**BEFORE THE**
**PUBLIC SERVICE COMMISSION**
**STATE OF GEORGIA**

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| **ON BEHALF OF GEORGIA POWER COMPANY APPLICATION FOR CERTIFICATION OF UNITS 3 AND 4 AT PLANT VOGTLE AND UPDATED INTEGRATED RESOURCE PLAN** | ) | **DOCKET NO. 27800-U** |

# DIRECT TESTIMONY OF DAVID A. SCHLISSEL
# ON BEHALF OF
# SOUTHERN ALLIANCE FOR CLEAN ENERGY

## PUBLIC VERSION
## CONFIDENTIAL INFORMATION REDACTED

## DECEMBER 19, 2008

**Georgia Public Service Commission**
**Docket No. 27800-U**
**Direct Testimony of David A. Schlissel**

**Q. What is your name, position and business address?**

A. My name is David A. Schlissel. I am a Senior Consultant at Synapse Energy Economics, Inc, 22 Pearl Street, Cambridge, MA 02139.

**Q. Please describe Synapse Energy Economics.**

A. Synapse Energy Economics ("Synapse") is a research and consulting firm specializing in energy and environmental issues, including electric generation, transmission and distribution system reliability, market power, electricity market prices, stranded costs, efficiency, renewable energy, environmental quality, and nuclear power.

Synapse's clients include state consumer advocates, public utilities commission staff, attorneys general, environmental organizations, federal government and utilities. A complete description of Synapse is available at our website, www.synapse-energy.com.

**Q. Please summarize your educational background and recent work experience.**

A. I graduated from the Massachusetts Institute of Technology in 1968 with a Bachelor of Science Degree in Engineering. In 1969, I received a Master of Science Degree in Engineering from Stanford University. In 1973, I received a Law Degree from Stanford University. In addition, I studied nuclear engineering at the Massachusetts Institute of Technology during the years 1983-1986.

Since 1983 I have been retained by governmental bodies, publicly-owned utilities, and private organizations in 28 states to prepare expert testimony and analyses on engineering and economic issues related to electric utilities. My clients have included the New Mexico Public Regulation Commission, the General Staff of the Arkansas Public Service Commission, the Staff of the Arizona Corporation Commission, the U.S. Department of Justice, the Commonwealth of Massachusetts, the Attorneys General of the States of Massachusetts, Michigan, New York, and Rhode Island, the General Electric Company, cities and towns in

Connecticut, New York and Virginia, state consumer advocates, and national and local environmental organizations.

I have testified before state regulatory commissions in Arizona, New Jersey, Connecticut, Kansas, Texas, New Mexico, New York, Vermont, North Carolina, South Carolina, Maine, Illinois, Indiana, Ohio, Massachusetts, Missouri, Rhode Island, Wisconsin, Iowa, South Dakota, Georgia, Minnesota, Michigan, Florida and North Dakota and before an Atomic Safety & Licensing Board of the U.S. Nuclear Regulatory Commission.

A copy of my current resume is attached as Exhibit DAS-1.

**Q. On whose behalf are you testifying in this case?**

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

**Q. Have you testified previously before this Commission?**

A. Yes. I presented testimony in Commission Docket No. 22449-U.

**Q. What is the purpose of your testimony?**

A. Synapse was retained to review the testimony filed by Georgia Power Company ("Georgia Power" or "the Company") and to provide testimony about the possible costs and risks of proceeding with the proposed Plant Vogtle Units 3 and 4 nuclear power plants.

**Q. What research have you undertaken in preparing this testimony?**

A. As part of my ongoing work, I regularly review nuclear industry and other publicly available documents regarding the estimated costs of proposed nuclear power plants in the United States and the costs and experiences of nuclear power plants under construction overseas. For this specific project, I reviewed the testimony filed by Georgia Power and the data responses provided by the Company to discovery submitted by the Commission Staff. In addition, I examined other public information regarding the proposed Plant Vogtle Units 3 and 4.

**Q. Have you been able to conduct discovery in this proceeding?**

A. No. Georgia Power has refused to answer any discovery from SACE other than to refer us to responses it had provided to data requests submitted by the Commission Staff that were similar to the questions SACE asked.

**Q. Is it prudent for Georgia Power to commit to a long-term capital-intensive project like Plant Vogtle Units 3 and 4 at this time?**

A. No. Despite what the Company claims in its application and supporting testimony, there is great uncertainty concerning the ultimate cost and schedule for Plant Vogtle Units 3 and 4, the need for the project, and its relative economics versus other alternatives including energy efficiency, renewable resources and gas-fired plants. It would be more prudent in these uncertain times to avoid a massive multi-billion dollar commitment to a single and extremely expensive generating project. Instead, the Company should adopt more flexible options (such as natural gas and additional DSM and renewable resources) to address any needs it currently anticipates it may have in 2016 and 2017 and to revisit the need for and the relative economics of the proposed Plant Vogtle Units 3 and 4 in the future when other AP 1000 plants have been licensed by the U.S. Nuclear Regulatory Commission ("NRC") and there is actual construction and operating experience with the currently untested design.

**Q. What are the major risks and uncertainties facing Georgia Power and the proposed Plant Vogtle Units 3 and 4 at this time?**

A. The major uncertainties facing Georgia Power and Plant Vogtle Units 3 and 4 are:

- No nuclear power plants have been licensed under the Nuclear Regulatory Commission's ("NRC") new Combined Construction and Operating ("COL") licensing process. Thus, there is no certainty as to how long the licensing process will take. This is especially true given that the NRC is already facing the need to conduct simultaneous reviews of the COL license applications that have already been filed, with more applications expected to be filed in 2009 and 2010. In addition, many of these applications reflect new and untested nuclear generation technologies. Moreover, the NRC staff personnel have no recent experience with

reviewing construction and operating licenses for new nuclear plants. Under these circumstances, it is unclear whether a COL will be issued for Plant Vogtle Units 3 and 4 under the Company's proposed schedule that would allow construction to begin in time for Unit 3 to start operations in 2016 and Unit 4 in 2017. In fact, preliminary evidence suggests that the schedule for one of the first applications for a COL, i.e., by South Carolina Electric & Gas, has slipped by perhaps 8 months since the application was filed with the NRC.

- Construction cost uncertainty represents the most significant risk for a new nuclear power plant -- no nuclear power plant with an AP 1000 design has been constructed, let alone operated, anywhere in the world. Without such actual experience, the estimated costs of proposed units such as Plant Vogtle Units 3 and 4 are highly uncertain. The actual costs of the existing generation of nuclear power plants were, on average, between two to three times the costs that were estimated during licensing or at the start of construction. And this does not include the experiences of the most expensive nuclear power plants like Plant Vogtle Units 1 and 2 whose actual costs were more than ten times the initial cost estimated by Georgia Power.

- The first AP 1000 project to actually begin construction has just been started in China and has a scheduled completion date of late 2013. Currently unanticipated problems may be experienced during the construction or initial operation of this project or of the other initial AP 1000 plants that will require extensive, expensive and time-consuming modifications to the design of Plant Vogtle Units 3 and 4.

- Perhaps as many as 15 to 20 other nuclear construction projects (including five other AP 1000 projects with a total of ten plants in the Southeast alone) may be underway in the U.S. at the same time as Plant Vogtle Units 3 and 4. This will create competing demands on the manufacturing capacity required to fabricate large structural components and equipment, craft labor, engineering labor and project management personnel, NRC licensing and oversight resources, and required construction commodities.

- For these reasons, there also is significant uncertainty as to whether Georgia Power will be able to achieve the accelerated construction schedules that would be required for Plant Vogtle Unit 3 to start commercial operations in 2016 and Unit 4 in 2017.

- Contrary to what Georgia Power may claim, its contract with Westinghouse and Stone & Webster will allow for [REDACTED], the costs of which would have to be borne by the Company's ratepayers.

- The Company's need for the 1,000 MW of capacity and associated energy represented by Plant Vogtle Units 3 and 4 may be significantly delayed if

the current economic recession is a deep and long as is currently anticipated.

- The need for and relative economics of the capacity and energy represented by Plant Vogtle Units 3 and 4 also will affected by how much cost-effective demand side management can and will be implemented and what cost-effective renewable resources will be developed.

- The relative economics of Plant Vogtle Units 3 and 4 also will be affected by the policies that are adopted by the federal government to address global climate change. While reducing greenhouse gas emissions is an essential goal, DSM and renewable resources may represent less expensive and faster alternatives for reducing greenhouse gas emissions than investing $6.4 billion or more in a single and expensive project like Plant Vogtle Units 3 and 4.

**Q. Is Georgia Power Company willing to expose shareholders to any of these risks and uncertainties associated with building Plant Vogtle Units 3 and 4?**

A. No. The Commission staff asked Georgia Power whether the Company was willing to assume any responsibility if the actual project costs are substantially higher than the estimated costs because the indices in the EPC Agreement by which costs would be escalated were underestimated. The Company's response was "No, the Company's shareholders will not invest capital in the project without a reasonable assurance of cost recovery."[1] In other words, the Company will seek to have ratepayers bear the risks of higher project costs.

**Q. Does Georgia Power have any incentive to continue to pursue building Plant Vogtle Units 3 and 4 in spite of the significant uncertainties that the project faces?**

A. Yes. The addition of the massive investment to rate base can be expected to improve the Company's earnings. This is especially true in early years if the Company is allowed to finance its investment in Plant Vogtle Units 3 and 4 by adding CWIP to rate base. As the Company has indicated, the break-even year for using CWIP is [REDACTED]. This means that ratepayers could be paying

[1] Georgia Power Company response to Staff Data Request No. STF-GDS-WRJ-1-43.

higher rates for [REDACTED] years than if the project were financed under more traditional ratemaking without CWIP.

*Regulatory Uncertainty*

**Q. When does Georgia Power currently anticipate that a combined Construction and Operating License ("COL") for Plant Vogtle Units 3 and 4 will be issued by the U.S. Nuclear Regulatory Commission ("NRC")?**

A. Georgia Power has said that it anticipates that the COL for Plant Vogtle Units 3 and 4 will be issued in the July to September 2011 timeframe.[2]

**Q. Is the any uncertainty in the schedule for the licensing of Plant Vogtle Units 3 and 4 by the NRC?**

A. Yes. Even though the NRC has approved Westinghouse's AP 1000 standardized design, there remains significant uncertainty as to when the NRC will issue a COL for Plant Vogtle Units 3 and 4

- No new nuclear has completed the NRC's new COL licensing process. Thus, it is uncertain how long the licensing process actually will take. This is especially true given that, according to the NRC's website, 17 COL applications already have been received, with more expected to be filed in 2009 and 2010. The NRC will have to process many of these COL applications at essentially the same time. In addition, the NRC has not licensed any new nuclear power plants since the 1980s so it is unclear whether the lack of staff resources or the lack of recent experience in plant licensing reviews will slow down the review process.
- The then-current AP 1000 design was certified by the NRC in 2006. However, Westinghouse has since submitted two design amendments (Rev. 16 and Rev 17) for the AP 1000. The issuance of the COL for Plant Vogtle Units 3 and 4 is dependent on the NRC issuing an amended design certification reflecting these two proposed Revisions. According to Georgia Power, the key date was to be the issuance of a Final Safety Evaluation Report in March 2010, however, a schedule change is anticipated due to the submittal of the new revision to the design certification (i.e., Rev. 17) that was submitted in September 2008.[3] The

[2] Georgia Power Company response to Staff Data Request No. STF-TN-6-2.
[3] Georgia Power Company response to Staff Data Request No. STF-TN-6-3.

NRC's website indicates that there is not yet a new schedule for the review of the two most recent Revisions to the AP 1000 design. As a result, it not known when the NRC will certify the amended AP 1000 design and what impact this will have on the Plant Vogtle Units 3 and 4 COL licensing process.

- The AP 1000 reference plant application is for TVA's proposed Bellefonte plant. According to Georgia Power, the issuance of the COL for Plant Vogtle Units 3 and 4 is dependent on the NRC successfully completing its review of the standard AP 1000 material for the reference plant application.[4] Georgia Power had said that a critical schedule item for the Plant Vogtle Application was the NRC's issuance of the Bellefonte "Draft SER for open items not including Chapter 2" which had been scheduled for April 2009.[5] According to the NRC's website, the issuance of this report already has slipped to the end of September 2009.

- Georgia Power also has said that the issuance of the COL for Plant Vogtle Units 3 and 4 is dependent on the NRC meeting its targeted milestones and the milestones established by the NRC's Atomic Safety and Licensing Board ("ASLB") for the mandatory and contested hearing required on the COL application. However, the ASLB has not yet issued a schedule for the hearing on the Plant Vogtle Units 3 and 4 COL application and is not expected to do so until late in 2008 or early in 2009.

Consequently, it is reasonable to expect that there will be some, perhaps significant, slippage in the schedule for issuance of the Plant Vogtle Units 3 and 4 COL. It also is possible that some significant design flaws or problems will be identified during the NRC's review of the Bellefonte AP 1000 reference plant application or during its review of any of the other AP 1000 projects for which licenses are being sought. The discovery of such significant design flaws or problems could further delay the issuance of a COL. Such delays could then be expected to push back the start of construction and endanger the proposed 2016 and 2017 target dates that Georgia Power has announced for the start of commercial operations.

Indeed, even Georgia Power has acknowledged that "It is difficult to predict when other companies will be successful in receiving licensing from NRC and

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[4] Id.
[5] Id.

certification from their State regulators to be able to begin construction."[6] The same is true for Georgia Power itself with regard to the receipt of the COL for Plant Vogtle Units 3 and 4 from the NRC.

*Construction Cost Uncertainty*

**Q. Is there any reasonable range of certainty regarding the ultimate construction cost of Plant Vogtle Units 3 and 4?**

A. No. There is great uncertainty regarding the project's ultimate construction cost. In fact, construction cost uncertainty represents the most significant risk facing a new nuclear power plant.

**Q. What are the reasons for this great uncertainty?**

A. There are a number of factors for the great uncertainty regarding the ultimate construction cost of Plant Vogtle Units 3 and 4:

- The AP 1000 is an untested design. No plant with the design has actually been built and operated anywhere in the world. There is only a very limited track record for building any nuclear plant with a new generation nuclear technology.
- Georgia Power's projected overnight cost for Plant Vogtle Units 3 and 4 is significantly lower than the estimated overnight costs of the other AP 1000 projects proposed to be built in the Southeast in the same relative time frame.
- Power plant construction costs have skyrocketed in recent years due to a surging global demand and a worldwide competition for design and construction resources, equipment and commodities. The proposed worldwide renaissance of nuclear power will increase that competition so that a larger number of generating projects will be competing for the same resources. Indeed, perhaps as many as 17 or more nuclear construction projects could be underway in the United States at the same time, with many of those projects being built in the Southeast. These projects will be competing for many of the same manufacturing, engineering, labor and management resources.

[6] Georgia Power Company response to Staff Data Request No. STF-GDS-WRJ-1-17.

- There is a reduced infrastructure in the U.S. for building new nuclear power plants: many experienced construction workers have retired and have been replaced with new, less experienced workers – this may lead to reduced labor productivity; there are fewer workers with the specialized skills required for building new nuclear power plants; suppliers who provided nuclear quality equipment and materials during the construction of the existing generation of nuclear plants no longer do so; as a result there is a tight supply chain with potential bottlenecks.
- The recent construction experiences of other nuclear plants with untested new generation designs suggests that the actual cost of building Plant Vogtle Units 3 and 4 may be significantly higher than Georgia Power now acknowledges and that construction may take substantially longer than the Company now predicts.

**Q. Is it widely accepted that the estimated costs for new nuclear power plants are very uncertain?**

A. Yes. For example, Lew Hay, Chairman and CEO of Florida Power & Light has told a meeting of the World Association of Nuclear Operators that "although suppliers keep quoting overnight costs of $2500 to $3500 per kilowatt, I believe the all-in costs are likely to be much higher – possibly twice as much once you factor in owners' costs such as land, cooling towers, switchyard, etc., interest during construction and cost escalation due to inflation and cost overruns. And of course we have to have a contingency as well."[7]

Moody's Investor Services has warned about the short-comings of nuclear power plant cost estimates: "All-in fact-based assessments require some basis for an overnight capital cost estimate, and the shortcomings of simply asserting that capital costs could be "significantly higher than $3,500/kw" should be supported by some analysis. That said, Moody's can not confirm (and all of our research supports our conclusion) definitive estimates for new nuclear costs at this time. Moody's can assert with confidence that there is considerable uncertainty with

[7] "How much, for some utilities, the capital costs of a new nuclear power plant are prohibitive," *Nuclear Engineering International*, November 2007, at page 27.

respect to the capital cost of new nuclear and coal-fired generating technologies…"[8]

Moody's further noted that "Throughout our due diligence process, Moody's has not been able to make a finite determination of the range for the all-in cost associated with new nuclear. As a result, we believe the ultimate costs associated with building new nuclear generation do not exist today – and that the current cost estimates represent best estimates, which are subject to change."[9]

An article in the August 2008 of Nuclear Engineering International similarly noted:

> What is clear is that it is completely impossible to produce definitive estimates for new nuclear costs at this time. The fact that the USA and other leading nuclear nations have not been building plants for some time, and also that most current reactor designs have not yet been built to completion, suggests that there is considerable uncertainty with respect to the capital cost of new nuclear and other generating technologies.[10]

The same article also explained:

> Clearly some of today's increased cost estimates can be attributed to including more things than before – but to what extent have costs risen owing to the lack of skilled workers, supply bottlenecks for imported heavy components, significant increases in key commodity prices, and, in the case of the USA, the devaluation of the dollar against other leading currencies.
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> Rising commodity prices seem to have taken a lot of the blame for the increased cost estimates, but this seems rather unfair. Steel, cement, copper and other important commodities have indeed risen rapidly in prices, but these only account for a small proportion of the costs of a modern nuclear power plant, perhaps less than 5% of the total. What really matters is the competence and capability of the manufacturers and vendors in the supply chain, where there is huge value added.

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8 *New Nuclear Generation in the United States*, Moody's Investor Services, October 2007, at page 8.

9 Id, at page 10.

10 *Comment: Escalating Costs of New Build: What Does It Mean?*, Nuclear Engineering International, August 31, 2008, at page 12.

> Take, for example, the ultra-heavy forgings needed to make reactor pressure vessels. Japan Steel Works (JSW) has an effective monopoly on this business, at least for now. The raw steel for these may cost only $1 million, but the price of the completed forging, sitting at the heart of the reactor, may well be $100 million and above. Pinch points in the current supply chain are having an obvious influence on costs. The number of suppliers in many key areas is now rather small and few have surplus capacity, hence prices will be marked upwards. Only a good run of reactor orders will likely change this position, as companies invest in new facilities to mop up demand.
>
> Turbine equipment makers also are very busy, with strong global demand for new power stations of all kinds. The International Energy Agency (IEA) has estimated that the power generation sector will require some $10 trillion of investment worldwide in the period to 2030. This is a huge sum and vendors will be able to extract premium prices until demand slackens. Labour cost estimates for new nuclear build are also rising sharply – not so much to do with wage inflation as higher estimates of the hours of labour input needed to complete a plant. It is reasonable to assume that new reactors in the USA will likely take longer to build than the most recent Japanese reactors, which have been as low as 40 months, given the lack of recent build experience. The delays at both EPR projects in Finland and France also suggest that caution is needed in this area.
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> In time, it should prove possible to control some of these costs, through a combination of skill and luck. The global economy may cool, cutting demand, and causing the commodity price increases to reverse, while production capacities of those in the supply chain will likely increase, stimulating price competition.[11]

Even though there is now a worldwide economic slowdown, there still is a very substantial global demand for power plant design and construction resources, equipment and commodities. At the same time, the United States, China and the European Union have said that they will begin very significant stimulus spending packages which will include infrastructure repairs and improvements. The incoming U.S. administration has indicated that this nation's stimulus spending program also will provide significant funds for renewable resources and energy

[11] Id.

efficiency. Such stimulus spending will increase the demand for some of the same resources and commodities that are used to build new nuclear power plants.

**Q. Have the estimated costs of proposed nuclear power plants increased significantly in recent years?**

A. Yes. As recently as the years 2000-2002, the industry and Department of Energy were talking about overnight costs of $1,200/kW to $1,500/kW for new nuclear units.[12] This range of estimated overnight costs suggested total plant costs of between $2 and $4 billion per new nuclear unit. The MIT *Future of Nuclear* Study in 2003, increased the estimated prices of new nuclear plants to $2,000/kW, not including financing costs.

However, the estimated costs for new nuclear power plants began to increase significantly starting in about 2006-2007. For example:

- A June 2007 report by the Keystone Center estimated an overnight cost of $2,950/kW for a new nuclear plant. With interest, this figure translated to between $3,600/kW and $4,000/kW.[13]
- In October 2007, Moody's Investor Services estimated a range of between $5,000/kW and $6,000/kW for the total cost of new nuclear units (including escalation and financing costs) but acknowledged that this cost estimate was "only marginally better than a guess."[14]

Also in October 2007, Florida Power & Light ("FPL") announced a range of overnight costs (i.e., no escalation or financing costs) for its two proposed nuclear power plants (total of 2200MW) as being between $3,108/kW and $4,540/kW. FPL also estimated the total cost of the project (including escalation and financing costs) as being between $5,492/kW and $8,081/kW. These estimated costs

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[12] An overnight cost estimate is what the plant would cost if it could be built "overnight." Overnight cost estimates are regularly used in the industry. They do not include escalation or financing costs.

[13] *Nuclear Power Joint Fact-Finding*, The Keystone Center, June 2007.

[14] *New Nuclear Generation in the United States*, Moody's Investor Services, October 2007, at page 11.

translated into a projected total cost of $12.1 billion to $17.8 billion, for just two 1100 MW plants.[15]

Other companies also have raised their nuclear construction cost estimates. For example, in 2007 TVA estimated the cost of its two proposed AP 1000 plants at Bellefonte at somewhere in the range of $6.4 to $7.1 billion. However, TVA has recently acknowledged that the two unit facility, similar in design to Plant Vogtle Units 3 and 4, might cost as much as $17.5 billion to build, including escalation and financing costs.[16]

**Q. What are the reasons for the dramatic increases in the estimated costs of new nuclear power plants?**

A. The increased estimated costs for today's new generation of nuclear plants are due, in large part, to a fierce worldwide competition for the resources, commodities and manufacturing capacity needed in the design and construction of new power plants. This competition has led to double-digit annual increases in the costs of key power plant commodities such as steel, copper, concrete, etc. At the same time, as explained in an article in the Wall Street Journal, new nuclear power plants are being proposed "amid a growing shortage of skilled labor; and against the backdrop of a shrunken supplier network for the industry."[17]

The worldwide demand also is straining the limited capacity of EPC (Engineering, Procurement, and Construction) firms and equipment manufacturers. The limited number of manufacturers and suppliers could cause bottlenecks in construction if, as expected, there are multiple orders for new power plants in the U.S. and abroad.

For example, there are only two companies that have the heavy forging capacity to create the largest equipment/components in new nuclear plants – Japan Steel

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[15] Direct Testimony and Exhibits of Steven D. Scroggs on behalf of Florida Power & Light in Docket No. 07-0650, dated October 2007.

[16] www.tennessean.com/20081209/GREEN02/812090342/1001/RSS6001.

[17] *New Wave of Nuclear Plants Faces High Costs*, Wall Street Journal, May 12, 2008, at page B1.

Works and Creusot Forge in France.[18] The demand for heavy forgings will be significant because the nuclear industry will be waiting in line alongside the petrochemical industry and new refineries for the material.[19]

At the same time, two decades ago there were about 400 suppliers of nuclear plant components and 900 so-called nuclear stamp, or N-stamp, certifications from the American Society of Mechanical Engineers. Today there are fewer than 80 suppliers in the U.S. and fewer than 200 N-stamp certifications.[20] Indeed, the chairman of the Nuclear Regulatory Commission has said publicly (in early 2007) that it appears now there will be a great reliance on overseas companies to manufacture plant systems and components.[21] He said that the NRC would need to inspect the quality of the manufacturing programs in foreign firms to ensure substandard materials or equipment don't end up installed in plants. He also cautioned that it would take more time to inspect foreign-made components than it would to check quality control of U.S.-manufactured components. The heavy reliance on overseas suppliers also will lead to cost increases due to the continuing weakness of the U.S. dollar relative to other currencies.

The worldwide competition for power plant design and construction resources, equipment and commodities means fewer bidders for work, higher prices, earlier payment schedules and longer delivery times. Long lead times (six years or so) are expected for key plant components. The demand and cost for both on-site construction labor and skilled manufacturing labor also have escalated.

Moody's has summarized the increased risks associated with the international competition for power plant resources as follows:

> Dramatic increases in commodity prices over the recent past, exacerbated by a skilled labor shortage, have led to significant increases in the over-all cost estimates for major construction projects

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18 "Supply chain could slow the path to construction, officials say," *Nucleonics Week*. February 15, 2007, at page 13.

19 Id.

20 Id.

21 Id.

> around the world. In the case of new nuclear, the very detailed specifications for forgings and other critical components for the construction process can add a new element of complexity and uncertainty. As noted previously, labor is in short supply and commodity costs have been extremely volatile. Most importantly, the commodities and world wide supply network associated with new nuclear projects are also being called upon to build other generation facilities, including coal as well as nuclear, nationally and internationally. Nuclear operators are also competing with major oil, petrochemical and steel companies for access to these resources, and thus represent a challenge to all major construction projects."[22]

**Q. Is it reasonable to expect that the current environment for building new nuclear power plants will continue for the foreseeable future?**

A. Yes. There is no reason to expect that the worldwide competition for resources or the existing supply constraints and bottlenecks affecting nuclear power plant costs will clear anytime in the foreseeable future. In fact, it is reasonable to expect that the competition for resources and supply bottlenecks may intensify as more nuclear power plants are slated to begin construction in the U.S. and around the world.

**Q. What are the announced construction start dates for the AP 1000 projects being proposed in the United States?**

A. The following information has been released concerning start dates for construction of the other AP 1000 projects being proposed in the U.S.:

- South Carolina Electric & Gas expects to start construction of two AP 1000 at its existing Virgil Summer site in April 2011.
- Progress Energy of Florida plans to begin construction of the Levy Nuclear Power plant in early 2012.[23]

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[22] *New Nuclear Generation in the United States*, Moody's Investor Services, October 2007, at page 9.

[23] Progress Energy Carolina also seeking licenses for two AP 1000s plants at its Shearon Harris Plant outside Raleigh, North Carolina. However, the Company has said that no final decision has yet been to achieve build the plants but if such a decision is made to move forward, the plants could be online by 2016 and 2017. This would suggest that construction would begin in 2011 or at about the same time as Plant Vogtle Units 3 and 4.

- Duke Energy Carolinas plans to initiate construction of the two units at Lee Nuclear Station in 2012 and 2013.
- Florida Power & Light is planning to start safety related construction for Turkey Point Units 6 and 7 in 2013 and 2015.[24]
- TVA expects to receive a COL for Bellefonte Units 3 and 4 in 2011. It has not indicated when it will begin construction.

It appears that each of these two-unit projects, plus an additional twelve or more other nuclear projects, many also having two units, may be under construction at the same time as Plant Vogtle Units 3 and 4.

**Q. Is it reasonable to expect that having so many nuclear projects underway at the same time as Plant Vogtle Units 3 and 4, including the five other AP 1000 projects, will increase competition on procurement, craft labor, engineering labor and project management personnel?**

A. Yes. It is reasonable to expect that having such a large number of nuclear projects competing for the same limited equipment manufacturing, craft labor, engineering labor and project management personnel will lead to increased costs.

**Q. Has Georgia Power assessed the impact of having multiple AP 1000 projects underway at the same time as Plant Vogtle Units 3 and 4?**

A. Yes. Georgia Power has essentially said that because it was the first to sign an EPC Agreement with Westinghouse, it is a favorable position relative to other projects competing for the same project materials.[25]

**Q. Is there any guarantee that, in fact, Plant Vogtle Units 3 and 4 will receive priority over other AP 1000 projects?**

A. Not that I have seen. Moreover, it is quite possible that the schedule for Plant Vogtle Units 3 or 4 will slip for any one of a number of possible reasons, e.g., delays in the regulatory review process or unexpected construction issues. As a

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[24] Georgia Power Company response to Staff Data Request No. STF-GDS-WRJ-1-16.
[25] Georgia Power Company response to Staff Data Request No. STF-GDS-WRJ-1-18.

result, Plant Vogtle Units 3 and 4 may not receive priority for resources over other AP 1000 projects.

**Q. How does Georgia Power's currently estimated cost for Plant Vogtle Units 3 and 4 compare to the estimated costs of AP 1000 plants being proposed by other U.S. utilities?**

A. The estimated overnight costs for the AP 1000 projects being proposed by Georgia Power, Duke Energy Carolinas, Progress Energy, Florida Power & Light, TVA and SCANA and Santee Cooper are presented in Table 1 below. As can be seen, the range of overnight costs presented by Georgia Power for Plant Vogtle Units 3 and 4 is significantly lower than the ranges of overnight costs estimated for the other AP 1000 projects for which overnight cost data has been made available to the public.

**Table 1: AP 1000 Project Overnight Cost Estimates**

| Utility | Project | Estimated Overnight Cost |
|---|---|---|
| Georgia Power | Plant Vogtle Units 3 & 4 | $3,200 to $3,500/kW[26] |
| Progress Energy | Levy Nuclear Plant Units 1 & 2 | $4,260/kW[27] |
| Florida Power & Light | Turkey Point Units 6 & 7 | $3,108/kW to $4,540/kW[28] |
| SCANA and Santee Cooper | Summer Units 2 & 3 | $4,340/kW[29] |
| TVA | Bellefonte Units 3 & 4 | $2,550/kW to $4,725/kW[30] |
| Duke Energy Carolinas | Lee Nuclear Station Units 1 & 2 | $5,000/kW[31] |

**Q. Is it reasonable to expect that currently unanticipated problems may be encountered during the construction and/or initial operations of the new AP 1000 plants in China that could affect the cost of building and operating Plant Vogtle Units 3 and 4?**

A. Yes. One clear lesson from the existing generation of nuclear power plants is that significant problems may be discovered during construction or operations of new plants that will require modifications and, consequently, increased costs at other plants with the same or similar designs. For this reason, it is reasonable to expect that the actual costs of the plants listed in Table 1 above may be substantially higher than the estimated costs presented in this Table.

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26 *Southern Nuclear Operating Company's Response to the Licensing Board's Order of October 17, 2008*, in NRC Docket No. 52-011-ESP, dated November 7, 2008, at page 23.

27 Florida Public Service Commission, Order No. PSC-08-0518-FOF-EI in Docket No. 080148-EI, at page 10

28 Testimony of Steven D. Scroggs on behalf of Florida Power & Light in Florida Public Service Commission Docket No. 070650-EI, at Exhibit SDS-7.

29 *EPC Contract Signed for New Reactors,* Nuclear News, July 2008, at page 26.

30 *Estimates for New Nuclear Plant Rise*, Chattanooga Times Free Press, December 12, 2008, at page A1.

31 Duke Energy Carolinas November 3, 2008 Letter to the Chief Clerk of the Public Service Commission of South Carolina in Docket No. 2005-356-E.

**Q. But doesn't the EPC agreement that Georgia Power has signed with Westinghouse and Stone & Webster protect the Company and ratepayers against significant construction cost increases?**

A. [REDACTED]

**Q. Does the EPC Agreement cover all construction-related project costs?**

A. [REDACTED]

**Q. Doesn't Georgia Power indicate in its response to one of the Staff Data Requests that there is approximately [REDACTED]?**

A. [REDACTED]

**Q. When discussing the risk of scope increases affecting the project's cost and schedule, Georgia Power states that "The Company is in control of Owner control changes and does not intend to request changes in scope except to the extent the value of the change to the ratepayer equals or exceeds the cost of the change.[32] Do you believe that this commitment will have a significant impact in mitigating project costs?**

A. No. I believe it is reasonable to expect that power plant owners only make changes in project scope when necessary or if they believe that the value of the change to the ratepayer equals or exceeds the cost of the change. In other words, I don't believe that plant owners agree to scope changes either frivolously or in order to pad the project cost. Having said that I believe that the most significant risks for project scope increases involve the untested AP 1000 design and the very real possibility that currently unanticipated problems that will be expensive to address will be experienced or identified through the construction and operation of other AP 1000 plants or during the construction of Plant Vogtle Units 3 and 4 themselves. That was the history of the first generation of nuclear power plants in the 1970s and 1980s. It also is quite possible that the NRC will require

[32] Georgia Power Company response to Staff Data Request No. STF-GDS-WRJ-1-5, at pages 6-7.

modifications to the design and construction of Plant Vogtle Units 3 and 4 as a result of problems identified during the construction of other AP 1000 plants. In other words, I believe that the Company will face the prospect of having to approve unavoidable scope changes. Moreover, the calculus of whether a scope change will produce greater value to the ratepayer will change over time as the Company's investment in the plants increases – at that point the evaluation of the value of a scope change to the ratepayer will have to include the payment of the sunk costs that have already been invested in the project.

**Q. Has Georgia Power conducted any sensitivity studies to identify its maximum cost exposure under the EPC contract?**

A. No.[33] However, the Company has estimated its expected costs for Plant Vogtle Units 3 and 4 at 50%, 75% and 85% confidence levels. The results were as follows:

[REDACTED]

**Q. Is it possible that the total cost of Georgia Power's share of Plant Vogtle Units 3 and 4 will exceed even these levels?**

A. Yes. Given the untested AP 1000 design and skyrocketing nuclear construction costs, it is reasonable to expect that the actual cost of the Company's share of Plant Vogtle Units 3 and 4 may well exceed even the [REDACTED] total "85% confidence level" cost.

**Q. How accurate have the nuclear industry's construction cost estimates been in the past?**

A. Until the 1970s, building new nuclear power plants appeared to be a relatively low risk investment because construction and operating costs were relatively stable and easy to predict. However, starting in the 1970s, the costs of building new nuclear power plants began to spiral out of control. As a result, the actual

[33] Georgia Power Company response to Staff Data Request No. STF-GDS-WRJ-1-27.

costs of new plants were two to three times higher than the costs that had been estimated during licensing or at the start of construction.

Consequently, the nuclear industry has a very poor track record in predicting plant construction costs and avoiding cost overruns. Indeed, as shown by data in a study by the Department of Energy, the actual costs of 75 of the existing nuclear power plants in the U.S. exceeded the initially estimated costs of these units by over 200 percent. The following table shows the overruns experienced by these 75 nuclear plants by the year in which construction of the nuclear power plant began.[34]

**Table 2: U.S. Nuclear Plant Cost Overruns**

**Projected and Actual Construction Costs for Nuclear Power Plants**

| Construction Starts | | Average Overnight Costs[a] | | |
|---|---|---|---|---|
| Year Initiated | Number of Plants[b] | Utilities' Projections (Thousands of dollars per MW) | Actual (Thousands of dollars per MW) | Overrun (Percent) |
| 1966 to 1967 | 11 | 612 | 1,279 | 109 |
| 1968 to 1969 | 26 | 741 | 2,180 | 194 |
| 1970 to 1971 | 12 | 829 | 2889 | 248 |
| 1972 to 1973 | 7 | 1,220 | 3,882 | 218 |
| 1974 to 1975 | 14 | 1,263 | 4,817 | 281 |
| 1976 to 1977 | 5 | 1,630 | 4,377 | 169 |
| **Overall Average** | **13** | **938** | **2,959** | **207** |

Source: Congressional Budget Office (CBO) based on data from Energy Information Administration, An Analysis of Nuclear Power Plant Construction Costs, Technical Report DOE/EIA-0485 (January 1, 1986).

Notes: Electricity-generating capacity is measured in megawatts (MW); the electrical power generated by that capacity is measured in megawatt hours (MWh). During a full hour of operation, 1 MW of capacity produces 1 MWh of electricity, which can power roughly 800 average households.
The data underlying CBO's analysis include only plants on which construction was begun after 1965 and completed by 1986.
Data are expressed in 1982 dollars and adjusted to 2006 dollars using the Bureau of Economic Analysis's price index for private fixed investment in electricity-generating structures. Averages are weighted by the number of plants.

a. Overnight construction costs do not include financing charges.
b. In this study, a nuclear power plant is defined as having one reactor. (For example, if a utility built two reactors at the same site, that configuration would be considered two additional power plants.)

[34] This table was taken from the May 2008 report by the Congressional Budget Office, *Nuclear Power's Role in Generating Electricity,* at page 17.

The **average cost overrun** for these 75 nuclear units was **207** percent. In other words, the actual average cost of the plants was about triple their estimated costs.

In fact, the data in the previous table understates the cost overruns experienced by the U.S. nuclear industry because (1) the cost figures do not reflect escalation and financing costs and (2) the database does not include some of the most expensive nuclear power plants built in the U.S. – e.g., Comanche Peak, South Texas, Seabrook, and Vogtle. For example, the cost of Plant Vogtle Units 1 and 2 increased from $660 million to $8.7 billion in nominal dollars – a 1,200 percent overrun.

**Q. What were the consequences of the cost overruns experienced by the existing generation of nuclear power plants in the United States?**

A. There were a number of significant consequences. First, only one-half of the nuclear power plants that were proposed were actually built and ratepayers frequently had to bear many millions of dollars of sunk costs for abandoned projects. Second, the cost of power from completed nuclear power plants became much more expensive for ratepayers than the proponents had claimed. In some instances this led to rate increases so large that they spawned the term “rate shock.”.

Rising construction costs also led to severe financial problems for many of the utilities that were building the nuclear power plants. One investor-owned company, Public Service Company of New Hampshire, and several public power utilities filed for Chapter 11 bankruptcy protection due to financing difficulties associated with the Seabrook nuclear plant. Several other companies nearly went bankrupt due to financial difficulties from their nuclear power plant construction projects. In addition, the Washington Public Power System defaulted on $2.25 billion in municipal bonds in 1983 after it had failed to complete construction of two nuclear power plants.

Rising nuclear power plant costs also led to more than ten billion dollars of write-offs and cost disallowance from utility rate bases. Finally, when many expensive

nuclear power plants were sold or divested to affiliates during restructuring efforts in some states, ratepayers were left paying hundreds of millions of dollars of "stranded" plant costs.

**Q. Is it reasonable to expect that the industry will experience significant cost overruns if it builds new nuclear power plants in the United States?**

A. Yes. Given the industry's poor track record in estimating plant costs and the substantial uncertainties associated with building new nuclear power plants (as I have discussed above), it is reasonable to expect that the actual costs of new plants, like Plant Vogtle Units 3 and 4, will be much higher than the industry now claims. At the same time, it does appear that the nuclear industry has learned some important lessons from the problems experienced during the building and operation of the existing generation of nuclear power plants and, therefore, can be expected to avoid some of those problems.

For example, Georgia Power has identified a number of actions that it is taking to mitigate the risks associated with Plant Vogtle Units 3 and 4.[35] These appear to be reasonable and should have some impact on avoiding some of the significant problems that were experienced during the construction of the existing generation of nuclear power plants. But it is not reasonable to expect that the Company's actions will mitigate or avoid all of the risks especially the untested AP 1000 design, the possibility that multiple projects will be completing for the same design and construction resources and equipment manufacturing capacity and the reality that new nuclear power plants have not been built in the U.S. for almost two decades (other than for TVA finishing its Watts Bar Plant).

Even just a 50 percent cost increase would mean that new plants like Plant Vogtle Units 3 and 4 3 would be extremely expensive, perhaps costing as much on an "all-in" basis as $20-25 billion, or more, just for two nuclear units. Such an increase of only 50 percent would be substantially below the 200 percent to 300

[35] Georgia Power Company responses to Staff Data Requests Nos. STF-GDS-WRJ-1-4 and 1-5.

percent overruns that the industry experienced in building the nation's existing nuclear power plants.

*Construction Schedule Uncertainty*

**Q. What is the planned construction schedule for Plant Vogtle Units 3 and 4?**

A. Georgia Power expects to receive a COL from the NRC in the June-September 2011 timeframe and to begin operations at Plant Vogtle Unit 3 in 2016 and at Unit 4 in 2017. This would represent a total construction duration of approximately five years for Plant Vogtle Unit 3.

**Q. Have any AP 1000 plants actually achieved such a short construction duration?**

A. No. No AP 1000 plants have been built anywhere in the world. As I indicated earlier, the first AP 1000 plants to be built any where in the world have recently started construction in China.

**Q. Have any new generation nuclear plants actually achieved such short construction schedules?**

A. No. The Olkiluoto 3 power plant in Finland was the first truly new generation nuclear unit to begin construction. Construction began in 2005 with a scheduled completion date of 2009 but Olkiluoto has experienced many problems. Indeed, it is reported that completion of the plant is currently two to three years behind schedule and the currently estimated cost of the plant has increased by between 33% and 50% or about $2 billion.[36] A second EPR project has been under construction in France for approximately a year and has also experienced some problems due to quality concerns.[37]

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[36] For example, see "Second top TVO executive leaving Olkiluoto-3*", Nucleonics Week*, June 26, 2008, at page 1, and "The Start-Up of Finland's Olkiluoto-3 May Be Delayed," *Nuclear News*, November 2008, at page 12.

[37] For example, see "Regulator stops flow of concrete at Flamanville," *Nuclear Engineering International*, June 18, 2008, at page 4.

**Q. Should the Commission rely on Georgia Power's projected construction schedule for Plant Vogtle Units 3 and 4?**

A. No. The schedule should be viewed as highly uncertain for the following reasons:

- The AP 1000 is an untested design – design certification by the NRC does not guarantee that the total plant design will be without flaws or that significant problems will not be experienced during construction.
- If construction begins when Georgia Power currently plans, there will be little lead time from the other AP 1000 construction projects in China to correct for design or construction problems and no lead time from other domestic U.S. AP 1000 construction projects.
- Supply chain bottlenecks or constraints may lead to longer than expected lead times for critical plant equipment or there may be transportation-caused delays in shipping.
- The history of large construction projects suggests that significant delays will be experienced, especially for new technologies.
- Multiple nuclear construction projects in the U.S. will be completed for limited engineering and construction resources and for limited equipment manufacturing capacity.
- The use of the modular construction process is untested in the United States.

**Q. Is the construction schedule established in the EPC Agreement subject to change?**

A. [REDACTED]

**Q. How does the current construction schedule for Plant Vogtle Units 3 and 4 compare with the construction durations for the existing generation of nuclear power plants?**

A. As I noted earlier, the planned construction schedule for Plant Vogtle Unit 3 is approximately five years between the receipt of a COL from the NRC and start of commercial operations. The actual construction durations of existing large (i.e., 800 MW or larger) pressurized water reactor plants that began safety-related

construction after 1973 averaged 125 months or almost ten and one-half years.[38] This experience suggests that the planned construction schedule for Plant Vogtle Unit 3 is extremely optimistic even if it is assumed that the industry is able to use lessons learned from the construction of existing nuclear power plants to significantly improve construction schedules.

[38] Construction duration is here measured as being between the first placement of structural concrete and the start of commercial operations.

*Fuel Diversity*

**Q. Georgia Power emphasizes in its Certification Application the dependence of its capacity mix on natural gas-fired generation and the sensitivity of natural gas generation to fuel price fluctuations.[39] Do you agree that this Commission should be concerned about an undue dependence on any one fuel such as coal, natural gas or nuclear?**

A. Yes. I agree that the Commission should be concerned about any Company's over-dependence on any single fuel. However, capacity mix is not the appropriate measure of Georgia Power's dependence on the different fuels. Instead, the Commission should look at the percentage of energy generated by each fuel type. If it does so, the Company's dependence on natural gas-fired generation is much lower than is suggested in Georgia Power's Certification Application.

For example, in its Certification Application, Georgia Power emphasizes that gas-fired capacity now comprises [REDACTED] of its capacity mix and that without the addition of Plant Vogtle Units 3 and 4, "natural gas will comprise roughly [REDACTED] of the Company's capacity mix by 2017."

However, the Company has provided the following information concerning its mix of energy supply in 2007 and 2017 without Plant Vogtle Units 3 and 4.

**Table 3: Georgia Power Company Fuel Mix (by Energy)**

| Fuel | 2007 | 2017 (without Vogtle 3 and 4) | 2017 (with Vogtle 3 and 4) |
|---|---|---|---|
| Coal | [REDACTED] | [REDACTED] | [REDACTED] |
| Nuclear | [REDACTED] | [REDACTED] | [REDACTED] |
| Hydro | [REDACTED] | [REDACTED] | [REDACTED] |
| Oil and Gas | [REDACTED] | [REDACTED] | [REDACTED] |

[39] For example, see *Georgia Power's Application for the Certification of Units 3 and 4 at Plant Vogtle and Updated Resource Plan*, at pages 2, and 9

Thus, the Company would not be as dependent on natural gas without Plant Vogtle Units 3 and 4 as it suggests in its Certification Application – even if Plant Vogtle Units 3 and 4 were replaced by gas-fired plants.

**Q. Are there other alternatives than building Plant Vogtle Units 3 and 4 for reducing Georgia Power's dependence on natural gas and coal-fired generation?**

A. Yes. Adding non-carbon emitting renewable resources and demand side management programs also would reduce the Company's dependence on natural gas-fired generation as well as reducing Georgia Power's emissions of greenhouse gases.

*Flaws in Georgia Power's Analyses of the Economics of Plant Vogtle Units 3 and 4*

**Q. Have you identified any flaws or biases in the economic analyses that Georgia Power has presented in its Certification Application or in its responses to Staff Data or Hearing Requests?**

A. Yes. I have identified a number of flaws and biases in the Company's economic analyses of Plant Vogtle Units 3 and 4 and alternatives:

1. It does not appear that the Company has examined a reasonable range of possible construction costs for Plant Vogtle Units 3 and 4 in its economic analyses -- As noted in Table 1 above, Georgia Power is projecting a much lower cost for Plant Vogtle Units 3 and 4 than other utilities have forecast for their proposed two unit AP 1000 projects. [REDACTED]. It would have been prudent to examine sensitivity scenarios where the cost of Plant Vogtle Units 3 and 4 was comparable to the costs projected by the other utilities that are proposing to build AP 1000 plants.

2. It also does not appear that the Company has assumed a reasonable range of possible delays for Plant Vogtle Units 3 and 4 in its economic analyses – the largest delays that the Company [REDACTED]. Given the uncertainties I have discussed, it would have been prudent for the Company to examine scenarios with more extensive regulatory and construction delays.

3. Georgia Power Company used very high natural gas prices in its economic analyses.

4. It appears that the Company only allowed the model to choose among coal, gas and natural-gas fired alternatives. The amounts of renewable resources and DSM appear to have been pre-determined and input as set values into the model. Instead, the Company should have allowed the model to select the optimal amounts of renewable resources and DSM, based on cost and availability, that would be included in the lowest cost expansion plans.

5. [REDACTED]

6. The Company examined too limited a range of possible future $CO_2$ emissions allowance or $CO_2$ tax prices.

**Q. Why it is important to consider reasonable ranges of construction costs and in-service dates when examining the economics of proposed supply-side alternatives?**

A. Risk and uncertainty are inherent in all enterprises. But the risks associated with any options or plans need to be balanced against the expected benefits from each such option or plan.

In particular, parties seeking to build new generating facilities and the associated transmission face a host of major uncertainties, including, for example, the expected cost of the facility, future restrictions on emissions of carbon dioxide, and future fuel prices. The risks and uncertainties associated with each of these factors needs to be considered as part of the economic evaluation of whether to pursue the proposed facility or other alternatives.

A common way of evaluating power plant construction cost and schedule risks is to conduct a series of sensitivities during modeling that reflect a reasonable range of costs and a reasonable set of potential in-service dates. Unfortunately, I have not seen that Georgia Power has done this although it has examined ranges of natural gas prices and $CO_2$ prices.

**Q. What is the basis for your conclusion that the Company used very high natural gas prices in its economic analyses of Plant Vogtle Units 3 and 4?**

A. We have compared the Henry Hub natural gas prices used by the Company in its modeling analyses with the NYMEX natural gas futures prices for the years 2009-

2020 as of several different dates in 2008. As can be seen in Table 4, the EVA High, EVA Mid, and SCS '09 forecast natural gas prices are significantly higher than the NYMEX futures prices as of mid-August and mid-November 2008:

**Table 4: NYMEX Futures vs. Georgia Power Natural Gas Prices (US$ per million Btu)**

| Year | NYMEX as of 8/11/08 | NYMEX as of 11/13/08 | EVA High | EVA Mid | EVA Low | SCS '09 |
|---|---|---|---|---|---|---|
| 2012 | 8.81 | 7.90 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| 2013 | 8.69 | 7.89 | | | | |
| 2014 | 8.67 | 7.94 | | | | |
| 2015 | 8.77 | 8.11 | | | | |
| 2016 | 8.87 | 8.26 | | | | |
| 2017 | 8.99 | 8.42 | | | | |
| 2018 | 9.11 | 8.59 | | | | |
| 2019 | 9.25 | 8.75 | | | | |
| 2020 | 9.43 | 8.92 | | | | |

[REDACTED]

**Q. Please explain what you meant by your conclusion that Georgia Power examine too limited a range of possible future $CO_2$ prices.**

A. Yes. Synapse believes that the adoption of a comprehensive federal policy for reducing greenhouse gas emissions is inevitable. We believe further that the range of likely $CO_2$ emissions allowance prices under such a comprehensive federal policy may be higher than the Company has assumed in its Certification Application. In fact, we have recommended that in resource planning utilities use a range of possible CO2 emissions allowance prices between $15/ton and $45/ton, levelized between 2013 and 2015, in 2007$. By contrast, Georgia Power's range of future $CO_2$ prices is only between REACTED.

**Q. Wouldn't the use of higher $CO_2$ prices improve the relative economics of Plant Vogtle Units 3 and 4 relative to natural gas-fired and coal-fired capacity?**

A. Yes. However, the use of higher $CO_2$ prices also would improve the relative economics of DSM and renewable resources, as well.

**Q. Have there been any significant changes in circumstances that justify a re-examination of Georgia Power's need for the capacity from Plant Vogtle Units 3 and 4?**

A. The entire nation, including the state of Georgia, is in the midst of a financial crisis and an economic recession that is expected to be both long and deep. These crises can be expected to have major impacts on the Company's peak load and energy sales forecasts. Utilities around the nation, including the South, have reported sharp decreases in electricity sales.[40] For example, Duke Energy Carolinas third-quarter electricity sales were down 4.3 percent for the three month period ending September 30, 2008 from a year earlier.

The Commission should withhold granting the Certification requested by Georgia Power until it has had a full opportunity to evaluate the effect of the financial crisis and economic recession.

**Q. Has the Company recently revised its capacity and energy needs as a result of updates to its energy and peak demand forecast and planned capacity additions?**

A. Yes. Georgia Power submitted a short two page letter in Docket No. 24505-U on November 3, 2008 that updated its capacity and energy needs. However, no details were provided. [REDACTED]. It is unclear from this letter what adjustment Georgia Power had made to its projected annual peak loads or annual

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[40] For example, see *Surprise Drop in Power Use Delivers Jolt to Utilities,* Wall Street Journal, November 21, 2008 and *Economy Slows Tennessee Valley Authority Sales,* Chattanooga Times Free Press, December 18, 2008.

energy sales figures beyond the stated changes to its ten year compound annual growth rates.

**Q. Do these numbers seem to be consistent with what you would expect during a deep and long economic recession and a major financial crisis?**

A. No. We would expect substantial reductions in forecast energy sales and perhaps peak loads as a result of the reduced industrial and commercial activity outlined in reports such as the Federal Reserve Bank's Beige Book.

**Q. Did Georgia Power refuse to provide any information that SACE requested concerning its need for the capacity and energy from Plant Vogtle Units 3 and 4?**

A. Yes. SACE asked Georgia Power to provide "any assessments prepared by or for Georgia Power which examined the impact that the current economic slowdown and/or the current financial crises can be expected to have on future peak loads and/or energy sales in the Company's service area or the state of Georgia."[41] The two page November 3, 2008 letter was referenced as the only "response" to that request. No additional information was provided.

At the same time, Georgia Power did not provide any of the following information requested by SACE because the Commission Staff had not requested the information in any of its Data Requests:

SACE-1.d. Assessments of the potential for Combined Heat and Power within Georgia Power's service territory or in the service territories of any parties to which it sells power.

SACE-1.e. Assessments of the potential for renewable resources within Georgia Power's service territory or in the service territories of any parties to which it sells power.

SACE-4.b. The evidence, studies, analyses, and assessments that shows that 1,900 to 2,200 MW represents the largest amount of demand reduction that will be technically or economically achievable by Georgia Power over the next decade.

[41] Question 9.b. of SACE's First Data Request to Georgia Power Company in Docket No. 27800-U.

SACE-9.a. Please state whether the Company considers the current economic slowdown or the current financial crises to be "significant recent developments."

SACE-12. The economic forecasts prepared by or for Georgia Power since January 1, 2008.

SACE-13. The weather-normalized and non-weather normalized energy sales and peak loads experienced by Georgia Power for each year since 2000 and the formula(e) used to convert non-weather normalized data into weather-normalized.

**Q. What are your conclusions regarding Georgia Power's request for certification to build Plant Vogtle Units 3 and 4?**

A. It is reasonable to expect that the construction cost of Plant Vogtle Units 3 and 4 may be substantially higher than Georgia Power Company has acknowledged and it may take far longer to license and build the plants than the Company now claims. Moreover, the Company has not demonstrated that Plant Vogtle Units 3 and 4 are the preferred option within a reasonable range of possible construction costs, possible regulatory and construction delays, future natural gas prices, and future $CO_2$ prices. The Company also has not provided persuasive evidence that it still needs the capacity and energy from Plant Vogtle Units 3 and 4 in light of the significantly changed circumstances represented by the ongoing financial crises and economic recession. For these reasons, the Commission should not grant the certificate requested by Georgia Power.

It would be more prudent in these uncertain times to avoid a massive multi-billion dollar commitment to a single and extremely expensive generating project. Instead, the Company should adopt more flexible options (such as natural gas and additional DSM and renewable resources) to address any needs it currently anticipates it may have in 2016 and 2017 and to revisit the need for and the relative economics of the proposed Plant Vogtle Units 3 and 4 in the future when other AP 1000 plants have been licensed by the U.S. Nuclear Regulatory Commission ("NRC") and there is actual construction and operating experience with the currently untested design.

**Q. Does this complete your testimony?**

A. Yes.