South Carolina Energy Policy Inquiry Aggregate Responses

Forward

This report is a state-wide aggregate based on the responses received from South Carolina's electric utilities. All utilities were asked the same questions. However, some did not, and were not required to, respond to all questions. This is because the utilities were instructed to only address the questions that pertained to their operations.

Section 1

Question 1

For your total system electric production facilities, please provide the following for the categories of baseload, intermediate and peaking. Please provide parameters used to categorize baseload, intermediate and peaking facilities (i.e. annual capacity factor, physical constraints, etc.) and provide the information by fuel type under each category.

Capacity Factor is a way to measure the productivity of power plants. It is determined by taking the actual power produced and dividing it by the power that would have been produced if the plant operated at 100% all the time.

The concept of capacity factor is used to classify different types of generation. It is useful for determining how different methods of generating electricity may be used to meet demands for electricity.

$$\frac{\text{Actual mWh produced}}{\text{8760 x MW Rating for plant}} = \text{Capacity Factor}$$

(8760 represents the # of hours in a year)

South Carolina

Classification	*Capacity Factor*
Baseload	60% and above
Intermediate	20–60%
Peaking	20% or less

a. Total summer net dependable capacity (NDC) in megawatts (MW) for each classification.
b. Energy, in megawatt hours (mWh), produced in 2007 for each classification.

South Carolina Total

Classification	*MW*	*% of Capacity*	*mWh in 2007*	*% of Generation*	*Capacity Factor*
Baseload	11,267	61.11%	90,023,907	85.70%	91.21%
Intermediate	3,128	16.97%	11,967,233	11.40%	43.68%
Peaking	4,042	21.92%	3,050,876	2.90%	8.62%
Total	**18,437**	**100.00%**	**105,042,016**	**100.00%**	

Question 2

In regard to your energy (mWh) generation for South Carolina customers, please state, by fuel type (i.e., nuclear, coal, natural gas, other):

a. 2007 generation in mWh (ratios may be used for multi-state companies).

South Carolina Total

Fuel Type	*2007 mWh Generated—SC Allocation*	*% of Generation*
Coal	55,047,651	60.54%
Nuclear	28,228,454	31.04%
Natural Gas/Oil	5,667,906	6.23%
Hydro	1,919,911	2.11%
Diesel	495	0.001%
Methane Gas	63,842	0.07%
Total	**90,928,259**	**100.00%**

b. Age of plants by unit.
c. Remaining depreciable/book life.

The concept of "remaining depreciable/book life" has significance for electricity rates. The cost of a generating plant is spread over its depreciable/book life and included in the rates customers pay during that time period. Early retirement of a generating plant disrupts this plan for spreading out its cost.

South Carolina Total

Fuel Type	*Average Age of Plant (years)*	*Average Remaining Depreciable/Book Life*
Nuclear	28	32
Coal	45	27
Natural Gas/Oil	25	20
Hydro	78	32
Diesel	6	Unknown
Methane Gas	3	12

Question 3

Please provide for your coal fired plants:

a. Total summer Net Dependable Capacity (NDC) in MW.
b. 2007 generation in mWh.
c. Summer peak capability (MW) of units with scrubbers and/or Selective Catalytic Reduction devices (SCR). Please identify what technology is being used.
d. 2007 generation in mWh of units with scrubbers and/or SCRs. Please identify what technology is being used.
e. Summer peak capability (MW) of existing units without scrubbers and/or SCRs that are scheduled to have scrubbers and/or SCRs installed within 5 years. Please identify what technology is scheduled to be installed and the expected installation date.
f. 2007 generation in mWh of existing units without scrubbers and/or SCRs that are scheduled to have scrubbers and/or SCRs installed within 5 years. Please identify what technology is scheduled to be installed and the expected installation date.

Scrubbers and Selective Catalytic Reduction Devices (SCR) are used in coal-fired power plants to reduce emissions. These devices cause a chemical change in the emissions from these plants which reduce the sulfur dioxide (SO_2), nitrous oxide (NOx) and many other emissions. Reductions can be as high as 98% depending on the equipment installed. Scrubbers reduce SO_2 and SCRs reduce NOx.

South Carolina Total

2007 Generation of coal fired plants	
Summer NDC (MW)	18,925
2007 Generation (mWh)	118,726,827
Summer Peak (MW) of Units with SCR or Scrubber	13,126
2007 Generation (mWh) of units with Scrubber or SCR	67,325,701
2007 Percentage Generation Capacity (MW) with Scrubber or SCR	69.4%

South Carolina Total

Projected for 2008-2013	
2007 Generation (mWh)	118,726,827
Summer Peak (mWh) of units to be Scrubbed/SCR **within 5 years**	1,864
2007 generation (mWh) of units to be scrubbed/SCR **within 5 years**	10,957,477
2007 **additional** Percentage Generation Capacity (MW) with Scrubber or SCR **within 5 years**	9.8%

**These numbers represent only coal fired power plants.*

Question 4

Please provide the total environmental capital investment for your power generation facilities.

This is the amount that South Carolina utilities have spent and will spend on capital projects solely to protect the environment. These costs were not spent to directly produce electricity.

a. Through 2007
b. Planned 2008-2013

South Carolina Total

Through 2007	*Planned 2008-2013*
$2,100,411,554	$1,493,481,520

Question 5

Please provide your annual variable environmental power generation costs.

This is the amount that South Carolina utilities spend every year on non-capital costs solely to protect the environment. These costs are in addition to the capital costs described in answer to Question 4.

South Carolina Total

Annual Total
$55,709,833

Question 6

What percentage of your current generation is produced by non-$C0_2$/Greenhouse Gas (GHG) emitting sources? If you expect these percentages to change significantly in the next 20 years, provide the year and those percentages.

a. Nuclear
b. Hydro
c. Other (please categorize and explain)

State Average, Weighted by Generation

	2007	*Next 20 Years**
Nuclear	31.04%	43.69%
Hydro	2.11%	3.65%
Renewables	0.07%	4.3%
Total	**33.22%**	**51.64%**

** Uses 2007 generation allocations for each company*

Question 7

What GHG neutral emitting generation sources have you studied or considered for inclusion in your generation capacity?

a. What, if any, GHG neutral generation do you consider being viable alternatives?
- **i. With current technology.**
- **ii. In the foreseeable future (next 20 years).**

b. Have you conducted any studies or research to determine the cost of GHG neutral generation on a per KW and kWh or overall cost basis?
- **i. If so, please provide the results or estimates produced by such study or research.**

Examples of Responses

With current technology:	*Foreseeable Future (20 years):*	
Nuclear	Nuclear	Wind
Biomass	Solar PV	Solar CSP
Hydro	Wave	Hydrogen
Solar	Biomass	Hydro
Wind		

Example of Cost Estimates

Technology	*$/KW (2007 Overnight Costs)*	*¢/kWh (All Costs)**
Nuclear (Existing site)	$3,400	7.500
Landfill Gas	$1,450	8.981
Wood Biomass	$2,700	10.791
Poultry Litter Biomass	$2,927	11.309
Wind Onshore	$1,700	12.262
Wind Offshore	$2,400	17.285
Solar PV	$6,000	65.639

**Includes capital and operating and maintenance costs.*

$/KW is a way of measuring the costs of building a generating plant so that different types of generation can be compared. ¢/kWh is a way of stating the expected impact on rates from construction of the various types of generation.

Question 8

Provide a cost estimate for the conversion of all of your current carbon emitting generation to non-GHG emitting generation (i.e., nuclear, hydro, wind, solar, geothermal, or other).

a. On a current cost basis.

b. Within or over the course of the next 10 years.

c. Within or over the course of the next 15 years.

Examples of Responses

- A complete conversion to non-GHG emitting generation within 15 years would result in prohibitively high rate increases for our customers.
- We don't believe that this is a feasible option in the Carolinas.
- Costs would be $25,000,000,000 (response of one company)
- Future costs are unknown
- We have not made any cost estimates

Question 9

Do you believe that carbon/GHG sequestration is a viable option for your company or entity?

{ *Carbon/GHG sequestration means the capture of carbon emitted during the generation process and storing that carbon underground so that it does not escape into the atmosphere.* }

a. If yes, provide a per ton cost estimate or projection for sequestering these emissions.

b. If no, explain why not.

Example of Responses

- There are no suitable geologic formations in the proximity of its South Carolina generating units, and no carbon dioxide transmission pipelines exist or are planned that would intersect the facility. Believes carbon capture and sequestration eventually may become a viable technology, it will not be viable for application to its South Carolina generating units.
- Do not believe that carbon sequestration is a viable option in this area because there are no known sedimentary basins, saline formations, oil fields, gas fields or coal beds suitable for geological storage of captured carbon.
- No. The technology is not sufficiently developed to begin sequestration and it would increase the operating cost approximately $1 billion per year.
- It is unknown whether sequestration is a viable technology. Permitting and liability questions remain unanswered. There continue to be questions concerning whether sequestration is a viable option for utilities located in South Carolina.

Question 10

What, if any, investment, research, or developments have you made in the study, consideration, or construction of non-GHG emitting generation facilities in South Carolina?

a. What plans or projects are currently being conducted or financed by you contemplating the use of non-GHG emitting generation by your entity in South Carolina?

b. Have you planned for or do you anticipate beginning or increasing any such studies or projects in the near future?

Example of Responses

Plans being conducted or financed in South Carolina:

- Additional nuclear generation
- Solar (current and future projects)
- Biomass
- Additional Landfill gas generation
- Funding studies on feasibility of off-shore wind and additional hydro
- Conservation and Demand Side Management
- Providing incentives to customers utilizing renewable generation
- Assisting customers with financing for the installation of renewable generation

Question 11

How many tons of $C0_2$ are produced each year by your generation facilities located in South Carolina?

a. What is your best estimate of your actual costs to eliminate or capture and sequester these emissions per ton?

b. Provide an explanation or analysis of the methods you would employ (e.g., solar generation, capture and sequestration, etc.).

Total CO_2 tons produced by plants located in SC

All Plants
46,726,352 tons (annually)

Example of Responses

a. We have not developed estimates on the cost to capture and sequester these emissions

Estimate costs to be $1 billion per year (response of one company)

b. • Nuclear

- Renewables
- Energy Efficiency
- Retirement of older coal units

Question 12

Please provide your estimate for the annual capacity factor for non-GHG emitting generation facilities in South Carolina including wind, solar, nuclear, hydro, geothermal, and other.

This is a way of comparing the productivity of different types of generation. This measurement is a significant factor in determining what types of generating plants should be built.

Approximate Capacity Factor

Nuclear	92%
Biomass	83%
Wind (offshore)	30%
Wind (onshore)	26%
Solar	18%
Hydro	14%

Section 2

Question 1

Please quantify your transmission interconnection capabilities and constraints (Available Transmission Capacity [ATC] by Interface). Please provide your latest annual peak hour transmission import and export capability.

"SC entity" refers to respondent to survey.
Entity is a company or transmission system controller.

Into entity from SC entity (MW)	*Into entity from non-SC entity (MW)*
11,849	8,718

From entity to SC entity (MW)	*From entity to non-SC entity (MW)*
19,701	9,120

Question 2

Please complete the attached sheet in regard to your forecast reserve margin, by year, for 2008-2023.

Year	*Generation Capacity (MW)*	*Purchased Power (MW)*	*Capacity (MW)*	**DSM/DR/EE (MW)*	*Capacity + DSM/DR/EE (MW)*	*System Peak Load (MW)*	*Weighted Reserve Margin*	*Weighted Capacity Margin*	*Generation Weights*
2010	*45,905*	*2,181*	*48,086*	*2,314*	*50,310*	*42,643*	*13.9%*	*13.8%*	*100.0%*
2015	*49,491*	*1,975*	*51,465*	*3,171*	*54,542*	*46,374*	*15.2%*	*14.8%*	*100.0%*
2020	*54,971*	*1,709*	*56,680*	*4,529*	*61,110*	*49,827*	*19.2%*	*20.4%*	*100.0%*

5.0% *2010*
6.9% *2015* } *weighted average DSM/DR/EE (weighted by generation only)*
9.9% *2020*

** Demand Side Management / Demand reduction / Energy Efficiency*

Two utilities are not included in totals.

Question 3

Based upon your load duration curves, what types of resources and how much of each type of resource is needed over your forecasted period (through 2023)?

Answers are summaries that reflect how many of the six utilities surveyed answered positively. There was only one "maybe" response.

Baseload

Nuclear	4
Coal	3
Energy Efficiency	2
Demand Side Management	3

Intermediate

Coal	1
Gas	2
Purchased power	0

Peaking

Gas	4
Hydro	2
Oil	1
Energy Efficiency	1
Demand Side Management	1

Renewable Power

Renewables	1
Biomass for baseload	1
Wind/solar for peaking	1
Landfill gas	1

Purchased power

Purchased Power	2

Question 4

Have you done (or commissioned) studies regarding:

a. Renewable energy availability in South Carolina?

1. Four of the six utilities refer to the "La Capra" study.
2. One utility study states that on a busbar basis, hydro is most competitive, followed by landfill gas and wood biofuel.
3. Of the two remaining utilities, one replied "yes" and one replied "no."

b. Reductions in peak demand and annual energy requirements for potential energy efficiency programs?

1. One utility replied with a "yes" and referenced a study that recommended 300m kWh, a 1.5% reduction out of economic potential of 4,116m kWh or 17% and a technically feasible reduction of 6,948m kWh or 29% of total 24,184m kWh.
2. One utility replied that there could be a cumulative potential savings from EE: 81,888 KW and 259,122,410 kWh.
3. One utility replied: 2,278,028 kWh per year by 2017, if 50% market penetration.
4. Two utilities replied that their studies were "underway."
5. One utility replied "no."

c. Reductions in peak demand for potential demand response programs?

1. One utility responded with a yes, adding that a "study concludes DSM can provide 10.7 mWh of savings across all customer classes over the 15-year planning horizon, with more than half coming from the commercial sector."
2. Two utilities responded that programs were "underway," with one adding, "most renewables are limited or unavailable in service territory."
3. One utility replied that no study had been completed.
4. One utility replied that the reduction could be "55.5MW reduction in coincidence peak."
5. One utility replied "no."
6. One utility replied, "unknown."

Question 5

How much renewable generation is technologically available in South Carolina and on what scale? How many MWs can SC realistically expect to get from renewable resources, when would they be available, and how dispatchable/reliable are they?

a. **Four utilities site the "La Capra" study.**
b. **One utility referred back to Question 3.**
c. **One utility said "no."**
d. **One utility said "unknown."**

Question 6

What is the cost of renewable generation compared to traditional supply side resources? Please quantify based on information currently available.

a. **One utility replied, "Due to most renewables lack of dispatchability, they are not good for baseload and hard to compare with other sources."**
b. **One utility replied, "Due to most renewables lack of dispatchability, they tend to be more expensive, especially if the need to backstop is considered."**
c. **Three replied that landfill gas is the most economical and/or cited the "La Capra" study.**
d. **One utility replied, "n/a."**
e. **One utility replied, "unknown."**

Question 7

Have you performed a Demand Side Management (DSM)/Energy Efficiency (EE) market potential study? If so, what are the results?

a. **One utility replied with a "yes" and referenced a study that recommended 300m kWh, a 1.5% reduction out of economic potential of 4,116m kWh or 17% and a technically feasible reduction of 6,948m kWh or 29% of total 24,184m kWh.**
b. **One utility replied that there could be a cumulative potential savings from EE: 81,888 KW and 259,122,410 kWh.**
c. **One utility replied, "yes" stating there is a potential savings of 6,527,531 mWh/yr.**
d. **Two utilities replied, "underway."**
e. **Two utilities replied, "no."**

Question 8

How much DSM capability and how much EE capability are technically viable for your service territory?

a. **One utility referenced a study that recommended 300m kWh, a 1.5% reduction out of economic potential of 4,116m kWh or 17% and a technically feasible reduction of 6,948m kWh or 29% of total 24,184m kWh.**

b. **One utility replied, "209 MW of DR is technologically viable and practical and feasible; studies show states with warm climates have maximum of 0.36% DSM/EE incremental energy savings."**

c. **One utility replied that, "by 2017, 3,389,931 mWh technically viable, with 50% penetration; about 25% residential."**

d. **One utility replied, "2,582,952 mWh annually by 2017."**

e. **One utility each replied "n/a," "unknown" or "underway."**

Question 9

How much DSM capability and how much EE capability are cost effective for implementation in your service territory? Please explain what is used to determine cost effectiveness (i.e., Total Resource Costs Test, Rate ImpactTest)?

a. **One utility replied with an explanation on how the tests work but did not give any results for DSM & EE.**

b. **Two utilities replied, "underway."**

c. **One utility replied, "209 MW of DR is technologically viable and practical and feasible; studies show states with warm climates have maximum of 0.36% DSM/EE incremental energy savings."**

d. **One utility replied, "2,278,028 kWh per year by 2017, if 50% market penetration."**

e. **One utility each replied "unknown" and "n/a."**

Question 10

Please provide for each program, explanations of your current energy efficiency and peak demand reduction programs. If you offer cost-effective energy efficiency and peak demand reduction programs for residential customers, how do these programs address lower income residents? Please provide summaries of these programs.

Answers are summaries that reflect how many of the seven utilities surveyed answered positively. One utility answered "n/a" across all categories.

South Carolina Total

Residential TOU	4
Interruptible/Curtailable	4
General Svc. (Commercial) & Industrial TOU	3
Timer- or remote-controlled electric water heaters	3
A/C or heat pump load control	2
Standby Generator Control	2
Hourly pricing for incremental load	2
Res. Energy Star Rates	2
Weatherization for low-income	2
Thermal storage space conditioning	2
Free CFL's distribution	2
Existing Residential Housing Program	1
Voltage Control	1
Real-time Pricing	1
Lower residential rate for upgraded efficiency	1
Lower residential rate for more efficient new homes	1
Lower rate for more efficient commercial buildings	1
Solar panel rebate	1

TOU = Time of use

Question 11

Please explain for your system, the availability:

a. What, if any, investments have you made in automatic metering systems that are capable of providing DSM options in South Carolina? Identify the type of equipment deployed, the cost, and the forecasted efficiencies to be realized as a result of such deployment. List the benefits you expect to achieve from this system of metering systems that are capable of providing DSM options. Any reference to the term "Smart Grid" should be as defined by the Energy Independence and Security Act of 2007.

There were a wide range of responses such as:

- Load control equipment for residential A/C load control: $500/unit
- Sending/Receiving remotely readable meter for interruptible nonresidential: $5,000/unit
- Remotely read-capable meter for hourly pricing rate: $3,500/unit
- Walk-by meters for TOU rate customers and automated for larger, automated meter installation about $3,500
- Advanced Metering Infrastructure only for relatively large users
- TOU meters for customers with TOU rates
- No quantified benefits
- No automatic metering systems capable of DSM
- No information, none or n/a

b. Do you have plans to deploy "smart grid" technologies in South Carolina in the near future (within 5 years)?

1. If yes, identify the forecasted cost of initial deployments in South Carolina.
2. Identify the timeline for the deployment.
3. Identify the number of endpoints.
4. Identify the type of "smart grid" friendly equipment to be deployed.

Summary: There is a wide variety among respondents in the degree of deployment. Some are studying the issue. The smallest respondents are least likely to have plans, but, even among them, there is considerable variation.

c. Provide projected or forecasted savings as a result of deployment of "smart grid" technologies.

Summary: There is a wide variety among respondents in the degree of deployment. Some are studying the issue. The smallest respondents are least likely to have plans, but, even among them, there is considerable variation.

Question 12

What challenges are there in providing GHG neutral (nuclear, solar, wind, hydro, etc.) generation in South Carolina? Please address all issues, including but not limited to: availability of natural resources, impact on natural resources (e.g., air quality or water quality) geographic characteristics, financial incentives, and expense and availability of non-carbon generation.

Summary: There are no GHG-neutral sources available in South Carolina with the scale and availability needed, except nuclear power, which has very high capital costs.

Question 13

Please provide the normal cooling and heating degree days that affect your operations in South Carolina.

- *Each utility used a different station across the state to determine normal Heating and Cooling Degree Days.*
- *All utilities, except one, used January to show its "maximum" example.*
- *Most projected usage over 30 years, which is standard, however, some responded with either a 15-year projection or did not indicate a specific time frame.*
- *Some companies used more than one station, others used just used one.*
- *One company uses a 30 year average while one uses a 15 year average.*

The following is a sampling of data received:

Heating Degree Days:

Station	Greenville/ Spartanburg	Myrtle Beach	Columbia	Charleston
Total	3272	2382	2482	1851
Maximum	750	570	583	467
Month of maximum	Jan	Jan	Jan	Jan
Basis	30 year average	Projected	Projected	Projected

Cooling Degree days:

Station	Greenville/ Spartanburg	*Myrtle Beach*	*Columbia*	*Charleston*
Total	1526	1893	2184	2409
Maximum	430	484	541	552
Month of maximum	July	July	July	July
Basis	30 year average	Projected	Projected	Projected

A. How does this compare nationally?

One utility referenced NOAA.

One utility ranks in the top 10 in CDD and is ranked in the low 40s for HDD.

One utility referenced 2007 EIA data that shows national averages of 1,242 CDDs and 4,524 HDDs.

Two utilities replied "unknown."

One utility replied "no answer."

One utility replied "n/a."

B. How does humidity/heat index affect this?

All utilities, except one, answered that humidity makes little difference or had no response. This utility responded that high humidity can make electric cooling systems work harder, which increases demand.

Question 14

Please describe the characteristics of your South Carolina residential sector's use of electricity (e.g., 20% of electricity is used for cooling). How does this compare to the average use in the United States?

Summaries:

- *Three respondents said heating, cooling and heating water comprise from 40.3% to 41% of customers' usage, versus 31.6% to 32% nationwide. One utility said 50% to 60% is for heating, cooling and heating water.*
- *One utility said only data by specific appliance was available.*
- *One utility each replied "n/a" or that there was no data on the subject.*

Question 15

Have you performed an electric appliance saturation study for the residential class? If so, please provide the results of the latest study.

Answers represent the percentage of residential homes with the following appliances. Responses varied for each company.

Sample of responses:

- *Electric Water Heater: 66–95%*
- *Refrigerator: Approximately 97%*
- *HVAC: Approximately 90%*
- *Washer and Dryer: Approximately 90%*
- *Three utilities have not performed studies.*
- *Two utilities cited the South Atlantic Region statistics, which addresses question 14*

Question 16

Please provide the percentage of types of residences you serve (i.e., single family, manufactured home, apartment, etc.).

Answers are ranges from eleven utilities that responded. One utility combined their house/townhouse and manufactured/mobiles segments to account for 93% of their residences.

Apartment/Condo/Multi-family	*7%–21%*
House/Townhouse	*50%–82%*
Manufactured/Mobile	*5%–40%*

Question 17

Please provide, by type of residences, the residential customer's average annual electric energy usage (kWh) for 2007. Please provide the same information on a weather-normalized basis, if available.

Answers are ranges from the eight utilities that responded. Please note that this information is not available on a normalized basis.

Apartment	*8,818 – 9,772*
Manufactured/Mobile	*13,688 – 16,921*
Single Family	*13,056 – 16,861*
All Types (not segmented)	*11,500 – 18,000*