



# Southern Company's Troubled Vogtle Nuclear Project

*Units 3 and 4 Now Expected to Cost More  
Than \$30 Billion and Are at Least Six Years  
Behind Schedule*

## Introduction

Georgia Power Company (“Georgia Power” or “the company”), Oglethorpe Power Corporation, the Municipal Electric Authority of Georgia, and the City of Dalton, Georgia (“the owners”) are the four owners of the two new reactors being built at the existing Plant Vogtle site.<sup>1</sup> Originally estimated by the owners to cost slightly more than \$14 billion and to be in service in April 2016 and April 2017, the total cost has more than doubled, climbing above \$30 billion. The owners now estimate commercial operation will not begin until 2022 and 2023—more than six years behind schedule.

Georgia Power asked the Georgia Public Service Commission (“the commission”) in 2008 to approve its application to build two new reactors at its Plant Vogtle site. Georgia Power told the commission that the new Vogtle Units 3 and 4 could be built at lower cost and in far less time than previous nuclear plants because they would feature a new AP1000 nuclear plant design from Westinghouse that would use modular techniques to shorten construction schedules and reduce plant costs.<sup>2</sup>

But cost overruns and schedule delays at the new Vogtle reactors should not come as a surprise to anyone, including Georgia Power, given the experience of Vogtle Units 1 and 2 and other U.S. nuclear projects. The cost of Vogtle 1 and 2 skyrocketed from an initially estimated \$660 million to \$8.8 billion when the new reactors came online in 1987 and 1989. Similarly, a U.S. Department of Energy study of 75 reactors whose construction began between 1966 and 1977 found that the average cost of construction for these reactors was 207% higher than the estimated cost.<sup>3</sup> In other words, the cost of construction tripled while the units were being built.

In addition, witnesses in the Vogtle project certification proceeding warned the commission that both the cost and the schedule of the company's proposed Vogtle reactors were highly uncertain because the AP1000 was an untested design. The recent experience of other nuclear plants with new generation designs also suggested the actual cost of building the new reactors would be significantly higher

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<sup>1</sup> Georgia Power is a wholly-owned subsidiary of the Southern Company.

<sup>2</sup> Georgia Public Service Commission. [Georgia Power Company Application for the Certification of Vogtle Generating Units 3 and 4 and Upgraded Integrated Resource Plan](#). August 1, 2008, p. 13.

<sup>3</sup> U.S. Energy Information Administration. [An Analysis of Nuclear Power Plant Construction Costs, Energy Information Administration of the U.S. Department of Energy, Technical Report DOE/EIA-0485](#). January 1, 1986.

than the owners acknowledged and/or that construction would take substantially longer than owners admitted.<sup>4</sup>

Unfortunately, the history of the U.S. nuclear industry and the warnings were disregarded by both Georgia Power and the commission. As a result, Georgia Power's proposal to build the two new reactors at the Vogtle site was approved by the commission in March 2009.

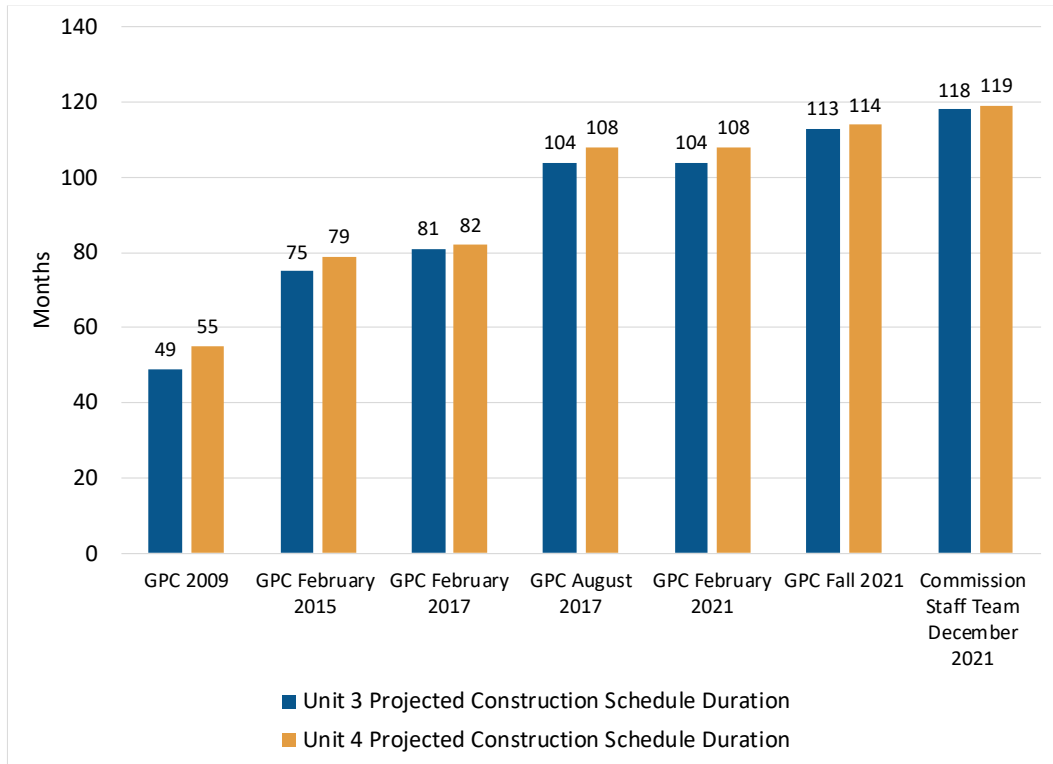
## **The Start of Commercial Operations at the Vogtle Units Will Be More Than Six Years Behind Schedule**

When Georgia Power proposed the new Vogtle reactors, it told the commission that the projected commercial operation dates (CODs) for the two units would be April 1, 2016, and April 1, 2017. As can be seen in Figure 1 on page 3, the owners have repeatedly delayed the unit CODs, with the most recent revisions being in-service dates of the third quarter of 2022 for Unit 3 and the second quarter of 2023 for Unit 4. Even in the very unlikely event that these CODs are achieved, they would represent a 78-month delay beyond April 2016 for Unit 3 and a 75-month delay beyond April 2017 for Unit 4.

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<sup>4</sup> Georgia Public Service Commission. [Testimony of David A. Schlissel](#) and the [Direct Testimony of William R. Jacobs, Jr.](#), Docket No. 27800. December 19, 2008.

**Figure 1: Projected Construction Schedules for Vogtle Units 3 and 4**



Sources: Georgia Power Company’s Application for the Certification of Vogtle Generating Units 3 and 4 and Upgraded Integrated Resource Plan; Plant Vogtle Units 3 and 4 Second through Twenty-Fifth Semi-Annual Construction Monitoring Reports; and the testimony of Donald N. Grace and Steven D. Roetger and William R. Jacobs, Jr. in Commission Docket No. 29849.

The Georgia Public Service Commission has a designated team of staff personnel and outside consultant nuclear engineers and construction management experts (“the commission staff team”) who monitor the cost, schedule and management of the Vogtle project. The members of the staff team present testimony to the commission every six months that addresses the current state of construction and whether Georgia Power’s current cost and schedule estimates are reasonable. The testimony filed by the staff team documents the cost and schedule history of the Vogtle project and the reasons why project costs have skyrocketed and schedules have slipped so significantly.

Among the most significant recent findings of the staff team has been that Georgia Power's forecasts of the two units' CODs have repeatedly been demonstrated to be "unrealistic and unreliable" and that the company has emphasized "pursuing an unrealistic schedule at any cost."<sup>5</sup> The staff team also noted that in every semi-annual review of the project held by the commission since 2012, they had testified that "unachievable and therefore overly aggressive, schedules have had and continue to have serious negative unintended consequences for the project," by which they clearly meant, further schedule delays and additional cost overruns.<sup>6</sup>

**Georgia Power's forecasts of the two units' CODs have repeatedly been demonstrated to be "unrealistic and unreliable."**

The staff's nuclear experts have repeatedly identified the serious consequences that pursuing unrealistic schedules at any cost have on the project. Some of these include:

- A culture of production over quality;
- A culture of poor inspecting or non-inspecting of work
- High personnel turnover and absenteeism;
- Significant work backlogs;
- High first-time component testing failure rates;
- Need for extensive rework and retesting.<sup>7</sup>

The staff's nuclear experts believe that continuing problems at Vogtle will further extend the construction schedule, pushing Unit 3's COD to between November 2022 and February 2023 and Unit 4's COD to November 2023 at the earliest and "perhaps more probably" during the first quarter of 2024.<sup>8</sup> But even longer delays could be experienced.

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<sup>5</sup> Georgia Public Service Commission. [Testimony of Donald N. Grace in Georgia Public Service Commission Docket No. 29849](#). December 1, 2021, p. 6.

<sup>6</sup> Georgia Public Service Commission. [Direct Testimony and Exhibits of Steven D. Roetger and William R. Jacobs in Georgia Public Service Commission Docket No. 29849](#). December 1, 2021, p. 17.

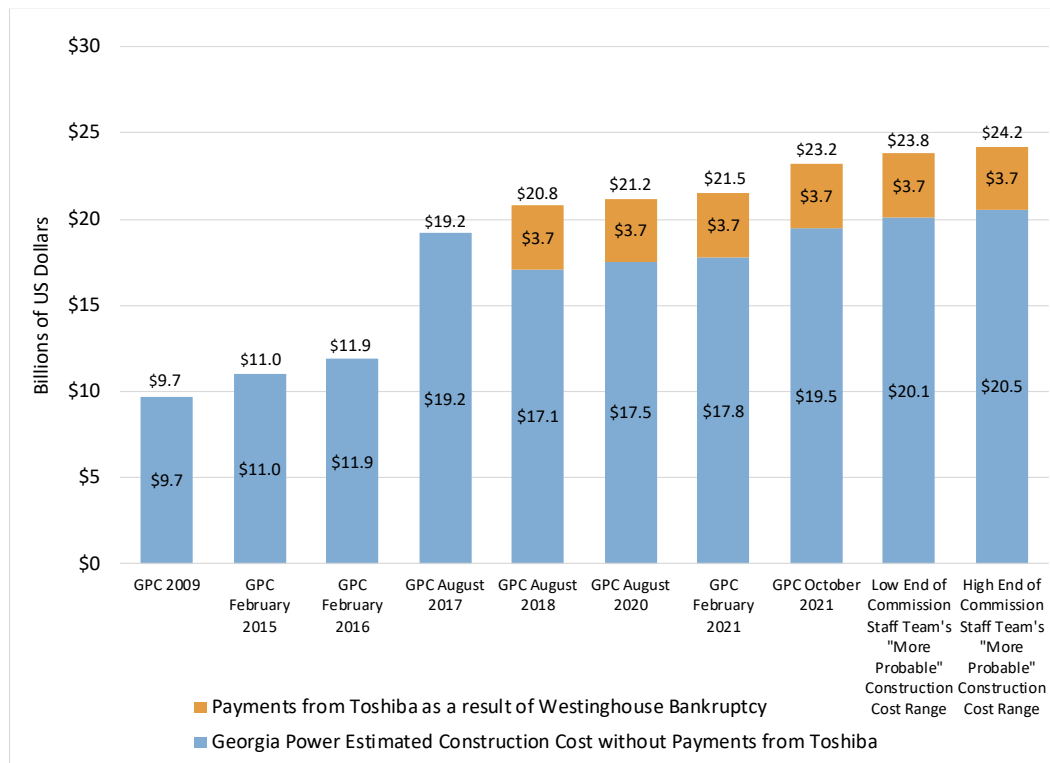
<sup>7</sup> *Ibid.*

<sup>8</sup> Georgia Public Service Commission. [Grace](#).

## The Estimated Cost of the Vogtle Project Has Increased by 140% Since 2009

The estimated construction cost, not including financing costs, of the new Vogtle reactors has increased by 140% from \$9.7 billion in 2009 to \$24.2 billion in the fall of 2021.

**Figure 2: Vogtle Units 3 and 4's Rising Construction Costs**



Sources: Georgia Power Company's Plant Vogtle Units 3 and 4 Semi Annual Construction Monitoring Reports to the Georgia Public Service Commission; Southern Company's Form 10-Q submission to the U.S. S.E.C. for the Quarterly period ending September 30, 2021; and the Direct Testimony of Donald N. Grace in Commission Docket No. 29849.

While it excludes financing costs, Figure 2 includes the \$3.7 billion payment that Vogtle's owners received from Toshiba due to the bankruptcy of its Westinghouse subsidiary. Even though customers won't have to cover the \$3.7 billion, the payment from Toshiba represents a legitimate cost of constructing the new Vogtle reactors that needs to be included in the project's total cost.

If financing costs are included, the total cost of the Vogtle project will have risen from an estimated \$14.1 billion in 2009 to approximately \$32 billion in the fall of 2021, an approximate 127% increase—and that's if Georgia Power's current cost estimate is accurate, which staff experts dispute.

In fact, the staff team's experts have testified they expect the Vogtle project's total cost will continue to increase and that a "more probable" range" of construction costs for the new units is \$20.1 to \$20.5 billion, not including financing costs.<sup>9</sup> This is \$600 million to \$1 billion higher than the owners' current estimate. If the additional costs estimated by the commission staff team, and associated financing costs are included, then the total cost of the Vogtle project is very likely, if not certain, to exceed \$34 billion, especially if the project continues to be delayed as frequently and as long as it has been in recent years.

As they found regarding Georgia Power's estimated construction schedules, the staff team recently has told the commission that "**the Company grossly underestimated the costs of Vogtle 3 and 4 in its filings and testimony to the Commission during at least the first twelve years of the Project.**"<sup>10</sup> [Emphasis added]

*The Company has provided ten cost estimates (certification and nine revisions) over the life of the Project and at least the first nine were materially inaccurate. Due to the fact that the Company provided inaccurate cost information, both the Company's and the Staff's economic analyses, conclusions and recommendations were inaccurate. A fundamental responsibility of Company management is to provide accurate cost estimates which it failed to do during the first twelve years of the Project. The materially inaccurate cost estimates are an example of management's continuous poor judgment over the life of the Project that should be taken into account when the Company seeks recovery of cost overruns.*<sup>11</sup>

During cross-examination in the most recent commission semi-annual review of the Vogtle project, one of the lawyers for Georgia Power asked staff witness Donald Grace if he would agree that the company "provides its best estimates of cost and schedule based on the information known at the time it's making the schedule or the projection." Grace's answer was, "Not necessarily."<sup>12</sup> He then continued with "his honest answer," which suggested that the company was using low forecasts to "justify the project" and "to delay as late as possible what the real costs are going to be."<sup>13</sup>

## 2021 Was a Very Bad Year for the Vogtle Project

Georgia Power didn't make significant progress in 2021 towards completing the two reactors, despite spending more money on the project.

- The project's construction costs had increased at a compound growth rate of 4.5% per year over the three-year period from 2018 to 2021. However, they

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<sup>9</sup> Georgia Public Service Commission. [Grace](#), p. 27.

<sup>10</sup> Georgia Public Service Commission. [Direct Testimony of Tom Newsome, Philip Hayet, and Lane Kollen](#), Docket No. 29849. December 1, 2021, p. 16.

<sup>11</sup> *Ibid.*

<sup>12</sup> Georgia Public Service Commission. [Transcript of December 16, 2021, hearing](#), Docket No. 29849. December 16, 2021, pp. 201-202.

<sup>13</sup> *Ibid.*

rose significantly faster over the eight months between March and November 2021, climbing at an annual rate of 14% per year.<sup>14</sup>

- As of February 2021, Georgia Power projected CODs of November 2021 for Unit 3 and November 2022 for Unit 4. By the fall of 2021, the projected dates had slipped to between May and September 2022 for Unit 3 and March and June 2023 for Unit 4. Despite spending more, the reactors' schedules continued "to be extended at a rate of nearly one month of schedule slippage per calendar month of work."<sup>15</sup>
- Indeed, as of January 2021, Georgia Power's estimated cost of completing the new reactors was \$2.503 billion. Yet, after spending a total of \$1.916 billion over the next nine months, the estimated remaining cost of completing the project had **increased** to \$2.661 billion.<sup>16</sup>

Staff expert Grace used an apt analogy to describe the lack of progress that had been achieved on the project during the year in his cross-examination in the commission's December 16, 2021, hearing on the project:

*But, you know, to me it reminds me of, you know, growing up in Southwest Pennsylvania and you're trying to go up hills in the snow; all right?*

*And the wheels are turning. Money is being spent and you're trying to get to the goal of getting to the top of the hill. But in some cases, you're making slow progress, but not at the rate you expected. And in some cases you're actually slipping backwards somewhat; okay.*

*And that's what's been going on over the, you know, past – I don't know – 9 to 12 months, I would say.<sup>17</sup>*

## Georgia Utility Customers Already Have Paid More Than \$3.5 Billion for the Vogtle Project

Within days of the Georgia Public Service Commission's approval of Georgia Power's application to build the Vogtle 3 and 4 reactors, the state legislature passed and the governor signed the Nuclear Energy Financing Act of 2009.<sup>18</sup> The act allowed a utility to recover from its customers the costs of financing associated with the construction of a new nuclear plant that had been certified by the PSC while the plant was under construction and before it produced any power.

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<sup>14</sup> Georgia Public Service Commission. [Grace](#), p. 23.

<sup>15</sup> Georgia Public Service Commission. [Direct Testimony and Exhibits of Roetger and Jacobs](#), p. 8.

<sup>16</sup> Georgia Public Service Commission. [Grace](#), p. 24.

<sup>17</sup> Georgia Public Service Commission. [Transcript of December 16, 2021, hearing Docket No. 29849](#). December 16, 2021, pp. 112-113.

<sup>18</sup> [Georgia Nuclear Financing Act of 2009](#).

As a result, Georgia Power's customers have paid more than \$3.5 billion for Vogtle 3 and 4 from January 2011 to December 2020 through a rider on their electric bills,<sup>19</sup> and the commission staff estimates the figure will grow to approximately \$4 billion by the time the units are completed.<sup>20</sup> This means the company's customers have been paying for Vogtle 3 and 4 for more than a decade without receiving any power from either of the two new reactors.

However, the Nuclear Energy Financing Act did not treat all customer classes equally, with the burden on Georgia Power's large industrial customers of paying the costs of financing Vogtle 3 and 4 being far smaller than those borne by residential and commercial customers. For example, between 2011 and 2020, Georgia Power's residential customers paid 47% of the \$3.5 billion Vogtle 3 and 4 financing costs collected through the bill rider and commercial customers paid 40%. Industrial customers paid only 11%.<sup>21</sup> According to the Public Service Commission staff, by the time the reactors at Vogtle finally go into service, a typical Georgia Power residential customer will have paid \$880 for project financing costs.<sup>22</sup>

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Georgia Power claims that collecting the Vogtle 3 and 4 financing costs during the construction period (by requiring customers to pay a return on the billions spent on Construction Work in Progress or CWIP) has benefits for customers,<sup>23</sup> but others dispute this. But two things are certain: Making customers pay for the new Vogtle reactors up to 12 years before they go into service hasn't prevented the project's cost from increasing by 140%, and Georgia Power Company and its owner Southern Company have benefitted financially from the early payments.

Oglethorpe Power Corporation,<sup>24</sup> which owns 30% of the new reactors, has a rate management program through which subscribing electric member cooperatives can elect to pay Vogtle project financing costs on a current basis, instead of being deferred or capitalized (that is, recovered after the reactors go into service). As of

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<sup>19</sup> Georgia Public Service Commission. [Georgia Power response to Staff discovery request STF-198-25, Docket No. 29849](#). April 9, 2021.

<sup>20</sup> Georgia Public Service Commission. [Direct Testimony of Tom Newsome et al.](#), p. 6.

<sup>21</sup> Georgia Public Service Commission. [Georgia Power response to Staff discovery request STF-198-25, Docket No. 29849](#). April 9, 2021.

<sup>22</sup> Georgia Public Service Commission. [Direct Testimony of Tom Newsome et al.](#), p. 6.

<sup>23</sup> Georgia Power. [Benefits of CWIP](#).

<sup>24</sup> Oglethorpe Power Corporation operates as an electric cooperative in the United States. The company offers wholesale electric power to 38 retail electric distribution cooperative members. Its members are local consumer-owned distribution cooperatives that provide retail electric service on a not-for-profit basis to approximately 4.3 million residential, commercial, and industrial consumers.



Sept. 30, 2021, Oglethorpe had billed participating members a cumulative \$107.54 million for Vogtle project financing costs.<sup>25</sup>

In addition to paying financing costs, Georgia Power's customers are picking up the tab for additional replacement fuel costs because the reactors have been delayed. For example, the staff estimates the total replacement fuel cost for the 6.5-year delay through 2023 will be approximately \$1 billion, which will be on top of the \$4 billion in financing costs.<sup>26</sup>

## Georgia Utility Customers Will Continue to Pay Dramatically More for Power From the Vogtle Project Over the Next 60 Years

The commission staff has concluded that Georgia Power's customers "will pay substantially more both prior to and after the [new Vogtle] units begin providing service due to the delays and cost overruns."<sup>27</sup> While that is clearly true, it also is clear that customers would be paying more for their electricity due to the owners' original decision to build the new Vogtle units even if the delays and cost overruns are excluded.

Staff has calculated that the total revenue requirements due to Vogtle 3 and 4 will be in excess of \$70 billion over the units' expected 60-year operating lives.<sup>28</sup> As a result, the revenue requirements of the two new reactors "significantly exceed that of natural gas combined cycle units over the entire 60-year operating life under all natural gas price and carbon dioxide emission price scenarios."<sup>29</sup> Unfortunately, the commission staff did not include the prices of renewable alternatives to Vogtle 3 and 4 in their analyses.

**Georgia Power residential customers will have to pay more than \$1,700 during just the first 10 years of Vogtle's 60-year life.**

Commission staff estimate the power from the new reactors will cost Georgia Power's customers an average of \$150 per megawatt-hour (MWh).<sup>30</sup> As shown in Figure 3, below, this is far higher than it would have cost the owners to build a new natural gas combined cycle plant as an alternative to Vogtle 3 and 4 and is approximately five times as expensive as the \$30.19 per megawatt-hour average price of five purchase power agreements (PPA) that Georgia Power recently signed

<sup>25</sup> Oglethorpe Power Corp. [Form 10-Q](#).

<sup>26</sup> Georgia Public Service Commission. [Direct Testimony of Tom Newsome et al.](#), p. 15.

<sup>27</sup> Georgia Public Service Commission. [Direct Testimony of Tom Newsome et al.](#), p. 7.

<sup>28</sup> Georgia Public Service Commission. [Direct Testimony of Tom Newsome et al.](#), Figure 1, page 9.

<sup>29</sup> Georgia Public Service Commission. [Direct Testimony of Tom Newsome et al.](#), p. 11.

<sup>30</sup> Georgia Public Service Commission. [Direct Testimony of Tom Newsome et al.](#), p. 12.

with solar developers. Four of the new renewable PPAs include both energy and storage capacity.<sup>31</sup>

Vogtle 3 and 4 will be expensive for Georgia Power's residential customers as the commission staff estimates that they will have to pay an average of \$14.30 per month for project-related costs during the reactors' first 10 years in operation,<sup>32</sup> for a total of more than \$1,700 during just the first 10 of the units' projected 60-year operating lives.

**Figure 3: The Cost of Power From Vogtle 3 and 4 vs. Solar and Natural Gas Alternatives**

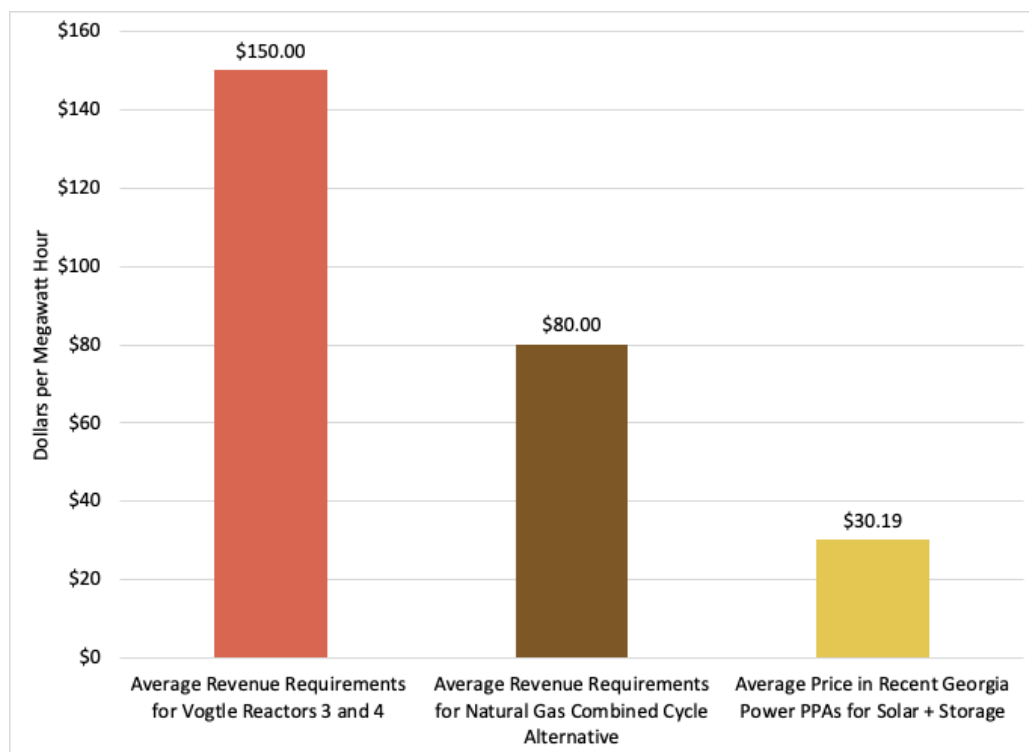


Figure Sources: *The Georgia Public Service Commission's July 6, 2021 Order Approving Certification of 2022/2023 Utility Scale Renewable Power Purchase Agreements*; the *Direct Testimony of the Panel of A. Wilson Mallard and Jeffrey B. Weathers on Behalf of Georgia Power Company in Commission Docket No. 43814*; and the *Direct Testimony of Tom Newsome, Philip Hayet and Lane Collen in Commission Docket No. 29849*.

As can be seen from Figure 3, the power from Vogtle 3 and 4 will be approximately five times as expensive as acquiring the same amounts of energy and capacity from renewable solar plus storage PPAs.

<sup>31</sup> Georgia Public Service Commission. [Georgia Public Service Commission Order in Docket No. 43814 Approving Certification of 2022/2023 Utility Scale Renewable Power Purchase Agreements](#). July 7, 2021.

<sup>32</sup> Georgia Public Service Commission. [Direct Testimony of Tom Newsome et al.](#), p. 7.

## **Conclusion**

There is clear evidence in the commission's docket both that Vogtle 3 and 4 will be very expensive sources of power for the customers of the four owners; that Georgia Power has repeatedly misled the commission and its staff about the project's likely cost and schedule; and that Georgia Power, its affiliate Southern Nuclear, and its contractors have mismanaged the project. When the units are completed, the Georgia Public Service Commission will be conducting a prudence review to determine how much of Georgia Power's share of the cost of the Vogtle 3 and 4 project should be borne by the company and its owner, Southern Company, instead of customers. The commission denied rate recovery for \$951 million of the cost overruns at Vogtle 1 and 2. It should deny rate recovery for a much larger share of the far more expensive Vogtle 3 and 4 project.

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