach to amending the Federal CCR Rule, with intent to cover numerous technical requirements with a Phase One and Phase Two rulemaking schedule, and subsequently issued both Phase One and Phase Two proposed rulemakings.

While the proposed Phase One Rule covered numerous technical requirements, only a subset of these provisions was finalized in July 2018 with Part One of the Phase One Amendments to the Federal CCR Rule ("Phase One, Part One Rule"). The Phase One, Part One Rule established groundwater protection standards for lithium, molybdenum, cobalt and lead and extended the deadline to cease receipt of both CCR and non-CCR wastes to October 31, 2020, under certain conditions. While litigation on the rule resulted in the D.C. Circuit granting EPA's request to voluntarily review and revise the rule in March 2019, the Court left the rule requirements in place in the meantime.

In August 2019, the EPA published the Phase Two proposed amendments, which addresses criteria relating to beneficial use practices, proposes a potential boron groundwater protection standard, and requires groundwater data and annual reports to be more accessible and transparent to the public. In December 2020, the EPA sought additional comment related to these proposed amendments, especially on beneficial use processes, but has not yet taken final action.

Federal CCR Rule Revisions: 2018 Litigation, Part A and Part B Rulemakings

In August 2018, the U.S. Court of Appeals for the D.C. Circuit issued a decision (1) vacating an exemption from the federal CCR rule for inactive surface impoundments at inactive power plants; (2) requiring all unlined CCR surface impoundments to close, irrespective of whether the impoundments are meeting the rule's groundwater protection standards; and (3) vacating a provision that classified certain clay-lined impoundments as "lined," meaning that all clay-lined impoundments are unlined and must close. As a result of the Court decision, EPA must revisit elements of the CCR rule through additional rulemakings.

After the August 2018 D.C. Circuit decision, EPA proposed two separate rulemakings to address certain issues, one titled "A Holistic Approach to Closure Part A: Deadline to Initiate Closure" ("Part A Rule") and

the other titled "Holistic Approach to Closure Part B; Alternate Demonstration for Unlined Surface Impoundments; Implementation of Closure" ("Part B Rule"). In August 2020, EPA finalized the Part A Rule, which incorporated a new deadline for unlined impoundments to cease receipt of waste and initiate closure as soon as technically feasible but no later than April 11, 2021; extended the existing alternative closure extensions to include CCR and non-CCR waste streams; added requirements for the publicly accessible CCR website; and changed the classification of compacted-soil lined, or "clay-lined", surface impoundments changed from "lined" to "unlined." For the Part B Rule, in November 2020, EPA finalized a portion of the proposed rule which provides an owner/operator the ability to demonstrate that alternative liner systems, such as natural clay, perform as well as or better than composite liner systems explicitly required by the CCR rule. Additional rulemakings are expected to address topics not covered by the Part A and Part B final rules.

In October 2020, EPA published an advanced notice of proposed rulemaking on legacy surface impoundments, or inactive surface impoundments at retired electricity generation facilities. This notice solicited data and information on the status and number of legacy impoundments. EPA has stated that a future proposed rule may include a new definition for legacy surface impoundments and may propose requiring such impoundments to follow existing regulatory requirements for fugitive dust, groundwater monitoring, closure, and other technical requirements.

New Regulatory Updates

- As discussed in the 2022 IRP and ECS, on January 11, 2022, the EPA published proposed determinations on nine CCR Rule Part A requests for additional time to stop sending ash to unlined ponds related to facilities of other utilities in different states. While Georgia Power did not seek additional time to stop sending ash to unlined ponds, EPA's proposed determinations for other facilities expressed new positions on a variety of CCR rule compliance requirements, including closure performance standards, groundwater monitoring, and corrective action. Since its initial January 11, 2022, proposed Part A determinations, the EPA has proposed three additional determinations and made one final determination, again related to facilities of other utilities in different states. Discussions between EPA and Georgia EPD related to Georgia Power CCR permits are expected to continue in 2023.
- On April 8, 2022, USWAG and a group of generating facilities filed petitions for review in the D.C. Circuit Court of Appeals, challenging EPA's January 11th actions. The primary basis of the challenge is whether EPA's actions are new "legislative" rules that should have gone through notice-and-comment rulemaking. Briefing is ongoing with a decision expected in 2023.
- EPA is expected to issue a proposed rule regarding legacy surface impoundments by June 2023. While CCR units meeting this definition are already regulated through the Georgia CCR Rule, there is uncertainty on whether EPA may include additional new requirements for legacy surface impoundments beyond those suggested in the 2020 advanced notice of proposed rulemaking.

State Coal Combustion Residuals Rule (391-3-4-.10)

In October 2016, the Georgia Department of Natural Resources ("DNR") Board adopted amendments to Georgia's Rules for Solid Waste Management pertaining to the storage and disposal of CCR. At the time, the Georgia CCR Rule acted in addition to, rather than a replacement of, the Federal CCR Rule. It included certain more stringent permitting, oversight, and monitoring requirements than the Federal CCR Rule, such as: regulating all CCR landfills and ash ponds and requiring a comprehensive permitting program covering CCR unit development, operation, and closure, which is approved and enforced by Georgia EPD. All existing CCR units, including ash ponds and landfills previously closed, were required to submit a CCR

permit application to Georgia EPD by November 22, 2018. The permitting process includes review of the Company's plans, engineering design, public notice, and public comment.

Georgia EPD adopted the compliance deadline extensions for the three-year closure units in March 2018.

New Regulatory Updates

- In February 2022, the Georgia DNR approved of updates that align the state CCR Rule with the latest applicable changes to the Federal CCR Rule. EPD has plans to continue to update the Georgia CCR Rule in order to incorporate changes to the Federal CCR Rule in the future.

Water Infrastructure Improvements for the Nation Act (WIIN Act, Section 2301)

In December 2016, the Water Infrastructure Improvements for the Nation Act ("WIIN Act") was approved by the U.S. Congress, including a section that amends a portion of RCRA to allow states to submit their CCR permit programs for EPA approval. An EPA-approved state permit program provides more regulatory certainty and reduces the burden of overlapping regulations since it would authorize states to enforce state regulations for CCR units and operate a permitting program in lieu of the federal rule. In March 2017, Georgia EPD submitted Georgia's CCR Rule for EPA's review and approval as a "partial" permit program, meaning that EPD did not seek approval of certain elements of the Federal CCR Rule.

In June 2019, Georgia received notice from EPA that their application was complete, officially initiating the 180-day review and approval process. In January 2020, EPA finalized a partial approval of Georgia's CCR permit program. Georgia's program was partially approved because the Georgia Rules for Solid Waste Management did not include provisions to cover the applicability of requirements for endangered species. Georgia's partial program approval allows the Georgia EPD to enforce rules promulgated under its solid waste statute related to CCR activities, as well as to issue permits and to enforce compliance. Georgia is the second of only three states in the nation to gain approval to operate a state CCR Permit Program.

In February 2020, EPA issued a proposed rule to establish a Federal CCR Permit Program for states that are not actively pursuing their own state CCR permit program for approval and to cover specific rules sections that are not included in state programs with partial approval.

New Regulatory Updates

- In July 2023, EPA is expected to finalize the Federal CCR Permit Program. Because Georgia EPD did not incorporate the endangered species review requirements in the State CCR Rule, the Federal CCR Permit Program is expected to apply in Georgia for that portion of the rule only.

CCR Compliance Strategy

Georgia Power's ash pond closure plans and compliance strategy are designed to comply with the Federal CCR Rule, as well as the more stringent requirements of the Georgia CCR Rule. One important element of both the Federal and Georgia CCR Rules has been public access to information, with the requirement to maintain a publicly available website of CCR compliance documents and data. Georgia Power has prioritized the public accessibility of its CCR information from the beginning of rule implementation and is committed to continuing this practice. The compliance strategy discussion that follows is divided into the topics of closure methods, dewatering, groundwater monitoring, and beneficial use.

Ash Pond Closure and Landfill Compliance Strategy

Since the EPA published the CCR rule in 2015, Georgia Power has worked to develop and implement closure plans in compliance with the rule at its 29 ash ponds and 12 existing CCR landfills at 12 sites across the state, as shown in **Table 5**. As a part of the compliance strategy and in preparation for closure, the Company ceased placement of coal ash in all ash ponds in 2019.

Table 5 Georgia Power CCR Unit Closure Strategies

Facility	Landfills	Ash Ponds	Closure Strategy
Arkwright	AP-1 Landfill, AP-2 DAS Landfill, AP-3/Monofill Landfill		The existing landfills were closed in 2010 under Solid Waste Regulations applicable at the time. Under the Georgia CCR Rule, the existing landfills will be closed by removal to a future permitted on-site landfill.
	Future LF		The future permitted landfill will be on-site and will receive CCR from the other on-site landfills. The landfill will undergo closure when permitted capacity is reached or when CCR disposal is no longer needed.
Bowen		AP-1	AP-1 is being closed in place by excavating and consolidating CCR into a fully contained engineered structure (composite-lined and final-covered area).
	LF		The permitted landfill is to remain active as part of ongoing plant operations and to support ash pond closure. The landfill will undergo closure when permitted capacity is reached or when CCR disposal is no longer needed.
Branch		AP-A	AP-A was closed by removal and consolidated within AP-E before the Georgia CCR Rule became effective.
		AP-B, C, D, E	AP-B, C, D, & E will be closed by removal to a future permitted on-site landfill.
	Future LF		Future permitted landfill will receive CCR from the removal of on-site ash ponds. The landfill will undergo closure when permitted capacity is reached or when CCR disposal is no longer needed.
Hammond		AP-1, AP-2	AP-1 and AP-2 are being closed by removal to a Company-owned off-site permitted landfill (Huffaker Road).
		AP-3	AP-3 has been closed in place with an engineered impermeable cap-cover system. Consistent with the post-closure plan, and to enhance the effectiveness of closure, a TreeWell® system is planned outside and downgradient of the CCR footprint.
		AP-4	AP-4 will be closed by removal to a Company-owned offsite permitted landfill (Huffaker Road).
	Huffaker Rd		The permitted landfill will receive CCR from certain ash ponds at Hammond. The landfill will undergo closure when permitted capacity is reached or when CCR disposal is no longer needed.
Kraft		AP-1	AP-1 was closed by removal to offsite permitted landfills prior to the Georgia CCR Rule. The removal was part of an expanded plant retirement project and was regulated by Georgia EPD's Response and Remediation Program.
	Grumman Rd		The permitted landfill is inactive and has been closed.
McDonough		AP-1	AP-1 is being closed in place with an engineered impermeable cap-cover system and the installation of a barrier wall to enhance the effectiveness of the closure.
		AP-2	AP-2 has been removed and the ash consolidated with AP-1 and AP-3&4.
		AP-3 & AP-4	AP-3 & AP-4 are being consolidated and closed in place with an engineered impermeable cap-cover system. Consistent with closure plans, closure construction includes an underslope drainage system and the continued interim use of dewatering wells to enhance the closure.

Table 5 continued

Facility	Landfills	Ash Ponds	Closure Strategy
McIntosh		AP-1	AP-1 has been closed by removal with the ash placed in a permitted on-site landfill.
	LF3		The landfill was closed in 2008 in accordance with the current landfill permit.
	LF4		The permitted landfill will receive CCR as needed. The landfill will undergo final closure when CCR disposal is no longer needed.
McManus		AP-1	AP-1 has been closed by removal with excavated CCR placed in an off-site permitted landfill.
Mitchell		AP-A, 1, 2	AP-A, 1, and 2 are being closed by removal of CCR.
Scherer		AP-1	AP-1 will be closed in place with an engineered impermeable cap-cover system. Consistent with the closure plans, the closure construction includes consolidation of the current ash pond footprint, with extension of the final cover system over non-CCR containing areas to minimize stormwater infiltration.
	LF		The permitted landfill to remain active as part of ongoing plant operations. The landfill will undergo closure when permitted capacity is reached or when CCR disposal is no longer needed.
Wansley		AP-1	AP-1 will be closed by removal with CCR excavated and placed in a permitted on-site landfill.
	LF		The permitted landfill will be expanded and then closed following placement of CCR from AP-1.
Yates		AP-1	CCR from AP-1 was removed from the ash pond and consolidated to R6, AP-B' and AP-3.
		AP-2	AP-2 is being closed by removal to AP-B' and AP-3.
		AP-3, B’	AP-3 and AP-B’ are being consolidated and will be closed in place with an engineered impermeable cap-cover system. Consistent with the closure plans, a subsurface hydraulic conveyance system has been incorporated into the closure construction activities to enhance the effectiveness of closure.
		AP-A	AP-A was closed by removal and the ash placed in AP-B' and AP-3.
		AP-B	AP-B is being closed by removal to AP-B' and AP-3.
		AP-C	The former ash pond AP-C was previously incorporated into the on-site permitted landfill, R6.
	LF R6		Former ash pond AP-C was previously incorporated into the on-site permitted landfill, R6. The landfill is currently being closed in accordance with its current landfill permit requirements.
	LF Gypsum		The gypsum landfill has been closed by removal.

The Company's closure plans are based on detailed site-specific designs performed by third party professional engineers that consider the size and volume of each CCR unit, local geology and topography, detailed modeling of site stability, the availability of on-site or off-site landfill space, safety requirements, the compliance deadline, and other site-specific constraints. In all cases, the compliance plans for each CCR unit are based on long-standing rule interpretation held by both industry and environmental regulators. In addition, the Company used industry- and agency- accepted engineering practices utilized for closure designs that are consistent with solid waste regulatory requirements, on which the CCR rule is based. At all times these plans have been supported by sound engineering designs and certified by Professional Engineers with expertise in solid waste permitting and design.

In November 2018, Georgia Power submitted 29 CCR permit applications as required by the Georgia CCR Rule for ash ponds and CCR landfills. These permit applications outlined detailed engineering information about Georgia Power's ash pond closure and landfill operations plans and were developed with significant internal resources supported by multiple third-party engineering firms and licensed professional engineers and geologists. As part of the permitting process, Georgia EPD reviews and provides comments to Georgia Power on the site-specific details of the individual permit applications. The Company took steps to address EPD's comments, which included working with third-party engineering firms to update groundwater monitoring plans, revise permit documents and update closure drawings and engineering calculations. However, while EPD required the Company to update its permit applications and plans, final permits were largely consistent with permit applications and did not significantly change the Company's closure plans. To date, final permits for Plant Bowen AP-1, Plant Bowen Landfill, Plant Branch Landfill, Plant Hammond AP-1, Plant Hammond AP-2, Plant Hammond AP-4, Plant McIntosh AP-1, Plant McIntosh Landfill 3, Plant McManus AP-1, Plant Mitchell AP-A/AP-1/AP-2, Plant Wansley Landfill, Plant Yates AP-1, and Plant Yates Gypsum Stack have been issued by the EPD. In addition, draft permits for Plant Hammond AP-3 and Plant McIntosh Landfill 4 were issued by Georgia EPD.

In order to advance ash pond closures and meet the closure deadlines associated with the Federal CCR Rule, Georgia CCR Rule or agreement with the EPD, regardless of permit issuance, the Company must continue to proceed with work, including groundwater monitoring, detailed engineering designs, construction activities, as well as develop and implement site-specific and comprehensive ash pond dewatering processes. Georgia Power has provided landfill and ash pond closure certifications and/or ash removal certifications to Georgia EPD for certain CCR Units at Plants Branch, Hammond, Kraft, McDonough, McManus, McIntosh, and Yates. These certifications document important information regarding the closure activities, quality control information, and verification of compliance with the CCR rule. Georgia EPD has issued acknowledgement letters for completion of CCR removal for certain CCR Units at Plants McManus, McDonough, McIntosh, and Yates, demonstrating the Company's compliance with the state CCR rule's closure requirements as well as Georgia EPD's active oversight regardless of final permit status, demonstrating the Company's compliance with the state CCR rule's closure requirements as well as Georgia EPD's active oversight regardless of final permit status.

In December 2022, Georgia Power entered into a consent agreement with the EPD, recognizing the need to extend the closure timeline for McDonough AP-1. Consistent with CCR rules, a Notification of Intent to Initiate Closure was filed in December 2015. Additionally, and in accordance with CCR rules, an extension request for two years was submitted to the EPD in December 2020 that re-established the closure deadline to December 2022. While much of the closure is complete, design and regulatory review of the remaining activities by the EPD are ongoing. Therefore, EPD, recognizing these factors are beyond the Company's control, is using the consent order to provide additional time to complete the closure while finalizing permitting. The consent order requires a milestone schedule be submitted to and approved by

the EPD within 90 days of the issuance date of the final closure permit, or within 10 months of execution of the order, whichever comes first. There was no monetary penalty associated with the consent order.

The Company's CCR compliance strategy process is developed to respond to changing regulations. While the strategy itself will continue to necessarily evolve, the purpose of the process has always been to produce cost-effective compliance solutions that will minimize the impact to customers while achieving environmental objectives and ensuring compliance with all requirements. With EPA's 2022 announcement of its new positions on the nearly seven-year-old rule and additional revisions to the Federal CCR Rule expected, and the Company remains focused on compliance and will continue to work with the Georgia EPD to ensure safe and effective closure ash ponds.

Dewatering and Water Treatment

The Company's dewatering process during ash pond closures involves treating all contact water to meet the requirements of each plant's wastewater permit, as well as the associated dewatering plans approved by the EPD, to ensure compliance with water quality standards.

The dewatering activities occur under the direction of independent, third-party licensed wastewater treatment plant operators throughout the duration of each closure project. Water quality monitoring data is reported monthly to the EPD, and a monthly summary is also placed on Georgia Power's external website. In some cases, water treatment may continue into the post-closure care ("PCC") period to manage ongoing water treatment requirements. This support will continue until the needs of the sites are addressed. In addition, the Company has engaged independent, third-party contractors for weekly effluent and bi-monthly receiving stream sampling throughout dewatering. Samples collected by independent contractors are analyzed by accredited independent laboratories.

The dewatering process is dynamic and complex. The treatment system demands are often impacted by rainfall and site-specific closure conditions. For these reasons, the required treatment technologies may be different at each site and may change during the closure process to support the needs of the site, which may cause labor resources, operating schedules, and associated costs to fluctuate. The Company will adjust the individual site water treatment infrastructure to align with site needs and regulatory requirements during closure and post-closure as required.

Groundwater Monitoring and Post Closure Compliance Strategy

Georgia Power continues to monitor groundwater at its ash ponds and CCR landfills and to report the results to the EPD, as well as to post regular updates to the Company's external website. Georgia Power has installed comprehensive groundwater monitoring networks, including more than 600 wells, at its facilities across the state to actively monitor groundwater quality at each site.

As required under the CCR Rules, the Company continues to perform routine sampling and reporting for the compliance parameters listed in the Rules. Where parameters have been observed at statistical levels above the groundwater protection standard ("GWPS"), the Company has completed evaluations and, when necessary, entered into assessment of corrective measures ("ACM").

As required under the CCR Rules, the Company has installed additional monitoring wells to further characterize groundwater quality near CCR units in ACM. As the Company continues the ACM process, prior to implementing a corrective measure or remedy, the Company will conduct additional activities such as continued site characterization (including groundwater sampling, well and piezometer installation, and laboratory bench scale testing), remedy selection, and reporting to the EPD.

Third-party, independent consultants will continue groundwater sampling, data evaluation, interpretation, and reporting while accredited independent laboratories will continue performing analyses following the appropriate methodology and protocols.

Draft remedy selection reports for Plant Hammond AP-1 and AP-2 and Plant Yates AP-3/AP-B' and R6 were submitted to Georgia EPD in the third quarter of 2022. The reports signify the next step in the regulatory process towards selecting a remedy or corrective action to address substances in groundwater above the GWPS. The reports were prepared by independent engineers and geologists and contain data for Plants Hammond and Yates that is used to evaluate corrective measures and to select a proposed remedy for EPD to review and approve. In the limited number of instances where the Company has detected substances in groundwater above the GWPS; these substances are isolated to a few wells on Company property.

Once ash pond closure is complete, post closure care will be implemented in accordance with the Federal and Georgia CCR rules. Post closure care will include inspecting CCR landfills and former ash ponds that are closed in place to verify continued structural integrity, maintaining the integrity and effectiveness of the final cover system for close in place units, maintaining and sampling the groundwater monitoring systems, and regulatory reporting.

Beneficial Use

One key aspect of Georgia Power's CCR compliance strategy is to use a market driven approach to beneficial use to optimize the cost of CCR unit closures. To minimize or offset costs related to CCR storage, landfill construction, and associated operations and maintenance ("O&M"), Georgia Power currently markets more than 85% of the CCR generated from operations for beneficial use. Georgia Power's fleetwide CCR closure strategy is to continue to evaluate opportunities to recycle ponded ash during closures as viable opportunities arise and technology and markets develop. The Company intends to maximize the benefits of beneficial use by engaging in R&D (as discussed in Appendix C with the Ash Beneficial Use Center), leveraging geographical market opportunities, and using the competitive bidding process. The Company will continue to seek out beneficial use opportunities during ash pond closures, where it adds value for the Company and our customers and will continue working with Georgia EPD to obtain any permit modifications in the future to support beneficial use.

The beneficial use plans at Plant Mitchell are an example of leveraging geographical market opportunities, with the south Georgia site able to take advantage of its proximity to Portland cement and concrete processing facilities located in Florida. This proximity is important to the cost effectiveness of the beneficial use project to remove the stored coal ash at Plant Mitchell's three ash ponds. Over the next several years, up to approximately two million tons of ash are planned to be removed from the site to help create Portland cement, reducing the amount of ash required to be removed to an off-site landfill and ultimately serving to produce a valuable product.

In December 2019, Georgia Power initiated an RFP for the beneficial use of stored coal ash at Georgia Power facilities, seeking to identify opportunities and maximize the value for the beneficial use of stored coal ash at its active and retired plants across the state. Initial bids were received from 16 bidders in October 2020. In early 2021, discussions were held with each of the entities that submitted proposals, and bidders were allowed to update their proposals.

The proposals provided numerous options for consideration, most of which would add significant cost to the closure plans due to the investment needed to retrieve and/or process stored CCR. The Company was supported by a third-party engineering consultant to perform a thorough review of the proposals to assess

which proposals offered the most value to customers. The Company's in-depth evaluation included, without limitation, the effects of the various beneficial use proposals on closure plans, project timelines, project costs, project sequencing, and project infrastructure requirements. Through this process, Georgia Power was able to identify the select proposals that did show the potential for overall net benefits. As discussed in the 2022 IRP, in order to take advantage of the overall expected benefits associated with beneficial use, the Company will need to make near-term investments. These investments are expected to benefit the CCR ARO program by providing downward pressure on the overall ash pond closure project costs and/or reducing long-term liability. These benefits could take the form of reduced ash volumes handled during closure, reduced final footprint needed to support closure, and/or reduced post-closure care cost. Additionally, the value of the ash sales can further offset closure costs.

Announced in June 2022 as a result of the RFP, Plant Bowen's beneficial use project, where reuse of ash in the ready-mix concrete market is expected to reduce the amount of on-site ash by approximately half (nine million tons), is an example of using the competitive bidding process to determine the best market opportunities and minimize costs for particular sites. While near-term investments and some ongoing operational costs are necessary to harvest, process, and remove stored ash from the Plant Bowen ash pond, the expected cost benefits are expected to provide significant savings to the customer over the life of the project.

For other sites included in the 2019 RFP, Georgia Power is continuing to negotiate with vendors and may potentially incorporate beneficial use into the closure plans at additional facilities. The Company will proceed with projects that provide value to customers and places ash into the market for reuse. As outlined in the 2022 IRP Final Order, the Company will provide a report to the Commission on the results of the beneficial use RFP upon completion of the RFP process. The CCR ARO compliance program is long-term in nature, with the possibility for changing market conditions, technology advancements, and many other factors over the coming decades. The Company will continue to monitor progress with its current beneficial use plans, consider additional beneficial use opportunities as appropriate in the future, and will evaluate future revisions to the CCR rules and CCR permit developments for any impacts to beneficial use projects.

2.3 Air Regulatory and Strategy Updates

The air compliance strategy considers a variety of regulations related to air quality and emissions, including both nationwide standards as well as state requirements. The strategy focuses on electric generating units that have emissions, mainly coal, natural gas, and/or oil-fired power plants. Based on the information currently available, the strategy to meet air compliance requirements is summarized in **Table** . The areas of legislation, regulation, permitting, or other actions that set, or are anticipated to set, critical air compliance requirements are discussed below.

Table 6 Emissions Control Equipment at Active Coal and Natural Gas Combined-Cycle Generating Units

Unit	Primary Fuel	NOx Control	SO2/Acid Gas Control	Mercury Control	PM Control	CO/VOC Control
Bowen 1 & 2	Coal	LNCS/SCR	Scrubber	ACI/ALK/MRCS FGD/SCR	ESP/FGD	N/A
Bowen 3 & 4	Coal	LNCS/SCR	Scrubber	ACI/ALK/BH FGD/SCR	ESP/BH/FGD	N/A
Gaston 1 – 4	Natural Gas	LNCS	N/A	N/A	N/A	N/A
McDonough 4 – 6	Natural Gas	LNCS/SCR	N/A	N/A	N/A	OC
McIntosh 10 & 11	Natural Gas	LNCS/SCR	N/A	N/A	N/A	OC
Scherer 1 – 3	Coal	LNCS/SCR	Scrubber	BH/ACI	ESP/BH/FGD	N/A
Yates 6 & 7	Natural Gas	LNCS	N/A	N/A	N/A	OC

Control Equipment Key:
BH = Baghouse
ACI = Activated Carbon Injection
ALK = Alkali Sorbent Injection
ESP = Electrostatic Precipitator
LNCS = Low NOx Combustion System
SCR = Selective Catalytic Reduction

2.3.1 National Ambient Air Quality Standards and Georgia Regulations

The CAA of 1970 centralized the authority to set National Ambient Air Quality Standards ("NAAQS") and requires EPA to review the primary and secondary NAAQS every five years and revise them as necessary. These reviews have resulted in multiple, significant changes to the ozone and PM NAAQS, the addition of short-term primary SO_2 and nitrogen dioxide ("NO_2") NAAQS, and other air quality standards updates. Implementing these standards is generally a state responsibility; however, EPA has also issued rules, such as the NO_x Budget Trading Program, the Clean Air Interstate Rule ("CAIR"), and the Cross State Air Pollution Rule ("CSAPR") programs, that deal with the transport of pollutants on a regional or multi-state scale to facilitate attainment with the NAAQS.

Ozone (40 CFR 50.10)

In 1979, EPA put into place an air quality standard on 1-hour ozone concentrations of 120 parts per billion ("ppb"). Subsequently, the Agency replaced the 1-hour standard with an 8-hour standard of 80 ppb in 1997, which was lowered to 75 ppb in 2008 and again to 70 ppb in 2015. In December 2020, EPA issued a final rule to retain the current standards for ozone, both primary and secondary, without revision based on EPA's review of the air quality criteria and the NAAQS.

For each historical ozone standard, portions of the Atlanta metropolitan area were designated as nonattainment during implementation before meeting the standard, as measured by air quality monitors, over a period of time. Georgia's implementation of past ozone standards for coal-fired electric generating units largely centered around Georgia Rule 391-3-1-.02(2)(jjj) ("Rule (jjj)"), NOX Emissions from Electric Utility Steam Generating Units. Rule (jjj) initially became effective in 1999 in response to Atlanta area ozone nonattainment and subsequently was revised multiple times, with the most recent revision effective in 2007. Rule (jjj) required the installation of low NOx combustion technology at coal-fired units in and around the Atlanta metropolitan area and selective catalytic reduction ("SCR") systems at select coal-fired units at Plants Bowen, Hammond, and Wansley in the early 2000s.

For the current 2015 standard, all areas in Alabama and Georgia, except the Atlanta area, were designated as in attainment with the current standards. Ambient air quality monitoring showed the Atlanta area

attaining the standards in 2020 and in November 2021, EPD proposed a revision to the Georgia State Implementation Plan ("SIP") to request that the Atlanta area be redesignated as attaining the 2015 8-hour Ozone NAAQS. In the meantime, in response to President Biden's EO 13990 in 2021 requiring the review of regulations finalized during the previous Administration, EPA has been in the process of reconsidering the 2020 decision to retain the ozone standard.

New Regulatory Updates

- On October 17, 2022, EPA finalized the official redesignation of the Atlanta area from nonattainment to attainment of the 2015 ozone standard, bringing the entire state of Georgia into attainment with all air quality standards.
- In December 2022, Georgia EPD proposed revisions to the Georgia rules to remove certain requirements for air permitting in the former nonattainment area. Some of the proposed changes were revised after public comment and reproposed in March 2023. These proposed revisions, if finalized, will streamline permitting for new projects.
- In 2022, EPA staff and the Clean Air Scientific Advisory Committee ("CASAC") Ozone Review Panel released conflicting recommendations on the review of the ozone standard, with EPA staff recommending not reopening the 2020 ozone review, while CASAC supported the reconsideration.
- In light of CASAC's comments, on January 3, 2023, the EPA Administrator published a letter to the Chair of CASAC announcing that the EPA is revising its recommendation report. However, the updated report released in March 2023 reached the same conclusion as the 2022 report and did not recommend reconsidering the ozone NAAQS. CASAC is expected to continue its review before issuing a final recommendation in the coming months.
- EPA is expected to issue a proposed reconsideration of the 2020 ozone standard later in 2023.

Particulate Matter (40 CFR 50.13)

While national air quality standards for PM were first established in 1971, EPA shifted its focus and revised the PM NAAQS to add fine particulate matter, i.e., $PM_{2.5}$, in 1997, focusing on particles of a smaller size. The first $PM_{2.5}$ standards were set at a level of 15 micrograms per cubic meter ("$\mu g/m^3$") on an annual average and 65 $\mu g/m^3$ on a 24-hour average. In September 2006, EPA retained the annual standard but lowered the 24-hour standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$. In December 2012, EPA lowered the annual standard for $PM_{2.5}$ to 12 $\mu g/m^3$. In December 2020, EPA published a final rule to retain the particulate matter NAAQS last updated in 2012, without revision.

While Atlanta, Floyd County, Macon, and Chattanooga areas were designated as nonattainment for the 1997 $PM_{2.5}$ annual standard, all areas in Georgia have since been redesignated to attainment for the 1997 $PM_{2.5}$ annual standard and also meet all of the subsequently finalized PM standards. EPA announced that it is reconsidering the December 2020 decision to retain the primary and secondary NAAQS for PM because it now believes the standards may not be protective enough. Similar to ozone, in response to President Biden's EO 13990 in 2021, EPA has been in the process of reconsidering the 2020 $PM_{2.5}$ standard.

New Regulatory Updates

- In 2022, both EPA Staff and CASAC recommended lowering the PM2.5 NAAQS.
- On January 6, 2023, EPA released a proposal that would revise the level of the primary annual PM2.5 standard from 12.0 $\mu g/m^3$ to a level within the range of 9.0 to 10.0 $\mu g/m^3$ while taking comments on a range between 8.0 and 11.0 $\mu g/m^3$; to retain the current 24-hour PM2.5 primary standard at 35.0 $\mu g/m^3$ but is taking comment on lowering the standard to a level as low as 25.0

µg/m^3; to retain the current primary 24-hour PM10 standard and all current secondary (welfare-based) standards for both PM2.5 and PM10.

- EPA is expected to finalize the PM2.5 standard reconsideration by the end of 2023.

Startup, Shutdown, Malfunction (CAA Section 110(k)(5), 40 CFR 52, GA Rule 391-3-1-.02(2)(a)7. and 11.)

In May 2015, EPA issued a final "SIP Call" requiring 36 states, including Georgia, to remove exemptions for excess emissions that occur during periods of startup, shutdown, and malfunction ("SSM") in previously approved state rules. The Sierra Club petitioned EPA to take this action, primarily based on the arguments that such provisions allow emissions that could cause or contribute to violations of ambient air quality standards and that interfere with or preclude enforcement by agencies and citizens. Georgia Power and the State of Georgia are parties to ongoing litigation in the D.C. Circuit Court challenging the 2015 SSM Rule on the basis that the long-standing Georgia excess emissions rules have supported and not interfered with significant air quality improvements in the area.

In November 2016 to address the SIP Call, Georgia EPD submitted a new state SSM rule (391-3-1-.02(2)(a)(11)) to EPA for approval as a revision to the Georgia SIP, setting requirements for work practice standards for periods of startup, shutdown, and malfunction. While the new state rule is final, it does not take effect unless it is approved by EPA. In the meantime, the existing rule that EPA previously approved decades ago but has now recalled remains in effect.

In 2020, three EPA region offices took action on the SSM rules in the state implementation plans for Texas, North Carolina, and Iowa. Although the actions taken were specific to rules and requirements in each state, each action had the effect of withdrawing the SSM SIP Call for those states, reversing the requirement to update or remove the state SSM rules. In October 2020, EPA issued a memorandum providing guidance that exemption provisions and affirmative defenses for SSM periods may be permissible in SIPs under certain circumstances. However, this SSM guidance was withdrawn by EPA in September 2021 and EPA has indicated it is reviewing the 2020 SSM SIP Call withdrawals as well.

In September 2021, environmental groups filed a legal suit against EPA in the Northern District of California claiming that EPA has failed to act on the SIP revisions required by the 2015 SSM SIP Call, including SIP revisions that were submitted by 29 states and air districts, including Georgia, and has failed to promulgate a Federal Implementation Plan for states, including Alabama, that did not submit a SIP.

In December 2021, the D.C. Circuit Court reactivated the SSM SIP Call litigation at the request of EPA and set an expedited supplemental briefing schedule.

New Regulatory Updates

- On January 12, 2022, the EPA published a formal finding that 12 state and local air pollution control agencies, including Alabama, failed to submit SIP revisions as required by the 2015 SSM SIP Call. The finding triggers an obligation for the EPA to promulgate a Federal Implementation Plan, which would replace existing state startup, shutdown, malfunction regulations, within 24 months.
- In the spring of 2022, supplemental briefing and oral argument was completed, and the D.C. Circuit Court of Appeals is expected to issue a decision in the SSM SIP Call litigation imminently.
- In July 2022, the Northern District of California Court finalized a consent decree in which EPA agreed to take action on previously submitted SSM SIPs for various states, including Georgia, by specific dates. The deadline for action on the Georgia SSM SIP was set at February 2023.

- On November 28, 2022, EPA proposed to disapprove of the Georgia SSM SIP that was submitted in November 2016 on the basis that the work practice standards in Georgia's rule did not satisfy Clean Air Act requirements.
- On January 10, 2023, Georgia EPD notified EPA that, although EPD disagrees with EPA's proposed disapproval, it was withdrawing the November 2016 SSM SIP and stated intentions to revise the state rule and resubmit. Georgia EPD is expected to brief the DNR Board on revisions to the new state SSM rule in April 2023 and, if adopted, request EPA approval for as a revision to the SIP in as early as November 2023.

Georgia Multipollutant Rule and SO2 Emissions Rule (GA Rule 391-3-1-.02(2)(sss) and (uuu))

In response to federal environmental rules as well as state-specific objectives, the state of Georgia has implemented a set of state rules requiring installation of emission controls and setting emission standards for coal-fired power plants.

Georgia EPD targeted emissions reductions for a broad set of air quality objectives with the Georgia Multipollutant Rule, which was finalized in June 2007. The Georgia Multipollutant Rule was designed to reduce emissions of mercury, SO_2, and NOx statewide by requiring installation of specified control technologies on all of the larger coal-fired electric generating units by specific dates originally set between December 31, 2008, and June 1, 2015. Specified controls included flue gas desulfurization scrubbers, SCRs, and baghouses.

The Georgia SO_2 Emissions Rule, finalized in January 2009, was designed to be a companion rule to the Georgia Multipollutant Rule. The rule requires reduction of SO_2 emissions by 95% from all units required to install scrubbers under the Georgia Multipollutant Rule, except Plant Yates Unit 1 where a 90% reduction was required. The rule required compliance beginning in January 2010 for units with scrubbers in operation and requires reductions from the remaining units at dates aligning with or close to the Multipollutant Rule compliance dates.

The most recent revisions to both the Georgia Multipollutant Rule and Georgia SO_2 Emissions Rule were finalized in June 2011 and April 2013. These revisions moved up the scrubber and SCR compliance dates for certain units and allowed for additional time to install controls at other units, in an attempt to streamline the compliance deadlines in the state rules with the Mercury and Air Toxics Standards ("MATS") Rule deadline of April 2015. The revision also provided the option for Plant Yates units to switch to natural gas instead of installing scrubbers and SCRs.

National Ambient Air Quality Standards and Georgia Regulations Compliance Strategy

Georgia Power's compliance strategy for NAAQS, SSM, and Georgia-specific requirements includes continued compliance with Georgia Rule (jjj), the Multipollutant Rule, the SO2 Emissions Rule, and continued diligence and operations of control equipment and minimizing emissions to meet SSM requirements.

If the ozone or PM NAAQS area lowered from current levels, new areas within Georgia and Alabama may become nonattainment in the future. This may result in more stringent emissions and/or permitting requirements. However, because the remaining Georgia Power generating fleet is well controlled for the relevant emissions, lower air quality standards are unlikely to result in the addition of emission controls. Because implementation of air quality standards typically takes several years once new standards are finalized, plants approved by the PSC for retirement by 2028, such as Plant Gaston Units 1-4 or Plant Scherer Unit 3, are also unlikely to be affected by future related requirements.

If the Georgia SSM rule requirements are revised, operational flexibility or enforcement mechanisms may be impacted, but no new controls are expected because Georgia Power units already comply with all Georgia SIP emission standards. However, the Company will continue to monitor developments in SSM, NAAQS, and other related state rules to determine any impacts to the environmental compliance strategy.

2.3.2 SO_2 and NOx Emissions Allowance Programs

Congress or the EPA may use market-based programs to drive emission reductions over multi-state regions. These are typically used in instances where regional, rather than local, factors drive air quality impacts, such as acid rain or secondary formation of air pollution after direct emissions may have traveled over long distances.

Acid Rain Program (40 CFR 72 through 78)

Authorized by the 1990 Clean Air Act Amendments, the Acid Rain Program sets a cap on SO_2 emissions from power plants by allocating a fixed number of allowances to each unit subject to the program. At the end of each year, a unit must surrender allowances in an amount equal to the number of tons of SO_2 emitted. Unused allowances may be sold to offset the cost of compliance or saved, i.e., banked, for future use. Initial allowance allocations were received in 1995 when Phase I of the program began. When Phase II began in 2000, the number of allowances available was reduced to limit SO_2 emissions to 50% below 1980 levels by 2010. The regulations also set emission rate limitations on NO_X emissions from coal units, which can be met by individual units or by a group of units under an averaging plan.

Ozone or PM2.5 Interstate Transport Rules (40 CFR 96 and 97)

Since emissions to the air may under certain conditions travel over long distances, the Clean Air Act requires states not only to address nonattainment of air quality standards within its own borders, but also requires states to develop plans to address any out-of-state air quality issues to which they contribute. EPA has issued various rules that dealt with the transport of pollutants on a regional or multi-state scale to facilitate the development of these interstate plans. In July 2011, EPA released the final CSAPR Rule, which replaced previous interstate transport rules such as the CAIR and the NO_x Budget Trading Program. The final rule applied to 27 states, including Georgia and Alabama. CSAPR established annual allowance trading programs for SO_2, and NO_x, to reduce transport of fine particulate matter under the 1997 NAAQS and a separate ozone season NO_x allowance trading program to reduce ground-level ozone under the 1997 standard. However, in a significant departure from past federal allowance trading programs, CSAPR only allowed for limited interstate trading resulting in a more restricted allowance market. Due to rule challenges and legal proceedings, the implementation of CSAPR was delayed by three years, so that CSAPR's Phase 1 emission budgets did not apply until 2015 and Phase 2 emission budgets began in 2017 and subsequent years.

In September 2016, EPA finalized the Cross State Air Pollution Rule Update ("CSAPR Update Rule") to address interstate transport related to the 2008 ozone NAAQS, further restricting interstate allowance trading for ozone season NOx. As a result, allowance allocations were unchanged but facilities in Georgia could no longer trade allowances outside of the state. Alabama was among 22 states placed in a different trading group that could trade with each other but had allowance allocations reduced as a result of the CSAPR Update Rule. In October 2020, EPA issued a proposal to revise the CSAPR Update Rule in response to a D.C. Circuit Court of Appeal's decision. Georgia and Alabama's emissions budgets remains unchanged; however, the revision led to the creation of third ozone NOx allowance trading group, further restricting interstate trading.

In October 2021, EPA published a Federal Register notice announcing that the Agency has proposed a consent decree with several environmental groups related to the 2015 ozone NAAQS. The proposed

consent decree would establish deadlines for EPA to act on 32 SIP submissions, including Alabama and Georgia, addressing interstate pollution transport for the 2015 ozone NAAQS. In December 2021, EPA issued a final rule approving interstate transport provisions for the 2015 8-Hour ozone standard for Georgia, resolving the need to address interstate transport emissions from the state.

New Regulatory Updates

- On February 22, 2022, the EPA published a proposal to disapprove 19 interstate transport SIPs for the 2015 ozone NAAQS, including Alabama.
- On March 11, 2022, EPA released a proposed Federal Implementation Plan ("FIP"), called the Good Neighbor Plan, to effectively revise CSAPR and require reductions in ozone season NOx emissions from sources in 26 states. Georgia is not included in the Good Neighbor Plan, but Alabama was proposed to be moved to a more stringent ozone season NOx trading group starting in May 2023, which tends to have much higher allowance market prices.
- On April 21, 2022, the State of Alabama submitted to EPA a revised good neighbor SIP. On June 22, 2022, EPA found that Alabama's revised SIP was incomplete and published a Finding of Failure ("Finding") of the State of Alabama to Submit an Interstate Transport SIP for the 2015 Ozone NAAQS. Alabama then submitted a replacement SIP.
- On August 17, 2022, the State of Alabama and the ADEM filed a joint petition for review of EPA's Finding in the U.S. Court of Appeals for the Eleventh Circuit. On October 25, 2022, EPA proposed to disapprove Alabama's replacement SIP.
- On March 15, 2023, EPA signed the final Good Neighbor Plan. The final rule contained various changes compared to the proposal, but both final and proposed rule would move power plants in Alabama to a more stringent ozone NOx trading group. Under the Group 3 ozone NOx trading group that Alabama will be a part of, the state receives less than half of the allowances it received under the previous CSAPR program. State allowance budgets are pre-set for the years 2023 through 2029, decreasing overall over time. Beginning in 2030, EPA requires dynamic state budgeting, meaning allowance budgets will automatically decrease as emissions decrease. EPA also introduces new requirements in the Good Neighbor Plan, including additional emissions constraints on units with SCR controls and limitations on allowance banking. Along with the fact that the final rule will not be effective until at least three weeks after the beginning of ozone season on May 1, the various changes to the Group 3 ozone NOx CSAPR program in the Good Neighbor Plan raise uncertainty in both the allowance market and in how specific requirements will apply.

NOx and SO2 Emissions Allowance Programs Compliance Strategy

Georgia Power's Acid Rain Program compliance strategy initially relied heavily upon use of low-sulfur coal. However, the strategy transitioned to rely on scrubbers for SO_2 control at coal-fired steam units and through firing natural gas and low sulfur content fuel oil at combined-cycle, combustion turbine, and other steam units, which also serves as the CSAPR SO_2 compliance strategy. For purposes of both Acid Rain and CSAPR compliance, Georgia Power currently expects to continue to utilize its SO_2 annual allowance allocations and banked allowances, as needed, to maintain compliance. Under current regulations for the Acid Rain Program and CSAPR, projections show that no Georgia Power SO_2 allowance purchases will be required in the future absent a change in legislation and regulation.

The Georgia Power compliance strategy for the Acid Rain Program for NOx historically consisted of installing low-NO_X burners and/or overfire air ("OFA") systems at coal units and use of the NOx Averaging Plan across the Southern Company coal generation fleet. However, after the retirement of all remaining coal units without SCR in 2019, use of the NOx Averaging Plan was no longer necessary. Therefore, in

September of 2019, the Company terminated the NOx Averaging Plan effective January 1, 2020. Affected units covered by the regulation now demonstrate ongoing compliance through individual Acid Rain Program limits.

The compliance strategy for the CSAPR NO_X programs rely on SCRs and low NOx burners for NO_X control. For purposes of CSAPR NOx compliance, Georgia Power currently expects to continue to utilize its annual and ozone season allowance allocations and banked allowances, if needed, to maintain compliance. Under current regulations for the CSAPR NO_X trading programs, projections show that no Georgia Power allowance purchases will be required in the future absent a change in CSAPR legislation and regulation. The Company is still evaluating the final Good Neighbor Plan, which was just released by EPA. Under the new requirements, Plant Gaston Units 1-4 will receive fewer allowances from EPA and may need to manage its ozone season NOx emissions, use banked allowances, or may need to purchase allowances.

2.3.3 Maximum Achievable Control Technology Regulations

Title III of the CAA requires regulation of listed Hazardous Air Pollutants ("HAPs") and requires implementation of emission limits equivalent to the Maximum Achievable Control Technology ("MACT") for specific source categories, as determined by EPA. The standards that may apply to power generation units typically include MATS, Combustion Turbine MACT, and Industrial Boiler MACT. Georgia Power owns and operates electric generating units that are subject to MATS and CT MACT, but currently does not own biomass-fired electric generating units that would be subject to the Industrial Boiler MACT.

MATS (40 CFR 63 Subpart UUUUU)

EPA's MATS Rule, which was finalized in April 2012, is a technology-based rule that regulates mercury, acid gases and certain metal emissions from coal- and oil-fired electric generating units. MATS establishes stringent emission limits for hazardous air pollutants in the form of mercury, hydrogen chlorine ("HCl") or SO2, and filterable particulate matter or metals. The compliance deadline for existing sources was April 16, 2015, with the possibility of extensions granted on a case-by-case basis. Various Georgia Power units were granted one-year extensions to install controls or complete necessary transmission work to comply.

As a results of legal challenges and court decisions, EPA continued to issue rulemakings related to the MATS rule even after the compliance dates had passed. Some of the MATS rulemakings considered the foundational legal basis of the MATS rule. Although rules in 2016 ("Supplemental Finding") and 2020 ("Reconsideration of Supplemental Finding") came to diverging conclusions on that legal basis, EPA ultimately decided to leave the standards in place in both cases. As a part of the 2020 rulemaking, EPA also finalized the Residual Risk and Technology Review ("RTR") for the MATS rule, which is required by the Clean Air Act Amendments on a periodic basis. EPA concluded in the RTR that the remaining risk did not warrant additional standards and a technology review did not identify any new control technologies that would further reduce emissions beyond the original standard. This rule was challenged in the D.C. Circuit Court and was subsequently included in the list of regulations the Biden Administration directed EPA to review via executive order in 2021.

Litigation related to both the 2016 and 2020 rulemakings are pending at the D.C. Circuit Court, with Georgia Power a party to the 2016 litigation. However, all related litigation was put on hold pending EPA's completion of its rule reviews.

New Regulatory Updates

- On February 9, 2022, EPA proposed to revoke the Reconsideration of Supplemental Finding that was finalized in 2020, effectively reverting to the 2016 Supplemental Finding for the legal basis of the MATS rule.

- On March 6, 2023, EPA finalized the revocation of the Reconsideration of Supplemental Finding but made no changes to the emission standards or compliance requirements in the MATS rule.
- In a separate action but also by Spring 2023, EPA is expected to propose any revisions or updates to the MATS compliance requirements that it deems necessary as a result of the RTR. The proposal will be available for public review and comment before EPA finalizes the rule.

Combustion Turbine Maximum Achievable Control Technology (40 CFR 63 Subpart YYYY)

Simple-cycle and combined-cycle combustion turbines can also be subject to existing HAPs emission standards and requirements. In March 2004, EPA issued a final rule for Combustion Turbines Maximum Achievable Control Technology ("CT MACT"), setting standards for HAP emissions, such as formaldehyde from new gas and oil-fired combustion turbines. In August 2004, EPA issued a stay for new sources for gas-fired turbine subcategories of the rule because of ongoing deliberation about whether gas-fired units should be regulated by this rule in the first place. EPA viewed this action as necessary to avoid wasteful and unwarranted expenditures on the installation of emission controls that would otherwise not be required if these gas-fired subcategories were delisted.

In March 2020, EPA finalized the RTR for combustion turbines, leaving the existing CT MACT standards largely unchanged. In the final rule, EPA determined that the risks from this source category of emissions are acceptable and that the existing NESHAP provides an ample margin of safety to protect public health. EPA also determined that no new cost-effective controls under the technology review would achieve further emissions reductions from the source category. With the RTR, the stay of the standards for new gas-fired turbines remained in place.

In August 2020, EPA granted a petition for reconsideration of the final CT MACT RTR, stating that it intends to address the stay of the emission standards for new gas-fired turbines and the lack of standards for certain HAPs not currently covered by the rule.

New Regulatory Updates

- On March 9, 2022, EPA lifted the stay on CT MACT standards and requirements for combustion turbines that began construction after the 2003 applicability date defined in the original rule. Although the stay had been in place since 2004, sources were subject to the rule immediately, which set requirements to comply with formaldehyde emission standards and other requirements.
- On April 6, 2022, EPA issued an Information Collection Request ("ICR") under Section 114 of the Clean Air Act to Georgia Power and other entities to collect data in preparation for the CT MACT RTR reconsideration. The ICR creates a one-time compliance obligation for sources to provide this data and was due back to EPA in January 2023. Originally, EPA asked Georgia Power to complete a questionnaire and perform extensive emissions testing at as many as 15 combustion turbine units. After Georgia Power informed EPA of the potential winter reliability concerns and cost impact to customers, EPA agreed to reduce the scope of the ICR to two simple cycle combustion turbines (Plant McIntosh CT1 and CT2) on both oil and natural gas and two combined cycle combustion turbines (Plant McDonough CT4A and CT4B) on natural gas.

MACT Compliance Strategy

Georgia Power's compliance strategy for MATS leveraged the Company's research and testing program to make individualized, targeted decisions for each unit that optimizes the available technology while minimizing costs to the customer. While the existing scrubbers at Plants Bowen were able to achieve compliance with the acid gas or SO_2 emission requirements, incremental controls were necessary to comply with mercury and metals or PM limits on a continuous basis. Therefore, Georgia Power installed

activated carbon and alkali sorbent (e.g., hydrated lime) injections systems on all units at Plants Bowen by the compliance deadline of April 2016. In addition, to minimize operational costs associated with the injection systems, Mercury Re-emission Control Systems ("MRCSs") were also installed at Plant Bowen Units 1-2 to prevent re-emission of mercury once it is captured in the scrubber. To ensure compliance with the MATS particulate matter limits, optimization of the existing electrostatic precipitators ("ESPs") was performed at Plant Bowen Units 1-2, while baghouse retrofits were necessary at Plant Bowen Units 3-4 to capture additional particulate in the flue gases in order to comply. In addition, the Company performed plant-specific optimization projects at Plants Bowen on the existing scrubbers to minimize potential impacts to reliability and on balance of plant equipment to ensure reliability of mercury, acid gas, and particulate matter controls as a part of the MATS compliance strategy.

For the subbituminous coal-fired units at Plant Scherer, existing controls installed to comply with the Georgia Multipollutant Rule (i.e., scrubber, SCR, and baghouse with activated carbon injection ("ACI")) are used to comply with the MATS limits. Plant Yates Units 6 and 7 and Plant Gaston Units 1-4 switched to natural gas as the primary fuel. By switching to natural gas, these units are no longer subject to MATS because MATS applies only to coal- and oil-fired units. Georgia Power determined that use of natural gas at these plants is the most economic choice for customers and is feasible both from a boiler technology as well as a natural gas fuel supply perspective.

While the proposed MATS RTR reconsideration is pending, the Company does not currently anticipate additional controls on its active generating fleet to comply and projects existing controls to continue to operate in a similar fashion to ensure compliance. The Company will continue to monitor developments in MATS requirements and will refine or update the strategy as needed through the ECS process.

For CT MACT, the lifting of the stay on requirements for natural gas-fired units affected Plants McDonough and McIntosh combined cycle units. However, all of the affected units were constructed with oxidation catalysts, which are considered state-of-the-art controls for formaldehyde. Thus, the units are able to comply with only minor updates to monitoring equipment and increased reporting and recordkeeping obligations. Georgia Power completed the emissions testing required by the CT MACT ICR during the summer and fall of 2022 and submitted required information to EPA in January 2023. The Company will monitor developments on the CT MACT rule following the submittal of the ICR information and will refine or update the strategy as needed through the ECS process.

2.3.4 Regional Haze Regulations (40 CFR 51.308)

The Regional Haze Rule was finalized in July 1999 with the goal to improve visibility conditions in specified federal Class I areas, including primarily national parks and wilderness areas, back to natural conditions by 2064. The rule requires states to develop a SIP to determine and address any SO_2 or NO_X emissions control measures necessary to make reasonable progress toward natural visibility conditions for each 10-year planning period. The first implementation period involved the application of best available retrofit technology ("BART") requirements, which was determined to be satisfied for power plants by CSAPR requirements for SO_2 and NOx.

In January 2017, EPA finalized revisions to the second planning period under the Regional Haze Rule, which covers through the year 2028. These revisions included the extension of the deadline for the SIP submittal from July 2018 to July 2021 and increased requirements for state consultations with Federal Land Managers. In addition to this rulemaking, EPA has released guidance documents for Regional Haze SIP development for the second implementation period in 2016, 2019, and 2021, changing course in at least certain elements each time.

For the Regional Haze Rule, Georgia EPD has ongoing participation in a regional planning organization for the Southeast U.S., which has assessed ambient air quality data for the 2028 planning period. Based on this analysis, in July 2020, Georgia EPD selected Plant Bowen for further evaluation of SO_2 emissions to determine whether additional control measures are required to make reasonable process toward achieving the program's goals. Georgia Power submitted the Regional Haze four-factor analysis for Plant Bowen in November 2020, recommending that no additional SO_2 emission controls were necessary. Regional Haze SIPs for the 2028 planning period were due to EPA by July 2021, which was missed by a majority of states, including Georgia.

New Regulatory Updates

- In June 2022, Georgia EPD completed and proposed its Regional Haze SIP, allowing for a period of public comment. In the proposal, Georgia EPD concurred with the Georgia Power four-factor analysis for Plant Bowen recommendation that no additional SO_2 emission controls are necessary for compliance with Regional Haze. Georgia Power will be required to comply with the existing MATS SO_2 emission standard using the existing scrubbers at all four Bowen units as a part of the SIP.
- In August 2022, Georgia EPD completed and submitted its Regional Haze SIP to EPA, with the requirements for Plant Bowen remaining consistent with the four-factor analysis submitted by Georgia Power.

Regional Haze Compliance Strategy

Based on the Regional Haze SIP submitted by Georgia EPD to EPA, the existing scrubbers at Plant Bowen are expected to be used to comply with Regional Haze requirements. While the adoption of the existing MATS SO_2 limit at Bowen will remove the flexibility to use both the HCl and SO_2 compliance options available in the MATS rule, no incremental controls or projects would be required to comply.

2.3.5 New Source Review and Other Air Permitting Regulations

Facilities that include activities with associated emissions may be required to obtain an air permit to authorize construction and/or operation. The most resource-intensive and stringent type of permitting is typically termed major New Source Review ("NSR"), which includes both federal and state requirements applicable to new sources or projects at existing sites that result in emissions over an applicability threshold. Sources or projects that do not require NSR may still need to obtain construction or operation authorization through a state or minor air permit.

New Source Review (40 CFR 52.21)

New Source Review ("NSR") is a pre-construction permitting program under the CAA that is required of new sources or can be triggered by changes to an existing emissions source (e.g., electric generating unit) that result in a "significant" increase of a regulated NSR pollutant. While the NSR program was established by the 1977 Clean Air Act Amendments, NSR regulations, EPA's interpretation of the requirements, and EPA's NSR guidance have changed over time. NSR permitting requires a case-by-case analysis of control technologies and emission reductions that are feasible at a particular facility.

In 1999, under a broad nationwide enforcement initiative, EPA brought a civil action in the U.S. District Court for the Northern District of Georgia against Georgia Power, alleging that these subsidiaries had violated the NSR provisions of the CAA and related state laws at certain coal-fired generating facilities. The civil action sought penalties and injunctive relief, including an order requiring installation of the best available control technology at the affected units. The case against Georgia Power was administratively closed in 2001 and has not been reopened.

Other Air Permitting (40 CFR 70, GA Rule 391-3-1-.03)

For projects that don't require NSR permitting, the state of Georgia may still require a construction or operating permit through the Title V program, which compiles all applicable air requirements into one place for larger sources, or through the minor source permitting programs, typically for smaller sources. These types of permitting are typically simpler and less resource intensive than NSR permitting.

GHG Air Permitting (40 CFR § 51.166(b)(48))

In April 2010, EPA issued a final rule regulating greenhouse gas ("GHG") emissions from new motor vehicles under the CAA, taking the position that this action then triggered CO_2 and other GHGs to become regulated pollutants under the NSR preconstruction permit program and the Title V operating permit program. As a result, the construction of new facilities or the major modification of existing power plants could trigger the requirement for a Prevention of Significant Deterioration ("PSD") permit and the installation of controls to reduce CO_2 and other GHGs, under the GHG Tailoring Rule, which was finalized in May 2010.

In June 2014, the Supreme Court ruled against the GHG Tailoring Rule that EPA could not use either its PSD or Title V permitting programs to require permits solely based on GHG emissions but could require applicants that triggered permitting for other pollutants to undertake GHG analysis. In October 2016, EPA released a proposed rule to revise PSD and Title V GHG permitting regulations and establishing a significant emission rate ("SER"), but never finalized these revisions.

New Regulatory Updates

- In the Fall of 2022, EPA conducted stakeholder engagement sessions focused on minor air permitting, or permitting that does not trigger major NSR. EPA indicated their efforts will focus on reviewing state and local agency's minor permitting programs to verify they provide adequate protection of the NAAQS and transparency to the public. EPA is expected to engage in proposed rulemaking on minor air permitting in mid-2023.
- On December 9, 2022, EPA rescinded previously issued 2017 guidance on NSR permitting. The 2017 guidance was intended to clarify EPA interpretations on the roles of state and federal permitting agencies as well as the obligations of the permitted source in response to complex judicial decisions. However, EPA did not replace the guidance, nor did it explain the rationale behind the recission, raising questions on EPA's current and future interpretation of the requirements.
- On December 22, 2022, EPA issued guidance to its regional permitting staff on "Principles for Addressing Environmental Justice in Air Permitting," meant to serve as an interim framework as EPA continues to evaluate ways to incorporate environmental justice into its work. Although the guidance does not lay out specific requirements, the principles focus on community engagement and minimizing adverse or disproportionate impacts on communities with environmental justice concerns.

NSR and Other Air Permitting Compliance Strategy

Georgia Power reviews projects for permitting applicability and obtains permits when required. The Company will continue to monitor any developments on permitting regulations, policy, and guidance.

2.3.6 Greenhouse Gas Emissions and Climate Policy

GHG and Renewable/Clean Energy Legislation

The U.S. Congress has considered many proposals to reduce GHG emissions and/or mandate renewable or clean energy. These proposals have taken many forms, for example: a cap-and-trade program, carbon tax, and renewable/clean energy standards.

Throughout the 116th and 117th Congresses (2019-2022), there was significant activity on climate-related legislation. Of note, several bills that were introduced focused on an economy-wide carbon tax. These proposals typically impose an initial economy-wide price on carbon, e.g., dollars per ton CO2, with varying degrees of escalation each year until the proposal's specific national emission reduction targets are achieved. The proposals contemplate initial pricing in a range from $15/ton to $52/ton and increase annually at varying rates. Another approach to pricing carbon, a clean energy standard, has also been proposed. As an example, a clean energy standard would set clean energy targets – a percentage of generation from low to zero GHG emitting sources – for retail electricity suppliers that would increase annually to 100% by some future year.

In December 2021, Congress passed the Infrastructure Investment and Jobs Act. The bill invests $1 trillion in the American economy, including roughly $73 billion for power infrastructure, and includes provisions related to cybersecurity and resiliency, broadband deployment, electric vehicle infrastructure deployment, carbon capture and storage ("CCS") related infrastructure and commercialization, hydrogen infrastructure and commercialization, renewable energy and storage demonstrations, hydropower improvements/enhancements, low-income home energy assistance program, NEPA, Minority Business Development Agency, nuclear, "Buy America," and grid infrastructure and transmission.

New Regulatory Updates

- On August 16, 2022, the Inflation Reduction Act ("IRA") was signed into law, providing $369 billion in funding for clean energy and climate related policies. The IRA extends, expands, and increases production and investment tax credits for clean energy projects, such as solar, wind, nuclear, hydrogen, energy storage, and carbon capture and sequestration.

Global Climate Change International Initiatives

International climate change negotiations under the United Nations Framework Convention on Climate Change (UNFCCC or Convention) continue. Since 2005, the Convention has established various "working groups" to address key issues and negotiate future climate-related international agreements. The working groups meet periodically throughout the year and, along with the formal subsidiary bodies to the Convention, again at the annual Conference of Parties (COP), a Meeting of the Parties to the Kyoto Protocol (CMP), and a Meeting of Parties to the Paris Agreement (CMA). The COP is the supreme decision-making body of the Convention, which reviews the implementation of the Convention and other legal instruments. The CMP reviews the implementation of the Kyoto Protocol. The CMA oversees the implementation of the Paris Agreement, which was adopted in 2015 and establishes a universal framework for addressing greenhouse gas emissions based on nationally determined contributions. It also sets in place a process for increasing those commitments every five years.

The United States joined the Paris Agreement in 2016, withdrew in 2020, and reentered in 2021. After rejoining, President Biden subsequently announced a new country-specific commitment under the Paris Agreement for the United States to achieve a 50 to 52 percent reduction from 2005 levels in economy-wide net GHG emissions in 2030.

In October and November 2021, COP 26 was held in Glasgow, Scotland, United Kingdom. As a result of the Glasgow Climate Pact, nations, including the U.S., committed to a phase down of unabated coal (without carbon capture) and subsidies for fossil fuels. Also, a group of one hundred world leaders, including President Biden, agreed to cut methane emissions by 30% by 2030 through the Global Methane Pledge.

New Regulatory Updates

- COP 27 was held in November 2022 in Sharm el-Sheikh, Egypt. While no additional international agreements on emissions reductions resulted at the meeting, member nations agreed to create a "loss and damage" fund for vulnerable countries impacted by climate-related disasters.
- In November 2022, the U.S. announced intentions to develop an international carbon offsets program to help fund greenhouse gas reductions in developing countries.

Social Cost of Greenhouse Gas

The social cost of greenhouse gas ("SC-GHG") is a monetary estimate of the damages from climate change to society as a whole from emitting an incremental amount of GHGs. Damage estimates, which include direct and indirect impacts, have also been created for emissions of other GHGs, including methane and nitrous oxide. EPA and other agencies may use this tool to incorporate the social benefits of reductions, or the harm from emitting, GHGs into cost-benefit analysis of regulatory actions that impact cumulative global emissions. In February 2021, the Interagency Working Group on Social Cost of GHGs announced an interim SC-GHGs at $51/ton for CO_2 at a 3% discount rate, reinstituting the values that were in effect under the Obama Administration that were drastically lowered during the Trump Administration.

New Regulatory Updates

- During 2022, the court proceedings occurred related to challenges brought against the interim SC-GHG. While the SC-GHGs ultimately was allowed to remain in effect, litigation at the Fifth Circuit Court of Appeals is ongoing and a decision may be issued in 2023.
- On November 11, 2022, as part of the supplementary material released with proposed Section 111 methane regulations for the oil and gas sector, the EPA released a draft report which updated estimates for the SC-GHGs, including estimates that the social cost of carbon in 2020, in 2020 dollars, is between $120 to $340 per metric ton, and the social cost of methane is $1,300 to $2,300 per metric ton, using discount rates between 2.5 percent to 1.5 percent, respectively.

GHG Emissions Performance Standards

In October 2015, the EPA's final new, modified, and reconstructed source standards for CO_2 emissions under Section 111(b) of the CAA were published in the Federal Register. In the final new source rule, EPA established separate standards for coal (1,400 pounds of CO_2 per megawatt-hour) and base load natural gas (1,000 pounds of CO_2 per megawatt-hour) units. EPA's standard for new coal units requires the implementation of partial carbon capture and sequestration. At the same time, the EPA also finalized regulatory guidelines for CO_2 emissions from existing sources under Section 111(d) of the CAA (known as the Clean Power Plan or "CPP"). For existing sources under 111(d) of the CAA, the Clean Power Plan required states to develop a state-specific compliance plan. Numerous parties filed petitions for review and accompanying motions to stay the CPP, including Georgia Power. On February 9, 2016, the U.S. Supreme Court granted a stay of the CPP, which put the rule on hold while the legal challenge proceeds through the courts.

On July 8, 2019, the EPA issued a final rule that repealed the CPP and replaced it with the Affordable Clean Energy (ACE) Rule, establishing revised emission guidelines for states to develop plans to address GHG

emissions from existing coal-fired power plants through heat rate improvements. On January 19, 2021, the D.C. Circuit Court vacated and remanded the ACE Rule back to the EPA. On October 29, 2021, the U.S. Supreme Court granted four petitions for certiorari asking the court to review the D.C. Circuit's decision.

New Regulatory Updates

- On June 30, 2022, the U.S. Supreme Court reversed the D.C. Circuit's vacatur of the ACE Rule and issued an opinion limiting the EPA's authority to regulate GHG emissions under the CAA.
- On December 23, 2022, EPA proposed changes to the generally applicable 111(d) implementing regulations, including clarification that states may adopt trading or averaging measures but also limiting time allowed for state plan development and limiting the states' ability to considering remaining useful life of a facility in setting standards. The proposal also states that source category-specific regulations may override the generally applicable requirements. Thus, it is unknown whether these proposed changes will have any bearing on a future rule applicable to fossil-fired power plants.
- The EPA has announced its intent to propose a new rule for existing fossil fuel-fired power plants to replace the ACE Rule and to propose revised performance standards for new fossil fuel-fired power plants pursuant to the Clean Air Act by April 2023.

GHG and Climate Policy Compliance Strategy

These potential actions around greenhouse gas emissions and climate policy are expected to result in legislative or regulatory pressures aimed at reducing carbon emissions, which would be most impactful to fossil generation units. With a wide range of possible outcomes, the Company's scenario planning process remains the best way to capture potential financial impacts and allow for long-term planning to mitigate risks to customers. The Company will monitor and evaluate the outcome of these executive, legislative, and regulatory actions and incorporate any new information into the compliance strategy process as appropriate. Future GHG and climate compliance requirements represent another area where the Company's R&D investment, as discussed in Appendix C, will provide for the necessary optionality in the future to provide cost-effective solutions for the generating fleet. In doing so and through the ECS process, the Company expects to continue to serve customers with clean, safe, reliable, and affordable energy.

3.0 Financial Summary

Georgia Power's annual totals were $23 million, $34 million, and $72 million for 2022, 2021, and 2020 respectively. In Georgia Power's Annual Report on Form 10-K for the year ended December 31, 2022, Georgia Power projected that base level capital expenditures to comply with existing statutes and regulations will be a total of approximately $301 million from 2023 through 2027, with annual totals of approximately $82 million, $86 million, $56 million, $53 million, and $24 million for 2023, 2024, 2025, 2026 and 2027, respectively. The environmental compliance capital, CCR ARO, and O&M costs are recovered through the Environmental Compliance Cost Recovery ("ECCR") tariff, established in the Georgia PSC's final order in Docket 25060-U.

The Company's compliance strategy, including potential unit retirement and replacement decisions, and future environmental capital expenditures will be affected by the final requirements of any new or revised environmental statutes and regulations that are enacted, including the proposed environmental legislation and regulations described; the cost, availability, and existing inventory of emissions allowances; and the Company's fuel mix.

For CCR Asset Retirement Obligations ("ARO"), the Company is required to adhere to Accounting Standards Codification ("ASC") 410-20 (formerly Financial Accounting Standard No. 143 and Financial Accounting Standards Board ("FASB") Interpretation No. 47) which requires the Company to record the legal obligation associated with the retirement of a long-lived asset. In accordance with ASC 410-20, the Company records the estimated closure and post closure care costs of CCR ash ponds and landfills under the Federal and Georgia CCR Rules.

The Company will continue providing CCR projects semi-annual progress and cost data updates to the Commission under Docket No. 43083. As outlined in the Company's CCR ARO Program Semi-Annual Program Status Report, the current forecasted spend for the CCR ARO program is the best estimate Georgia Power has at this time for this long-term compliance program spanning over approximately the next 60 years into the future. The Company's cost estimates are based on various assumptions related to closure and post-closure costs, timing of future cash outlays, inflation and discount rates, and the methods for complying with closure requirements. Georgia Power will continue to update its cost estimates and ARO liabilities periodically as additional information related to these assumptions becomes available.

Georgia Power's current forecast applicable to retail customers for the CCR ARO program over the coming decades is approximately $7.94 billion, including around $1.1 billion in actual costs previously incurred. While the nominal cost forecast remained consistent with the Company's previous forecast, this $7.94 billion total is approximately $950 million lower than the last update due to a change in the expected future escalation rates which are applied based on GAAP accounting requirements for AROs. While the inflation currently being experienced in the market remains high due to the economy's response to the COVID-19 pandemic with an increased demand for goods and a strained supply chain, the trends in forecasted rates signal that, over the long term, the effect of inflation on prices is not expected to be as high, increase as quickly, or stay elevated as far into the future as was previously forecasted.

ECS - Appendix A – Monitored Regulations

In addition to the environmental legislation, regulation, policy, and permitting discussed in the ECS, the Company continues to monitor various environmental compliance topics for future updates that may need to be considered in the compliance strategy. Examples of monitored regulations are listed below:

CAA – Industrial Boiler MACT

In October 2022, EPA finalized amendments to the Industrial Boiler MACT rule in response to a remand of certain requirements by the D.C. Circuit Court. The changes did not affect any Company generating units and no changes to the ECS are required.

CAA – Reciprocating Internal Combustion Engines MACT

In October 2022, EPA finalized amendments to the Reciprocating Internal Combustion Engines MACT rule in response to the vacatur of demand response provisions by the D.C Circuit Court. The changes did not affect any Company generating units and no changes to the ECS are required.

CAA – New Source Performance Standards

In September 2022, a coalition of 17 environmental groups submitted a petition for rulemaking to EPA to eliminate startup, shutdown, malfunction and/or maintenance exemptions under the New Source Performance Standards (NSPS). The Company is monitoring any developments on NSPS rules but does not anticipate changes to the ECS at this time.

CAA – Oil and Gas 111(d)

In December 2022, EPA proposed a supplemental rule pertaining to methane emissions from the upstream oil and gas sector. While this rule is not applicable to power plants, it uses the same regulatory mechanism through the CAA Section 111(d) to regulate existing sources. The Company is monitoring any developments for relevance to the upcoming 111(d) rule for existing power plants.

CAA – Other NAAQS (40 CFR 50)

In addition to ozone and particulate matter, EPA also sets NAAQS for SO2, NO2, lead, and carbon monoxide. However, the most recent revisions to any of these standards occurred in 2010 or earlier and subsequent reviews completed by EPA resulted in no changes. Implementation of current standards is complete with no areas in Georgia or Alabama designated as nonattainment.

CAA – RMP

EPA is expected to finalize revisions in 2023 to the Risk Management Program (“RMP”) requirements for highly hazardous chemicals, reversing actions taken with a 2019 RMP reconsideration rule. The Company continues to monitor developments but does not currently project an impact to the ECS.

CAA – HFC Refrigerants

EPA continues to implement the hydrofluorocarbon (“HFC”) refrigerants phase down mandated by Congress in 2020, due to the global warming potential of HFCs. The Company continues to monitor developments but does not currently project an impact to the ECS.

CWA – Section 401 Water Quality Certifications

In June 2022, EPA proposed to revise requirement related to obtaining permits or licenses for any discharge into waters of the United States through CWA Section 401, which gives states authority over

discharges that do not comply with existing state water quality requirements. A final rule is expected mid-2023 but is not currently projected to affect the Company's ECS.

CWA – Nationwide Permit

Nationwide Permits ("NWP") authorize certain activities with minimal impact to a WOTUS, allowing projects to move forward without receiving an individual review under CWA Section 404. The USACE recently completed update or reissuance of the NWP program requirements. The Company continues to monitor developments but does not currently project an impact to the ECS.

CWA – Hazardous Discharges Planning

In March 2022, the EPA published a proposed rule in response to a consent decree between EPA and environmental groups and would require facility response plans (FRPs) to address potential worst-case discharges of hazardous substances under the CWA. This would expand the current FRP program that only deals with oil releases.

PFAS Regulations

EPA is considering regulation of per- and polyfluoroalkyl ("PFAS") substances through a variety of avenues across various environmental media. For example, in September 2022, the EPA published a proposed rulemaking to the Federal Register to designate certain types of PFAS as "hazardous substances" under the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"). The Company continues to monitor developments but does not currently project an impact to the ECS.

ESA Developments

The Company monitors developments related to the Endangered Species Act ("ESA") on an ongoing basis, especially for affected species found in the Southeast. The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. ESA regulatory developments typically affect the construction new facilities. The Company continues to monitor developments but does not currently project an impact to the ECS.

NEPA Developments

In April 2022, the Council for Environmental Quality ("CEQ") finalized updates to the National Environmental Policy Act ("NEPA") regulations, essentially reversing actions in the 2020 NEPA regulations. NEPA developments are expected to continue as the CEQ continues to evaluate how to incorporate climate considerations into the required analysis. The Company continues to monitor developments but does not currently project an impact to the ECS.

TMDL Developments

States are required to identify impaired waters (waters that do not meet applicable water quality standards), develop total maximum daily loads ("TMDLs") for those waters, and impose point and non-point source limitations designed to bring the waters into compliance. The Company continues to monitor developments but does not currently project an impact to the ECS.

Hydroelectric and Nuclear Generating Units

While hydroelectric and nuclear electric generating units also comply with various environmental requirements and consider environmental impacts through regulatory processes at the Federal Energy Regulatory Commission ("FERC"), the Nuclear Regulatory Commission ("NRC"), and the Georgia EPD, the Company currently does not anticipate any significant retrofit of these facilities for the purpose of environmental compliance.

ECS - Appendix B – Acronyms/Abbreviations

ABUC	Ash Beneficial Use Center
ACE	Affordable Clean Energy
ACI	Activated Carbon Injection
ACM	Advanced Closure Methods
ADEM	Alabama Department of Environmental Management
ALK	Alkali Sorbent Injection
ARO	Asset Retirement Obligation
ASC	Accounting Standards Codification
BART	Best Available Retrofit Technology
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CCR	Coal Combustion Residuals
CCS	Carbon Capture & Sequestration
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMP	Meeting of the Parties to the Kyoto Protocol
CO	Carbon Monoxide
CO2	Carbon Dioxide
COHPAC	Compact Hybrid Particulate Collector
COP	Conference of Parties
CORE-CM	Carbon Ore, Rare Earths and Critical Minerals
CPP	Clean Power Plan
CSAPR	Cross State Air Pollution Rule
CWA	Clean Water Act
CWWS	Cylindrical Wedge Wire Screens
DOE	Department of Energy
DSI	Dry Sorbent Injection

ECCR	Environmental Compliance Cost Recovery
ECS	Environmental Compliance Strategy
ELG	Effluent Limitations Guidelines
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPD	Georgia Environmental Protection Division
EPRI	Electric Power Research Institute
ESA	Endangered Species Act
FASB	Financial Accounting Standards Board
FERC	Federal Energy Regulatory Commission
FGD	Flue Gas Desulfurization
GAAP	Generally Accepted Accounting Principle
GHG	Greenhouse Gas
GPC	Georgia Power Company
GWPS	Groundwater Protection Standard
HAP	Hazardous Air Pollutant
HDPE	High-Density Polyethylene
HFC	Hydrofluorocarbon
HLRW	High-Level Radioactive Waste
HTL	Heat Transfer Loop
IRA	Inflation Reduction Act
IRP	Integrated Resource Plan
LLRW	Low Level Radioactive Waste
LNCS	Low NOx Combustion System
MACT	Maximum Achievable Control Technology
MATS	Mercury and Air Toxics Standards
MRCS	Mercury Re-emission Control System
NAAQS	National Ambient Air Quality Standards
NDC	Nationally Determined Contribution

NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOPP	Notice of Planned Participation
NO2	Nitrogen Dioxide
NOx	Nitrogen Oxide
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
NSR	New Source Review
NWP	Nationwide Permits
NWPR	Navigable Waters Protection Rule
OFA	Overfire Air
O&M	Operations and Maintenance
PJFF	Pulse Jet Fabric Filter
PM	Particulate Matter
PM2.5	Particulate Matter less than 2.5 micrometers in size
PRB	Powder River Basin Coal
PSC	Georgia Public Service Commission
PSD	Prevention of Significant Deterioration
R&D	Research and Development
RFP	Request for Proposals
RCRA	Resource Conservation and Recovery Act
RMDC	Remote Mechanical Drag Chain
RTR	Risk and Technology Review
SCR	Selective Catalytic Reduction
SC-GHG	Social Cost of Greenhouse Gases
SEC	Securities and Exchange Commission
SER	Significant Emission Rate
SIP	State Implementation Plan
SNCR	Selective Non-Catalytic Reduction

SO2	Sulfur Dioxide
SSM	Startup, Shutdown, Malfunction
TWS	Traveling Water Screens
UNFCCC	United Nations Framework Convention on Climate Change
USWAG	Utility Solid Waste Activities Group
VIP	Voluntary Incentive Program
VOC	Volatile Organic Compounds
WIIN Act	Water Infrastructure Improvements for the Nation Act
WOTUS	Waters of the U.S.
WRC	Water Research Center
WRCC	Water Research and Conservation Center

ECS - Appendix C – R&D and Environmental Control Alternatives

Research and Development ("R&D") continues to be an integral part of the overall Georgia Power environmental strategy and compliance plan. Through research, development, and demonstration, technologies are evaluated, and selected for possible implementation to meet compliance with federal and state regulatory requirements. Technology-related decisions are made based on compliance alternatives, technical review (often following actual testing), schedules, equipment-vendor price quotes, total costs over the useful life, specific unit issues, and performance guarantees. Operations, maintenance, and cost-effectiveness are important parts of the decision-making process.

Since the implementation of the Clean Air Act Amendments of 1990, R&D has been crucial in assuring that the best-possible environmental compliance strategies are selected for implementation at Georgia Power. Georgia Power and Southern Company leverage existing knowledge through industry affiliations across the U.S. and around the world to identify these opportunities and help reach cost-effective paths forward. To minimize cost and risk, only proven technologies should be implemented commercially. These industry R&D efforts have successfully tested low-NO_X burners, precipitators, catalyst materials for SCRs, scrubbers, mercury reduction systems, wastewater treatment systems, water balance optimization measures, ash beneficial use, and other equipment and have contributed to Georgia Power's ability to meet stringent requirements while continuing to provide affordable energy for customers. Insight from this research benefited vendor and material selection, construction, and long-term operation, efficiency, and flexibility.

This appendix describes R&D efforts related to water, ash beneficial use, and carbon emissions and provides a list of control technologies considered in an ongoing effort to meet mandated requirements in a timely manner, maintain system reliability, and assure cost-effective generation for customers.

Water Research and Conservation Center

Originally developed in 2012 through collaboration with the Electric Power Research Institute ("EPRI") and Southern Company, the Water Research Center ("WRC") at Plant Bowen provided a venue for technology evaluations to address water use, withdrawal, consumption, treatment, and recycling throughout the power generation process. The WRC generated new information regarding current and future regulatory compliance issues related to water withdrawal, use, and discharge restrictions in direct support of the Company's ongoing evaluation of the 2015 ELG Rule and ELG Reconsideration Rule and associated strategy. Testing at the WRC successfully informed technology strategies for achieving cost-effective environmental compliance. Several technologies have been implemented throughout the energy industry and across the Southern Company fleet. For example, the WRC has hosted tests of several different technologies for the treatment of scrubber wastewater. This R&D resulted in decreased costs and improved performance for physical, chemical, and biological treatment systems, which Georgia Power is evaluating for scrubber wastewater compliance. Due to the success of the WRC, Southern Company and EPRI expanded the WRC to become the Water Research and Conservation Center ("WRCC"), adding a state-of-the-art facility at Plant McDonough. This research center provides the infrastructure needed to test and identify the most promising water technologies. To better manage and conserve water across our thermoelectric power generation sites, the WRCC at Plant McDonough promotes advancements in power plant cooling systems leading to reduced water withdrawal and consumption as well as improved plant efficiency while optimizing total cost and energy generation.

The WRCC commissioning was completed in October 2020. Several projects have been completed including an evaluation of condenser tube coatings and surface modifications in the Heat Transfer Loop ("HTL") as part of a project funded by the U.S. Department of Energy ("DOE") to investigate technologies to improve heat transfer and mitigate heat transfer losses due to condenser tube fouling. Other

completed projects at the WRCC include a non-chlorine biocide, as well as a technology to monitor deposition on heat transfer surfaces for better identification and control of fouling. Upcoming projects include additional heat transfer improvement technologies, water chemistry evaluations, and a DOE-funded project focused on improving performance of air-cooled condensers.

Ash Beneficial Use Center

The Company, in partnership with EPRI and other utilities, has developed a center, located at Plant Bowen, for beneficial use of harvested CCR. The Ash Beneficial Use Center ("ABUC") will strive to develop additional uses of CCR and better technologies to process ash for beneficial use, which can help reduce future costs to CCR closure projects and further open opportunities to reuse this byproduct.

The center aims to develop new technologies or processes that drive downward cost pressure associated with beneficial use and expand current and potential markets. This downward cost pressure would create an adjustable mechanism to obtain market equilibrium such that beneficial reuse from operating power plants is preserved. In addition, technology developments or enhancements to beneficially use CCR could ultimately allow Georgia Power to reduce the amount of CCR that is stored in landfills or reclaim CCR already stored in landfills and ash ponds. This may result in reduced capital and O&M costs for CCR management. The strategy associated with introducing additional beneficiated ash into the market, as well as limiting the quantity of CCR in landfills, benefits both current and future customers.

The core capability of the center is pre-processing harvested ash for use in technology demonstrations. Pre-processing includes drying, classifying, storing and delivering the ash for beneficial use. The major mechanical components of the center were completed in February 2021, and full commissioning and acceptance testing were completed in July 2021.

In September 2021, the ABUC was used to execute part of a critical mineral extraction project funded by the U.S Department of Defense. Approximately 75 tons of ash were harvested from a Southern Company ash pond in Alabama, and the ash was screened, dried and classified using the ABUC infrastructure. Carbon was removed from the ash using a triboelectrostatic belt separator. Lessons learned during this project will allow Georgia Power to better understand process performance and energy costs for potential future beneficiation projects.

Georgia Power and EPRI have met with several technology developers to discuss potential demonstrations at the ABUC. Technologies under consideration include lower cost non-thermal ash drying, the production of aggregate for concrete using ash, and the production of fuels from ash. Increased knowledge of these emerging technologies and potential technology evaluations at ABUC will help Georgia Power to more effectively evaluate commercial beneficial use proposals.

Additionally, Georgia Power and Southern Company are participants in the Department of Energy's Carbon Ore, Rare Earths and Critical Minerals ("CORE-CM") Initiative with the goal of evaluating coal ash as a domestic source for rare earth elements and critical minerals and driving regional economic development to establish domestic supply chains.

Carbon Emissions Research & Development

The National Carbon Capture Center, managed and operated by Southern Company and located in Wilsonville, Alabama, is working to accelerate the commercialization of advanced technologies to reduce greenhouse gas emissions. The NCCC was created in partnership with the U.S. DOE in 2009 and has worked with over 30 government, university and research organizations from seven countries. The NCCC serves as a unique test bed for third-party developers to help bridge the gap between laboratory research and large-scale demonstrations to evaluate promising technologies for future commercial deployment. The

R&D scope of the NCCC includes carbon capture for power generation, carbon utilization and conversion, and negative-emission technologies such as direct air capture.

Negative carbon solutions are an important component of a net-zero carbon approach and counterbalance direct GHG emissions from Company operations through either the actual capture and storage of GHG or the application of carbon offset credits created by qualifying GHG reduction projects. While many of these negative carbon solutions are still evolving or in development across the industry and the country, Georgia Power faces some unique challenges for carbon capture and storage in the state of Georgia. Unlike some neighboring states with extensive oil and gas exploration and development, Georgia lacks the detailed geological information needed to prepare for CCS deployment. To minimize risks to customers in a net-zero future, carbon capture technology and viable locations for storage will likely be necessary for continued fossil fuel operations. CCS could potentially be applied as an add-on environmental control to a generating unit to remove GHG emissions at their source or could be used to remove GHG from ambient air, known as direct air capture. Due to the lack of geologic feasibility studies in the state of Georgia, Georgia Power began partnering in 2021 with Southern Company to evaluate the technical and economic viability of CCS in potential locations in Georgia.

In 2022, Georgia Power and Mitsubishi Power, alongside EPRI, successfully validated fuel blending of hydrogen and natural gas at both partial and full load on an M501G natural gas turbine at Georgia Power's Plant McDonough-Atkinson in Smyrna, Georgia. The demonstration project was the first to validate 20% by volume hydrogen fuel blending on an advanced class gas turbine in North America, and the largest test of this kind to date, with the 20% blend providing an approximately 7% reduction in carbon emissions compared to natural gas. Georgia Power collaborated with Mitsubishi Power for the landmark testing as part of a continued commitment to new R&D to build the energy grid of the future and to reduce carbon emissions across its generation fleet.

Environmental Control Alternatives Index

I. Low-NOX Combustion Systems (LNCS)

II. Selective Catalytic Reduction (SCR)

III. Selective Noncatalytic Reduction (SNCR)

IV. Fuel Switch to Natural Gas

V. Fuel Switch to Powder River Basin (PRB) Coal

VI. Flue Gas Desulfurization (FGD)

VII. Dry Sorbent Injection (DSI)

VIII. Baghouses

IX. Activated Carbon Injection (ACI) and Alkali Sorbent Injection (ALK)

X. Mercury Re-emission Control Systems (MRCS)

XI. Containment and Control Technologies for Ash Storage Areas

XII. Cooling Water Intake Screen Technology

XIII. Water Cooling Technologies

XV. Ash Handling Methods

XVI. Landfills

XVII. Wastewater Treatment

ENVIRONMENTAL CONTROL ALTERNATIVES

I. Low-NO_X Combustion Systems

Low-NO_X combustion systems ("LNCS") is a generic term for burners and/or air systems designed to combust fuel while reducing the amount of NO_X that is formed. Since there are several different firing arrangements for fossil fuel-fired units, there are several different types of LNCS.

NO_X is formed during combustion from either the nitrogen in the fuel or the air. NO_X formed from nitrogen in air requires high-flame temperatures and because of this, is usually referred to as thermal NO_X. While some fuels contain small amounts (2 percent or less) of nitrogen as a chemical constituent, thermal NOx is by far the predominant source of emissions over fuel NOx.

LNCS can include burners that are designed to reduce either fuel NOx or thermal NO_X or both. LNCS can also include overfire air, which is air that is added above the main combustion zone to finish the combustion process, to reduce NOx. For all LNCS, the balance of air and fuel must be optimized to achieve NOx reduction and to minimize additional production of carbon monoxide.

II. Selective Catalytic Reduction ("SCR")

SCR technology involves the catalytic reaction of ammonia, which is injected into the flue gas, with NO_X to produce molecular nitrogen (N_2) and water vapor. These reactions take place across one or more layers of catalyst in the SCR reactor and generally result in a NO_X reduction capability of 85 to 90 percent depending upon the particular application. The SCR is sensitive to temperature and must be placed in an area with appropriate flue gas temperatures to operate optimally.

III. Selective Noncatalytic Reduction ("SNCR")

SNCR employs chemical injection of ammonia or urea directly into the boiler at high flue gas temperatures between 1,600 and 2,100°F. In this temperature range, which is typically near the top of the boiler close to the furnace exit or in the convective pass, the reagent reacts with NO_X to form nitrogen and water without the use of a catalyst to promote the reaction.

Application of SNCR to utility-scale boilers is highly site specific. Generally, SNCR is capable of 15- to 40-percent NO_X removal. One particular benefit of SNCR as compared to SCR is that capital cost is limited due to the absence of catalyst and the associated reactor vessel. However, the difficulty in meeting temperature and distribution requirements and the greater potential for ammonia slip makes implementation of the technology difficult on many boilers, especially on a large-scale boiler.

IV. Fuel Switch to Natural Gas

Depending on availability of natural gas supply and pipelines, existing coal plants may be partially or completely converted to burn natural gas instead of coal as an emissions control strategy, since natural gas contains very little sulfur and trace metals are largely absent.

NO_x emissions result from both fuel chemistry and from the air used in combustion. Therefore, a natural gas conversion does not automatically eliminate emissions of nitrogen oxides. The level of NOx in such a conversion is determined by the boiler design plus the presence and design of low NOx combustion systems (see the next section).

V. Fuel Switch to Powder River Basin ("PRB") Coal

PRB coal is a subbituminous coal mined primarily from seams in the PRB located in Wyoming and Montana in the western United States. PRB coal may be considered as an emission control strategy for bituminous coal-fired units due to lower sulfur content that enhances the ability of generating units to minimize SO_2 emissions. NO_X emission reductions are also realized because of the lower combustion flame temperature

brought about by the higher moisture content in PRB coal. With this increase in moisture content come lower heat contents (heating values), possible loss of generation capacity due to unit load derating, increased heat rate, and often higher operating and maintenance costs. The considerations for a fuel switch to PRB coal are highly dependent on site-specific operating characteristics and equipment layout.

VI. Scrubber or Flue Gas Desulfurization ("FGD")

A Scrubber or FGD is any process that removes sulfur oxides, which primarily SO_2, from flue gas. Wet scrubber processes collect the SO_2 by treating the flue gas with a water-based solution or slurry. One typical design the utility industry uses is a spray tower module where the flue gas flows up the tower and a series of nozzles spray an alkaline solution, typically limestone based, into the flue gas. Another type is a jet bubbling reactor where the flue gas flows into a limestone slurry bath. The chemical reaction in wet FGDs between limestone and SO_2 produces predominantly calcium sulfate, or gypsum. The wet processes are very efficient and typically remove 95 percent of the SO_2 in flue gas.

Dry processes typically inject an alkaline slurry into the flue gas stream in a spray dryer followed by a particulate control device. The spray dryer is a unit where the hot flue gases are contacted with the wet alkaline spray that absorbs the SO_2. The hot flue gas evaporates the water and leaves a dry residue that can then be captured with the fly ash, typically in a baghouse. The residue contains a mixture of calcium sulfite/sulfate, along with the fly ash from the fuel. This waste is generally not suitable for other uses and must be disposed of in a landfill. Historically, dry scrubbing is considered to typically remove 75 to 90 percent of the SO_2 in flue gas.

VII. Dry Sorbent Injection ("DSI")

Dry sorbent injection is a technology that can help reduce acid gas emissions, such as hydrogen chloride (HCl) through two basic steps. In step one, a powdered sorbent is injected into the flue gas where it reacts with the HCl. The sorbents most commonly associated with DSI are trona (sodium sesquicarbonate, a naturally occurring mineral mined in Wyoming), sodium bicarbonate, and hydrated lime. For step two, the compound is removed by a downstream PM control device such as an ESP or a baghouse, with HCl removal performance highly dependent on site-specific factors.

DSI systems generally do not require significant capital expenses but may rely on significant quantities of sorbent to operate effectively, which increases the operating costs. Waste disposal for DSI may also be a significant variable cost. In addition, DSI's potential effectiveness is limited to certain types of plants, typically plants that are 300 megawatts or less and burn low-sulfur coal.

VIII. Baghouses

Baghouses are filter devices that remove solid particles from flue gas streams by passing the gases through a fabric, and thus collecting the particles. Baghouses can either operate as a standalone control device or in conjunction with other particulate capture devices. A baghouse located downstream of an existing ESP was patented by EPRI and is known as a Compact Hybrid Particulate Collector ("COHPAC"). The basic COHPAC concept is to place a pulse-jet fabric filter ("PJFF") downstream of an existing ESP to serve as a "polishing" or performance-upgrading unit. Since the ESP removes a significant amount of the particles from the gas stream the flue gas reaching the baghouse has a significantly reduced dust load. As a result, the physical size of a COHPAC PJFF can be one-fourth the size of a normal PJFF, which may reduce the relative cost significantly.

IX. Activated Carbon Injection ("ACI") and Alkali Sorbent Injection ("ALK")

ACI for mercury control involves the addition of powdered activated carbon to flue gas streams where it adsorbs vapor phase mercury. Once injected into the flue gas, the activated carbon (and adsorbed

mercury) must be collected in a particulate collection device. The applications of this technology include injection ahead of an ESP or downstream of an existing ESP but upstream of a high ratio (COHPAC) baghouse, which is an EPRI patented technology known as TOXECON™.

Typically, due to rapid removal of the carbon in the ESP and limited contact time with the flue gas, these applications typically achieve lower removal of mercury than carbon into baghouses. In either application, the mercury removal effectiveness of ACI can be enhanced when burning coals with higher sulfur content (e.g. non-PRB coals) by employing ALK, typically hydrated lime injection, ahead of the ACI. Typically, the hydrated lime used for ALK is less expensive than the activated carbon, so the use of ACI plus ALK is a more economical process than ACI alone for a given mercury capture target.

X. Mercury Re-emission Controls System ("MRCS")

Wet scrubbers are effective at removing oxidized mercury. However, as the captured mercury may remain in a dissolved form in the scrubber slurry in the vessel, the scrubber may from time to time re-emit the mercury that was captured from the flue gas, causing increased levels of mercury emissions out of the stack. The addition of additives, such as activated carbon, into the scrubber slurry can help prevent the occurrence of mercury re-emission by encouraging the precipitation of the mercury dissolved in the slurry.

XI. Containment and Control Technologies for Ash Storage Areas

Several technologies are available to control and close ash storage areas. The most common technologies include liners, caps, slurry walls, sheet pile walls, grouting, and *in situ* solidification and stabilization. A brief description of each technology is provided below.

Closure Footprint Reduction

Ash ponds closed in place may involve consolidating ash into a smaller footprint. This will likely reduce the extent of groundwater impacts and the area requiring long term O&M associated with maintaining the closed facility.

Liners

A liner is a layer of impermeable or low-permeability material placed at the bottom of ash storage facilities, which prevents ash leachate from entering soil and groundwater. Liners can be constructed of compacted natural material (such as clay), synthetic materials (such as High-Density Polyethylene ("HDPE")), or composite materials (combination of synthetic and natural materials). Regulations require liners under new ash storage areas.

Caps

A cap is a layer of impermeable or low-permeability material placed on top of ash storage areas, to prevent surface water infiltration and resulting leachate. As with liners, caps can be constructed of natural materials (for example, compacted clay), synthetic materials (HDPE), or composite materials. Capping may be used in conjunction with liners, slurry walls, or other proven engineering methods to effectively encapsulate a material in place.

Slurry Walls

Slurry walls are subsurface walls constructed in trenches that are designed and installed to a pre-determined depth based on site conditions and project objectives. The trench is filled with a slurry of materials that forms an impermeable barrier to prevent/minimize the migration of groundwater within the area. Slurry materials can include various mixtures of soil, bentonite clay, and/or cement.

Sheet Pile Walls

Sheet piling includes interlocking wood, concrete, or steel sectors driven into the ground or forced into pre-dug trenches, usually to the top of a relatively impermeable layer (for example, clay or bedrock). As with slurry walls, sheet pile walls form an impermeable barrier to prevent/minimize the migration of groundwater. Steel sheet pilings are the most reliable and most commonly used. Sheet piling is often used as a temporary measure of containment while dewatering or excavation, or while other containment is constructed.

Grout Curtains

A grout curtain is a method of sealing gaps in subsurface geology by injection of grout to fill voids in fractured rock, or to consolidate soil by filling the pore space. The grout material may be a Portland cement mix or any fluid material that hardens, such as a resin or sodium silicate. The grout material is injected as a pressurized fluid through holes drilled into the ground, generally in rows. Under ideal conditions, the injected fluids harden to create a relatively impermeable barrier, similar to a wall, in the subsurface.

In situ Solidification/Stabilization

Solidification/stabilization describes the technique of solidifying soil or waste material (e.g., a sludge), to reduce the potential for groundwater interaction. Solidification refers to the addition of a binder to produce a solid. Stabilization refers to the addition of a chemical agent to convert the soil or waste material to a more chemically stable form. Some additives, such as Portland cement, produce both physical and chemical changes. Large augers or equipment with rotary blades are typically used to mix the additives with contaminated soil or waste material.

XII. Cooling Water Intake Screen Technology

Inclined traveling water screens ("TWS") and cylindrical wedge wire screens ("CWWS") will generally be the preferred water screen technologies. Both screens will allow debris handling and the design is also adaptable to minimize impingement and entrainment. Screen wash systems for the TWS and airburst systems for the CWWS can maintain screen cleanliness to an acceptable level. If needed, continuous fish and debris handling systems can also be designed to work with the TWS. As needed, fish-return technologies are also available.

XIII. Water Cooling Technologies

Cooling water systems are generally placed into two categories: either wet systems, which use water as the cooling medium, or dry systems that utilize air. Wet cooling systems withdraw water to absorb heat via indirect contact with steam in a condenser. These wet cooling systems are divided into two types, based on the manner in which the cooling water is used: once-through and closed-cycle systems with cooling towers or ponds. Unlike once-through systems that continuously draw fresh cold water from a large water source, closed cycle systems recirculate the same cooling water in a continuous loop through the condenser, with only very small amounts of water being withdrawn from a source to replace the water that is lost due to evaporation, drift, and blowdown in the cooling tower.

Because of the relative simplicity, the capital and operating costs for once-through systems are less than those for closed-cycle systems with a cooling tower. Once-through systems can also include helper cooling towers to reduce thermal load at the water discharge point, but these systems do not reduce water withdrawals. Closed-cycle cooling water systems reduce water withdrawals about 95%. Because of this, use of a closed-cycle system with a cooling tower is one potential method of minimizing impingement and entrainment. However, consumptive use of water is increased from use of cooling towers and

approximately 75% of the cooling water withdrawn is not returned to source but is lost to the atmosphere via evaporation.

Dry cooling systems transfer heat to the atmosphere without the use of water. Steam leaving the turbine is piped to an air-cooled, finned-tube condenser. Dry cooling has an adverse effect on power plant efficiency, requires a large area of land, and is more expensive than wet cooling. A hybrid system incorporates elements of both wet and dry cooling systems in an attempt to maximize the benefits of each. Few large-scale applications of hybrid systems exist in the United States and the cost is commensurate with that of dry cooling. Neither a dry nor a hybrid cooling system is considered an economically or technically viable option for retrofit of an existing generating unit in the Southeast.

XV. Dry or Closed-Loop Ash Handling Methods

To prevent the discharge of ash sluicing water, facilities can convert to dry handling or closed loop ash sluicing. Such ash handling systems include pneumatic dry ash handling equipment (typically used for lighter fly ash) and remote submerged drag chain conveyors and ash coolers (typically used for bottom ash). These systems are utilized in conjunction with additional storage silos and collection systems to facilitate disposal or reuse options.

XVI. Landfills

With ash ponds no longer in use, use of landfills is the alternative for long-term ash storage or disposal. This technology can be implemented for ash and gypsum, requiring regulatory permitting, hydrogeologic/geologic studies, and large amounts of available property. In addition, a leachate collection and pumping system would be installed to manage any landfill leachate collected and groundwater monitoring is required.

XVII. Wastewater Treatment

Wastewater treatment systems remove or reduce certain constituents in wastewater prior to discharge. Wastewater treatment needs are highly site- and waste stream-specific and can include various systems or equipment, such as settling basins, tanks, clarifiers, pH adjustment, and associated pumps, piping and equipment, to meet site-specific needs.

Physical-chemical treatment systems are used to reduce solids and certain metals within a waste stream. These systems may include lined settling basins, tanks, clarifiers, pH adjustment, and associated pumps, piping and equipment. These systems are widely used across industries.

Physical-chemical-biological treatment includes the same components as a physical-chemical system with the addition of a biological treatment system to remove selenium and nitrate from the waste stream. This system can be used for the scrubber wastewater. These systems are newer technologies that continue to be tested and researched.

For membrane-based treatment, scrubber return water use is maximized and scrubber wastewater discharge is minimized. The chloride purge stream is processed through an advanced membrane process to produce a clean permeate stream and a small brine concentrate stream. The concentrate is managed either through third party disposal, ash conditioning and landfill on-site or off-site, or paste processing and landfill on-site. This is another option for scrubber wastewater at sites with optimal water balances.

ECS - Appendix D – High-Level and Low-Level Radioactive Waste Storage

PLANTS HATCH AND VOGTLE

Georgia Power's affiliate, Southern Nuclear Operating Company ("Southern Nuclear") safely operates and maintains Plants Hatch and Vogtle in accordance with industry standards and regulatory requirements. Southern Nuclear is dedicated to maintaining the highest standards for safely handling radioactive waste to protect the public, the environment, and its workers.

High-Level Radioactive Waste ("HLRW" - spent fuel)

Dry Cask Storage:

Plant Hatch and Plant Vogtle currently store spent fuel in underwater spent fuel pools and some above ground in dry casks on concrete pads known as Independent Spent Fuel Storage Installations until such time that the federal government licenses and builds a permanent disposal facility capable of accepting this waste.

These above ground dry casks are engineered to assist in cooling the spent fuel bundles while providing adequate shielding for the protection of plant employees as well as the surrounding community and environment.

Low-Level Radioactive Waste ("LLRW" - trash, tools, scrap, filtering media, irradiated hardware, etc.)

Similar to the nuclear power industry, over 95 percent of the LLRW generated by Plant Hatch and Plant Vogtle continues to be buried at the Energy Solutions burial site in Clive, Utah.

Plant Hatch and Plant Vogtle send waste that cannot be disposed of directly at Energy Solutions', Clive, Utah facility either to, Energy Solutions for additional processing or to the Waste Control Specialist, Andrew County, Texas facility for disposal. Plant Hatch and Plant Vogtle may store this waste on the site where it was generated inside concrete shields on a concrete pad until it can be further processed for disposal at Clive, Utah or shipped to Andrew County, Texas for disposal. Plant Hatch does not have any on-site storage capability for LLRW and Vogtle does not have any LLRW stored on site. All low-level radioactive waste that was stored in the environmental shields at Vogtle has been shipped for disposal. Hatch ships all waste promptly after generation and packaging.

Southern Nuclear in conjunction with the nuclear industry is always working towards reducing the generation of radioactive waste.