



# SOUTH CAROLINA STATE ENERGY PLAN

## Appendices

***This document dated July 29, 2016, represents the first phase of the development of the State Energy Plan. This draft includes a look at the current state of Energy in South Carolina. Phase II of the development will look to provide policy recommendations.***

The South Carolina State Energy Plan is a comprehensive blueprint to build a reliable, resilient, clean, and affordable energy system for South Carolina residents and businesses. Specifically, the plan is designed to maximize (to the extent practical) environmental quality, energy conservation, and energy efficiency while minimizing the cost of energy throughout the state.

Office of Regulatory Staff: State Energy Office  
[www.energy.sc.gov](http://www.energy.sc.gov)

## Contents

I.	Appendix A: Enabling Legislation .....	1
	State Energy Office .....	2
	South Carolina Office of Regulatory Staff .....	3
	Public Service Commission of South Carolina .....	3
	South Carolina Department of Health and Environmental Control.....	4
II.	Appendix B: Demographic, Economic, and Environmental Drivers in South Carolina .....	5
	Population .....	5
	Age.....	6
	Housing Stock.....	6
	Income .....	7
	Environment .....	10
	Air Quality Trends.....	10
III.	Appendix C: South Carolina Electric and Gas Utilities.....	15
	Investor-Owned Utilities.....	15
	State-Owned Utilities.....	15
	Electric Cooperatives .....	20
	Municipal Electric Utilities.....	20
	Municipal Natural Gas Utilities.....	24
	Commissions of Public Works.....	24
	Municipal Departments or Divisions .....	25
	Natural Gas Authorities.....	26
	SC Wholesale Power Producers .....	27
	LS Power .....	27
	Broad River Power, LLC .....	28
IV.	Appendix D: Electric Transmission System .....	29
	<b>System Constraints</b> .....	29
	<b>Infrastructure Upgrade</b> .....	29
V.	Appendix E: Smart Meter Penetration .....	31
VI.	Appendix F: Electric System Reliability and Resiliency.....	33
	SAIDI and SAIFI.....	33
VII.	Appendix G: Natural Gas Permitting at the State Level.....	35

VIII.	Appendix H: Natural Gas Supply and Delivery .....	37
	Shale Gas Growth and Flow .....	37
	Interstate Pipelines.....	39
IX.	Appendix I: South Carolina Natural Gas Pipeline Infrastructure .....	46
	Natural Gas Main and Service Infrastructure .....	46
	Main Infrastructure .....	47
	Service Infrastructure .....	49
X.	Appendix J: Propane Gas Basics .....	52
	What Is Propane? .....	52
	Where Does Propane Come From? .....	52
XI.	Appendix K: Electric Generation Capacity by Provider .....	55
	SCE&G .....	55
	Santee Cooper .....	55
	DEC .....	56
	DEP .....	56
	Ameresco .....	57
	Lockhart Power Company .....	57
	Merchant Biomass .....	57
XII.	Appendix L: Electric Consumption by Provider .....	58
XIII.	Appendix M: Energy Efficiency and Renewable Energy Programs.....	60
	Energy Efficiency .....	60
	Evaluation, Measurement, and Verification (EM&V) .....	60
	What is EM&V? .....	60
XIV.	Appendix N: SC Biomass Facilities .....	70
XV.	Appendix O: Renewable Energy Task Force .....	71
XVI.	Appendix P: Distributed Energy Resource Program Act (Act 236) .....	73
	South Carolina Electric and Gas Company.....	73
	Duke Energy Carolinas, LLC and Duke Energy Progress, LLC .....	74
XVII.	Appendix Q: Public Transit Agencies.....	76
	Lowcountry Buses .....	76
	Palmetto Breeze .....	76
	Horry and Georgetown Counties .....	76
	Williamsburg County.....	76

Midlands Buses .....	76
Aiken County.....	76
Barnwell County.....	76
Calhoun and Orangeburg counties.....	76
Chester County.....	77
Richland, Lexington, Newberry counties.....	77
Sumter County .....	77
Pee Dee Buses .....	77
Darlington, Florence, and Marion Counties.....	77
Upstate and Piedmont Buses.....	77
Anderson County.....	77
Edgefield and Greenwood Counties .....	78
Greenville County.....	78
Oconee and Pickens counties .....	78
Spartanburg County .....	78
York County.....	78
XVIII. Appendix R: SmartRide and Park-and-Ride Programs.....	80
SmartRide program (Park-and-Ride) for Camden/Lugoff and Sumter .....	80
North Augusta Park-and-Ride .....	80
Greenville County Square Park-and-Ride.....	80
Greenville West End Park-and-Ride.....	80
Charlotte Park-and-Ride .....	81
XIX. Appendix S: Alternative Fuel Infrastructure.....	82
XX. Appendix T: Inventory of State and Federal Statutes .....	83
Federal Policies .....	83
Federal Tax Credits .....	86
Inventory of State Statutes.....	89
State Tax Credits.....	97
XXI. Appendix U: Clean Power Plan: Compliance Projections and Modeling.....	99
EPA Clean Power Plan.....	99
South Carolina at a Glance .....	99
Pathway to 2030.....	100
XXII. Appendix V: Projected Natural Gas Infrastructure .....	104

New Pipeline Infrastructure ..... 104

DRAFT

## I. Appendix A: Enabling Legislation

State Energy Plan, Section 48-52-210 of the South Carolina Code of Laws governs the State Energy Plan and states that:

“(A) It is the policy of this State to have a comprehensive state energy plan that maximizes to the extent practical environmental quality and energy conservation and efficiency and minimizes the cost of energy throughout the State. To implement this policy there is adopted the Plan for State Energy Policy.”

(B) The purpose of the plan is to:

- (1) ensure access to energy supplies at the lowest practical environmental and economic cost;
- (2) ensure long-term access to adequate, reliable energy supplies;
- (3) ensure that demand-side options are pursued wherever economically and environmentally practical;
- (4) encourage the development and use of clean energy resources, including nuclear energy, energy conservation and efficiency, and indigenous, renewable energy resources;
- (5) ensure that basic energy needs of all citizens, including low income citizens, are met;
- (6) ensure that energy vulnerability to international events is minimized;
- (7) ensure that energy-related decisions promote the economic and environmental well-being of the State and maximize the ability of South Carolina to attract retirees, tourists, and industrial and service-related jobs;
- (8) ensure that short-term energy decisions do not conflict with long-range energy needs;
- (9) ensure that internal governmental energy use patterns are consistent with the state's long-range interests;
- (10) ensure that state government is organized appropriately to handle energy matters in the best public interest;
- (11) ensure that governmental energy-related tax, expenditure, and regulatory policies are appropriate, and, wherever possible, maximize the long-range benefits of competition; and
- (12) ensure that any future energy strategy that promotes carbon-free, nongreenhouse gas emitting sources includes nuclear energy, renewable resources, and energy conservation and efficiency.”

## State Energy Office

Section 48-52-410 of the South Carolina Code of Laws describes the purpose of the State Energy Office as follows:

“There is established the State Energy Office within the Office of Regulatory Staff which shall serve as the principal energy planning entity for the State. Its primary purpose is to develop and implement a well-balanced energy strategy and to increase the efficiency of use of all energy sources throughout South Carolina through the implementation of the Plan for State Energy Policy. The State Energy Office must not function as a regulatory body.”

Section 48-52-420 of the South Carolina Code of Laws describe the State Energy Office’s role in energy policy:

- “(1) provide, in cooperation and conjunction with the Governor's Office, informational and technical assistance programs to assist with residential, commercial, governmental, industrial, and transportation conservation and efficiency and to encourage the use of renewable indigenous energy resources;
- (2) promote, in conjunction with the South Carolina Energy Research and Development Center and the Governor's Office, continued and expanded energy research and development programs geared toward the energy needs of the State;
- (3) evaluate and certify energy conservation products in cooperation with the South Carolina Energy Research and Development Center;
- (4) in cooperation with the Governor's Office and other appropriate entities, examine and consider the desirability and feasibility of mechanisms for tax incentives, low-interest loans, and other financing means for cost-effective energy consideration and efficiency and use of renewable and indigenous energy resources, and advocate their implementation when deemed appropriate;
- (5) work with the Public Service Commission and other groups to promote appropriate financial incentives for electric and gas utilities to maximize the use of cost-effective demand-side options in meeting future energy needs;
- (6) promote the adoption and use of energy efficient building codes and certification procedures for builders, heating and cooling specialists, and building inspectors;
- (7) promote energy efficiency in manufactured housing;
- (8) promote the use of less-polluting transportation fuels, public transportation and other transportation alternatives, higher mileage and less-polluting vehicles, and work with state and local entities through policy development, planning, and advocacy to encourage reduction in the need for vehicle travel;

(9) ensure that state government agencies establish comprehensive energy efficiency plans and become models for energy efficiency in South Carolina, and assist the Department of Education in achieving energy efficiency in public schools;

(10) collect currently published and publicly available energy data and provide energy information clearinghouse functions in conjunction with the Governor's Office, and conduct long-range energy planning;

(11) assist the Governor's Office and the General Assembly in assessing the public economic and environmental interest on issues related to energy production, transportation, and use and provide information on the public interest in appropriate forums.

(12) ensure that any future energy strategy that promotes carbon-free, nongreenhouse gas emitting sources includes nuclear energy, renewable energy resources, and energy conservation and efficiency.”

### **South Carolina Office of Regulatory Staff**

Section 58-4-10 of the South Carolina Code of Laws creates the Office of Regulatory Staff (ORS). The ORS is a party of record in all proceedings before the Public Service Commission of South Carolina (PSC) and represents the public interest. This purpose is stated in the code as follows:

“(B) Unless and until it chooses not to participate, the Office of Regulatory Staff must be considered a party of record in all filings, applications, or proceedings before the commission. The regulatory staff must represent the public interest of South Carolina before the commission. For purposes of this chapter, "public interest" means a balancing of the following:

- (1) concerns of the using and consuming public with respect to public utility services, regardless of the class of customer;
- (2) economic development and job attraction and retention in South Carolina; and
- (3) preservation of the financial integrity of the state's public utilities and continued investment in and maintenance of utility facilities so as to provide reliable and high quality utility services.”

### **Public Service Commission of South Carolina**

The Public Service Commission of South Carolina (PSC or Commission) regulates public utilities under Section 58-3-140 of the South Carolina Code of Laws. This section states that:

“(A) Except as otherwise provided in Chapter 9 of this title, the commission is vested with power and jurisdiction to supervise and regulate the rates and service of every public utility in this State and to fix just and reasonable standards, classifications, regulations, practices, and measurements of service to be furnished, imposed, or observed, and followed by every public utility in this State.



(B) The commission must develop and publish a policy manual which must set forth guidelines for the administration of the commission. All procedures must incorporate state requirements and good management practices to ensure the efficient and economical utilization of resources.

(C) The commission must facilitate access to its general rate request orders in contested matters involving more than one hundred thousand dollars by publishing an order guide which indexes and cross-references orders by subject matter and case name. The order guide must be made available for public inspection.

(D) The commission must promulgate regulations to require the direct testimony of witnesses appearing on behalf of utilities and of witnesses appearing on behalf of persons having formal intervenor status, such testimony to be reduced to writing and prefiled with the commission in advance of any hearing.

(E) Nothing in this section may be interpreted to repeal or modify specific exclusions from the commission's jurisdiction pursuant to Title 58 or any other title.

(F) When required to be filed, tariffs must be filed with the office of the chief clerk of the commission and, on that same day, provided to the Executive Director of the Office of Regulatory Staff.”

### **South Carolina Department of Health and Environmental Control**

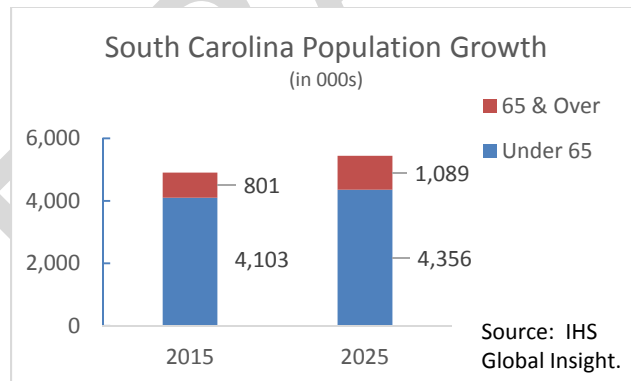
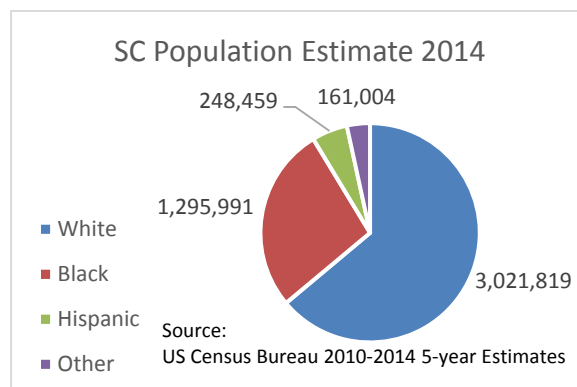
The S.C. Department of Health and Environmental Control (DHEC) is the public health and environmental protection agency for the state and carries out its duties pursuant to numerous statutes including, but not limited to the: Emergency Health Powers Act, Pollution Control Act, Safe Drinking Water Act, Hazardous Waste Management Act, Solid Waste Policy and Management Act, Coastal Tidelands and Wetlands Act, Beachfront Management Act, Contagious and Infectious Diseases Act, State Certification of Need and Health Facility Licensure Act and Vital Statistics Act. DHEC is organized into three areas: public health, environmental, administration. The agency's approximately 3,500 employees provide a wide range of resources and services that support a vision of healthy people living in healthy communities.

Source: DHEC 2012-2013 Annual Accountability Report.

## II. Appendix B: Demographic, Economic, and Environmental Drivers in South Carolina

### Population

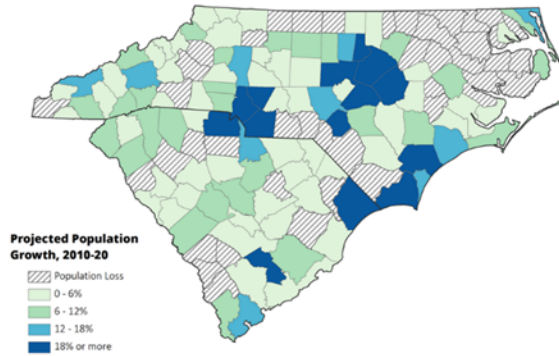
With a 2015 estimated population of 4.9 million people, South Carolina has outpaced the nation in percentage growth for the last forty years. This growth is due to net migration of individuals from outside South Carolina who have made it a popular retirement choice, plus continued population growth within the state itself. Such growth creates an increased demand for energy and the infrastructure which provides this energy. The charts below shows the population of South Carolina in 2014, along with estimates for 2015 and 2025.



Over the next ten years, South Carolina’s population is expected to grow by over one-half million (500,000) from its current level of 4.9 million individuals, which equates to a growth rate of 11.1 percent. This level of growth exceeds the projected national population growth rate of 7.9 percent.

Population growth in South Carolina has not been consistent across the state, nor is it expected to be so in the future. As the map below depicts, 11 out of 46 counties are projected to show population declines in 2020 when compared to the last official census of 2010.

**Population growth will be uneven across the Carolinas**  
*Projected population growth, 2010-2020*

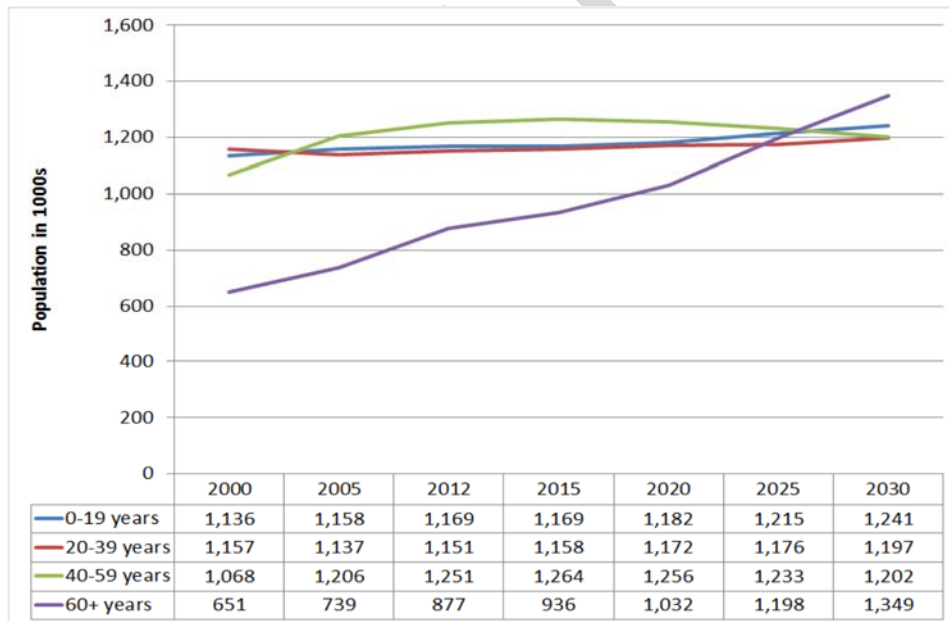


Sources: NC OSBM, SC Revenue & Fiscal Affairs Office

UNC CAROLINA  
 DEMOGRAPHY

**Age**

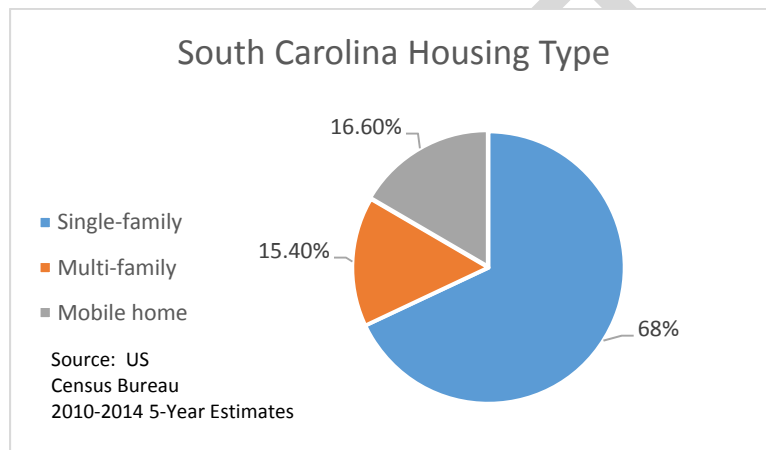
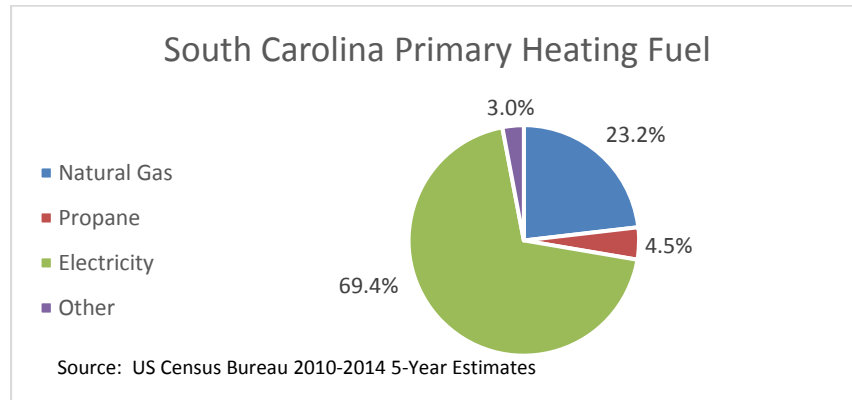
The age distribution of South Carolina’s population has changed dramatically in the recent past, due to aging of the Baby Boomer generation and South Carolina’s popularity as a retirement destination (especially along the coast). The Census Bureau anticipates that the 60+ population cohort will equal or exceed those of the other primary age distributions by 2025 and will continue its lead relative to the others categories beyond that year (see figure below).



**Housing Stock**

Single-family dwellings are the most common types of homes in South Carolina. The remaining roughly one third of dwellings are almost equally split between mobile homes and multi-family housing. Multi-family housing generally uses much less energy because of smaller square footage, while mobile homes use relatively more energy due to lack of insulation and their stand-alone construction. Mobile homes are also more likely to use electric resistance heating, which the Department of Energy characterizes as a very expensive way to heat a home. Overall,

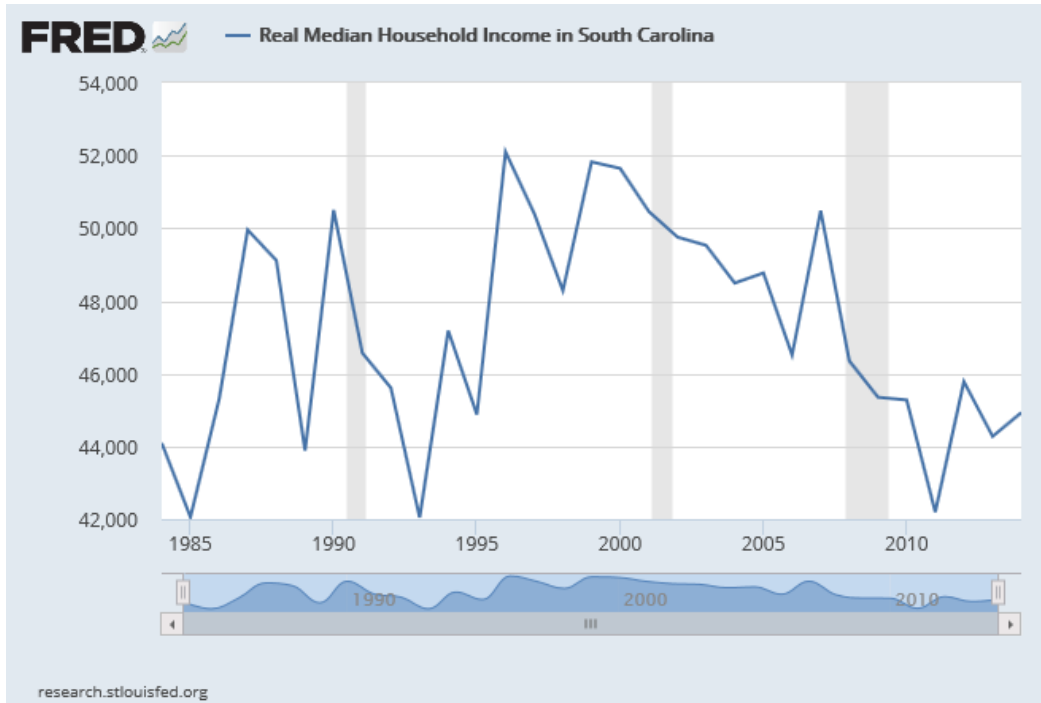
South Carolinians use electricity to heat their homes far more frequently than any other fuel. This practice is common across the Southeast, but atypical of other regions in the country.



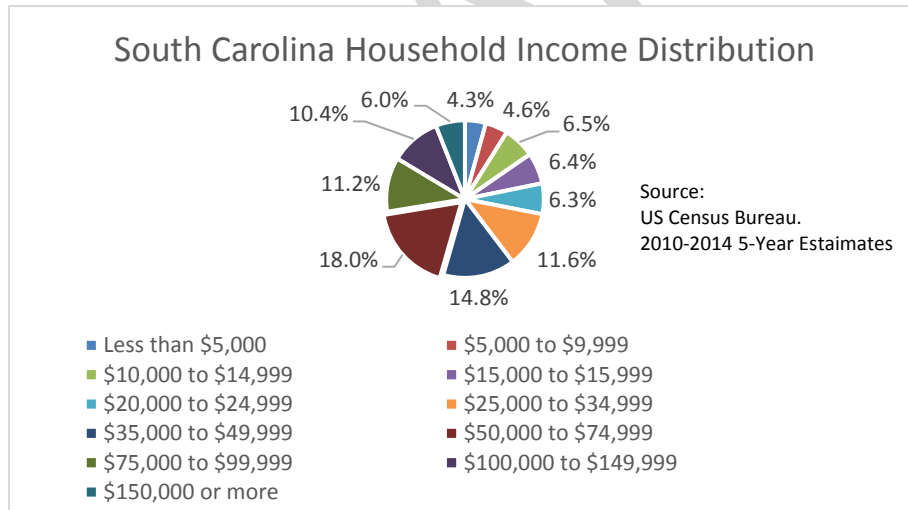
## Income

Another important factor to consider when looking at energy consumption in South Carolina is that of income. The state’s real median household income has fluctuated considerably over the past 30 years (1984-2014), with relatively low growth equating to an increase of 0.1 percent annually. In 2013, the state’s poverty rate was still the ninth highest in the nation, with just over 18% of the population classified as living in households with income below \$23,550.

The path of income growth in South Carolina is important, since real income is positively correlated with energy consumption. Higher incomes make it possible for households to implement energy-saving or renewable options. Figure 6 shows that real median household income in the state has fluctuated considerably over the 30-year timespan shown. More importantly, it also shows that there has been relatively low growth during this period. From the first data point, 1984, to the most recent year, 2014, an increase of less than 0.1 percent annually occurred.



The figure below shows annual household income distribution for the state.



### Energy Use and Expenditure per Capita

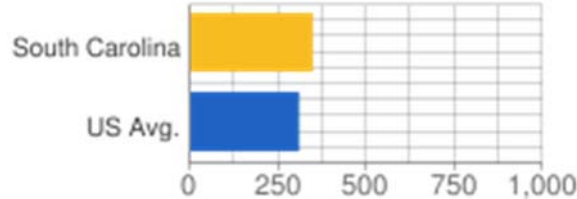
The average American spent \$3,052 per person (2012 data) while the average South Carolinian spent \$3,310 for residential and transportation energy combined. South Carolinians consumed 347 million BTUs per person in 2009, compared to an average of 308 million for the average U.S. resident. South Carolina ranked 18 out of all states based on 2009 data according to the US Department of Energy.

In 2009, South Carolina consumed 347 million BTUs per person, compared to an average of 308 million in the US.

State Rank: 18

Next Higher State: AR

Next Lower State: MN



Average Monthly Electric Bill by Sector and Location, 2015

	<u>Residential</u>	<u>Commercial</u>	<u>Industrial</u>
	¢ per kWh	¢ per kWh	¢ per kWh
South Carolina	12.42	10.12	5.98
South Atlantic	11.79	9.52	6.53
United States	12.67	10.59	6.89

Source: EIA

In the case of industrial electric rates, South Carolina has slightly lower rates than the South Atlantic states. However, residential and commercial rates are among the highest in the region.

Household energy costs place a disproportionate burden, depending on family income. The table below shows that households earning less than \$50,000 annually devote about twice as much of their income for energy as those earning over \$50,000. In residential units whose occupants earn less than \$10,000 per year, energy bills may consume 75 percent of their annual income.

US Average Percentage of Income Spent on Electricity (2014)						
Income Level	% of total house holds	Average Total Yearly Residential Energy Costs	Average Total Yearly Transportation Energy Costs	% of After Tax Income Residential Energy	% of After Tax Income Transportation Energy	% of After Tax Income Total Energy
<\$10k	7.3%	\$ 1,655	\$ 1,854	35.8%	40.0%	75.8%
\$10k-\$30k	22.9%	\$ 1,763	\$ 2,309	9.6%	12.6%	22.2%

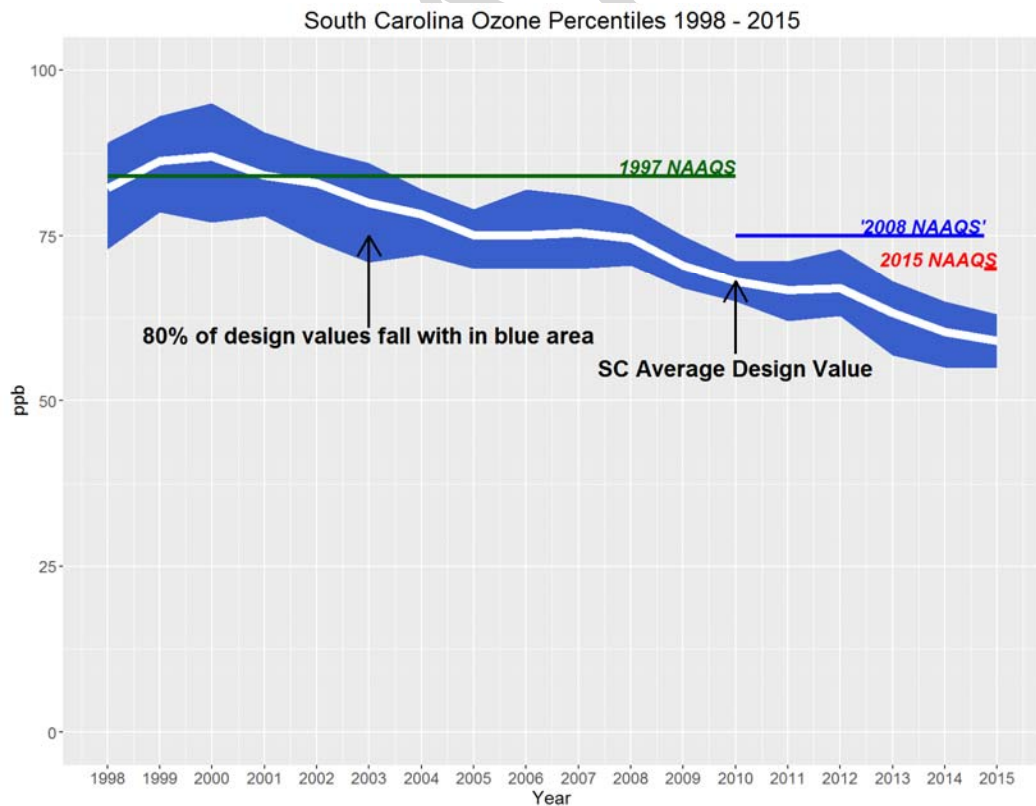
US Average Percentage of Income Spent on Electricity (2014)						
Income Level	% of total house holds	Average Total Yearly Residential Energy Costs	Average Total Yearly Transportation Energy Costs	% of After Tax Income Residential Energy	% of After Tax Income Transportation Energy	% of After Tax Income Total Energy
\$30k-<\$50k	18.8%	\$ 1,985	\$ 3,260	5.9%	9.7%	15.7%
>\$50k	51.1%	\$ 2,642	\$ 4,369	3.1%	5.1%	8.2%

Source: EIA, Census, and DOE

## Environment

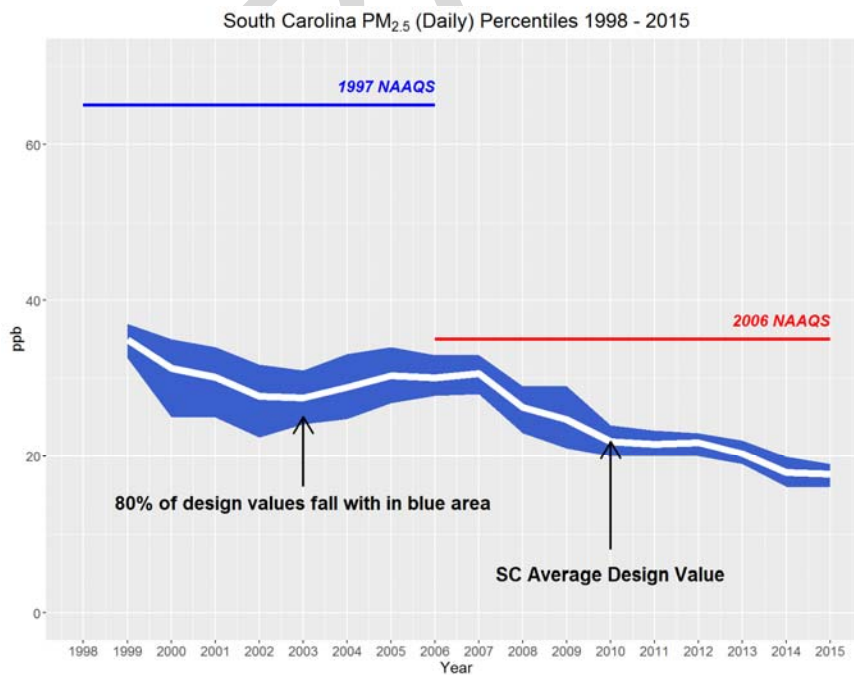
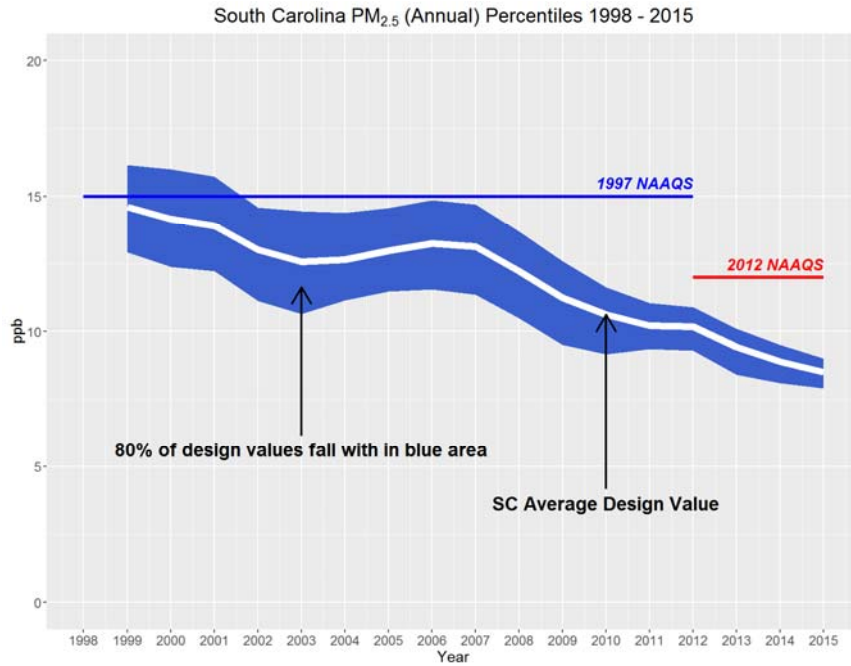
### Air Quality Trends

**Ozone** - Ground level ozone may exacerbate breathing problems for patients with pre-existing cases of bronchitis, emphysema, and asthma.<sup>1</sup> Currently all South Carolina ozone monitors meet federal air quality standards. The figure below shows ozone trend data.



<sup>1</sup> <https://www3.epa.gov/apti/ozonehealth/effects.html>

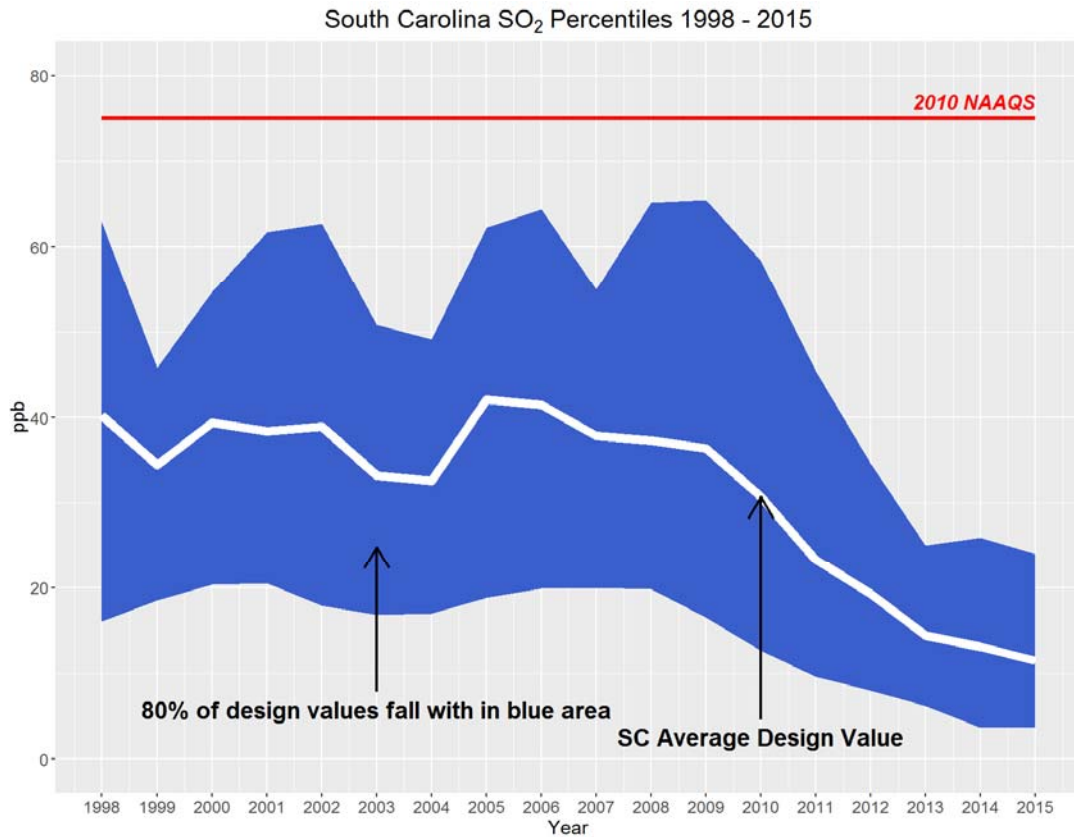
**Particulate Matter** –Particulate matter is so small that it can lodge deeply within our bodies and aggravate lung and heart disease.<sup>2</sup> Fine particulates can also reduce visibility and create haze. Fortunately, all particulate matter monitors in South Carolina indicate that both annual and daily air quality standards are being met. The figures below shows the downward trend in ambient air particulate matter concentrations over the past decade.



<sup>2</sup> <https://www3.epa.gov/pm/health.html>

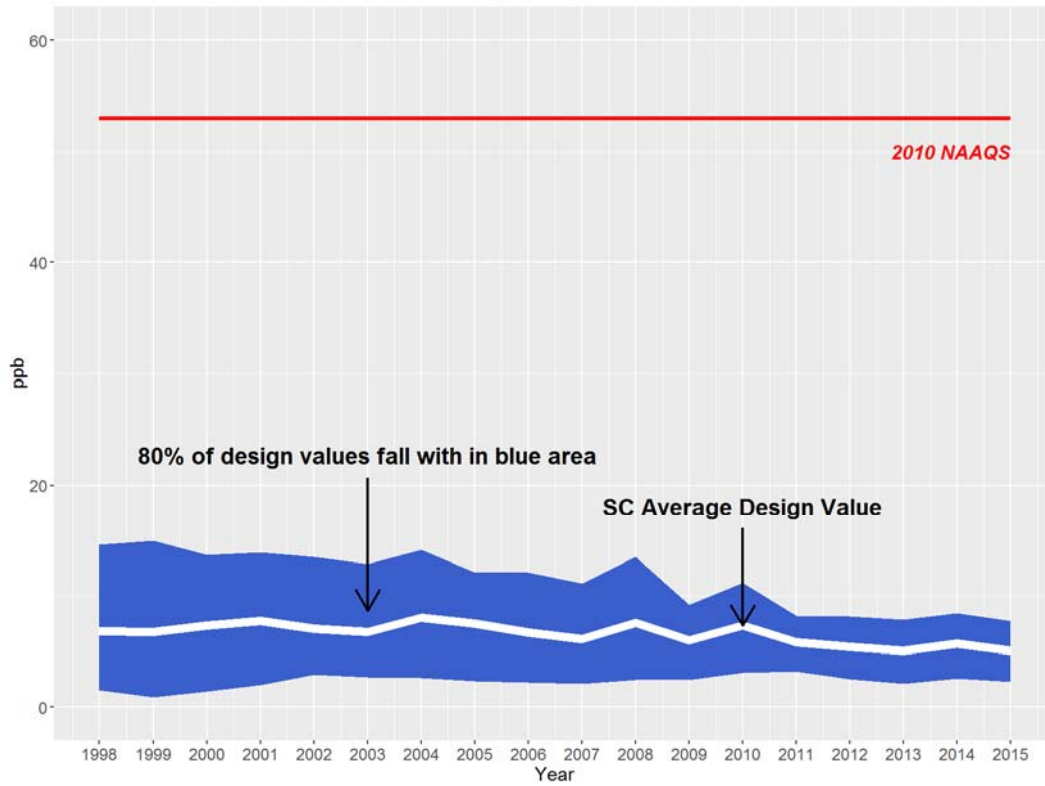


**Sulfur Dioxide and Nitrogen Oxides** – Sulfur and nitrogen oxides can exacerbate breathing problems and form acid rain that harms waterways, plants and animals, and buildings.<sup>3</sup> South Carolina has seen about a 71 percent decrease in sulfur dioxide and a decrease of 61 percent in nitrogen oxides due to the enforcement of federal air quality regulations and use of cleaner fuels.

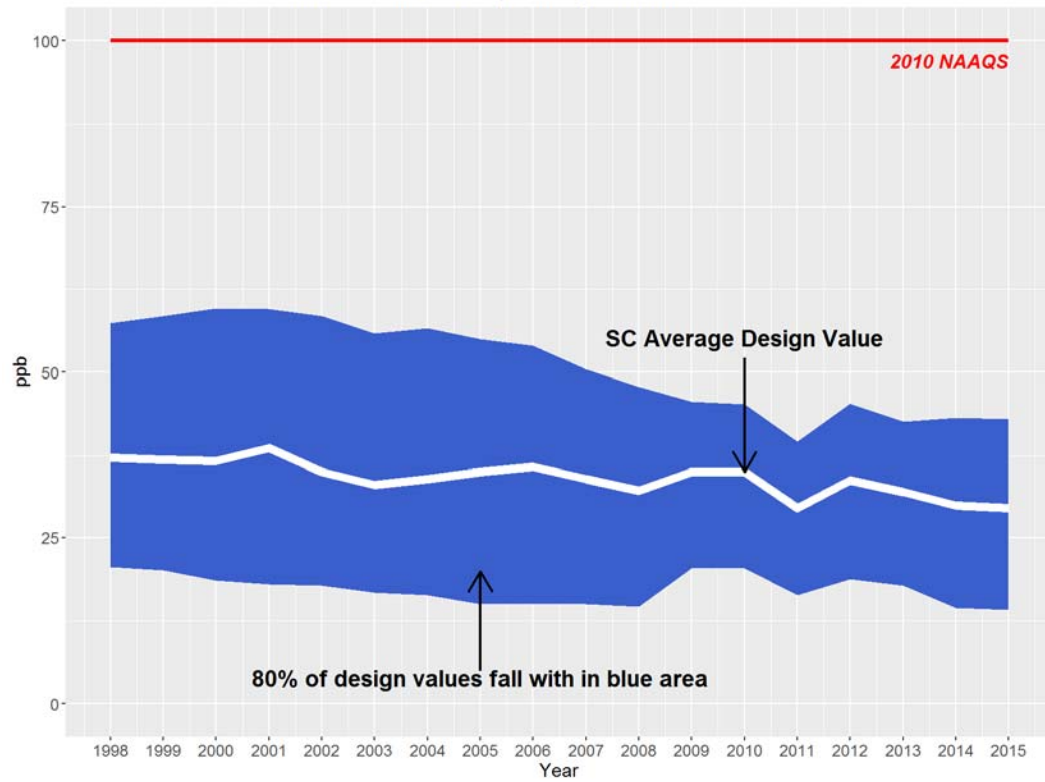


<sup>3</sup> <https://www3.epa.gov/airquality/sulfurdioxide/health.html>;  
<https://www3.epa.gov/airquality/nitrogenoxides/health.html>

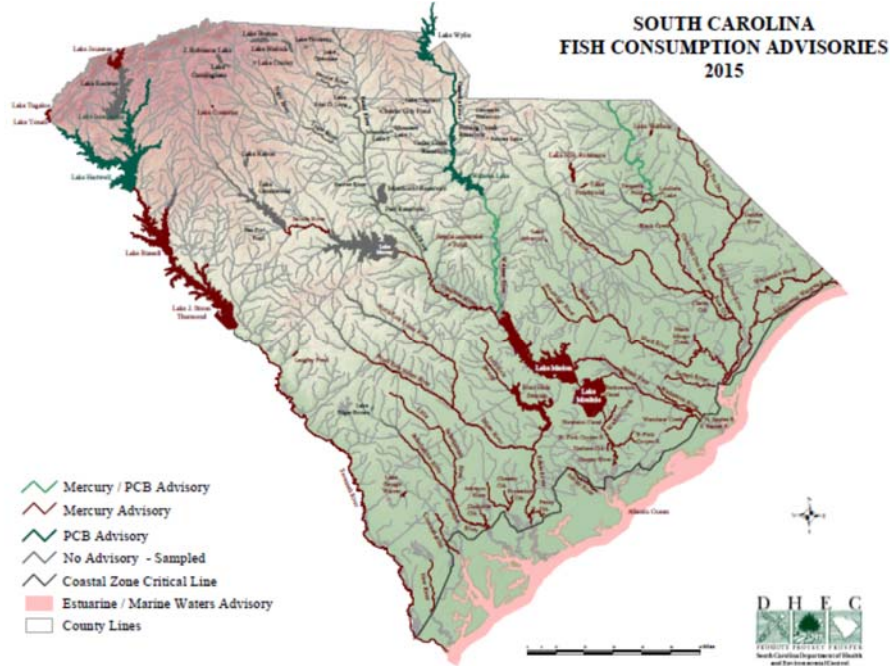
South Carolina NO<sub>2</sub> (Annual) Percentiles 1998 - 2015



South Carolina NO<sub>2</sub> (1-hour) Percentiles 1998 - 2015



**Mercury** –Wastewater discharges from coal facilities and other wastewater treatment plants discharge small amounts of mercury, but most mercury pollution originates from air deposition that results from burning of coal, oil, wood, and wastes that contain mercury. The figure below shows that almost half the waterways in the State are currently under a fish mercury advisory.



DRAFT

### III. Appendix C: South Carolina Electric and Gas Utilities

Forty-six electric distribution utilities and 16 natural gas distribution utilities operate in South Carolina. These utilities serve the nearly 5 million residents of the state. Furthermore, these utilities are responsible for the electric transmission and distribution lines as well as the natural gas pipeline system that crisscrosses South Carolina.

These utilities can be grouped into four categories: investor-owned utilities, state-owned utilities, electric cooperatives, and municipal utilities.

#### Investor-Owned Utilities

Investor-owned utilities (IOUs) are privately owned electric utilities whose stock is publicly traded. Their rates are regulated by the PSC, and they are allowed to earn a rate of return on their investments.

The four South Carolina investor-owned electric utilities are listed in below.

<b>Investor-Owned Electric Utilities</b>
Duke Energy Carolinas, LLC
Duke Energy Progress
Lockhart Power Company
South Carolina Electric & Gas Company

The two investor-owned natural gas utilities are listed in below.

<b>Investor-Owned Natural Gas Utilities</b>
Piedmont Natural Gas
South Carolina Electric & Gas Company

#### State-Owned Utilities

The South Carolina Public Service Authority (Santee Cooper) is a state-owned utility governed by a board of directors who are appointed by the Governor with the advice and consent of the Senate. The board approves adjustments to rates, the issuance of debt, and other business decisions as described in Title 58 Chapter 31 of the South Carolina Code of Laws. Santee Cooper is the only state-owned utility in South Carolina.

<b>State-Owned Utility</b>
Santee Cooper

Residential customer profiles of each of major IOUs, Santee Cooper, and the Electric Cooperatives are below.

2013 Duke Energy South Carolina Residential Consumer Survey (sample findings)	
<b>Housing</b>	<b>Energy Savings</b>
<ul style="list-style-type: none"> <li>The majority of customers (81%) live in single family homes; 10% of customers live in mobile homes.</li> <li>More than six out of ten (65%) customers own or are purchasing their residence.</li> <li>Four out of ten (41%) customers' homes were built between 1970 and 1999.</li> <li>More than one half (56%) of customers live in homes with less than 2,000 square feet of living space.</li> <li>More than four out of ten (46%) customers have programmable thermostats.</li> </ul>	<ul style="list-style-type: none"> <li>Slightly more than seven out of ten (72%) customers have taken actions to cut back on electricity use in their home to save money and/or control their electric bill.</li> <li>Less than one out of five (14%) customers have installed 1 to 3 LED bulbs in their home.</li> </ul>
	<b>Solar</b>
	<ul style="list-style-type: none"> <li>&lt;1% of customers have added solar panels.</li> <li>For those who do not currently use solar panels, one out of ten (9%) customers are either very likely or somewhat likely to install solar panels in the next 5 years.</li> </ul>
<b>Appliances</b>	<b>Technology Preferences</b>
<ul style="list-style-type: none"> <li>59% of customers have an automatic dishwasher in their home; 84% have an electric range; 22% have a separate freezer; and 74% heat water with electricity.</li> <li>66% of customers have at least one standard television in their home; 15% have at least one plasma television; 34% have at least one LCD television; and 17% have at least one LED television.</li> </ul>	<ul style="list-style-type: none"> <li>Almost six out of ten (58%) customers have high speed Internet service at their home; 4% have dial-up internet service.</li> <li>Eight out of ten (81%) customers use cell phones in their home.</li> <li>Two out of three (68%) customers use traditional landline telephones.</li> </ul>
<b>Heating and Cooling</b>	<b>Demographics</b>
<ul style="list-style-type: none"> <li>Two out of three (67%) customers use electricity as the main source of energy to heat their home; while 25% use natural gas as their main source.</li> <li>Four out of ten customer's primary heating system is 6-15 years old.</li> <li>95% of customers use a standalone heat pump as the main energy source to heat their home.</li> <li>More than four out of ten (45%) customers use central air conditioning to cool their home.</li> </ul>	<ul style="list-style-type: none"> <li>23% of respondents have at least one person 65 years or older living in their residence.</li> <li>26% of customers have an income between \$15,000-\$34,999; 29% have a total income between \$35,000-\$74,999; 18% have a total income between \$75,000 and \$100,000+</li> </ul>

South Carolina Electric & Gas Residential Customer Profile (from various sources)	
<p style="text-align: center;"><b>Housing</b></p> <ul style="list-style-type: none"> <li>67% of Electric customers live in SFUDs, 23% live in multi-family homes and 10% live in mobile/manufactured/modular homes.</li> <li>90% of gas customers live in single-family, 9% multi-family, and 1% mobile homes.</li> <li>37% live in the Columbia MSAs and 35% live in the Charleston/N. Charleston MSA. Another 9% live in the Hilton Head-Bluffton-Beaufort MSA and 9% live in the Augusta-Richmond County, GA-SC MSA.</li> <li>81% live in urban areas, 19% in rural areas</li> <li>68% own their homes</li> </ul> <p><b>Source: U.S. Census</b></p> <ul style="list-style-type: none"> <li>41% were built prior to 1980 (Electric)</li> <li>63% were under 2,000 s.f. (Electric)</li> </ul> <p><i>Source: Direct Options, 2016</i></p>	<p style="text-align: center;"><b>Energy Savings</b></p> <ul style="list-style-type: none"> <li>80% have CFLs; 8% have LEDs <i>Source: Opinion Dynamics, 2013</i></li> <li>44% say their home is energy efficient. <i>Source: SCE&amp;G Voice of the Customer Panel, 2015</i></li> </ul> <p style="text-align: center;"><b>Solar</b></p> <ul style="list-style-type: none"> <li>&lt;1% have a solar panel system on their home</li> <li>50% of homeowners have an interest in rooftop solar panels</li> </ul> <p><i>Source: SCE&amp;G Voice of the Customer Panel, 2015</i></p>
<p style="text-align: center;"><b>Appliances</b></p> <ul style="list-style-type: none"> <li>77% have an electric range; 24% have a gas range</li> <li>88% have a dishwasher</li> <li>98% have a microwave</li> <li>22% have more than one refrigerator; 39% have a separate freezer</li> <li>24% have a natural gas fireplace</li> <li>96% have a clothes washer</li> <li>90% have an electric clothes dryer; 6% have a gas clothes dryer</li> <li>99% have at least one television</li> <li>58% heat water with electricity; 38% heat water with gas</li> <li>80% have storage tank water heaters; 16% have tankless water heaters</li> </ul> <p><i>Source: SCE&amp;G Voice of the Customer Panel, 2016</i></p>	<p style="text-align: center;"><b>Demographics</b></p> <ul style="list-style-type: none"> <li>24% of householders are 65+ years old</li> <li>58% have income &lt; \$50K; the median income is \$54,028</li> </ul> <p><i>Source: Claritas, 2013</i></p>
<p style="text-align: center;"><b>Heating and Cooling</b></p> <ul style="list-style-type: none"> <li>52% use an electric heat pump to heat their home</li> <li>42% use gas to heat their home</li> <li>29% have a primary heating system that is 10 or more years old</li> <li>96% have central air conditioning or a heat pump to cool their home</li> <li>68% have ceiling fans</li> </ul> <p><i>Source: SCE&amp;G Voice of the Customer Panel, 2016</i></p>	

**2012 Santee Cooper Residential Energy Saturation Survey (sample findings)**

Housing	Energy Savings		
<ul style="list-style-type: none"> <li>• 52 percent of customers live in single-family housing</li> <li>• 32 percent live in multi-family: apartments, condos, townhomes or duplexes</li> <li>• 17 percent live in mobile or modular homes</li> <li>• 56 percent own their home as primary residence</li> <li>• 30 percent own as secondary/recreational residence</li> <li>• 8 percent rent or lease</li> <li>• 6 percent own as a rental property.</li> </ul>	<ul style="list-style-type: none"> <li>• 52 percent have a programmable thermostat.</li> <li>• 72 percent have CFLs installed in their homes</li> <li>• 45 percent have upgraded heating/cooling in past two years or plan to do in next two years</li> <li>• 24 percent have upgraded insulation or duct work in past two years</li> </ul>		
	Solar		
<th data-bbox="240 772 792 821">Appliances</th> <td data-bbox="792 772 1416 1094"> <th data-bbox="792 772 1416 821">Appliances (cont.)</th> </td>	Appliances	<th data-bbox="792 772 1416 821">Appliances (cont.)</th>	Appliances (cont.)
<th data-bbox="240 1094 792 1136">Heating and Cooling</th> <td data-bbox="792 1094 1416 1339"> <th data-bbox="792 1094 1416 1136">Demographics</th> </td>	Heating and Cooling	<th data-bbox="792 1094 1416 1136">Demographics</th>	Demographics
<ul style="list-style-type: none"> <li>• 92 percent have refrigerator/freezer</li> <li>• 91 percent have electric water heaters</li> <li>• 88 percent have electric range, 4 percent have gas range</li> <li>• 88 percent have a microwave</li> <li>• 77 percent have electric clothes dryer, 2 percent have gas clothes dryer</li> <li>• 77 percent have electric dishwasher</li> </ul>	<ul style="list-style-type: none"> <li>• 83 percent have clothes washer</li> <li>• 18 percent have a separate freezer, 10 percent have more than one refrigerator</li> <li>• 52 percent have at least one LED/LCD TV, 49 percent have at least one standard TV, and 17 percent have a plasma TV</li> <li>• 41 percent have a laptop computer, 34 percent have a desktop computer</li> </ul>		
<ul style="list-style-type: none"> <li>• 97 percent use electricity as primary heating source</li> <li>• 2 percent use natural gas</li> <li>• 1 percent use LP gas</li> <li>• 95 percent have a heat pump or central air conditioning.</li> </ul>	<ul style="list-style-type: none"> <li>• &lt;1 percent have solar panels installed at home</li> <li>• &lt;1 percent have subscribed to a Santee Cooper community solar project</li> </ul>		



**2015 CEPC Residential Consumer Survey (sample findings)**

Housing	Energy Savings
<ul style="list-style-type: none"> <li>• The majority of customers (71%) live in single family homes; a fifth (22%) of customers live in mobile/manufactured/modular homes.</li> <li>• 48% of customers live in urban/suburban areas while 41% of customers live in rural areas.</li> <li>• More than 9 out of 10 (93%) customers own their residence.</li> <li>• 26% of homes were built 1982 or earlier, 22% were built 1993-2002, 17% were built 1983-1992, and 15% were built 2003-2007.</li> <li>• 7 out of 10 customers (73%) live in a one story residence.</li> <li>• Nearly two thirds (65%) of customers live in homes with less than 2,200 square feet of living space.</li> <li>• 11% of customers have a pool.</li> </ul>	<ul style="list-style-type: none"> <li>• 89% of customers have taken actions to cut back on electricity use in their home to save money and/or control their electric bill in the last three years.</li> <li>• 4 out of 10 customers (43%) regularly adjusts their thermostat.</li> <li>• Four out of 10 (47%) customers has converted their lighting to CFL or LED.</li> </ul>
	Solar
	<ul style="list-style-type: none"> <li>• &lt;1% of customers have added solar panels.</li> </ul>
Appliances	Technology Preferences
<ul style="list-style-type: none"> <li>• More than seven out of ten (74%) customers have a dishwasher in their home.</li> <li>• More than nine out of ten (94%) customers have electric ranges in their homes.</li> <li>• More than six out of ten (63%) customers have a separate freezer in their home.</li> <li>• There are at least 2 TV's per household (2.29 average TV's).</li> <li>• 10 out of 10 customers have a dishwasher in their home.</li> </ul>	<ul style="list-style-type: none"> <li>• 1 out of 4 customers has no access to internet.</li> <li>• 72% of customers prefer to receive energy information and tips through direct mail.</li> <li>• Of customers with internet access, 36% use cable, 22% use DSL, 8% use satellite, 6% use cellular, and 2% use dial-up.</li> <li>• 32% of customers use internet as a source for energy information and tips, 30% use television, and 25% use the newspaper.</li> </ul>
Heating and Cooling	Demographics
<ul style="list-style-type: none"> <li>• Seven out of ten customers (74%) use electricity as their primary heating fuel, followed by 2 out of 10 customers (22%) which use natural gas.</li> <li>• 76% of homes use no other secondary fuel for heating. Of homes that have other sources for heating, 19% use electricity, 16% use propane, 6% use gas.</li> <li>• 8 out of ten (83%) of customers use electric water heaters, followed by 1 out of 10 which use natural gas.</li> <li>• Three out of ten customers' primary heating system is 8-15 years old, and three out of ten customers' heating system is 2-7 years old.</li> <li>• In terms of cooling, 5 out of 10 customers use an electric heat pump as their primary A/C type, followed by 1 out of 3 customers which use electric central air (32.43%).</li> </ul>	<ul style="list-style-type: none"> <li>• 46% of customers have someone 66 years or older living in their residence.</li> <li>• 66% of customers have household members between 23-65 years of age.</li> <li>• 20% of customers have an income between \$15,000-\$29,999, 32% of customers have a total income between \$30,000-\$64,999, 34% of customers have a total income between \$65,000-\$100,000+.</li> </ul>



## Electric Cooperatives

Twenty-two non-profit electric cooperatives operate in South Carolina. Twenty of these electric cooperatives are distribution cooperatives. As customer-owned entities, the members of these distribution cooperatives (consumers) elect a board of trustees to represent them in setting policies for their cooperatives and rates for their electricity. In addition, two generation and transmission (G&T) electric cooperatives serve as wholesale power providers to other electric cooperatives and do not serve retail customers.

<b>South Carolina Electric Cooperatives</b>
Aiken Electric Coop, Inc.
Berkeley Electric Coop, Inc.
Black River Electric Coop, Inc.
Blue Ridge Electric Coop, Inc.
Broad River Electric Coop, Inc.
Central Electric Power Coop, Inc. (G&T)
Coastal Electric Coop, Inc.
Edisto Electric Coop, Inc.
Fairfield Electric Coop, Inc.
Horry Electric Coop, Inc.
Laurens Electric Coop, Inc.
Little River Electric Coop, Inc.
Lynches River Electric Coop, Inc.
Marlboro Electric Coop, Inc.
Mid-Carolina Electric Coop, Inc.
New Horizons Electric Cooperative, Inc. (G&T)
Newberry Electric Coop, Inc.
Palmetto Electric Coop, Inc.
Pee Dee Electric Coop, Inc.
Santee Electric Coop, Inc.
Tri-County Electric Coop, Inc.
York Electric Coop, Inc.

## Municipal Electric Utilities

<b>Municipal Electric Utilities</b>
<b>Municipal Departments or Divisions</b>
City of Abbeville
City of Bennettsville
City of Camden

City of Clinton
City of Georgetown
City of Newberry
City of Orangeburg
City of Rock Hill
City of Seneca
City of Union
City of Westminster
Town of Prosperity
Town of Due West
Town of Winnsboro
<b>Commission or Board of Public Works</b>
Bamberg Board of Public Works
Easley Combined Utility System
Gaffney Board of Public Works
Greenwood Commission of Public Works
Greer Commission of Public Works
Laurens Commission of Public Works
McCormick Commission of Public Works

**City of Abbeville**

Governing body: City council  
 Number of meters: 3,500  
 System peak: 17,000 KW  
 Wholesale power supplier: Piedmont Municipal Power Agency

**Bamberg Board of Public Works**

Governing body: Board of public works  
 Number of meters: 1,800  
 System peak: 12,50KW  
 Wholesale power supplier: Santee Cooper

**City of Bennettsville**

Governing body: City council  
 Number of meters: 4,649  
 System peak: 23,000 KW  
 Wholesale power supplier: Marlboro Electric Cooperative

**City of Camden**

Governing body: City council  
 Number of meters: 9,297  
 System peak: 52,500 KW  
 Wholesale power supplier: Duke Energy - Progress

**City of Clinton**

Governing body: City council

Number of meters: 4,083

System peak: 24,197 KW

Wholesale power supplier: Piedmont Municipal Power Agency

**City of Due West**

Governing body: City council

Number of meters: 435

System peak: 2,938 KW

Wholesale power supplier: Duke Energy

**Easley Combined Utility**

Governing body: Commission of public works

Number of meters: 13,943

System peak: 76,016 KW

Wholesale power supplier: Piedmont Municipal Power Agency

**Gaffney Board of Public Works**

Governing body: Board of public works

Number of meters: 7,268

System peak: 51,000 KW

Wholesale power supplier: Piedmont Municipal Power Agency

**City of Georgetown**

Governing body: City council

Number of meters: 5,116

System peak: 35,238 KW

Wholesale power supplier: Santee Cooper

**Greenwood Commission of Public Works**

Governing body: Commission of public works

Number of meters: 11,397

System peak: 68,000 KW

Wholesale power supplier: Duke Energy

**Geer Commission of Public Works**

Governing body: Commission of public works

Number of meters: 17,505

System peak: 88,080 KW

Wholesale power supplier: Piedmont Municipal Power Agency

**Laurens Commission of Public Works**

Governing body: Commission of public works

Number of meters: 5,223

System peak: 26,198 KW

Wholesale power supplier: Piedmont Municipal Power Agency

**Town of McCormick**

Governing body: Town council  
Number of meters: 978  
System peak: 7,434 KW  
Wholesale power supplier: Duke Energy

**City of Newberry**

Governing body: City council  
Number of meters: 5,016  
System peak: 43,500 KW  
Wholesale power supplier: Piedmont Municipal Power Agency

**City of Orangeburg**

Governing body: City council  
Number of meters: 26,376  
System peak: 198,000 KW  
Wholesale power supplier: SCE&G

**Town of Prosperity**

Governing body: Town council  
Number of meters: 809  
System peak: 1,500 KW  
Wholesale power supplier: Duke Energy

**City of Rock Hill**

Governing body: City council  
Number of meters: 34,102  
System peak: 189,960 KW  
Wholesale power supplier: Piedmont Municipal Power Agency

**City of Seneca**

Governing body: City council  
Number of meters: 6,334  
System peak: 35,000 KW  
Wholesale power supplier: Santee Cooper

**City of Union**

Governing body: City council  
Number of meters: 6,877  
System peak: 30,907 KW  
Wholesale power supplier: Lockhart Power Company billed through Piedmont Municipal Power Agency

**City of Westminster**

Governing body: City council  
Number of meters: 1,519  
System peak: 6,217 KW  
Wholesale power supplier: Piedmont Municipal Power Agency

**City of Winnsboro**

Governing body: Town council  
 Number of meters: 3,400  
 System peak: 21,500 KW  
 Wholesale power supplier: SCE&G

**Municipal Natural Gas Utilities**

<b>Municipal Natural Gas Utilities</b>
<b>Municipal Departments or Divisions</b>
City of Bennettsville
City of Fountain Inn
City of Orangeburg
City of Union
Town of Winnsboro
<b>Commission of Public Works</b>
Bamberg Board of Public Works
Greenwood Commission of Public Works
Greer Commission of Public Works
Laurens Commission of Public Works
<b>Natural Gas Authorities</b>
Chester County Natural Gas Authority
Clinton-Newberry Natural Gas Authority
Fort Hill Natural Gas Authority
Lancaster Natural Gas Authority
York County Natural Gas Authority

Commissions of Public Works

Bamberg BPW

Natural gas is the newest of utilities offered by the Board of Public Works. The natural gas system was constructed and began service in the early 1960s. With the other utilities limited almost exclusively to the incorporated area of Bamberg, natural gas has seen rapid growth in number of customers and service territory. The Board of Public Works natural gas system has over 70 miles of main. The BPW serves approximately 2,000 customers with one or more utilities.

The Board of Public Works serves Bamberg, Cope, and the western side of Cordova. Natural gas mains extend from 5 miles south of Bamberg on Hwy. 301 to the junction of Hwy. 70 and Hwy. 301 in Orangeburg County. The Board of Public Works also has mains from Hwy. 78 west of Bamberg at the Bamberg County Industrial Park to the Midway Community that is 5 miles east of Bamberg on Hwy. 78. The Board of Public Works purchases natural gas through Dominion Carolina.

### Greenwood CPW

Greenwood CPW has been providing safe and reliable natural gas to Greenwood County for over 70 years. The natural gas unit, which began operation in 1940, was initially operated by the City of Greenwood, which at the time manufactured and distributed liquid petroleum gas. In 1946, the natural gas system became part of the Combined Public Utility System.

The CPW operates the natural gas unit within a territory that extends from near the town of Chappells, SC to Belton, SC. The territory includes portions of Greenwood, Abbeville, Anderson, Laurens, and Greenville counties. Besides the city of Greenwood, the unit operates franchises and is the exclusive natural gas supplier to the towns of Donalds, Hodges, Ware Shoals, Ninety Six, and Promised Land in South Carolina.

Greenwood CPW delivers natural gas to over 17,500 customers through its distribution network of 770 miles of natural gas pipeline. The natural gas system serves an area of 310 square miles with interconnections with two interstate pipelines, Transco and Dominion Carolina Gas Transmission (DCGT).

### Greer CPW

Greer CPW was formed in 1913 for the purposes of providing electricity, water distribution, and sewer collection and treatment to the residents of the City of Greer. In 1957, the City Council enacted an ordinance that founded a natural gas unit to be added to what is now the present-day system.

The Greer Commission of Public Works natural gas system was established in 1958 and is comprised of approximately 739 miles of distribution pipelines and 42 miles of transmission pipelines located in Greenville and Spartanburg counties. Distribution mains consist of 182 miles (24.7%) of cathodically protected coated steel mains and 557 miles (75.4%) of plastic mains. Gas is transported by Transcontinental Gas Pipeline Corporation transmission pipelines at a location south of the City of Greer near the Town of Woodruff and north of the City of Greer in the Town of Landrum. The Greer Commission of Public Works provides service to approximately 22,000 customers in Spartanburg and Greenville counties. The maximum daily volume is 32,000 dekatherms.

### Laurens CPW

In February of 1922, the South Carolina General Assembly enacted a law creating the Laurens Board of Commissioners of Public Works, thereby initiating the improvement and expansion of the utilities system. In the 1950s, the citizens of Laurens established a municipally owned natural gas system, the fourth utility in the combined system.

### Municipal Departments or Divisions

#### City of Bennettsville

The City of Bennettsville natural gas system was established in 1958 and has a total of 86 miles of distribution piping located in Marlboro County. The Distribution system consists of 54 miles of steel mains and 32 miles of polyethylene mains. Gas is transported through Dominion Carolina Gas Transmission Company to a service point on the west side of Bennettsville. The City currently has approximately 2,800 customers. The maximum daily demand is 2,689 dekatherms.

#### City of Fountain Inn

The Fountain Inn Natural Gas System was established in July 1954 as a municipal enterprise pursuant to the Federal Power Commission Order in December 1953. As a municipal enterprise, the Fountain Inn Natural Gas System serves over 6,400 residential, commercial, and industrial customers. The system includes approximately 270 miles of natural gas pipeline. Approximately 70% of the system consists of plastic pipe, and 30% is steel pipe. The system has 9 regulator stations. All corporate control of the utility is vested in the city's seven-member Council.

#### City Of Orangeburg

In 1955, the original natural gas system for the City of Orangeburg was completed; later, the gas systems expanded to the suburban areas and today serve the towns of Cordova and Rowesville. The gas system consists of approximately 323 miles of 2" to 10" diameter mains that distribute more than 2.3 BCF of natural gas per year to approximately 10,000 meters. The Gas Division owns and operates a propane-air peak shaving plant. At this facility, liquid propane is stored to be used on cold winter nights when natural gas is curtailed or purchases are limited.

#### City of Union

The City of Union natural gas system was established in 1956 and is comprised of approximately 410 miles of distribution piping located in Union and Spartanburg counties. Distribution mains consist of 42% cathodically protected coated steel mains and 58% of plastic mains. Gas is transported using Transco (Transcontinental Gas Pipeline Corporation) transmission pipelines at a location south of the City of Spartanburg and is transported approximately 22 miles to the city providing service to approximately 6,200 customers in Spartanburg and Union counties. The city's current maximum daily volume is 10,147 dekatherms.

#### Town of Winnsboro

The Town of Winnsboro has been providing gas service to the town citizens for over forty years. It currently provides natural gas to approximately 2,800 gas utility customers.

#### Natural Gas Authorities

##### Chester County NGA

The Chester County Natural Gas Authority was created in April 1954 under Act 806 of the Acts and Joint Resolution of the state of South Carolina of 1954 and began the distribution of natural gas in 1957. The service area for the Authority is defined as being Chester County, Lockhart School District in Union County, and the Mitford and Blackstock area in Fairfield County. The Chester County NGA is a member of the Patriots Energy Group.

##### Clinton Newberry NGA

Clinton Newberry Natural Gas Authority began supplying natural gas services to Laurens and Newberry counties in 1952. In the mid-1980s, it began providing services to Southern Spartanburg. The NGA currently is expanding its services to the Lake Murray and Lake Greenwood areas in these counties as well. The NGA currently provides service to about 13,000 customers.

### Fort Hill NGA

Fort Hill Natural Gas Authority was established by the South Carolina General Assembly to serve the municipalities and outlying areas of Oconee and Pickens Counties, and portions of Anderson County. By statute, Fort Hill is a non-profit, tax-exempt entity and is authorized to issue tax-exempt "municipal" bonds to construct and expand its natural gas distribution network and facilities.

Fort Hill serves approximately 38,000 residential, commercial, and industrial customers in a 3-county service area. Fort Hill maintains approximately 2,700 miles of steel and PE plastic distribution gas mains and service lines of varying diameters between 5/8" and 10". Fort Hill purchases natural gas for resale to its customers on the open market. The gas is transported from various sources in the gas-producing regions of the United States to Fort Hill via three interconnects with Transco in Anderson County, South Carolina.

### Lancaster County NGA

Since 1954 Lancaster County Natural Gas Authority has provided natural gas service, whenever feasible, to the residences, commercial businesses, and industries within Lancaster County, South Carolina. Service areas include the following: Indian Land, Lancaster, and Kershaw/Heath Springs. The Lancaster County NGA is a member of the Patriots Energy Group.

### York County NGA

For over 55 years, York County Natural Gas Authority (YCNGA) has provided residential, commercial, and industrial gas service throughout York County, South Carolina. In April of 2010, it added another gas system that was purchased from the Town of Blacksburg. The NGA's service area includes all of York County and the northeast portion of Cherokee County. Service is not presently economically feasible in all rural areas, but is generally available in and around Rock Hill, York, Clover, Fort Mill, Tega Cay, River Hills, Smyrna, McConnells, Sharon, Hickory Grove, and Blacksburg. Most densely populated residential subdivisions have service, as do all industrial parks in York County. The York County NGA currently has over 1,000 miles of distribution mains and serves over 58,000 customers. It is a member of the Patriots Energy Group.

## **SC Wholesale Power Producers**

Wholesale power producers are corporation, person, agency, authority, or other legal entity or instrumentality that owns or operates facilities for the generation of electricity for use primarily by the public, and that is not an electric utility.

### LS Power

LS Power is a developer and operator of power-generating sites. It purchased the Columbia Energy Center from Calpine Corporation in 2014. The Columbia Energy Center in Gaston, SC operates a 606 MW combined cycle power plant with Combined Heat and Power (CHP) capabilities. The facility started commercial operation in May 2004, providing power to the local utility and steam to a nearby chemical plant.

The plant consists of two natural gas-fired combustion turbines combined with a steam turbine and two heat recovery steam generators. LS Power offers its host site, DAK Americas, steam on



a long-term contract. CHP provides an efficient source of energy where the excess steam is directed through the combined cycle plant and is available for wholesale electricity markets. LS Power also operates the 98 MW Cherokee Energy Center in Gaffney, SC. Together, the Columbia Energy Center and the Cherokee Energy Center provide more than 700 MW of energy to South Carolina's power grid.

Broad River Power, LLC

In December 2012, Broad River Power, LLC, an affiliate of Energy Capital Partners, LLC purchased the Broad River Energy Center from Calpine Corporation. The Broad River facility is an 847 MW simple cycle, natural gas-fired power plant located in Gaffney, SC. It began commercial operations in June 2000 and sells 100% of its output through two long-term power contracts with Duke Energy Progress, a subsidiary of Duke Energy Corp. The Broad River facility utilizes 5 natural gas turbines. The units can be on the grid and supplying power within 15 minutes to help serve peak and emergency loads.

DRAFT

## IV. Appendix D: Electric Transmission System

### **System Constraints**

Keeping the grid running reliably is a balancing act, where the amount of power put into the grid must equal the amount taken out. The electricity being used right now was created just a few seconds ago, at a generation plant that an operator must ramp up or down to meet electric demand. The passage of Act 236, the expansion of distributed energy resources already expressed in policy and statutes of South Carolina, and the variability in output of renewable energy sources like wind or solar power make maintaining this balance increasingly important.

The continued safe and reliable operation of the grid is critical. With the adoption of digital consumer and commercial technologies, outages affect a wider range of daily living when they occur. South Carolina has seen reliability challenges from storm restoration and polar vortex scenarios. While the utilities have been commended for excellent power restoration in South Carolina considering the severe weather seen in this state in recent years (e.g., the winter storm of February 2014), challenges to the grid make restoration an increasingly difficult task.

Reliability is important not only to residential consumers but also to the broader economy of South Carolina. Large manufacturers could lose entire production runs if they are out of power. The safe and consistent operation of hospitals, schools, and water and sewage treatment facilities depends on a reliable power supply. Further, a reputation for reliability is key for economic development and businesses contemplating South Carolina locations.

### **Infrastructure Upgrade**

Significant grid enhancements have taken place in South Carolina. These include Volt/Var Optimization systems like Duke Energy Progress' Distribution System Demand Response program and self-healing networks. The building of this infrastructure spans all aspects of the power grid— from advanced customer meters and upgraded substation equipment to improved operational control through automated distribution and transmission system devices. Modernization of the grid includes the application of information technology and digital equipment that provides remote monitoring, remote control, and expanded intelligence capabilities such as smart meters at the homes of consumers. Smart meters provide a path for customer programs and data that offer more transparency and control to consumers over their usage and, ultimately, their bill (See Appendix E for more on Smart Grids and Smart Grid Penetration in South Carolina).

Communication with smart meters allows for the collection of hourly energy use data, thus enabling electric providers to more effectively study and design services that give customers better control over their energy costs.

However, utilities foresee growth in the need for such investment. Meeting customer expectations— for continuous power and for prompt restoration when an outage does occur— requires improvements in infrastructure to maintain reliability and system integrity in South Carolina. To enhance reliability and resiliency, a continued modernization of the existing infrastructure is necessary.

In developing this State Energy Plan, it has become very evident that electric utilities are facing expanding customer expectations, increasing environmental regulation, and new technologies that have to be integrated seamlessly into the grid. The grid of the rapidly approaching future will function in ways never imagined when the original wires were installed. If South Carolina is to participate in the innovation coming to fruition in the electric sector— such as distributed energy resources like solar panels, wind turbines, electric vehicles, and microgrids— then the state will require an advanced, integrated grid to manage and optimize the increasingly dynamic flow of electricity.

All of the needs described require communications among grid equipment and with centralized systems. Ideally, tomorrow's grid will operate with increased efficiency, easily integrate renewable sources of generation, and provide South Carolina consumers and utilities with near real-time data and greater monitoring capabilities.

#### **Open Access Same-Time Information System (OASIS)**

Transmission Providers utilize web-based Open Access Same-Time Information Systems (OASIS) to provide information on a non-discriminatory basis to users of the Bulk Electric System (BES).

This system includes near real-time Available Transfer Capacity (ATC) on the transmission system. Pursuant to NERC Reliability Standards, the available transmission capacity on each interface between transmission providers is calculated in increments of hourly, daily, weekly, and monthly periods. These values are then posted to OASIS on a rolling 12-18 month basis.

The calculation of ATC takes into account planned system outages for transmission and generation, existing schedules (current or future), along with unplanned extended outages when data is available to the Reliability Coordinator (RC).

The method of viewing ATC is based on Point of Receipt (POR)/Point of Delivery (POD). With access to OASIS, one can quickly view ATC and determine if there is congestion due to the lack of ATC (if that exists).

While better means of determining congestion do exist, the OASIS/ATC process is readily available and easily accessed. Therefore, it seems the best choice for South Carolina in the foreseeable future.

## V. Appendix E: Smart Meter Penetration

South Carolina electric providers are well on their way in the development of a smarter energy infrastructure. For years, electric providers in South Carolina have been implementing technology to monitor and control grid operations and, in some cases, even remotely self-heal power outages on the grid. Smart meters allow electric providers to remotely “see” what the consumer experiences regarding power quality and hence make adjustments to improve their electric utility service without requiring the consumer to initiate contact with their provider. The 2016 Smart Meter survey captures an important aspect of energy infrastructure development by reporting on the level of smart meter penetration in the power grid. Higher penetration levels of smart meters can allow utilities to run equipment more efficiently and more optimally plan their generation, transmission, and distribution systems for the benefit of South Carolina’s electric consumers.

The following definitions support the Smart Meter Penetration table below.

**Total Number of Meters:** Total number of customer meters that a utility serves.

**Manually Read Meters:** Customer meters that require personnel to be physically present in order to extract energy use data.

**AMR Meters:** Automatic Meter Reading (AMR) meters are customer meters that communicate data about a customer’s energy use and/or outage status to electric providers by sharing information over power lines or to collection equipment nearby through radio frequencies. Typically, these meters only communicate data one way— from the customer’s meter to the utility’s collection equipment. The AMR solution is also commonly referred to as a drive-by metering solution.

**AMI Meters:** Advanced Metering Infrastructure (AMI) meters are more advanced than AMR meters and enable two-way data communication. This system allows for better outage reporting, remote disconnection of service, the installation of load management devices, and a finer resolution of energy use. This finer resolution allows utilities to provide information and services that give customers better control over their energy costs by capturing hourly energy use and demand data.

**Number of Meters Time of Use (TOU) Ready:** This metric shows how many meters are ready to be used for time-variant rates. Not all AMI metering systems are TOU-ready since time-variant rates require energy use data down to an hour interval or less. Some AMI systems do not allow that level of resolution and some utility data collection systems do not yet perform VEE – validating, editing, and estimating – down to the hour or less.

**Number of Meters Implementing Time of Use Rates:** This metric is a subset of the previous and captures the number of metering accounts that are currently on time-of-use or time-variant rates.

<b>Smart Meter Penetration in South Carolina</b>						
<b>Utility</b>	<b>Total Number of Meters</b>	<b>Manually Read Meters</b>	<b>AMR Meters</b>	<b>AMI Meters</b>	<b>Number of Meters Time of Use Rate Ready</b>	<b>Number of Meters Implementing Time of Use Rate</b>
SC Cooperatives	756,137	-	58,412	697,726	477,402	54,035
Duke Energy Carolinas	587,976	8,806	485,119	94,051	94,051	5,609
Duke Energy Progress	172,549	2,988	161,337	8,224	8,224	4,977
Santee Cooper	172,362	57,991	114,014	357	66	66
SCE&G	696,410	178	686,058	10,174	10,174	1,341
<b>Total</b>	<b>2,385,434</b>	<b>69,963</b>	<b>1,504,940</b>	<b>810,532</b>	<b>589,917</b>	<b>66,028</b>

DRAFT

## VI. Appendix F: Electric System Reliability and Resiliency

### SAIDI and SAIFI

Electric power system reliability can be measured and reported in several different ways in order to provide performance trends, both in outage duration and in outage frequency.

The Institute of Electrical and Electronics Engineers (IEEE) defines the generally accepted reliability indices in its standard number 1366, "Guide for Electric Distribution Reliability Indices."

The most common measurement indices which distribution utilities follow and share are those defined by the System Average Interruption Duration Index (SAIDI) and the System Average Interruption Frequency Index (SAIFI).

SAIDI indicates the total duration of interruptions for the average customer across the electric system during a predefined period of time such as a month or a year. It is commonly measured in minutes or hours of interruption. Mathematically, it is the total number of customer-minutes of interruption divided by the total number of customers on the system. As an example, a SAIDI of 100 means the average customer on the electric system over a period of a year would experience a total of 100 minutes of power interruption.

SAIFI indicates how often the average customer experiences a sustained interruption over a predefined period of time, typically a year. It is derived by dividing the total number of customers interrupted in a year by the total number of customers served. As an example a SAIFI of 1.00 means the average customer over a year would experience one single outage.

Pursuant to Regulatory Condition 11.3 and Order No. 2012-905, on a quarterly basis the IOUs must provide to the PSC and to the ORS SAIDI and SAIFI results.

The tables below give the SAIFI and SAIDI results on a 12-month roll, with and without Major Event Day(s) (MEDs). The IEEE Standard 1366-2003 "Guide for Electric Power Distribution Reliability Indices" method is used for calculating these indices.

#### Santee Cooper

Utility	Date Range	Without MEDs		With MEDs	
		SAIFI	SAIDI	SAIFI	SAIDI
Santee Cooper	12 Months Ending 12/31/15	0.292	23.0	0.616	38.5
Santee Cooper	YTD 12/31/15	0.292	23.0	0.616	38.5

\*\*Based on IEEE Standard 1366-2012.

**Duke Energy Carolinas**

Utility	Date Range	Without MEDs		With MEDs	
		SAIFI	SAIDI	SAIFI	SAIDI
Duke Energy Carolinas	12 Months Ending 12/31/15	1.04	166	1.42	423
Duke Energy Carolinas	YTD 12/31/15	1.04	166	1.42	423

**Duke Energy Progress**

Utility	Date Range	Without MEDs		With MEDs	
		SAIFI	SAIDI	SAIFI	SAIDI
Duke Energy Progress	12 Months Ending 12/31/15	1.90	224	2.07	297
Duke Energy Progress	YTD 12/31/15	1.90	224	2.07	297

**SCE&G**

Utility	Date Range	Without MEDs		With MEDs	
		SAIFI	SAIDI	SAIFI	SAIDI
South Carolina Electric & Gas	12 Months Ending 12/31/15	1.34	96.6	1.62	154.5
South Carolina Electric & Gas	YTD 12/31/15	1.34	96.6	1.62	154.5

**Central Electric**

Utility	Date Range	Without MEDs		With MEDs	
		SAIFI	SAIDI	SAIFI	SAIDI
Central Electric Power Cooperative, Inc. - Transmission Level	12 Months Ending 12/31/15	0.32	20.2	0.33	26.8
Central Electric Power Cooperative, Inc. - Transmission Level	YTD 12/31/15 same as above	0.32	20.2	0.33	26.8

**Note:** For Central Electric, the SAIFI & SAIDI indices indicate transmission level service to the high side of Member Cooperative substations. These numbers do not include outages caused at the substation or on the distribution system.

**Note:** MED is Major Event Days

## VII. Appendix G: Natural Gas Permitting at the State Level

### **SCDHEC Pipeline Permitting Overview**

Below is a list of permits that may be required by the South Carolina Department of Health and Environmental Control (SCDHEC) for proposed gas pipelines:

#### ***1. Bureau of Water (BOW)***

**Hydrostatic Test Water Discharge General Permit:** This permit may cover all new and existing point-source discharges to waters of South Carolina and discharges to the land, as identified in below, except for discharges identified under *Limitations on coverage*. The permit authorizes discharge of the following types of wastewater as further specified:

- Hydrostatic test waters from new and used natural gas and new liquefied petroleum gas (LPG) pipelines.
- Hydrostatic test waters from used LPG pipelines and from new petroleum tanks and pipelines.
- Hydrostatic test waters from used petroleum tanks and pipelines.

**401 Water Quality Certifications:** Any applicant for a federal license or permit to conduct any activity which during construction or operation may result in any discharge to navigable waters is required by federal law to first obtain a certification from the BOW. Potential applicants are encouraged to contact the BOW prior to submitting an application. Federal law provides that no federal license or permit is to be granted until such certification is obtained.

**Navigable Waters Permit:** Unless expressly exempted, a permit issued by the SCDHEC is required for any dredging, filling, or construction or alteration activity in, on, or over a navigable water, or in, or on the bed under navigable waters, or in, or on lands or waters subject to a public navigational servitude under Article 14 Section 4 of the South Carolina Constitution and 49-1-10 of the 1976 S.C. Code of Laws including submerged lands under the navigable waters of the state, or for any activity significantly affecting the flow of any navigable water.

**Storm water Construction Permit:** Under the National Pollutant Discharge Elimination System (NPDES) Permit Program, storm water discharges are considered point sources and operators of these sources are required to receive an NPDES permit before they can discharge storm water runoff.

#### ***2. Ocean and Coastal Resource Management (OCRM)***

**Coastal Zone Consistency (CZC) Certification:** CZC Certification is required for all land-disturbing activities that required permit coverage located within any of the eight coastal counties (Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Horry and Jasper) prior to receiving coverage under the NPDES Permit Program. These certifications establish that all land and water uses within these critical areas are consistent with both the state's Coastal Zone Management Plan and the South Carolina Coastal Zone Management Act.

#### ***3. Bureau of Air Quality (BAQ)***

**Air Construction Permit:** Congress established an air construction permitting program as part of the EPA's 1977 Clean Air Act Amendments. This permitting program requires stationary sources of air pollution to receive permits from the government before they start construction. Air



construction permits issued to a facility specify what conditions must be met to demonstrate compliance with state and federal air quality requirements.

DRAFT

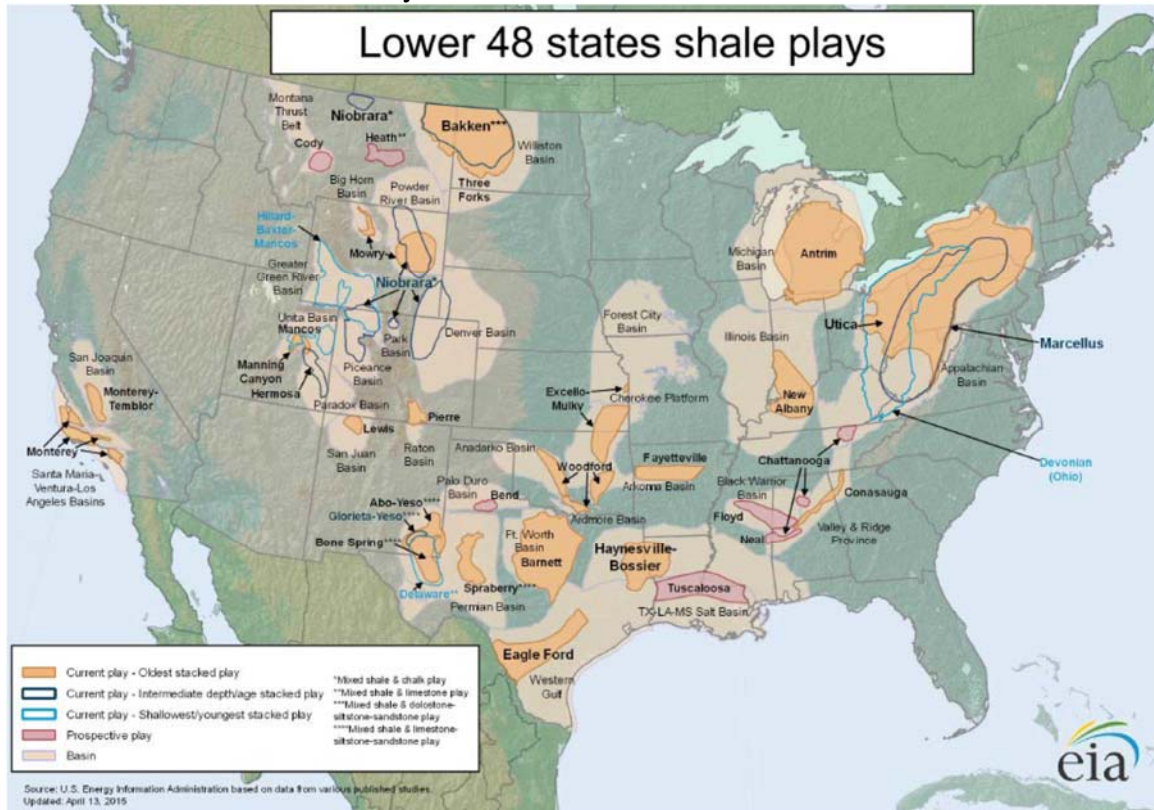
## VIII. Appendix H: Natural Gas Supply and Delivery

Gas distribution systems have general service area assignments. Interstate pipelines also deliver directly to industrial and electrical generation customers in the state.

### Shale Gas Growth and Flow

With the shale gas growth that has occurred over the last several years, natural gas supply sources and traditional pipeline flows across the nation are in the process of changing.

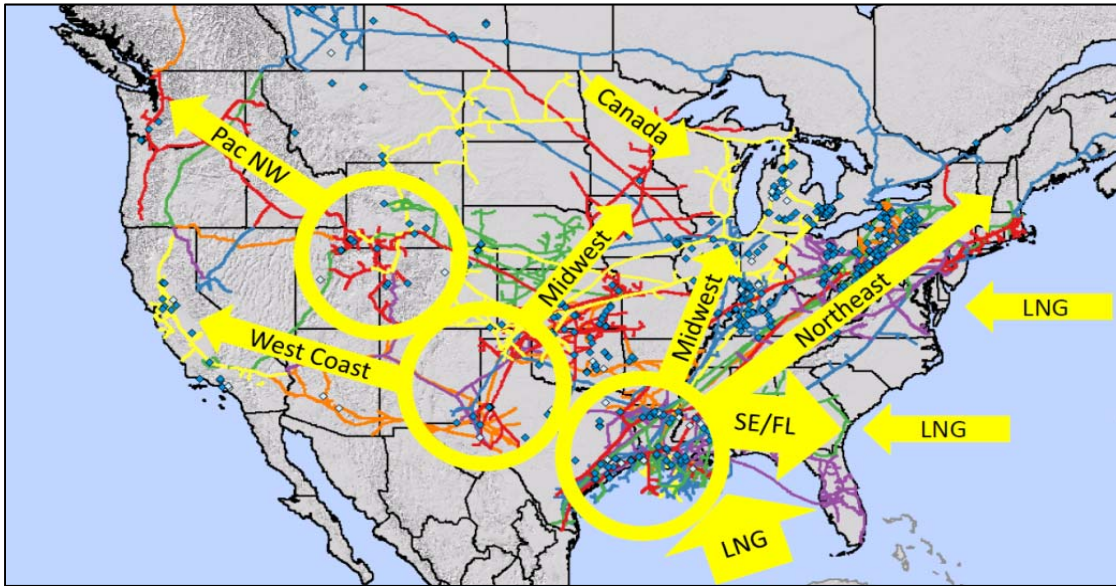
EIA Major shale basins in the United States.



Source: EIA

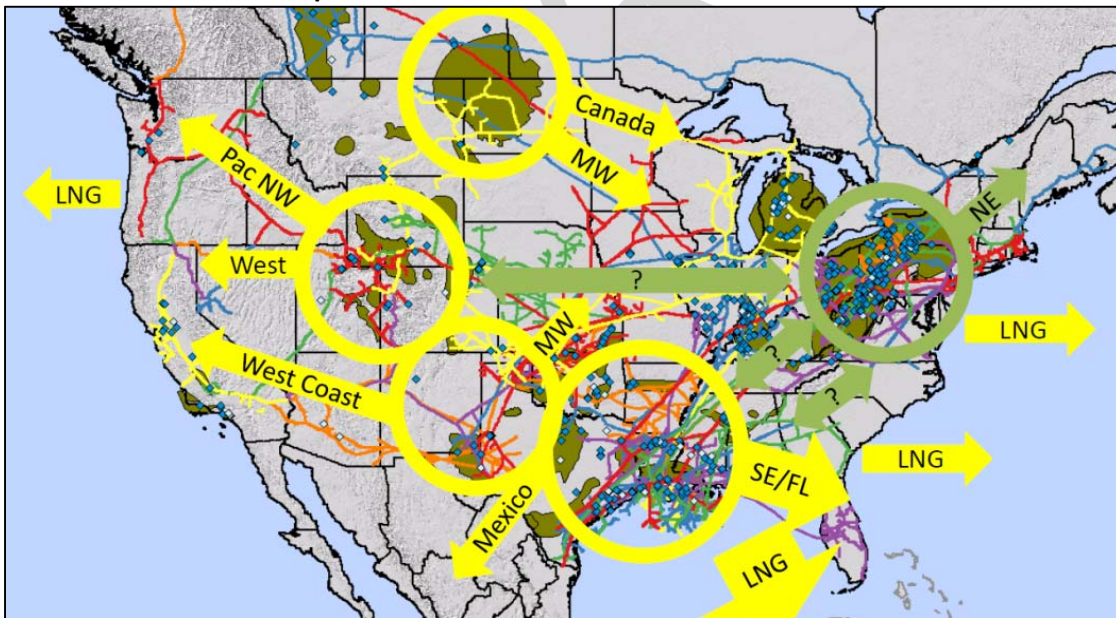
The change in the United States' pre-shale to post-shale supply flow is illustrated in the figures below.

### Illustrative Pipeline and LNG Flows Pre-Shale Gas Production Growth



Source: America Natural Gas Alliance (now part of the American Petroleum Institute)

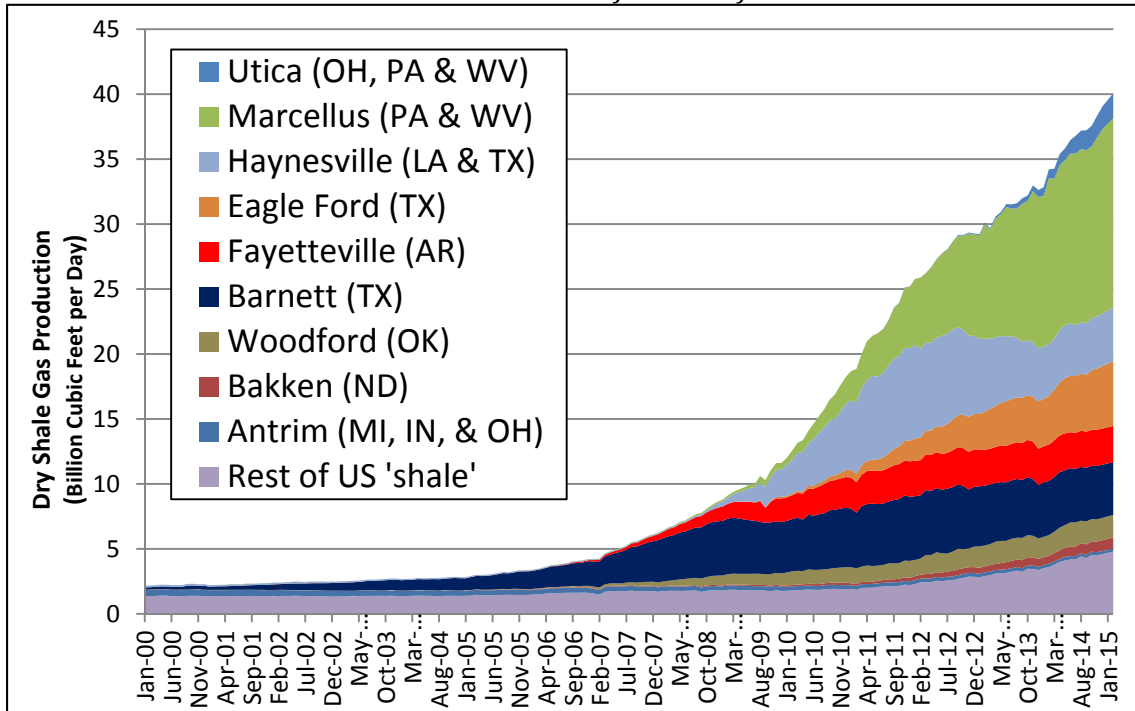
### Illustrative Pipeline and LNG Flows Post-Shale Gas Production Growth



Source: America Natural Gas Alliance (now part of the American Petroleum Institute)

The major shale plays (formations) in the Gulf Coast region are the Barnett, Eagle Ford, Fayetteville, Haynesville, and Woodford. The initial shale growth occurred in the Barnett, located in Texas. However, in recent years, the Marcellus and the Utica shale plays of Ohio, Pennsylvania, and West Virginia have led in growth. The continued growth in Northeast production over time could change some of the state's natural gas supply sources. See figure below.

SHALE GAS PRODUCTION JAN 2000-JAN 2015



SOURCE: EIA

With the growth in Marcellus natural gas supply, traditional pipeline flows from the south to the north are being displaced with natural gas produced in the Northeast region. New pipeline projects have been proposed and executed to move the growing Northeast natural gas supply to markets in the West, South and North (See Appendix H for pre-shale and post-shale supply flows).

## Interstate Pipelines

Four interstate natural gas pipelines deliver natural gas from out-of-state sources to support the needs of South Carolina end-users. These interstate pipelines are DCGT, Southern Natural Gas (SNG), Elba Express Company, and Transcontinental Pipeline (Transco).

### *Dominion Carolina Gas Transmission (DCGT)*

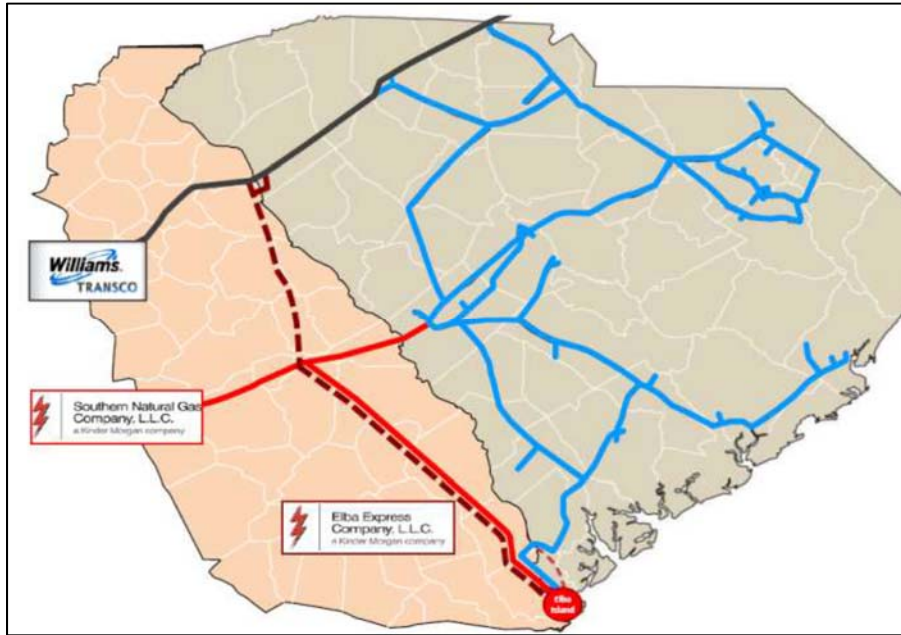
DCGT is an interstate natural gas pipeline company serving wholesale and direct industrial customers throughout South Carolina.



DCGT owns and operates the interstate pipeline system with the widest geographic coverage in South Carolina. DCGT's system delivers natural gas to the majority of natural gas utilities in the state.

The DCGT system consists of approximately 1,500 miles of pipelines between 2 inches to 24 inches diameter operating at pressures up to 1200 psi. The majority of the natural gas that flows into DCGT is sourced from Sonat and Transco (See Appendix H for additional graphics on DCGT).

*DCGT MAP WITH INTERSTATE INTERCONNECTS*

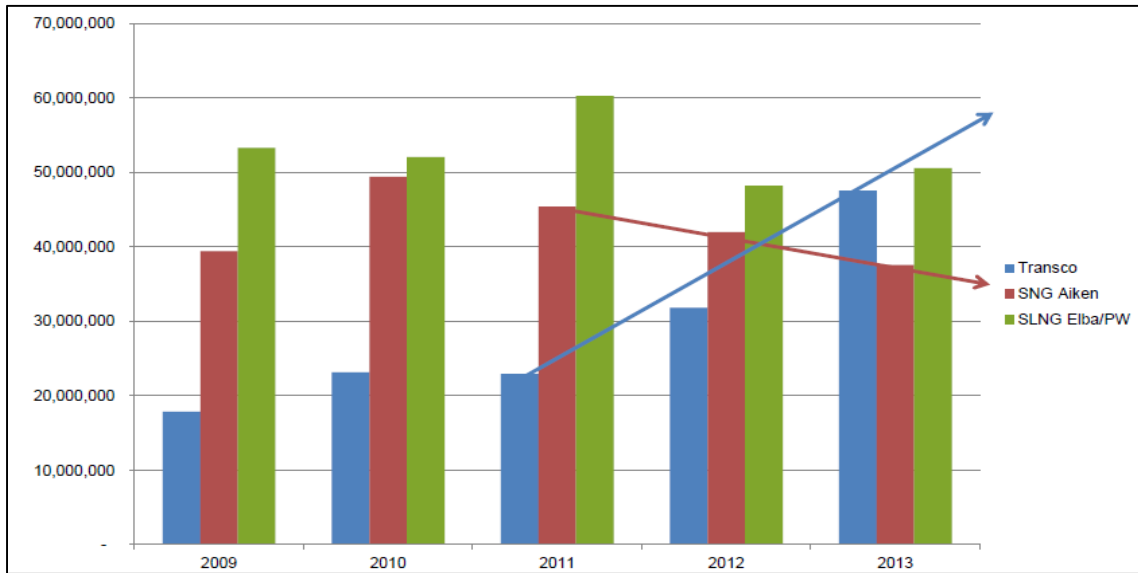


*Source: Dominion*

DCGT provides natural gas delivery service to the industrial, Local Distribution Company (LDC), and power generation sectors. DCGT's estimated throughput in 2014 was approximately 137.5 BCF. Overall throughput grew approximately 9.7 percent between 2010 and 2014 (See Appendix H for details). DCGT has two proposed expansion projects: a \$119 million Transco to Charleston project and a Columbia to Eastover Project (See Appendix H for details).

The majority of the natural gas that flows into DCGT is sourced from Sonat and Transco. Volumes in the figure below are scheduled pipeline receipts before netting displacement deliveries.

DCGT SUPPLY SOURCES



Source: DCGT

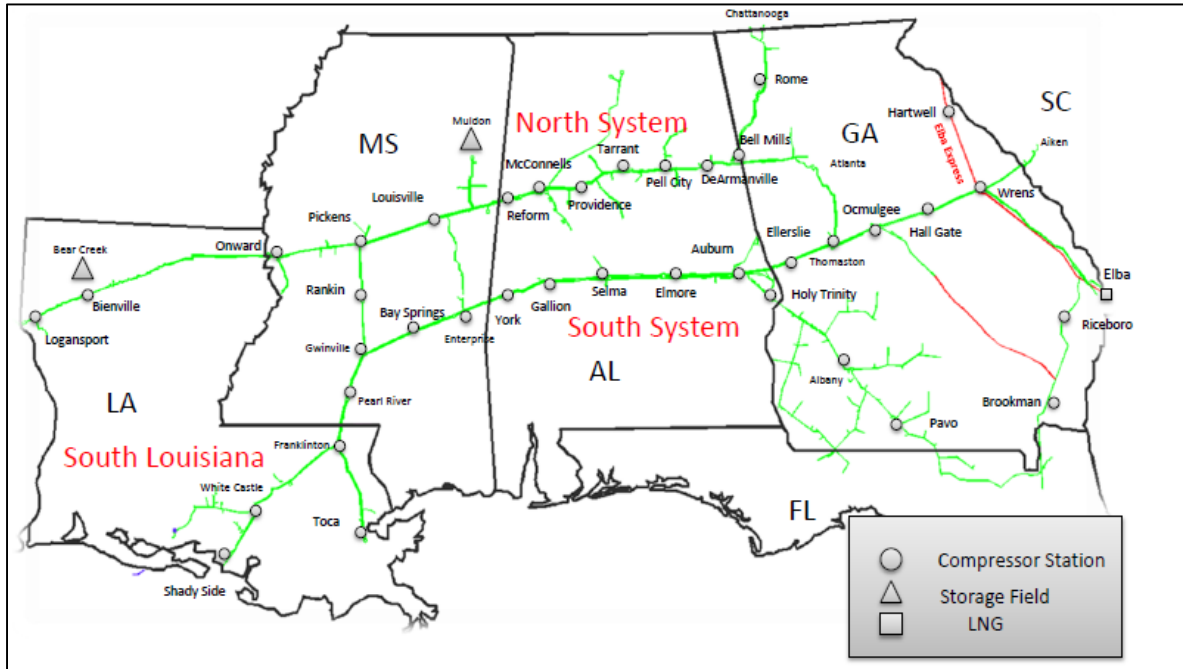
**Southern Natural Gas (SNG)**

SNG is owned and operated by Kinder Morgan. SNG was initially designed to transport natural gas from northern Louisiana and the Gulf Coast to states in the Southeast, including South Carolina. With the development of new gas supplies in different parts of the country and the decline of Gulf Coast production, today less than half of SNG’s supply comes from the Gulf Coast. SNG connects with DCGT in both Aiken County, S.C. and in Chatham County, Ga. SNG has other direct customers in Aiken County, S.C., including SCE&G.



The main SNG delivery point into South Carolina is on the East of Wrens portion of the pipeline delivering up to 475,000 million cubic feet per day (Mcf/d) at the Aiken interconnect with DCGT. In addition, there are two delivery points off of SNG with SCE&G. One delivers up to 125,000 Mcf/d to the 650 Megawatt Urquhart power plant and the other delivers up to 80,000 Mcf/d to North Augusta. According to the EIA, SNG delivered approximately 56 BCF of gas into South Carolina in 2014. This total compares to historical flows of 51 BCF in 2013, 66 BCF in 2012, and 63 BCF in 2011.

SOUTHERN NATURAL GAS MAP

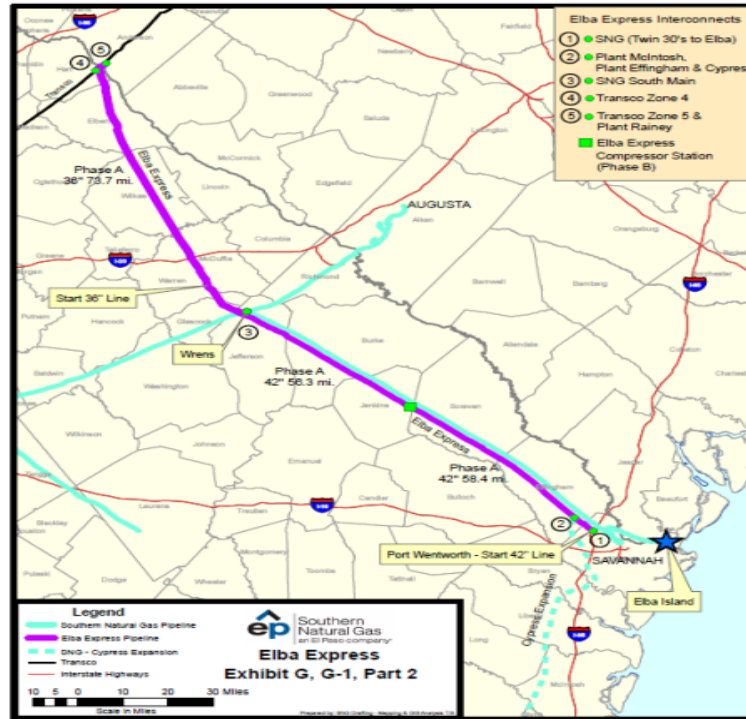


Source: Kinder Morgan

**Elba Express Company**

The 200-mile Elba Express pipeline, also owned and operated by Kinder Morgan, has bi-directional interconnects with Transco in Anderson County, S.C. and across the Savannah River in Hart County, Ga.. Elba Express interconnects with SNG near Wrens, Ga. In Port Wentworth, Ga., Elba Express interconnects with SNG and DCGT.

## ELBA EXPRESS MAP



Source: Kinder Morgan

The Elba Express pipeline was originally constructed to move vaporized LNG that was being imported into the Elba Island LNG facility to domestic markets, including South Carolina. However, with the growth in domestic shale gas production and the market price of natural gas in the U.S., imports of LNG into Elba Island and across the U.S. have been declining. Kinder Morgan is planning to add liquefaction facilities to be able to export natural gas from Elba Island, which will make the terminal bi-directional. Elba Express is planning a companion expansion to move gas from Transco to Elba Island and to other southeastern markets, including South Carolina.

### **Transcontinental Pipeline (Transco)**

Transco is an interstate natural gas transmission company that owns and operates approximately a 9,700-mile natural gas pipeline system that extends from Texas, Louisiana, Mississippi, and the offshore Gulf of Mexico through Alabama, Georgia, South Carolina, North Carolina, Virginia, Maryland, Delaware, Pennsylvania and New Jersey to the New York City metropolitan area. Regulated by the FERC, the system serves customers in Texas and 12 Southeast and Atlantic seaboard states, including major metropolitan areas in Georgia, North Carolina, Washington, D.C., Maryland, New York, New Jersey, and Pennsylvania. There are two compressor stations in South Carolina located on the Transco system in Anderson and Spartanburg counties. Per Transco operational data, the design capacity of the pipeline into South Carolina is approximately 3.8 Bcf/day (See Appendix H for more information on the entire Transco system covering multiple states).



Transco is the largest interstate pipeline source of gas for the state. According to the EIA, approximately 717 BCF flowed into South Carolina in 2014. This 717 BCF includes consumption in multiple states, from South Carolina to Mid-Atlantic markets.

### TRANSCO SYSTEM MAP



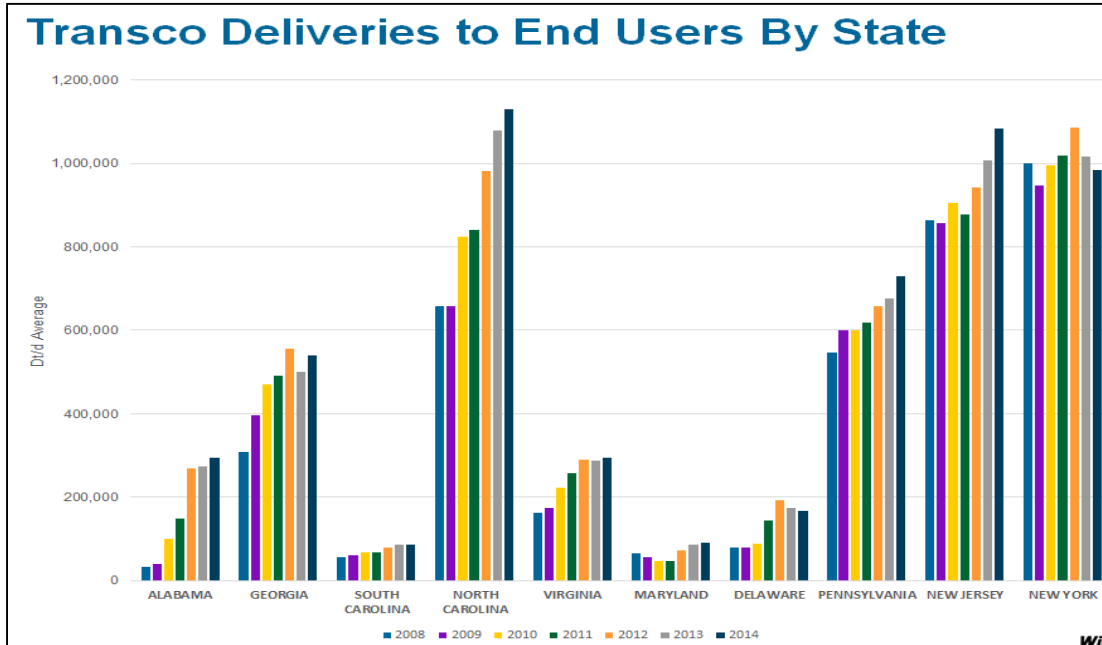
Source: Williams

The 717 BCF is lower than previous years as south-to-north flow displacement continues as a result of Marcellus Shale production growth. Historical flows on Transco into South Carolina were 805 BCF in 2013, 977 BCF in 2012, and 1,034 BCF in 2011.

As of December 31, 2015, Transco's system had a mainline delivery capacity of approximately 6.4 MMDth of natural gas per day from its production areas to its primary markets, including delivery capacity from the mainline to locations on its Mobile Bay Lateral. Using its Leidy Line along with market-area storage and transportation capacity, Transco can deliver an additional 5.1MMDth of natural gas per day for a system-wide delivery capacity total of approximately 11.5 MMDth of natural gas per day. Transco's system includes 45 compressor stations, four underground storage fields, and an LNG storage facility. Compression facilities at sea level-rated capacity total approximately 1.8 million horsepower.

Transco's major natural gas transportation customers are public utilities and municipalities that provide service to residential, commercial, industrial, and electric generation end users. Shippers on Transco's system include public utilities, municipalities, intrastate pipelines, direct industrial users, electrical generators, natural gas marketers, and producers. Transco's firm transportation agreements are generally long-term agreements with various expiration dates and account for the major portion of Transco's business. In addition, Transco offers interruptible transportation services under shorter term agreements.

TRANSCO DELIVERS TO END-USERS BY STATE



Source: Williams

Transco has natural gas storage capacity in four underground storage fields located on or near its pipeline system or market areas and operates two of these storage fields. Transco also has storage capacity in an LNG storage facility that it owns and operates. The total usable gas storage capacity available to Transco and its customers in underground storage fields, in its LNG storage facility, and through storage service contracts is approximately 200 Bcf of natural gas. In addition, wholly owned subsidiaries of Transco operate and hold a 35 percent equity-method investment in Pine Needle LNG Company, LLC, and an LNG storage facility with 4 Bcf of storage capacity.

## IX. Appendix I: South Carolina Natural Gas Pipeline Infrastructure

In 2011 the U.S. Department of Transportation (DOT) and its Pipeline and Hazardous Materials Safety Administration (PHMSA), in response to significant national natural gas pipeline incidents, promulgated regulations that require inspection, repair, rehabilitation and/or replacement of the highest risk natural gas pipeline infrastructure by pipeline operators. The program includes an inventory of pipelines by type, system evaluation to identify risks, and an implementation plan to mitigate those risks. The regulatory compliance process is divided into two major areas starting with Transmission Integrity Management Program (TIMP). TIMP focuses on high pressure, high consequence pipelines that comprise the nationwide interstate pipeline network and major feeds owned by local natural gas distribution companies. The second regulatory component is termed Distribution Integrity Management Program (DIMP) and requires natural gas utilities to assess and take action to mitigate any risks discovered on lower pressure delivery systems serving cities, towns, and individual natural gas customers. South Carolina's natural gas utilities continue to invest in projects that focus on integrity upgrades that address regulatory safety concerns while prudently improving the systems that serve the state's growing population, business, industry, and power generation needs.

Pipeline materials and construction are the primary factors considered in assessing the condition of natural gas pipeline infrastructure within states. The major types of natural gas pipeline are cast iron, bare steel, coated and wrapped steel, and plastic. In addition, modern steel pipes are protected from corrosion-related material loss through the use of cathodic protection. Whereas steel is exclusively used for high-pressure transmission pipelines, steel, cast iron, and plastic pipe are all used for low-pressure distribution systems. Elimination of cast iron distribution pipes and uncoated steel pipes is a primary focus of the federal Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011; it requires that utilities on a state-by-state basis provide data on their replacement of bare steel and cast iron pipe.

Nineteen states, including South Carolina, have completely eliminated cast iron distribution lines. Cast iron pipe has been supplanted by plastic pipe that will not corrode and is easier to repair if cut by a dig-in. By comparison, New Jersey is ranked last for remaining cast iron distribution lines at 4,586 miles of pipe still in service. New York has 6,375 cast iron service lines that have yet to be replaced.

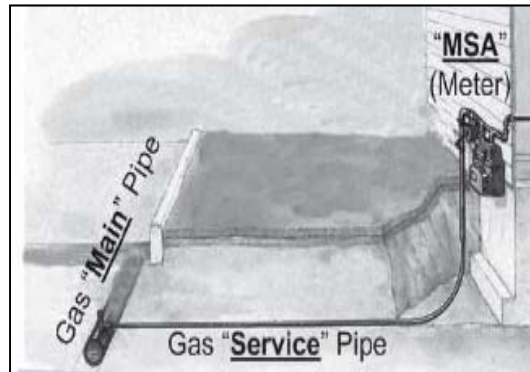
Higher risk uncoated pipes, commonly known as bare steel pipe, are being replaced by coated pipelines, thus eliminating external corrosion. PHMSA's accelerated approach has made high-pressure bare steel replacements its highest priority. South Carolina is a leader in this area with no uncoated steel transmission pipelines and only 6 miles of uncoated steel distribution remaining in service at the end of 2015. Only 396 bare steel natural gas services (from the distribution main to the customer premise) remained in SC at the close of 2015. Pennsylvania takes the bottom ranking with bare steel transmission at 963 miles, with Ohio having the lowest distribution ranking at 7,672 miles of pipe in service.

### Natural Gas Main and Service Infrastructure

The infrastructure of a gas utility is comprised of two main components: mains and services. The figure below illustrates how a gas main comes from an interstate pipeline to the gas service,

which then connects to the end-user's meter. Mains and services come in various sizes and materials.

MAIN & SERVICES ILLUSTRATIVE IMAGE



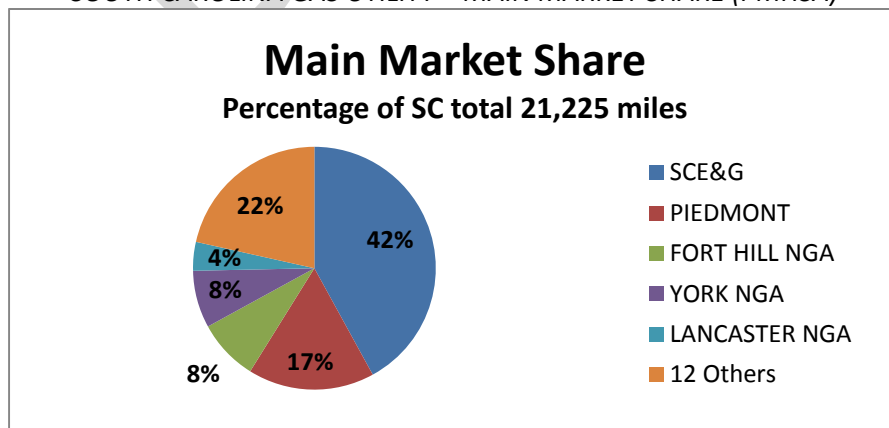
Source: SoCal Gas

All reported infrastructure in South Carolina is made of steel or plastic (polyethylene). While steel is used for all pipe sizes, it currently is primarily used for larger pipes. Over the last twenty years polyethylene pipe use has increased due to its longer lifespan as compared to steel, which naturally corrodes from elements in the ground and moisture. South Carolina gas utilities report that no iron or copper gas infrastructure exists in South Carolina. In addition, no natural gas utilities in South Carolina have reported any mains or services built prior to 1950. The largest portion of gas utility infrastructure construction occurred between 1990 and 2009.

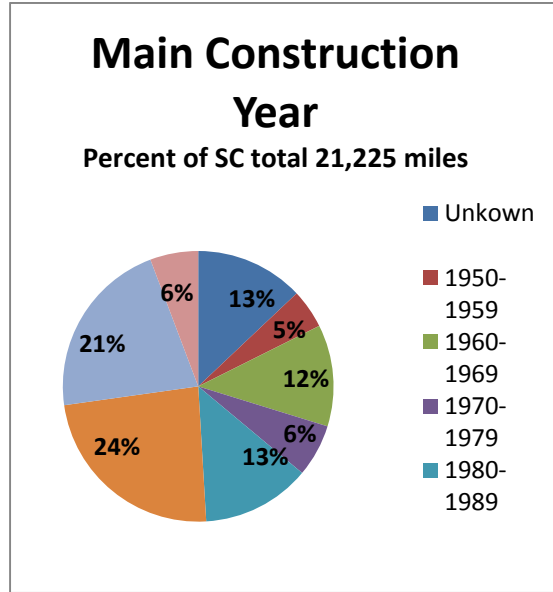
Main Infrastructure

The gas main pipeline infrastructure of the state transports natural gas from the interstate pipelines to the service lines. As of 2014, the state had approximately 21,225 miles of gas main pipeline between its Investor-Owned Utilities (IOUs) and municipal utilities. The following figures detail the market share, size, material composition, and age of South Carolina's gas main infrastructure.

SOUTH CAROLINA GAS UTILITY – MAIN MARKET SHARE (PMHSA)



*SOUTH CAROLINA GAS UTILITY – CONSTRUCTION YEAR OF MAINS (PMHSA)*



*SOUTH CAROLINA GAS UTILITY – MAINS BY SIZE (PMHSA)*

SC GAS UTILITY	2" or Less	>2"-4"	>4"-8"	>8"-12"	>12"	Total
SOUTH CAROLINA ELECTRIC & GAS CO	6,178	1,516	1,140	77	7	8,918
PIEDMONT NATURAL GAS CO INC	2,412	669	442	54	-	3,577
FORT HILL NGA	1,093	460	144	33	-	1,730
YORK COUNTY NGA	1,099	369	152	2	-	1,622
LANCASTER COUNTY NGA	570	170	73	-	-	813
GREENWOOD CPW	407	246	46	43	-	742
CLINTON - NEWBERRY NGA	477	191	64	-	-	732
GREER CPW	449	220	60	-	-	729
CHESTER COUNTY NGA	385	170	35	-	-	590
UNION, CITY OF	235	109	57	5	-	405
LAURENS CPW	227	78	42	44	-	391
ORANGEBURG PUBLIC UTILITIES	210	59	52	30	-	351
FOUNTAIN INN NGA	176	108	19	-	-	303
WINNSBORO, TOWN OF	68	50	21	-	-	138
BENNETTSVILLE, CITY OF	56	28	2	-	-	86
BAMBERG BOARD OF PUBLIC WORKS	51	32	-	-	-	83
PATRIOTS ENERGY GROUP	-	3	13	-	-	16
	<b>14,092</b>	<b>4,478</b>	<b>2,361</b>	<b>286</b>	<b>7</b>	<b>21,225</b>
	66%	21%	11%	1%	0%	

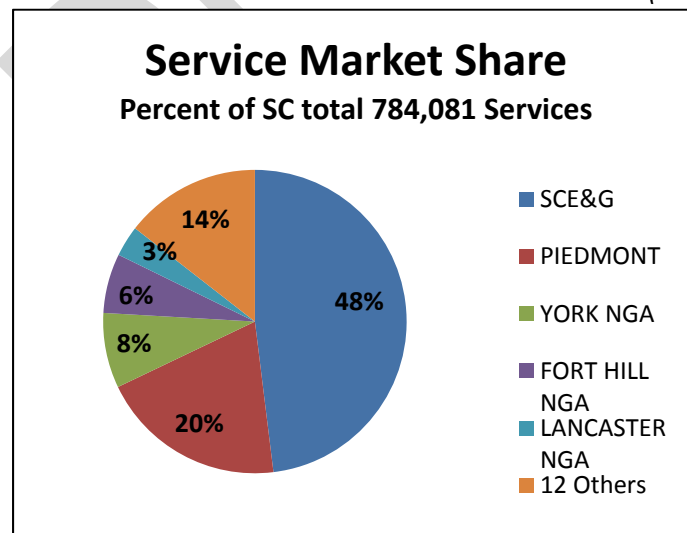
*SOUTH CAROLINA GAS UTILITY – MAINS BY MATERIAL (PMHSA)*

SC GAS UTILITY	Steel	Plastic	Total	% Steel	% Plastic
SOUTH CAROLINA ELECTRIC & GAS CO	3,905	5,013	8,918	44%	56%
PIEDMONT NATURAL GAS CO INC	1,461	2,116	3,577	41%	59%
FORT HILL NGA	742	988	1,730	43%	57%
YORK COUNTY NGA	358	1,264	1,622	22%	78%
LANCASTER COUNTY NGA	234	579	813	29%	71%
GREENWOOD CPW	332	410	742	45%	55%
CLINTON - NEWBERRY NGA	188	544	732	26%	74%
GREER CPW	182	547	729	25%	75%
CHESTER COUNTY NGA	123	467	590	21%	79%
UNION, CITY OF	172	233	405	43%	57%
LAURENS CPW	169	222	391	43%	57%
ORANGEBURG PUBLIC UTILITIES	236	115	351	67%	33%
FOUNTAIN INN NGA	70	233	303	23%	77%
WINNSBORO, TOWN OF	70	68	138	51%	49%
BENNETTSVILLE, CITY OF	54	32	86	63%	37%
BAMBERG BOARD OF PUBLIC WORKS	38	45	83	46%	54%
PATRIOTS ENERGY GROUP	16	-	16	100%	0%
	<b>8,350</b>	<b>12,875</b>	<b>21,225</b>	<b>39%</b>	<b>61%</b>

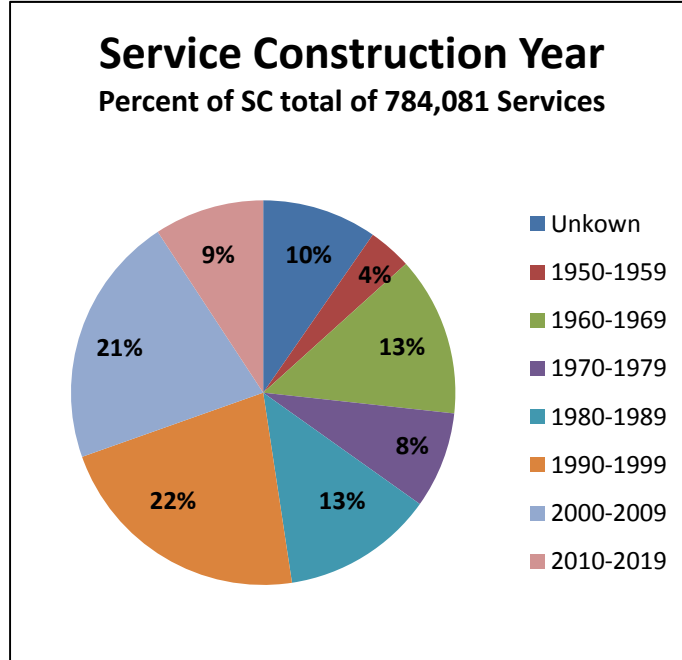
Service Infrastructure

The gas service pipeline infrastructure of the state transports natural gas from the main pipes to the end-user’s meter. As of 2014, the state had approximately 784,092 service lines. The figures below detail the market share, size, material composition, and age of South Carolina’s gas service line infrastructure.

*SOUTH CAROLINA GAS UTILITY – SERVICE MARKET SHRAE (PMHSA)*



SOUTH CAROLINA GAS UTILITY – CONSTRUCTION YEAR OF SERVICES (PMHSA)



SOUTH CAROLINA GAS UTILITY – SERVICES BY SIZE (PMHSA)

SC GAS UTILITY	Unkown	1" or Less	>1"-2"	>2"-4"	>4"-8"	>8"	Total
SOUTH CAROLINA ELECTRIC & GAS CO	3	355,896	20,727	129	30	1	376,786
PIEDMONT NATURAL GAS CO INC	-	144,274	11,102	223	26	11	155,636
YORK COUNTY NGA	-	62,549	165	18	2	-	62,734
FORT HILL NGA	-	49,144	598	20	3	-	49,765
LANCASTER COUNTY NGA	-	25,631	55	9	1	-	25,696
GREENWOOD CPW	-	24,008	181	26	2	-	24,217
GREER CPW	-	21,393	565	77	3	-	22,038
CLINTON - NEWBERRY NGA	-	16,110	213	28	-	-	16,351
ORANGEBURG PUBLIC UTILITIES	-	10,088	72	5	3	-	10,168
CHESTER COUNTY NGA	-	9,979	47	12	4	-	10,042
LAURENS CPW	7,414	348	11	1	-	-	7,774
FOUNTAIN INN NGA	-	7,643	48	4	-	-	7,695
UNION, CITY OF	-	7,355	26	15	-	-	7,396
BENNETTSVILLE, CITY OF	-	3,292	-	-	-	-	3,292
WINNSBORO, TOWN OF	-	2,863	19	-	1	-	2,883
BAMBERG BOARD OF PUBLIC WORKS	-	1,595	12	1	-	-	1,608
PATRIOTS ENERGY GROUP	-	-	-	-	-	-	-
	<b>7,417</b>	<b>742,168</b>	<b>33,841</b>	<b>568</b>	<b>75</b>	<b>12</b>	<b>784,081</b>
	1%	95%	4%	0%	0%	0%	



*SOUTH CAROLINA GAS UTILITY – SERVICES BY MATERIAL (PMHSA)*

<b>SC GAS UTILITY</b>	<b>Steel</b>	<b>Plastic</b>	<b>Total</b>	<b>% Steel</b>	<b>% Plastic</b>
SOUTH CAROLINA ELECTRIC & GAS CO	93,173	283,613	376,786	25%	75%
PIEDMONT NATURAL GAS CO INC	25,288	130,348	155,636	16%	84%
YORK COUNTY NGA	5,232	57,502	62,734	8%	92%
FORT HILL NGA	18,062	31,703	49,765	36%	64%
LANCASTER COUNTY NGA	2,089	23,607	25,696	8%	92%
GREENWOOD CPW	8,160	16,057	24,217	34%	66%
GREER CPW	3,629	18,409	22,038	16%	84%
CLINTON - NEWBERRY NGA	2,501	13,850	16,351	15%	85%
ORANGEBURG PUBLIC UTILITIES	6,167	4,001	10,168	61%	39%
CHESTER COUNTY NGA	2,016	8,026	10,042	20%	80%
LAURENS CPW	2,396	5,378	7,774	31%	69%
FOUNTAIN INN NGA	727	6,968	7,695	9%	91%
UNION, CITY OF	3,885	3,511	7,396	53%	47%
BENNETTSVILLE, CITY OF	2,255	1,037	3,292	68%	32%
WINNSBORO, TOWN OF	852	2,031	2,883	30%	70%
BAMBERG BOARD OF PUBLIC WORKS	732	876	1,608	46%	54%
PATRIOTS ENERGY GROUP	-	-	-	-	-
	<b>177,164</b>	<b>606,917</b>	<b>784,081</b>	<b>23%</b>	<b>77%</b>

DRAFT



## X. Appendix J: Propane Gas Basics

### What Is Propane?

Propane is a naturally occurring hydrocarbon commonly found in the production stream of oil and gas wells. With the chemical formula  $C_3H_8$ , it is one of the least complex hydrocarbons (technically an alkane). Propane is colorless, odorless, and tasteless. It is gaseous at normal temperatures and pressures. With pressure, propane becomes a liquid at somewhat higher temperatures, which is why "liquefied petroleum gas" (LPG) is another name for propane.

Most people know propane as the fuel in a white container attached to a barbecue grill, but propane has long proven its versatility for heating homes, heating water, cooking, drying clothes, fueling gas fireplaces, and as an alternative fuel for vehicles.

Propane has applications in residential and commercial markets for heating (furnaces, boilers, and gas logs), water heating, cooking, and clothes drying. It is well known across America, even among those who do not use it as a primary home fuel, as a fuel source for barbecues, outdoor stoves, heaters, and the like. More than 14 million American families use propane for these various applications, and approximately 10 million households' heat with propane. In addition, propane commands a significant market as a transportation fuel for forklifts, buses, vans, trucks, and cars.

Propane is also used as a fuel in the industrial sector both for space heating and process applications. Propane is used on nearly 1 million farms for irrigation pumps, grain dryers, standby generators, and other farm equipment.

Also, propane is used to make petrochemicals, which are the building blocks for plastics, alcohol, fibers, and cosmetics, to name just a few. Propane naturally occurs as a gas at atmospheric pressure but can be liquefied if subjected to moderately increased pressure. It is stored and transported in its compressed liquid form, but by opening a valve to release propane from a pressurized storage container, it is vaporized into a gas for use. Simply stated, propane is always a liquid until it is used. Although propane is non-toxic and odorless, an identifying odor is added so the gas can be readily detected.

### Where Does Propane Come From?

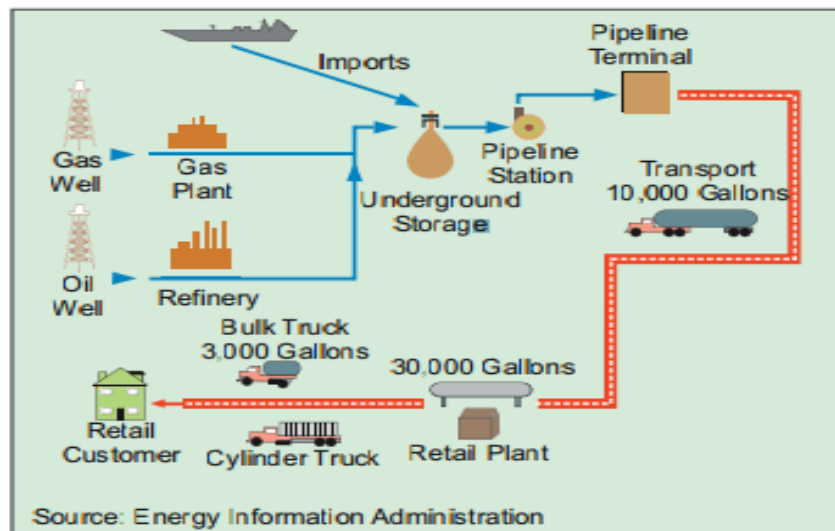
Propane is produced through two processes. First, it can be extracted from natural gas streams in natural gas processing plants. Second, it can be produced by refiners as part of the crude oil cracking process. Today, the former method of production accounts for more than 70 percent of domestic supply. North American supplies of propane are adequate to meet the entire U.S. demand. Unlike customers of gasoline, diesel fuel, and heating oil, propane customers are not dependent upon supplies from foreign nations. Propane is in essence a byproduct and, from a commercial perspective, production varies not so much with the demand for propane as the demand for the products of which it is a byproduct (natural gas and refinery products).

While large volumes of propane are transported by petroleum products' pipelines, it is also commercially feasible to transport it by rail, truck, ship, and barge. Technically, those modes are

possible for natural gas, but they are not generally economically feasible on a retail basis. Natural gas, whether compressed or liquefied, requires much heavier storage containers and higher pressure or lower temperature. At ordinary temperatures and pressures, natural gas is lighter than air while propane is heavier than air.

A unique feature of propane is that it is not produced for its own sake but is a by-product of two other processes, natural gas processing and petroleum refining. The figure below shows a diagram of where propane comes from and how it gets to the consumer. Natural gas plant production of propane primarily involves extracting materials such as propane and butane from natural gas to prevent these liquids from condensing and causing operational problems in natural gas pipelines. Similarly, when oil refineries make major products such as motor gasoline and heating oil, some propane is produced as a by-product of those processes. It is important to understand that the by-product nature of propane production means that the volume made available from natural gas processing and oil refining cannot be adjusted when prices and/or demand for propane fluctuate.

*PROPANE PRODUCTION & DISTRIBUTION SYSTEMS*



### *South Carolina Propane Distribution*

Distribution of propane to South Carolina consumers is made from one of the 112 retail dealer outlets located throughout 43 counties. Each dealer location has one or more bulk storage tanks, usually 30,000 gallons in capacity, on-site to provide storage for the propane needed to serve the dealers' customers. Between 700 and 800 individuals are employed in the retail propane business in S.C.

In 2014, 114,982,000 gallons of odorized propane was sold in South Carolina for residential, commercial, internal combustion fuel, chemical, industrial, and agricultural use. Propane is the go-anywhere fuel that can be used wherever natural gas is not available. It is delivered by a vehicle commonly known as a bulk truck that carries 2,500-3,500 gallons. Appropriately sized

tanks are placed at a consumer's residence or place of business and connected to the gas burning appliances used by the consumer. While refill rates can vary, tanks are refilled on an as needed basis, usually every 30-45 days.

The South Carolina Propane Gas Association (SCPGA) [www.scpropane.com](http://www.scpropane.com) was established in 1948 and serves as the trade association for the retail propane dealers in South Carolina. It provides an excellent website that offers propane users an easy access to find local propane retailers by zip code. The SCPGA website also provides links to safety information to assist consumers in broadening their knowledge about using propane in a safe manner. See Appendix J for information provided by the SCPGA on the basics of propane – what it is and where it comes from.

DRAFT

**xi. Appendix K: Electric Generation Capacity by Provider**

**SCE&G**

Generation Capacity (MW)		
Fuel Type	Winter	Summer
Coal	1,739	1,734
Biomass	55	55
Nat Gas - Combustion Turbines	399	340
Nat Gas - Boiler	346	345
Nat Gas - Combined Cycle	1,408	1,310
Oil - Turbine	9	9
Pumped Storage	576	576
Hydroelectric	226	218
Solar	2.85	2.85
Nuclear	3,226	3,205
<b>Total</b>	<b>7,986.85</b>	<b>7,794.85</b>

**Santee Cooper**

Generation Capacity (MW)		
Fuel Type	Winter	Summer
Coal	3,530	3,500
Biomass	29	29
Nat Gas - Combustion Turbines	630	517
Nat Gas - Boiler	-	-
Nat Gas - Combined Cycle	520	447
Oil - Turbine	185	159
Pumped Storage	-	-
Hydroelectric	241	241
Solar	3	3
Nuclear	1,327.30	1,312.00
<b>Total</b>	<b>6,465.30</b>	<b>6,208.00</b>

Notes:	1. Santee Cooper has a one third ownership in V.C. Summer Unit 1		
	2. Santee Cooper transitions from 45% ownership (shown) to 40% ownership by 2021 for units 2 & 3.		

**DEC**

Generation Capacity (MW)	<b>*Only Including Operating Units</b>	
Fuel Type	Winter	Summer
Coal	6,909.00	6,821.00
Biomass	-	-
Nat Gas - Combustion Turbines	3,204.20	2,769.40
Nat Gas - Boiler	173.00	170.00
Nat Gas - Combined Cycle	1,359.90	1,292.40
Oil - Turbine	-	-
Pumped Storage	2,140.00	2,140.00
Hydroelectric	1,100.15	1,100.15
Solar	3.55	3.55
Nuclear	7,318.80	7,140.30
<b>Total</b>	<b>22,208.60</b>	<b>21,436.80</b>

**DEP**

Generation Capacity (MW)	<b>*Only Includes Operating Units</b>	
Fuel Type	Winter	Summer
Coal	3,587	3,542
Biomass	-	-
Nat Gas - Combustion Turbines	1,981	1,673
Nat Gas - Boiler	-	-
Nat Gas - Combined Cycle	2,991	2,620
Oil - Turbine	1,491	1,270
Pumped Storage	-	-
Hydroelectric	227	227
Solar	-	-
Nuclear	3,698	3,539
<b>Total</b>	<b>13,975</b>	<b>12,871</b>

### Ameresco

Generation Capacity (MW)		
Fuel Type	Winter	Summer
Coal	0	0
Biomass	12	17
Nat Gas - Combustion Turbines	0	0
Nat Gas - Boiler	0	0
Nat Gas - Combined Cycle	0	0
Oil - Turbine	0	0
Pumped Storage	0	0
Hydroelectric	0	0
Solar	0	0
Nuclear	0	0
<b>Total</b>	<b>12</b>	<b>17</b>

### Lockhart Power Company

Generation Capacity (MW)		
Fuel Type	Winter	Summer
Coal	0	0
Biomass	0	0
Nat Gas - Combustion Turbines	0	0
Nat Gas - Boiler	0	0
Nat Gas - Combined Cycle	0	0
Oil - Turbine	14.1	14.1
Pumped Storage		
Hydroelectric	20.6	20.6
Solar	0	0
Nuclear	0	0
<b>Total</b>	<b>34.7</b>	<b>34.7</b>

### Merchant Biomass

Generation Capacity (MW)		
Fuel Type	Winter	Summer
Coal	0	0
Biomass	52	267.49
Nuclear	0	0
<b>Total</b>	<b>52</b>	<b>267.49</b>

**XII. Appendix L: Electric Consumption by Provider**

SCE&G - Electric		
2015	Consumption (MWh)	Customers (#)
Residential	7,977,834	596,686
Commercial	7,398,918	93,178
Industrial	6,201,242	757
Transportation		
Electric Power		
<b>Total Consumption</b>	<b>21,577,994</b>	<b>690,621</b>

SCE&G		Natural Gas
2015	Consumption (MBtu)	Customers (#)
Residential	12,085,581	316,263
Commercial	12,579,536	25,989
Industrial	17,901,001	474
Transportation	4,781,023	176
Electric Power	16,185,555	-
<b>Total Consumption</b>	<b>63,532,696</b>	<b>342,902</b>

DEC		
2015	Electric Consumption (MWh)	Customers (#)
Residential	27,915,922	2,117,482
Commercial	28,699,967	345,119
Street Lighting	22,135,696	6,417
Industrial	305,034	15,041
<b>Total Consumption</b>	<b>79,056,620</b>	<b>2,484,059</b>

DEP		
2015	Electric	
	Consumption (MWh)	Customers (#)
Residential	17,953,670	1,274,550
Commercial	14,038,502	226,094
Military	1,490,196	5
Street Lighting	106,399	1,677
Industrial	10,287,506	4,209
<b>Total Consumption</b>	<b>43,876,273</b>	<b>1,506,535</b>

Central Electric Power Cooperative Inc.		
2015	Electric Cooperatives Total	
	Consumption (MWh)	Customers (#)
Residential	9,848,854	677,948
Commercial	2,502,588	83,795
Industrial	3,417,840	376
Transportation		
Electric Power		
<b>Total Consumption</b>	<b>15,769,282</b>	<b>762,119</b>

Santee Cooper				
	Electric		Natural Gas	
	Consumption (MWh)	Customers (#)	Consumption (MBtu)	Customers (#)
Residential	1,785,433	145,208		
Commercial	2,069,359	27,565		
Industrial	7,270,792	29		
Transportation				
Electric Power			54,891,036	1
<b>Total Consumption</b>	11,125,584	MWh	54,891,036	Mbtu

Note: Natural Gas Consumption for Electric Power represents Transco to Rainey Generating Station delivery.



### **XIII. Appendix M: Energy Efficiency and Renewable Energy Programs**

#### **Energy Efficiency**

The Lawrence Berkeley National Laboratory defines energy efficiency as using less energy to provide the same service.

Energy efficiency programs reduce costs for the utility system from the avoided costs for energy, generation capacity, and transmission and distribution capacity.

They can also help reduce electricity market prices, reduce disconnections, reduce the number of customers in arrears, improve system reliability and electricity price stability, support local job growth, and provide a host of benefits to participants including non-energy benefits such as increased property values or positive health impacts.

#### **Evaluation, Measurement, and Verification (EM&V)**

##### What is EM&V?

According to the Department of Energy, EM&V is the collection of methods and processes used to assess the performance of energy efficiency activities so that planned results can be achieved with greater certainty and future activities can be more effective.

Customer-funded energy efficiency programs are commonly subject to this process. The EM&V process includes determining and documenting the results, benefits, and lessons learned from energy efficiency programs. The overall evaluation objectives are to assess energy efficiency measures and document the gross and net energy and demand savings associated with programs. Through the process, the evaluation includes suggested improvements to the design and implementation of existing and future programs. In addition, EM&V consists of data collection and analysis that is used to understand the effects of efficiency projects and programs in order to assess whether they are cost-effective and how they can be improved.

A key component of EM&V is assessment of the savings attributable to the program of interest, also known as net savings. Net savings are calculated when it is of interest to know what savings resulted from the program's influence on program participants and non-participants. In other words, net savings takes into account factors such as free ridership and spillover, whereas gross savings does not. Free ridership refers to energy savings that would have occurred naturally, even without the efficiency program in question; spillover refers to energy savings that are induced by the program but without financial or technical assistance from the program. Gross savings, in contrast, refers to any change in energy consumption resulting from the action participants take as part of the program, regardless of why they participated.

Net savings are important for providing decision makers with an understanding of whether investment in an efficiency program is achieving savings that would not have otherwise occurred, and whether the program is cost-effective (that is, whether the benefits outweigh the costs). Gross savings, on the other hand, can be used by utilities for the purpose of load forecasting within the integrated resource planning process, since this forecasting is concerned primarily with what the load is expected to be and not necessarily what caused customers to

adopt an efficiency measure. In its 2014 study, the American Council for an Energy-Efficient Economy reported that “when quantifying and reporting energy efficiency program savings,” 19 of 43 states surveyed (or 44 percent) responded that they use both net and gross savings, 15 states (35 percent) use net, and 9 states (21 percent) use gross.

Overall, to keep program benefits from being under- or overstated, it is important to understand and properly reflect the influences of both net and gross energy savings. The numerical difference between a program’s net savings and gross savings varies by program for any given utility. Using SCE&G as an example, the net and gross savings for the Home Energy Reports program in 2014 are identical; however, for the Energy Star Lighting program in 2014, the net savings was 48,401 MWh and the gross savings was 58,314 MWh.

Program savings data can also be reported at the level of the customer meter, or at the generator. “At the meter” refers to the energy savings that participating customer’s experience (that is, electricity savings for the customer). “At the generator” includes both the savings at the meter and the additional savings that accrue due to avoiding the line losses that occur when power is delivered to customers over transmission and distribution lines (that is, premise savings increased for line loss factors).

The following tables provide information on utility-specific Energy Efficiency and Renewable Energy Programs available in South Carolina.

DRAFT

Duke Energy Carolinas (DEC) Investor-Owned Programs				2015 Annual Gross Savings at Plant		2015 Net Savings at the Meter	
Program Name	Program Type	Target Consumer	Brief Description	KWH	KW	KWH	KW
Appliance Recycling program	Energy Efficiency	Residential	Promotes the removal and responsible disposal of older, inefficient appliances	10,550,952	1,424	5,213,450	705
Energy Assessments Program	Energy Efficiency	Residential	Provides customers with an energy audit of their home and an energy efficiency starter kit including LED bulbs	10,293,765	1,275	9,693,997	1,200
Energy Efficiency Education Program	Energy Efficiency	Residential	Engages school Children with a live-in school theatrical presentation regarding energy efficiency and allow children to receive a home energy efficiency kit featuring weather stripping and LED bulbs.	4,417,898	827	4,160,489	779
Energy Efficient Appliances and Devices	Energy Efficiency	Residential	The Company provides financial incentives for customers to install energy efficient equipment. Program consist of measures related to all types of lighting and hot water heating.	145,723,780	16,986	119,224,428	13,887
HVAC Energy Efficiency Program	Energy Efficiency	Residential	Provides customers with financial incentives to install or take action around making their homes or HVAC equipment more energy efficient. This program includes incentives for air conditioners, heat pumps and insulation	6,810,489	3,854	4,486,078	2,508
Multi-Family Energy Efficiency Program	Energy Efficiency	Residential	Targeted at getting energy efficient water saving measures and lighting installed into multi-family residents.	14,970,512	1,436	13,173,090	1,261
My Home Energy Report	Energy Efficiency	Residential	A periodic report is sent to customers to engage them around their energy usage by providing them with a normative comparison to similar customers, and provides customers with actionable energy saving tips.	228,776,428	61,770	215,446,739	58,171
Income-Qualified Energy Efficiency and Weatherization Program	Energy Efficiency	Residential	Provides income qualified household with highly incentivized home weatherization. It also includes a program that uses neighborhood engagements to directly install low cost measures like efficient lighting in homes in a targeted neighborhood.	2,714,581	586	2,514,102	542

Duke Energy Carolinas (DEC) Investor-Owned Programs				2015 Annual Gross Savings at Plant		2015 Net Savings at the Meter	
Program Name	Program Type	Target Consumer	Brief Description	KWH	KW	KWH	KW
Power Manager	Demand Response	Residential	Program provides customers with a financial incentive to allow the Company to cycle the customer's air conditioner during peak events.	-	457,528	-	430,870
Non-Residential Smart \$aver® Energy Efficient Food Service Products Program	Energy Efficiency	Commercial and Industrial	The Company provides financial incentives for customers to install energy efficient equipment. Program consist of measures related to food processing and preparation.	10,691,281	1,722	7,047,846	1,135
Non-Residential Smart \$aver® Energy Efficient HVAC Products Program	Energy Efficiency	Commercial and Industrial	The Company provides financial incentives for customers to install energy efficient equipment. Program consist of measures related to heating and cooling.	7,718,198	2,299	5,087,947	1,515
Non-Residential Smart \$aver® Energy Efficient IT Products Program	Energy Efficiency	Commercial and Industrial	The Company provides financial incentives for customers to install energy efficient equipment. Program consist of measures related to computer systems and information technologies	7,423,871	772	4,893,923	509
Non-Residential Smart \$aver® Energy Efficient Lighting Products Program	Energy Efficiency	Commercial and Industrial	The Company provides financial incentives for customers to install energy efficient equipment. Program consist of measures related to lighting	87,851,745	15,050	62,592,188	10,752
Non-Residential Smart \$aver® Energy Efficient Process Equipment Products Program	Energy Efficiency	Commercial and Industrial	The Company provides financial incentives for customers to install energy efficient equipment. Program consist of measures related to process related energy usage	1,161,907	242	765,946	160
Non-Residential Smart \$aver® Energy Efficient Pumps and Drives Products Program	Energy Efficiency	Commercial and Industrial	The Company provides financial incentives for customers to install energy efficient equipment. Program consist of measures related to motors, pumps and drives	6,208,214	803	4,092,544	529

Duke Energy Carolinas (DEC) Investor-Owned Programs				2015 Annual Gross Savings at Plant		2015 Net Savings at the Meter	
Program Name	Program Type	Target Consumer	Brief Description	KWH	KW	KWH	KW
Non-Residential Smart \$aver® Custom Program	Energy Efficiency	Commercial and Industrial	The Company provides financial incentives for customers to install energy efficient equipment that is outside of the Company's prescriptive programs. It is designed to give customers flexibility and incentive based on a specific customer application.	79,519,597	11,396	67,614,517	9,775
Non-Residential Smart \$aver® Custom Energy Assessments Program	Energy Efficiency	Commercial and Industrial	In addition to the Custom Incentive Program, The Company provides financial incentive for a customer to undertake an energy assessment that can be used to identify projects and help them through the custom application process.	765,303	87	720,713	82
PowerShare®	Demand Response	Commercial and Industrial	The Company provides customers with financial incentives for the ability to require a customer to shed load during peak events.	-	417,276	-	392,963
Small Business Energy Saver	Energy Efficiency	Commercial	Targeted to provide small business customers with an audit of their facilities and the ability to have lighting, heating and cooling measures installed at a discounted price	66,895,930	14,581	56,698,407	12,358
Smart Energy in Offices	Energy Efficiency	Commercial	Designed to create a community engagement around energy efficiency in office space. The community participating office buildings then receive important usage data, participate in behavioral campaigns targeting efficiency and work toward a common efficiency goal.	31,080,946	6,469	24,001,408	4,995
Business Energy Report Pilot	Energy Efficiency	Commercial	Designed to engage commercial customers around understanding their energy usage by providing them with periodic reports that feature a normative comparison to like-types of business and targeted actionable tips for to become more efficient.	-	-	-	-
EnergyWise for Business	Demand Response	Commercial	Program provides small business customers with a financial incentive to allow the Company to cycle the customer's air conditioner during peak events.	-	14	-	13

Duke Energy Progress (DEP) Investor-Owned Programs				2015 Annual Gross Savings at Plant		2015 Net Savings at the Meter	
Program Name	Program Type	Target Consumer	Brief Description	KWH	KW	KWH	KW
Residential Appliance Recycling Program	Energy Efficiency	Residential	Promotes the removal and responsible disposal of older, inefficient appliances	8,303,006	1,061	4,195,361	538
Residential Energy Assessments	Energy Efficiency	Residential	Provides customers with an energy audit of their home and an energy efficiency starter kit including LED bulbs	-	-	-	-
My Home Energy Report	Energy Efficiency	Residential	A periodic report is sent to customers to engage them around their energy usage by providing them with a normative comparison to similar customers, and provides customers with actionable energy saving tips.	132,315,687	35,955	125,895,040	34,211
Energy Efficient Lighting Program	Energy Efficiency	Residential	The Company provides financial incentives for customers to install energy efficient lighting. Program provides incentive in the form of discounts applied at retail stores and online.	136,848,030	19,715	77,265,505	11,131
EnergyWise Program	Demand Response	Residential	Program provides customers with a financial incentive to allow the Company to cycle the customer's air conditioner during peak events.	-	266,272	-	266,272
Neighborhood Energy Saver Program	Energy Efficiency	Residential	Program uses neighborhood engagements to educate low income customers and directly install low cost measures like efficient lighting in homes in a targeted neighborhood.	5,959,494	885	5,670,308	842
New Construction Program	Energy Efficiency	Residential	Company provides financial incentive to builders to build new homes to a high efficiency standard	7,046,952	2,741	5,699,247	2,217
Home Energy Improvement Program	Energy Efficiency	Residential	Provides customers with financial incentives to install or take action around making their homes or HVAC equipment more energy efficient. This program includes incentives for air conditioners, heat pumps and insulation	5,093,714	4,825	3,721,658	3,525

Duke Energy Progress (DEP) Investor-Owned Programs				2015 Annual Gross Savings at Plant		2015 Net Savings at the Meter	
Program Name	Program Type	Target Consumer	Brief Description	KWH	KW	KWH	KW
Energy Efficiency Education Program	Energy Efficiency	Residential	Engages school Children with a live-in school theatrical presentation regarding energy efficiency and allow children to receive a home energy efficiency kit featuring weather stripping and LED bulbs.	2,284,689	226	2,173,824	215
Multi-Family Energy Efficiency Program	Energy Efficiency	Commercial and Industrial	Targeted at getting energy efficient water saving measures and lighting installed into multi-family residents.	19,825,244	1,998	16,731,554	1,676
Save Energy and Water Kit Program	Energy Efficiency	Commercial and Industrial	The Company provides financial incentives for customers to install energy efficient measures related to hot water heating, such as faucet aerators and low flow shower heads.	-	-	-	-
EnergyWise for Business	Demand Response	Commercial and Industrial	Program provides small business customers with a financial incentive to allow the Company to cycle the customer's air conditioner during peak events.	-	-	-	-
Business Energy Pilot Program	Energy Efficiency	Commercial and Industrial	Designed to engage commercial customers around understanding their energy usage by providing them with periodic reports that feature a normative comparison to like-types of business and targeted actionable tips for to become more efficient.	-	-	-	-
Energy Efficiency for Business	Energy Efficiency	Commercial and Industrial	The Company provides financial incentives for customers to install energy efficient equipment. Program consist of both prescriptive and custom incentives.	53,633,706	6,172	47,007,975	5,383
Small Business Energy Saver	Energy Efficiency	Commercial and Industrial	Targeted to provide small business customers with an audit of their facilities and the ability to have lighting, heating and cooling measures installed at a discounted price	45,077,020	8,570	42,031,855	7,991

Duke Energy Progress (DEP) Investor-Owned Programs				2015 Annual Gross Savings at Plant		2015 Net Savings at the Meter	
Program Name	Program Type	Target Consumer	Brief Description	KWH	KW	KWH	KW
Commercial, Industrial, & Governmental Demand Response Automation Program	Demand Response	Commercial and Industrial	The Company provides customers with financial incentives for the ability to require a customer to shed load during peak events.	-	23,159	-	23,159
Energy Efficient Lighting Program	Energy Efficiency	Commercial and Industrial	The Company provides financial incentives for customers to install energy efficient lighting. Program provides incentive in the form of discounts applied at retail stores and online.	94,343,748	19,433	37,102,850	7,642

DRAFT



<b>SCE&amp;G Investor-Owned Programs</b>				<b>2014-15 Gross Savings</b>		<b>2014-15 Net Savings</b>	
<b>Program Name</b>	<b>Program Type</b>	<b>Target Consumer</b>	<b>Brief Description</b>	<b>MWH</b>	<b>MW</b>	<b>MWH</b>	<b>MW</b>
Appliance Recycling Program	Energy Efficiency	Residential	Incentives for allowing SCE&G to collect and recycle less-efficient, but operable, secondary refrigerators, and/or standalone freezers, permanently removing the units from service. Units recycled under an environmentally responsible process.	1,343	0.30	1,343	0.30
Home Energy Reports	Energy Efficiency	Residential	Free monthly/bi-monthly reports comparing customer's energy usage to peer group and providing information to help identify, analyze, and act upon potential energy efficiency measures and behaviors.	12,948	4.65	12,948	4.65
Home Energy Check-up	Energy Efficiency	Residential	Free in-home visual energy assessment performed by SCE&G staff with leave-behind energy efficiency kit consisting of ENERGY STAR® bulbs and water heater tank wrap and pipe insulation, as appropriate.	2,485	0.47	1,938	0.32
Neighborhood Energy Efficiency Program (NEEP)	Energy Efficiency	Residential	Provides income qualified customer's energy efficiency education, an in-home energy assessment and direct installation of low-cost energy saving measures while delivered in a neighborhood door-to-door sweep approach.	1,543	0.19	1,543	0.19
Heating & Cooling	Energy Efficiency	Residential	Incentives to residential electric customers for the purchase of new ENERGY STAR® qualified HVAC equipment that replaces older inefficient equipment. Additionally, incentives to encourage customers to improve the efficiency of existing AC and heat pump systems through complete duct replacements, duct insulation and duct sealing.	8,705	3.48	3,768	2.17
ENERGY STAR® New Homes	Energy Efficiency	Residential	Incentives provided to builders for homes built to ENERGY STAR® standards. In 2016, this program will no longer be available.	248	0.13	223	0.12
ENERGY STAR® Lighting	Energy Efficiency	Residential	Incentivizes residential customers to purchase and install high-efficiency ENERGY STAR® light bulbs.	1,811	0.04	1,811	0.04
EnergyWise For Your Business Program	Energy Efficiency	Commercial & Industrial	Incentives to non-residential customers to become more energy efficient. Incentives include retrofit lighting, new construction lighting, HVAC unitary, HVAC chillers, HVAC variable frequency drives, food service and refrigeration equipment, custom, retrocommissioning, and technical services.	47,246	8.51	36,379	6.55

<b>SCE&amp;G Investor-Owned Programs</b>				<b>2014-15 Gross Savings</b>		<b>2014-15 Net Savings</b>	
<b>Program Name</b>	<b>Program Type</b>	<b>Target Consumer</b>	<b>Brief Description</b>	<b>MWH</b>	<b>MW</b>	<b>MWH</b>	<b>MW</b>
Small Business Energy Solutions Program	Energy Efficiency	Commercial & Industrial	Provides cost-effective, comprehensive retrofit services to small business customers on a turnkey basis. The program identifies cost-effective efficiency retrofit opportunities and provides the direct installation of measures, financial incentives and other strategies to encourage early replacement of existing equipment with high efficiency alternatives.	2,254	0.74	2,254	0.74
Interruptible electric rider	Demand Response	Commercial & Industrial	A rider to Commercial & Industrial Rates 23 and 24 for interruptible service is available for customers willing to be exposed to interruption during certain hours up to a total number of annual hours, which offers a credit against the demand charge. Interruptible Demand Credit ranges from \$2.75 - \$4.50 per KW	---	---	---	---
Interruptible gas	Demand Response	Commercial & Industrial	Commercial & Industrial contracts for interruptible gas service. 2015 Average Interruptible Commodity Margin Revenue per DT = \$0.726	---	---	---	---

<b>Santee Cooper State Programs</b>					
<b>Program Name</b>	<b>Program Type</b>	<b>Target Consumer *</b>	<b>Brief Description</b>	<b>2015 GROSS Savings kWh**</b>	<b>2015 GROSS savings kW**</b>
Smart Energy New Homes	Energy Efficiency	Residential	Rebates based on HERS ratings	547,000	170
Smart Energy Existing Homes	Energy Efficiency	Residential	Rebates for insulation, heat pump tune-ups, HVAC installations, heat pump water heaters	2,682,000	2280
Commercial Prescriptive	Energy Efficiency	Commercial	Rebates for lighting, HVAC, refrigeration, and envelope	19,540,000	3900
Commercial Custom	Energy Efficiency	Commercial	Rebates for complex commercial projects not covered under prescriptive	2,328,000	350
LED	Energy Efficiency	Residential	Distribution of LEDs to residential customers for high use sockets	1,361,000	40

#### XIV. Appendix N: SC Biomass Facilities

SCE&G Biomass Facilities						
Name	Unit	Winter (MW)	Summer (MW)	Location	Resource Type	On Line Date
Kapstone*	1	55.00	55.00	Charleston, SC	Intermediate	1999

Santee Cooper Biomass Facilities					
Name	Winter (MW)	Summer (MW)	Location	Resource Type	On Line Date
Anderson Landfill	3.00	3.00	Belton, SC	Base	2008
Berkeley Landfill	3.00	3.00	Moncks Corner, SC	Base	2011
Georgetown Landfill	1.00	1.00	Georgetown, SC	Base	2010
Horry Landfill	3.00	3.00	Conway, SC	Base	2001
Lee Landfill	11.00	11.00	Bishopville, SC	Base	2005
Richland Landfill	8.00	8.00	Elgin, SC	Base	2006

Ameresco Biomass Facilities					
Name	Unit	Winter (MW)	Summer (MW)	Location	On Line Date
No 1 TG	TG	12	17	Aiken SRS	2012

Merchant Biomass Facilities						
Name	Unit	Winter (MW)	Summer (MW)	Location	Resource Type	On Line Date
Ameresco No 1 TG	TG	12.00	17.00	Aiken SRS	Base	2012
International Paper			25.00	Georgetown	Base	
International Paper			29.50	Georgetown	Base	
International Paper			40.59	Georgetown	Base	
Domtar Paper			51.40	Marlboro	Base	
Resolute			44.00	Catawba	Base	1959
Resolute			20.00	Catawba	Base	1962
Allendale		20.00	20.00	Allendale	Base	2013
Dorchester		20.00	20.00	Dorchester	Base	2013

## XV. Appendix O: Renewable Energy Task Force

While a state may promote such development, the Bureau of Ocean Energy Management (BOEM) has the exclusive authority to issue leases, easements, and right of ways (ROW) on the Outer Continental Shelf (OCS) for renewable energy purposes. While fully cognizant of the distinction between state and federal responsibilities, South Carolina has undertaken a number of activities to prepare for eventual offshore wind development.

As early as 2005, the South Carolina Energy Office (now the ORS Energy Office) and Santee Cooper, the state's public utility, produced a comprehensive set of wind maps across South Carolina. The study, conducted by AWS Truewind, assessed the State's wind resource and concluded that winds sufficient for economic wind-energy generation are sustained off the South Carolina coast.

In late 2008, the South Carolina General Assembly passed Act 318 to create the Wind Energy Production Farms Feasibility Study Committee (Committee). The purpose of this Committee was to review, study, and make recommendations regarding the feasibility of wind farms in the State. The focus of the Committee included, but was not limited to, whether South Carolina is a suitable site for wind production on land or in offshore areas, the economic and environmental impact to South Carolina, and the cost of wind farm installation and operation in the State. Committee members included elected officials and other leaders knowledgeable about wind energy. The Committee was staffed by the SC Energy Office.

Also in 2008 South Carolina, with multiple partners, obtained a U.S. Department of Energy (DOE) grant entitled *The South Carolina Roadmap to Gigawatt-Scale Coastal Clean Energy Generation: Transmission, Regulation & Demonstration*. The goal of the grant was to identify and overcome existing barriers for coastal clean energy development for wind, wave, and tidal energy projects in South Carolina. Efforts included in the grant were an offshore wind transmission study; a wind, wave, and current study; and a comprehensive spatial database on existing resources and activities.

The grant also established the Regulatory Task Force, to foster a regulatory environment conducive to wind, wave, and tidal energy development in South Carolina waters. The Regulatory Task Force is composed of the full spectrum of state and federal regulatory and resource protection agencies, universities, private industry, and utility companies. The Task Force was established in April 2009 and has held regular meetings since that time. Although some members were also asked to serve on the BOEM task force when it was created, most Regulatory Task Force members have direct regulatory responsibilities.

In 2009 South Carolina, in partnership with the Southern Alliance for Clean Energy, received a Market Acceptance grant from the DOE's Wind Powering America program. Through this effort, a series of public forums and community-leader meetings were conducted at various key locations throughout the state.

The Clemson University Restoration Institute and its partners received a \$45 million grant from the DOE, combined with \$53 million of matching funds, to build and operate a large-scale wind-turbine drive-train testing facility at the institute's research campus on the former Navy base in

Charleston. This facility is capable of full-scale advanced testing of drive-train systems, full nacelles, and simulation of blade forces. The facility contains two test beds, a 7.5 megawatt and 15 megawatt, with dynamic non-torque loading. Capable of 50Hz or 60Hz testing, the facility can test for any unit bound for anywhere in the world.

In addition to this work, the SC Energy Office used DOE funds to contract with Clemson University to conduct two economic studies of the impact of a pilot scale wind farm on South Carolina's economy and utility rates.

At the local government level, several communities have passed resolutions related to wind energy (both supporting and expressing concerns). The North Strand Coastal Wind Team was established as a collaborative partnership with the North Myrtle Beach Chamber of Commerce, Coastal Carolina University, Savannah River National Lab, Myrtle Beach Regional Economic Development Authority, and the South Carolina Energy Office. The City of North Myrtle Beach passed an ordinance allowing installation of vertical axis turbines and has installed several in strategic locations along the beachfront. While not directly offshore wind, this ordinance is significant in that it demonstrated the community's strong support for wind-energy development.

Most recently, South Carolina joined with BOEM to create a cooperative research agreement coordinated by the SC Sea Grant Consortium that engages researchers from Coastal Carolina University, the University of South Carolina, and the College of Charleston.

DRAFT

## **XVI. Appendix P: Distributed Energy Resource Program Act (Act 236)**

The Distributed Energy Resources Program Act (SC Code 58-39-110 *et seq.*) is landmark renewable energy legislation passed unanimously by the General Assembly and signed into law by Governor Nikki Haley in 2014. It was designed collaboratively by legislators, investor-owned utilities, electric cooperatives, electric regulators, conservation groups, renewable energy developers, large energy users, and other stakeholders. The legislation addresses several major aspects of renewable energy development in South Carolina and is expected to spur installation of around 200 MW of renewable energy capacity by 2020. Due to resource economics, the bulk of this capacity is expected to be solar photovoltaic technology— ranging from small residential rooftop systems, to larger commercial systems, to utility-scale solar facilities sized up to 10 MW. Act 236 in its entirety is expected to create jobs, lessen South Carolina’s dependence on fossil-fuel imports, expand customer choice, further diversify utility generation mixes, and reduce pollution in the Palmetto State. Additionally, Act 236 will ensure that net metering rates associated with distributed generation do not shift costs among customers.

The legislation’s three sections address third-party leasing transactions, net energy metering arrangements, and utility cost recovery for renewable energy procurement and incentives. In 2015, the regulations and programs for implementing Act 236 were established by the PSC in several regulatory dockets, with participation by most of the same stakeholder groups that helped craft the legislation. This work brought about several regulatory changes authorized by Act 236. First, renewable energy leasing arrangements were explicitly made legal for the first time in South Carolina. Second, a new framework was created for the valuation of net energy metered resources that provide a pathway to better understanding of the benefits and costs of integrating these resources onto utility grids. Third, the PSC reviewed and approved utility plans for procuring electricity from utility-scale solar arrays (installations) as well as programs aimed to spur adoption of customer-scale solar technologies by families and businesses.

Each of the utilities’ applications for Distributed Energy Resources (DER) included detailed plans to develop renewable energy facilities, incent participation in the purchase or lease of renewable energy facilities and allow the utilities to recover DER program costs. All three DER program applications recommended solar generation as the best method to reach Act 236 DER goals.

### **South Carolina Electric and Gas Company**

SCE&G received Commission approval on July 15, 2015, in Order No. 2015-512 to implement its DER programs. The programs offered by SCE&G to meet its DER goals included: 1) Contracts with solar developers for the installation of at least 30 MW of solar farms on property not owned by the utility and where the solar power can be integrated into SCE&G’s electrical grid; 2) a Performance Based Incentive (PBI) bill credit for residential customers fixed for a 10-year term; 3) Bill Credit Agreements (BCA) for small non-residential customers fixed for 10-year terms; 4) a Community Solar program; and 5) the formation of a DER Program Advisory Group. SCE&G will solicit offers for 20 year power purchase agreements (PPA) and turnkey engineering, procurement and construction (EPC) agreements to meet Utility Scale goals.

## Duke Energy Carolinas, LLC and Duke Energy Progress, LLC

DEC and DEP also received Commission approval on July 15, 2015 in Order Nos. 2015-515 and 2015-514 respectively to structure the DER programs for both IOU’s in a similar fashion. Both DER programs include: (1) the use of requests for proposals (RFPs) for large-scale renewable generation facilities; (2) up-front solar rebates (“Solar Rebate Program”) for residential and non-residential customers; (3) the formation of a DER Program Collaborative Group; and (4) the offering of a Shared Solar Program. DEC and DEP will solicit offers for 15 year PPAs and turnkey proposals with EPC agreements to meet Utility Scale goals.

*DER PROGRAM AND GOALS BY UTILITY*

	<b>SCE&amp;G<sup>4</sup></b>	<b>DEC<sup>5</sup></b>	<b>DEP<sup>6</sup></b>
Total DER Program Goals <sup>7</sup>	84.50 MW	80 MW	26 MW
Utility Scale <sup>8</sup>	42.25 MW	40 MW	13 MW
Programs to meet goal	RFPs PPAs (variable terms but generally 20 years) EPCs	RFPs PPAs (15 Year) EPCs	RFPs PPAs (15 Year) EPCs
Customer Scale <sup>9</sup>	42.25 MW	40 MW	13 MW
Programs to meet goal	NEM w/ PBI NEM w/incentive 10 YearBCAs Community Solar	NEM w/incentive Solar Rebate - \$1 per watt direct current Shared Solar	NEM w/incentive Solar Rebate - \$1 per watt direct current Shared Solar

With Act 236 and its implementing regulations in place, South Carolina is poised for significant growth in renewable generation in the coming years. This growth has already begun as both utility-scale and rooftop solar arrays are coming online across the state. Although the electricity production from projects installed under Act 236 will represent less than 1 percent of South Carolina’s total power production, the law is an important step toward realizing the full potential of local renewable energy resources. Families and businesses now have new options for meeting their energy needs; business development and competition will help further drive down resource costs while creating jobs; and utilities, regulators, and industry stakeholders will gain experience with new technologies and regulatory approaches. These developments will place South Carolina in an excellent position to further take advantage of local renewable resource opportunities moving forward into the next decade.

<sup>4</sup> Docket No. 2015-54-E, Order No. 2015-512

<sup>5</sup> Docket No. 2015-55-E, Order No. 2015-515

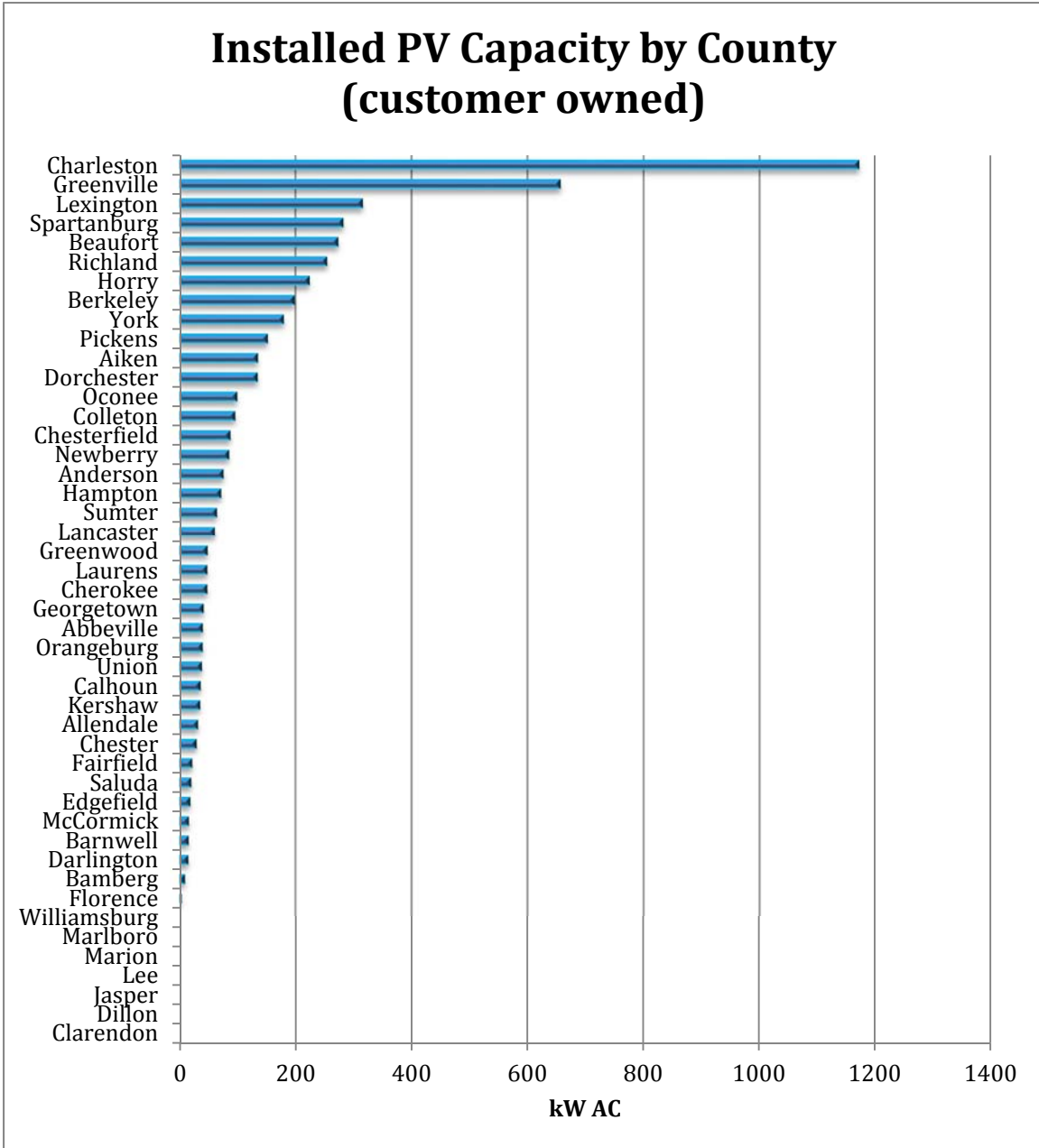
<sup>6</sup> Docket No. 2015-53-E, Order No. 2015-514

<sup>7</sup> 2% of 5-year average South Carolina retail peak demand

<sup>8</sup> Half of the 2% shall be met by facilities sized between 1 and 10 MW (“Utility Scale”)

<sup>9</sup> The remaining half of the 2% shall be met by facilities sized less than 1 MW (“Customer Scale”)

Since the passage of Act 236, citizens have been given greater access to distributed photovoltaic systems. Currently, most distributed solar generation facilities are located in the most populous counties and coastal counties. Charleston County has the most installed capacity with over 1100 kW. The table below highlights the installed PV capacity by county in 2015. (The chart was produced shortly after the DER programs were approved by the PSC, and as such do not fully reflect the implementation of the DER programs.)



Source: <http://www.energy.sc.gov/files/view/2015%20South%20Carolina%20Energy%20Statistical%20Highlights.pdf>



## **XVII. Appendix Q: Public Transit Agencies**

### **Lowcountry Buses**

Several transit systems operate throughout several counties in the Lowcountry and along the South Carolina coast.

#### Palmetto Breeze

Operated by Lowcountry Regional Transportation Authority and covering Allendale, Beaufort, Colleton, Hampton, and Jasper Counties.

#### CARTA – Charleston Area Regional Transit Authority

Operating in Berkeley, Charleston, and Dorchester Counties. Service areas for CARTA include Downtown, East Cooper, Folly Beach, James Island, Mount Pleasant, North Charleston, and West Ashley. They also provide paratransit service through Tel-A-Ride.

#### TriCounty Link

Rural bus system serving Berkeley, Charleston, and Dorchester counties

#### Horry and Georgetown Counties

#### Coast RTA – Waccamaw Regional Transportation Authority

Serves Georgetown and Myrtle Beach area - also provides paratransit service

#### Williamsburg County

#### Williamsburg County Transit System

WCTS provides transportation to the residents of Williamsburg County 7 days a week with the exception of Dec. 25.

### **Midlands Buses**

#### Aiken County

#### Best Friend Express

Serves Aiken County - also operates Dial-A-Ride for passengers with physical disabilities.

Operated by Lower Savannah Council of Governments (COG)

The Best Friend Express Transit System has five 14-passenger Cutaways in its fleet. All of the buses are gasoline powered.

#### Barnwell County

Local Motion – 803-541-1197

#### Calhoun and Orangeburg counties

### Cross County Connection

Provides a "Downtown Circulator" service in the City of Orangeburg and a paratransit service throughout Orangeburg and Calhoun counties

### Chester County

#### Chester County Connector

Serves all residents of Chester County

### Richland, Lexington, Newberry counties

#### Carolina Shuttle

Serves students on the main campus of the University of South Carolina

#### The Comet – Central Midlands Transit

Serves Cayce, Chapin, Columbia, Fort Jackson, Newberry, and West Columbia - also operates DART, a service for riders with physical disabilities

#### MegaBus - Columbia

Commercial, interstate bus service

### Sumter County

#### SWRTA – Santee Wateree Regional Transit Authority

primarily serves the City of Sumter, but also provides express commuter services and Medicaid transportation to areas of Calhoun, Clarendon, Kershaw, Lee, Orangeburg, Richland, and Sumter counties

Santee-Wateree RTA, located in Sumter, SC, has the following vehicles:

4- 6 passenger vans (ADA accessible)

27- 14 passenger cutaways (ADA accessible) (5 are propane\*)

3- 18 passenger cutaways (ADA accessible)

8- 28 passenger cutaways (ADA accessible)

6- 32 passenger buses (ADA accessible)

5- 42 passenger buses (ADA accessible)

\*Note that the 5 propane vehicles are a pilot program; if successful, fleet will be converted.

## **Pee Dee Buses**

### Darlington, Florence, and Marion Counties

#### PDRTA – Pee Dee Regional Transportation Authority

Serves Florence, Hartsville, Darlington, Chesterfield, Cheraw, and Bennettsville - also includes a route from Lake City / Johnsonville to Myrtle Beach - provides extensive paratransit services for riders with physical disabilities

## **Upstate and Piedmont Buses**

### Anderson County

#### Electric City Transit

Neighborhood and Transit Services Division of the City of Anderson Operates 8 buses— range in size from 30-40 feet, low-floor diesel buses. In April 2016 two buses will be replaced with 32-foot and 35-foot low-floor CNG buses.

CAT – Clemson Area Transit

Includes Anderson - everyone rides free

The CAT system includes 6 all-electric buses that run in the Seneca area to and from Clemson University.

Edgefield and Greenwood Counties

Edgefield County Senior Citizens Council

Serves the towns of Edgefield, Greenwood, Johnston, and Trenton in Edgefield and Greenwood counties

Greenville County

Greenlink Transit

Paratransit available for physically-disabled patrons. Greenville County students ride free 7-9 AM and between 2-4:30 PM with school district identification card on scheduled school days

At maximum service, Greenlink operates 17 fixed-route vehicles at a time and 3 paratransit vehicles at a time. The fixed-route vehicles are broken down as follows:

- 2 trolleys
- 2 cutaway, 15-passenger vans
- 13 heavy-duty, 35ft buses

Paratransit is divided as follows:

- 3 cutaway, 15-passenger vans

Greenlink has spares as follows:

- 9 heavy-duty, 35 ft bus
- 4 cutaway, 15 passenger vans

All of the vehicles run on either diesel or gasoline.

Oconee and Pickens counties

CAT – Clemson Area Transit

Includes Clemson, Pendleton, and Seneca - everyone rides free

Spartanburg County

SPARTA – Spartanburg Area Regional Transit Agency

Also provides a low-cost paratransit service for riders with physical disabilities

Operates 11 buses: 2 class “C” and 9 class “B”. One runs on gasoline, the remainder run on diesel.

York County

CATS – Charlotte Area Transit System

Includes a Rock Hill route with Park-and-Ride capabilities

CATS operates four buses in the morning and four buses in the afternoon between Rock Hill and Charlotte. All of the buses are 40 foot diesel buses. The service operates Monday through Friday.

In addition, they operate three trips in the morning and three trips in the afternoon on a shuttle route, connecting the last station of their light rail system with Carowinds. This shuttle route operates predominantly in North Carolina, but it does operate for a short distance in South Carolina, where there are some bus stops. This route uses 29' diesel buses.

York County Access

Offers "Essential Service" for all York County residents who need medical transportation (doctor appointments, pharmacy, grocery store, etc.). Also offers "Ride-to-Work Service" within Rock Hill's city limits

DRAFT

## **XVIII. Appendix R: SmartRide and Park-and-Ride Programs**

### **SmartRide program (Park-and-Ride) for Camden/Lugoff and Sumter**

Now in its fourth year of service, the SmartRide Commuter-Focused Transit Program is a partnership between SCDOT, the Newberry County Council on Aging, the Santee Wateree Regional Transit Authority (SWRTA), local communities, businesses, and conscientious commuters who want a viable alternative to the traditional single-occupant vehicle commute. Commuters are invited to try either of the SmartRide commuter transit services described below that are available into the downtown Columbia area:

The Camden/Lugoff service is operated by the Santee Wateree Regional Transit Authority. SmartRide service originates out of the Camden/Lugoff areas. Two separate runs operate Monday through Friday. The fare for the Camden/Lugoff SmartRide is \$20 per week (weekly pass) or \$2 for a one-way trip.

Newberry Express SmartRide, operated by Newberry Council on Aging, originates out of Newberry with stops in Newberry, Little Mountain, and Chapin. Two separate runs operate Monday through Friday. The cost for the Newberry Express SmartRide is \$30 per week (weekly pass) or \$4 for a one-way trip.

Columbia SmartRide pick-up locations:  
 Sumter at Laurel (*Sumter Street Transit Station*)  
 Sumter at Hampton (*Palmetto Health*)  
 Sumter at Gervais (*State House*)  
 Sumter at Pendleton (*State Office Buildings*)  
 Assembly at Pendleton (*SCDOT/DNR/Capitol Complex*)  
 Assembly at Gervais (*South Trust Transit Station*)  
 Assembly at Washington  
 Assembly at Blanding (*Richland Co. Courthouse*)  
 Sumter at Laurel (*Sumter Street Transit Station*)  
 Bull at Confederate (*DSS/DHEC/Mental Health*)  
 Medical Park Road (*Palmetto Richland Hospital*)

### **North Augusta Park-and-Ride**

Located off of exit 5 at I-20 west/US Hwy 25; 220 parking spaces; federally funded (through SCDHEC); acts as a central meeting point for carpoolers; not serviced by buses; has a rain garden and LED lighting

### **Greenville County Square Park-and-Ride**

301 University Ridge; 1,565 parking spaces (also services County offices); serviced by the downtown Greenville trolley system on nights and weekends and Greenlink on weekdays.

### **Greenville West End Park-and-Ride**

100 block of Augusta Street near Fluor Field; 69 parking spaces; \$1 an hour up to 7 hours; monthly rate is \$45; serviced by Greenlink

### **Charlotte Park-and-Ride**

Charlotte Area Transit System (CATS), free of charge

Manchester Theater pick-up location: 1935 Cinema Drive, Rock Hill

White Street pick-up location: 107 E. White Street, Rock Hill

DRAFT

## XIX. Appendix S: Alternative Fuel Infrastructure

Registered vehicles on the road as of December 31, 2014 (POLK_VIO_DETAIL_2014) Accessed October 15, 2015											
State / County	CNG	Convertible	Diesel	EV	FFV	Gasoline	HEV	PHEV	LPG	Unknown	Grand Total
<b>SOUTH CAROLINA</b>	<b>90</b>	<b>1,868</b>	<b>96,387</b>	<b>596</b>	<b>308,346</b>	<b>3,924,265</b>	<b>34,165</b>	<b>670</b>	<b>3</b>	<b>8,179</b>	<b>4,374,569</b>
ABBEVILLE		10	848		1,413	22,122	92	1		50	24,536
AIKEN	1	64	4,686	15	10,543	133,572	1,101	19		275	150,276
ALLENDALE		6	154		515	6,134	12			15	6,836
ANDERSON	2	69	5,374	15	10,775	159,868	1,117	21		260	177,501
BAMBERG		5	280		992	10,478	25	1		13	11,794
BARNWELL	1	7	634		1,467	18,565	72			38	20,784
BEAUFORT		22	2,838	41	10,649	135,648	2,259	30	1	333	151,821
BERKELEY		67	3,467	23	13,182	150,354	1,194	23		386	168,696
CALHOUN		8	432	1	1,068	12,581	57	1		35	14,183
CHARLESTON	1	102	6,729	99	23,813	287,327	4,202	66		727	323,066
CHEROKEE		25	1,611	1	3,035	46,709	196	3		114	51,694
CHESTER	1	24	829	1	1,877	29,637	87			70	32,526
CHESTERFIELD		25	1,046	2	2,568	37,053	112			87	40,893
CLARENDON		15	612		2,595	25,229	125	1		41	28,618
COLLETON		23	1,103	1	3,060	33,675	157	4		73	38,096
DARLINGTON	1	33	1,190	7	5,066	55,486	268	4		158	62,213
DILLON		20	404		2,067	24,079	63		1	60	26,694
DORCHESTER	3	54	2,519	10	9,974	121,691	1,055	19		177	135,502
EDGEFIELD		7	928	1	2,111	23,516	119	3		60	26,745
FAIRFIELD		15	526	2	1,540	21,172	99	4		51	23,409
FLORENCE	54	77	2,311	8	10,157	109,310	756	10		256	122,939
GEORGETOWN		25	1,119	10	5,010	53,394	468	4		128	60,158
GREENVILLE	6	137	8,653	78	25,921	390,191	4,101	121		731	429,939
GREENWOOD		20	1,429	5	3,983	55,456	389	4		96	61,382
HAMPTON		9	408		1,344	15,750	55	1		43	17,610
HORRY		100	4,432	76	22,778	246,896	2,409	36		568	277,295
JASPER		5	643	16	1,742	21,071	148	8		49	23,682
KERSHAW		27	1,644	3	4,211	53,909	373	4		115	60,286
LANCASTER	1	23	1,711	10	4,776	67,499	592	9		122	74,743
LAURENS		28	2,022	2	4,087	57,032	247	9	1	123	63,551
LEE		14	283		969	12,278	33			23	13,600
LEXINGTON		99	6,251	24	20,792	259,383	2,199	41		495	289,284
MARION		23	478		1,968	25,409	68	1		67	28,014
MARLBORO		18	267	1	1,527	21,502	48	1		61	23,425
MC CORMICK		2	229	1	671	8,886	83			25	9,897
NEWBERRY		16	1,060	2	3,006	33,531	185	4		67	37,871
OCONEE		46	2,947	3	4,690	65,994	713	21		133	74,547
ORANGEBURG	1	58	1,381	2	5,593	73,117	282	4		159	80,597
PICKENS	2	53	3,345	17	5,927	95,037	824	21		195	105,421
RICHLAND	2	181	4,653	70	26,941	303,452	3,360	60		624	339,343
SALUDA		7	520		1,120	12,760	57	1		27	14,492
SPARTANBURG	1	121	6,884	15	16,291	248,338	1,827	34		421	273,932
SUMTER		49	1,707	3	8,021	88,140	427	8		171	98,526
UNION		19	564	1	1,370	24,474	66	2		75	26,571
WILLIAMSBURG		16	501		2,611	27,228	50	1		86	30,493
YORK	13	94	4,735	30	14,530	199,332	1,993	65		296	221,088

## XX. Appendix T: Inventory of State and Federal Statutes

### Federal Policies

#### **FEDERAL POWER ACT**- 16 U.S.C. §791 *et seq.* (1920)

This statute was originally developed as the Federal Water Power Act, and the Act authorized the then Federal Power Commission (now Federal Energy Regulatory Commission) to issue licenses to non-federal projects that affected navigable waters, occupied federal lands, affected the interests of interstate commerce, or used water or water power from government-operated dams. Congress amended the statute in 1935 to charge the agency with the responsibility to oversee all interstate transmission and sale rates of electric power and hydropower.

#### **NATURAL GAS ACT**- 15 U.S.C. §717 *et seq.* (1938)

This statute gave the Federal Power Commission (now Federal Energy Regulatory Commission) the authority to set 'just and reasonable rates' for the sale or transmission of natural gas in interstate commerce. The statute gave the agency the authority to grant certificates allowing construction and operation of facilities used in interstate gas transmission, to authorize the provision of services, and to allow pipeline companies to charge customers for some of the expenses incurred in pipeline construction and operation. The statute also required the agency to approve abandonment of any pipeline facility or services.

#### **ATOMIC ENERGY ACT** - 42 U.S.C. §2011 *et seq.* (1954)

Under this statute, Congress created the Atomic Energy Commission, which had the responsibility for the development and production of nuclear weapons and development of safety regulations of the civilian uses of nuclear materials.

#### **CLEAN AIR ACT** - 42 U.S.C. §7401 *et seq.* (1970)

This statute authorizes the Environmental Protection Agency (EPA) to establish national air quality standards to protect public health and public welfare and allows the EPA to regulate air emissions from stationary and mobile sources. Specifically, Section 112 regulates emissions of hazardous air pollutants and establishes emission standards that require the maximum degree of reduction in emissions of hazardous air pollutants (MACT standards).

#### **CLEAN WATER ACT** - 33 U.S.C. §1251 *et seq.* (1972)

This statute was based on the Federal Water Pollution Control Act of 1948. When Congress amended the Act in 1972, the statute became known as the Clean Water Act. The statute established the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters.

#### **NATIONAL ENVIRONMENTAL POLICY ACT** - 42 U.S.C. §4332 *et seq.* (1969)

This statute requires federal agencies to incorporate environmental considerations in the planning and decision making process of the agency. As a result of this statute, all federal agencies are required to prepare detailed statements that assess the environmental impact of, and alternatives to, any major federal actions that significantly affect the environment.

#### **COASTAL ZONE MANAGEMENT ACT** - 16 U.S.C. §1451 *et seq.* (1972)



This statute is administered by the National Oceanic and Atmospheric Administration, and the statute provides for the management of the nation's coastal resources, including the Great Lakes. The statutory goal is to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone."

**FEDERAL ENERGY REGULATORY COMMISSION - 42 U.S.C. §7171 *et seq.* (1977)**

The Department of Energy Reorganization Act of 1977 created and defined the Federal Energy Regulatory Commission (FERC), which regulates the interstate transmission of electricity, natural gas, and oil. FERC also reviews proposals to build liquefied natural gas terminals and interstate natural gas pipelines as well as licensing of hydropower projects.

**NUCLEAR REGULATORY COMMISSION - 42 U.S.C. §5801 *et seq.* (1974)**

The Energy Reorganization Act of 1974 established the Nuclear Regulatory Commission (NRC) that is responsible for formulating policies and regulations governing nuclear reactors and materials safety, issuing orders to licensees, and adjudicating legal matters. As part of this regulatory process, NRC has four regional offices that conduct inspection, enforcement, and emergency response programs for licensees within their region.

**NATIONAL ENERGY CONSERVATION POLICY ACT – 42 U.S.C. §8251 *et seq.* (1978)**

Originally, this Act directed the U.S. Department of Energy (DOE) to set minimum energy performance standards to replace the standards set by the Energy Policy and Conservation Act in 1975. An amendment to this Act changed the standards from voluntary to mandatory and these standards preempted state standards. Under this Act, DOE issues notices and rules related to federal energy management including new federal, commercial, and residential buildings; federal procurement of energy efficient products; and federal fleet management.

**INTERSTATE COMMERCE COMMISSION TERMINATION ACT – 49 U.S.C. §10101 *et seq.* (1995)**

*This statute created the Surface Transportation Board, and this board has broad economic regulatory oversight of railroads, including rates and service.*

**ADDITIONAL ENERGY ACTS THAT AMENDED MULTIPLE EXISTING ACTS:**

ENERGY INDEPENDENCE AND SECURITY ACT OF 2007 addressed key energy issues including clean, renewable fuels; energy efficiency of products, buildings and vehicles; and vehicle-fuel economy.

ENERGY POLICY ACT OF 2005 addressed key energy issues including energy efficiency; renewable energy; oil and gas; coal; tribal energy; nuclear matters and security; vehicles and motor fuels, including ethanol; hydrogen; electricity; energy tax incentives; hydropower and geothermal energy; and climate change technology.

ENERGY POLICY ACT OF 1992 addressed key issues including clean and renewable energy incentives; energy efficiency; and alternative fuel vehicles.

NATURAL GAS POLICY ACT OF 1978 addressed key issues including 1) setting maximum prices for wellhead sale of natural gas and 2) approving the transportation of natural gas by an interstate pipeline on behalf of intrastate pipelines and local distribution companies.

PUBLIC UTILITY REGULATORY POLICIES ACT OF 1978 addressed key issues including conservation of electric energy, wholesale distribution of electric energy, and reliability of electric service.

PUBLIC UTILITY HOLDING COMPANY ACT OF 1935\* addressed holding companies that owned electric and natural gas utilities and required those holding companies to divest their utilities or register with and seek approval from the Securities Exchange Commission.

\*NOTE: The Energy Policy Act of 2005 repealed this Act, effective February 8, 2006.

DRAFT

## Federal Tax Credits

Federal Tax Incentives					
Name	Category	Policy / Incentive Type	Code	Summary	More Information
Business Energy Investment Tax Credit (ITC)	Financial Incentive	Corporate Tax Credit	26 USC §48	The federal Business Energy Investment Tax Credit (ITC) has been amended a number of times, most recently in December 2015. The table in the link shows the value of the investment tax credit for each technology by year. The expiration date for solar technologies and wind is based on when construction begins. For all other technologies, the expiration date is based on when the system is placed in service (fully installed and being used for its intended purpose).	<a href="http://programs.dsireusa.org/system/program/detail/658">http://programs.dsireusa.org/system/program/detail/658</a>
Energy-Efficient Commercial Buildings Tax Deduction	Financial Incentive	Corporate Tax Credit	26 USC §179D	A tax deduction of \$1.80 per square foot is available to owners of new or existing buildings who install (1) interior lighting; (2) building envelope, or (3) heating, cooling, ventilation, or hot water systems that reduce the building's total energy and power cost by 50% or more in comparison to a building meeting minimum requirements set by ASHRAE Standard 90.1-2007. Energy savings must be calculated using qualified computer software approved by the IRS. Click here for the list of approved software. Deductions of \$0.60 per square foot are available to owners of buildings in which individual lighting, building envelope, or heating and cooling systems meet target levels that would reasonably contribute to an overall building savings of 50% if additional systems were installed.	<a href="http://programs.dsireusa.org/system/program/detail/1271">http://programs.dsireusa.org/system/program/detail/1271</a>
Energy-Efficient New Homes Tax Credit for Home Builders	Financial Incentive	Corporate Tax Credit	26 USC §45L	Site-built homes qualify for a \$2,000 credit if they are certified to reduce heating and cooling energy consumption by 50% relative to the International Energy Conservation Code (IECC) 2006 and meet minimum efficiency standards established by the Department of Energy. Building envelope component improvements must account for at least one-fifth of the reduction in energy consumption. Manufactured homes qualify for a \$2,000 credit if they conform to Federal Manufactured Home Construction and Safety Standards and meet the energy savings requirements of site-built homes described above. Manufactured homes qualify for a \$1,000 credit if they conform to Federal Manufactured Home Construction and Safety Standards and reduce energy consumption by 30% relative to IECC 2006. In this case, building envelope component improvements must account for at least one-third of the reduction in energy consumption. Alternatively, manufactured homes can also qualify for a \$1,000 credit if they meet ENERGY STAR Labeled Home requirements.	<a href="http://programs.dsireusa.org/system/program/detail/1272">http://programs.dsireusa.org/system/program/detail/1272</a>
Renewable Electricity	Financial Incentive	Corporate Tax Credit	26 USC §45	The tax credit amount is \$0.015 per kWh in 1993 dollars for some technologies and half of that amount for others. The amount is adjusted for inflation by multiplying the tax credit amount by the	<a href="http://programs.dsireusa.org/system/program/detail/734">http://programs.dsireusa.org/system/program/detail/734</a>

Federal Tax Incentives					
Name	Category	Policy / Incentive Type	Code	Summary	More Information
Production Tax Credit (PTC)				inflation adjustment factor for the calendar year in which the sale occurs, rounded to the nearest 0.1 cents. The Internal Revenue Service (IRS) publishes the inflation adjustment factor no later than April 1 each year in the Federal Registrar. For 2015, the inflation adjustment factor used by the IRS is 1.5336. Applying the inflation-adjustment factor for the 2014 calendar year, as published in the IRS Notice 2015-20, the production tax credit amount is as follows: \$0.023/kWh for wind, closed-loop biomass, and geothermal energy resources; \$0.012/kWh for open-loop biomass, landfill gas, municipal solid waste, qualified hydroelectric, and marine and hydrokinetic energy resources	
Residential Energy Conservation Subsidy Exclusion (Corporate)	Financial Incentive	Corporate Tax Exemption	26 USC §136	According to Section 136 of the U.S. Code, energy conservation subsidies provided (directly or indirectly) to customers by public utilities* are non-taxable. This exclusion does not apply to electricity-generating systems registered as "qualifying facilities" under the Public Utility Regulatory Policies Act of 1978 (PURPA). If a taxpayer claims federal tax credits or deductions for the energy conservation property, the investment basis for the purpose of claiming the deduction or tax credit must be reduced by the value of the energy conservation subsidy (i.e., a taxpayer may not claim a tax credit for an expense that the taxpayer ultimately did not pay).	<a href="http://programs.dsireusa.org/system/program/detail/727">http://programs.dsireusa.org/system/program/detail/727</a>
Residential Energy Conservation Subsidy Exclusion (Personal)	Financial Incentive	Personal Tax Exemption	26 USC §136	According to Section 136 of the U.S. Code, energy conservation subsidies provided (directly or indirectly) to customers by public utilities* are non-taxable. This exclusion does not apply to electricity-generating systems registered as "qualifying facilities" under the Public Utility Regulatory Policies Act of 1978 (PURPA). If a taxpayer claims federal tax credits or deductions for the energy conservation property, the investment basis for the purpose of claiming the deduction or tax credit must be reduced by the value of the energy conservation subsidy (i.e., a taxpayer may not claim a tax credit for an expense that the taxpayer ultimately did not pay).	<a href="http://programs.dsireusa.org/system/program/detail/666">http://programs.dsireusa.org/system/program/detail/666</a>
Residential Energy Efficiency Tax Credit	Financial Incentive	Personal Tax Credit	26 USC §25C	Owners of existing homes may receive a tax credit worth 10% of the cost of upgrading the efficiency of the building's envelope. Installation (labor) costs are not included and the credit is capped at \$500 for all improvements. To be eligible for the credit, the improvement must meet the prescriptive requirements established for it under the 2009 International Energy Conservation Code (including supplements).	<a href="http://programs.dsireusa.org/system/program/detail/1274">http://programs.dsireusa.org/system/program/detail/1274</a>

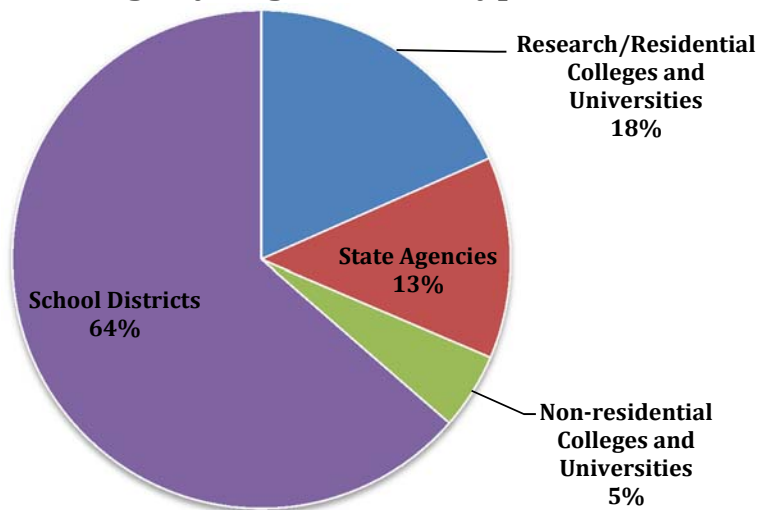
Federal Tax Incentives					
Name	Category	Policy / Incentive Type	Code	Summary	More Information
Residential Renewable Energy Tax Credit	Financial Incentive	Personal Tax Credit	26 USC §25D	A taxpayer may claim a credit of 30% of qualified expenditures for a system that serves a dwelling unit located in the United States that is owned and used as a residence by the taxpayer. Expenditures with respect to the equipment are treated as made when the installation is completed. If the installation is at a new home, the "placed in service" date is the date of occupancy by the homeowner. Expenditures include labor costs for on-site preparation, assembly or original system installation, and for piping or wiring to interconnect a system to the home. If the federal tax credit exceeds tax liability, the excess amount may be carried forward to the succeeding taxable year.	<a href="http://programs.dsireusa.org/system/program/detail/1235">http://programs.dsireusa.org/system/program/detail/1235</a>

DRAFT

## Inventory of State Statutes

The South Carolina Energy Efficiency Act (Section 48-52-620) requires affected state agencies, public school districts, and public colleges and universities (Public Entities) to develop energy conservation plans and work to reduce their energy consumption by 20 percent by 2020, as compared to 2000 levels. The Office of Regulatory Staff (ORS) Energy Office has benchmarked agency cost (of energy) per square foot and agency use (of energy) per square foot for a number of years. Reporting entities are divided into public school districts, state agencies, and public institutions of higher education with residence halls and without, in order to compare energy use among similar organizations. As shown below, school districts account for the largest category by square footage. Use per square foot has consistently declined for all four groups.

**Square Footage by Organization Type, FY 2015**



The most recent data, shown in the table below, indicates that while progress toward the twenty percent reduction is being made, work remains to be done. This is especially true for South Carolina’s public school districts.

Organization Type	Average Energy Use per Square Foot (site kBTU)			Average Energy Spending per Square Foot (\$)		
	FY2000	FY2015	% change	FY2000	FY2015	% change
State Agencies	113	87	-23%	\$1.86	\$1.78	-4%
Residential Colleges and Universities	143	117	-18%	\$1.81	\$2.25	+24%
Non-Residential Colleges and Universities	80	63	-21%	\$1.62	\$1.60	-1%

School Districts	45	39	-13%	\$1.17	\$1.21	+3%
<b>Total</b>	<b>75</b>	<b>61</b>	<b>-19%</b>	<b>\$1.42</b>	<b>\$1.50</b>	<b>+6%</b>
<p>Note: These statistics are based on self-reported data submitted by public entities. EO makes no representation regarding the accuracy of these data. Dollars adjusted using the Consumer Price Index-Urban, BLS (data.bls.gov)</p>						

**The South Carolina Energy Independence and Sustainable Construction Act of 2007** (S.C. Code 48-52-800) was intended to “promote effective energy and environmental standards for construction, rehabilitation, and maintenance of state-owned buildings, improving the state's capacity to design, build, and operate high-performance buildings and creating new jobs and contributing to economic growth and increasing the state's energy independence” (Section 48-52-820). State agencies establishing Permanent Improvement Projects after June 2007 that meet certain size requirements are required to weigh the life-cycle benefits of constructing to the US Green Building Council’s Leadership in Energy and Environmental Design (LEED) certification standards or to the Green Building Initiative’s Green Globes certification standards.

The *South Carolina Energy Independence and Sustainable Construction Act* required the adoption of policies and procedures that:

- (1) optimize the energy performance of buildings throughout this state;
- (2) increase the demand for environmentally preferable building materials, finishes, and furnishings;
- (3) improve environmental quality in this state by decreasing the discharge of pollutants from state buildings and their manufacture;
- (4) create public awareness of new technologies that can improve the health and productivity of building occupants by meeting advanced criteria for indoor air quality;
- (5) improve working conditions and reduce building-related health problems;
- (6) reduce the state's dependence on imported sources of energy through buildings that conserve energy and utilize local and renewable energy sources;
- (7) protect and restore this state's natural resources by avoiding development of inappropriate building sites;
- (8) reduce the burden on municipal water supply and treatment by reducing potable water consumption;
- (9) reduce waste generation and manage waste through recycling and diversion from landfill disposal;
- (10) establish life cycle cost analysis as the appropriate and most efficient analysis to determine a building project's optimal performance level;
- (11) ensure each building project's systems are designed, installed, and tested to perform according to the building's design intent and its operational needs through third-party, post-construction review and verification; and
- (12) authorize the board to pursue ENERGY STAR designation from the EPA to further demonstrate a building project's energy independence.

Accordingly, major facility projects (defined as new construction exceeding 10,000 square feet, or renovation that affects more than 50 percent of the replacement value of the building, or a change in ownership, or a tenant fit-out project that is larger than 7,500 square feet of leasable

area) must be designed and constructed to meet the LEED Silver standard or Green Building Initiative Green Globes Standard.

As of August 2010, owners of proposed buildings seeking LEED certification were required to conduct a life-cycle cost analysis to compare the costs and benefits of designing, constructing, maintaining, and operating the facility at LEED certification levels versus simply meeting minimum requirements. Owners must then construct the project in the manner that achieves the lowest 30-year life cycle cost.

In order to ensure that energy efficiency is maximized, the legislation further specifies that projects must earn at least 40 percent of the available points for energy performance in LEED or 20 percent of available points for energy performance under Green Globes. If this is not feasible, building owners may request a waiver from the Office of the State Engineer.

**Base Load Review Act** (SC Code 58-33-210 *et seq.*). South Carolina lawmakers in 2007 established the Base Load Review Act (BLRA), a law which adds structure and consistency to the process regulated utilities follow in licensing and building new base load generation plants. The law helps protect customers from responsibility for imprudently incurred costs associated with building such plants, while at the same time providing for the recovery of prudently incurred costs. Before the BLRA was established, prudence decisions about new base load plants were not determined until after construction was completed and the units began operation, which caused uncertainty.

Two provisions of the BLRA are pertinent to SCE&G's new nuclear project at the V.C. Summer Nuclear Station in Jenkinsville, South Carolina:

**Base Load Review Order** — A base load review order means an order issued by the commission pursuant to Section 58-33-270 establishing that if a plant is constructed in accordance with an approved construction schedule, approved capital costs estimates, and approved projections of in-service expenses, as defined herein, the plant is considered to be used and useful for utility purposes such that its capital costs are prudent utility costs and are properly included in rates.

**Revised Rates Order** — has the effect of lowering the total cost of a new nuclear plant to customers. By allowing the utility to adjust rates each year during the construction phase to reflect only financing costs (the cost of capital), the amount of interest associated with construction is significantly reduced. Then, as each plant begins commercial operation, a final adjustment to rates under the BLRA allows for recovery of *construction* costs for that plan. By ensuring more effective recovery of prudently incurred costs, the BLRA assists the utility in attracting investment capital at reasonable rates, which also helps control costs to customers.

Independent analysis has affirmed that paying financing costs while the two new nuclear units are being built, as opposed to waiting until they are complete, significantly lowers the project cost which, in turn, reduces the amount customers will pay through rates. SCE&G estimates the BLRA will save its customers approximately \$4 billion in electric rates over the life of the new units.

**Electric Utilities and Coops Rates** (SC Code 58-27-810 *et seq.*) If any electrical utility wants to put into operation a new rate, it must first give at least 30 days' notice of its intention to file



with the Commission, and once that time period has passed, file with the Commission and provide to ORS a schedule of its proposed rates. Once the utility files with the Commission a schedule setting forth its proposed rate changes the Commission must hold a public hearing concerning the lawfulness or reasonableness of the proposed changes, and if the proposed changes relate to rates, the Commission must issue its order approving or disapproving the changes within six months after the date the schedule is filed. In making its determination, the Commission must ensure that all rates are just and reasonable. Once a rate has been set, an electrical utility cannot collect an amount different than is listed on the schedule then on file with the Commission.

In addition to a hearing to determine rates, a Commission held fuel cost hearing will determine whether an adjustment in the base-rate amount designed to recover fuel costs should be granted. After the hearing, the Commission must direct the utility to put in its base-rates an amount designed to recover the utility's fuel costs for the succeeding 12 months adjusted for any over/under-recovery from the preceding 12 months. In a fuel cost hearing, an electric utility is entitled to recover fuel costs, certain variable environmental costs and incremental and avoided costs of distributed energy resource program and net metering as authorized and approved under Chapters 39 and 40, Title 58.

**Gas and Water/Wastewater Rates** (SC Code 58-5- 210 *et seq.*) The Public Service Commission is vested with the power and jurisdiction to supervise and regulation the rates and service of every gas and water/wastewater public utility in South Carolina. If a public utility wants to put into effect a new rate, it must give the Commission at least 30 days' notice of its intention to file, and after that period has expired, the utility will file with the Commission and provide to ORS a schedule setting forth the proposed changes. After the schedule is filed, the Commission must, after notice to the public, hold a public hearing concerning the lawfulness or reasonableness of the proposed changes. The Commission will rule and issue its order approving or disapproving the changes in full or in part within six months after the date the schedule is filed.

**The Natural Gas Rate Stabilization Act** (SC Code 58-5-400 *et seq.*) Any public utility that provides natural gas distribution service can elect to have the terms of the Natural Gas Rate Stabilization Act apply to its rates and charges for gas. Once an appropriate utility elects to have the RSA apply to its rates, the Commission will use the utility's most recently approved rates from the utility's general rate case and issue an order specifying a range for the utility's cost of equity that includes a band of fifty points (0.50 percentage points) below and fifty basis points (0.50 percentage points) above the cost of equity on which the rates are set. Subsequent to the Commission's Order, the utility must file with the Commission, and serve on the ORS, reports that outline much of the utility's expenses and earnings, taxes, and other accounting information. Upon review of the relevant reports, the ORS shall propose any adjustments necessary to bring the utility into compliance with the Commission's Order and the Commission shall order as such to achieve appropriate revenue levels.

**Utility Facility Siting and Environmental Protection Act** (SC Code 58-33-10 *et seq.*) No person may begin constructing an electric generating plant designed for, or capable of, operation at a capacity of more than 75 megawatts without first having obtained a certificate issued with respect to the facility by the Commission. Once the Commission has received an Application for a Certificate, the Commission will fix a date for a public hearing that will occur at least 60, but not more than 90, days after receipt. The Commission will finish the hearing as expeditiously as

practicable. Thereafter, the Commission must render a decision granting, denying, or modifying the Application.

**The South Carolina Distributed Energy Resources Program Act** (SC Code 58-39-110 *et seq.*) is landmark renewable energy legislation passed unanimously by the General Assembly and signed into law by Gov. Nikki Haley in 2014. It was designed collaboratively by legislators, investor-owned utilities, electric cooperatives, electric regulators, conservation groups, renewable energy developers, large energy users, and other stakeholders. The legislation addresses several major aspects of renewable energy development in South Carolina and is expected to spur installation of around 200 MW of renewable energy capacity by 2020. Due to resource economics, the bulk of this capacity is expected to be solar photovoltaic technology— ranging from small residential rooftop systems, to larger commercial systems, to utility-scale solar facilities sized up to 10 MW. Act 236 encompasses a number of aspects, including but not limited to the Distributed Energy Resources Act, Net Metering, Leasing, etc. and will create jobs, lessen South Carolina’s dependence on fossil fuel imports, expand customer choice, further diversify utility generation mixes, and reduce pollution in the Palmetto State.

The legislation’s three sections address third-party leasing transactions, net energy metering arrangements, and utility cost recovery for renewable energy procurement and incentives. In 2015, the regulations and programs for implementing Act 236 were established by the PSC in several regulatory dockets, with participation by most of the same stakeholder groups that helped craft the legislation. This work brought about several regulatory changes authorized by Act 236. First, renewable energy leasing arrangements were explicitly made legal for the first time in South Carolina. Second, a new framework was created for the valuation of net energy metered resources that provides a pathway to better understanding of the benefits and costs of integrating these resources onto utility grids. Third, the PSC reviewed and approved utility plans for procuring electricity from utility-scale solar arrays (installations) as well as programs aimed to spur adoption of customer-scale solar technologies by families and businesses.

With Act 236 and its implementing regulations in place, South Carolina is poised for significant growth in renewable generation in the coming years. This growth has already begun as both utility-scale and rooftop solar arrays are coming online across the state. Although the electricity production from projects installed under Act 236 will represent less than 1% of South Carolina’s total power production, the law is an important step toward realizing the full potential of local renewable energy resources. Families and businesses now have new options for meeting their energy needs; business development and competition will help further drive down resource costs while creating jobs; and utilities, regulators, and industry stakeholders will gain experience with new technologies and regulatory approaches. These developments will place South Carolina in an excellent position to further take advantage of local renewable resource opportunities moving forward into the next decade.

**The South Carolina Pollution Control Act (PCA)** (SC Code 48-10 *et seq.*) - Enacted in 1972. While many requirements in this statute are covered in the Clean Water Act and Clean Air Act, the South Carolina Pollution Control Act has additional requirements not set forth in its federal counterparts. SCDHEC is the primary regulatory agency responsible for administering the requirements of the PCA.

**Act 175** (SC Code 1-3-240 *et seq.*) – Enacted in 2004 to separate powers in regulating utility providers in South Carolina. Prior to Act 175, the PSC handled all aspects of utility regulation. The creation of the Office of Regulatory Staff (ORS) by Act 175 provides a revised structure for addressing the public interest that clearly separates the adjudicative function (which remains with the PSC) from the investigative, legal, prosecutorial, and educational roles necessary to utility regulation that are now within the purview of the ORS. Act 175 also created a State Regulation of Public Utilities Review Committee. This ten-member committee is composed of six members of the S.C. General Assembly and four representatives from the general public.

**Atlantic Interstate Low-Level Radioactive Waste Compact Implementation Act** (SC Code 48-46-10 *et seq.*) Passed in 2000, the Atlantic Interstate Low-Level Radio-active Waste Compact Implementation Act (the “Act”) was implemented to establish South Carolina as a member of the Atlantic Low-Level Radioactive Waste Compact. South Carolina joined Connecticut and New Jersey as the third member state. The Compact was formed in response to the Federal Low-Level Radioactive Waste Policy Act, 1980, which invited states to form interstate compacts for the disposal of radioactive waste. The Act designates ORS as the entity that approves of disposal rates for low-level radioactive waste disposed at any regional disposal facility within the State. Within 90 days following the end of the fiscal year, the site operator of the disposal facility may file an application with the Commission to adjust the level of allowable costs or to allow a cost not previously designated allowable. The Commission is directed to identify allowable costs for operating a regional low-level radioactive waste disposal facility in South Carolina.

**South Carolina Energy Efficiency Act** (SC Code 48-52-10 *et seq.*) This Act established that the State Energy Office is within the ORS, and that the Energy Office serves as the principal energy planning entity for South Carolina with the primary purpose to develop and implement a well-balanced energy strategy and to increase the efficiency of use of all energy sources throughout South Carolina through the implementation of the Plan for State Energy Policy. The Plan for State Energy Policy is a comprehensive plan that maximizes, to the extent practical, environmental quality and energy conservation and efficiency and minimizes the cost of energy throughout South Carolina. The State Energy Office must submit the state energy action plan to the Governor, and other relevant parties, annually.

**State Energy Standards** (SC Code 6-10-30 *et seq.*)

In 2006, the International Energy Conservation Code (IECC) was adopted by the General Assembly as the minimum standard for compliance with the State Energy Standard. Commonly referred to as building energy codes, these standards set minimum requirements for energy-efficient design and construction for new and renovated buildings, thus ensuring reductions in energy use and greenhouse gas emissions over the life of buildings. (US DOE) The General Assembly updated the energy code to the 2009 IECC during the 2012 legislative session (Act 143).

Current Commercial Code, South Carolina Energy Standard

The commercial provisions of the South Carolina Energy Standard reference the 2009 IECC, including that code’s reference to ASHRAE Standard 90.1-2007 as an alternative compliance path.

Current Residential Code, South Carolina Energy Standard

The residential provisions of the South Carolina Energy Standard reference the 2009 IECC. Both the residential and commercial code are mandatory statewide. All new and renovated buildings and additions constructed within South Carolina must comply with this standard. Local jurisdictions may adopt more stringent codes.

DRAFT

DRAFT

## State Tax Credits

State					
Name	Category	Policy / Incentive Type	Code	Summary	More Information
Biomass Energy Tax Credit (Corporate)	Financial Incentive	Corporate Tax Exemption	§12-6-3620	Equipment must be powered by a 90% biomass resource and creates energy from that resource on site; must be in service by 2020 and certified by SEO. Credit is for 25% of purchase and installation of eligible equipment at that site and only \$650,000 of the total credit can be applied in any one year. The excess credit can be carried forward for 15 years.	<a href="http://programs.dsireusa.org/system/program/detail/1805">http://programs.dsireusa.org/system/program/detail/1805</a>
Biomass Energy Tax Credit (Personal)	Financial Incentive	Personal Tax Exemption	§12-6-3620	Equipment must be powered by a 90% biomass resource and creates energy from that resource on site; must be in service by 2020 and certified by SEO. Credit is for 25% of purchase and installation of eligible equipment at that site and only \$650,000 of the total credit can be applied in any one year. The excess credit can be carried forward for 15 years.	<a href="http://programs.dsireusa.org/system/program/detail/5046">http://programs.dsireusa.org/system/program/detail/5046</a>
Energy Efficient Manufactured Homes Incentive Tax Credit	Financial Incentive	Personal Tax Credit	§48-52-870	During the 2008 legislative session, South Carolina legislators passed SB 1141, creating the Energy Efficient Manufactured Homes Incentive Program, effective July 1, 2009. This bill created an income tax credit, with the goal of encouraging consumers to purchase energy efficient manufactured homes. To qualify for the nonrefundable \$750 tax credit, an individual must purchase either: 1) a manufactured home that meets or exceeds the U.S. Environmental Protection Agency's and the U.S. Department of Energy's energy-saving efficiency requirements; or 2) a manufactured home that meets or exceeds energy efficiency requirements under the ENERGY STAR program. In addition, the individual must purchase the home from a retail dealership licensed by the South Carolina Manufactured Housing Board and use the manufactured home in South Carolina.	<a href="http://programs.dsireusa.org/system/program/detail/3178">http://programs.dsireusa.org/system/program/detail/3178</a>

State					
Name	Category	Policy / Incentive Type	Code	Summary	More Information
Solar Energy and Small Hydropower Tax Credit (Corporate)	Financial Incentive	Corporate Tax Credit	§12-6-3587	In South Carolina, taxpayers may claim a credit of 25% of the costs of purchasing and installing a solar energy system, small hydropower system, or a geothermal system for heating water, space heating, air cooling, energy-efficient daylighting, heat reclamation, energy-efficient demand response, or the generation of electricity in a building owned by the taxpayer. Only hydropower systems installed after July 1, 2009 are eligible for the tax credit. The maximum credit a taxpayer may take in any one tax year is \$3,500 for each facility or 50% of the taxpayer's tax liability for that taxable year, whichever is less. Unused credit, or credit that exceeds the annual cap, may be carried forward for 10 years.	<a href="http://programs.dsireusa.org/system/program/detail/1804">http://programs.dsireusa.org/system/program/detail/1804</a>
Solar Energy and Small Hydropower Tax Credit (Personal)	Financial Incentive	Personal Tax Credit	§12-6-3587	In South Carolina, taxpayers may claim a credit of 25% of the costs of purchasing and installing a solar energy system, small hydropower system, or a geothermal system for heating water, space heating, air cooling, energy-efficient daylighting, heat reclamation, energy-efficient demand response, or the generation of electricity in a building owned by the taxpayer. Only hydropower systems installed after July 1, 2009 are eligible for the tax credit. The maximum credit a taxpayer may take in any one tax year is \$3,500 for each facility or 50% of the taxpayer's tax liability for that taxable year, whichever is less. Unused credit, or credit that exceeds the annual cap, may be carried forward for 10 years.	<a href="http://programs.dsireusa.org/system/program/detail/1803">http://programs.dsireusa.org/system/program/detail/1803</a>

## XXI. Appendix U: Clean Power Plan: Compliance Projections and Modeling

### EPA Clean Power Plan

On August 3, 2015, the U.S. Environmental Protection Agency (EPA) released the final version of the Clean Power Plan final rule for existing power plants. The rule is designed to reduce carbon dioxide (CO<sub>2</sub>) emissions from power plants by a national average of 32 percent from 2005 levels.

In the final Clean Power Plan (CPP), the EPA established interim and final CO<sub>2</sub> emission performance rates for the two types of electric generating units — steam electric and natural gas fired power plants — under Section 111(d) of the Clean Air Act. The CPP also establishes state-specific interim (starting in 2022) and final (starting in 2030) goals for each state, based on these limits and on each state's mix of power plants. The goals are expressed in two ways—rate-based and mass-based— either of which can be used by a state in its compliance plan. Rate-based standards require a state's power fleet to reach an average level of carbon emissions expressed in pounds of CO<sub>2</sub> per megawatt hour (MWh), while mass-based standards cap CO<sub>2</sub> emissions outright in short tons. States are encouraged to trade emissions credits or allowances among themselves as part of their compliance strategies. However, states with differing standards are not allowed to operate in the same carbon-trading regime.

### South Carolina at a Glance

The final CPP requires each state to develop its own State Implementation Plan (SIP) for reducing carbon emissions, which has to be submitted within three years. The S.C. Department of Health and Environmental Control (SCDHEC) formed a coalition of stakeholders (SC Energy Coalition) to work on the SIP. The SC Energy Coalition includes representatives from electric utilities and cooperatives, government agencies, industries, environmental justice and environmental non-governmental organizations whose insight and expertise are crucial to the development of the SIP. By forming statewide collaborative partnerships, South Carolina has taken a proactive approach in shaping these national standards. SCDHEC remains committed to working with all stakeholders to ensure that the development of the SIP is done in a manner that provides maximum flexibility in development and implementation at the state level, is tailored to meet our state's unique economic challenges, and is right for South Carolina. These objectives were formalized by the stakeholder group in 2014 as part of the SC Energy Principles. The South Carolina goal, which contributes toward meeting the national goal, is to reduce CO<sub>2</sub> emissions by 36 percent from 2012 baseline emissions.

As of January 2013, South Carolina's annual CO<sub>2</sub> emissions had already dropped 32 percent from 2005, and this trend is expected to continue because of the following:

- Increased use of natural gas for generation due to the lower cost of natural gas,
- A downturn in the economy which reduced customer demand,
- Fuel switching at some units from coal to natural gas,
- Startup of two new nuclear units that will displace dispatch from fossil units,



- Retirement of older coal-fired units (from 26 in 2005 to an expected 12 in 2020),
- Addition of more renewables including new solar generation as encouraged by S.C Act 236, and
- Increased use of energy efficiency measures by South Carolina customers.

Adopting rules for Clean Power Plan compliance will likely require statutory or regulatory changes that must be approved by the South Carolina General Assembly.

### Pathway to 2030

In February 2016 the U.S. Supreme Court entered a stay of implementation of the EPA's Clean Power Plan until all court challenges are resolved. A group of state and business interests brought their request for a stay to the Supreme Court after the U.S. Court of Appeals for the District of Columbia denied the same request weeks earlier. The Court of Appeals will hear oral arguments in the case on June 2, 2016.

The stay is important for several reasons. Under the regulations, states had to begin filing their compliance plans with the EPA in September of 2016. With the stay in place, that filing date is certainly delayed. Now, even if the regulations are ultimately upheld, implementation of any measures is likely to be delayed. The stay also adds uncertainty to the goals, deadlines, and other measures required by the CPP. Because of this uncertainty, many states have ceased work on their compliance preparations.

Notwithstanding the stay, it is important to note that the South Carolina state goal is expected to be achievable. In fact, the EPA made improvements in the final rule specifically for the purpose of ensuring that states and power plants could rely on the electricity system's inherent flexibility and the changes already underway in the power sector to find affordable pathways to compliance. The final rule includes the following:

- Recognition of all new non-emitting generation towards compliance (i.e. new nuclear, which was not included as part of the proposed rule)
- Flexibility in state plans and easier access to trading programs
- Clean Energy Incentive Program available for early investments. This program supports renewable energy projects – and energy efficiency in low-income communities – in 2020 and 2021.
- Energy efficiency available for compliance

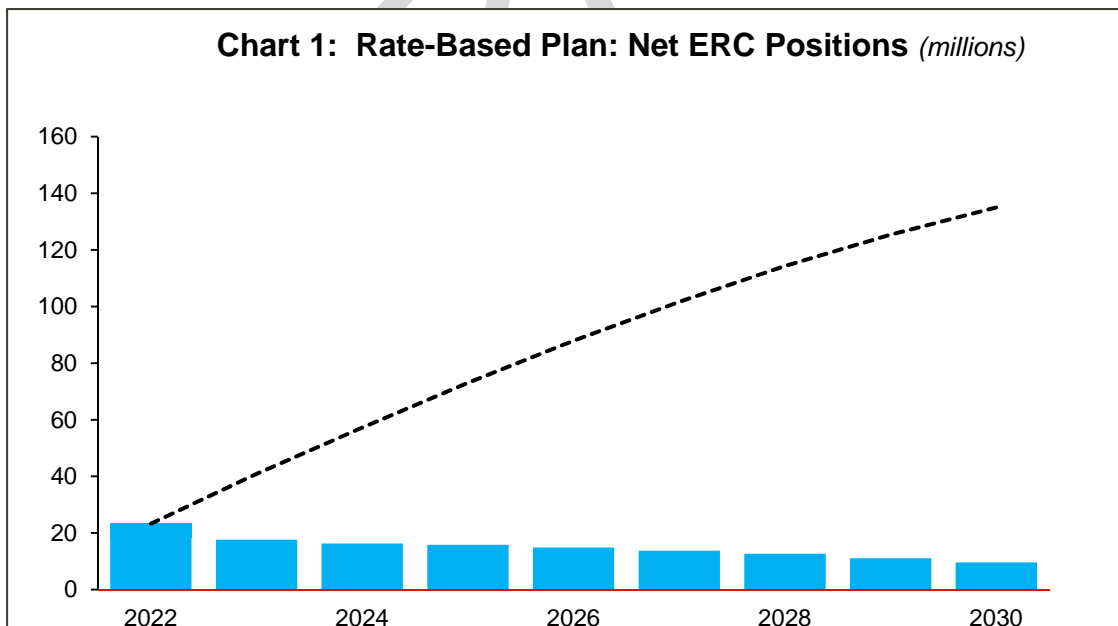
Depending on the outcome of the District and Supreme Court actions, the SC Energy Coalition will resume its effort to assess the pros and cons of the various CPP compliance pathways to provide recommendations that are most feasible and beneficial for the citizens of South Carolina. This evaluation will fill in gaps left by modeling efforts to date; it will potentially include electric system costs-of-compliance options, environmental outcomes, equity considerations, and economic development impacts in South Carolina. (See Appendix U for compliance projections and modeling.)

As part of the stakeholder process, a compliance model was developed to predict South Carolina's ability to comply with the 2030 Clean Power Plan target. Each South Carolina utility

governed by the CPP provided CO<sub>2</sub> emissions estimates based on their current load and anticipated load growth through 2030. Those estimates were consistent with the Integrated Resource Plan “business as usual” assumptions. Those utility CO<sub>2</sub> estimates were aggregated to create a statewide emission estimate for all sources governed by the CPP. The model also assumed that the state would be in a position to take full advantage of certain credits granted under the CPP, including credits for renewable energy and energy efficiency.

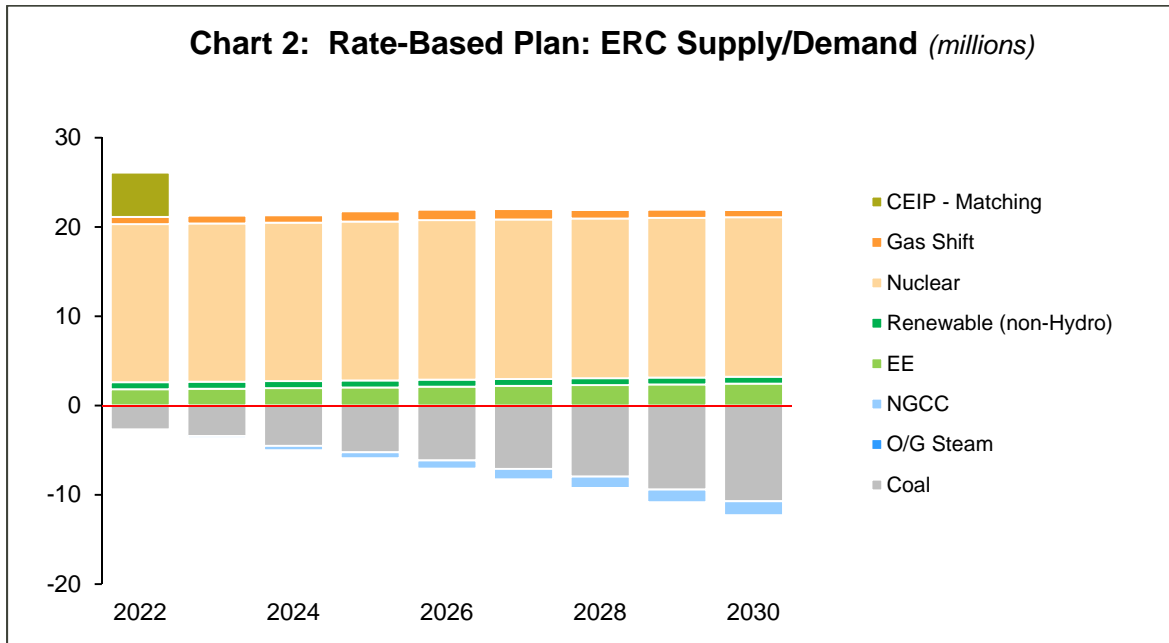
These aggregated results reveal that South Carolina’s proactive measures to construct new nuclear units benefit the state under the two compliance programs offered under the CPP. Under the CPP’s rate-based program, South Carolina generates a substantial amount of Emission Rate Credits (ERCs) that may be used for trading or to offset emissions, if needed. Under the CPP’s mass-based program, South Carolina could meet the EPA’s allowance targets, although the margin of compliance was not as significant as under the rate-based program. Notably, substantial additional modeling is needed to understand the cost implications and other outcomes of various CPP compliance options, including the selection of a rate-based or mass-based program.

The charts shown below display the results of the modeling efforts to date. The chart below demonstrates that as South Carolina approaches the 2030 Clean Power Plan compliance date, ERCs continue to increase in the state cumulatively. Essentially, this trend means that South Carolina will continue to have enough credits to ensure that all of the electric generating units in the state comply with the target rate, as well as have a surplus. This surplus could be banked (and therefore used at a future date when credits may be needed) or traded on the open market.



The chart below illustrates the ERCs that are generated and demanded by the various types of generation counted under the CPP. Although solar renewables and energy efficiency efforts generate ERCs, the contribution from nuclear is substantially greater. The decision to include the

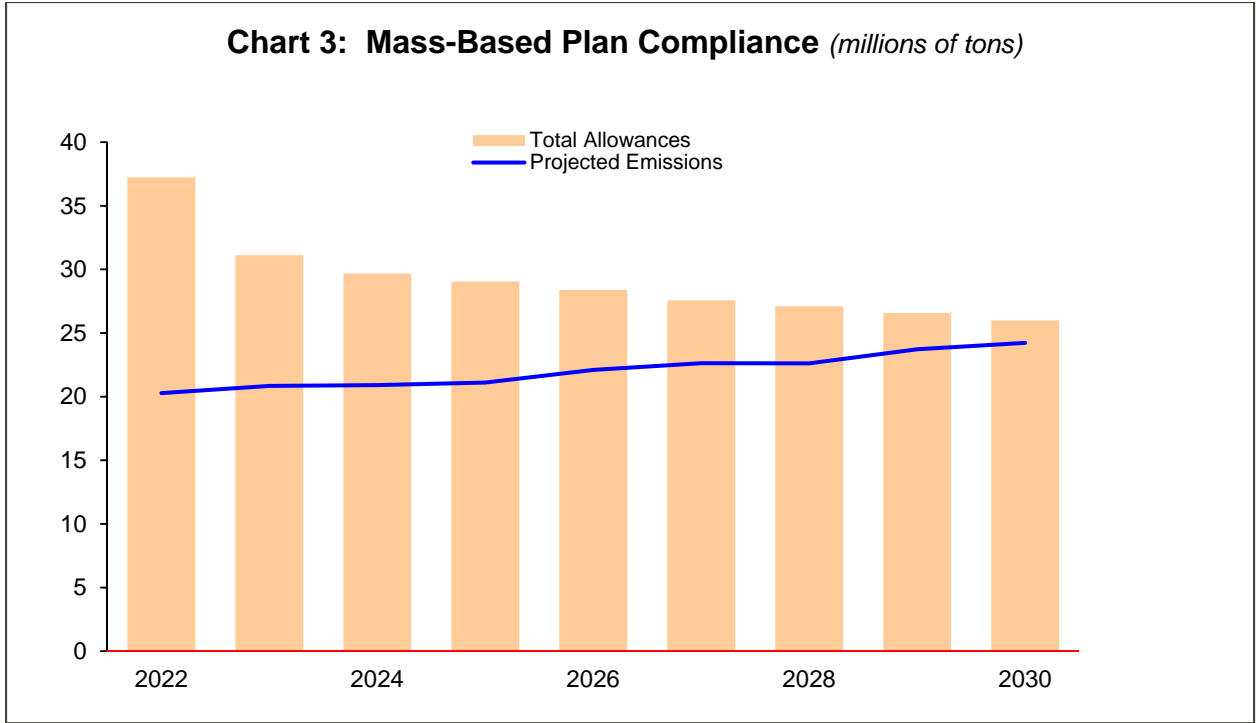
two new nuclear units as zero-emitting generation sources positively positions the state through 2030.



### Understanding Chart 2

Under a rate-based compliance plan, non-emitting and low-emitting sources of electric generation create or “supply” ERCs. These sources include new nuclear, solar and wind generation, energy efficiency, and shifting generation from coal to natural gas. Additional ERCs can be supplied by participating in a Clean Energy Incentive Program (CEIP). Conversely, fossil fuel electric generation - including coal, natural gas combined cycle (NGCC), and oil/gas steam (O/G Steam) - demand ERCs in order to comply with emission-rate targets. A state will be compliant under a rate plan if the net supply of ERCs exceeds the demand for ERCs. A state with a surplus of ERCs may be able to sell ERCs to facilities in states with a deficit of ERCs. Fossil fuel facilities in a state with a deficit of ERCs will need to purchase ERCs from states with a surplus. The market price for ERCs will depend on the supply and demand for these credits.

The chart below illustrates South Carolina’s compliance with a mass-based program under the CPP. South Carolina is expected to be compliant with the CPP target through 2030. However, if there were to be changes to the “business as usual” assumptions, the projected allowance surplus in the mass-based program could be smaller or larger than shown here.



DRAFT

## XXII. Appendix V: Projected Natural Gas Infrastructure

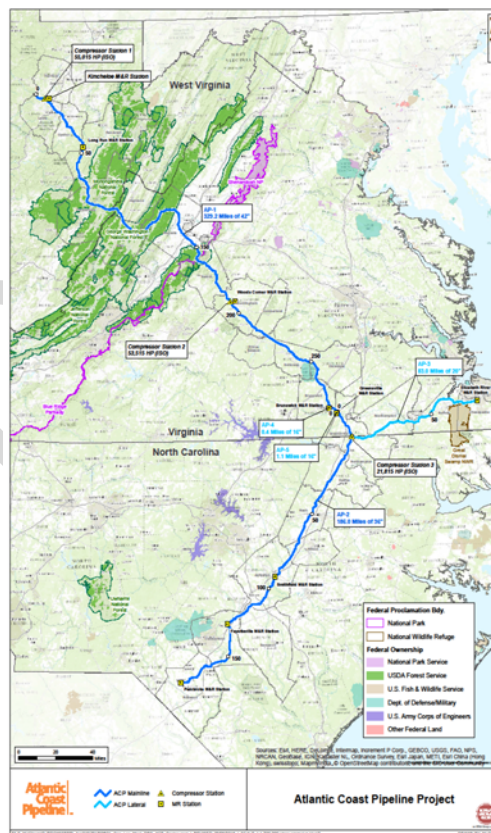
### New Pipeline Infrastructure

#### *Atlantic Coast Pipeline*

An example of new pipeline infrastructure that is transporting growing Northeast shale gas production from the Marcellus and Utica to the South is the proposed Atlantic Coast Pipeline (ACP). ACP is an approximately 600-mile, FERC-regulated pipeline originating in Harrison County, West Virginia. The southern termination of ACP is in Robeson County, North Carolina, which borders South Carolina.

ACP will initially have a capacity of 1.5 Bcf/d, with future expansion capability up to 2.0 Bcf/d. The project will offer additional supply capacity for economic growth, direct supply access to shale production, and pipeline diversity to meet the growing needs of power generators and gas utilities.

*ATLANTIC COAST PIPELINE MAP*



Source: Dominion

### *Transco Expansion Projects*

Transco's Leidy Southeast, Dalton, and Atlantic Sunrise projects are examples of expansion projects of current pipeline infrastructure that are moving the growing Northeast shale southward. These projects could affect the sources of natural gas that flow into South Carolina. Leidy Southeast went into service in late 2015, while Dalton and Atlantic Sunrise are scheduled to go into service in 2017.

These Transco expansion projects allow for contractual and physical gas flows north-to-south, which will displace traditional south-to-north flows. The Atlantic Sunrise project, for example, involves modifying valves and piping at compressor stations within South Carolina to allow for bi-directional gas flow across the state.

According to the Energy Information Administration (EIA), South Carolina's natural gas infrastructure has inflow capacity of 4.8 Bcf/d and outflow capacity of 4.2 Bcf/d. Projects such as these could potentially allow for greater flows into and out of the state.

### *Dominion Carolina Gas Transmission Projects*

Dominion Carolina Gas Transmission is proposing to construct and operate approximately 28 miles of new 8-inch-diameter natural gas pipeline and associated ancillary facilities in Lexington, Calhoun, and Richland counties in South Carolina.

The pipeline will interconnect with the Dominion Carolina Gas Transmission 20-inch diameter Salley to Eastman Line, originating at the DAK Americas plant close to K Avenue in Calhoun County, and terminate at the International Paper Eastover plant in Richland County.

The proposed new pipeline and associated ancillary facilities are collectively referred to as the Columbia to Eastover Project and will support International Paper's intent to convert from coal to natural gas to meet environmental standards for boiler air emissions.

The proposed project corridor is located entirely on privately owned property. The proposed pipeline is approximately 75 percent co-located within an existing right-of-way corridor.

Dominion Carolina Gas Transmission also proposes to construct and operate the Charleston Project, consisting of the following facilities:

- Moore to Chappells Pipeline
- Dillon Pipeline
- Moore Compressor Station
- Dorchester Compressor Station

The project is proposed to help meet the growing regional need for clean, reliable and domestic natural gas. The project would cost about \$119.3 million and provide 80,000 dekatherms per day of firm transportation service to three customers in Charleston, Dillon, Lexington and Marlboro counties.

DCGT submitted a pre-filing request in July 2015 with the Federal Energy Regulatory Commission (FERC), the agency responsible for reviewing and authorizing interstate natural gas

transmission projects. The company plans to file first-quarter 2016 for a Certificate of Public Convenience and Necessity with the FERC, which is conducting a full review of the project in compliance with two federal statutes, the Natural Gas Act and National Environmental Policy Act.

### *New Markets*

With the growth in domestic shale gas production over the last several years and projected growth into the future, additional markets for natural gas are developing. These markets include petrochemical plants, pipeline exports to Mexico, and new Liquefied Natural Gas (LNG) export facilities. Per the FERC, approximately 8.9 BCF/day of LNG export capability is permitted and under construction at five facilities in Louisiana, Maryland, and Texas. These facilities will come online in different stages between 2016 and 2020. Cheniere Energy's LNG export facility in Sabine Pass, Louisiana, is the only current operational LNG export facility. Its first export cargo left in February of 2016 bound for Latin America. As of March 22, 2016, 8 FERC applications for LNG export facilities were pending in the lower 48 states. These applications include the proposed 0.35 Bcf/d Southern LNG project at Elba Island. Also, 12 proposed LNG export facilities in the lower 48 states are in the pre-filing stage with the FERC.

DRAFT