BEFORE THE PUBLIC SERVICE COMMISSION
STATE OF GEORGIA

In Re:	)	
	)	
Georgia Power Company	)	**Docket No. 22449-U**
Request for an Accounting Order	)	
	)	
	)	

Direct Testimony of

David A. Schlissel

Synapse Energy Economics, Inc.

On Behalf of

Southern Alliance for Clean Energy

PUBLIC VERSION
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May 5, 2006

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

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

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.

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 Staff of the Arizona Corporation Commission, the General Staff of the Arkansas Public Service Commission, the Staff of the Kansas State Corporation Commission, municipal utility systems in Massachusetts, New York, Texas, and North Carolina, and the Attorney General of the Commonwealth of Massachusetts.

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, and

Wisconsin 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. Have you previously submitted testimony before this Commission?

A. No.

Q. What is the purpose of your testimony?

A. Synapse was asked by SACE to review Georgia Power Company's request for an accounting order to record early site permitting and construction operating license costs for new nuclear power plants. This testimony presents the results of our review.

Q. Please summarize your conclusions.

A. The Commission should reject Georgia Power's request for the accounting order. Instead of making any decision regarding the relative economics of new nuclear power plants based on the incomplete record that will be developed in this rushed docket, the Commission should require that the economics of all technically feasible supply-side and demand-side options be investigated in detail in the 2007 IRP proceeding. The Commission also should not take any action that would give nuclear power any specific subsidies that are not being provided to other supply-side and demand-side options. New nuclear power plants already are the beneficiaries of very generous subsidies in EPACT 2005.

Q. Do you agree with Georgia Power's claim that "Although wind, solar, renewable and Integrated Gasification Combined Cycle ("IGCC") may emerge as contributors to the generation mix, the contribution of these technologies simply cannot meet the demand for baseload generation in the needed time frame?"[1]

A. No. Without any supporting evidence or analyses, Georgia Power summarily dismisses the significant contributions that wind, renewable, energy efficiency, and IGCC can make to serving baseload customer demands and energy requirements.

Q. Is it possible that these technologies could be on-line and displacing energy generated at natural gas and imported oil-fired facilities before 2015?

A. Absolutely. A portfolio of wind, solar, biomass and energy efficiency can be on-line and displacing energy at natural gas and imported oil-fired facilities substantially before 2015. It also appears likely that IGCC facilities also could be built and on-line before 2015.

Georgia Power apparently has selected the option that requires substantial up-front expenditures by ratepayers and that has an extremely long, i.e., at least nine year, lead time. However, the Company does not want to risk shareholder funds on nuclear power. Instead, it wants ratepayers and federal taxpayers to bear the risks.

Q. Have you had any opportunity in this docket to compare the relative economics of new nuclear power plants and renewable resources, energy efficiency or IGCC?

A. No. There has been no meaningful time to conduct such critical analyses.

[1] Application, at page 2.

Q. Have you seen any estimates elsewhere which have examined the potential contributions that a portfolio of aggressive energy efficiency measures and renewable resources could make to serving the demands and energy requirements of customers in Georgia?

A. Yes. My firm, Synapse Energy Economics, prepared a study in 2001 on *Powering the South*.[2] This study showed that the implementation of cost-effective energy efficiency technologies and measures could reduce electricity consumption significantly and reduce electricity demand by nearly 14 percent in 2010 and 23 percent in 2020.[3] Such a program also would cost significantly less than generating, transmitting and distributing electricity, with an average cost of $26/MWh. In addition, the study found that nearly 1,200 MW of new renewable resources could be added by 2010 and 3,000 MW could be added by 2020. These renewable resources would include biomass co-firing, landfill methane, biomass combined heat and power, photo voltaic, and wind turbines.[4] The results of this study showed that energy efficiency and renewables certainly can be part of a portfolio approach for meeting the demand for baseload power in Georgia.

Q. Please comment on Georgia Power's claim that without new nuclear power plants its fuel mix could become heavily dependent on natural gas and imported oil.[5]

A. The development of a portfolio of energy efficiency and renewable technologies also would diversify Georgia Power's fuel mix and reduce its potential dependence on natural gas, oil and nuclear power. After all, the Company already is part owner of more than 4,000 MW of nuclear capacity, a figure which would grow by roughly a thousand megawatts for each new plant that it builds or co-builds.

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[2] A copy of this Report is attached as Exhibit____DAS-2.

[3] Exhibit____DAS-2, at pages 57 and 58.

[4] Ibid.

Moreover, building new nuclear power plants will not necessarily make Georgia or the U.S. less dependent on foreign sources of energy. For example, in 2004, over 80 percent of the uranium for U.S. nuclear plants came from fourteen foreign countries including Australia, Canada, Russia, Kazakhstan, Uzbekistan, South Africa and Namibia.[6] The demand for uranium is expected to grow, but the supply is expected to be significantly below demand. The International Atomic Energy Agency's assessment "Analysis of Uranium Supply to 2050" concludes that "As we look to the future, presently known resources fall short of demand."[7] It is possible that future supplies will be discovered. However, the potential costs of developing those supplies are uncertain.

Q. Has the Southern Company taken any actions that are inconsistent with the claim presented in Georgia Power's testimony in this Docket that IGCC simply cannot meet the demand for baseload generation by 2015?

A. Yes. Southern Company is working with the Orlando Utilities Commission to build a 285 MW IGCC plant near Orlando, Florida with a scheduled in-service date of 2010.

Q. Are other utilities also planning to build new IGCC facilities prior to 2015?

A. Yes. American Electric Power Company and Cinergy are both planning to build IGCC plants that they currently project to be on-line in the 2010-2013 timeframe.

Q. Are there any IGCC facilities currently operating in the U.S.?

A. Yes. It is my understanding that there are currently two IGCC integrated gasification combined cycle facilities operating in the U.S. A 292 MW plant that began operating in West Terre Haute, Indiana and a 313 MW plant that went into service in 1996 in Florida.

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[5] Application, page 2.

[6] "2004 Uranium Marketing Annual Report," Energy Information Administration of the U.S. Department of Energy. Available at www.eia.doe.gov/cneaf/nuclear/umar/umar.html.

[7] "Analysis of Uranium Supply to 2050," International Atomic Energy Agency, at page 5.

Q. Are you testifying that IGCC is an option that should be part of Georgia Power's IRP?

A. No. I am testifying that the Company's claim that IGCC cannot be part of a portfolio supplying baseload power by 2015 appears to be incorrect and, therefore, that IGCC warrants serious consideration as part of a supply plan alternative to the development of new nuclear units.

Q. Has Georgia Power provided any evidence to show that it could not prepare an application for an Early Site Permit in 2006 without the requested accounting order?

A. No.

Q. Has Georgia Power provided any evidence to show that it could not prepare an application for a COL by early 2008 without the requested accounting order?[8]

A. No.

Q. Have you had any opportunity to review the assumptions and calculations underlying the preliminary economic analysis discussed in Georgia Power Company's testimony in this Docket?[9]

A. Yes. I have reviewed the confidential tables discussed in the Company's testimony but the Company has not provided any evidence showing how the figures in those tables were calculated or that the assumptions used in the derivation of those tables are reasonable.

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[8] Application, pages 5 and 6.

[9] Direct Testimony of Ann P. Daiss, Jeffrey A. Burleson, and Louis B. Long, at pages 9 and 10.

Q. Georgia Power's witnesses have testified that a new nuclear unit would be economic in 2015 even if the predicted capital cost incurred increases by up to 19 percent over the Company's base case assumption.[10] Do you believe it is reasonable to expect that the actual costs of new nuclear power plants will be at least 19 percent above the currently projected costs?

A. Yes. Given the construction cost increases experienced by the existing generation of nuclear plants built in the U.S. and the fact that no nuclear units with the new designs being considered by Georgia Power have been built in the U.S. or elsewhere, I believe that it is reasonable to expect that the actual costs of building new nuclear power plants in Georgia will be at least 19 percent, higher than the preliminary figures now estimated by Georgia Power.

Q. What was the construction cost experience of the first generation of nuclear plants built in the U.S.?

A. The actual costs of the first generation of nuclear power plants built in the U.S. were significantly higher than the costs projected for the plants during licensing or at the start of construction. In fact, the actual construction costs of the first generation of nuclear units were higher than the estimated by a factor of two or more.

The initial cost estimates for 75 nuclear units are listed in Exhibit____DAS-3. compared to the actual costs. These cost figures are taken from a U.S. Department of Energy study and are adjusted to exclude the effects of inflation and interest.[11] The total *estimated* cost for this group of plants was $45 billion (in 1990 dollars). The *actual* cost turned out to be higher than $145 billion (in 1990

[10] Ibid, at page 10.

[11] U.S. DOE EIA 1986 study, "An Analysis of Nuclear Power Plant Construction Costs."

dollars).[12] This cost overrun of $100 billion is more than 200 percent above the initial cost estimate.

In a February 2006 presentation on the Prospects for Nuclear Power, Professor Paul L. Joskow at MIT organized this same data in a different way:

Table 1. Nuclear Power Plant Construction Cost Overruns[13]

Construction Started	Estimated Overnight Cost	Actual Overnight Cost	% Over
1966-67	$560/kWe	$1,170/kWe	209%
1968-69	$679/kWe	$2,000/kWe	294%
1970-71	$760/kWe	$2,650/kWe	348%
1972-73	$1,117/kWe	$3,555/kWe	318%
1974-75	$1,156/kWe	$4,410/kWe	381%
1976-77	$1,493/kWe	$4,008/kWe	269%

Dr. Joskow also noted that:

- Nuclear industry has a poor historical record on construction cost estimation, realization and time to build
- Few recent plants built and limited information on recent actual construction cost experience
- Nuclear industry has put forward very optimistic construction cost estimates but there is no experience to verify them
- Nobody has ever underestimated the construction cost of a nuclear power plant at the pre-construction stage.[14]

[12] The figures in Exhibit____ DAS-3 actually understate the cost overruns because they exclude a large number of the latest nuclear power plants built in the U.S. and only reflect some of the cost overruns at other plants.

[13] Exhibit____DAS-4. February 22, 2006 Presentation on the "Prospects for Nuclear Power," by Professor Paul L. Joskow, MIT, at page 10.

[14] Exhibit____DAS-4, at page 9.

Q. What was Georgia Power's construction cost experience with the Vogtle nuclear units?

A. The actual cost of the Vogtle units was $8.87 billion, in nominal dollars, or more than thirteen times as high as the initial $660 million estimated cost, also in nominal dollars.

Q. Is it your testimony that if Georgia Power were to undertake a nuclear power construction project in the future that the project would be likely to experience schedule delays and cost overruns of more than one thousand percent?

A. No, not at this time. However, it is my testimony that Georgia Power, in particular, and the nuclear industry, in general, have a serious credibility issue with regards to estimating the costs of nuclear construction projects, and that before this Commission makes any commitment whatsoever to a new nuclear project, it would be prudent to (1) examine the bases for Georgia Power's estimates very carefully, and (2) plan with the recognition that very large cost overruns are possible, perhaps, even likely.

Q. What is the significance of the fact that none of the new reactor designs being considered by Georgia Power actually have been built in the U.S.?

There is literature available on the traditionally poor cost analyses associated with "mega-projects" – multi-billion dollar projects including those that represent first-of-a-kind technologies. The book "Megaprojects and Risk: An Anatomy of Ambition"[15] notes that "many [of these] projects have strikingly poor performance records in terms of economy, environment and public support." In 1988, the RAND Corporation studied the performance of 52 megaprojects including several nuclear power plants. Though a number of factors influenced the increase in costs experienced by these projects, the four largest were (1)

[15] Flyvbjerg, Bent, Nils Bruzelius and Werner Rothengatter. "Megaprojects and Risk: An Anatomy of Ambition." Cambridge University Press, 2003. Available at http://assets.cambridge.org/052180/4205/sample/0521804205WS.pdf.

number of regulatory problems (that is, not regulation itself, but a lack of accounting for the effects that regulations would have on the projects), (2) if the project was publicly owned, (3) if new materials/construction methods were used and (4) if first-of-a-kind technology was used.[16] Because of regulatory problems, nuclear plants as a group "experienced the worst cost growth [i.e., the most]."[17] The study concluded "the data on cost growth, schedule slippage and performance shortfalls of megaprojects are certainly sobering, but the most chilling statistic is that only about one in three of these projects is meeting its profit goals…Megaprojects take so long to develop from concept to reality that the need or opportunity for profits that originally spawned them may have passed by the time they are ready to begin producing."[18] Regulators and companies interested in building new nuclear power plants, particularly those based upon a conceptual design that has not been built in the U.S., must be cautious concerning the risks of underestimating costs and overly optimistic industry cost estimates, especially given the experience of the first generation of nuclear power plants.

Q. How do Georgia Power's preliminary estimates for the construction costs of the new nuclear units compare to the costs of recently built nuclear power plants?

A. Georgia Power's estimated [REDACTED] construction cost for new nuclear power plants is [REDACTED] than the costs of recently built nuclear power plants that are presented in Table 2 below.

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[16] Merrow, Edward W. *Understanding the Outcomes of Megaprojects: A Quantitative Analysis of Very Large Civilian Projects.* RAND Corporation, March 1998.

[17] Ibid, page 40.

[18] Ibid, page 60.

Table 2. Estimated Construction Costs for Recently Built Nuclear Power Plants, $ per kW, 2003 Prices[19]

Country	Name of Plant	Start of Commercial Operation	Overnight Cost
Japan	Onagawa 3	January 2002	2,417
Japan	Genkai 3	March 1994	2,827
Japan	Genkai 4	July 1997	2,296
Japan	Kariwa 6	NA	2,027
Japan	Kariwa 7	NA	1,796
South Korea	Yongwang 5 & 6	2004/2005	2,308

Q. Do you have any comment on Georgia Power's claim that because these costs are being incurred to develop and preserve the nuclear generation option for the benefit of future customers, it is therefore appropriate to capitalize these costs for ultimate recovery from those customers who will benefit from nuclear generation?[20]

A. Yes. Georgia Power is seeking to have ratepayers contribute all of these ESP and COL costs. Shareholders will not be contributing any of these costs nor will they be exposed to risks. However, Georgia Power is seeking to have these costs, which would be recorded in FERC Account 183, included in ratebase in the near future. This would mean that current ratepayers soon would be paying a return on those costs. So the costs will not only affect future ratepayers, as Georgia Power implies.

Moreover, if the Company's request is granted, shareholders will earn a full return on these costs even though they will not bear the risks. That would be inequitable. Shareholders should be required to bear the risks if they are to be awarded with a return on the investments.

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[19] "Economic Future of Nuclear Power," The University of Chicago for the U.S. DOE, August 2004, page 2-14.

[20] Application, page 7, and Direct Testimony of Ann P. Daiss, Jeffrey A. Burleson, and Louis B. Long, at page 20.

Q. Does the Company's proposed accounting order actually provide for a prudence review, as Georgia Power's witnesses have claimed?[21]

A. Despite what the Company's witnesses say in their testimony, there is no mention in Attachment A to the Application of any prudence review before the Account 183 costs are included in rate base and ultimately recovered from ratepayers.

Q. Have the very preliminary economic analyses presented by Georgia Power shown that it would be prudent for the Company to spend $51 million for a nuclear option that will not produce any benefits before the year 2015, if not substantially later, if at all?

A. No. The Company has not shown that it would be better to spend those funds on supply-side and demand-side options that would provide tangible benefits long before 2015.

Q. Does this complete your testimony?

A. Yes.

[21] Direct Testimony of Ann P. Daiss, Jeffrey A. Burleson, and Louis B. Long, at pages 20 and 21.