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Investment Justification

The primary goal of the Georgia Power Company (GPC) Hydro Modernization program is to modernize and extend the life of turbine/generator units and Balance of Plant Electrical systems, Mechanical systems, Instrumentation and Controls, and Civil Infrastructure in the GPC Hydro Fleet for another 40 to 50 years. Additional focus will be on reduction of oil capacities in various hydraulic systems within the powerhouse where possible by implementing new technologies.

The Tugalo Development was initially placed into service in the early 1920s. The Tugalo development consists of Tugalo dam, a reservoir (also known as Lake Tugalo), four penstocks from the intake section to the powerhouse, a powerhouse, and a tailrace. The powerhouse contains four vertical Francis turbines units rated at 11.25 MW each, which have been in operation for approximately 95 years. GPC plans to upgrade the four generating units in the Tugalo powerhouse, including refurbishing the turbines, replacing the turbine runners, rewinding the generators, and replacing spillway gates and intake trash racks. Following these upgrades, the total nameplate capacity of the development will increase from 45 megawatts (MW) to **64** MW. Work has already begun on Units 1 through 3, and the entire project is expected to be completed by the end of 2025.

All applicable and available common systems at Tugalo will be replaced as part of the scope of this GPC's Hydro Modernization Program. The first unit at Tugalo to undergo Modernization efforts is Unit 1; therefore, where it is appropriate, common systems shared by multiple or all units will be modified or upgraded during the first outage to support outages on future units. Common systems that are part of this scope of work include the following:

- Switchyard;
- General service water;
- Station service;
- Service facilities;
- Fire detection; and
- Computer system

All Units 1 through 4 components that are available and near the end of their service lives will be replaced with modern components. The Tugalo Unit 1 through 4 turbine upgrade capital improvement project that GPC is seeking Hydroelectric Efficiency Improvement Incentive funding for includes the following scope of work for each unit:

- Turbine Component Assessment and Engineering
- Bearing Lube Oil System - Thrust and Guide Bearing
- Install new supply and return lines and install new carbon steel isolation valves for the guide and thrust bearings
- Install new and/or refurbish Bottom Ring
- Install new Hydraulic Power Unit (HPU) Governor Oil System, HPU Skid, and Concrete housing for skid

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- Install new automatic Grease System
- Install new and/or refurbish Headcover
- Replace Shaft Packing Box with mechanical seal
- Install High Pressure Oil Lift System, piping and concrete housekeeping pad
- Install new Runner
- Install new Servo Motors
- Inspect Stay Ring and Spiral Case and replace/refurbish
- Install new and/or refurbish Turbine Guide Bearing
- Install new and/or refurbish Turbine Shaft
- Replace existing vacuum breaker with air admission valve
- Install new and/or refurbish Wicket Operating Ring mechanism
- Install new and/or refurbish Wicket Gates
- Disassembly and reassembly of existing components
- Instrumentation

The Tugalo Unit 1 through 4 turbine upgrade capital improvement project will result in an estimated expected combined unit efficiency improvement of **over 11%**. Unit-specific numbers cannot be disclosed in documents that would be publicly available, but GPC may be able to provide more specific figures and rationales during award negotiations under non-disclosure agreement with United States Department of Energy –Grid Deployment Office (GDO).

In addition to improving the overall efficiency over 3% of the Tugalo facility, the project will also accomplish the following objectives:

- Increase energy production through more efficient utilization of river flows by replacing vintage turbines with state-of-the-art turbines.
- Extend the life of the facility and increase energy resiliency at the hydroelectric development to provide customers with additional low-cost, renewable hydro generation to meet peak and off-peak power demand.
- Increase individual unit reliability, including increasing the ability of each unit to perform at its maximum efficiency when needed to meet power demand. Unit reliability is measured by lower operating temperatures, a decrease in outages, less bearing wear, and lower maintenance costs.
- Continue Georgia Power's commitment to the development and maintenance of clean, renewable energy sources and responsible stewardship of natural resources and local habitats.
- Contribute to local and national economies and communities by creating skilled jobs in the manufacturing and construction industries, and will advance diversity, equity, inclusion and accessibility and contribute to the Justice40 Initiative.

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Documentation Demonstrating Efficiency or Generation Increase Beyond Original Design

Georgia Power Company's (GPC) Tugalo Units 1-4 turbine upgrade capital improvement project will result in a combined unit efficiency improvement of **over 11%** and the total nameplate capacity of the development will increase from the existing nameplate rated capacity of 45 megawatts (MW**)** to **64 MW.**

Efficiency and/or generation increases beyond original designs for Units 1-4 cannot be known with certainty until after installation and testing. Further, the requested documentation includes trade secrets/critically sensitive proprietary information of GPC and of the turbine manufacturer that is privileged and confidential. Consequently, GPC is uncomfortable providing supporting internal and/or manufacturer documentation attempting to demonstrate that the Units 1-4 turbine upgrade project increase efficiency and/or generation beyond original designs. Consequently, in the event of oversubscription, GPC is not currently seeking consideration for the bonus point.

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Georgia Power Company (GPC) has begun investment in the upgrade and modernization of the turbines for Units 1 through 4 of the Tugalo Development. The Tugalo Development is a hydroelectric facility located northeast of Clarkesville, Georgia that comprises part of GPC's North Georgia Project (Project No. P-2354). It was initially placed in service in the early 1920s, and the turbines for Units 1 through 4 have now been in operation for approximately 95 years.

To modernize and increase energy production and the efficiency of the Tugalo Development through more efficient utilization of available river flows by replacing vintage turbines with state-of-the-art turbines, GPC has begun an effort to refurbish and upgrade all turbine components, replace the existing four generators, replace control panels and instrumentation in the control room, balance plant electrical and mechanical systems, upgrade the cooling system, and replace the spillway gates and trash racks. GPC has already begun work on the upgrades at Units 1 through 3 and expects to begin work on Unit 4 in late 2023. Unit 1 is expected to be online by the end of 2023, and Units 2 and 3 will be online by the end of 2024. Unit 4 is expected to be online in August 2025.

On October 3, 1996, the Federal Energy Regulatory Commission (FERC) issued a 40-year license for the North Georgia Project, which consists of six developments: Burton, Nacoochee, Mathis-Terrora, Tallulah Falls, Tugalo and Yonah. The six developments abut one another over a 388-mile stretch of the Tallulah and Tugalo Rivers. On September 24, 2021, and supplemented on October 21, 2021, GPC filed an application to amend the license for the 173.2-megawatt (MW) North Georgia Project No. 2354, to replace and upgrade four generating units, replace control room panels and instrumentation, replace the spillway gates and trash racks, and revise Exhibits A and F at the project's Tugalo Development.

On February 16, 2023, the FERC granted the application amending the license for the North Georgia Project to accommodate the improvements at the Tugalo Development. The order addressed review and consideration under various laws, including but not limited to the National Historical Preservation Act ("NHPA") and the National Environmental Policy Act ("NEPA"). In addition, the FERC's Division of Dam Safety and Inspection ("D2SI") reviewed the application and concluded that the proposed modifications would not adversely affect the safety of the project when constructed, operated and maintained in accordance with the FERC's standards and oversight. Moreover, FERC concluded, the modified spillway gates would constitute a substantial enhancement to the safety of the project. FERC also concluded that the proposed upgrades are needed to maintain project operations because the existing equipment reached the end of its useful life.In addition to improving the overall efficiency of the Tugalo Units 1-4 by over 3%, the project will also accomplish the following objectives:

- Increase energy production through more efficient utilization of available river flows by replacing vintage turbines with state-of-the-art turbines.
- Extend the life of the facility and increase energy resiliency at the hydroelectric developments to provide customers with additional low-cost, renewable, hydro generation to meet peak and off-peak power demand.

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- Increase individual unit reliability, including increasing the ability of each unit to perform at its maximum efficiency when needed to meet power demand. Unit reliability is measured by lower operating temperatures, a decrease in outages, less bearing wear, and lower maintenance costs.
- Continue Georgia Power's commitment to the development and maintenance of clean, renewable energy sources and responsible stewardship of natural resources and local habitats.
- Contribute to local and national economies by creating skilled jobs in the manufacturing and construction industries and will benefit communities by advancing diversity, equity, inclusion, and accessibility and contributing to the Justice40 Initiative

These unit upgrades will increase installed capacity at the Tugalo Dam from 45 MW to 64 MW (19 MW total) and decrease maximum hydraulic capacity from 6,840 cfs to 6,000 cfs. The proposal does not change any of the Project features or operations and will not impact water control capabilities of the Tugalo powerhouse. The unit modifications are expected to increase each unit's rating by about 4.75 MW each and increase each unit's efficiency. The existing nameplate rated capacity is 11.25 MW for each unit and following the upgrade, the units will be approximately 16 MW each (17 MW each at full gate).

Georgia Power requests funding to invest in the equipment, manufacture, and installation of modernized turbines. The total amount of project costs for turbine equipment, manufacture and installation for Units 1-4 is $25,835,488. Therefore, Georgia Power requests $5,000,000 in funding for the project.