STATE OF SOUTH CAROLINA

South Carolina Electric & Gas Company's 2017 Integrated Resource Plan

BEFORE THE PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA

COVER SHEET

DOCKET NUMBER: 2017 - ___ - E

(Please type or print)

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DOCKETING INFORMATION (Check all that apply)

☐ **Emergency Relief demanded in petition** ☐ **Request for item to be placed on Commission's Agenda expeditiously**

☐ **Other:**

INDUSTRY (Check one)	NATURE OF ACTION (Check all that apply)		
☒ Electric	☐ Affidavit	☒ Letter	☐ Request
☐ Electric/Gas	☐ Agreement	☐ Memorandum	☐ Request for Certification
☐ Electric/Telecommunications	☐ Answer	☐ Motion	☐ Request for Investigation
☐ Electric/Water	☐ Appellate Review	☐ Objection	☐ Resale Agreement
☐ Electric/Water/Telecom.	☐ Application	☐ Petition	☐ Resale Amendment
☐ Electric/Water/Sewer	☐ Brief	☐ Petition for Reconsideration	☐ Reservation Letter
☐ Gas	☐ Certificate	☐ Petition for Rulemaking	☐ Response
☐ Railroad	☐ Comments	☐ Petition for Rule to Show Cause	☐ Response to Discovery
☐ Sewer	☐ Complaint	☐ Petition to Intervene	☐ Return to Petition
☐ Telecommunications	☐ Consent Order	☐ Petition to Intervene Out of Time	☐ Stipulation
☐ Transportation	☐ Discovery	☐ Prefiled Testimony	☐ Subpoena
☐ Water	☐ Exhibit	☐ Promotion	☐ Tariff
☐ Water/Sewer	☐ Expedited Consideration	☐ Proposed Order	☐ Other:
☐ Administrative Matter	☐ Interconnection Agreement	☐ Protest	
☐ Other:	☐ Interconnection Amendment	☐ Publisher's Affidavit	
	☐ Late-Filed Exhibit	☐ Report	

Matthew W. Gissendanner
Assistant General Counsel

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February 28, 2017

VIA ELECTRONIC FILING

The Honorable Jocelyn G. Boyd
Chief Clerk/Administrator
Public Service Commission of South Carolina
101 Executive Center Drive
Columbia, South Carolina 29210

RE: South Carolina Electric & Gas Company's 2017 Integrated Resource Plan
Docket No. 2017-____-E

Dear Ms. Boyd:

In accordance with S.C. Code Ann. § 58-37-40 (2015) and Order No. 98-502 enclosed you will find the 2017 Integrated Resource Plan of South Carolina Electric & Gas Company ("SCE&G 2017 IRP"). This filing also serves to satisfy the annual reporting requirements of the Utility Facility Siting and Environmental Protection Act, S.C. Code Ann § 58-33-430.

By copy of this letter, we are also serving the South Carolina Office of Regulatory Staff and the South Carolina Energy Office with a copy of the SCE&G 2017 IRP and attach a certificate of service to that effect.

If you have any questions or concerns, please do not hesitate to contact us.

Very truly yours,

Matthew W. Gissendanner

Matthew W. Gissendanner

MWG/kms
Enclosures
cc: Dawn Hipp
Jeffrey M. Nelson, Esquire
M. Anthony James
(all via electronic and U.S. First-Class Mail w/enclosures)

BEFORE

THE PUBLIC SERVICE COMMISSION OF

SOUTH CAROLINA

DOCKET NO. 2017-___-E

IN RE:

South Carolina Electric & Gas Company's Integrated Resource Plan	))))	**CERTIFICATE OF SERVICE**

This is the certify that I have caused to be served this day one (1) copy of the **2017 Integrated Resource Plan of South Carolina Electric & Gas Company** via electronic mail and U.S. First Class Mail to the persons named below at the address set forth:

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Karen M. Scruggs
Karen M. Scruggs

Cayce, South Carolina

This 28th day of February 2017

2017

Integrated

Resource

Plan

SCE&G®
A SCANA COMPANY

Introduction

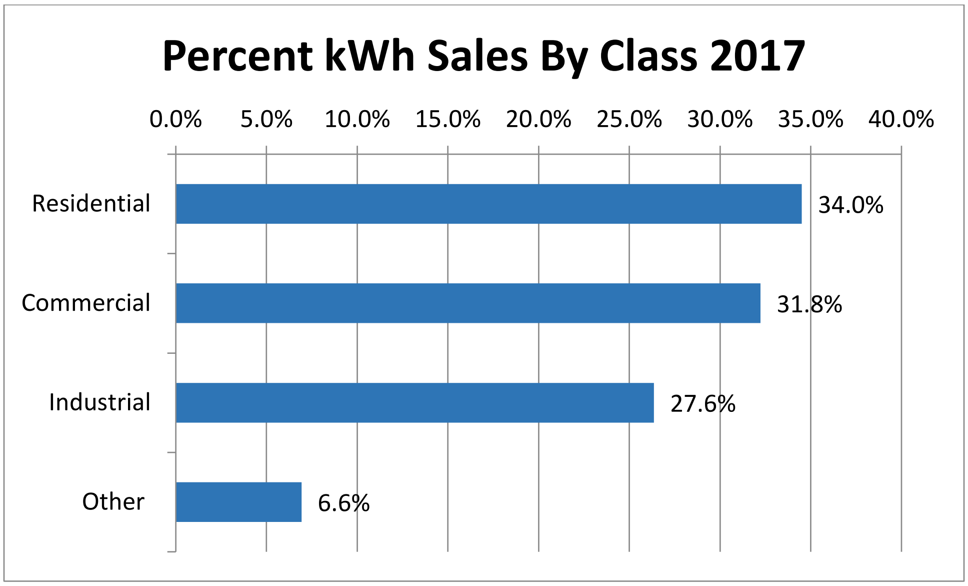
This document presents South Carolina Electric & Gas Company's ("SCE&G" or "Company") Integrated Resource Plan ("IRP") for meeting the energy needs of its customers over the next fifteen years, 2017 through 2031. This document is filed with the Public Service Commission of South Carolina ("Commission") in accordance with S.C. Code Ann. § 58-37-40 (2015) and Order No. 98-502 and also serves to satisfy the annual reporting requirements of the Utility Facility Siting and Environmental Protection Act, S.C. Code Ann. § 58-33-430 (2015). The objective of the Company's IRP is to develop a resource plan that will provide reliable and economically priced energy to its customers while complying with all environmental laws and regulations.

I. Demand and Energy Forecast for the Fifteen-Year Period Ending 2031

Total territorial energy sales on SCE&G's system are expected to grow at an average rate of 1.2% per year over the next 15 years, while firm territorial summer peak demand and winter peak demand will increase at 1.4% and 0.9% per year, respectively, over this forecast horizon. The table below contains these projected loads. Note that by utility convention winter follows summer so that the 2017 winter refers to the 2017-2018 winter season.

	Summer Peak (MW)	Winter Peak (MW)	Energy Sales (GWh)
2017	4,805	4,636	22,972
2018	4,914	4,757	23,280
2019	4,959	4,779	23,105
2020	5,073	4,827	23,338
2021	5,198	4,875	23,567
2022	5,308	4,920	23,996
2023	5,410	4,966	24,426
2024	5,489	5,008	24,837
2025	5,552	5,046	25,239
2026	5,612	5,083	25,643
2027	5,666	5,120	26,053
2028	5,716	5,156	26,487
2029	5,770	5,195	26,619
2030	5,822	5,233	26,745
2031	5,873	5,274	27,093

The energy sales forecast for SCE&G is made for over 30 individual categories. The categories are subgroups of our six classes of customers. The three primary customer classes - residential, commercial, and industrial - comprise just over 93% of our sales. The following bar chart shows the relative contribution to territorial sales made by each class. The “other” class in the chart below includes public street lighting, other public authorities, and municipalities.

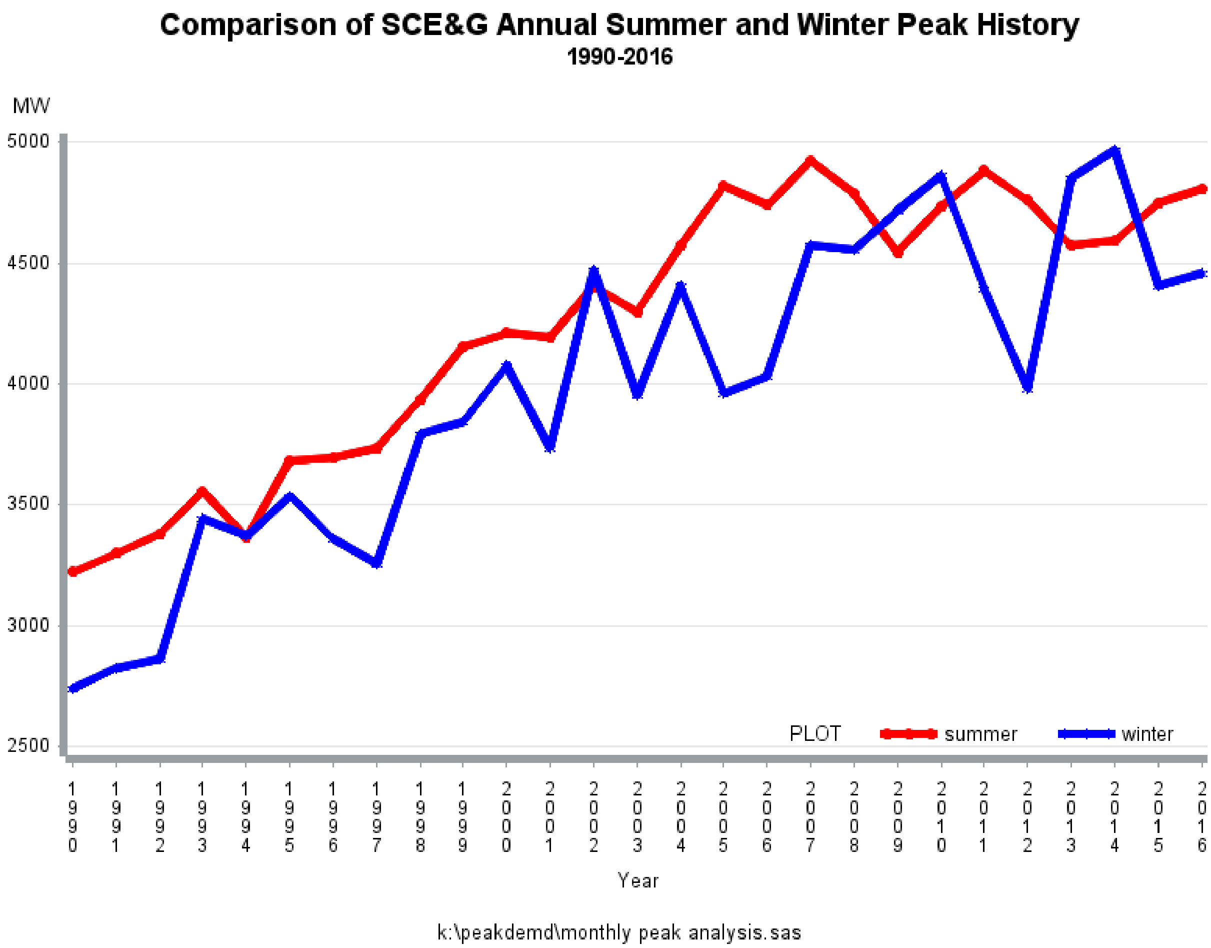


SCE&G’s forecasting process is divided into two parts: development of the baseline forecast, followed by adjustments for energy efficiency impacts. A detailed description of the short-range baseline forecasting process and statistical models is contained in Appendix A of this report. Short-range is defined as the next two years. Appendix B contains similar information for the long-range methodology. Long range is defined as beyond two years. Sales projections for each group are based on statistical and econometric models derived from historical relationships.

1. System Peak Demand: Summer vs. Winter

SCE&G usually peaks in the summer as seen in the following chart. This is reasonable for several factors. First, the climate in SCE&G’s service area is generally hotter in the summer than colder in the winter in the sense that kWh sales are about 15% higher in the summer than winter. Second, the penetration of air-conditioners among SCE&G’s customers approaches 100% since there are no real substitutes for electric air-conditioners at present. Finally, a large number of electric customers heat their homes and/or businesses with natural gas. Results of the peak demand forecast methodology used herein show that the general pattern of higher summer peaks relative to winter peaks will continue.

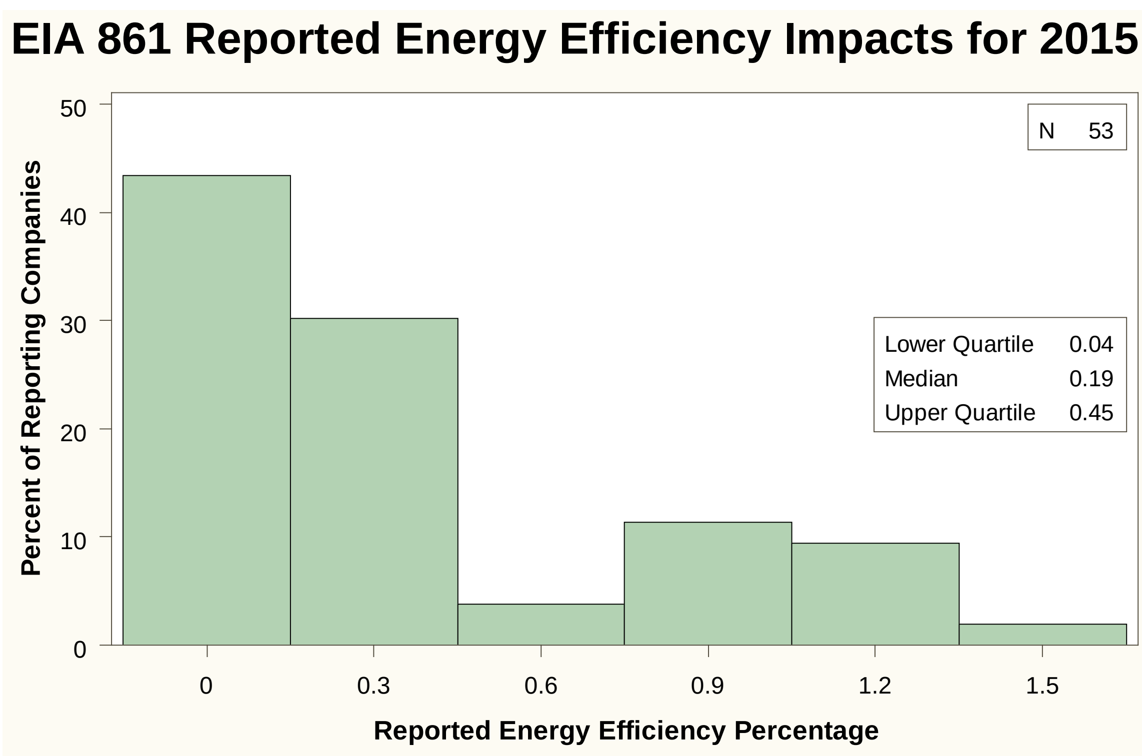
The following chart shows SCE&G's experience with summer versus winter peaking. By utility industry convention, the winter period is assumed to follow the summer period. In 6 of the past 27 years (4 of which occurred within the last 10 years), SCE&G peaked in the winter. One other notable feature of the peak demand chart is the greater variability in winter peak demand.



The forecast of summer peak demand is developed by combining the load profile characteristics of each customer class collected in the Company's Load Research Program with forecasted energy. The winter peak demand is projected through customer class equations which relate class winter peaks with weather variables and growth factors.

2. DSM Impact on Forecast

SCE&G anticipates that its energy efficiency ("EE") programs will reduce retail sales in 2017 by 72,414 MWH or approximately 71 GWH. Retail sales after this EE impact are expected to be 22,240 GWH. Therefore, the EE programs are expected to reduce retail sales by about 0.32% from what they would have been. To gauge how its EE programs compared to other companies in the Southeast, SCE&G analyzed the EE impacts filed with the U.S. Energy Information Administration ("EIA") in 2015, the latest year available. There were 56 companies filing from the Southeast, in particular, from the North American Electric Reliability Corporation (NERC) regions of the SERC Reliability Corporation (SERC) and the Florida Reliability Coordinating Council (FRCC). Three companies were dropped from the analysis. The chart below shows graphically the distribution of reported results. The median EE impact was 0.19%. Thus, half the companies reported results higher and half lower than this median value. SCE&G's expectation for 2017 places it in the top half of the distribution. Clearly, SCE&G's EE programs compare favorably with other companies in the Southeast.



As part of the forecast development, the 0.32% EE savings was divided into a residential and commercial component. In addition savings due to lighting efficiencies were removed from the class numbers and combined with lighting efficiency effects due to federally mandated measures. This was necessary to produce a consistent forecast of lighting efficiency effects. After this adjustment the annual EE percentages used to produce the forecast were determined to be 0.28% and 0.10% for the residential and commercial sectors, respectively. The table below illustrates the calculation of the EE reductions. The far right-hand column labeled “Total Cumulative Reductions” is the sum of the residential and commercial cumulative reductions and represents the “SCE&G DSM Programs” column shown in a subsequent forecast summary table.

Derivation of Annual EE Savings

	Baseline Residential (GWH)	Cumulative Reductions (GWH)	Incremental Reductions (GWH)	Inc. %	Baseline Commercial (GWH)	Cumulative Reductions (GWH)	Incremental Reductions (GWH)	Inc. %	Total Cumulative Reductions (GWH)
2017	7,904	-	-	-	7,328	-	-	-	-
2018	7,982	-	-	-	7,432	-	-	-	-
2019	8,055	-23	-23	-0.28	7,578	-7	-7	-0.10	-30
2020	8,121	-46	-23	-0.28	7,729	-15	-8	-0.10	-61
2021	8,194	-68	-22	-0.28	7,885	-23	-8	-0.10	-91
2022	8,374	-92	-24	-0.28	8,142	-31	-8	-0.10	-123
2023	8,558	-116	-24	-0.28	8,401	-39	-8	-0.10	-155
2024	8,738	-140	-24	-0.28	8,655	-48	-8	-0.10	-188
2025	8,913	-165	-25	-0.28	8,909	-57	-9	-0.10	-222
2026	9,085	-191	-26	-0.28	9,163	-66	-9	-0.10	-257
2027	9,258	-216	-25	-0.28	9,418	-76	-10	-0.10	-292
2028	9,433	-242	-26	-0.28	9,688	-86	-10	-0.10	-328
2029	9,510	-268	-26	-0.28	9,760	-96	-10	-0.10	-364
2030	9,585	-296	-27	-0.28	9,826	-105	-10	-0.10	-401
2031	9,736	-324	-28	-0.28	10,030	-115	-10	-0.10	-439

3. Energy Efficiency Adjustments

Several adjustments were made to the baseline projections to incorporate significant factors not reflected in historical experience. These were increased air-conditioning, heat pump, and water heater efficiency standards, plus improved lighting efficiencies, all mandated by federal law, and the addition of SCE&G’s energy efficiency and solar programs. The following table shows the baseline projection, solar and energy efficiency adjustments, and the resulting forecast of territorial energy sales.

	Baseline Sales (GWh)	SCE&G Solar Programs (GWh)	SCE&G DSM Programs (GWh)	Federal Mandates (GWh)	Total EE Impact (GWh)	Territorial Sales (GWh)
2017	23,082	-25	0	-85	-110	22,972
2018	23,438	-31	0	-127	-158	23,280
2019	23,328	-31	-30	-162	-223	23,105
2020	23,645	-33	-61	-213	-307	23,338
2021	23,958	-35	-91	-265	-391	23,567
2022	24,472	-36	-123	-317	-476	23,996
2023	24,988	-38	-155	-369	-562	24,426
2024	25,487	-40	-188	-422	-650	24,837
2025	25,981	-42	-222	-478	-742	25,239
2026	26,479	-44	-257	-535	-836	25,643
2027	26,984	-46	-292	-593	-931	26,053
2028	27,516	-49	-328	-652	-1,029	26,487
2029	27,745	-51	-364	-711	-1,126	26,619
2030	27,962	-54	-401	-762	-1,217	26,745
2031	28,405	-56	-439	-817	-1,312	27,093

Baseline sales are projected to grow at the rate of 1.5% per year. The impact of energy efficiency, both from SCE&G's DSM and solar programs, plus savings from federal mandates, causes the ultimate territorial sales growth to fall to 1.2% per year as reported earlier.

Since the baseline forecast utilizes historical relationships between energy use and driver variables such as weather, economics, and customer behavior, it embodies changes which have occurred between them over time. For example, construction techniques which result in better insulated houses have had a dampening effect on energy use. Because this process happens with the addition of new houses and/or extensive home renovations, it occurs gradually. Over time this factor and others are captured in the forecast methodology. However, when significant events occur which impact energy use but are not captured in the historical relationships, they must be accounted for outside the traditional model structure.

The first adjustment relates to federal mandates for air-conditioning units and heat pumps. In 2015 the minimum Seasonal Energy Efficiency Ratio ("SEER") increased from 13 to 14 for South Carolina and other regions of the United States. This was the first change in SEER ratings since 2006, when the minimum SEER for newly manufactured appliances was raised from 10 to 13. The cooling load for a house that replaced a 10 SEER unit with a 13 SEER unit would decrease by 30% assuming no change in other factors. The first mandated change to efficiencies like this took place in 1992, when the minimum SEER was raised from 8 to 10, a 25% increase in energy efficiency. Since then air-conditioner and heat pump manufacturers introduced much higher-efficiency units, and models are now available with SEERs over 20. However, overall market production of heat pumps and air-conditioners is concentrated at the lower end of the SEER mandate. The 2015 minimum SEER rating represented another significant change in energy use which would not be fully captured by statistical forecasting techniques based on historical relationships. For this reason an adjustment to the baseline was warranted.

All electric water heaters manufactured after April 2015 will also be subject to higher efficiency standards. The level of increase varies according to the size of the water heater, but for a 40-gallon water heater the energy factor will rise by 3.4%. While high-efficiency water heaters have been available in the market for some time, it is still expected that a considerable percentage of residential customers will be impacted by the new standards. Therefore, reductions were made to the baseline energy projections to incorporate this effect.

A third reduction was made to the baseline energy projections beginning in 2013 for savings related to lighting. Mandated federal efficiencies as a result of the Energy Independence and Security Act of 2007 took effect in 2012 and were phased in through 2014. Standard incandescent light bulbs are inexpensive and provide good illumination, but they are extremely inefficient. Compact fluorescent light bulbs (“CFLs”) have become increasingly popular over the past several years as substitutes. They last much longer and generally use about one-fourth the energy that incandescent light bulbs use. However, CFLs are more expensive and still have some unpopular lighting characteristics, so their large-scale use as a result of market forces was not guaranteed. The new mandates will not force a complete switchover to CFLs, but they will impose efficiency standards that can only be met by them, LED bulbs or newly developed high-efficiency incandescent light bulbs. Again, this shift in lighting represents a change in energy use which was not fully reflected in the historical data.

The final adjustment to the baseline forecast was to account for SCE&G’s set of energy efficiency and new solar programs. These energy efficiency programs along with the others in SCE&G’s existing DSM portfolio are discussed later in the IRP. In developing the forecast it was assumed that the impacts of these programs were captured in the baseline forecast for the next two years but thereafter had to be reflected in the forecast on an incremental basis.

4. Load Impact of Energy Efficiency and Demand Response Programs

The Company's energy efficiency programs ("EE") and its demand response programs ("DR") will reduce the need for additional generating capacity on the system. The EE programs implemented by our customers should lower not only their overall energy needs but also their power needs during peak periods. The DR programs serve more directly as a substitute for peaking capacity. The Company has two DR programs: an interruptible program for large customers and a standby generator program. These programs represent over 250 megawatts ("MW") on our system. The following table shows the impacts of EE from the Company's DSM programs and from federal mandates as well as the impact from the Company's DR programs on the firm peak demand projections.

Territorial Peak Demands (MWs)							
		Energy Efficiency					
Year	Baseline Trend	SCE&G Programs	Federal Mandates	Total EE Impact	System Peak Demand	Demand Response	Firm Peak Demand
2017	5,075	-10	-7	-17	5,057	-252	4,805
2018	5,197	-19	-9	-28	5,169	-255	4,914
2019	5,271	-40	-14	-54	5,218	-257	4,961
2020	5,411	-58	-20	-78	5,333	-259	5,074
2021	5,558	-69	-29	-98	5,460	-261	5,199
2022	5,691	-79	-38	-117	5,574	-264	5,310
2023	5,814	-90	-47	-137	5,677	-266	5,411
2024	5,915	-100	-56	-156	5,758	-268	5,490
2025	6,000	-111	-65	-176	5,823	-270	5,553
2026	6,083	-121	-75	-196	5,887	-273	5,614
2027	6,160	-133	-84	-217	5,942	-275	5,668
2028	6,234	-144	-94	-238	5,996	-278	5,718
2029	6,311	-154	-105	-259	6,051	-280	5,771
2030	6,384	-166	-113	-279	6,104	-282	5,822
2031	6,456	-178	-120	-298	6,158	-285	5,873

II. SCE&G's Program for Meeting Its Demand and Energy Forecasts in an Economic and Reliable Manner

A. Demand Side Management

Demand Side Management (DSM) can be broadly defined as the set of actions that can be taken to influence the level and timing of the consumption of energy. There are two common subsets of Demand Side Management: Energy Efficiency and Load Management (also known as Demand Response). Energy Efficiency typically includes actions designed to increase efficiency by maintaining the same level of production or comfort, but using less energy input in an economically efficient way. Load Management typically includes actions specifically designed to encourage customers to reduce usage during peak times or shift that usage to other times.

1. Energy Efficiency

SCE&G's Energy Efficiency programs include Customer Education and Outreach, Energy Conservation and the Demand Side Management programs. A description of each follows:

a. **Customer Education and Outreach:** SCE&G's customer education and outreach includes a wide variety of communication vehicles to increase customer awareness and to help customers become more energy efficient in their homes and businesses. Two key components of customer education and outreach are summarized below:

    i. **Customer Insights and Analysis:** SCE&G continues to leverage insights learned from ongoing research, voice of the customer panels and PRIZM data to ensure customer education/outreach, messages, collateral and channel placement are optimized.

    ii. **Media/Channel Placement:** SCE&G is committed to customer education about available programs and services designed to help them be more energy efficient. To reach as many customers as possible, a diverse mix of channels is used, including both paid and earned media. Direct mail, bill inserts, radio, online and community events continue to prove successful with engaging customers. Extensive outreach via social media continues to provide maximum coverage and the opportunity to inform customers. A steady increase in customer engagement with social media networks, Facebook and Twitter, has resulted in over 36,500 likes and about 9,100 followers, respectively. Year-round news coverage is equally important and is consistently integrated into the media mix, particularly during peak winter and summer months when usage is high.

b. Energy Conservation: Energy conservation is a term that has been used interchangeably with energy efficiency. However, energy conservation has the connotation of using less energy in order to save rather than using less energy to perform the same or better function more efficiently. The following is an overview of each SCE&G energy conservation offering:

i. **Energy Saver / Conservation Rate**: Rate 6 (Energy Saver/ Conservation) rewards homeowners and homebuilders with a reduced electric rate when they upgrade existing homes or build new homes to a high level of energy efficiency. This reduced rate, combined with a significant reduction in energy usage, provides for considerable savings to customers. Participation in the program is easy as the requirements are prescriptive which is beneficial to all customers and trade allies.

ii. **Seasonal Rates**: Many of our rates are designed with components that vary by season. Energy provided in the peak usage season is charged a premium to encourage conservation and efficient use.

c. Demand Side Management Programs: In 2016, the Demand Side Management portfolio of programs included six (6) programs targeting SCE&G's residential customer classes and two (2) programs targeting commercial and industrial customer classes. With each program, considerable effort is made to cross-sell and promote other DSM offers, as appropriate, to help ensure customers are consistently informed of all available incentives. A description of each program follows:

i. **Residential Home Energy Reports** provides customers with monthly/bi-monthly reports comparing their energy usage to a peer group and providing information to help identify, analyze and act upon potential energy efficiency measures and behaviors.

ii. **Residential Home Energy Check-up** provides customers with a visual energy assessment performed by SCE&G staff at the customer's home. At the completion of the visit, customers are offered an energy efficiency kit containing simple measures, such as energy efficient bulbs, water heater wraps and/or pipe insulation. The Home Energy Check-up is provided at no additional cost to all residential customers who elect to participate.

iii. **Residential ENERGY STAR® Lighting** incentivizes residential customers to purchase and install high-efficiency ENERGY STAR® qualified lighting products by providing deep discounts directly to customers. In 2016, SCE&G continued to offer incentives via an online store, in addition to providing energy efficiency lighting kits at various business office locations.

iv. **Residential Heating & Cooling Program** provides incentives to customers for purchasing and installing high efficiency HVAC equipment in existing homes. Additionally, the program provides residential customers with incentives to improve the efficiency of existing AC and heat pump systems through complete duct replacements, duct insulation and duct sealing.

v. **Neighborhood Energy Efficiency Program (NEEP**) provides income qualified customers with energy efficiency education, an in-home energy assessment and direct installation of low-cost energy saving measures as part of a neighborhood door-to-door sweep approach. In 2016, neighborhoods in Summerville, Aiken County, Allendale and Columbia participated in the program. Additionally, the program expanded offerings to mobile and manufactured homes to include additional measures specific to this housing stock.

vi. **Appliance Recycling Program** provides incentives to residential customers for allowing SCE&G to collect and recycle less-efficient, but operable, secondary refrigerators, and/or standalone freezers, permanently removing the units from service.

vii. **EnergyWise for Your Business Program** provides incentives to non-residential customers to invest in high-efficiency lighting and fixtures, high efficiency motors and other equipment. To ensure simplicity, the program includes a master list of prescriptive measures and incentive levels that are easily accessible to commercial and industrial customers on SCE&G's website. Additionally, a custom path provides incentives to commercial and industrial customers based on the calculated efficiency benefits of their particular energy efficiency plans or construction proposals. This program applies to technologies and applications that are more complex and customer-specific. All aspects of this program fit within the parameters of both retrofit and new construction projects.

viii. **Small Business Energy Solutions Program** is a turnkey program, tailored to help owners of small businesses manage energy costs by providing incentives for energy efficiency lighting, electric water heaters and refrigeration upgrades. The program is available to SCE&G's small business and small nonprofit customers with an annual energy use of 250,000 kWh or less, and five or fewer SCE&G electric accounts.

2. Load Management Programs

The primary goal of SCE&G's load management programs is to reduce the need for additional generating capacity. There are four load management programs: Standby Generator Program, Interruptible Load Program, Real Time Pricing Rate and the Time of Use Rates. A description of each follows:

a. Standby Generator Program: The Standby Generator Program for wholesale customers provides about 25 megawatts of peaking capacity that can be called upon when reserve capacity is low on the system. This capacity is owned by our wholesale customers and through a contractual arrangement is made available to SCE&G dispatchers. SCE&G has a retail version of its standby generator program in which

SCE&G can call on participants to run their emergency generators. This retail program provides about 10 megawatts of additional capacity as needed.

b. **Interruptible Load Program:** SCE&G has over 200 megawatts of interruptible customer load under contract. Participating customers receive a discount on their demand charges for shedding load when SCE&G is short of capacity.

c. **Real Time Pricing ("RTP") Rate:** A number of customers receive power under our real time pricing rate. During peak usage periods throughout the year when capacity is low in the market, the RTP program sends a high price signal to participating customers which encourages conservation and load shifting. Of course during low usage periods, prices are lower.

d. **Time of Use Rates:** Our time of use rates contain higher charges during the peak usage periods of the day and lower charges during off-peak periods. This encourages customers to conserve energy during peak periods and to shift energy consumption to off-peak periods. All SCE&G customers have the option of purchasing electricity under a time of use rate.

B. Supply Side Management

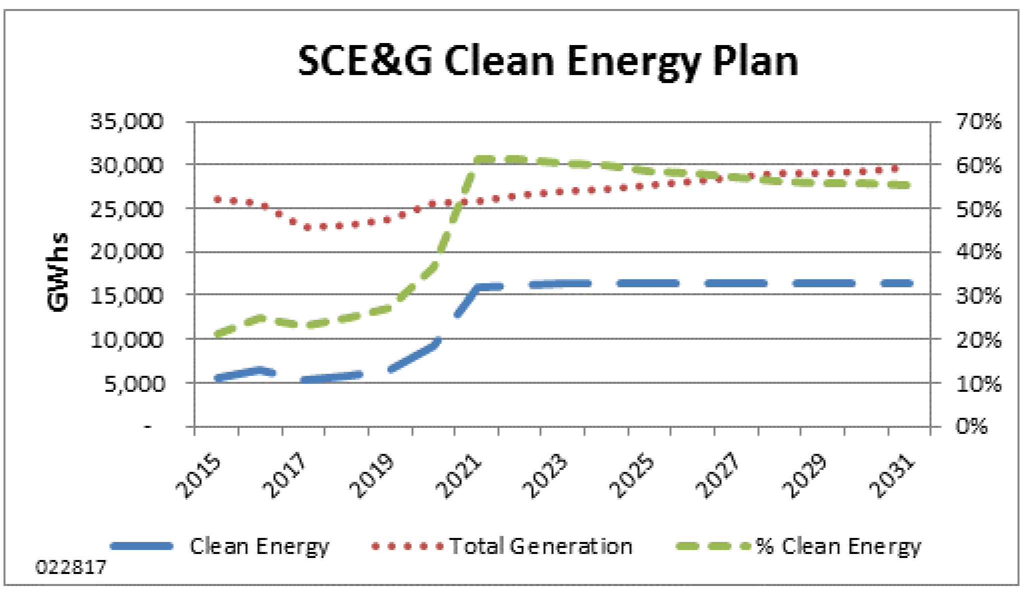
Clean Energy at SCE&G

Clean energy includes energy efficiency and clean energy supply options such as nuclear power, hydro power, combined heat and power, and renewable energy.

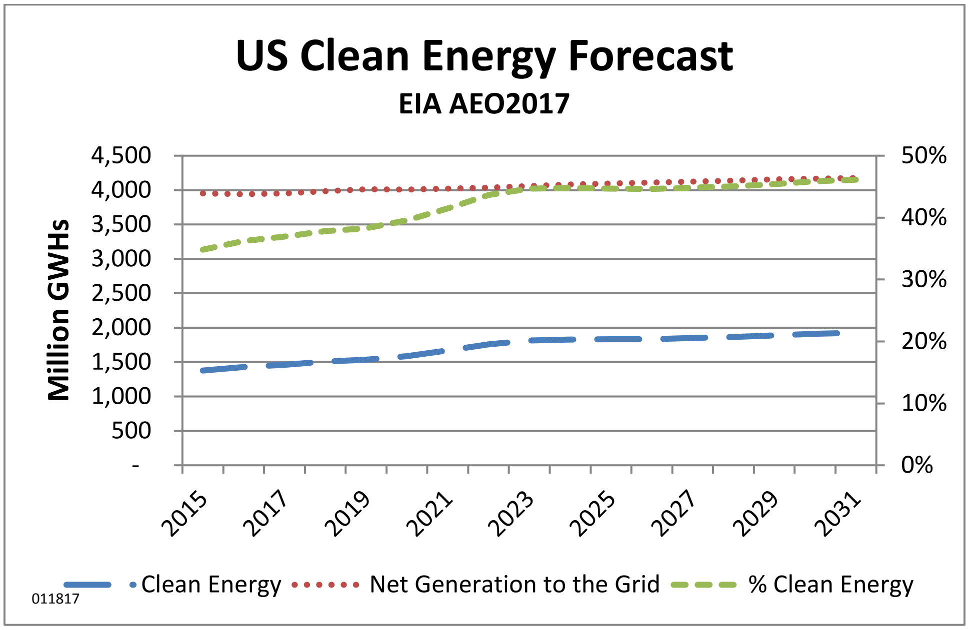
1. Existing Sources of Clean Energy

SCE&G is committed to generating more of its power from clean energy sources. This commitment is reflected: in the amount of current and projected generation coming from clean sources, in the certified renewable energy credits that the Company generates each year, in the Company's distributed energy resource program, and in the Company's support for Palmetto Clean Energy, Inc. Below is a discussion of each of these topics.

a. **Current Generation:** SCE&G currently generates clean energy from hydro, nuclear, solar and biomass. The following chart shows the current and projected amounts of clean energy in GWH and as a percentage of total generation.



As seen in the chart above, SCE&G currently produces approximately 25% of its total generation from clean energy sources but by 2021 it expects to generate about 60% from clean energy. According to the EIA, the U.S. as a nation currently produces about 34% of its total generation from clean sources and it expects this percentage to increase to about 45% over the next ten years or so. The following chart graphs EIA's forecast for US clean energy.



SCE&G compares favorably to the nation in its clean energy plans. By 2021 SCE&G should be producing 33% more clean energy on a relative basis compared to the nation.

b. Nuclear Power: Unit 1 at the Summer Nuclear Station produces a substantial amount of clean energy and has a significant beneficial impact on the environment. The Unit came online in January 1984 and has a capacity of 966 MWs with SCE&G owning 647 MWs (two-thirds) and Santee Cooper owning the balance. In 2016, Unit 1 produced 5,772 gigawatt-hours ("GWH") of clean energy for SCE&G's customers. This represented 23% of its customers' need. Over the last 34 years of operation, Unit 1 has produced 154,401 GWHs for SCE&G's customers. SCE&G received an extension to its original operating license in April 2004 and the Unit is now licensed to operate until August 2042. Over these next 26 years Unit 1 should produce another 128,893 GWHs of clean energy for SCE&G. If SCE&G were to generate this 60-years' worth of energy with fossil fuels, it would mean about 212 million more tons of CO_2 emitted to the atmosphere. And this represents only SCE&G's two-thirds share of the Unit; when Santee Cooper's share is also considered, the full impact of the Unit to the environment is 50% greater.

c. Renewable Energy Credits: The SCE&G owned electric generator, located at the KapStone Charleston Kraft LLC facility, generates electricity using a mixture of coal and biomass. KapStone Charleston Kraft LLC produces black liquor through its Kraft pulping process and produces and purchases biomass fuels. These fuels are used to produce renewable energy which qualifies for Renewable Energy Certificates ("REC"). SCE&G has also begun generating RECs from solar generation. The nearby table shows the MWhs of renewable energy generated by the KapStone biomass and Leeds solar generators.

Year	Kapstone MWhs	Leeds MWhs	% of Retail Sales
2007	371,573		1.7%
2008	369,780		1.7%
2009	351,614		1.7%
2010	346,190		1.5%
2011	336,604		1.5%
2012	414,047		1.9%
2013	385,202		1.8%
2014	404,526		1.8%
2015	385,470		1.8%
2016	394,814	1,027	1.8%

d. Boeing Solar Generator: In 2011, SCE&G installed approximately 10 acres of thin-film laminate panels (18,095 individual panels) on the roof of Boeing's North Charleston assembly plant. The PV system with a nameplate rating of 2.6 MW DC began generating in October 2011 and has a peak output of about 2.35 MW AC. All RECs and energy generated by the roof top solar system are provided to Boeing for onsite use. At the time of completion this was the largest roof-top solar generator in the Southeast. Over the last five years the Boeing solar plant has generated the following amounts of energy:

Year	MWhs
2012	3,513
2013	3,410
2014	3,337
2015	3,267
2016	3,332

e. Net Energy Metering, PR-1 and PR-2 Rates: Protecting the environment includes encouraging and helping our customers to take steps to do the same. Net Energy Metering (NEM) provides a way for residential, commercial and industrial customers interested in generating their own renewable electricity to partially power their homes or businesses and sell the excess energy back to SCE&G. For residential customers, the generator output capacity cannot exceed the annual maximum household energy requirements or 20 kilowatts alternating current (kW AC), whichever is less. For commercial and industrial customers, the generator output capacity cannot exceed the annual maximum energy requirements of the business, the contract demand, or 1,000 kW AC, whichever is less. The total customer generator capacity under the NEM program is limited to 2% of the Company's previous five-year average retail peak demand.

Under Commission Order 2015-194, a Net Energy Metering Methodology was approved whereby a value per kWh will be calculated annually for distributed energy resources. This value will be the basis upon which the Company will continue to provide customers a retail NEM incentive and have the difference funded through the Distributed Energy Resource Program Act. Provided the total customer generator capacity cap has not been met, customers will be offered the NEM rate until January 1, 2021, and those customers taking service under the NEM rate will receive the Net Metering Incentive described above through December 31, 2025, or until they take service under a different rate, whichever occurs first.

The Company offers Qualifying Facilities as defined by the Federal Energy Regulatory Commission Order No. 70 under Docket No. RM 79-54 payments for power generated and transmitted to the SCE&G system. For Qualifying Facilities no greater than 100 kW, the PR-1 rate is available for these energy payments. For Qualifying Facilities greater than 100 kW but less than 80 megawatts (MW), the PR-2 rate is available for these energy payments. Both the PR-1 and PR-2 rates are developed using SCE&G's avoided costs.

f. Palmetto Clean Energy, Inc.: Palmetto Clean Energy, Inc. ("PaCE") is a non-profit, tax exempt organization formed in 2007 by SCE&G, Duke Energy, Progress Energy (n/k/a Duke Energy Progress), the South Carolina Office of Regulatory Staff ("ORS") and the S.C. Energy Office for the purpose of promoting the development of renewable power in South Carolina. Customers voluntarily make a tax deductible contribution to PaCE and PaCE uses the funds collected to pay renewable generators a financial incentive for their power. On December 5, 2016, PaCE announced 23 solar grants to South Carolina schools and housing facilities, as part of a final round of awards capping the landmark nine-year program. Since its launch in 2007, PaCE has enabled the production of 5 million kilowatt-hours of renewable energy through financial incentives to renewable generators and grants to qualified educational institutions and nonprofit, supportive housing facilities. More than 1.2 million South Carolina customers have had the opportunity to support green energy initiatives through tax-deductible contributions to PaCE. The program also has contributed to the development of solar generation at more than 140 customer sites. In light of both PaCE's accomplishments and the South Carolina General Assembly's passage of a comprehensive renewable energy law encouraging distributed generation, PaCE declared its mission accomplished and it is in the process of winding down its operations.

2. Future Clean Energy

SCE&G is participating in activities seeking to advance renewable technologies in the future. Specifically, the Company is involved with a) distributed energy resources, b) off-shore wind activities in the state, c) co-firing with biomass fuels, d) smart grid opportunities, e) distribution automation, f) environmental mitigation activities, and g) nuclear power in the future. These activities are set forth in more detail below.

a. Distributed Energy Resource ("DER") Program: SCE&G's customers and other South Carolina stakeholders have expressed a desire for solar energy in the state, and SCE&G is looking for ways to integrate additional solar into the system in the most economical way possible while beginning to grow a new clean energy economy in South Carolina based on a diverse portfolio of generation. At the end of 2016, SCE&G had approximately 37 megawatts alternating current (MW AC) of solar capacity on the system.

As part of its new DER Programs, which were approved by the Commission in July 2015 under Order 2015-512, SCE&G plans to add over 84 MW AC of renewable energy to its system by 2021. SCE&G's DER programs became available to customers in October of 2015 and these programs offer incentives through simple, customer centric offerings with a variety of customer choices. Customer feedback has been positive and participation levels have been increasing. In late 2017 or early 2018, SCE&G plans to make available up to 16 MW AC of Community Solar as one of these DER offerings. Through the end of 2016, SCE&G had approximately 25 MW

AC of solar generation interconnected to the system specifically related to customer scale DER programs.

In 2016, SCE&G contracted for a 6.8 MW AC utility scale solar farm located in Saluda County, SC. This farm became commercially operational on December 30, 2016. By the end of 2017, SCE&G anticipates having over 40 MW AC of additional utility scale solar generation on its system. SCE&G has assembled an experienced team focused on research, design, and implementation of renewable energy resources.

The following picture is the 0.5 MW AC solar farm constructed at Leeds Ave in North Charleston.

b. Off-Shore Wind Activities: SCANA/SCE&G is a founding member of the Southeastern Wind Coalition and participates in the Utility Advisory Group of that organization. The mission of the Southeastern Wind Coalition is to advance the wind industry in ways that result in net economic benefits to industry, utilities, ratepayers, and citizens of the Southeast. The focus is three fold:

i. Research and Analysis – objective, transparent, data-driven, and focused on economics.

ii. Policy / Market Making – exploring multistate collaborative efforts and working with utilities, not against them.

iii. Education and Outreach – website, communications, and targeted outreach.

SCE&G participated in the Regulatory Task Force for Coastal Clean Energy. This task force was established with a 2008 grant from the U.S. Department of Energy. The goal was to identify and overcome existing barriers for coastal clean energy development for wind, wave and tidal energy projects in South Carolina. Efforts included an offshore wind transmission study; a wind, wave and ocean current study; and creation of a Regulatory Task Force. The mission of the Regulatory Task Force was to foster a regulatory environment conducive to wind, wave and tidal energy development in state waters. The Regulatory Task Force was comprised of state and federal regulatory and resource protection agencies, universities, private industry and utility companies.

SCANA/SCE&G participated in discussions to locate a 40 MW demonstration wind farm off the coast of Georgetown. This effort, known as Palmetto Wind, included Clemson University's Restoration Institute, Coastal Carolina University, Santee Cooper, the S.C. Energy Office and various utilities. Palmetto Wind has been put on hold due to the high cost of the project.

In an effort to promote wind turbine research, SCE&G invested $3.5 million in the Clemson University Restoration Institute's wind turbine drive train testing facility at the Clemson campus in North Charleston. This new facility is dedicated to groundbreaking research, education, and innovation with the world's most advanced wind turbine drive train testing facility capable of full-scale highly accelerated mechanical and electrical testing of advanced drive train systems for wind turbines.

c. Smart Grid Activities:

AMI (Advanced Metering Infrastructure): SCE&G currently has approximately 14,000 AMI meters that are installed predominately on our medium to large commercial and industrial customers. Other applications where this technology is deployed include all time-of-use accounts and all accounts with customer generation (net metering). These meters utilize public wireless networks as the communication backbone and have full two-way communication capability. Register readings and load profile interval data are remotely collected daily from all AMI meters. In addition to traditional metering functions, the technology also provides real-time monitoring capability including power outage/restoration, meter/site diagnostics, and power quality monitoring. Load profile data is provided to customers daily via web applications enabling these customers to have quick access to energy usage allowing better management of their energy consumption. SCE&G is in the planning stages for deploying mass AMI technology for all electric meters.

Distribution Automation: SCE&G is continuing to expand the penetration of automated Supervisory Control and Data Acquisition ("SCADA") switching and other intelligent devices throughout the system. We have approximately 1,000 SCADA switches and reclosers, most of which can detect system outages and operate automatically to isolate sections of line with problems thereby minimizing the number of affected customers. Some of these isolating switches can communicate with each other to determine the optimal configuration to restore service to as many customers as possible without operator intervention. We are continuing to evaluate systems that will enable these automated devices to communicate with each other and safely reconfigure the system in a fully automated fashion, let operators know exactly where the faulted section of a line is, and monitor the status of the system as it is affected by outages, switching, and customer generation (solar).

d. Environmental Mitigation Activities:

On January 1, 2015, the Clean Air Interstate Rule (CAIR) was replaced by the Cross State Air Pollution Rule (CSAPR), which set new emission limits for Annual and Seasonal NO_X and also for Annual SO_2. In addition the existing Acid Rain Program (ARP) continues in effect for annual SO_2 emissions.

To meet the compliance requirements for NO_X, SCE&G (& GENCO) has installed Selective Catalytic Reduction equipment (SCRs) at Wateree, Cope and Williams Stations. Also, all coal fired units have previously installed low NO_X burners.

To meet the compliance requirements for SO_2, Williams and Wateree Stations have installed flue gas desulfurization ("FGD") equipment, commonly known as wet scrubbers. Cope Station has FGD equipment in the form of a dry scrubber, which was part of the original equipment of that plant.

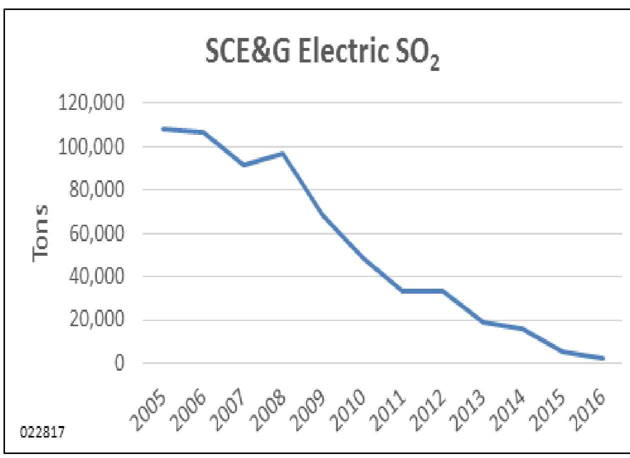
Mercury emission control has also been realized via the operation of FGD equipment. Consequently, the continued operation of the FGD equipment has contributed to SCE&G's strategy for meeting the requirements of the US EPA's Mercury and Air Toxics Standard

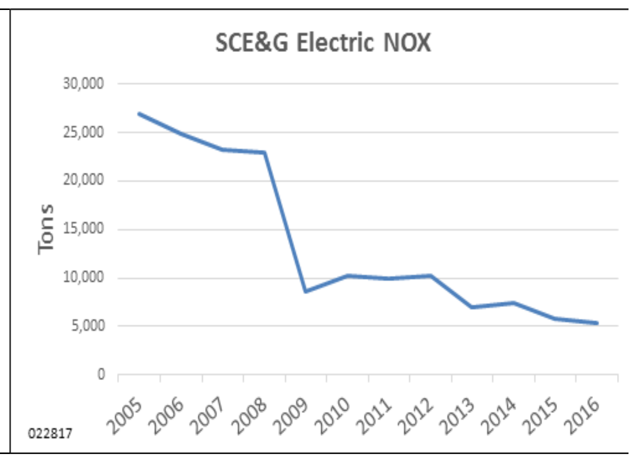
(“MATS”) that became effective on April 16, 2015. The Chem-Mod fuel additive being used at Cope and Williams Stations will similarly contribute to SCE&G’s efforts in stack emission control for mercury, as well as for NO_X and SO_2 As a result of the MATS regulations for mercury, the company has also installed carbon injection systems at Williams, Wateree and Cope. This will allow for additional control of mercury emissions if needed to comply with MATS requirements.

In response to the EPA MATS regulations, the last coal-fired boiler at Urquhart Station, Unit 3, was converted to natural gas. Decommissioning of the plant’s former coal handling facilities was completed in 2014. Also in response to MATS, Canadys Station ceased operations on November 6, 2013, and the plant infrastructure was decommissioned in 2015. McMeekin Units 1 & 2 were fully converted to gas in April 2016 with no coal utilized after that date.

In an effort to cease bottom ash sluicing to the Wateree Station’s ash ponds, SCE&G installed two remote submerged flight conveyors that dewater boiler bottom ash sluice and recycle the overflow back to the boiler for reuse. This retrofit was completed for Units 1 and 2 during October 2012. The bottom ash is then marketed as an ingredient in the manufacture of pre-stressed concrete products. In April 2016, Wateree Station completed construction of a dry fly ash handling systems and discontinued sluicing ash to ponds. All ash is now managed dry.

The two charts below illustrate the significant emission reductions realized since 2005.





e. Nuclear Power in the Future – Small and Modular:

Small Modular Reactor (“SMR”) technology continues to be developed. DOE has awarded several grants to support the development of the SMR technology. At about a third, or less, of the size of current nuclear power plants, SMRs could make available, for a smaller capital investment, a modular design for specific generation needs. In 2015 and 2016, SCE&G assisted an SMR vendor with a feasibility study for replacement of coal generation with the SMR technology. However, SCE&G has no current plans for SMR on its system but will continue to evaluate this technology as it develops.

3. Summary of Proposed and Recently Finalized Environmental Regulations

The EPA has recently enacted a number of regulations with significant potential to impact SCE&G operations. These are: a) Cross-State Air Pollution Rule (CSAPR); b) Mercury and Air Toxics Standards (MATS): c) Clean Power Plan; d) Cooling Water Intake Structures Rule; e) Coal Combustion Residuals (CCR) Rule; f) Effluent Limitation Guidelines; and g) a 1-hour sulfur dioxide (SO2) National Ambient Air Quality Standard (NAAQS). A discussion of these proposed and finalized regulations follows.

a. Cross-State Air Pollution Rule (CSAPR): On July 6, 2011, the EPA issued the Cross-State Air Pollution Rule to reduce emissions of SO_2 and NO_X from power plants in the eastern half of the United States. A series of court actions stayed this rule until October 23, 2014, when the U.S. Court of Appeals for the D.C. Circuit issued an order granting a motion to lift the stay. On July 28, 2015, the Court of Appeals held that Phase 2 emissions budgets for certain states, including South Carolina, required reductions in emissions beyond the point necessary to achieve downwind attainment and were, therefore, invalid. The State of South Carolina has chosen to remain in the CSAPR program, even though this recent court ruling exempted the state. This allows the state to remain compliant with regional haze standards.

CSAPR, replaces the Clean Air Interstate Rule (CAIR), and requires a total of 28 states to reduce annual SO_2 emissions, annual NO_X emissions and/or ozone season NO_X emissions to assist in attaining the 1997 ozone and fine particle and 2006 fine particle National Ambient Air Quality Standards (NAAQS). The rule establishes an emissions cap for SO_2 and NO_X and limits the trading region for emission allowances by separating affected states into two groups with no trading between the groups.

SCE&G generation is in compliance with the allowances set by CSAPR. Air quality control installations that SCE&G has already completed have positioned the Company to comply with the rule.

b. Mercury and Air Toxics Standards ("MATS"): The MATS rule set numeric emission limits for mercury, particulate matter as a surrogate for toxic metals, and hydrogen chloride as a surrogate for acid gases. MATS became effective on April 16, 2012, and compliance with MATS were required by April 2015. SCE&G and GENCO were granted a one year extension (through April 2016) to comply with MATS at Cope, McMeekin, Wateree and Williams Stations. These extensions allowed time to convert McMeekin Station to burn natural gas and to install additional pollution control devices at the other plants to enhance the control of certain MATS-regulated pollutants. In addition, SCE&G retired certain other coal-fired units during this time frame. The MATS rule has been the subject of ongoing litigation even while it remains in effect. SCE&G and GENCO are in compliance with the MATS rule and expect to remain in compliance.

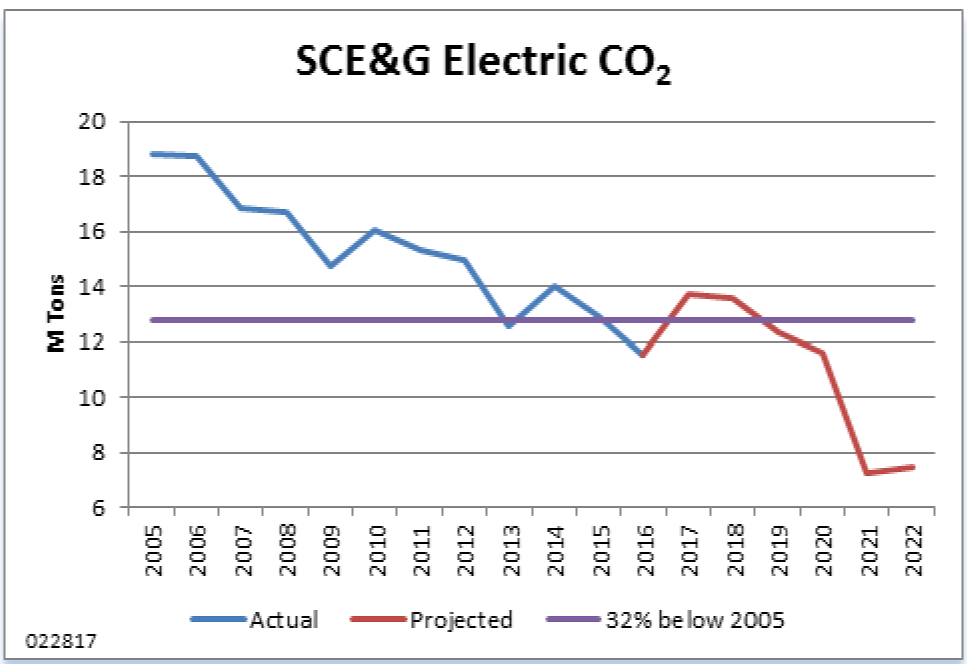
c. Clean Power Plan: In August 2015, the EPA issued two rules addressing the emission of greenhouse gases from electric generating units (EGU), one for existing units and one for new or modified units. These rules were issued in response to the President's June 2013 Climate Action Plan.

The first of these rules amends the new source performance standards ("NSPS") for EGUs and establishes the first NSPS for greenhouse gas ("GHG") emissions. Carbon dioxide emissions from natural gas-fired EGUs are limited to 1000 lbs. CO_2/MWh. Coal-fired EGUs carbon dioxide emissions are limited to 1400 lbs. CO_2/MWh. The Company currently has no plans to add new coal-fired generation.

The second rule published in August 2015, was issued under the authority of Section 111(d) of the Clean Air Act and governs existing power plants. The EPA has determined a "Best System of Emissions Reduction" (BSER) for these existing plants. The BSER includes three "Building Blocks," including heat rate reduction at coal-fired plants; re-dispatch of electric generation from coal to natural gas plants; and substituting zero-emission generation for existing coal-fired plants. The final rule differs from the 2014 proposed rule, which did not give proper credit to new nuclear units being constructed in South Carolina and several other states. The August 2015 final rule does give proper credit to those nuclear units.

Using this BSER, the EPA established targets for each state covered by the 111(d) rule and has proposed various pathways for each state to comply with those targets. Those pathways include rate-based compliance plans, wherein each EGU would be required to meet an emission rate target. Alternatively, a state may select a mass-based compliance plan, in which an EGU would be allocated a CO_2 emission (in short tons) cap. In both the rate and mass-based plans, EGUs would have the opportunity to trade credits or allocations to assist in meeting those targets.

The Company has no plans to add new coal-fired generation but is currently constructing two new nuclear generation units (see Section 4d, "New Nuclear Capacity"). The new nuclear credit in addition to the Company's plans to add renewables and energy efficiency measures are expected to help it achieve compliance with the Clean Power Plan. However, it is not known what specific measures and requirements may be promulgated in the final State Implementation Plan. If the Clean Power Plan is implemented, the EPA anticipates that CO2 emissions will be 32% below 2005 levels by the year 2030. The following chart shows that SCE&G's CO_2 emissions were below the "32% below 2005" emission level in 2016 and will be significantly below the level after new nuclear begins generating.



On February 9, 2016, the Supreme Court stayed the rule, and arguments were held in the United States Court of Appeals for the D.C. Circuit in September 2016; however, no rulings on the rule have been issued as yet. Although the order of the Supreme Court has no immediate impact on SCE&G and GENCO or their generation operations, it is generally expected that the stay will delay the implementation dates of the rule on a day for day basis just as it has done during litigation of other environmental rules (e.g. the Cross State Air Pollution Rule or CSAPR).

d. Cooling Water Intake Structures: The Clean Water Act Section 316(b) Existing Facilities Rule became effective on October 14, 2014. This rule is intended to reduce impacts to fish and shellfish due to impingement, when organisms are trapped against inlet screens, and entrainment, when small organisms are drawn through the screens into the facility's cooling water system. Facilities capable of withdrawing at least 2 million gallons per day are generally subject to the rule. Facilities that are subject to the rule must, at a minimum, submit a series of reports which describe the design and operation of the cooling water intake, as well as physical and biological characteristics of the cooling water source waterbody. For some facilities, operational or design changes will be necessary to meet the requirements of the rule. Potential design changes range from enhanced screening and reconfiguration of water intake systems to installation of closed-cycle cooling towers to reduce flow rates. Of the SCE&G generating facilities potentially subject to the rule, two, Wateree and Cope Stations, currently meet Best Technology Available (BTA) requirements for impingement mortality and entrainment. Two others, McMeekin and Jasper Stations, have been determined to be not-in-scope of the rule. An entrainment study at Summer Station Unit 1 was completed in 2016 and recommends no modifications to the intake structure. A biological study plan, which would evaluate current impacts to fish and shellfish, is being developed for Urquhart Station. Finally, Williams Station was issued a permit in December 2016 that requires biologic and intake study plans be conducted over the five year permit life. Modifications to the Williams Station intake structure, if any, may be delayed due to interferences of this intake with the Charleston Water Service intake for drinking water supplied to the Charleston Metro area.

e. Coal Combustion Residuals: In response to concerns over the potential structural failure of coal ash impoundment facilities, EPA has elected to further regulate coal combustion residual (CCR or ash) management in landfills and surface impoundments (ponds). On April 17, 2015, the EPA issued a final CCR management rule. The rule regulates CCR as a non-hazardous waste under Subtitle D of the Resource Conservation and Recovery Act (RCRA). The rule became effective on October 19, 2015, and requires the phase-in of several activities including making information accessible on the Company website, additional structural integrity assessments of pond dikes, and additional monitoring of environmental conditions at each landfill and pond.

The rule acknowledges that CCR can be safely reused in encapsulated uses such as cement and wallboard manufacture. SCE&G has long provided CCR as a useful raw material to those industries and expects to continue to do so.

CCR landfills at Cope, Wateree, and Williams station are subject to the rule. Ponds at Wateree and Williams station are also covered by the rule. Notwithstanding this new CCR rule, SCE&G has already closed its ash storage ponds or has begun the process of ash pond closure at all of its operating facilities. Those ash storage ponds that are still open are subjected to a rigorous inspection and maintenance program to ensure the safe management of those units. SCE&G will continue to operate ponds for flue-gas desulfurization (FGD) solids for the foreseeable future, and will continue to operate CCR landfills.

SCE&G has been conducting compliance activities required by this rule, including, but not limited to: studies and monitoring of pond dikes; increased inspections of CCR units; additional groundwater monitoring; and publication on the internet of certain data required by the rule.

f. Effluent Limitation Guidelines: On September 30, 2015, the EPA amended the Effluent Limitation Guideline for Steam Electric Power Generators. The standards under this rule were set to match the "Best Available Technology" for wastewaters produced at this type of electric generating facilities. Although several types of wastewaters were given new discharge standards under this rule, the most significant and difficult water to treat is flue-gas desulfurization (FGD) wastewater. FGD wastewater is generated at Wateree and Williams Stations.

Under the CWA, compliance with applicable limitations is achieved under State-issued National Permit Discharge Elimination System (NPDES) permits. As a facility's NPDES permit is renewed (every 5 years) any new effluent limitations would be incorporated. Now that the rule is effective, the State environmental regulators will modify the NPDES permits to match more restrictive standards thus requiring utilities to retrofit each facility with new wastewater treatment technologies. Compliance dates will vary by type of wastewater and some will be based on a plant's 5-year permit renewal cycle and thus may range from 2018 to 2023. Based on the proposed rule, SCE&G expects that wastewater treatment technology retrofits will be required at Williams and Wateree at a minimum.

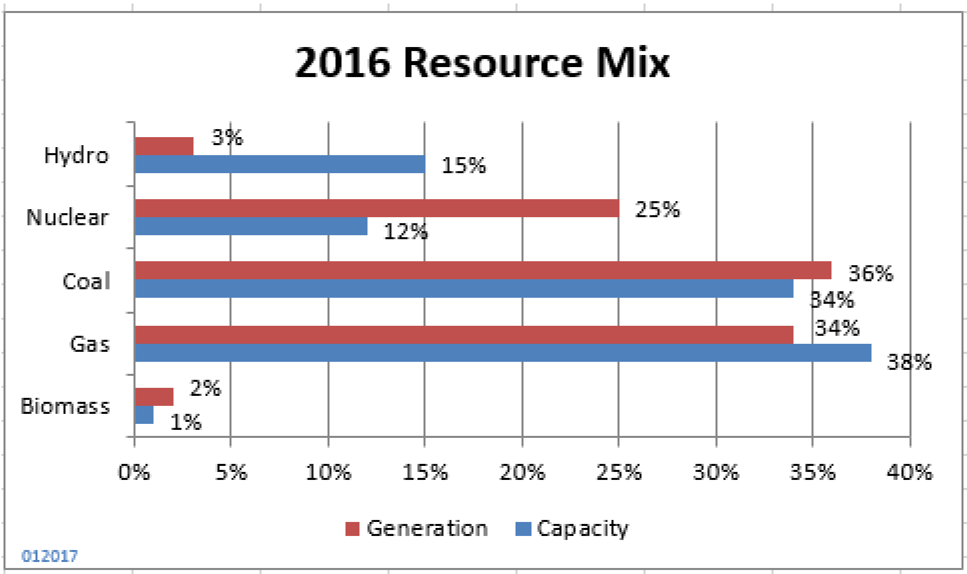
g. NAAQS 1-hour SO_2: In June 2010, EPA revised the primary SO_2 standard by establishing a new 1-hour standard at a level of 75 parts per billion ("ppb"). The EPA revoked the two existing primary standards of 140 ppb evaluated over 24-hours, and 30 ppb per hour averaged over an entire year. The new form is the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations.

In August 2015, the EPA issued additional rules (the Data Requirements Rule) clarifying that only facilities emitting more than 2000 tons per year of SO_2 are required to demonstrate compliance. For SCE&G, only Wateree Station exceeds that threshold. Compliance can be demonstrated using computer-based dispersion models; however, compliance may also be demonstrated using a series of ambient SO_2 monitors. In January 2017, SCE&G submitted to SCDHEC and EPA a computer modeling study that demonstrated compliance with the SO_2 standard at the Wateree Station.

4. Supply Side Resources at SCE&G

a. Existing Supply Resources: SCE&G owns and operates three (3) coal-fired fossil fuel plants, two (2) gas-fired steam plants, two (2) combined cycle gas turbine/steam generator plants (gas/oil fired), seven (7) peaking turbine plants, four (4) hydroelectric generating plants, and one Pumped Storage Facility. In addition, SCE&G receives the output of 85 MWs from a cogeneration facility. The total net non-nuclear summer generating capability rating of these facilities is 4,586 MWs in summer and 4,758 MWs in winter. These ratings, which are updated at least on an annual basis, reflect the expectation for the coming summer and winter seasons. When SCE&G's nuclear capacity (647 MWs in summer and 661 MWs in winter), a long term capacity purchase (25 MWs) and additional capacity (20 MWs) provided through a contract with the Southeastern Power Administration are added, SCE&G's total supply capacity is 5,278 MWs in summer and 5,464 MWs in winter. This is summarized in the table on the following page.

The bar chart below shows SCE&G's actual 2016 relative energy generation and relative capacity by fuel source.



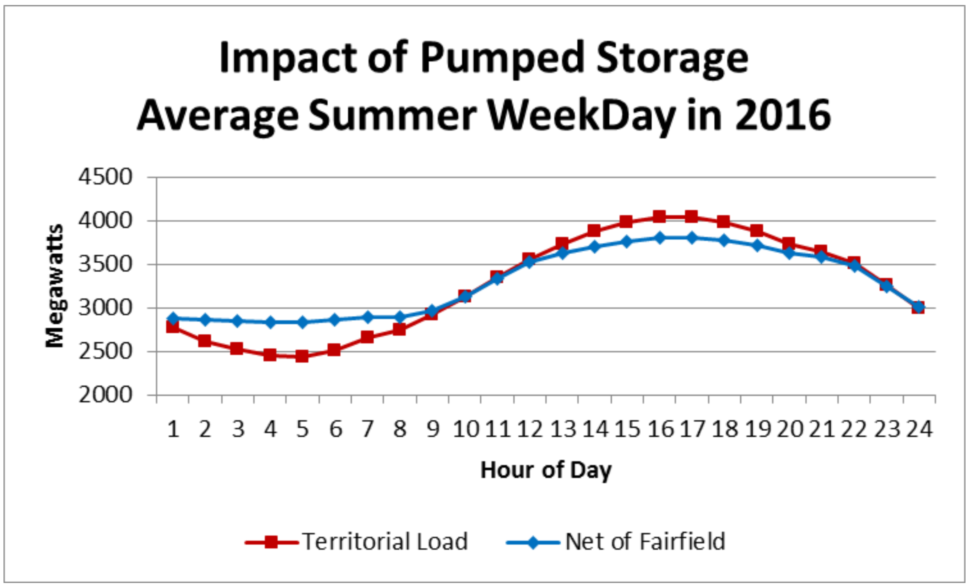
Existing Long Term Supply Resources

The following table shows the generating capacity that is available to SCE&G in 2017.

	In-Service Date	Summer (MW)	Winter (MW)
Coal-Fired Steam:			
Wateree – Eastover, SC	1970	684	684
Williams – Goose Creek, SC*	1973	605	610
Cope - Cope, SC	1996	415	415
KapStone – Charleston, SC	1999	85	85
Total Coal-Fired Steam Capacity		1,789	1,794
Gas-Fired Steam:			
McMeekin – Irmo, SC	1958	250	250
Urquhart – Beech Island, SC	1955	95	96
Total Gas-Fired Steam Capacity		345	346
Nuclear:			
V. C. Summer - Parr, SC	1984	647	661
I. C. Turbines:			
Hardeeville, SC	1968	9	9
Urquhart – Beech Island, SC	1969	39	48
Coit – Columbia, SC	1969	26	36
Parr, SC	1970	60	73
Williams – Goose Creek, SC	1972	40	52
Hagood – Charleston, SC	1991	126	141
Urquhart No. 4 – Beech Island, SC	1999	48	49
Urquhart Combined Cycle – Beech Island, SC	2002	458	484
Jasper Combined Cycle – Jasper, SC	2004	852	924
Total I. C. Turbines Capacity		1,658	1,816
Hydro:			
Neal Shoals – Carlisle, SC	1905	3	4
Parr Shoals – Parr, SC	1914	7	12
Stevens Creek - Near Martinez, GA	1914	8	10
Saluda - Irmo, SC	1930	200	200
Fairfield Pumped Storage - Parr, SC	1978	576	576
Total Hydro Capacity		794	802
Other: Long-Term Purchases		25	25
Southeastern Power Administration (SEPA)		20	20
Grand Total:		5,278	5,464

* Williams Station is owned by GENCO, a wholly owned subsidiary of SCANA and is operated by SCE&G.
* Not reflected in the table is a solar PV generator owned by SCE&G with a nominal direct current rating of 2.6 MWs, nor are 300 MWs of firm capacity purchases for the years 2017-2019.
* 16 MWs of existing and expected solar capacity purchases is also not reflected in the table.

b. DSM from the Supply Side: SCE&G is able to achieve a DSM-like impact from the supply side using its Fairfield Pumped Storage Plant. The Company uses off-peak energy to pump water uphill into the Monticello Reservoir and then displaces on-peak generation by releasing the water and generating power. This accomplishes the same goal as many DSM programs, namely, shifting use to off-peak periods and lowering demands during high cost, on-peak periods. The following graph shows the impact that Fairfield Pumped Storage had on a typical summer weekday.



In effect, the Fairfield Pumped Storage Plant was used to shave about 307 MWs from the daily peak times of 2:00 p.m. through 6:00 p.m. and to move about 2.5% of customer's daily energy needs off peak. Because of this valuable supply side capability, a similar capability on the demand side, such as a time of use rate, would be less valuable on SCE&G's system than on many other utility systems.

c. Planning Reserve Margin: Summer and Winter: The Company provides for the reliability of its electric service by maintaining an adequate reserve margin of supply capacity. The appropriate level of reserve capacity for SCE&G is in the range of 14 to 20 percent of its firm summer peak demand. This range of reserves will allow SCE&G to adequately address the three components of reserves which are: 1) the need for daily operating reserves; 2) the need to cover the supply risk, i.e., the unexpected loss of capacity; and 3) the need to cover the demand risk, i.e., higher than expected loads.

To analyze these three components of reserve and establish a reserve margin target range, SCE&G employs three methodologies: 1) the component method which analyzes separately each of the three components mentioned above; 2) the traditional and industry standard technique of "Loss of Load Expectation," or LOLE, using a range of LOLE from 1 day per year to 1 day in 10 years; and 3) the largest unit out method. The results of this analysis are summarized in the following table and support a reserve margin target range of 14% to 20%.

	Low MWs	**Low %**	**High MWs**	**High %**
Component Method	675	14.0%	1,085	22.6%
LOLE	715	14.9%	1,158	24.1%
Largest Unit	647	13.5%	971	20.2%
Reserve Margin Range		14%		20%

In recent years SCE&G has become concerned about the significant reliability risk of meeting peak loads during the winter season. On the supply side of the risk is the increasing amount of solar capacity in SCE&G's resource mix. Solar capacity will help meet the summer peak loads but our winter peaks usually occur early in the morning when little solar energy is available. This fact alone calls into question the adequacy of looking only at a summer based reserve margin. Additionally, the risk of higher winter peaks has become obvious. In four of the last 10 years, SCE&G has been winter peaking. The following table shows SCE&G's experience over the last ten years. Note that the winter season follows the summer season by utility convention.

Seasonal Peak Demands			
MWs	Summer	Winter	Difference
2007	4,926	4,577	349
2008	4,785	4,557	228
2009	4,546	4,718	-172
2010	4,735	4,868	-133
2011	4,885	4,397	488
2012	4,761	3,984	777
2013	4,574	4,853	-279
2014	4,594	4,970	-376
2015	4,750	4,409	341
2016	4,807	4,457	350

It should be observed that the largest peak demand over the last ten years, 4,970 MWs, occurred during the 2014 winter, i.e. the 2014-2015 winter season while the second largest peak demand, 4,926 MWs, occurred during the 2007 summer. Considering these changes in both the supply side and the demand side components of reliability risk, the Company has decided to re-evaluate its reserve margin policy. A reserve margin study is currently under development.

d. New Nuclear Capacity: On May 30, 2008, SCE&G filed with the Commission a Combined Application for a Certificate of Environmental Compatibility and Public Convenience and Necessity and for a Base Load Review Order for the construction and operation of two 1,117 net MW nuclear units to be located at the V.C. Summer Nuclear Station near Jenkinsville, South Carolina. Following a full hearing on the Combined Application, the Commission issued Order No. 2009-104(A) granting SCE&G, among other things, a Certificate of Environmental Compatibility and Public Convenience and Necessity.

On March 30, 2012, the United States Nuclear Regulatory Commission issued a combined Construction and Operation License ("COL") to SCE&G for each unit. Both units will have the Westinghouse AP1000 design and use passive safety systems to enhance the safety of the units.

On January 27, 2014, SCE&G and Santee Cooper agreed to increase SCE&G's ownership share from 55% to 60% in three stages. SCE&G will acquire an additional 1% of the 2,234 MWs of capacity when Unit #2 achieves commercial operation. An additional 2% will go to SCE&G one year later, and another 2% one year after that. By the end of April 2022, SCE&G expects to own 60% of both units (about 670 MWs each) while Santee Cooper will own 40%. SCE&G's purchase of this additional 5% ownership will require approval of the South Carolina Public Service Commission.

On October 27, 2015, SCE&G and Westinghouse Electric Company ("WEC") agreed to amend the Engineering, Procurement and Construction ("EPC") agreement. The amendment resolves substantially all existing disputes among parties to the project and provides better protection against future cost increases for SCE&G's customers. On February 14, 2017, WEC informed SCE&G that the revised in-service dates for Units 2 and 3 are April 2020 and December 2020, respectively.

e. Retirement of Coal Plants: When the EPA promulgated its Mercury and Air Toxics Standards ("MATS") on December 21, 2011, SCE&G had six small coal-fired units in its fleet totaling 730 MWs ranging in age from 45 to 57 years that could not meet the emission standards without further modifications to the units. Those six units are displayed in the following table.

Plant Name	Capacity (MW)	Commercialization Date
Canadys 1	90	1962
Canadys 2	115	1964
Canadys 3	180	1967
Urquhart 3	95	1955
McMeekin 1	125	1958
McMeekin 2	125	1958
Total	730	

After a thorough retirement analysis, SCE&G decided that these six units would be retired when the addition of new nuclear capacity was available as a replacement.[1] As part of this retirement plan SCE&G has retired Canadys' Units #1, 2 and 3 and has converted Urquhart Unit 3 to be fired with natural gas while dismantling the coal handling facilities at this unit. The capacity (250 MWs) of the remaining two coal-fired units, McMeekin Units 1 and 2, is required to maintain system reliability until the new nuclear capacity is available. Under the MATS regulations, but with a one year waiver granted by DHEC, these units were not allowed to run on coal after April 15, 2016. SCE&G is bridging the gap between the MATS compliance date and the availability of the new nuclear capacity by firing McMeekin Units 1 and 2 on natural gas and purchasing the balance of needed capacity.

When the 2011 retirement study was reported in SCE&G's 2012 IRP, SCE&G stressed that the plan to retire units was only a plan. It was not a decision. The plan was based on conditions existing and projected at that time. In its 2016 IRP, SCE&G reported that natural gas prices had decreased and the economics of retiring these units had changed since 2011, suggesting that it might be in SCE&G's customers' best interest to keep the units operating for a

[1] In announcing its plans to retire the units in its 2012 Integrated Resource Plan, the Company was careful to note that its retirement plans were subject to change if circumstances changed. See SCE&G's 2012 Integrated Resource Plan, at 29 (May 30, 2012) ("Although today's reference resource plan calls for the plant retirements, the Company will continue to monitor, among other things, developments in environmental regulations and will continue to analyze its options and modify the plan as needed to benefit its customers.").

while. At present, SCE&G plans to monitor the changing environmental regulations and fossil fuel prices and will make a retirement decision at the appropriate time.

f. Electric Vehicles: Electric vehicles represent the potential for the addition of a large electrical load on SCE&G's system. Using electricity a car will go about 3 miles per kWh. Some cars will get more miles, some less but the figure is about right for both a Battery Electric Vehicle ("BEV") which is all electric and a Plug-in Hybrid Electric Vehicle ("PHEV") which runs partly on electricity and partly on gasoline. On gasoline, a car might get 30 miles to the gallon. Again naturally it varies. If the cost of electricity is $0.14 per kWh and the cost of gasoline is $2.00 per gallon, then on electricity a car can go about 21.4 miles per dollar while on gasoline the car will go about 15.0 miles per dollar. Assuming the need to drive 15,000 miles per year, the annual fuel cost of the electric car will be about $700 while the annual fuel cost for the gasoline car will be about $1,000. Thus the more efficient electric car will save a driver about $300 per year in fuel costs. To counterbalance the better economics of operating an electric vehicle, the downsides today include a larger capital outlay to purchase, a reduced driving range and fewer and less convenient opportunities to re-fuel on the road. Of course all these dynamics continue to change and SCE&G will continue to monitor developments in the electric vehicle market.

g. Battery Storage on the Grid and in the Home: Battery storage systems are likely to play a significant role in the future, both on the grid and in the home. The cost of battery storage has been decreasing consistently over the last several years and the technology continues to improve. Today battery storage can be cost effective in select grid integrations when supplying necessary stabilization services such as frequency response and voltage regulation. Often these applications require specific, real-time experience by the utility in examining the available battery storage solutions and impact they have to the utility's transmission and distribution systems. This experience is especially important in determining the potential for cost effectively storing and shifting large amounts of renewable energy generation when coupled together. The dominant technologies currently are lithium-ion and a variety of flow batteries. Lithium-ion batteries have a high density storage coupled with a quick response time while flow batteries are better able to store energy for longer periods of time, hours to days. SCE&G will continue to monitor developments in battery storage technologies and their cost, and look for ways to improve the economics and reliability of service to our customers.

h. Projected Loads and Resources: SCE&G's resource plan for the next 15 years is shown in the table labeled "SCE&G Forecast Summer Loads and Resources – 2017 IRP" on a subsequent page. The resource plan shows the need for additional capacity and identifies, on a preliminary basis, whether the need is for peaking/intermediate capacity or base load capacity.

Line 6 for the summer season shows the amount of capacity available at the beginning of each summer. On line 7 the resource plan shows the amount of firm solar capacity expected to be available on the system peak hour. This solar capacity represents 280 MWs of solar capacity but only 50% of this capacity is assumed firm and therefore reflected in the resource plan. Also embedded in the peak demand forecast is the projected Net Energy Metering (NEM) solar capacity, i.e., behind the customer's meter, which is projected to increase to about 84 MWs by 2031, the end of the planning horizon.

Line 8 shows the amount of peaking capacity needed. The capacity related to the two nuclear units under construction is shown on line 9. On line 10 the resource plan shows a decrease in capacity of 85 MWs in 2018 and another decrease of 25 MWs in 2020. The reduction of 85 MWs represents the sale of the Cogen South generator and the 25 MWs, the expiration of a power purchase contract with Santee Cooper. The need for any firm one year capacity purchases is shown on line 12. The Company has secured the purchase of 300 MWs in the years 2017 through 2019. Capacity is added to maintain the SCE&G's summer planning reserve margin above a minimum of 14%. The resource plan thus constructed represents one possible way to reliably meet the increasing demand of our customers. Before the Company commits to adding a new resource, it will perform a study to determine what type resource will best serve our customers.

The Company believes that its supply plan, summarized in the following table, will be as benign to the environment as possible because of the Company's continuing efforts to utilize state-of-the-art emission reduction technology in compliance with state and federal laws and regulations. The supply plan will also help SCE&G keep its cost of energy service at a minimum since the generating units being added are competitive with alternatives in the market.

SCE&G Forecast of Summer Loads and Resources - 2017 IRP
(MW)

	YEAR	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Load Forecast																
1	Baseline Trend	5074	5197	5270	5410	5557	5689	5813	5913	5998	6081	6158	6232	6309	6383	6456
2	EE/Renewables Impact	-17	-28	-54	-78	-98	-117	-137	-156	-176	-196	-217	-238	-259	-279	-298
3	Gross Territorial Peak	5057	5169	5216	5332	5459	5572	5676	5757	5822	5885	5941	5994	6050	6104	6158
4	Demand Response	-252	-255	-257	-259	-261	-264	-266	-268	-270	-273	-275	-278	-280	-282	-285
5	Net Territorial Peak	4805	4914	4959	5073	5198	5308	5410	5489	5552	5612	5666	5716	5770	5822	5873
System Capacity																
6	Existing	5278	5294	5418	5333	5934	6604	6648	6648	6648	6648	6648	6648	6648	6648	6648
	Additions:															
7	Solar Plant	16	124													
8	Peaking/Intermediate															93
9	Baseload				626	670	44									
10	Retirements			-85	-25											
11	Total System Capacity	5294	5418	5333	5934	6604	6648	6648	6648	6648	6648	6648	6648	6648	6648	6741
12	Firm Annual Purchase	300	300	300												
13	Total Production Capability	5594	5718	5633	5934	6604	6648	6648	6648	6648	6648	6648	6648	6648	6648	6741
Reserves																
14	Margin (L13-L5)	789	804	674	861	1406	1340	1238	1159	1096	1036	982	932	878	826	868
15	% Reserve Margin (L14/L5)	16.4%	16.4%	13.6%	17.0%	27.0%	25.2%	22.9%	21.1%	19.7%	18.5%	17.3%	16.3%	15.2%	14.2%	14.8%

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III. Transmission System Assessment and Planning

SCE&G's transmission planning practices develop and coordinate a program that provides for timely modifications to the SCE&G transmission system to ensure a reliable and economical delivery of power. This program includes the determination of the current capability of the electrical network and a ten-year schedule of future additions and modifications to the system. These additions and modifications are required to support customer growth, provide emergency assistance and maintain economic opportunities for our customers while meeting SCE&G and industry transmission performance standards.

SCE&G has an ongoing process to determine the current and future performance level of the SCE&G transmission system. Numerous internal studies are undertaken that address the service needs of our customers. These needs include: 1) distributed load growth of existing residential, commercial, industrial, and wholesale customers, 2) new residential, commercial, industrial, and wholesale customers and 3) customers who use only transmission services on the SCE&G system.

SCE&G has developed and adheres to a set of internal Long Range Planning Criteria which can be summarized as follows:

The requirements of the SCE&G "LONG RANGE PLANNING CRITERIA" will be satisfied if the system is designed so that during any of the following contingencies, only short-time overloads, low voltages and local loss of load will occur and that after appropriate switching and re-dispatching, all non-radial load can be served with reasonable voltages and that lines and transformers are operating within acceptable limits.

a. *Loss of any bus and associated facilities operating at a voltage level of 115kV or above*
b. *Loss of any line operating at a voltage level of 115kV or above*
c. *Loss of entire generating capability in any one plant*
d. *Loss of all circuits on a common structure*
e. *Loss of any transmission transformer*
f. *Loss of any generating unit simultaneous with the loss of a single transmission line*

Outages more severe are considered acceptable if they will not cause equipment damage or result in uncontrolled cascading outside the local area.

Furthermore, SCE&G subscribes to the set of mandatory Electric Reliability Organization ("ERO"), also known as the North American Electric Reliability Corporation ("NERC"), Reliability Standards for Transmission Planning, as approved by the NERC Board of Trustees and the Federal Energy Regulatory Commission ("FERC").

SCE&G assesses and designs its transmission system to be compliant with the requirements as set forth in these standards. A copy of the NERC Reliability Standards is available at the NERC website http://www.nerc.com/.

The SCE&G transmission system is interconnected with Duke Energy Progress, Duke Energy Carolinas, South Carolina Public Service Authority ("Santee Cooper"), Georgia Power ("Southern Company") and the Southeastern Power Administration ("SEPA") systems. Because of these interconnections with neighboring systems, system conditions on other systems can affect the capabilities of the SCE&G transmission system and also system conditions on the SCE&G transmission system can affect other systems. SCE&G participates with other transmission planners throughout the southeast to develop current and future short circuit, power flow and stability models of the integrated transmission grid for the NERC Eastern Interconnection. All participants' models are merged together to produce current and future models of the integrated electrical network. Using these models, SCE&G evaluates its current and future transmission system for compliance with the SCE&G Long Range Planning Criteria and the NERC Reliability Standards.

To ensure the reliability of the SCE&G transmission system while considering conditions on other systems and to assess the reliability of the integrated transmission grid, SCE&G participates in assessment studies with neighboring transmission planners in South Carolina, North Carolina and Georgia. Also, SCE&G on a periodic and ongoing basis participates with other transmission planners throughout the southeast to assess the reliability of the southeastern integrated transmission grid for the long-term horizon (up to 10 years) and for upcoming seasonal (summer and winter) system conditions.

The following is a list of joint studies with neighboring transmission owners completed over the past year:

1. SERC NTSG Reliability 2016 Summer Study
2. SERC NTSG Reliability 2016/2017 Winter Study
3. SERC LTSG 2021 Summer Peak Study
4. SERC RAWG 2018 Summer Transfer Study
5. SERC RAWG 2018/19 Winter Transfer Study
6. SERC RAWG 2020 Summer Transfer Study
7. SERC RAWG 2020/21 Winter Transfer Study
8. SERC NTSG OASIS 2016 January Studies (16Q1)
9. SERC NTSG OASIS 2016 April Studies (16Q2)
10. SERC NTSG OASIS 2016 July Studies (16Q3)
11. SERC NTSG OASIS 2016 October Studies (16Q4)
12. CTCA 2018/19 Winter Peak Reliability Study
13. CTCA 2020 Summer, 2026 Summer Peak Reliability Study
14. SCRTP 2016/17 Winter, 2017 Summer, and 2020 Summer Transfer Studies

The acronyms used above have the following reference:

SERC – SERC Reliability Corporation
NTSG – Near Term Study Group
LTSG – Long Term Study Group
RAWG – Resource Adequacy Working Group
OASIS – Open Access Same-time Information System
CTCA – Carolinas Transmission Coordination Arrangement
SCRTP – South Carolina Regional Transmission Planning

These activities, as discussed above, provide for a reliable and cost effective transmission system for SCE&G customers.

Eastern Interconnection Planning Collaborative (EIPC)

The Eastern Interconnection Planning Collaborative ("EIPC") was initiated by a coalition of regional Planning Authorities. These Planning Authorities are entities listed on the NERC compliance registry as Planning Authorities and represent the entire Eastern Interconnection. The EIPC was founded to be a broad-based, transparent collaborative process among all interested stakeholders:

- State and Federal policy makers
- Consumer and environmental interests
- Transmission Planning Authorities
- Market participants generating, transmitting or consuming electricity within the Eastern Interconnection

The EIPC provides a grass-roots approach which builds upon the regional expansion plans developed each year by regional stakeholders in collaboration with their respective NERC Planning Authorities. This approach provides coordinated interregional analysis for the entire Eastern Interconnection guided by the consensus input of an open and transparent stakeholder process.

The EIPC purpose is to model the impact on the grid of various policy options determined to be of interest by state, provincial and federal policy makers and other stakeholders. This work builds upon, rather than replaces, the current local and regional transmission planning processes developed by the Planning Authorities and associated regional stakeholder groups within the entire Eastern Interconnection. Those processes are informed by the EIPC analysis efforts including the interconnection-wide review of the existing regional plans and development of transmission options associated with the various policy options.

Appendix A

Short Range Methodology

This section presents the development of the short-range electric sales forecasts for the Company. Two years of monthly forecasts for electric customers, average usage, and total usage were developed according to Company class and rate structures, with industrial customers further categorized individually or into SIC (Standard Industrial Classification) codes. Residential customers were classified by housing type (single family, multi-family, and mobile homes), rate, and by a statistical estimate of weather sensitivity. For each forecasting group, the number of customers and either total usage or average usage was estimated for each month of the forecast period.

The short-range methodologies used to develop these models were determined primarily by available data, both historical and forecast. Monthly sales data by class and rate are generally available historically. Daily heating and cooling degree data for Columbia and Charleston are also available historically, and were projected using a 15-year average of the daily values. Industrial production indices are also available by SIC on a quarterly basis, and can be transformed to a monthly series. Therefore, sales, weather, industrial production indices, and time dependent variables were used in the short range forecast. In general, the forecast groups fall into two classifications, weather sensitive and non-weather sensitive. For the weather sensitive classes, regression analysis was the methodology used, while for the non-weather sensitive classes regression analysis or time series models based on the autoregressive integrated moving average (ARIMA) approach of Box-Jenkins were used.

The short range forecast developed from these methodologies was also adjusted for federally mandated lighting programs, new industrial loads, terminated contracts, or economic factors as discussed in Section 3.

Regression Models

Regression analysis is a method of developing an equation which relates one variable, such as usage, to one or more other variables which help explain fluctuations and trends in the first. This method is mathematically constructed so that the resulting combination of explanatory variables produces the smallest squared error between the historic actual values and those estimated by the regression. The output of the regression analysis provides an equation for the variable being explained. Several statistics which indicate the success of the regression analysis fit are shown for each model. Several of these indicators are R^2, Root Mean Squared Error, Durbin-Watson Statistic, F-Statistic, and the T-Statistics of the Coefficient. PROC REG of SAS was used to estimate all regression models. PROC AUTOREG of SAS was used if significant autocorrelation, as indicated by the Durbin-Watson statistic, was present in the model.

Two variables were used extensively in developing weather sensitive average use models: heating degree days ("HDD") and cooling degree days ("CDD"). The values for HDD and CDD are the average of the values for Charleston and Columbia. The base for HDD was 60^o and for CDD was 75^o. In order to account for cycle billing, the degree day values for each day were weighted by the number of billing cycles which included that day for the current month's billing. The daily weighted degree day values were summed to obtain monthly degree day values. Billing sales for a calendar month may actually reflect consumption that occurred in the previous month based on weather conditions in that period and also consumption occurring in the current month. Therefore, this method more accurately reflects the impact of weather variations on the consumption data.

The development of average use models began with plots of the HDD and CDD data versus average use by month. This process led to the grouping of months with similar average use patterns. Summer and winter groups were chosen, with the summer models including the months of May through October, and the winter models including the months of November through April. For each of the groups, an average use model was developed. Total usage models were developed with a similar methodology for the municipal customers. For these customers, HDD and CDD were weighted based on monthly calendar weather. Simple plots of average use over time revealed significant changes in average use for some customer groups. Three types of variables were used to measure the effect of time on average use:

1. Number of months since a base period;
2. Dummy variable indicating before or after a specific point in time; and,
3. Dummy variable for a specific month or months.

Some models revealed a decreasing trend in average use, which is consistent with conservation efforts and improvements in energy efficiency. However, other models showed an increasing average use over time. This could be the result of larger houses, increasing appliance saturations, lower real electricity prices, and/or higher real incomes.

ARIMA Models

Autoregressive integrated moving average ("ARIMA") procedures were also used in developing the short range forecasts. For various class/rate groups, they were used to develop customer estimates, average use estimates, or total use estimates.

ARIMA procedures were developed for the analysis of time series data, i.e., sets of observations generated sequentially in time. This Box-Jenkins approach is based on the assumption that the behavior of a time series is due to one or more identifiable influences. This method recognizes three effects that a particular observation may have on subsequent values in the series:

1. A decaying effect leads to the inclusion of autoregressive (AR) terms;
2. A long-term or permanent effect leads to integrated (I) terms; and,
3. A temporary or limited effect leads to moving average (MA) terms.

Seasonal effects may also be explained by adding additional terms of each type (AR, I, or MA).

The ARIMA procedure models the behavior of a variable that forms an equally spaced time series with no missing values. The mathematical model is written:

$$Z_t = u + Y_i \ (B) \ X_{i,t} + q \ (B)/ f \ (B) \ a_t$$

This model expresses the data as a combination of past values of the random shocks and past values of the other series, where:

t indexes time

B is the backshift operator, that is $B (X_t) = X_{t-1}$

Z_t is the original data or a difference of the original data

f(B) is the autoregressive operator, $f(B) = 1 – f_1 B - \dots - f_1 B^p$

u is the constant term

q(B) is the moving average operator, $q (B) = 1 - q_1 B - ... - q_q B^q$

a_t is the independent disturbance, also called the random error

$X_{i,t}$ is the ith input time series

$y_i(B)$ is the transfer function weights for the ith input series (modeled as a ratio of polynomials)

$y_i(B)$ is equal to $w_i (B)/ d_i (B)$, where $w_i (B)$ and $d_i (B)$ are polynomials in B.

The Box-Jenkins approach is most noted for its three-step iterative process of identification, estimation, and diagnostic checking to determine the order of a time series. The autocorrelation and partial autocorrelation functions are used to identify a tentative model for univariate time series. This tentative model is estimated. After the tentative model has been fitted to the data, various checks are performed to see if the model is appropriate. These checks involve analysis of the residual series created by the estimation process and often lead to refinements in the tentative model. The iterative process is repeated until a satisfactory model is found.

Many computer packages perform this iterative analysis. PROC ARIMA of (SAS/ETS)[2] was used in developing the ARIMA models contained herein. The attractiveness of ARIMA models comes from data requirements. ARIMA models utilize data about past energy use or customers to forecast future energy use or customers. Past history on energy use and customers serves as a proxy for all the measures of factors underlying energy use and customers when other variables were not available. Univariate ARIMA models were used to forecast average use or total usage when weather-related variables did not significantly affect energy use or alternative independent explanatory variables were not available.

Electric Sales Assumptions

For short-term forecasting, over 30 forecasting groups were defined using the Company's customer class and rate structures. Industrial (Class 30) Rate 23 was further divided using SIC codes. In addition, thirty-five large industrial customers were individually projected. The residential class was disaggregated into several sub-groups, starting first with rate. Next, a regression analysis was done to separate customers into two categories, "more weather-sensitive" and "less weather sensitive". Generally speaking, the former group is associated with higher average use per customer in winter months relative to the latter group. Finally, these categories were divided by housing type (single family, multi-family, and mobile homes). Each municipal account represents a forecasting group and was also individually forecast. Discussions were held with Industrial Marketing and Economic Development representatives within the Company regarding prospects for industrial expansions or new customers, and adjustments made to customer, rate, or account projections where appropriate. Table 1 contains the definition for each group and Table 2 identifies the methodology used and the values forecasted by forecasting groups.

The forecast for Company Use is based on historic trends and adjusted for Summer 1 nuclear plant outages. Unaccounted energy, which is the difference between generation and sales and represents for the most part system losses, is usually between 4-5% of total territorial sales. The average annual loss for the three previous years was 4.6%, and this value was assumed throughout the forecast. The monthly allocations for unaccounted use were based on a regression model using normal total degree-days for the calendar month and total degree-days weighted by cycle billing. Adding Company Use and unaccounted energy to monthly territorial sales produces electric generation requirements.

1. TABLE 1 Short-Term Forecasting Groups

A. Number	Class Class Name	Designation	Rate/SIC Comment
10	Residential Less Weather-Sensitive	Single Family	Rates 1, 2, 5, 6, 8, 18, 25, 26, 62, 64
		Multi Family	67, 68, 69
910	Residential More Weather-Sensitive	Mobile Homes	
20	Commercial Less Weather-Sensitive	Rate 9	Small General Service
		Rate 12	Churches
		Rate 20, 21	Medium General Service
		Rate 22	Schools
		Rate 24	Large General Service
		Other Rates	3, 10, 11, 14, 16, 18, 25, 26 29, 62, 67, 69
920	Commercial Space Heating More Weather-Sensitive	Rate 9	Small General Service
30	Industrial Non-Space Heating	Rate 9	Small General Service
		Rate 20, 21	Medium General Service
		Rate 23, SIC 22	Textile Mill Products
		Rate 23, SIC 24	Lumber, Wood Products, Furniture and Fixtures (SIC Codes 24 and 25)
		Rate 23, SIC 26	Paper and Allied Products
		Rate 23, SIC 28	Chemical and Allied Products
		Rate 23, SIC 30	Rubber and Miscellaneous Products
		Rate 23, SIC 32	Stone, Clay, Glass, and Concrete
		Rate 23, SIC 33	Primary Metal Industries; Fabricated Metal Products; Machinery; Electric and Electronic Machinery, Equipment and Supplies; and Transportation Equipment (SIC Codes 33-37)
		Rate 23, SIC 99	Other or Unknown SIC Code*
		Rate 27, 60	Large General Service
		Other	Rates 18, 25, and 26
60	Street Lighting	Rates 3, 9, 13, 17, 18, 25, 26, 29, and 69	
70	Other Public Authority	Rates 3, 9, 20, 21, 25, 26, 29, 65 and 66	
92	Municipal	Rate 60, 61	Three Individual Accounts

*Includes small industrial customers from all SIC classifications that were not previously forecasted individually. Industrial Rate 23 also includes Rate 24. Commercial Rate 24 also includes Rate 23.

TABLE 2

Summary of Methodologies Used To Produce
The Short Range Forecast

Value Forecasted	Methodology	Forecasting Groups
Average Use	Regression	Class 10, All Groups Class 910, All Groups Class 20, Rates 9, 12, 20, 22, 24, 99 Class 920, Rate 9 Class 70, Rate 3
Total Usage	ARIMA/ Regression	Class 30, Rates 9, 20, 99, and 23, for SIC = 91 and 99 Class 930, Rate 9 Class 60 Class 70, Rates 65, 66
	Regression	Class 92, All Accounts Class 97, One Account
Customers	ARIMA	Class 10, All Groups Class 910, All Groups Class 20, All Rates Class 920, Rate 9 Class 30, All Rates Except 60, 99, and 23 for SIC = 22, 24, 26, 28, 30, 32, 33, and 91 Class 930, Rate 9 Class 60 Class 70, Rate

Appendix B

Long Range Sales Forecast

Electric Sales Forecast

This section presents the development of the long-range electric sales forecast for the Company. The long-range electric sales forecast was developed for six classes of service: residential, commercial, industrial, street lighting, other public authorities, and municipals. These classes were disaggregated into appropriate subgroups where data was available and there were notable differences in the data patterns. The residential, commercial, and industrial classes are considered the major classes of service and account for over 93% of total territorial sales. A customer forecast was developed for each major class of service. For the residential class, forecasts were also produced for those customers categorized into two groups, more and less weather-sensitive. They were further disaggregated into housing types of single family, multi-family and mobile homes. Residential street lighting was also evaluated separately. These subgroups were chosen based on available data and differences in the average usage levels and/or data patterns. The industrial class was disaggregated into two digit SIC code classification for the large general service customers, while smaller industrial customers were grouped into an "other" category. These subgroups were chosen to account for the differences in the industrial mix in the service territory. With the exception of the residential group, the forecast for sales was estimated based on total usage in that class of service. The number of residential customers and average usage per customer were estimated separately and total sales were calculated as a product of the two.

The forecast for each class of service was developed utilizing an econometric approach. The structure of the econometric model was based upon the relationship between the variable to be forecasted and the economic environment, weather, conservation, and/or price.

Forecast Methodology

Development of the models for long-term forecasting was econometric in approach and used the technique of regression analysis. Regression analysis is a method of developing an equation which relates one variable, such as sales or customers, to one or more other variables that are statistically correlated with the first, such as weather, personal income or population growth. Generally, the goal is to find the combination of explanatory variables producing the smallest error between the historic actual values and those estimated by the regression. The output of the regression analysis provides an equation for the variable being explained. In the equation, the variable being explained equals the sum of the explanatory variables each multiplied by an estimated coefficient. Various statistics, which indicate the success of the regression analysis fit, were used to evaluate each model. The indicators were R^2, mean squared Error of the Regression, Durbin-Watson Statistic and the T-Statistics of the Coefficient. PROC REG and PROC AUTOREG of SAS were used to estimate all regression models. PROC REG was used for preliminary model specification, elimination of insignificant variables, and also for the final model specifications. Model development also included residual analysis for incorporating dummy variables and an analysis of how well the models fit the historical data, plus checks for any statistical problems such as autocorrelation or multicollinearity. PROC AUTOREG was used if autocorrelation was present as indicated by the Durbin-Watson statistic.

Prior to developing the long-range models, certain design decisions were made:

- The multiplicative or double log model form was chosen. This form allows forecasting based on growth rates, since elasticities with respect to each explanatory variable are given directly by their respective regression coefficients. Elasticity explains the responsiveness of changes in one variable (e.g. sales) to changes in any other variable (e.g. price). Thus, the elasticity coefficient can be applied to the forecasted growth rate of the explanatory variable to obtain a forecasted growth rate for a dependent variable. These projected growth rates were then applied to the last year of the short range forecast to obtain the forecast level for customers or sales for the long range forecast. This is a constant elasticity model, therefore, it is important to evaluate the reasonableness of the model coefficients.
- One way to incorporate conservation effects on electricity is through real prices or time trend variables. Models selected for the major classes would include these variables, if they were statistically significant.
- The remaining variables to be included in the models for the major classes would come from four categories:
    1. Demographic variables - Population.
    2. Measures of economic well-being or activity: real personal income, real per capita income, employment variables, and industrial production indices.
    3. Weather variables - average summer/winter temperature or heating and cooling degree-days.

4. Variables identified through residual analysis or knowledge of political changes, major economics events, etc. (e.g., the gas price spike in 2005 attributable to Hurricane Katrina and recession versus non-recession years).

Standard statistical procedures were used to obtain preliminary specifications for the models. Model parameters were then estimated using historical data and competitive models were evaluated on the basis of:

- Residual analysis and traditional "goodness of fit" measures to determine how well these models fit the historical data and whether there were any statistical problems such as autocorrelation or multicollinearity.
- An examination of the model results for the most recently completed full year.
- An analysis of the reasonableness of the long-term trend generated by the models. The major criteria here was the presence of any obvious problems, such as the forecasts exceeding all rational expectations based on historical trends and current industry expectations.
- An analysis of the reasonableness of the elasticity coefficient for each explanatory variable. Over the years a host of studies have been conducted on various elasticities relating to electricity sales. Therefore, one check was to see if the estimated coefficients from Company models were in-line with others. As a result of the evaluative procedure, final models were obtained for each class.
- The drivers for the long-range electric forecast included the following variables.

Service Area Housing Starts
Service Area Real Per Capita Income
Service Area Real Personal Income
State Industrial Production Indices
Real Price of Electricity
Average Summer Temperature
Average Winter Temperature
Heating Degree Days
Cooling Degree Days

The service area data included Richland, Lexington, Berkeley, Dorchester, Charleston, Aiken and Beaufort counties, which account for the vast majority of total territorial electric sales. Service area historic data and projections were used for all classes with the exception of the industrial class. Industrial productions indices were only available on a statewide basis, so forecasting relationships were developed using that data. Since industry patterns are generally based on regional and national economic patterns, this linking of Company industrial sales to a larger geographic index was appropriate.

Economic Assumptions

In order to generate the electric sales forecast, forecasts must be available for the independent variables. The forecasts for the economic and demographic variables were obtained from Global Insight, Inc. and the forecasts for the price and weather variables were based on historical data. The trend projection developed by Global Insight is characterized by slow, steady growth, representing the mean of all possible paths that the economy could follow if subject to no major disruptions, such as substantial oil price shocks, untoward swings in policy, or excessively rapid increases in demand.

Average summer temperature (average of June, July, and August temperature) or CDD , and average winter temperature (average of December (previous year), January and February temperature) or HDD were assumed to be equal to the normal values used in the short range forecast.

After the trend econometric forecasts were completed, reductions were made to account for higher air-conditioning and water-heater efficiencies, DSM programs, and the replacement of incandescent light bulbs with more efficient CFL or LED light bulbs. Industrial sales were increased if new customers are anticipated or if there are expansions among existing customers not contained in the short-term projections.

Peak Demand Forecast

A demand forecast is made for the summer peak, the winter peak and then for each of the remaining ten months of the year. The summer peak demand forecast and the winter peak demand forecast is made for each of the seven major classes of customers. Customer load research data is summarized for each of these major customer classes to derive load characteristics that are combined with the energy forecast to produce the projection of future peak demands on the system. Interruptible loads and standby generator capacity is captured and used in the peak forecast to develop a firm level of demand. By utility convention the winter season follows the summer season. The territorial peak demands in the other ten months are projected based on historical ratios by season. The months of May through October are grouped as the summer season and projected based on the average historical ratio to the summer peak demand. The other months of the year are similarly projected with reference to the winter peak demand.