

# Energy <sup>in</sup> Action

South Carolina  
State Energy Plan

APPENDICES

OFFICE OF REGULATORY STAFF



This material is based upon work supported by the Department of Energy, Office of Energy Efficiency and Renewable Energy (EERE), under Award Number DE-EE0006996.

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

South Carolina Office of Regulatory Staff

**Energy Office**

2016



# Content

<b>ACRONYMS</b>	<b>4</b>
<b>APPENDICES</b>	<b>6</b>
<b>Appendix A: Survey Results</b>	<b>6</b>
<b>Appendix B: Enabling Legislation</b>	<b>14</b>
<b>Appendix C: Subcommittee Recommendations</b>	<b>18</b>
<b>Appendix D: Economic Drivers</b>	<b>78</b>
<b>Appendix E: Income</b>	<b>80</b>
<b>Appendix F: Relevant Federal and State Regulations and Laws</b>	<b>83</b>
<b>Appendix G: Clean Power Plan - Compliance Projections and Modeling</b>	<b>98</b>
<b>Appendix H: Environmental Trends</b>	<b>102</b>
<b>Appendix I: South Carolina Electric and Gas Utilities</b>	<b>105</b>
<b>Appendix J: Electric Transmission System</b>	<b>120</b>
<b>Appendix K: Natural Gas Permitting at the State Level</b>	<b>126</b>
<b>Appendix L: Natural Gas Supply and Delivery</b>	<b>128</b>
<b>Appendix M: Projected Natural Gas Infrastructure</b>	<b>141</b>
<b>Appendix N: Propane Gas Basics</b>	<b>144</b>

<b>Appendix O: Electric Generation Capacity by Provider</b>	<b>147</b>
<b>Appendix P: Electric Consumption by Provider</b>	<b>150</b>
<b>Appendix Q: Energy Efficiency and Renewable Energy Programs</b>	<b>152</b>
<b>Appendix R: South Carolina Biomass Facilities</b>	<b>161</b>
<b>Appendix S: Bureau of Ocean Energy Management - Wind Task Force</b>	<b>162</b>
<b>Appendix T: Distributed Energy Resource Program Act (Act 236)</b>	<b>164</b>
<b>Appendix U: Transportation</b>	<b>167</b>
<b>GLOSSARY</b>	<b>175</b>
<b>THANK YOU</b>	<b>180</b>

# ACRONYMS

**ACEEE** – American Council for an Energy-Efficient Economy

**ACP** – Atlantic Coast Pipeline

**AFV** – Alternative Fuel Vehicles

**AMI** – Advanced Metering Infrastructure

**AMR** – Automatic Meter Reading

**ASHRAE** – American Society of Heating, Refrigerating and Air-Conditioning Engineers

**ATC** – Available Transfer Capacity

**BCA** – Bill Credit Agreements

**BCC** – Building Codes Council

**BCF** – Billion Cubic Feet

**BES** – Bulk Electric System

**BLRA** – Base Load Review Act

**BOEM** – Bureau of Ocean Energy Management

**BTU** – British Thermal Unit

**CAA** – Clean Air Act

**CAFE** – Corporate Average Fuel Economy

**CCR** – Coal Combustion Residuals

**CDC** – Community Development Corporation

**CDFI** – Community Development Financial Institutions Fund

**CFL** – Compact Fluorescent Light

**CHP** – Combined Heat and Power

**CNG** – Compressed Natural Gas

**C-PACE** – Commercial Property-Assessed Clean Energy

**CPW** – Commission of Public Works

**CWA** – Clean Water Act

**CZC** – Coastal Zone Consistency

**DCGT** – Dominion Carolina Gas Transmission

**DEC** – Duke Energy Carolinas

**DEP** – Duke Energy Progress

**DER** – Distributed Energy Resources

**DHEC** – South Carolina Department of Health and Environmental Control

**DIMP** – Distribution Integrity Management Program

**DNR** – South Carolina Department of Natural Resources

**DOC** – South Carolina Department of Commerce

**DOE** – US Department of Energy

**DOT** – US Department of Transportation

**DSM** – Demand Side Management

**Duke** – Duke Energy Corporation

**ECSC** – Electric Cooperatives of South Carolina

**EE** – Energy Efficiency

**EIA** – Energy Information Administration

**Energy Office** – South Carolina Office of Regulatory Staff State Energy Office

**EM&V** – Evaluation, Measurement, and Verification

**EPA** – US Environmental Protection Agency

**EPAct** – Energy Policy Act of 2005

**EPC** – Engineering, Procurement, and Construction

**ERC** – Emission Rate Credit

**FERC** – Federal Energy Regulatory Commission

**GDP** – Gross Domestic Product

**GWh** – Gigawatt-Hours

**HVAC** – Heating, Ventilation, and Air Conditioning

**IECC** – International Energy Conservation Code

**IEEE** – Institute of Electrical and Electronics Engineers

**IOUs** – Investor-Owned Utilities

**IRC** – International Residential Code

**IRP** – Integrated Resource Plan

**kV** – Kilovolt

**kW** – Kilowatt

**kWh** – Kilowatt-Hour

**LDC** – Local Distribution Company

**LED** – Light-Emitting Diode

**LEED** – Leadership in Energy and Environmental Design

**LNG** – Liquefied Natural Gas

**Lockhart Power** – Lockhart Power Company

**LPG** – Liquid Propane Gas

**MACT** – Maximum Achievable Control Technology

**Mcf/d** – Million Cubic Feet per Day

**MED** – Major Event Day(s)

**MW** – Megawatt

**MWa** – Average Megawatt

**MWh** – Megawatt-Hour

**NAAQS** – National Ambient Air Quality Standards

**NERC** – North American Electric Reliability Corporation

**NGA** – Natural Gas Authorities

**NGO** – Non-Governmental Organizations

**NPDES** – National Pollutant Discharge Elimination System

**NRC** – Nuclear Regulatory Commission

**OASIS** – Open Access Same-Time Information System

**OCS** – Outer Continental Shelf

**ORS** – South Carolina Office of Regulatory Staff

**OSE** – South Carolina Office of State Engineer

**PACE** – Property-Assessed Clean Energy

**PBI** – Performance-Based Incentive

**PBF** – Public Benefit Fund

**PCA** – Pollution Control Act

**PSI** – Pounds per Square Inch

**PHMSA** – Pipeline and Hazardous Materials Safety Administration

**PNG** – Piedmont Natural Gas Company

**POD** – Point of Delivery

**POR** – Point of Receipt

**PPA** – Power Purchase Agreements

**PSC** – Public Service Commission of South Carolina

**PURC** – State Regulation of Public Utilities Review Committee

**PURPA** – Public Utility Regulatory Policies Act

**RC** – Reliability Coordinator

**RFP** – Request for Proposals

**RMDAC** – Recycling Market Development Advisory Council

**ROW** – Right of Way

**RPS** – Renewable Portfolio Standards

**SAIDI** – System Average Interruption Duration Index

**SAIFI** – System Average Interruption Frequency Index

**Santee Cooper** – South Carolina Public Service Authority

**SCADA** – Supervisory Control and Data Acquisition (electric)

**SCAMPS** – South Carolina Association of Municipal Power Systems

**SCCCL** – South Carolina Coastal Conservation League

**SCDOT** – South Carolina Department of Transportation

**SCE&G** – South Carolina Electric and Gas

**SCPGA** – South Carolina Propane Gas Association

**SNG** – Southern Natural Gas

**SELC** – Southern Environmental Law Center

**SFAA** – State Fiscal Accountability Authority

**TIMP** – Transmission Integrity Management Program

**TOU** – Time-of-Use

**Transco** – Transcontinental Pipeline

**VMT** – Vehicle Miles Traveled

**WAP** – Weatherization Assistance Program

# Appendix A: Survey Results

## Stakeholder Survey Responses (73 responses)

**High** level of importance: *Topics rated either 4 or 5 on a scale of 1 to 5 by a majority of stakeholders.*

- Demand-side management, weatherization, energy efficiency for commercial and industrial customers, on-bill financing, building codes, IRPs, large-scale renewable energy generation, distributed solar photovoltaic generation, distributed energy storage, and economic development.

**Medium** level of importance: *Topics rated a median of 3 on a scale of 1 to 5 by a majority of stakeholders.*

- Home energy management technology, public benefit funds, geothermal technologies, plug-in electric vehicle charging infrastructure development, natural gas pipeline capacity, and income.

**Low** level of importance: *Topics rated either 1 or 2 on a scale of 1 to 5 by a majority of stakeholders.*

- Small-scale wind generation.

**Mixed** level of importance: *Topics that received a variety of responses across the scale.*

- Coal-fired generation heat rate improvements, solar thermal technologies, fuel cell technologies, plug-in electric vehicle battery research & development, alternative fuels, CNG infrastructure.

The most important topics, which received the most 4s and 5s on the scale (44 total, 60% of respondents), was the use of IRPs and consideration of economic development in the Plan.

### Immediacy:

**High** level of time sensitivity: *Most urgent to stakeholders.*

- Addressing demand-side management, weatherization, on-bill financing, state building codes, IRPs, large-scale renewable energy generation, and economic development.

**Medium** level of time sensitivity: *Moderately urgent to stakeholders.*

- Addressing home energy management technology, energy efficiency for commercial and industrial customers, distributed energy storage, geothermal technologies, plug-in electric vehicle charging infrastructure development, addressing CNG infrastructure, natural gas pipeline capacity, and addressing alternative fuels.



**Low** level of time sensitivity: *Least urgent to stakeholders.*

- Addressing Small-scale wind generation.

**Mixed** level of time sensitivity: *A variety of urgencies among stakeholders.*

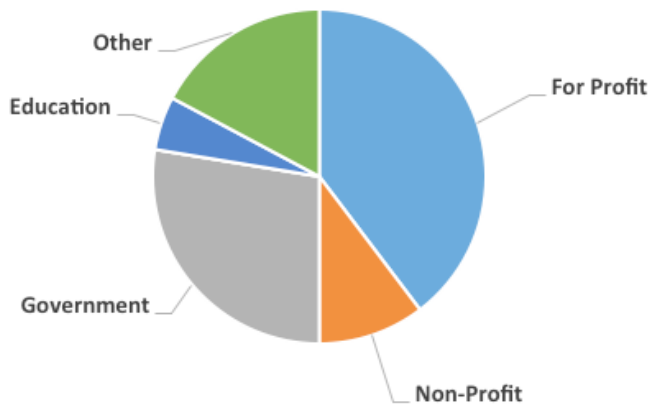
- Addressing coal-fired generation heat-rate improvements, public-benefit funds, distributed solar photovoltaic generation, solar thermal technologies, fuel-cell technologies, plug-in electric vehicle battery research and development, and income.

The most time-sensitive topic was addressing on-bill financing as part of the Plan (22 “most time-sensitive” responses).

**Non-Ranked Questions:**

- Some barriers listed by stakeholders:
  - Education of the public on: Demand-Side Management, energy management technology, weatherization;
  - Cost of: generation, energy-efficiency programs, development and implementation of new technologies, weatherization;
  - “The relatively low cost of energy in the region makes payback challenging”; and
  - “Many parts of the state energy plan may cause rates to rise and this could reduce the state’s ability to attract new industries.”

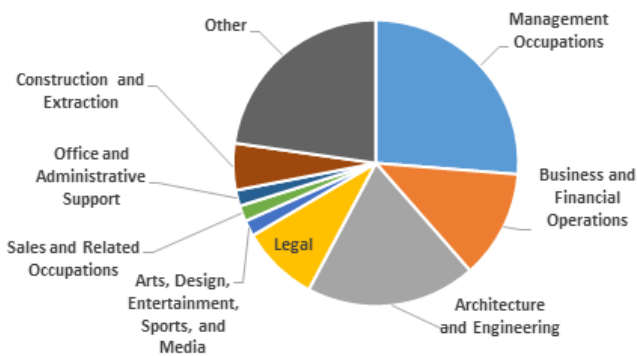
**Which of the following best describes the type of organization you currently work for?**



For Profit	40.7%	24
Non Profit (religious, arts, social assistance, etc.)	10.3%	6
Government	27.6%	16
Healthcare	0.0%	0
Education	5.2%	3
Other (please specify)	17.2%	10

- Some opportunities listed by stakeholders:
  - Making weatherization incentives available to all customers regardless of income;
  - Retiring older coal plants that cannot make generation or efficiency improvements; and
  - “EE coupled with DSM can provide numerous benefits to both utilities and their consumers/ratepayers, potentially avoiding costly new generation.”

### Which category best describes your current occupation?



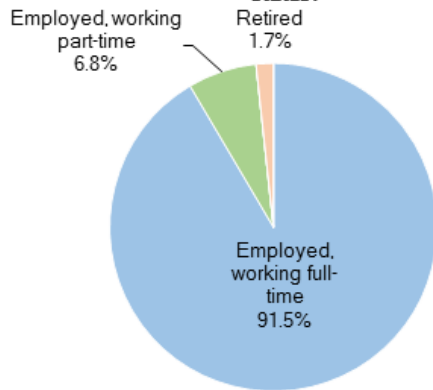
Management Occupations	27.6%	16
Business and Financial Operations Occupations	12.3%	7
Architecture and Engineering Occupations	19.3%	11
Legal Occupations	8.8%	5
Arts, Design, Entertainment, Sports, and Media Occupations	1.8%	1
Sales and Related Occupations	1.8%	1
Office and Administrative Support Occupations	1.8%	1
Construction and Extraction Occupations	5.3%	3
Other (please specify)	22.8%	13

Should environmental and health costs be factored into energy resource decisions? Yes

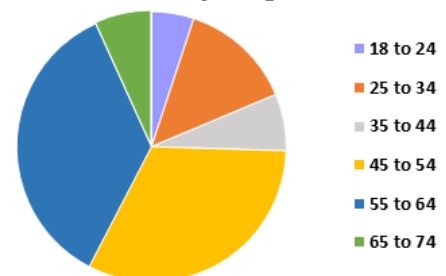
- 43 – impacts that degrade natural resources including air and water quality and quantity
- 41 – impacts that increase incidence of disease and illness
- 40 – impacts that increase waste storage and disposal
- 39 – impacts that either shorten the lengths of, or would interfere with the quality of life
- 38 – impacts that may reduce the productivity of the natural environment in terms of crops, livestock, and fishing
- 35 – impacts on recreational tourism

### Demographics:

#### Which of the following categories best describes your employment status?



#### What is your age?



18 to 24	5.1%	3
25 to 34	13.6%	8
35 to 44	6.8%	4
45 to 54	32.2%	19
55 to 64	35.6%	21
65 to 74	6.8%	4

## Industrial Survey Response (7 responses)

**High** level of importance: Topics rated either 4 or 5 on a scale of 1 to 5 by a majority of industrial respondents.

- IRPs and Economic Development.

**Low** level of importance: *Topics rated either 1 or 2 on a scale by a majority of industrial respondents.*

- Coal-fired generation heat rate improvements, large-scale renewable wind energy, small-scale wind generation.

In terms of both importance and immediacy, the average response to topics not explicitly mentioned fell into the “Moderate/Medium” range for industrial participants.

### **Non-Ranked Questions:**

#### **Opportunities listed by industrial responders:**

- “Long range forecasting like is required for IRPs have always been challenging, but with the economic shifts and growth rates prior assumptions have to be challenged. This needs to be as much backwards looking as it is forwards, to confirm assumption relevance and accuracy with a focus on updating/revising 15 yr plans.”
- Cost-competitive instead of socialized economic development (to be emphasized in the Plan).

#### **Barriers listed by industrial responders:**

In terms of large-scale renewable energy generation:

- “While manufacturers and installers in this space say otherwise, the economics of these systems aren’t adequate even with incentives. Any renewable system evaluation should be done with equal financial metrics for other solution requirements around ROI w/o incentives that may or may not continue.”

In terms of energy efficiency for industrial/commercial consumers:

- “One thing to consider is not forcing these efforts on those already doing this kind of work. Companies of both commercial and industrial purpose should be able to define a measurement for their efficiency, establish and demonstrate a strategy and process for improving results, and then prove them. Be careful that this isn’t a one solution fits all approach, but that it does have some constructive and reasonable guidelines that encourages efficiency improvement.”
- “Businesses need to invest where most beneficial to their specific organizations.”

**\*100% of respondents believed that environmental and health costs SHOULD be factored into energy resource decisions**

Only 20% of respondents stated that they would like to know more about the Plan and that they would prefer to be contacted by email.

Impacts that degrade natural resources including air and water quality and quantity.	66.67%	2
Impacts that may reduce the productivity of the natural environment in terms of crops, livestock, and fishing.	100.00%	3
Impacts on recreation and tourism.	0.00%	0
Impacts that increase waste storage and disposal.	66.67%	2
Impacts that increase incidence of disease and illness.	100.00%	3
Impacts that either shorten the lengths of, or would interfere with the quality of life.	66.67%	2

## Consumer Survey Responses (250 responses)

**High** level of importance: *Topics rated either 4 or 5 on a scale of 1 to 5 by a majority of consumers.*

- Residential energy efficiency, weatherization, state building codes, distributed solar and wind generation, utility-scale wind generation, energy storage, plug-in electric vehicle battery research/development, ride-and-drive development, mass transit development, impact pricing, on-bill financing.

**Medium** level of importance: *Topics rated a median of 3 on a scale by a majority of consumers.*

- Natural gas infrastructure, utility infrastructure, public benefits fund.

**Mixed** level of importance: *Topics that received a variety of responses across the scale.*

- Fuel-cell technologies, plug-in electric vehicle charging infrastructure, alternative fuels, subsidized rates.

The most important topic, which received the most 4s and 5s on the scale (220 total, 88% of responding consumers), was addressing residential energy efficiency in the Plan.

In this category, a large percentage of consumers wanted the Plan to increase financial incentives for energy efficiency in households and increased incentives/tax credits for solar panels.

### Non-Ranked Questions:

Consumers expressed interest in:

- Providing education for energy policies and problems in the state. These problems include weatherization, alternative fuels, fuel-cell technology, and payment for new energy initiatives.

- Monitoring and updating state building codes.
- Moving away from non-renewables like natural gas and moving toward solar and wind generation (“I’d rather see a wind turbine than an oil rig.”).
- Addressing costs of solar generation in the state, as well as the dangers of wind turbines to birds.
- Improving mass transit infrastructure.

**In Order of Importance to consumers regarding energy (on average):**

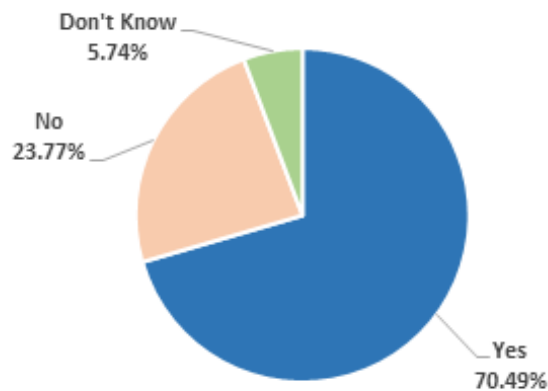
1. Price
2. Reliability
3. Health Impact
4. Environmental Impact

**“How should costs incurred through changes to the utility grid be paid for?”**

(In order of consumer preference):

1. An increase on a utility’s rates
2. A statewide fee
3. A fee on utility usage
4. A peak usage fee

**Are you currently using any residential EE programs such as smart meters, LED lights, rebates, etc.?**

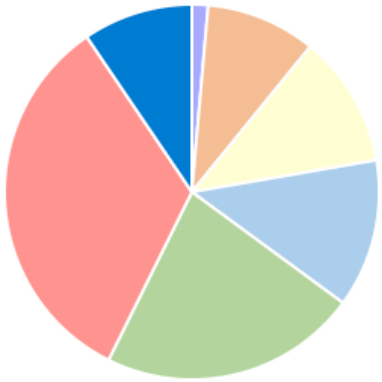


**Types of EE programs mentioned by customers:**

- LED Lights (the majority of responses, near 85%)
- Solar panels
- Electric and hybrid cars
- Smart meters and thermostats

**Demographics:**

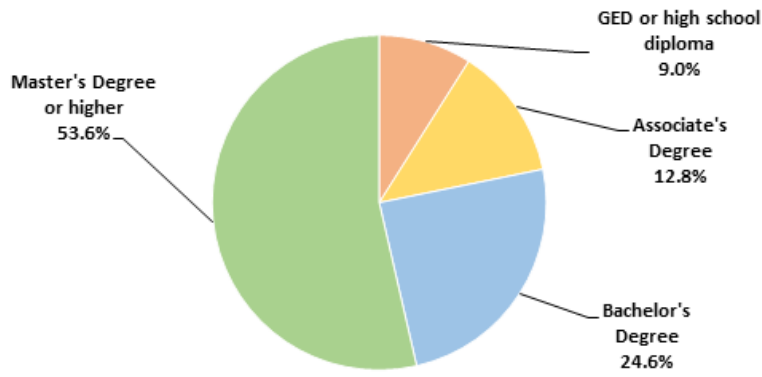
**What is your age?**



- 18 to 24
- 25 to 34
- 35 to 44
- 45 to 54
- 55 to 64
- 65 to 74
- 75 or older

18 to 24	1.4%	3
25 to 34	9.5%	20
35 to 44	11.4%	24
45 to 54	12.8%	27
55 to 64	22.3%	47
65 to 74	33.2%	70
75 or older	9.5%	20
answered question		211

**What is your education level?**



No GED or high school diploma	0.0%	0
GED or high school diploma	9.0%	19
Associate's degree	12.8%	27
Bachelor's degree	24.6%	52
Master's degree or higher	53.6%	113
answered question		211

Which of the following categories best describes your employment status?		
Answer Options	Response Percent	Response Count
Employed, working full-time	50.2%	106
Employed, working part-time	7.1%	15
Not employed, looking for work	0.5%	1
Not employed, NOT looking for work	0.0%	0
Retired	39.8%	84
Disabled, not able to work	0.9%	2
Student	1.4%	3
answered question		211

Please describe your housing circumstances.		
Answer Options	Response Percent	Response Count
Own home or condo	85.7%	180
Rent home or condo	5.7%	12
Rent apartment	6.7%	14
Student housing	0.5%	1
Other	1.4%	3
answered question		210

What is the income level for your entire household?		
Answer Options	Response Percent	Response Count
Less than \$10,000	1.1%	2
\$10,001 to \$20,000	3.2%	6
\$20,001 to \$35,000	6.8%	13
\$35,001 to \$50,000	13.7%	26
\$50,001 to \$75,000	21.6%	41
\$75,001 to \$100,000	22.6%	43
\$100,001 or greater	31.1%	59
answered question		190

How many people live in your household?		
Answer Options	Response Percent	Response Count
1	21.1%	44
2	55.0%	115
3	12.0%	25
4	8.6%	18
5 or more	3.3%	7
answered question		209

How many members of your household are over 18?		
Answer Options	Response Percent	Response Count
1	23.4%	49
2	66.0%	138
3 or more	10.5%	22
answered question		209

# Appendix B: 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, non-greenhouse 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, non-greenhouse 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 ORS. The ORS is a party of record in all proceedings before the 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 PSC 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

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, PCA, 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, and 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.

# Appendix C: Subcommittee Recommendations

## DSM-Demand Response-EE Subcommittee Recommendations

### Consensus Recommendations:

#### Recommendation for Changing the Review and Adoption Process of the Energy Code in South Carolina

**Challenge:** Move the amendment and adoption of the International Energy Conservation Code (IECC) back to the Building Codes Council (BCC) so this important code is reviewed, promulgated, and adopted on the same cycle and with the same criteria as the other model building codes in the state.

**Background:** In 2009, Governor Sanford signed H.3550 into law which mandates the 2006 IECC for all new and renovated buildings, effective July 1, 2009, but removes the code from the normal adoption process. Future updated versions must also be adopted by statutory amendment through the Energy Advisory Council of the State Regulation of PURC. Also, importantly, the law removed a residential compliance option that weakened the energy savings achievable through the 2006 IECC by allowing homes to meet state code through a method of achieving four prescriptive R-values that are comparable to homes built using the 1992 Model Energy Code. Furthermore, the BCC cannot apply the energy efficiency chapter of the International Residential Code (IRC), which has been deleted in the 2003 version of the IRC with state-specific modifications that South Carolina adopted.

Through passage of Act 143, signed by the Governor, the South Carolina General Assembly updated the energy code to the 2009 IECC during the 2012 legislative session. The changes to the review and adoption process of the IECC were made by the homebuilders to reduce the requirements on residential building. However, these changes have had a significant impact on the state's ability both to ensure that public buildings are designed and constructed to up-to-date codes and standards and to benefit from the cost savings of operating and maintaining public properties built to the latest edition of the IECC.

**Approach:** Convene a task force of building design and construction professionals, building owners and major tenants, local and state elected officials, general commercial contractors, commercial sub-contractors, homebuilders, insurers, lenders, and the conservation community. This task force will begin investigating the impact of the adoption of the most current building efficiency standards (2015 IECC and American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE Standard 90.1-

2013) and identify the impact of outdated energy codes on the public's health, safety, and wellness and on the cost to the public and private sector to operate and maintain the buildings they own or lease.

**Timeframe:** Begin immediately.

**Subcommittee Outcome:** Consensus

## Building Energy Efficiency

**Challenge:** To maximize efficiencies in South Carolina city buildings

**Background:** Many ways have been identified to initiate more efficient use of resources in large buildings in downtown business districts. Envision Charlotte - <http://envisioncharlotte.com/> - is a public/private-plus collaborative that leads Charlotte's progress as a global Smart City through innovations that strengthen economic competitiveness, environmental sustainability, and positive community impacts. Four areas of focus are waste, water, air, and energy. Please see the website for details. Duke Energy's Smart Energy in Offices energy efficiency program provides the foundational support for the energy savings efforts. – [www.smartenergyinoffices.com](http://www.smartenergyinoffices.com).

**Approach:** Convene a task force to develop an approach for engaging city leaders and others needed to implement a similar program in certain South Carolina cities to be identified.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Trade Ally Certification to Maximize Efficiency Gains

**Challenge:** Need to ensure that energy efficiency savings achieved from installed efficiency measures are maximized through quality installation by trade allies.

**Background:** Utility programs and other efficiency efforts such as weatherization have a demonstrated track record of being able to reach customers and convince them to make energy efficiency investments and upgrades. One of the biggest challenges that these efforts face is the supply of knowledgeable, properly trained, and certified installers. If a high efficiency piece of equipment is installed improperly or hooked up to an inefficient existing system, the energy savings that were used to justify the investment will not be realized. For example, if a high efficiency air conditioner is not

properly sized for the building it is installed on, the unit will neither operate efficiently nor provide the optimal savings to the customer. While there are certainly certified and trained contractors out there, the availability and quantity of them available to perform quality installations is far less certain.

**Approach:** Develop a South Carolina trade-ally certification process. The state of South Carolina develops and provides training to trade allies that would result in a certification and periodic recertification to ensure that technological advancements are understood. This certification could be used by trade allies to differentiate themselves in the market, and utility programs could potentially only allow installations that are performed by a trade ally with the state certification to participate in their respective energy efficiency programs. The utility company refers qualified contractors to a customer looking to have HVAC work/installation performed; the referral is based on an algorithm that give priority to contractors that have been verified to perform quality installation, install high efficiency equipment, and have a strong customer satisfaction rating.

**Timeframe:** In the next six months, develop a stakeholder group that includes trade allies to discuss the establishment of the certification process and begin to assess the potential state budgetary requirements to establish and run such a program.

**Subcommittee Outcome:** Consensus

## Converted EE Manufactured Housing Tax Credit to Direct Rebate

**Challenge:** Low participation in the current program

**Background:** South Carolina has a \$750 tax credit program for the purchase of energy-efficient manufactured housing. This rebate has little participation, largely due to the low tax burdens of potential participants. To qualify for the nonrefundable \$750 tax credit, an individual must purchase either 1) a manufactured home that meets or exceeds the EPA's and the DOE'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. Increasing the energy efficiency of housing for low- to middle-income communities will help decrease electricity bills and help free income for low-to-moderate income sectors, while helping the state meet energy efficiency goals. Additional information is available at [www.energy.sc.gov/files/TaxIncentives\\_for\\_ManufacturedHomesORS.pdf](http://www.energy.sc.gov/files/TaxIncentives_for_ManufacturedHomesORS.pdf) and [www.energy.sc.gov/files/view/EnStarManufHomeCreditFormORS.pdf](http://www.energy.sc.gov/files/view/EnStarManufHomeCreditFormORS.pdf).

**Approach:** It is our recommendation that the current tax credit program for energy-efficient manufactured housing be converted to a direct rebate. This will widen participation within the program and increase energy efficiency in residential structures.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Building Energy Labeling

**Challenge:** There is a lack of information in real estate markets on building energy use.

**Background:** Building energy expenses are a significant cost for residents and businesses, and energy-efficient buildings can have significantly lower energy expenses compared to inefficient buildings. Nonetheless, real estate listings rarely include information on building energy use. As a consequence, neither buyers nor renters have a clear vision of the likely energy expenses of properties they are considering. Standards for assessing and disclosing residential and commercial building energy use would increase the information that market participants consider when purchasing or leasing a property. Established standards would also create a market incentive for building owners to invest in efficiency measures.

**Approach:** The ORS Energy Office should convene a task force— engaging real estate representatives and home builders, state and local officials, and efficiency advocates— to identify model energy-labeling approaches and propose an approach that would address this challenge in South Carolina.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Create a state tax credit for energy efficiency for residential homeowners

**Challenge:** Minimal state incentives for existing home owners or landlords to complete energy efficiency upgrades on housing. This is particularly important for manufactured housing.

**Background:** The federal government currently allows a 10% tax credit, up to \$500 for energy efficiency upgrades to existing principal residences. No similar programs exist at the state level for energy efficiency. By expanding the credit to the state level, we will encourage broader participation in EE programs. [www.energystar.gov/about/federal\\_tax\\_credits](http://www.energystar.gov/about/federal_tax_credits)

**Approach:** Adoption of state tax credits for energy efficiency upgrades for existing residences.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Multifamily Housing EE

**Challenge:** The multifamily community is underserved by existing energy efficiency programs due to minimal incentives issued and funding sources. In addition, many properties are extremely inefficient, and it is difficult to get landlords to make sure properties have affordable energy costs — especially since in many cases they are not the ones paying the electric bill.

**Background:** Energy efficiency initiatives are becoming more commonly implemented on owner-occupied structures due to increased awareness as well as existing funding and resources for work in owner-occupied residences. However, rental units and public housing projects often face difficulties in implementing energy efficiency initiatives due to funding restrictions of existing programs.

Energy efficiency efforts have been shown to be some of the lowest cost options to reduce residential energy bills, and utilities have programs to incentivize landlords and building managers that implement energy efficiency improvements at their properties. Implementation of these incentives requires both upfront capital and often a recognized payback period. As a result, landlords and public housing facilities lack an incentive to undertake substantial efficiency enhancements because the savings flow to the ratepayer rather than the property owner.

State tax incentives would be a great way to incentivize this segment. The federal government currently allows a 10% tax credit, up to \$500 for energy efficiency upgrades to existing principal residences. No similar programs exist at the state level for energy efficiency. Expanding the credit to rentals and multi-family housing will encourage expansion of energy efficiency measures to the structures that would be least likely to see improvements or upgrades.

[www.energystar.gov/about/federal\\_tax\\_credits](http://www.energystar.gov/about/federal_tax_credits).

Rental codes are another way to address this issue. The City of Memphis passed a rental energy code ordinance that establishes minimum standards that properties must meet in order to be rented out. These requirements include acceptable windows, sealing, weather stripping, and sufficient insulation.  
<http://programs.dsireusa.org/system/program/detail/3687>

A program is also available for the low-income population segment called Energy Efficiency for All. This initiative has developed best practices for programs focused on affordable multifamily housing.  
<http://energyefficiencyforall.org/>



Enhanced incentives and programs for local governments and NGOs that aim to improve, expand, and enhance efficiency initiatives in rental and public housing projects would also fulfill a need in the energy efficiency space. Multiple groups and organizations are well suited to assist with these activities, but they require additional resources and incentives to ensure that payback and/or cost recovery occurs.

**Approach:** It is suggested that the multifamily issues can be addressed in four ways:

1. Adoption of state tax credits for energy efficiency upgrades for rentals and multi-family housing.
2. Convene a working group of interested stakeholders to discuss state-level legislation to require minimum energy efficiency standards for all rental properties.
3. The utilities should continue to investigate the implementation and improvement of programs for multifamily through their collaborative groups.
4. Establish a study committee to examine opportunities to provide incentives and resources to local governments and NGOs to expand energy efficiency initiatives to rental and public housing projects. Recommendations from the study committee should be incorporated into future Energy Plan revisions and implemented as appropriate.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Opt-Outs for Industrial Customers

**Challenge:** To maximize competition in South Carolina, it is important to make sure that industrial customers' needs are met when it comes to energy efficiency.

**Background:** Energy efficiency is a critical element for industry in South Carolina when it comes to competing with companies across the country and abroad. By leveraging utility system benefits, the investor-owned utilities are able to offer economical industrial energy efficiency incentive programs, which large customers are permitted to "opt out" of, along with the associated rate rider.

The investor-owned utilities currently meet with stakeholders on a quarterly basis through their energy efficiency collaborative groups, where program performance and best practices are discussed. However, variation exists among the current IOU collaborative programs. In addition, the electric cooperatives generally do not have processes like this for engaging stakeholders in regular meetings.

Many large industrial customers have opted out of the investor-owned utilities' energy efficiency programs, with some reporting that the programs are not economical for them. SCE&G surveyed its

opted-out customers and found that (1) 21% were unaware of SCE&G's energy efficiency programs (2) 22% were not aware they had opted out and (3) only 52% of respondents said they opted out because they implemented their own measures at a lower cost.

To opt out of the DSM rider, large industrial customers are required to state that they have implemented their own measures; however, no system is currently in place to verify which measures they have actually put in place. Therefore, a verification process or request for additional information from customers might be needed. Incremental opportunities may exist to enhance the current programs or the emerging best practices for new program designs to help South Carolina's industrial customers better compete with companies across the country and abroad.

**Approach:** Maintain opt-out as an option and convene a statewide study committee of interested stakeholders to study best practices.

*Questions for study committee:*

1. What are the existing barriers that limit industrial customers' EE investments and how can we assist in removing them?
2. How can the incentives and/or costs to industrial customers be improved to make participation in existing programs more attractive?
3. What information (if any) should customers be required to provide when they elect to opt out?
4. How long should customers be required to stay opted in after receiving an incentive?
5. How can utilities address customer concerns about data confidentiality?
6. What other beneficial services and delivery channels could the utilities provide to industrial customers?
7. What is the expected financial impact to all ratepayers if several industrial companies opt in to the EE program?
8. How will these issues affect industrial customers that operate in both North and South Carolina?

**Timeframe:** Convene a stakeholder group within six months of the passage of this policy.

**Subcommittee Outcome:** Consensus

## Encourage On-Bill Financing Programs

**Challenge:** Expand the availability of on-bill financing of energy efficiency program.

**Background:** State law allows electrical utilities to offer on-bill financing of energy-efficient home improvements to their customers. SC Code Section 58-37-50. Consumer interest rates on the loans are capped at 4% above the one-year Treasury rate. The loans are tied to the meter, instead of the

customer, so the obligation of repayment is passed on to subsequent account holders who also enjoy the benefits of the energy-efficient home improvement. The Help My House pilot administered by Central Electric Power Cooperative has been successful. The co-op targeted high energy users for this program and feel it is a very beneficial program. The pilot included 125 homes that realized an average annual energy savings of 11,000 kWh each. Participants reported that their homes were more comfortable, and the electricity bills were reduced.

**Approach:** A committee should examine whether changes to the on-bill financing statute and program design could encourage expansion of the programs. In particular, the Energy Office should study whether the existing interest rate limit is too low to make on-bill financing programs economically viable, and whether low-interest sources of financing may be available to utilities that want to make these programs available to their customers.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Appliance and Equipment Energy Efficiency Standards

**Challenge:** Inefficient appliances waste money and cause unnecessary pollution, but customers do not always make economical or environmentally friendly purchasing decisions due to insufficient information or motivation.

**Background:** Nine states and the District of Columbia have implemented appliance/equipment energy efficiency standards on items such as battery chargers, pool pumps, hot food holding cabinets and water dispensers. This is a low-cost way to save customers money and reduce the demand for electricity. Per the Appliance Standards Awareness Project (ASAP): [www.appliance-standards.org/states#states-table](http://www.appliance-standards.org/states#states-table). National standards trump state standards, so the only things it makes sense to have state standards for are odd things. There also are many standards that are in the process of being developed by the DOE ([www.appliance-standards.org/products](http://www.appliance-standards.org/products)). ASAP conducted a study in 2012 on a few appliances and determined payback and savings by state. The table for South Carolina is here: [www.appliance-standards.org/sites/default/files/states/Model\\_Bill\\_Analysis-SC.pdf](http://www.appliance-standards.org/sites/default/files/states/Model_Bill_Analysis-SC.pdf). The products from the study are battery chargers, commercial dishwashers, double-ended quartz halogen lamps, faucets, hot food holding cabinets, portable electric spas, room air cleaners, toilets, urinals and water dispensers. The payback ranged from 0.5 to 3.5 years.

**Approach:** Include language in the State Energy Plan calling for the development of appliance energy efficiency targets. Convene a working group of interested stakeholders, including retailers, to explore best practices and develop a list of applicable appliances and proposed minimum standards for consideration by the Legislature.

**Timeframe:** Convene the working group upon completion of the State Energy Plan.

**Subcommittee Outcome:** Consensus

## Public Benefits Fund

**Challenge:** The State lacks a revenue stream to advance energy efficiency and renewable energy opportunities that support policy goals.

**Background:** PBFs exist in 27 states, with some of them providing funds for both energy efficiency and renewable energy. PBFs are funded through a surcharge on utility bills (not a utility charge) or through other payments collected from utilities. [www.c2es.org/us-states-regions/policy-maps/public-benefit-funds](http://www.c2es.org/us-states-regions/policy-maps/public-benefit-funds)

**Approach:** The ORS should convene a stakeholder working group to explore best practices and the possibility of rolling out the PBF, if appropriate, and associated surcharges. The group will ensure that those who will have access to the funds are clearly noted. The funds should be used for energy efficiency upgrades for electric and natural gas customers and not be reappropriated. The funds should be used for their intended purpose. In addition, the group should develop a plan for customer outreach and ensure that it includes information noting this is not a utility charge.

**Timeframe:** Convene the working group within six months of presenting the State Energy Plan to the PURC.

**Subcommittee Outcome:** Consensus

## Non-Consensus Recommendations:

### EE Use/Potential Studies

**Challenge:** Outdated and inadequate energy efficiency potential studies undermine the utilities' ability to establish plans that maximize the benefits of DSM.

**Background:** A critical part of DSM planning is the completion of robust energy efficiency potential studies that examine technical, economic and achievable potential across several different incentive-level scenarios. Because the circumstances underlying potential studies can change in a short number of years, it is important to update the potential studies regularly.

**Approach:** A stakeholder group should be convened that includes local and national experts, such as ACEEE, to discuss best practices for energy efficiency potential studies. In addition, utilities should be required to submit new energy efficiency potential studies to the South Carolina PSC at least once every three years.

**Timeframe:** Convene stakeholder group within six months of the passage of this policy and require utilities to submit their first update potential studies based on best practices in their 2018 DSM cost-recovery filings.

**Subcommittee Outcome:** Non-Consensus

## Energy Efficiency Portfolio Standards

**Challenge:** South Carolina utilities do not currently have any energy-savings targets.

**Background:** As of August 2014, 24 states had implemented energy-savings targets or portfolio standards. Massachusetts, Rhode Island, and Vermont had some of the strongest standards that required roughly 2.5% annual incremental savings.

**Approach:** The South Carolina General Assembly should set preliminary energy-savings targets of 1.5% by 2019 for all utilities, with a provision to update future requirements based on potential studies. Following the results of updated energy efficiency potential studies, the ORS should convene a working group to develop a timeline with annual targets building toward capture of all achievable cost-effective potential.

**Timeframe:** Include legislation in the State Energy Plan and convene the working group by the end of 2018.

**Subcommittee Outcome:** Non-Consensus

# Environmental Justice, Economic Development, and Environment Planning Subcommittee Recommendations

## Consensus Recommendations

### Environmental Indicators

**Challenge:** Inability to easily view status of key environmental indicators related to energy production and use

**Background:** Many environmental indicators are closely related to energy production or use. An example is the relationship between ground-level ozone and transportation. It would be useful to have a simplified measure of progress, year over year, on various key indicators — particularly since the state is generally showing improvement on many, if not most, of them. (To continue the ozone example, the Upstate was recently moved from non-attainment to attainment status as ground-level ozone dropped below the EPA's threshold.)

At various times in the past, DHEC has published key indicators in a “state of the environment” type of report. DHEC currently maintains a searchable database for some indicators, notably National Air Quality Standards. While these are very helpful, they do not include all of the indicators presented in the environmental report. Reviving the indicators report — either in downloadable form or as an interactive online tool — would be helpful in tracking the state’s progress going forward.

**Approach:** The subcommittee recommends that DHEC return to its practice of producing an environmental indicators report in a format that is simple for the public to understand and easy to replicate each year. The subcommittee also recommends that DHEC periodically publicize the availability of existing trends data. Ideally, DHEC will consult with a wide variety of stakeholders to determine the most useful trends related to energy production and use.

**Timeframe:** Begin in 2017, based on limitations of time and resources

**Subcommittee Outcome:** Consensus

### Offshore Wind Development in South Carolina

**Challenge:** With some encouragement, offshore wind has the potential to provide economic development benefits.

**Background:** South Carolina has gigawatt-scale offshore wind potential that could power our

coastal areas and beyond, reduce environmental impacts, and result in significant local economic development. A Clemson University study estimated that a 1,000 MW offshore wind farm would generate an average of over 3,800 jobs annually over the 10-year construction period, with hundreds of ongoing post-construction O&M jobs.<sup>1</sup> While offshore wind is currently not cost-competitive for commercial-scale deployment, a demonstration-scale installation would help reduce costs going forward, familiarize South Carolina utilities with the technology, and act as a powerful signal to wind developers and OEMs that our state is looking at wind in the state.<sup>2</sup> Further background on the wind energy capabilities of South Carolina is available in the 2014 Concurrent Resolution on Wind. The DOE has estimated that South Carolina has the lowest offshore wind construction cost in the country, thus giving us a unique edge as this industry takes hold in the US. South Carolina's wind-energy supply chain already supports over 1,100 jobs statewide, and the CURI Wind Turbine Drivetrain Test facility in North Charleston is another asset for attracting companies to locate in South Carolina. Offshore wind development in South Carolina enjoys local support in the Grand Strand Energy Capabilities of South Carolina legislation, passed by the General Assembly [www.scstatehouse.gov/sess120\\_2013-2014/bills/757.htm](http://www.scstatehouse.gov/sess120_2013-2014/bills/757.htm).

Legislation for wind-development cost recovery was introduced in the South Carolina General Assembly in 2015 [www.scstatehouse.gov/sess121\\_2015-2016/prever/166\\_20141203.htm](http://www.scstatehouse.gov/sess121_2015-2016/prever/166_20141203.htm).

**Approach:** Early-stage resource development activities, such as a demonstration project, could be achieved through cost sharing among in-state and regional utility partnerships and through US DOE grant opportunities. A new or existing task force should provide the locus for exploring such an opportunity. In addition, as offshore wind becomes more likely, workforce development programs should be established to maximize in-state employment impacts and opportunities for environmental justice communities.

**Timeframe:** Integrate these issues into ongoing work of the Coastal Clean Energy Task Force.

**Subcommittee Outcome:** Consensus

## Environmental Justice Assessment

*Note: This recommendation is a combination of four separate recommendations submitted to the subcommittee that address siting, waste disposal, rights-of-way development and maintenance, and an overarching committee to focus on environmental justice. The recommendation was among the top-tier recommendations singled out for initial action. The original language was modified for consistency with other top-tier recommendations. The original recommendations appear at the end as Modified Policy Recommendations.*

<sup>1</sup> See "SC Wind Energy Supply Chain Survey & Offshore Wind Economic Impact Study" at [http://sti.clemson.edu/publications-mainmenu-38/commentaries-mainmenu-211/cat\\_view/293-regional-economic-analysis-laboratory](http://sti.clemson.edu/publications-mainmenu-38/commentaries-mainmenu-211/cat_view/293-regional-economic-analysis-laboratory)

<sup>2</sup> Clemson PRTM marine recreationists survey: <https://www.clemson.edu/centers-institutes/tourism/documents/brownlee,-hallo--jodice-2012.pdf>; City of North Myrtle Beach resolution: <http://northstrandcoastalwindteam.org/city-of-north-myrtle-beach-offshore-wind-energy-resolution/>

**Challenge:** Decisions for energy and transportation facilities may inadvertently affect environmental justice communities because of compounding impacts and/or cumulative effects of various stressors. Multiple agencies may have responsibilities in this arena, with minimal coordination among them.

**Background:** Impacts of energy and transportation infrastructure — including waste disposal, rights-of-way location and management, and transmission corridors on environmental justice communities — are varied. They may range from emissions and depositions of pollutants to the more intangible “disrupting the cohesiveness of a community.” While many agencies have responsibilities to evaluate environmental justice considerations, both the methodology and the parameters of the analysis vary. To ensure a continued commitment toward addressing environmental justice issues, an adaptive management framework for identifying, recommending, and implementing environmental justice policies and solutions should be established.

**Approach:** Establish a statewide environmental justice advisory panel that will serve as a “think tank” and resource center for environmental justice issues. The advisory panel will work with and advise all entities throughout the state on environmental justice issues. It will develop and submit additional policy recommendations on environmental justice issues for consideration in future Energy Plan revisions. The panel can also consider necessary changes in state policy related to energy and environmental justice.

## **Merged or Transferred Recommendations:**

### **Enhanced Energy Efficiency Incentives in Rental and Public Housing Projects**

**Challenge:** Energy efficiency initiatives are less common in rental housing and public housing projects due to requirements and restrictions associated with existing funding sources.

**Background:** Energy efficiency initiatives are becoming more commonly implemented on owner-occupied structures due to increased awareness as well as existing funding and resources for work in owner-occupied residences. However, rental units and public housing projects often face difficulties in implementing energy efficiency initiatives due to funding restrictions of existing programs.

Energy efficiency efforts have been shown to be some of the lowest-cost options to reduce residential energy bills, but implementation of these incentives requires both upfront capital and often a recognized payback period. As a result, landlords and public housing facilities lack an incentive to undertake substantial efficiency enhancements because the savings flow to the ratepayer rather than to the property owner. As a result, enhanced incentives and programs for local governments and NGOs that aim to improve, expand, and enhance efficiency initiatives in rental and public housing projects would fulfill a need in the energy efficiency space. Multiple groups



and organizations are well-suited to assist with these activities but require additional resources and incentives to ensure that payback and/or cost recovery occurs.

**Approach:** Establish a study committee to examine opportunities to provide incentives and resources to local government and NGOs to expand energy efficiency initiatives to rental and public housing projects. Recommendations from the study committee should be incorporated into future State Energy Plan revisions and implemented as appropriate.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** This recommendation has been combined with the consensus multifamily recommendation from the DSM-DR-EE committee.

## Establish a Long-Term Renewable Energy Target

**Challenge:** To identify components of a sustainable and balanced long-term energy mix that take into consideration improving technology and low- or no-cost fuel options.

**Background:** Maintaining a balanced and diverse energy mix in South Carolina is key to ensuring a wide range of energy options and reasonable costs to all South Carolina residents. Renewable energy should be a core component of this long-term mix of sources. Currently, South Carolina requires that renewables represent at least 2% of the energy mix from investor-owned utilities (based on the 5-year average peak demand). While some incentives exist for renewable generation beyond the 2% requirement, no overarching goals or targets exist for renewable energy generation from all utilities within South Carolina over a long-term timeframe (20+ years). With this situation in mind, a long-term renewable energy target for all utilities in the state should be considered.

Over 29 states have enacted Renewable Portfolio Standards (RPS) that establish targets (both binding and non-binding) for renewable energy. Nationwide, it has been found that RPS led to the creation of 200,000 gross domestic renewable energy jobs, drove over \$20 billion in GDP, reduced consumer electric bills by up to \$0.012 per kWh, and reduced natural gas prices by up to \$0.14 per MMBtu (or equivalent of up to \$0.037 per kWh ([https://emp.lbl.gov/sites/all/files/lbnl-1003961\\_factsheet.pdf](https://emp.lbl.gov/sites/all/files/lbnl-1003961_factsheet.pdf))).

Establishing a long-term target for renewable energy generation will assist in creating a reliable, versatile, resilient, clean, and cost-effective energy system for all citizens of South Carolina.

**Approach:** South Carolina should establish a long-term renewable energy target of 20% of its energy portfolio by 2035 in order to provide reliable energy supplies at affordable costs.

**Subcommittee Outcome:** This recommendation was transferred to the Renewables subcommittee (and subsequently designated non-consensus).

## Recommendations Pending Further Research:

### Workforce Development

**Challenge:** Low-income energy efficiency programs sometimes struggle to find enough local qualified contractors, and vulnerable communities are in need of new job opportunities.

**Background:** Incorporating local workforce development into low-income energy efficiency programs has proved to be a successful model through examples like the Knoxville Extreme Energy Makeovers program, which trains at-risk youth to recruit workshop participants door-to-door while distributing LED bulbs and educational materials. Their efforts increased participation several-fold in the community workshops, which are required to receive the free home retrofits administered by the local weatherization office with funding from the TVA.

Currently, several energy efficiency training and certification programs are available in SC— for example, the Sustainability Institute's Green Corps or the Technical College of the Lowcountry's North American Board of Certified Energy Practitioners certification program. However, they are not always accessible to or well known by vulnerable community members living in areas where energy efficiency contractors are needed; untapped opportunities to coordinate with energy efficiency program administrators may exist. The Governor's Office has partnered with the South Carolina Technical College System to establish seven Energy Efficiency Training Centers across the state. This partnership provides an excellent opportunity to explore ways that workforce development can collaborate with energy efficiency programs to advance shared goals that improve environmental justice.

**Approach:** Form a study committee of interested stakeholders to 1) explore ways to integrate workforce development and energy efficiency efforts through an environmental justice lens and 2) to consider what additional resources are needed.

**Timeframe:** Form the study group within six months.

**Subcommittee Outcome:** The recommendation requires additional research.

### Enhancing Inter-Organization Collaboration through a Weatherization Assistance "One-Stop Shop"

**Challenge:** Weatherization Assistance Programs (WAP) may face barriers to implementation of key projects due to a variety of unforeseen circumstances (poor roof conditions for solar installation, for example). Enhanced inter-organizational and inter-agency collaboration through a "one-stop shop" for WAP projects could bring together a wide range of affordable housing assistance programs to capitalize on collective efforts.

**Background:** The federal WAP is implemented at the local level, and funds are disbursed to local agencies by the SC Office of Executive Policy and Programs. Unforeseen site conditions can increase project costs and present unforeseen barriers to project implementation. Forming an inter-organization “one-stop shop” for building retrofits for affordable housing may increase resources available for holistic projects and improve timing and efficiency of implementation schedules. Such a collaborative could increase funding for prerequisite structures and assist at overcoming other barriers for successful project implementation on potential project sites.

Many entities that are actively engaged in affordable housing and energy efficiency could come together under the “one-stop shop” collaboration. A working group is necessary to explore the logistics and structure necessary to convene a “one-stop shop” and move the concept to a concrete proposal phase.

**Approach:** Convene a working group to develop a low-income “one-stop shop” program in partnership with local agencies that combine WAP funds with utility-run incentives and education efforts. The program would provide for cost recovery of prudent administrative costs incurred by utilities.

**Timeframe:** Convene the working group immediately and implement the program within two years.

**Subcommittee Outcome:** This recommendation requires additional research.

## Funding for Low-Income Residential Energy Efficiency Upgrades

**Challenge:** Lack of consistent, financing capital for residential energy efficiency programs in low-to-moderate income communities — South Carolina ranks 19th nationally and 1st in the Southeast in “Average Retail Price of Electricity to Residential Sector” (source EIA, March 2016).

**Background:** Many low-income rate payers live in older homes with inefficient HVAC systems, inadequate insulation, aging duct work, and significant air leakage, all of which can lead to extremely high energy bills. Lacking the disposable income to make efficiency upgrades and structural repairs to their homes, low-income families are left to deal with skyrocketing energy costs, and entire communities become further mired in poverty and financial insecurity.

Embedded in many of these underserved communities are Community Development Corporations (CDCs) that manage residential energy efficiency programs and provide efficiency upgrades and emergency repairs for low-income homeowners at no cost to them. Traditionally, these CDCs have relied on the South Carolina Housing Trust Fund as the most consistent source of funding for these programs, yet the Trust Fund cannot provide every participating group with the level of funding needed to meet the now overwhelming need in their respective communities. With few federal or state

resources available to support these programs, the waiting lists in these communities have become “depressingly long” as one CDC representative put it. Some CDCs have considered shelving the programs entirely until they find enough funding to meet the demand.

**Approach:**

1. Create a statewide Energy Efficiency Financing Fund to complement the State Housing Trust Fund in providing grant capital for residential programs throughout the state:
  - Could be managed by the ORS or in partnership with a statewide non-profit entity
  - Utilities and co-ops could apply for funds to support existing or establish new on bill financing
2. Create incentive programs for utilities and co-ops to expand existing and create new OBF programs:
  - Billing can be managed by a Community Development Financial Institutions Fund (CDFI) like the successful model in Kentucky (How\$martKY)
  - Kentucky’s How\$martKY : Four rural utilities have partnered with the CDFI Mountain Association for Community Economic Development to administer energy efficiency improvements for 200-300 homes with just \$2 million in initial loan capital. Going forward, the program will be sustained through a mix of government and private capital and loan repayment – all channeled through the CDFI.

**Timeframe:** Begin developing a task force or steering committee by 2017.

**Subcommittee Outcome:** This recommendation was deemed to require additional research. It subsequently was folded into the Top-Tier Funding recommendation.

# Electric and Natural Gas Resource Planning Subcommittee Recommendations

## Consensus Recommendations:

### IRP Metrics

**Challenge:** Electric utility IRPs do not demonstrate that the scenario selected would ensure “access to energy supplies at the lowest practical environmental and economic cost.”

**Background:** Electric utility IRPs vary across utility, and some IRPs do not contain any form of cost estimate for the selected plan or for alternative plans that were not selected. Similarly, IRPs do not contain relevant environmental impact projections for the selected plan or alternative plans. Without including, as part of IRP documents, cost and environmental impact metrics for multiple possible resource plans, it is unclear whether environmental quality is being maximized, and whether the cost of energy is being minimized. See, for example, 2015 IRPs at [www.energy.sc.gov/utilities](http://www.energy.sc.gov/utilities).

**Approach:** Requirements should be established to ensure that IRP documents include economic and environmental outcome metrics. These metrics should be presented for the selected plan and for alternative plans that were not selected.

**Timeframe:** The recommendations should be applied within 2017 IRP filings.

**Authorities:** SC Code 58-37-10 and 58-37-40 define “integrated resource plan” and require utilities to prepare them. The State Energy Plan would include recommendations on metrics to include in IRPs, and the PSC and Santee Cooper board would adopt those recommendations to require inclusion of these metrics in IRPs. The statutory definition of IRP provides for comparing options, and 58-37-40 lays out what the ORS Energy Office shall and shall not do with respect to IRPs. No statutory changes would be needed to implement this recommendation.

**Funding:** Utilities already pay for software licenses and trained FTEs to do the necessary modeling. This approach would continue as is, with additional model runs being performed at minimal, if any, additional cost. Documentation of modeling results in IRPs should also add minimal, if any, additional cost. Including environmental impact metrics that are not already provided by utility software could add costs.

**Subcommittee Outcome:** Consensus and therefore this item will be sent to an IRP study committee.

## IRP Resource Portfolios

**Challenge:** Electric utility IRPs do not demonstrate that the scenario selected would ensure “access to energy supplies at the lowest practical environmental and economic cost” or that “demand-side options are pursued wherever economically and environmentally practical.”

**Background:** Electric utility IRPs vary across utility and generally do not evaluate relevant alternative resource portfolios that are expected to result in lower environmental and economic costs. In particular, IRP documents do not consider alternative resource portfolios that feature aggressive deployment of demand-side energy efficiency, or resource portfolios that feature greater procurement of viable renewable resources compared to the selected plan. Without analyzing and including, as part of IRP documents, alternative resource portfolios featuring more aggressive adoption of efficiency and renewables, it is unclear whether environmental quality is being maximized and whether the cost of energy is being minimized. See, for example, 2015 IRPs at [www.energy.sc.gov/utilities](http://www.energy.sc.gov/utilities).

**Approach:** A set of relevant alternative resource portfolios should be established and updated annually, and utilities should include, at a minimum, this set of portfolios as part of their IRP analysis and public documentation. Examples are a portfolio featuring annual energy savings at 1.5% of retail sales and a portfolio featuring a cumulative goal by 2025 of generating 10% of annual energy production from solar photovoltaics.

**Timeframe:** The recommendations should be applied within 2017 IRP filings.

**Authorities:** SC Code 58-37-10 and 58-37-40 define “integrated resource plan” and require utilities to prepare them. The State Energy Plan would include recommendations on alternative resource portfolios to include (at a minimum) in IRPs, and the PSC and Santee Cooper board would adopt those recommendations to require inclusion of these alternative resource portfolios in IRPs. The statutory definition of IRP provides for comparing options, and 58-37-40 lays out what the ORS Energy Office shall and shall not do with respect to IRPs. No statutory changes would be needed to implement this recommendation.

**Funding:** Utilities already pay for software licenses and trained FTEs to do the necessary modeling. This would continue as is, with additional model runs being performed at minimal, if any, additional cost.

**Subcommittee Outcome:** Consensus and therefore this item will be sent to an IRP study committee.

## IRP Scenario Analysis

**Challenge:** Electric utility IRPs do not demonstrate that the scenario selected would ensure “access to energy supplies at the lowest practical environmental and economic cost.”

**Background:** Electric utility IRPs vary across utility, and some IRPs do not contain any form of scenario analysis for the selected plan or for alternative plans that were not selected. Scenario analysis is commonly used to test the performance of a resource plan under multiple possible future scenarios. By testing each candidate resource portfolio under several relevant scenarios, planners obtain information on how robust a resource plan is across a range of future conditions. Without including scenario analysis for the resource plans evaluated as part of IRP documents, it is unclear whether environmental quality is being maximized and whether the cost of energy is being minimized. See, for example, 2015 IRPs at [www.energy.sc.gov/utilities](http://www.energy.sc.gov/utilities).

**Approach:** A set of relevant scenarios should be established and updated annually, and utilities should include, at a minimum, this set of scenarios as part of their IRP analysis and public documentation. Examples are a scenario featuring a mass-based CPP approach and elevated natural gas prices and a scenario featuring additional delays in completion of V.C. Summer Units 2 and 3.

**Timeframe:** The recommendations should be applied within 2017 IRP filings.

**Authorities:** SC Code 58-37-10 and 58-37-40 define “integrated resource plan” and require utilities to prepare them. The State Energy Plan would include recommendations on scenario analysis to include (at a minimum) in IRPs, and the PSC and Santee Cooper board would adopt those recommendations to require inclusion of these scenarios in IRPs. The statutory definition of IRP provides for comparing options, and 58-37-40 lays out what the ORS Energy Office shall and shall not do with respect to IRPs. No statutory changes would be needed to implement this recommendation.

**Funding:** Utilities already pay for software licenses and trained FTEs to do the necessary modeling. This would continue as is, with additional model runs being performed at minimal, if any, additional cost.

**Subcommittee Outcome:** Consensus. This item will be sent to an IRP study committee.

## Statutory Facilitation of Second License Renewal for Nuclear Plants

**Challenge:** Second License Renewal is being pursued for nuclear plants throughout the industry. For example, Oconee Nuclear Station represents 2,538 MW of capacity and currently provides

approximately 22% of the energy consumed by Duke Energy Carolinas (DEC) customers. Obviously, Oconee is a critical component of the DEC generation system.

**Background:** US nuclear power plants are licensed to operate for 40 years, as specified in the Atomic Energy Act of 1954. Congress selected a 40-year period for nuclear plant licenses because this period was a typical amortization period for an electric power plant. The 40-year license term is not based on safety, technical or environmental factors. An NRC rule allows licensees to apply for multiple extensions of up to 20 years after the initial 40-year license. The company must demonstrate to the NRC that it will manage aging issues effectively during the renewal term, thus ensuring equipment safety and functionality.

Renewing the licenses for the nuclear power plants serving South Carolina for another 20 years is good for our customers, South Carolina and the environment. For our customers: safe, reliable and low-cost electricity will continue for over 30 more years because our nuclear stations are among the most efficient and most reliable sources of electricity that we operate.

**Approach:** The Energy Plan should include a recommendation that lawmakers identify or create the necessary statutory provisions to facilitate the extension of the lives of assets serving South Carolina customers and any associated investment necessary to effectuate requirements of Second License Renewal.

**Timeframe:** Second License Renewal is being pursued for nuclear plants throughout the industry. Exelon and Dominion have announced their intention to pursue second license renewal for Peach Bottom Nuclear Station and Surry Nuclear Station, respectively.

**Subcommittee Outcome:** Consensus

**Note:** Although not a member of this subcommittee, the South Carolina Chapter of the Sierra Club filed comments objecting to this policy recommendation, subsequent to the consensus outcome.

## Electric Grid Modernization

**Challenge:** South Carolina's electric grid is aging and needs to be modernized for the dynamic needs of the future.

**Background:** The nation's electric delivery system design is more than 100 years old, and much of the equipment installed across the country has been in place for decades (for example, transformers, capacitors, and regulators). This delivery system, or electric grid, was designed to transport electricity from large centralized generation plants to customers across the Carolinas, sometimes hundreds of miles away. This fundamental infrastructure is still the basis for an electricity grid in the US that



is almost 100% reliable. Although it has served South Carolina well, the existing electric grid was not designed to support the diverse and dynamic demands that are increasingly being placed on it, such as increased distributed energy resources, reliability challenges, and grid hardening/security requirements.

The existing grid is limited in its capability to integrate large amounts of renewable energy sources. 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 utility's control systems continuously ramp generating units up or down to meet electric demand of the customers it serves. With the variability of renewable energy sources, like wind or solar power, this balance becomes increasingly difficult to maintain. In South Carolina this becomes especially important with the passage of Act 236 and the expansion of distributed energy resources already expressed in the policy and statutes.

The continued safe and reliable operation of the grid is critical, and given the adoption of digital consumer and commercial technologies, outages can have a more widespread impact if they occur. While the utilities have been commended for excellent restoration in South Carolina considering the severe weather seen in this state in recent years, challenges to the grid make restoration an increasingly difficult task (for example, the winter storm of February 2014). Homes, hospitals, businesses, and schools all depend on a reliable power supply. Reliability is also important to the economy of South Carolina as large manufacturers could lose entire production runs if they are out of power. Reliability is key for economic development and vital for businesses contemplating South Carolina locations.

Significant grid enhancements have taken place in South Carolina. However, utilities foresee the need for growing such investments. Meeting customer expectations for power 24x7, and immediate restoration when an outage does occur, requires enhancements and improvements in the South Carolina infrastructure. A modernization and hardening of the existing infrastructure will also allow the integration of new forms of technologies such as battery storage and microgrids.

The modernization of the grid includes the application of information technology and digital equipment that provide remote monitoring, remote control, and expanded intelligence capabilities, including smart meters at the homes of consumers. Smart meters, as reported by the Economic and Demographic Subcommittee, lay the foundation for customer programs and data that provide more transparency and control to consumers over their usage and, ultimately, their bill. Examples include Time-of-Use (TOU) rate programs that provide customers with variable usage charges based on the time of day to encourage optimal usage patterns, and pre-pay programs. All of the needs described above require communications among grid equipment and with centralized systems. 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.

Furthermore, it has become clear through the development of this Energy Plan 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, (for example, solar panels, wind turbines, electric vehicles, battery storage, and microgrids) then the state will require an advanced, integrated grid to manage and optimize the increasingly dynamic flow of electricity.

**Approach:**

1. Policies in South Carolina should continue to support the upgrade to leading-edge grid and metering technology while supporting the continued recovery of the asset life of the older equipment being replaced.
2. Categories of grid investment should be identified and updated in subsequent Energy Plans since modernization of the grid is more diverse than central station generation investment. Utilities should be encouraged to bring their major grid modernization projects before the PSC.

**Timeframe:** Adopt recommendation in 2016 Energy Plan

**Subcommittee Outcome:** Consensus

## Utility Regulations

**Challenge:** The electric utility industry is in a state of transformation. Keeping the grid running reliably is a balancing act, where the amount put into the grid must equal the amount taken out. Utilities are seeing slower growth in demand for electricity due to the effects of energy efficiency and a sluggish economy; at the same time, demand for renewable energy and natural gas resources is increasing. Utilities are striving to incorporate those new sources of generation into the grid.

**Background:** Utilities have been modernizing their generating plants and building new, cleaner sources of generation including non-greenhouse gas emitting nuclear. In addition, utilities are also increasingly modernizing the electric grids with advanced metering infrastructure and investing in enhancements to maintain and improve reliability for customers and the broader manufacturing economies within South Carolina.

New technologies like energy storage are becoming more of a reality every day. Customer expectations are also shifting as customers are expecting their utilities to interact with real-time information, through smart phones and non-traditional communication channels, and to provide increasing options for payment and service. And, in South Carolina, customers have a variety of options for their energy supply including community solar farms and customer-sited solar systems, whether owned or leased.

This industry transformation is ongoing in the midst of ever-increasing environmental and system security regulations that put pressure on utilities to recover their investments in a timely manner. Given the changes happening in the industry, it merits asking whether the regulatory construct we have in place today in South Carolina is sufficient to keep pace with the evolution of the industry and the technological advancements driving that evolution.

**Approach:** Accordingly, we recommend that a new subcommittee convene in 2017 to evaluate the regulatory construct including resource planning, revenue recovery, and rate design policies. The topics the subcommittee may evaluate include, but are not limited to, the following:

- whether opportunities exist to enhance current policy or regulations to further help expedite necessary and/or cost-beneficial infrastructure modernization and expansion;
- whether the changing state of the industry merits consideration of a more flexible revenue recovery model for utilities; and
- whether there are rate-making or rate-related policy changes that should be considered to 1) provide more flexibility to better allow for adaptation to changes in the industry 2) send informative price signals to customers 3) support economic development and industrial retention 4) take into account customer adoption of energy efficiency, demand response, conservation, and distributed energy resources and 5) properly account for benefits and costs in an obligation to serve territory.

**Timeframe:** Convene subcommittee in 2017

**Subcommittee Outcome:** Consensus

## **Non-Consensus Recommendations:**

### **Economic Impact Modeling**

**Challenge:** Lack of consideration of expected economic development consequences of resource plans.

**Background:** Economists routinely use modeling tools to evaluate how government policies, new infrastructure, and other economic changes are expected to affect employment, gross domestic product, state and local government revenues, and other economic indicators. These tools and the information they provide to aid decision-making have not been adopted for resource planning purposes in South Carolina. Additional background can be found in the EPA's Assessing the Multiple Benefits of Clean Energy, Chapter 5: [www.epa.gov/sites/production/files/2015-08/documents/epa\\_assessing\\_benefits\\_ch5\\_0.pdf](http://www.epa.gov/sites/production/files/2015-08/documents/epa_assessing_benefits_ch5_0.pdf)

**Approach:** As part of coordinating “the preparation of an integrated resource plan for the State” (SC Code 58-37-40(D)), the ORS Energy Office or the PSC should perform economic impact modeling to further inform resource decisions and policy.

**Subcommittee Outcome:** Non-Consensus

## Electric Portfolio Standard

**Challenge:** Lack of a planning mechanism that ensures utilities are deploying resources “at the lowest practical environmental and economic cost.”

**Background:** Various types of quantitative analysis – including but not limited to integrated resource planning, energy efficiency potential studies, and economic impact modeling – have the potential to demonstrate that deploying clean energy resources such as energy efficiency and renewable energy would be expected to reduce environmental and economic costs and risks, and also to enhance economic development in South Carolina. However, absent a strong utility motivation to pursue these resources, they may not be deployed. Establishing binding targets for these types of resources, based on quantitative analysis, would ensure that the goals of the State Energy Plan are being met. Notably, in 2008 the South Carolina Climate, Energy, and Commerce Advisory Committee recommended, by super majority, development of energy portfolio standards.

**Approach:** As part of coordinating “the preparation of an integrated resource plan for the State” (SC Code 58-37-40(D)), the ORS Energy Office should identify and recommend energy portfolio targets for adoption by the PSC.

**Subcommittee Outcome:** Non-Consensus

## Natural Gas and Propane Efficiency Programs

**Challenge:** Lack of clarity regarding the potential for demand-side efficiency programs to reduce natural gas and propane consumption.

**Background:** While demand-side incentives for high-efficiency natural gas-consuming equipment are available, South Carolina has not systematically evaluated the cost-effective potential of demand-side efficiency programs to reduce natural gas or propane consumption across the state.

**Approach:** A requirement should be established for producing and updating efficiency potential studies for natural gas and propane at reasonable intervals, and all cost-effective efficiency potential should be pursued.

**Subcommittee Outcome:** Non-Consensus

## Natural Gas Infrastructure

**Challenge:** Ensure that natural gas is a viable energy option for residential, commercial, industrial, and power-generation customers across South Carolina, thus putting the state in a better position to continue to attract economic development prospects.

**Background:** Natural gas is a cost effective<sup>3</sup>, reliable<sup>4</sup>, clean<sup>5</sup>, and domestic<sup>6</sup> source of energy for residential, commercial, industrial, and power-generation customers in South Carolina. In addition, natural gas supports a balanced approach to electric generation in the state.

Because natural gas is not produced in South Carolina, all natural gas is transported into South Carolina by three underground interstate pipelines: DCGT, Transco, and SNG. The natural gas is then delivered to local distribution companies, municipalities, power generators, and industrial customers.

Interstate natural gas transmission pipelines are regulated by the FERC, the PHMSA, and other federal and state agencies.

South Carolina has thousands of miles of underground transmission pipelines that bring and move natural gas across the state. These pipelines serve energy needs for industrial, commercial, and residential customers. Natural gas is in high-demand due to the increased availability of low-cost, domestic natural gas; the implementation of the CPP (if approved); and manufacturing and population growth in South Carolina<sup>7</sup>. Consequently, new investment or capacity expansion within the existing pipelines will need to occur.

In order to continue to serve the growing demand for natural gas in South Carolina, additional natural gas transmission pipeline capacity is needed. The process for planning for additional natural gas pipeline capacity begins only when necessary end-user commitments have been finalized. Construction does not begin until the pipeline has been reviewed and approved by all required regulatory bodies. The process to submit and receive approval to expand or construct a pipeline system can take several years.

<sup>3</sup>U.S. Energy Information Administration - EIA - Independent Statistics and Analysis." Short-Term Energy Outlook. N.p., n.d. Web. 04 Aug. 2016.

<sup>4</sup>PHMSA - FAQs - General Pipeline FAQs." PHMSA - FAQs - General Pipeline FAQs. N.p., n.d. Web. 04 Aug. 2016.

<sup>5</sup>U.S. Energy Information Administration - EIA - Independent Statistics and Analysis." How Much Carbon Dioxide Is Produced per Kilowatthour When Generating Electricity with Fossil Fuels? N.p., n.d. Web. 04 Aug. 2016.

<sup>6</sup>U.S. Energy Information Administration - EIA - Independent Statistics and Analysis." U.S. States. N.p., n.d. Web. 04 Aug. 2016.

<sup>7</sup>U.S. Energy Information Administration - EIA - Independent Statistics and Analysis." Short-Term Energy Outlook. N.p., n.d. Web. 04 Aug. 2016.

## Approach:

1. A study committee should be convened in 2017 to consider issues that prevent natural gas from being an option for many South Carolina energy consumers. The goals of the committee should include the following:
  - a. Expand education of current natural gas infrastructure and potential new infrastructure to policy advisors, business development professionals, and legislative/community stakeholders.
  - b. Determine/further evaluate the potential government efforts/programs that may encourage or assist with the subsidy/recovery of development costs to encourage gas infrastructure growth in rural or underserved areas<sup>8</sup>.
    1. To increase statewide access to natural gas, to expand natural gas pipelines to rural or underserved areas and to enhance future economic development, South Carolina will need to encourage and support firm transportation capacity contracts from creditworthy customers to support 1) natural gas-fired electric generation 2) residential and commercial growth served via municipal utilities and distribution companies and 3) additional industrial consumption to existing and prospective companies.
    2. Recognizing the constraints on the current interstate natural gas pipeline systems and the capital costs and risks required to construct new infrastructure for new or expanded pipelines to provide potential service to underserved markets, the state/utilities/municipalities/industrial and commercial customers could contract for new or expanded pipeline expansion projects to serve regions of the state for future economic development prospects. Taking this action could position new areas of the state to have infrastructure in place to market and compete for future economic development prospects. Interstate pipeline expansion projects typically take four or more years to implement, so these costs would likely not be seen in customer rates until 2020 or later. As these prospects are secured, the capacity obligations (if assumed by the state) could be shifted to the applicable entities providing service. Annual costs would then be dependent on the amount of capacity for which each respective company contracted.
    3. As future economic development projects have participants which seek and utilize natural gas, the applicable state/utility/municipality/industrial customer/commercial customer would have flexibility to manage and optimize any unutilized or uncommitted capacity by looking for opportunities to minimize costs by releasing portions of its firm capacity, if possible, based on the prospects' timing. As a result, parties would have opportunities to support expanded infrastructure projects while looking for opportunities to minimize cost over time.

<sup>8</sup>For example, during the 2015 North Carolina Legislative Session, legislation was passed to provide recovery of capital-related costs incurred by a natural gas company for constructing natural gas infrastructure for a large manufacturing employer. Cost recovery for natural gas economic development infrastructure (§ 62 -133.15. General Assembly of North Carolina).

- c. Review existing regulations and policies to determine if opportunities exist to enhance current policy or regulations to further help expedite infrastructure enhancement.
- d. Determine the gas infrastructure project(s) that are desired and then determine the necessary coalitions required to make the projects a reality. Note: with new infrastructure projects taking four years or more to implement, each day of delay further affects the opportunity for future economic development in new and underserved areas.
  - 1. Interstate natural gas pipeline companies, as a matter of practice, routinely conduct open seasons for expansions. These open seasons provide a mechanism for identifying market interest. Open seasons can be binding or non-binding. Generally, binding open seasons are held when a specific project and anchor customer(s) have already been identified. Nonbinding open seasons are more general solicitations of interest to help identify potential future capacity needs. The ultimate goal of open seasons is to develop and construct infrastructure that serves the greatest need in the most cost-effective way. A prudent approach for new infrastructure development in South Carolina would be to hold an open season; gather potential participants; determine where new infrastructure is desired and how much incremental capacity is needed, and then design the most cost-effective pipeline project(s) to meet those needs.
  - 2. Ultimately, the key issue will be to determine which entity(ies) will be the contracting party(ies) and serve as the anchor customer(s). A binding open season could then be held to further enhance the project economics by attracting additional participants. It is recommended that the state work with South Carolina entities in this initial phase of evaluation.

**Timeframe:** Begin conversations with the natural gas transmission companies immediately. The review process for new pipelines can take many months/years before it is approved. Convene the study committee to review issues that prevent access to natural gas in the first quarter of 2017.

**Subcommittee Outcome:** Non-Consensus

## Fuel Diversity

**Challenge:** Ensuring energy diversity

**Background:** South Carolina's energy production includes a diverse mix of fuel sources for its electric generation plants. Energy diversity is defined as having a varied set of energy options to include, but not limited to, coal, natural gas, nuclear, hydro, pumped storage, solar, biomass, and wind. This diversity provides benefits to the citizens of South Carolina by allowing the economical dispatch of generating facilities based on the lowest fuel prices at the time of consumer demand needs, the reliable and continuous base load power that customers count on each day and night, as well as the lessening of environmental impacts through the reduction of emissions. Maintaining a balanced and diverse energy mix in South Carolina will allow a reliable, versatile, resilient, clean, and cost-effective energy system to continue to be available to all residents and businesses as the state economy continues to grow.

**Approach:** To that end, nuclear power — used as base load electric generation — is critically important to meet 24x7 customer demand with zero greenhouse-gas emissions. In fact, almost 33% of the energy consumed in South Carolina comes directly from nuclear power, and it is estimated to be 45% in 2025. Nuclear plants have been providing power safely and reliably for over four decades and will continue to do so, well into the future. Nuclear generation is able to avoid volatile market price fluctuations in coal and natural gas that often occur during periods of high customer demand. Recently, the decision to build new nuclear power as a zero greenhouse-gas emitting source was affirmed by the new nuclear base load plants qualifying as credit against South Carolina's goal for CO<sub>2</sub> reductions. Therefore, South Carolina's continued reliance on nuclear generation is an important factor to provide energy supplies, today and tomorrow, at the lowest practical environmental and economic cost.

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.

Two provisions of the BLRA that are pertinent to South Carolina's new nuclear projects are as follows:

- Base Load Review Order — a determination as to whether the anticipated costs and construction schedule for a nuclear plant are prudent before construction begins.
- 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 plant. 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. This approach, in turn, reduces the amount customers will pay through rates. It is estimated that the BLRA will save customers approximately \$4 billion in electric rates over the life of the new units.

**Subcommittee Outcome:** Non-Consensus

# Renewables Subcommittee Recommendations

## Consensus Recommendations:

### Corporations Seek Renewable Energy Purchases

**Challenge:** A subset of South Carolina electricity consumers, primarily multinational corporations with “green” or “carbon-free” goals, seek “greener” energy mix through large purchases of renewable and/or carbon-free or carbon-neutral energy.

**Background:** Sixty percent of Fortune 100 companies and nearly two-thirds of Global 100 companies have set renewable energy and/or greenhouse-gas goals and therefore demand access to renewable energy in the places where they do business. These goals are driven by cost considerations and locking in long-term energy pricing, fuel supply diversification, and environmental stewardship. Access to renewable energy is now a factor in economic development recruitment and retention. When large employers scout locations for new facilities, power is a major consideration — reliability, price, and whether or not it is renewable. A recent example in South Carolina is Boeing in North Charleston. They demanded renewable energy to power their facility, and their demands were met.

Renewable energy technology is evolving rapidly, and South Carolina needs to adapt to this progression. Current Net Energy Metering regulations limit capacity to 1 MWac, and customers may not have the land or roof space to integrate the necessary capacities to offset meaningful load. Rate structures with high demand charges and low energy charges create challenging economics for solar projects, and solar-plus-storage projects for peak shaving are not yet viable.

#### Approach:

- The Plan should encourage continued utility investment in or procurement of renewable and/or carbon-free or carbon-neutral energy for specific customers’ voluntary environmental goals.
- The Plan should reiterate that such “voluntary” offers have the potential to enhance the state’s attraction and retention of corporations and manufacturers.
- The Plan should emphasize that there is not a “one size fits all” product; utilities should exercise flexibility in product design and resource investment/procurement to meet the needs of economic development customers in a timely manner.
- The Plan should emphasize that if and when the South Carolina PSC examines these offerings to large customers, care should be taken to balance the needs of the subscribing customer with the imperative to insulate non-subscribing customers from any rate impacts.
- Continue to work with the DOC, other stakeholders, and industry to evaluate additional tools and policy options such as encouraging the use of utility green-power buying programs and the development of renewable energy projects.

- Utilize the existing DER Collaborative Groups, augmented with other stakeholders as appropriate, to start discussing green-source rider programs and the promotion and continued development of voluntary Renewable Energy Certificate programs.
- Evaluate and disseminate Power Purchase Agreements (PPA) best-practices recommendations for utilities and renewable energy facilities.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Solar Farm Siting

**Challenge:** Lack of regulatory oversight for siting and decommissioning of solar farms in SC.

**Background:** Recent legislation has resulted in a significant increase in large-scale solar installations (farms) in South Carolina, thus prompting a number of questions:

- What should be considered in siting for a solar farm? Factors for consideration could include natural resources; amount of site prep required (land clearing, grading, access roads); wetlands/streams; protection of riparian or wetland buffers (will adjacent forests need to be cleared or cut back due to shading effects on panels?); floodplains; threatened, endangered or rare species/habitat inventory check with the DNR and/or Fish and Wildlife Service; and slope.
- What do best management practices for siting in South Carolina look like? Examples could include a simple storm water plan for each site detailing any concentration of flow with erosion measures outlined; construction erosion control plan; protection of topsoil; recommended plantings of native warm-season grasses (little bluestem, big bluestem, Indian grass) and/or low-growing pollinator species; minimum height panels need to be above ground; fencing or planted vegetative buffer required around the solar arrays; maintenance of the site (herbicides, mowing periodicity); gravel required on certain slopes, if trees in adjacent areas need to be removed; BMPs on type of clearing (hand clearing or specify means of mechanical clearing?).
- Several specific natural resources-related issues need to be further explored and researched. One is the lake effect for waterfowl and other wading birds who may mistake an array of solar panels for water, causing mortality, as well as other potential concerns of insects attracted to panels that may also attract bats in a similar manner. Also, the potential effect of panels on gopher tortoises in certain areas of South Carolina needs further research. Establish a protocol for reporting gopher tortoises for relocation and/or an excessive amount of wildlife damage as a result of solar panels.

- What does reclamation look like? What happens to the land when the lease with the landowner is up in 25 years? Who is required to return the land to its original state, and is it required to be returned to its original state? Are there financial assurances set up in the lease agreements with the “solar prospectors” and the landowners to ensure the integrity of the land is returned? Who is responsible if the developer leaves panels in place or leaves large concrete or gravel pads, wiring, and so forth?
- What happens if a landowner dies, goes bankrupt, loses the land — who is then responsible for the solar site? Are protocols and financial assurances in place to deal with abandonment of a solar site?
- Is there an opportunity to collaborate and have a review process with the South Carolina PSC in reviewing these sites or with the utilities as they review the proposals?

**Approach:** Create a committee to address the issues raised above. The committee will include representatives from state agencies, non-profits, municipalities and utility companies to develop recommended best management practices for siting, development, and reclamation of solar farm sites in South Carolina. Encourage utility companies to adopt the usage of this guidance in their RFPs for solar development.

**Timeframe:** Begin immediately to establish interested parties for the development of the committee.

**Subcommittee Outcome:** Consensus

## Develop a Plan for Acceptable Use of Beneficial Waste-to-Energy in South Carolina

**Challenge:** Problematic waste streams that cannot be recycled exist throughout the state which could be utilized for waste-to-energy, rather than landfilling. This changeover requires defining preferred pathways for these waste streams, which are acceptable from the environmental standpoint, and then providing encouragement or incentive to develop.

**Background:** Significant waste streams (often biomass-based) exist, which could be funneled to a beneficial use by using a waste-to-energy process. Such waste streams could be a commonly used waste product such as waste wood; or a highly specialized waste product which cannot be recycled but could be useful in waste-to-energy processes.

The DOC has a committee named Recycling Market Development Advisory Council (RMDAC) that is tasked with finding markets for recycled materials and could help with determining the waste stream availability. DHEC also has responsibility for waste accounting and supervision in the state, as well

as for air and water quality when the waste is processed. The ORS Energy Office monitors energy use and production in the state. Among these entities, the knowledge and responsibility could be harnessed to develop best practices for utilizing these wastes and then for incentivizing the preferred pathways.

**Approach:** Establish a task force, under the guidance of RMDAC and including other related stakeholders, to identify the economically significant waste streams that are unutilized in the state. Prioritize developing beneficial uses for the waste streams, based on economic and environmental benefit. Make recommendations for incentives that could result in creation of new waste-to-energy projects to meet this need. Create marketing assistance (exchanges, or buyer-seller lists and maps) for waste streams when this would be helpful.

**Timeframe:** Begin upon approval, and continue with yearly reassessments of relevant changes.

**Subcommittee Outcome:** Consensus

## Increasing the Utilization of Forestry Byproducts, Tree Trimmings, and Waste Wood

**Challenge:** South Carolina's forestry industry is already a major economic contributor to the state and there are forestry byproducts and residuals that could add incremental revenues to landowners and forest products processors if nearby markets were available. In addition, tree trimmings and other forms of wood waste can be diverted from landfills for beneficial use as fuel wood.

**Background:** More nuclear generation will be incorporated into South Carolina's electric generation mix (with no load-following capability), along with more solar generation at utility-scale and behind the meter in homes and businesses. As restrictions on coal or the desire to reduce coal use increase, the need for load-following and peaking units becomes more important. Natural gas, hydro, biomass, and energy storage are dispatchable generating resources that can adjust with load variation. The current price of natural gas generation drives utilities to run these units as base load so that there is less ability to use them for peaking or load-follow capacity. There is very limited ability to expand hydro generation. As a result of these constraints, the increased use of electric generation that uses waste wood could be beneficial to the utilities. Waste wood as a fuel may provide emission benefits and economic benefits to the state, especially in the rural economy. Forestry jobs would increase, and fuel dollars would be paid to in-state landowners instead of exported to coal- or natural gas-producing states. Less transport would be required since the wood is available locally in South Carolina.

**Approach:** The South Carolina Forestry Commission monitors the forestry products markets and could provide fuel wood studies to determine where sufficient forestry residuals, forestry byproducts, urban wood waste, and suitable tree/yard trimmings exist for wood-fueled generating station

sites. A task force of state government, state environmental groups, and industry could prepare recommendations to legislators to develop additional in-state electric generation from this resource while ensuring no conversion of natural forests.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Develop State Support and Implementation of Purposely Grown Crops for Biofuels and Bioenergy

**Challenge:** Purposely grown crops produced for biofuels and bioenergy can serve a significant role in meeting the state's liquid and solid fuel energy needs. The challenge will be to identify which biomass crops will be most sustainable for production in South Carolina and to determine the most profitable means to harvest, transport, and store the biomass while minimizing its carbon footprint. It will be necessary for the costs associated with biomass crops to be competitive with the costs associated with fossil fuels.

**Background:** Biomass produced in South Carolina represents significant economic opportunities for the state's rural landowners and farmers by creating jobs and tax revenues in the agricultural and forestry sector, the current largest industries in the state. Bioenergy crops are generally more drought-tolerant and require fewer inputs to produce than traditional food crops; they are also well suited for production by limited-resource farmers. They are more suitable for production on the state's many marginal, sandy soils and are safer for the environment than most food crops. Current research efforts are focused on finding additional "bio-product" uses for biomass crops, with the expectation that bio-products will result in another revenue stream for farmers and landowners. Several of the biomass crops offer environmental benefits such as improving soil quality, water quality, and wildlife habitat, compared to traditional agriculture and forestry land uses.

**Approach:** Work with Clemson University to develop recommendations and a plan for the use of biomass crops such as purposely grown trees, perennial grasses, annual sorghum crops, and, to a lesser extent, food crop residues to be utilized to meet South Carolina energy needs and contribute to the state's energy independence and economy.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Act 236 – DER 2.0, Net Energy Metering 3.0

**Challenge:** To determine the needs of the state moving forward with Act 236 and beyond.

**Background:** Recognized nationally as landmark legislation, the Act 236 was passed unanimously by the South Carolina General Assembly and signed into law by the Governor in 2014. Designed collaboratively by policy makers, investor owned utilities, electric cooperatives, the Office of Regulatory Staff, environmental and conservation groups, renewable energy developers and installers, large energy users, and other stakeholders in the state, this legislation represents multiple public policies to support the adoption and integration of various types of renewable energy in South Carolina — from small customer-generators like rooftop solar to large, “central plant” renewable generation, and distributed energy resources like energy storage.

Over the past two years, much has been accomplished under Act 236. Regulators and investor-owned utilities have put in place programs that poise South Carolina for significant growth in renewable generation with the installation of more than 200 MW of capacity by 2020. The law is an important step toward realizing the full potential of local renewable energy resources and is consistent with the State Energy Plan’s encouragement of “the development and use of clean energy resources, including nuclear energy, energy conservation and efficiency, and indigenous, renewable energy resources.”

To build on the growing South Carolina solar industry, we need to look at how to continue to incorporate more renewables into future IRPs or through legislative actions that allow the utilities to operate their grids safely and reliably while not shifting cost burden across different rate classes and rate payers.

As the price of solar continues to fall and the industry grows and matures, it is important for consumers to understand the economics of their purchasing decisions. This understanding is especially important for consumers engaging solar financing options. Some of these financing options have price escalators that assume full retail compensation for excess energy exports that will continue past 2025.

**Approach:** Recommend that cooperation among interested stakeholders continue through the individual DEP, DEC, and SCE&G DER advisory groups, augmented with other stakeholders as appropriate. Also recommend that a joint meeting be held across those stakeholders in 2017 to not only discuss the progress each utility has made toward fulfilling the goals of Act 236 but also to determine whether:

- Program modifications are required for an advanced, integrated grid to manage and optimize the increasingly dynamic flow of electricity such as energy storage, microgrids, electric vehicles, power quality, and system security; and
- Opportunities exist to enhance current policy or regulations to further help expedite infrastructure modernization, expansion, and service reliability.

**Timeframe:** Begin within the first six months of 2017

**Subcommittee Outcome:** Consensus

## Renewable Energy Cost Data Tracking

**Challenge:** With the rapid and dramatic decline in the cost of renewable energy in recent years, it is critical to stay as current as possible on project and PPA prices when making energy policy and resource planning decisions.

**Background:** The state does not have a public process in place for keeping track of the most current cost of renewable energy projects across the country. Fortunately, the LBNL publishes accurate reports on renewable energy prices (including annual PPA reviews) that could significantly improve South Carolina's ability to respond quickly to a changing marketplace and make sure ratepayers are able to benefit from low-cost, clean, renewable energy.

**Approach:** The ORS should link to LBNL reports and annual updates on the cost of renewable energy on its website.

**Timeframe:** Launch the webpage within six months after completion of the State Energy Plan

**Subcommittee Outcome:** Consensus

## Shared Solar Program Implementation

**Challenge:** To make sure South Carolina utilities' shared solar programs are successful and accessible.

**Background:** Many South Carolinians interested in solar power face limitations to installing their own rooftop solar systems. Shared solar programs (also called community solar) provide an option for clean, renewable energy generation for homeowners and businesses unable to install rooftop solar because of issues like building orientation, shade, or rental status. Many of the state's electric utilities have already committed to developing shared solar projects. For example, Duke Energy and SCE&G have committed to shared solar programs under their Act 236 Distributed Energy Resource Programs. A majority of the state's electric cooperatives have also recently announced plans to pursue shared solar projects. Santee Cooper already has a solar share program available for their customers ([www.santeecooper.com/about-santee-cooper/news-releases/news-items/santee-cooper-board-increases-incentives%2C-sets-april-1-as-launch-for-community%2C-rooftop-solar-programs.aspx](http://www.santeecooper.com/about-santee-cooper/news-releases/news-items/santee-cooper-board-increases-incentives%2C-sets-april-1-as-launch-for-community%2C-rooftop-solar-programs.aspx)). The next steps



should include seeing through existing utility commitments to shared solar programs, ensuring that program designs align with national and regional best practices, and encouraging all South Carolina utilities to develop successful shared solar programs. Shared solar programs specifically aimed at low-to-moderate income customers should also be encouraged. One way to do this is through a low-to-moderate income community solar carve-out, which has been done in states like Colorado and Maryland. A carve-out could be legislatively required (as in Colorado and Maryland) or committed to voluntarily by individual utilities.

**Approach:** Compile updates from South Carolina electric utilities on existing plans and status of shared solar programs. In addition, compile shared solar program resources — including resources on low-to-moderate income shared solar programs — to provide to South Carolina utilities that are in the planning stages of shared solar programs, to utilities that have not yet committed to such programs, and to regulators and legislators that are interested in shared solar. If the Energy Office is willing to lead the compilation, it could provide the list as an annual update, similar to existing annual energy efficiency reports.

**Timeframe:** Compile updates from South Carolina electric utilities on existing plans and status of shared solar programs. Compile and share list of additional shared solar resources such as model documents and reports.

**Subcommittee Outcome:** Consensus

## Incorporating Regulated and Non-Regulated Utility Ownership of Solar Assets

**Challenge:** How to incorporate regulated and non-regulated utility ownership of solar assets?

**Background:** Regulated utilities are not allotted the same tax efficiencies provided by federal investment tax credit and depreciation rules as developers/customers are. Considerations need to be evaluated that allow utilities to invest in solar assets post Act 236 while being careful not to discriminate against customer- and developer-owned assets.

**Approach:** Utilize the existing DER Collaborative Groups, augmented with other stakeholders as appropriate, to start discussing South Carolina's approach to post DER utility-owned solar assets.

**Timeframe:** Begin within the first six months of 2017

**Subcommittee Outcome:** Consensus

## Qualified Facilities' Rights

**Challenge:** How to continue to protect the rights of Qualified Facilities (QF) under the Public Utility Regulatory Policy Act (PURPA)?

**Background:** PURPA regulates how Qualified Facilities should be treated, but it leaves the duties of implementing and enforcing the law to the states. The utilities have introduced, and the PSC has approved, standard contract options for QFs to deliver power to the grid.

**Approach:** The SC Solar Business Alliance will continue to monitor updated tariff filings to review/evaluate avoided cost methodologies and calculations.

**Timeframe:** Ongoing

**Subcommittee Outcome:** Consensus

## Advanced Inverter and Storage Technologies

**Challenge:** How to utilize the benefits of advanced inverter and storage technologies?

**Background:** New technologies for inverters and storage solutions can provide grid support to address power quality and strengthen the grid in a variety of ways. The newly adopted South Carolina Grid Integration Plan is not entirely clear on how these inverter or storage benefits can be used or how solutions can be interconnected.

**Approach:** Convene a technical working group with utility engineers and industry experts to discuss best practices from high photovoltaic penetration markets and markets that have started implementing smart inverter or storage solutions. The working group will also identify financial, contractual, or other policy issues that may present barriers to realizing potential benefits from third-party PPAs or PURPA QF providers. This action will help realize the potential benefits associated with smart inverters or storage provided by these providers.

**Timeframe:** 2017

**Subcommittee Outcome:** Consensus

## Property-Assessed Clean Energy Programs

**Challenge:** Utility customers are often challenged or unable to access financing for renewable energy and energy efficiency.

**Background:** PACE is one approach that can help certain customers access affordable financing for renewable energy and energy efficiency. PACE programs are implemented by local governments and provide for repayment of financing through property tax assessments. Nearly 30 states have passed enabling legislation for PACE.

Some concern exists with residential PACE because it may place a lien on real estate and cause issues with Fannie Mae, Freddie Mac, HUD, and the Department of Veterans Affairs (VA). Through the federal government's Clean Energy for All Americans Initiative a press release dated July 19, 2016 states that "HUD and VA are releasing new guidance to unlock residential PACE financing by outlining how properties with PACE assessments can be purchased and refinanced with FHA mortgage insurance and by welcoming the use of PACE financing for VA insured mortgages." This press release also states that the "DOE is releasing a draft of their Best Practices Guidelines for Residential PACE Financing for public comment."

**Approach:** The State Energy Plan should call for commercial and residential PACE legislation and provide implementation guidance to local governments. The legislation and implementation guidance should provide for financing of renewable energy and energy efficiency upgrades.

**Timeframe:** Call for legislation in the next session and annually update local guidance information on a state webpage following passage.

**Subcommittee Outcome:** Consensus

## Consumer Protections and Renewables to Tax Exempt Entities

**Challenge:** How to ensure consumer protections and best practices are maintained and how to bring more renewables to entities that do not pay taxes.

**Background:** It is important that industry professionals properly present cost/benefit analysis and financing programs to customers. The ORS currently has oversight on solar leasing companies. As market penetration increases, it is important that the highest construction standards are maintained for safety and reliability. South Carolina utilities have seen and experienced poor construction practices related to interconnection.

In addition, it is important to ensure that everyone, including entities that do not pay taxes— such as non-profits, local governments, and schools— have access to renewables. IRS guidance does not allow for the flow of tax benefits to the system owner for operating leases with non-profit counterparts. Generous DER programs have been established to try to incentivize the development of these projects, but struggles remain with capital allocations for these types of entities.

**Approach:** Utilize the existing DER Collaborative Groups, augmented with other stakeholders as appropriate, to establish best practices manuals that can be shared with groups such as the ORS, utilities, industry trade groups, and Chambers of Commerce. These groups also can be used to discuss how to make it easier to access renewables for entities that do not pay taxes.

**Timeframe:** 2017

**Subcommittee Outcome:** Consensus

## **Non-Consensus Recommendations:**

### **Renewable Portfolio Standard Study Group**

**Challenge:** To address future energy needs in a low-cost and environmentally responsible way, it is important to set goals for increasing the utilization of clean renewable energy.

**Background:** Climate change and other environmental pressures necessitate an increase in clean renewable energy. Fortunately, the dramatic drop in the cost of renewables has also made it an attractive way to reduce utility costs and cost effectively hedge against fuel price uncertainty. Currently, South Carolina does not have a policy in place or any report establishing a plan for how much of the state's electricity should be generated from renewable resources. Twenty-nine states and Washington DC have implemented RPS as a way to increase the use of renewable energy.

**Approach:** Convene a study group to discuss the possibility of establishing a RPS and whether there should be carve-outs for specific renewable resources, including those that directly benefit low-income communities.

**Timeframe:** Convene the study group within six months after completion of the State Energy Plan

**Subcommittee Outcome:** Non-Consensus

## Develop State Support and Implementation of Offshore Wind Resources

**Challenge:** South Carolina has the second largest offshore wind resource on the east coast and is uniquely positioned to take advantage of an industry that is set to grow rapidly in the US over the next decade. However, state policy is a critical driver of offshore wind adoption in the US. The northeastern states have begun to make significant commitments to offshore wind in their state energy plans, thereby securing a foothold in attracting hundreds of millions of dollars in investment and tens of thousands of potential jobs. Those states that are first movers will be able not only to capture the learning curve for development and operation but also to provide the ports that will manufacture, transport, and service this new large-scale industry. South Carolina has the ports, manufacturing expertise, and competitive labor markets that make it an ideal base for the industry.

**Background:** Although the offshore wind industry is in its very early stages in the US, it is a well-established industry across the globe, with significant development in Europe and China. Offshore wind power provides electricity generation with a load profile that typically follows daytime peak usage, is located off coasts where load requirements are greatest, and provides an emissions-free source of electricity. As the US moves to reduce overall carbon output, this resource is one that South Carolina can leverage to provide renewable, home-grown electricity to the citizens of our state.

South Carolina has over 130,000 MW of wind power capacity potential within 90 nautical miles of our coast. The economic development opportunities from offshore wind to create manufacturing, maintenance, port operations, ship building, and other jobs are unparalleled.

**Approach:** Establish a state offshore wind installation target that will encourage the industry to locate manufacturing and operations at South Carolina ports. Both an offshore wind capacity target as well as guaranteed rate recovery by South Carolina utilities would be required to bring offshore wind development to the state. This electricity would be utilized to meet South Carolina energy needs, contribute to energy independence, and provide a major driver to the economy of South Carolina.

**Timeframe:** Begin upon approval

**Subcommittee Outcome:** Non-Consensus

## Establish a Long-Term Renewable Energy Target

**Challenge:** To identify components of a sustainable and balanced long-term energy mix that take into consideration improving technology and low- or no-cost fuel options.

**Background:** Maintaining a balanced and diverse energy mix in South Carolina is key to ensuring a wide range of energy options and reasonable costs to all South Carolina residents. Renewable energy

should be a core component of this long-term mix of sources. Currently, South Carolina requires that renewables represent at least 2% of the energy mix from investor-owned utilities (based on the five year average peak demand). While some incentives exist for renewable generation beyond the 2% requirement, overarching goals or targets for renewable energy generation from all utilities within South Carolina over a long-term timeframe (20+ years) do not exist. With this in mind, a long-term renewable energy target for all utilities in the state should be considered.

Over 29 states have enacted RPS that establish targets (both binding and non-binding) for renewable energy. Nationwide, it has been found that RPS led to creation of 200,000 gross domestic renewable energy jobs, drove over \$20 billion in GDP, reduced consumer electric bills by up to \$0.012 per kWh, and reduced natural gas prices by up to \$0.14 per MMBtu (or equivalent of up to \$0.037 per kWh ([https://emp.lbl.gov/sites/all/files/lbnl-1003961\\_factsheet.pdf](https://emp.lbl.gov/sites/all/files/lbnl-1003961_factsheet.pdf))).

Establishing a long-term target for renewable energy generation will assist in creating a reliable, versatile, resilient, clean, and cost effective energy system for all citizens of South Carolina.

**Approach:** South Carolina should establish a long-term renewable energy target of 20% of its energy portfolio by 2035 in order to ensure provide reliable energy supplies at affordable costs.

**Timeframe:** Begin upon approval

**Subcommittee Outcome:** Non-Consensus

## Solar Property Tax

**Challenge:** How to address issues related to business or personal property tax assessed on solar property?

**Background:** Rules and regulations for determining property tax liability on solar equipment are complex and have been adapted from existing practices that originally did not contemplate solar technologies. Ownership structure affects both who assesses solar energy assets (SC Department of Revenue or Local Auditor) as well as the valuation methods. Implementation of these valuation methods may vary based on differing practices among the assessors, which can create inequities from project to project. Depending on the ownership structure, PPA term, and other transaction terms, property taxes are estimated to range from \$14/MWh to \$27/MWh. All of these values are substantially higher than property taxes paid by investor-owned electric utilities, which are on the order of \$5/MWh as calculated using publicly available information from IRP filings and EIA-posted data on MWhs sold and from fact sheets available on the IOUs' websites regarding self-reported property tax payments.

**Approach:** State legislation should assign the responsibility for assessing solar energy assets to the SC Department of Revenue. Legislation should direct the SC Department of Revenue to adopt a valuation method that provides a consistent tax payment regardless of ownership structure, PPA term, or other transaction terms, and that results in a tax rate that is comparable to that paid by electric utilities. The process to introduce this legislation is already underway.

**Timeframe:** Continue efforts already underway

**Subcommittee Outcome:** Non-Consensus

# State Government Energy Use Subcommittee Recommendations

## Consensus Recommendations:

### Convene the Green Purchasing Taskforce

**Challenge:** Inability to purchase energy-efficient items if they are not on state contract

**Background:** A green purchasing taskforce was put together in 2009 to develop the green purchasing policy ([www.mmo.sc.gov/PS/agency/PS-agency-green-purchasing.phtm](http://www.mmo.sc.gov/PS/agency/PS-agency-green-purchasing.phtm)). This policy covers areas such as EE, recycled-content items, and source reduction. While this policy exists, many state government agencies and colleges/universities would like to purchase energy-efficient items such as lighting, washers, dryers, solar panels, and vehicles. When these items are not on state contract, it is difficult to justify purchasing them. It would make the process easier, and more people would purchase energy efficient items, if they were on state contract and/or if there were a price preference similar to what is in place for recycled-content items. The green purchasing policy will need to be revived and enforced.

**Approach:** Convene the green purchasing taskforce to add to the policy and work on adding vendors of energy-efficient items to the state contract. In addition, the group can add a price preference for energy-efficient items to the policy.

**Timeframe:** Begin immediately. It will take time to update the policy and add vendors to the state contract.

**Subcommittee Outcome:** Consensus

### Incentives for State Entities

**Challenge:** Inability to make renewable energy and energy efficiency projects economically viable and sustainable

**Background:** State schools, government and public buildings, or state entities are not eligible for tax incentives or any kind of rebates for renewable energy projects/installations. Private entities can receive about 55% of tax incentives (both federal and state) for renewable energy productions.

Clemson University has committed to a goal of carbon neutrality by 2030. To go carbon-neutral, Clemson needs to install solar photovoltaic or wind-energy projects on campus; with no current incentive and low utility rates, these types of projects are not financially viable.



The following chart shows the financial comparison of one public entity (Clemson University) with private entities receiving tax incentives:

	Clemson / Public Entities	Private entities with tax incentives	
Utility rate	0.07	0.11	Per kWh
Photovoltaic installation cost	2.35	1.0575	Per kWh (after tax incentives)
Simple payback	33.57	9.61	Years

Although universities and other state entities may pay lower utility rates, they lack financial incentives in support of renewable energy. With some minimal assistance, the universities can install renewable energy and meet established carbon neutrality goals.

**Approach:** Create a study committee to research the following options:

- State incentives or grants for renewable energy and energy efficiency projects
- 2-5% renewable energy production policy/goal. (To promote green energy projects)
- Create a state contract with solar photovoltaic companies that can lower the cost of photovoltaic/wind installation, or have a special loan period from the SC Treasurer’s Office
- Allow performance-based partnerships for renewable energy projects with private entities

**Timeframe:** Begin upon approval

**Subcommittee Outcome:** Consensus

## Energy Audits

**Challenge:** State agencies have a need to prequalify and contract directly with qualified firms to obtain energy audits on state buildings.

**Background:** Many state agencies are unable to go through the lengthy process of a Guaranteed Energy Savings Contract due to their uncertainty of the process, lack of personnel resources, and lack of knowledge of the required qualifications of firms performing the work. OSE has the expertise to select qualified firms and put them on state contract available to all state agencies. However, for the OSE to take this action, a SFAA policy must be in place (similar to other existing policies) that will allow OSE to contract with multiple firms for an extended period, without a cap on spending.

**Approach:** The OSE is proposing the attached policy to be submitted to the SFAA for approval. If approved, the OSE will proceed with the qualification-based selection and contracting of firms qualified to perform energy audits on state buildings.

**Timeframe:** Begin as soon as the policy is approved by the SFAA

**Subcommittee Outcome:** Consensus

## Recommendation for Minimum Energy Requirements for Leased Facilities

**Challenge:** Many state entities operate partially or entirely in leased space, and leases may or may not take into account the operating costs related to energy. By drawing attention to energy costs at the point a lease is developed, the state may be able to negotiate energy-saving improvements and/or a cost per square foot that adjusts for higher energy costs.

**Background:** Real Property Services provides centralized real estate-related services for all agencies of the State of South Carolina. Real Property Services — on behalf of the Department of Administration and the Division of General Services — maintains and processes all leases either for or from a state agency. Exceptions are for property matters for those agencies and processes specifically exempt from the oversight delegated by the South Carolina Code of Laws and the South Carolina Code of Regulations.

The oversight delegated to the Department of Administration and the Division of General Services regarding leasing matters is required by the following:

- SC Code of Laws [§1-11-55](#), [§1-11-56](#), [§1-11-67](#)
- SC Code of Regulations [§19-447.1000](#)

SECTION 1-11-56. Program to manage leasing; procedures.

(A) The Division of General Services of the Department of Administration, in an effort to ensure that funds authorized and appropriated for rent are used in the most efficient manner, is directed to develop a program to manage the leasing of all public and private space of a governmental body. The department must submit regulations for the implementation of this section to the General Assembly as provided in the Administrative Procedures Act, Chapter 23, Title 1. The department's regulations, upon General Assembly approval, shall include procedures for:

(1) assessing and evaluating agency needs, including the authority to require agency justification for any request to lease public or private space; and

- (2) establishing standards for the quality and quantity of space to be leased by a requesting agency

**Approach:** It is recommended that Real Property Services consider adopting a requirement that the costs of energy per square foot of leased space do not exceed the average for state agency buildings by more than 5% (excluding exempt and temporary lease buildings).

**Timeframe:** As soon as possible

**Subcommittee Outcome:** Consensus

### **Non-Consensus Recommendations:**

## **Energy and Water Conservation Through More Effective Measurement and Analysis of Use**

**Challenge:** State agencies may not be able to identify opportunities to conserve energy and water or measure the effects of conservation measures already installed because several buildings owned by a single agency may share energy or water meters. It is difficult to accurately assess energy and water use in the buildings, or to measure the effects of energy and water efficiency measures.

**Background:** It is quite common for a state agency, college, or public school to share water and energy meters across several buildings. Very few older projects have been equipped with separate meters, which means that data for energy and water use cannot be accurately assigned to individual buildings. Often energy and facility managers have allocated energy use among buildings sharing a meter, but it is not an ideal way to determine current energy or water use. Moreover, the lack of individual meters impedes even the use of national benchmarking software such as Portfolio Manager, which is strongly supported by the DOE.

The newest version of Leadership in Energy and Environmental Design (LEED), LEED v4, which must be implemented by November 1, 2016, will require that new buildings have individual meters. This is not true for other certification programs, or for buildings which have not been substantially renovated. In addition, it does not address the problem of assessing the effectiveness of energy retrofits or even benchmarking energy use in existing buildings.

SECTION 48-52-620 (B) (1) of the SC Code of Laws states:

(B) (1) In order to monitor energy consumption, the State Energy Office must determine those state buildings that require individual metering. Metering must be installed by the agency, the cost of which must be borne by the agency responsible for the utility bill for the building.

A number of years ago, the ORS Energy Office evaluated the cost of this measure and found it to be too high for agencies to implement without supplemental funding. No further effort was made to

require agencies to install separate meters. However, the recent requirement for agencies to reduce energy use by 20% has focused attention on energy-use benchmarking and has opened the door to a possible interim measure.

**Approach:** Encourage installation of individual building meters (or submeters if multiple tenants are involved) to assist in efforts to conserve energy and water through more effective assessment and management strategies, encourage installation of individual building meters (or submeters if multiple tenants are involved). Meters should not be required for very small structures such as small storage sheds. This action should be accomplished by:

1. A letter from the Office of Regulatory Staff to all agencies reminding them of the value of individual metering and requesting that they retrofit buildings with individual meters whenever possible.
2. Amendment of the Energy Independence and Sustainable Construction Act of 2007 (48-52-810 et seq.) to require that when a building undergoes a major facility construction or renovation project, as defined by the Act, a separate meter for each electricity, natural gas, fuel oil, and water utility shall be installed.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Non-Consensus

# Transportation Planning Subcommittee Recommendations

## Consensus Recommendations:

### Public Awareness

**Challenge:** To reduce energy used in transportation, create public awareness of the importance of clean fuel technologies and multi-modal solutions and support for their adoption in South Carolina and create a workforce that can create, manage, and maintain these technologies.

**Background:** The impact of air pollution and the dependence on fossil fuels threatens the health and security of the people of the US and of South Carolina. A recent report in the Annals of The American Thoracic Society shows that pollution in the Greenville Metropolitan area causes 29,768 illnesses a year and kills 15 people in just Greenville every year. In its report “Beyond Traffic,” the US DOT notes that without effective policies and regulations, growing freight movements will increase greenhouse-gas emissions and will affect human health in neighborhoods along freight corridors. Nationally, trucking accounts for about 9% of all highway miles traveled, but it is the source of 20% of all transportation-sector greenhouse-gas emissions. It is also the largest source of freight movement in South Carolina and projected to grow in leaps and bounds.

Recognizing this threat, the federal government has put forth aggressive measures to curb emissions related to transportation and promote the use of alternative fuels across the board in the transportation sector. As a result, significant improvements in engine technologies — including the use of new fuels (such as natural gas or hydrogen) and vehicles built from lighter materials — are on the horizon. In the case of light-duty vehicles, new technologies such as autonomous vehicles, plug-in and hybrid vehicles, and electric vehicles are coming to the marketplace. These technologies are of great importance to South Carolina because they not only will reduce South Carolina’s fossil fuel imprint but also will produce significant environmental and health benefits to residents, as well as generate economic development in the state.

Automation will have a potentially transformative impact across all transportation modes by increasing productivity, improving safety, and enhancing the capacity of existing infrastructure. It will also have a profound impact on the transportation workforce by changing the skills required to manage, operate, and maintain transportation vehicles and systems.

Acceptance of these new technologies and the availability of a workforce that has the skills to create, manage, and maintain these new technologies will be crucial for economic prosperity in the state in the long term. Success of implementation will depend heavily on public acceptance and investment. Public awareness of the advantages and the impact of these technologies on human health and future economic prosperity will spur government to invest resources.

**Approach:** Task the Energy Office to coordinate the creation of a committee that brings together representatives from the SCDOT, SC Department of Education, the transportation industry, municipal leaders, and academia (including the Technical School System) in a taskforce to develop a plan for public education and workforce development. The task force will focus on clean technologies, alternative transportation, and multi-modal solutions. The plan should detail short-, medium-, and long-term strategies and recommendations for implementation.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Intelligent Infrastructure

**Challenge:** Create an intelligent infrastructure plan that prepares the state for the coming advances in transportation technology.

**Background:** The transportation industry is undergoing a technological revolution with automation and connectivity synergistically leading the way. Per the US DOT 2016 white paper “Beyond Traffic Framework,” automation will have a potentially transformative impact across all transportation modes by increasing productivity, improving safety, and enhancing the capacity of existing infrastructure including the ability to combat the impact of climate change. Automation has the potential to revolutionize how ports, trains, vessels, and trucks operate and has the potential to significantly and favorably affect the environment.

Part of the excitement of the upcoming autonomous vehicle revolution is the realization that automated vehicles have the potential to transform society. Some of the benefits these vehicles bring include the following:

- Significantly reducing crashes, thereby improving safety, travel time reliability, and congestion associated with crashes.
- Enabling real-time route planning, thus improving travel time and reliability.
- Increasing the ability of existing infrastructure to accommodate more vehicles due to synchronized traffic flows.
- Improving transportation access to the young, older adults, and people with disabilities, thereby improving quality of life and job opportunities.
- Reducing costs associated with delivering freight.
- Freeing up time for more productive or recreational activities.

Reaping these benefits is possible only if vehicles and the infrastructure are part of a system that works synergistically.

**Approach:** Engage SCDOT and other interested parties, including the State’s automotive and transportation industry, and universities to develop an intelligent infrastructure plan as an addendum to their 2040 Statewide Multi-modal Transportation Plan. This plan should have a long term vision for the State, identify new and important technologies that are essential in the short, mid, and long term, and a path, including funding for their implementation.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Innovation and Technology Transfer Center

**Challenge:** Make the state a hub of clean energy transportation innovation, thus leading to development and rapid implementation of clean technologies.

**Background:** South Carolina has some very unique assets. It is home to one of the most advanced automotive companies in the world (BMW) and one of the most unique research centers (CU-ICAR) focused on the transportation industry. The energy resources in the state include the world’s largest wind turbine drivetrain testing facility and a grid-simulation capability that is second to none. The Smart State Program has drawn talent into the state unlike any other and has resulted in significant industry investment in the program. The automotive sector in the state is thriving, and the automotive and aircraft industries (with Boeing leading the way) have put South Carolina on the global map. Almost every day one hears of supporting industries coming to the state. A prime example is the cluster of industries focused around advanced materials, which are now considered to be essential in meeting the CAFE standards on fuel efficiency slated for 2025. South Carolina also has the International Transportation Innovation Center. The International Transportation Innovation Center is designed as a physical test bed for connected vehicle and sustainable mobility technologies. The state is therefore heavily invested in the clean transportation/energy area and can easily position itself as a clean energy/transportation hub if it can bring all these assets together and focus them on creating future prosperity in the state.

The German Fraunhofer Institute model is an excellent example of an entity that rapidly translates innovation into workable technologies. Fraunhofer Institutes are well known for being strong engines of economic activity in the regions in which they are present. These institutes are prime examples of public/private partnerships and are dedicated to serving the cluster industries of the region. The creation of institutes such as Fraunhofer, with a focused vision to bring new ideas rapidly to the marketplace and drawing from talent in other entities in the state, could make the state a real powerhouse in the clean-energy technology domain.

**Approach:** Create a South Carolina Clean Transportation and Technology Transfer Center, funded through a public/private partnership that includes SC DOT, the research universities, and industry that focuses on the development, rapid implementation of new technologies, and technology transfer in a cost effective manner. The Center should serve as a resource for local companies trying either to bring innovation into their products or to adopt new technologies by connecting the companies to existing assets in the state. It would serve as a repository of information related to clean transportation, be responsible for its dissemination, and support efforts of local communities to adopt clean energy best practices. The Center should operate independently as a state entity but work synergistically with existing assets such as CU-ICAR, the SC Energy Innovation Center, The McNair Center, the ITIC, and other organizations such as Upstate Forever and the Coastal Conservation League. Create a task force to develop a vision and goals for this Center. An example of one such center is the NC Clean Energy Technology Center.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

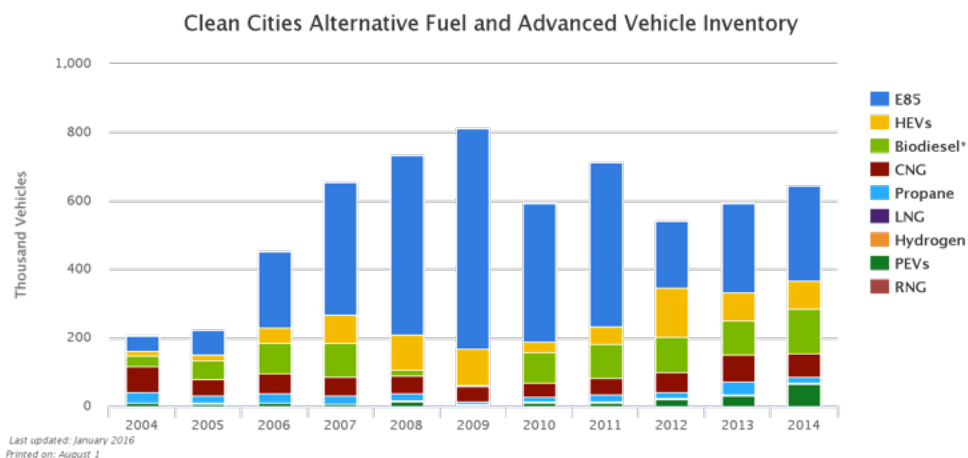
## Lead By Example – State Transportation

**Challenge:** Currently, the proportion of state-owned or leased fleet vehicles that are fueled by a DOE-established alternative fuel is not large. As a result, the state’s fleet lacks diversity and fuel supply is vulnerable, thereby limiting fuel efficiency and diversity in transportation.

**Background:** An increase in transportation fuel efficiency and diversity is considered a priority by the federal government as a means of reducing dependence on foreign oil, thereby reducing security risks. The mission of the DOE Clean Cities program – in which Palmetto State Clean Fuels Coalition is based – is to encourage voluntary public/private partnerships coordinated by the DOE that expand the use of alternatives to gasoline and diesel fuel. Legal alternatives under EPA92 include CNG, ethanol, methanol, electricity, and liquefied petroleum gas (propane). According to the EIA, “the number of alternative fuel vehicles (AFVs) in use has been increasing steadily during the past 15 years, largely due to federal policies that encourage and incentivize the manufacture, sale, and use of vehicles that use non-petroleum fuels. AFVs in widest use today are those that run on E85, propane, compressed natural gas, and electricity.” The importance of the deployment of these alternative fuels and technologies cannot be understated. Not only can they reduce South Carolina’s fossil fuel use in the transportation sector, but also they can assuage potential human health impairments and environmental impacts, as well as generate economic development in the state. Shown in the following chart, the diversity of these fuels has increased over time. Nonetheless, to determine ways the state can lead by example to promote stability and drive economic development, more research into these trends and the barriers that limit adoption of alternative fuels should be conducted.



**Approach:** Lead by Example



1. Palmetto State Clean Fuels Coalition or another umbrella organization devoted to transportation issues should conduct a survey of state agencies, local governments, and municipalities to determine their interest and willingness to lease, purchase, use, or convert to alternative fuel vehicles or equipment.
2. Palmetto State Clean Fuels Coalition or another umbrella organization devoted to transportation issues should convene a task force that engages state agencies and local municipalities to determine what, if any, barriers currently exist that limit their ability to lease, purchase, use, or convert to alternative fuel vehicles or equipment.
3. If warranted by the results, Palmetto State Clean Fuels Coalition, or another umbrella organization devoted to transportation issues — in conjunction with its stakeholders and using existing state and federal statutes as a baseline — should develop a recommendation to establish a statewide goal as it applies to state entities. An example could be to identify a certain percentage of state vehicles that should be powered by a DOE-established alternative fuel — with a phased-in approach to adoption. Another possibility would be to create a policy document to promote the use of alternative fuels by state entities. (These goals or policies may later be expanded to other entities.) The effort should also include an education component so that agencies understand the benefits and challenges of alternative-fuel vehicle use.
4. The task force should also consider a reward structure for exemplary performance in this domain.

**Timeframe:** Begin immediately, in order to be ready for any funding opportunities that arise and to prepare for the next contract renewal.

**Subcommittee Outcome:** Consensus

## PSCFC/South Carolina Electric Auto Association

**Challenge:** Current state statute does not provide an income-tax credit for the purchase of an all-electric vehicle.

**Background:** There are three basic electric-drive vehicles currently produced. These include hybrid electric vehicles, plug-in hybrid electric vehicles, and all-electric vehicles. The distinction in these types relates to how they are powered. Hybrid electric vehicles are powered by an internal combustion engine (using conventional or alternative fuels) supplemented by an electric motor charged through regenerative braking (for example, Toyota Prius). plug-in hybrid electric vehicles use batteries to power an electric motor and use another fuel, such as gasoline, to power an internal combustion engine. These are often referred to as extended-range electric vehicles. These vehicles can either run on a battery or the internal combustion engine (for example, Chevy Volt). All-electric vehicles use only a battery to store the electric energy that powers the motor (for example, Nissan Leaf/Tesla).

On June 19, 2007, by act of the Governor, Act No. 83 was signed into law that provided a state income-tax credit for plug-in hybrid vehicles. This legislation was revised and extended in 2012. The current state statute provides a state income-tax credit to a taxpayer purchasing or leasing a plug-in hybrid vehicle in South Carolina. The credit is \$667 per vehicle, plus \$111 if the vehicle has at least 5 kWh of battery capacity and an additional \$111 for each kWh of battery capacity in excess of 5 kWh. The maximum credit is \$2,000 per vehicle. Any unused credit may be carried forward five years. A plug-in hybrid vehicle is a vehicle that (a) shares the same benefits as an internal combustion and electric engine with an all-electric range of nine miles or more (b) has four or more wheels (c) draws propulsion using a traction battery (d) has at least 4 kWh of battery capacity and (e) uses an external source of energy to recharge the battery. The current credit is capped at \$200,000 each calendar year for all eligible taxpayers. If the cap is exceeded, the credit is claimed on a first come basis as determined by the SC Department of Revenue. The credit is claimed on Form TC-48, "Plug-in Hybrid Vehicle Tax Credit," and the taxpayer must provide sufficient documentation to the SC Department of Revenue to substantiate the credit. However, the credit applies only to plug-in hybrid vehicles. With the advent of new vehicle technology, many have recognized the limitation in this tax credit, in that it does not apply to all-electric vehicles as described above.

On February 11, 2016, a bill sponsored by Representatives Smith, Merrill, McLeod, Rutherford, Stavrinakis, Bernstein, Simrill, Quinn, and Bingham was introduced into the South Carolina House of Representatives. This bill (H. 4942) was referred to Committee on Ways and Means. H. 4942 proposed to amend SC Code Ann Section 12-6-3376 to add a pure-battery electric vehicle in the description of eligible vehicles, to add a tax credit for pure-battery electric vehicles, and to extend the time the tax credit is allowed (from 2017 to 2020). This legislation did not pass out of committee during the 2016/2017 session.

**Approach:** Revise existing statute to include that all-electric vehicles are qualifying vehicles eligible for the state income tax credit. In addition, continue the work begun last year to provide incentives to encourage use of all types of alternative fuels in the state.

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Encouraging Connectivity

**Challenge:** To reduce energy use in transportation, encourage connectivity between major cities and towns by working on land use and public facility siting with SCDOT, thereby reducing the number of single occupancy vehicles and, as a result, the overall energy consumption of the state's citizens.

**Background:** Some transit systems within the state are small — owned by an individual county, city, or metropolitan planning organization; therefore, jurisdictional boundaries make it more difficult to communicate and plan regularly for regional travel. Absent the provision in the SCDOT intercity bus plan, it can be difficult to travel from cities and towns not within the same county region (for example, Charleston to Columbia) on a statewide transit service.<sup>9</sup> This situation increases the reliance on single-occupancy vehicles for regional travel. Within local areas, new projects are not always accessible by transit because of disjointed planning processes, an emphasis on traffic-impact analysis of vehicles only, and lack of available funds. Planning for new transit systems alone will not improve this situation entirely: Transit planning must be coordinated with land-use investments at the local and state level — whether an individual local school, or a state-supported economic development opportunity that will draw from a larger region.

**Approach:** Link land use and transportation investments by improving public facility siting to ensure government buildings, schools, and transit hubs are located in priority investment areas. This approach requires local planning with strong coordination between SCDOT, transit authorities, Departments of Commerce and Education, local economic alliances, and others.

- Engage in and fund scenario planning for major projects, including but not limited to, the projects that receive public funding by the state.
- Facilitate partnerships with local and regional entities, as well as with other state agencies to better coordinate land use, economic development, and transit investment on new developments; facilitate transit development and coordination between existing economic hubs.
- Documents to use as a starting point include SCDOT and Department of Commerce's work on interstate investment and strategic investment areas.<sup>10</sup>

<sup>9</sup> Statewide Transit Plan as starting document: <http://www.scdot.org/Multimodal/default.aspx>

<sup>10</sup> Statewide Transit Plan as starting document: <http://www.scdot.org/Multimodal/default.aspx>

### Examples:

- Scenario planning: Delaware: LUTSAM “The Delaware DOT developed the Land Use and Transportation Scenario Analysis and Microsimulation (LUTSAM) tool. DeIDOT will use the tool to help local stakeholders and land use authorities visualize the positive and negative transportation outcomes of potential development plans. Depending on compactness, mixture of uses, connectivity, and other criteria, the tool can estimate VMT and emissions, and can produce an animated simulation of traffic conditions.” [www.dvrpc.org/reports/08059.pdf](http://www.dvrpc.org/reports/08059.pdf)
- Partnering with state agencies: [www.smartgrowthamerica.org/documents/the-innovative-dot-third-edition.pdf](http://www.smartgrowthamerica.org/documents/the-innovative-dot-third-edition.pdf)
- Public facility siting: State of Maryland Code of Maryland Regulations (COMAR) 23.03.02.13 “Unless a waiver is granted in accordance with Regulation 28 of this chapter, a proposed site for a new school or a replacement school that adds capacity shall be in a priority funding area.” Maryland Division of State Documents website (COMAR Online). Retrieved 11/25/13 from [www.dsd.state.md.us/comar/comarhtml/23/23.03.02.13.htm](http://www.dsd.state.md.us/comar/comarhtml/23/23.03.02.13.htm)

**Timeframe:** Begin immediately by convening stakeholders and developing recommendations.

**Subcommittee Outcome:** Consensus

## Complete Streets Policies

**Challenge:** Infrastructure built across the state today is primarily owned by SCDOT and not the local county or municipality. This reality presents challenges for the DOT budget and local authority on road design. The SCDOT should strengthen its existing 2003 resolution for Complete Streets policies and/or support local municipalities’ adoption of Complete Streets policies to encourage transit, bicycle, and pedestrian opportunities and increased network capacity, thereby reducing energy used for transportation. Improving the capacity and design of the existing streets by investing in other modes of travel will relieve some of the maintenance burden and reduce congestion and energy used (per vehicle and in general).

**Background:** Complete Streets policies have been adopted in over 800 communities — large and small. The FHWA, in recognizing the challenges to adopt policies such as this one, relaxed its own requirements and oversight (via the Fixing America’s Surface Transportation Act). Complete Streets are streets designed to accommodate multiple modes of travel and be safe, convenient, and comfortable for all users — whether in a car, in a truck, on a bike, on foot, or travelling by public transit. At the local level, trips that could be walked or taken on a bike are driven due to lack of safe, convenient, or comfortable infrastructure. The same can be said for longer trips and lack of transit access. Increasing public transit use, walking, and bicycling offer benefits across the spectrum including public health improvements, cleaner air via lower air emissions, reduced congestion, and more livable neighborhoods. Pursuant to state energy goals, Complete Streets policies can also lead to reduced fossil-fuel use and more efficient use of road space.

**Approach:** Recommend adoption of local-level Complete Streets policies and transit-oriented development standards in the State Energy Plan. Policies can be adopted via a pilot project or home rule of a municipality and should be coordinated with SCDOT to ensure design approval and safety. Policies for Complete Streets review and support within SCDOT should be reviewed and made more efficient; expertise should be available to local entities for this type of transportation planning. In addition, consideration should also be given to financial and/or administrative incentives.

**Examples:**

Pilot Project: Recently, the Town of Clemson wanted to improve walkability and traffic calming on Old Greenville Highway (SC 93). SCDOT agreed to renumber the route (by combining SC 93 with US 76, a major road), and they turned over ownership of the road to the Town of Clemson so it could control traffic engineering.

- National Complete Streets Inventory: [www.smartgrowthamerica.org/best-complete-streets-policies-of-2015](http://www.smartgrowthamerica.org/best-complete-streets-policies-of-2015)
- Littlerock, Arkansas: [www.smartgrowthamerica.org/documents/cs/policy/cs-ar-littlerock-ordinance.pdf](http://www.smartgrowthamerica.org/documents/cs/policy/cs-ar-littlerock-ordinance.pdf)
- Reading, PA Executive Order 2-2015-3. [www.smartgrowthamerica.org/documents/cs/policy/cs-pa-reading-order.pdf](http://www.smartgrowthamerica.org/documents/cs/policy/cs-pa-reading-order.pdf)

**Timeframe:** Review existing policies immediately; convene stakeholders to write additional policies.

**Subcommittee Outcome:** Consensus

## Funding for Public Transit

**Challenge:** Public transit is recognized as a means of reducing the energy used for transportation. Funding options for transit providers are limited in quantity and lack diverse options, while urban congestion in South Carolina is increasing, thus resulting in increased fossil-fuel use.

**Background:** Comparing the funding levels (federal, state, and local) of South Carolina transit providers to their peers in the Southeast reveals how far South Carolina's transit systems are falling behind during a period of significant growth in population, freight movement, and congestion. Poor land-use planning has contributed to the problem of sprawl and congestion in the larger metropolitan areas, but South Carolina's transit funding structure and level has not provided any relief. That South Carolina has the third lowest gas and diesel tax rates in the nation (\$.1675 per gallon) means that state dollars available for both funding and for federal match are extremely limited. In addition, state rules governing local-option sales taxes can be overly prescriptive and

further inhibit an individual community's ability to 1) fund transit improvements locally and 2) meet state and federal matching requirements for additional funds.

**Approach:** Convene a study group to identify the various federal, state, and local transit funding options to 1) identify existing legislative restrictions on local funding options (such as local option sales taxes) and 2) to identify relevant Southeastern best practices and alternatives for transportation funding. Release the findings publicly and make them available to entities wishing to pursue policy change.

Conceptual questions for a study group to address:

- What flexibility do we currently have with local-option sales taxes with respect to funding transit projects?
- What can we NOT do?
- What are the restrictions?
- What federal funds are we leaving on the table by not having more state match?
- What are local and state funding options, other than sales taxes? (for example, development impact fees, ad valorem taxes, vehicle taxes or fees, bonds, and local hospitality taxes)
- Are regional sales taxes, local hospitality taxes, or other funding mechanisms possible in SC?

**Timeframe:** Begin immediately

**Subcommittee Outcome:** Consensus

## Availability of Alternative Fueling Infrastructure at Transportation Nodes

**Challenge:** Locations exist throughout the state where several types of transportation, such as rail and freight distribution via trucks, come together. The state may not be able to maximize efficiencies in energy used to transport cargo due to limited availability of multi-modal fueling and other equipment at transportation hubs or nodes throughout the state.

**Background:** Many long- and mid-distance haulers are turning to CNG as a more efficient fuel for transporting cargo. At the same time, multi-modal carriers are exploring other forms of transportation fuel, such as electric vehicles. These fuels could be used more efficiently if logical hubs were identified so that resources applied to alternative fueling infrastructure can

be concentrated where they are likely to be needed the most. Thus, CNG fueling stations can be strategically located near interstate hubs where cargo is most likely to be transferred from rail to long-distance trucks. Additional information is available at [www.scdot.org/multimodal/](http://www.scdot.org/multimodal/) and [www.scdot.org/multimodal/pdf/SC\\_MTP\\_Freight\\_Plan.pdf](http://www.scdot.org/multimodal/pdf/SC_MTP_Freight_Plan.pdf).

**Approach:** The Palmetto State Clean Fuels Coalition or another umbrella organization devoted to transportation issues should develop a background document — by working with private and public haulers, state and federal officials, planners, and universities — to identify the most important hubs for infrastructure development, determine availability of fueling infrastructure, and recommend next steps as appropriate.

**Timeframe:** Begin immediately, in order to be ready for any funding opportunities that arise

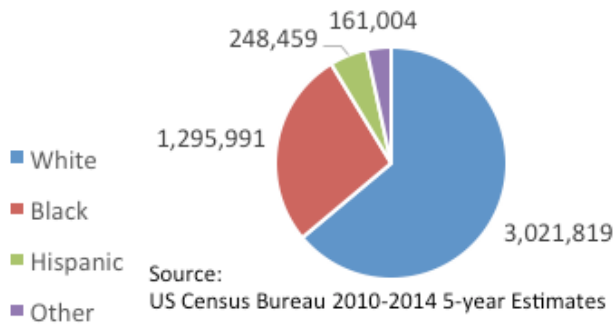
**Subcommittee Outcome:** Consensus

# Appendix D: Economic Drivers

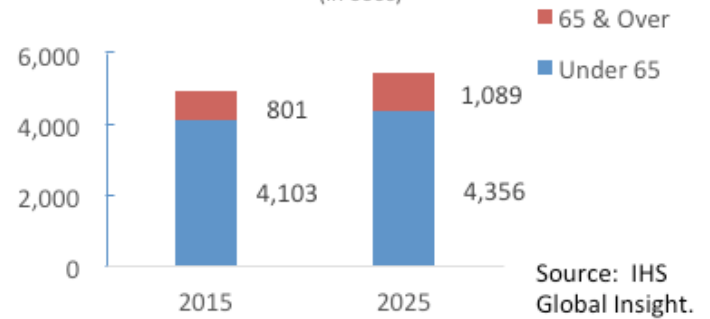
## Population

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, in addition to continued population growth within the state itself. Such growth creates an increased demand for energy and the infrastructure that provides this energy. The charts below show the population of South Carolina in 2014, along with estimates for 2015 and 2025.

SC Population Estimate 2014



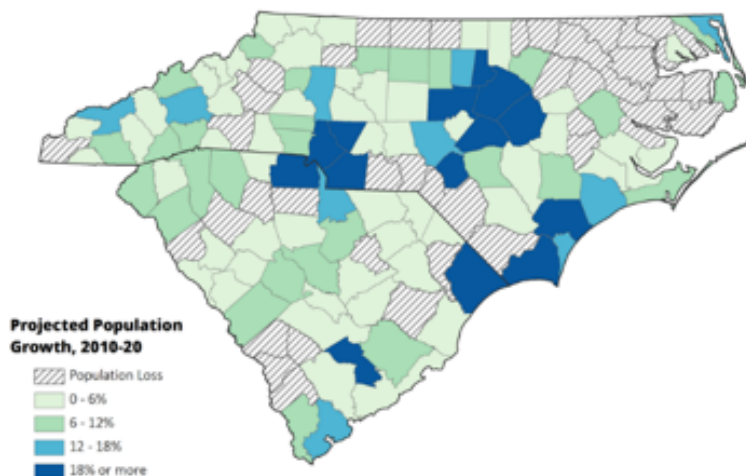
South Carolina Population Growth (in 000s)



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, or an increase of 11.1%. This level of growth exceeds the projected national population growth rate of 7.9%.

Population growth in South Carolina has not been consistent across the state, nor is it expected to be 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*



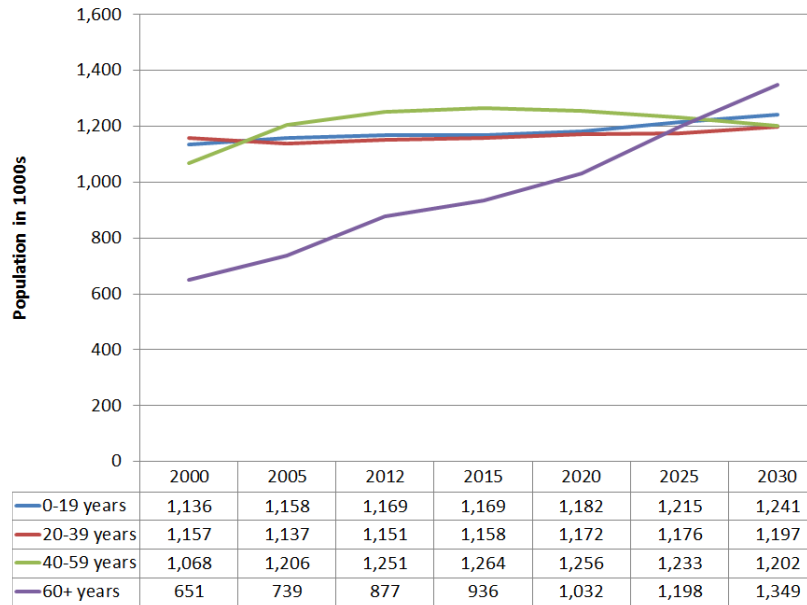
Sources: NYCOSBI, SC Revenue & Fiscal Affairs Office





## Age

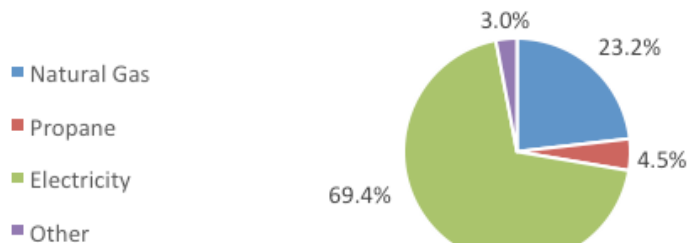
The age distribution of South Carolina’s population has changed dramatically in recent years due to an aging Baby Boomer generation and South Carolina’s popularity as a retirement destination, especially along the coast. The Census Bureau anticipates that the 60+ population cohort will equal or exceed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

South Carolina Primary Heating Fuel

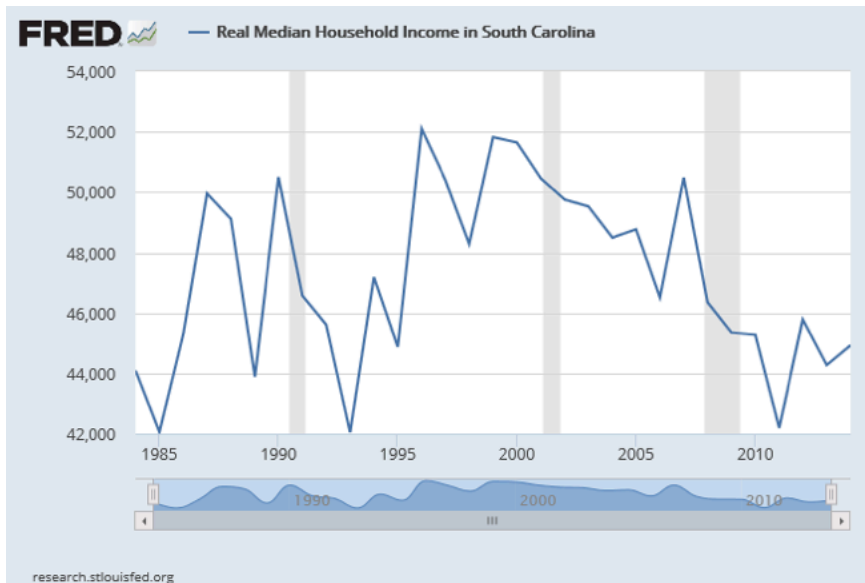


Source: US Census Bureau 2010-2014 5-Year Estimates

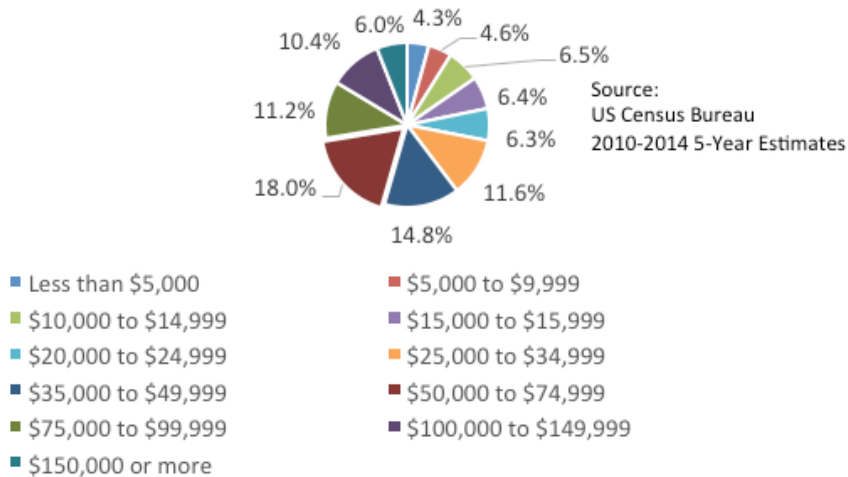
# Appendix E: Income

Another important factor to consider when looking at energy consumption in South Carolina is 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% 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 trend 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. The figure below 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% annually occurred.



South Carolina Annual Household Income Distribution



## Energy Use and Expenditure per Capita

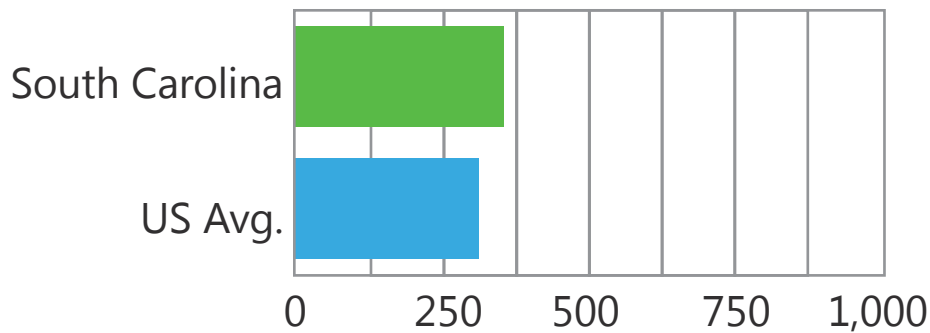
For residential and transportation energy combined, the average American spent \$3,052 per person (2012 data) while the average South Carolinian spent \$3,310. South Carolinians consumed 347 million BTUs per person in 2009, compared to an average of 308 million in the US. South Carolina ranked 18th out 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

	Residential	Commercial	Industrial
	¢ 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 can place a disproportionate burden on families, especially those in the lower income brackets. The table below shows that households earning less than \$50,000 annually devote about twice as much of their income to energy costs as those earning over \$50,000. In residential units whose occupants earn less than \$10,000 per year, energy bills may consume 75% of their annual income.

US Average Percentage of Income Spent on Electricity (2014)						
Income Level	% of total households	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%
\$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

# Appendix F: Relevant Federal and State Regulations and Laws

## 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 FERC) 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 for the civilian uses of nuclear materials.

### **Clean Air Act - 42 U.S.C. §7401 et seq. (1970)**

This statute authorizes the 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 (Maximum Achievable Control Technology 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 CWA. The statute established the basic structure for regulating discharges of pollutants into the waters of the US 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 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 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, the 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 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 services.

## **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; EE; 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 (EPAAct) of 2005 repealed this Act, effective February 8, 2006.

## Federal Tax Credits

Name	Category	Policy / Incentive Type	Code	Summary	More Information
<b>Business Energy Investment Tax Credit (ITC)</b>	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>
<b>Energy-Efficient Commercial Buildings Tax Deduction</b>	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. 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>
<b>Energy-Efficient New Homes Tax Credit for Home Builders</b>	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. Improvements to building envelope components 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, improvements to building envelope components 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. (Expires 12/31/16)	<a href="http://programs.dsireusa.org/system/program/detail/1272">http://programs.dsireusa.org/system/program/detail/1272</a>



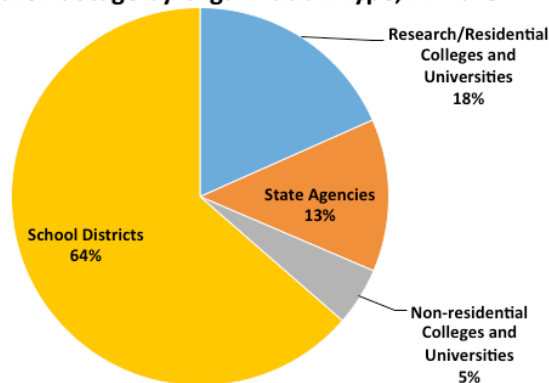
Name	Category	Policy / Incentive Type	Code	Summary	More Information
<b>Renewable Electricity Production Tax Credit (PTC)</b>	Financial Incentive	Corporate Tax Credit	26 USC §45	<p>The tax credit amount is \$0.015 per kWh in 1993 dollars for some technologies and half of that amount for others. The amount is adjusted for inflation by multiplying the tax credit amount by the 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 Register. 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.</p>	<a href="http://programs.dsireusa.org/system/program/detail/734">http://programs.dsireusa.org/system/program/detail/734</a>
<b>Residential Energy Conservation Subsidy Exclusion (Corporate)</b>	Financial Incentive	Corporate Tax Exemption	26 USC §136	<p>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 (in other words, a taxpayer may not claim a tax credit for an expense that the taxpayer ultimately did not pay).</p>	<a href="http://programs.dsireusa.org/system/program/detail/727">http://programs.dsireusa.org/system/program/detail/727</a>
<b>Residential Energy Conservation Subsidy Exclusion (Personal)</b>	Financial Incentive	Personal Tax Exemption	26 USC §136	<p>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 (in other words, a taxpayer may not claim a tax credit for an expense that the taxpayer ultimately did not pay).</p>	<a href="http://programs.dsireusa.org/system/program/detail/666">http://programs.dsireusa.org/system/program/detail/666</a>

Name	Category	Policy / Incentive Type	Code	Summary	More Information
<b>Residential Energy Efficiency Tax Credit</b>	Financial Incentive	Personal Tax Credit	26 USC §25C	<p>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). (Expires 12/31/2016)</p> <p>A taxpayer may claim a credit of 30% of qualified expenditures for a system that serves a dwelling unit located in the US 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.</p>	<a href="http://programs.dsireusa.org/system/program/detail/1274">http://programs.dsireusa.org/system/program/detail/1274</a>
<b>Residential Renewable Energy Tax Credit</b>	Financial Incentive	Personal Tax Credit	26 USC §25D		<a href="http://programs.dsireusa.org/system/program/detail/1235">http://programs.dsireusa.org/system/program/detail/1235</a>

## 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% by 2020, as compared to 2000 levels. The 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 20% 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>

Note: These statistics are based on self-reported data submitted by public entities. The Energy Office makes no representation regarding the accuracy of these data. Dollars adjusted using the Consumer Price Index-Urban, BLS (data.bls.gov)

**The South Carolina Energy Conservation Plans Act of 2008** (SC Code 48-52-620) amended several sections of law to provide for specific energy reduction and reporting requirements for state agencies. The law also established the Wind Energy Production Farms Feasibility Study Committee.

**The South Carolina Energy Independence and Sustainable Construction Act of 2007** (SC 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 LEED certification standards or to the Green Building Initiative's Green Globes certification standards.

The South Carolina Energy Independence and Sustainable Construction Act also 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% 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.

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

**Base Load Review Act** (SC Code 58-33-210 et seq.) South Carolina lawmakers in 2007 established the BLRA, a law which adds structure and consistency to the process regulated utilities follow in licensing and building new base load generation plants.

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 is an order issued by the PSC 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 in the statute, 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** — A 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, 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 Cooperatives' 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 PSC, and once that time period has passed, file with the PSC and provide to ORS a schedule of its proposed rates. Once the utility files with the PSC a schedule setting forth its proposed rate changes the PSC must hold a public hearing concerning the lawfulness or reasonableness of the proposed changes, and if the proposed changes relate to rates, the PSC must issue its order approving or disapproving the changes within six months after the date the schedule is filed. In making its determination, the PSC 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 that is on file with the PSC.

In addition to a hearing to determine rates, a fuel cost hearing held by the PSC will determine whether an adjustment in the base-rate amount designed to recover fuel costs should be granted. After the hearing, the PSC 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 programs 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 PSC is vested with the power and jurisdiction to supervise and regulation the rates and services 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 PSC at least 30 days' notice of its intention to file, and after that period has expired, the utility will file with the PSC and provide to ORS a schedule setting forth the proposed changes. After the schedule is filed, the PSC must, after notice to the public, hold a public hearing concerning the lawfulness or reasonableness of the proposed changes. The PSC 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 services 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 a rate stabilization adjustment apply to its rates, the PSC 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 basis 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 PSC's order, the utility must file with the PSC, 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 PSC's order, and the PSC 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 PSC. Once the PSC has received an Application for a Certificate, the PSC will fix a date for a public hearing that will occur at least 60, but not more than 90, days after receipt. The PSC will finish the hearing as expeditiously as practicable. Thereafter, the PSC 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 the Governor 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, and Leasing. Act 236 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 CWA and CAA, the South Carolina PCA has additional requirements not set forth in its federal counterparts. DHEC 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 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 PURC. This ten-member committee is composed of six members of the South Carolina 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 Radioactive 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 PSC to adjust the level of allowable costs or to allow a cost not previously designated allowable. The PSC 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.) Passed in 1992, the Act created the State Energy Office and stated that “it is the policy of this State to have a comprehensive state energy plan” that maximizes, to the extent practical, environmental quality, energy conservation, and efficiency and minimizes the cost of energy throughout South Carolina. This plan is called the Plan for State Energy Policy. The Act also created the State Energy Office, which serves as the principal energy planning entity for South Carolina with its primary purpose being 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 submit a state energy action plan that includes, but is not limited to activities by the State Energy Office to carry out the Plan for State Energy Policy to the Governor, and other relevant parties, annually.



**State Energy Standards** (SC Code 6-10-30 et seq.) In 2006, the 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. 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.

## State Tax Credits/Incentives

Name	Category	Policy / Incentive Type	Code	Summary	More Information
<b>Biomass Energy Tax Credit (Corporate)</b>	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>
<b>Biomass Energy Tax Credit (Personal)</b>	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>
<b>Energy Efficient Manufactured Homes Incentive Tax Credit</b>	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>

Name	Category	Policy / Incentive Type	Code	Summary	More Information
<b>Solar Energy and Small Hydropower Tax Credit (Corporate)</b>	Financial Incentive	Corporate Tax Credit	§12-6-3587	<p>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.</p> <p>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.</p>	<a href="http://programs.dsireusa.org/system/program/detail/1804">http://programs.dsireusa.org/system/program/detail/1804</a>
<b>Solar Energy and Small Hydropower Tax Credit (Personal)</b>	Financial Incentive	Personal Tax Credit	§12-6-3587	<p>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.</p> <p>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.</p>	<a href="http://programs.dsireusa.org/system/program/detail/1803">http://programs.dsireusa.org/system/program/detail/1803</a>

# Appendix G: Clean Power Plan - Compliance Projections and Modeling

## EPA Clean Power Plan

On August 3, 2015, the US EPA released the final version of the CPP 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% from 2005 levels.

In the final 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 CAA. 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 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 for reducing carbon emissions, which has to be submitted within three years. DHEC formed a coalition of stakeholders (SC Energy Coalition) to work on the State Implementation Plan. 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 State Implementation Plan. By forming statewide collaborative partnerships, South Carolina has taken a proactive approach in shaping these national standards. DHEC remains committed to working with all stakeholders to ensure that the development of the State Implementation Plan 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 South Carolina Energy Principles. The South Carolina goal, which contributes toward meeting the national goal, is to reduce CO<sub>2</sub> emissions by 36% from 2012 baseline emissions.

As of January 2013, South Carolina's annual CO<sub>2</sub> emissions had already dropped 32% 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 Act 236, and
- Increased use of energy-efficiency measures by South Carolina customers.

Adopting rules for CPP 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 US Supreme Court entered a stay of implementation of the EPA's CPP 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 US Court of Appeals for the District of Columbia denied the same request weeks earlier. The Court of Appeals heard 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 (for example, 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; and

- Energy efficiency available for compliance.

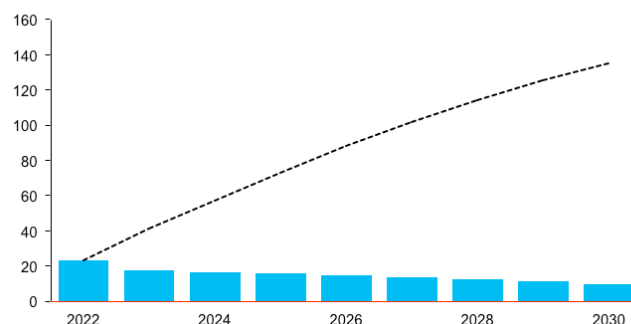
Depending on the outcome of the District and Supreme Court actions, the SC Energy Coalition will resume its effort to assess the pros and cons of the various CPP compliance pathways to provide recommendations that are most feasible and beneficial for the citizens of South Carolina. This evaluation will 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.

As part of the stakeholder process, a compliance model was developed to predict South Carolina’s ability to comply with the 2030 CPP 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.

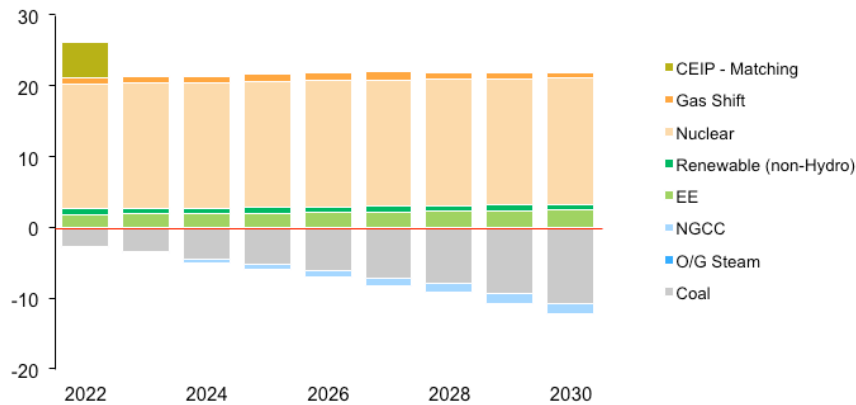
The charts shown below display the results of the modeling efforts to date. The chart below demonstrates that as South Carolina approaches the 2030 CPP compliance date, ERCs continue to increase in the state cumulatively. Essentially, this trend means that South Carolina will continue to have enough 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.

**Chart 1: Rate-Based Plan: Net ERC Positions (millions)**



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.

**Chart 2: Rate-Based Plan: ERC Supply/Demand (millions)**

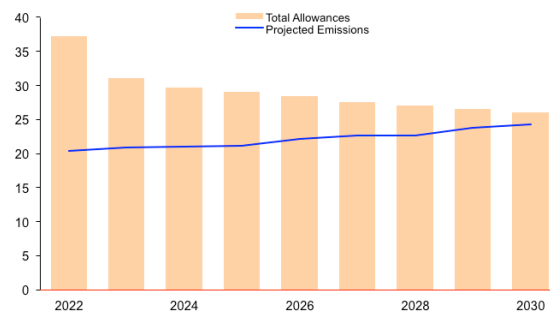


## Understanding Chart 2

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. Conversely, fossil fuel electric generation — including coal, natural-gas combined cycle, and oil/gas steam — demands 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 to the right 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.

**Chart 3: Mass-Based Plan Compliance (millions of tons)**

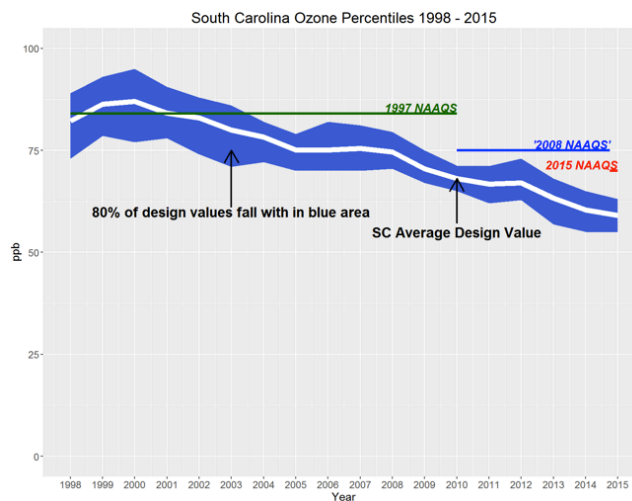


# Appendix H: Environmental Trends

## 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.



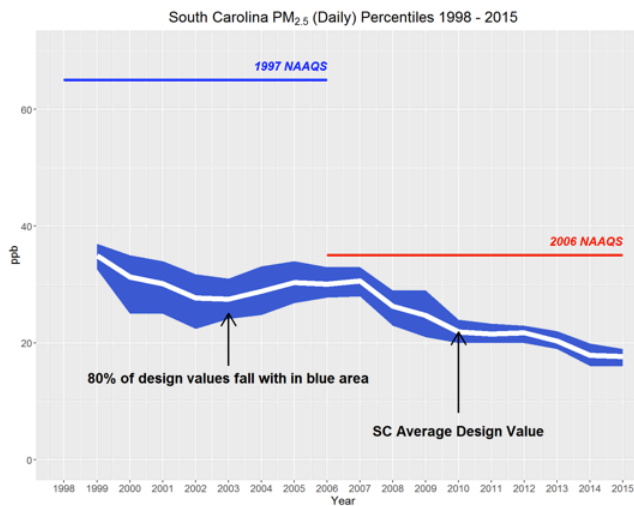
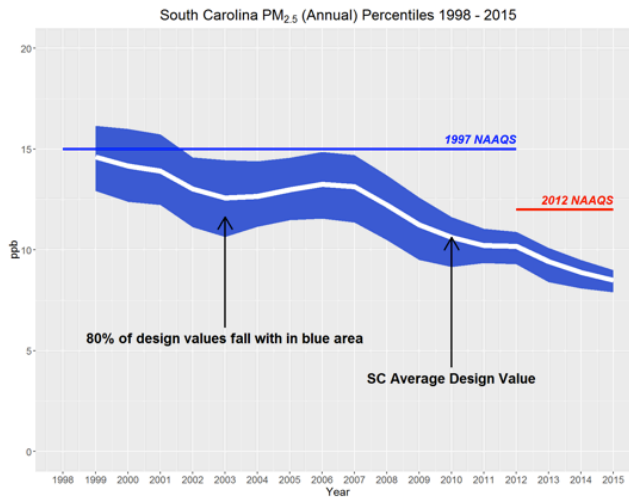
*A design value is a statistic that describes the air quality status of a given location relative to the level of the NAAQS.*

**Particulate Matter** – Particulate matter is so small that it can lodge deeply within the human body 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 show the downward trend in ambient-air particulate matter concentrations over the past decade.

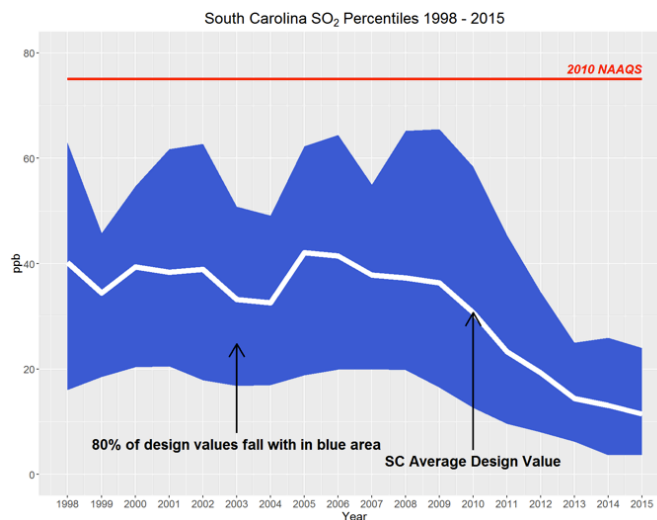
<sup>1</sup><https://www3.epa.gov/apti/ozonhealth/effects.html>

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

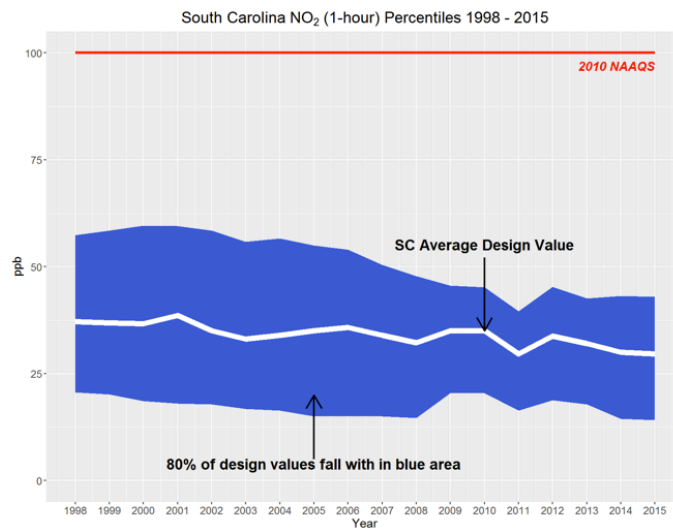
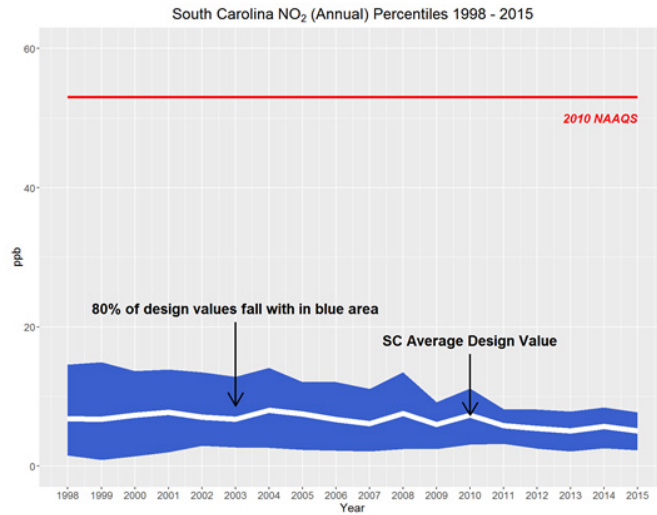




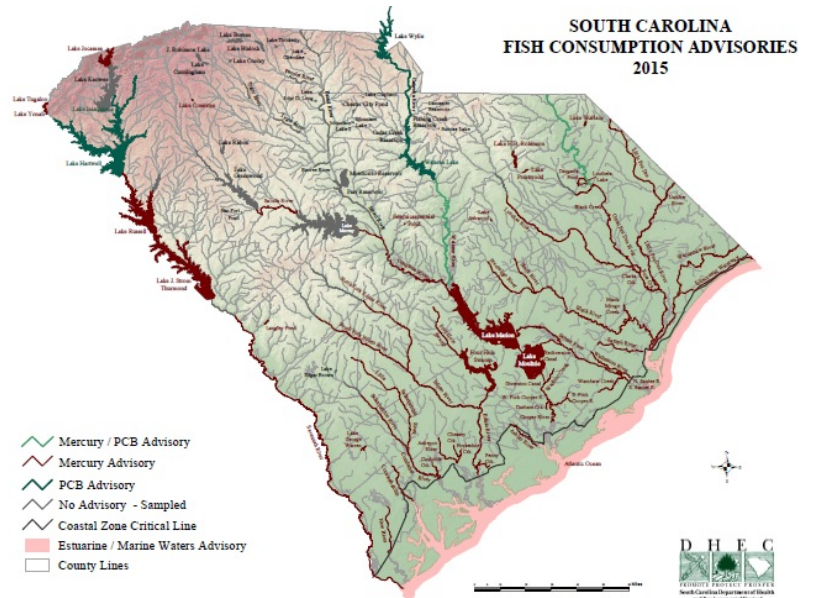
**Sulfur Dioxide and Nitrogen Oxides** – Sulfur dioxide and nitrogen oxides can exacerbate breathing problems and form acid rain that harms waterways, plants and animals, and buildings.<sup>3</sup> South Carolina has seen about a 71% decrease in sulfur dioxide and a decrease of 61% in nitrogen oxides 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>



**Mercury** – Coal facilities and wastewater treatment plants release small amounts of mercury through their wastewater discharges. However, most mercury pollution originates from air deposition that results from the burning of coal, oil, wood, and wastes that contain mercury. The figure to the right shows that almost half the waterways in the state are currently under a fish consumption advisory due to mercury levels.



# Appendix I: 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 five 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

IOU 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 below.

Duke Energy Carolinas, LLC
Duke Energy Progress
Lockhart Power Company
South Carolina Electric & Gas Company

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

Piedmont Natural Gas
South Carolina Electric & Gas Company

## State-Owned Utilities

Santee Cooper is a state-owned utility governed by a board of directors; board members 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.

Santee Cooper
---------------

Residential customer profiles of each of the 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>
<p>The majority of customers (81%) live in single family homes; 10% of customers live in mobile homes.</p> <p>More than six out of ten (65%) customers own or are purchasing their residence.</p> <p>Four out of ten (41%) customers' homes were built between 1970 and 1999.</p> <p>More than one half (56%) of customers live in homes with less than 2,000 square feet of living space.</p> <p>More than four out of ten (46%) customers have programmable thermostats.</p>	<p>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.</p> <p>Less than one out of five (14%) customers have installed 1 to 3 LED bulbs in their home.</p>
	<b>Solar</b>
	<p>&lt;1% of customers have added solar panels.</p> <p>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.</p>
<b>Appliances</b>	<b>Technology Preferences</b>
<p>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.</p> <p>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.</p>	<p>Almost six out of ten (58%) customers have high speed Internet service at their home; 4% have dial-up Internet service.</p> <p>Eight out of ten (81%) customers use cell phones in their home.</p> <p>Two out of three (68%) customers use traditional landline telephones.</p>
<b>Heating and Cooling</b>	<b>Demographics</b>
<p>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.</p> <p>Four out of ten customers' primary heating system is 6-15 years old.</p> <p>95% of customers use a stand-alone heat pump as the main energy source to heat their home.</p> <p>More than four out of ten (45%) customers use central air conditioning to cool their home.</p>	<p>23% of respondents have at least one person 65 years or older living in their residence.</p> <p>26% of customers have a total 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+.</p>

## South Carolina Electric & Gas Residential Customer Profile (from various sources)

### Housing

67% of electric customers live in single family homes, 23% live in multi-family homes, and 10% live in mobile/manufactured/modular homes.  
 90% of gas customers live in single-family homes, 9% in multi-family homes, and 1% in mobile homes.  
 37% live in the Columbia MSA 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.  
 81% live in urban areas; 19% live in rural areas.  
 68% own their homes.  
 Source: U.S. Census  
 41% were built prior to 1980 (electricity as primary heating source).  
 63% were under 2,000 square feet (electricity as primary heating source).  
*Source: Direct Options, 2016*

### Energy Savings

80% have CFLs; 8% have LEDs.  
 Source: Opinion Dynamics, 2013  
 44% say their home is energy efficient.  
*Source: SCE&G Voice of the Customer Panel, 2015*

### Solar

<1% have a solar-panel system on their home.  
 50% of homeowners have an interest in rooftop solar panels.  
*Source: SCE&G Voice of the Customer Panel, 2015*

### Appliances

77% have an electric range; 24% have a gas range.  
 88% have a dishwasher.  
 98% have a microwave.  
 22% have more than one refrigerator; 39% have a separate freezer.  
 24% have a natural gas fireplace.  
 96% have a clothes washer.  
 90% have an electric clothes dryer; 6% have a gas clothes dryer.  
 99% have at least one television.  
 58% heat water with electricity; 38% heat water with gas.  
 80% have storage-tank water heaters; 16% have tankless water heaters.  
*Source: SCE&G Voice of the Customer Panel, 2016*

### Demographics

24% of householders are 65+ years old.  
 58% have income < \$50K; the median income is \$54,028.  
*Source: Claritas, 2013*

### Heating and Cooling

52% use an electric heat pump to heat their home.  
 42% use gas to heat their home.  
 29% have a primary heating system that is 10 or more years old.  
 96% have central air conditioning or a heat pump to cool their home.  
 68% have ceiling fans.  
*Source: SCE&G Voice of the Customer Panel, 2016*

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

**Housing**

52 percent of customers live in single-family housing.  
 32 percent live in multi-family: apartments, condos, townhomes, or duplexes.  
 17 percent live in mobile or modular homes.  
 56 percent own their home as a primary residence.  
 30 percent own as a secondary/recreational residence.  
 8 percent rent or lease.  
 6 percent own as a rental property.

**Energy Savings**

52 percent have a programmable thermostat.  
 72 percent have CFLs installed in their homes.  
 45 percent have upgraded heating/cooling in past two years or plan to do in next two years.  
 24 percent have upgraded insulation or duct work in past two years.

**Solar**

<1% of customers have added solar panels.  
 For those who do not currently use solar panels, close to one out of ten (9%) customers are either very likely or somewhat likely to install solar panels in the next 5 years.

**Appliances**

92 percent have a refrigerator/freezer.  
 91 percent have an electric water heater.  
 88 percent have an electric range; 4 percent have a gas range.  
 88 percent have a microwave.  
 77 percent have an electric clothes dryer; 2 percent have a gas clothes dryer.  
 77 percent have an electric dishwasher.

**Appliances (cont.)**

83 percent have a clothes washer.  
 18 percent have a separate freezer; 10 percent have more than one refrigerator.  
 52 percent have at least one LED/LCD TV, 49 percent have at least one standard TV, and 17 percent have a plasma TV.  
 41 percent have a laptop computer; 34 percent have a desktop computer.

**Heating and Cooling**

97 percent use electricity as a primary heating source.  
 2 percent use natural gas.  
 1 percent use LP gas.  
 95 percent have a heat pump or central air conditioning.

**Demographics**

<1 percent have solar panels installed at home.  
 <1 percent have subscribed to a Santee Cooper community solar project.

**2015 Central Electric Power Cooperative Residential Consumer Survey (sample findings)**

**Housing**

The majority of customers (71%) live in single family homes; a fifth (22%) of customers live in mobile/manufactured/modular homes. 48% of customers live in urban/suburban areas while 41% of customers live in rural areas.

More than 9 out of 10 (93%) customers own their residence. 26% of homes were built 1982 or earlier, 22% were built 1993-2002, 17% were built 1983-1992, and 15% were built 2003-2007.

7 out of 10 customers (73%) live in a one-story residence.

Nearly two thirds (65%) of customers live in homes with less than 2,200 square feet of living space.

11% of customers have a pool.

**Energy Savings**

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.

4 out of 10 customers (43%) regularly adjust their thermostat.

Close to five out of 10 (47%) customers have converted their lighting to CFL or LED.

**Solar**

<1% of customers have added solar panels.

**Appliances**

More than seven out of ten (74%) customers have a dishwasher in their home.

More than nine out of ten (94%) customers have electric ranges in their homes.

More than six out of ten (63%) customers have a separate freezer in their home.

There are at least 2 TVs per household (2.29 average TVs).

10 out of 10 customers have a dishwasher in their home.

**Technology Preferences**

1 out of 4 customers has no access to the Internet.

72% of customers prefer to receive energy information and tips through direct mail.

Of customers with Internet access, 36% use cable, 22% use DSL, 8% use satellite, 6% use cellular, and 2% use dial-up.

32% of customers use Internet as a source for energy information and tips, 30% use television, and 25% use the newspaper.

**Heating and Cooling**

Seven out of ten customers (74%) use electricity as their primary heating fuel, followed by 2 out of 10 customers (22%) who use natural gas.

76% of homes use no other secondary fuel for heating. Of homes that have other sources for heating, 19% use electricity, 16% use propane, and 6% use gas.

8 out of ten (83%) customers use electric water heaters, followed by 1 out of 10 who use natural gas.

Three out of ten customers' primary heating system is 8-15 years old, and three out of ten customers' primary heating system is 2-7 years old.

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 who use electric central air (32.43%).

**Demographics**

46% of customers have someone 66 years or older living in their residence.

66% of customers have household members between 23-65 years of age.

20% of customers have a total 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+.

## 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.

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



## Municipal Electric Utilities

Municipal Departments or Divisions
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
Commission or Board of Public Works
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: 12,500 kW

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

### **Greer 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

Municipal Departments or Divisions
City of Bennettsville
City of Fountain Inn
City of Orangeburg
City of Union
Town of Winnsboro
Commissions of Public Works
Bamberg Board of Public Works
Greenwood Commission of Public Works
Greer Commission of Public Works
Laurens Commission of Public Works
Natural Gas Authorities
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 Board of Public Works

Natural gas is the newest of utilities offered by the Bamberg Board of Public Works (Bamberg BPW). 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 natural-gas system has over 70 miles of main. The Bamberg BPW serves approximately 2,000 customers with one or more utilities.

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

#### Greenwood Commission of Public Works

The Greenwood Commission of Public Works (Greenwood CPW) has been providing safe and reliable natural gas to Greenwood County for over 70 years. The natural gas unit began operation in 1940 and 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 Greenwood 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 DCGT.

### **Greer Commission of Public Works**

The Greer Commission of Public Works (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 CPW natural-gas system was established in 1958 and consists 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 CPW provides service to approximately 22,000 customers in Spartanburg and Greenville counties. The maximum daily volume is 32,000 dekatherms.

### **Laurens Commission of Public Works**

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. The system grew over the years. In the 1950s, the citizens of Laurens established a municipally owned natural-gas system, making it 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 DCGT 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 nine 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 two inches to 10 inches 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 consists 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% plastic mains. Gas is transported using Transco (Transcontinental Gas Pipeline Corporation) transmission pipelines beginning at a location south of the City of Spartanburg. The gas is transported approximately 22 miles to the City of Union and provides 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's citizens for over 40 years. It currently provides natural gas to approximately 2,800 gas utility customers.

## **Natural Gas Authorities**

### **Chester County Natural Gas Authority**

The Chester County Natural Gas Authority (Chester County NGA) 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 Natural Gas Authority**

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

### **Fort Hill Natural Gas Authority**

Fort Hill Natural Gas Authority (Fort Hill NGA) 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 NGA 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 NGA serves approximately 38,000 residential, commercial, and industrial customers in a three-county service area. Fort Hill NGA maintains approximately 2,700 miles of steel and polyethylene plastic distribution gas mains and service lines of varying diameters between 5/8" and 10." Fort Hill NGA 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 US to Fort Hill NGA via three interconnects with Transco in Anderson County, South Carolina.

### **Lancaster County Natural Gas Authority**

Since 1954 Lancaster County Natural Gas Authority (Lancaster County NGA) 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 Natural Gas Authority**

For over 55 years, York County Natural Gas Authority (York County NGA) 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 York County 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 it 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.



## South Carolina Wholesale Power Producers

Wholesale power producers are a 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 under South Carolina law.

### 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 and provides power to the local utility and steam to a nearby chemical plant.

The Columbia Energy Center 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 DEP, a subsidiary of Duke Energy. The Broad River facility utilizes five natural-gas turbines. The units can be on the grid and supplying power within 15 minutes to help serve peak and emergency loads.

# Appendix J: 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 (for example, 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 Upgrades

Significant grid enhancements have taken place in South Carolina. These include Volt/Var Optimization systems like DEP's 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.

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 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 ATC 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 the 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.

## 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 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 validating, editing, and estimating – down to the hour or less.

**Number of Meters Implementing TOU 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.

Smart Meter Penetration in South Carolina						
Utility	Total Number of Meters	Manually Read Meters	AMR Meters	AMI Meters	Number of Meters Time of Use Rate Ready	Number of Meters Implementing Time of Use Rate
SC Electric 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
Municipalities	172,749	45,298	82,260	44,813	39,202	27,163
<b>Total</b>	<b>2,558,183</b>	<b>115,261</b>	<b>1,587,200</b>	<b>855,345</b>	<b>629,119</b>	<b>93,191</b>

## 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 that distribution utilities follow and share are those defined by the SAIDI and 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	0.32	20.2	0.33	26.8

Note: For Central Electric, the SAIFI and 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.

# Appendix K: Natural Gas Permitting at the State Level

## DHEC Pipeline Permitting Overview

Below is a list of permits that may be required by DHEC for proposed gas pipelines:

### 1. Bureau of Water

*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 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 Bureau of Water. Potential applicants are encouraged to contact the Bureau of Water 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 DHEC 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 SC 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 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**

*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**

*Air Construction Permit:* Congress established an air construction permitting program as part of the EPA's 1977 CAA 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.

# Appendix L: Natural Gas Supply and Delivery

## Natural Gas Pipeline Infrastructure

In 2011 the DOT and its 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 the 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. Steel is exclusively used for high-pressure transmission pipelines; however, 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.

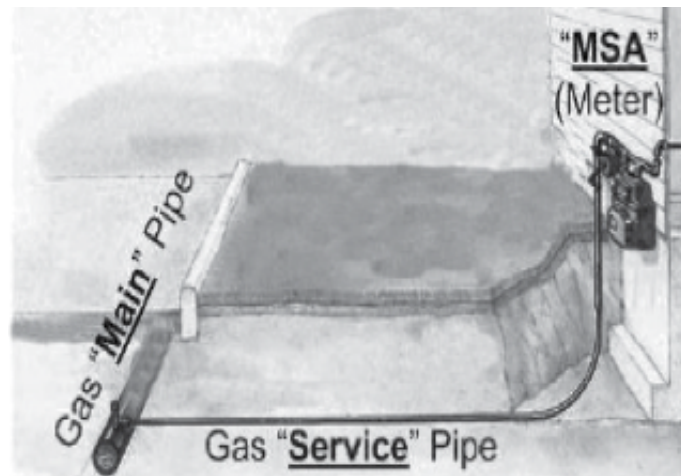
Higher risk uncoated pipes, commonly known as bare steel pipe, are being replaced by coated pipelines, thus eliminating external corrosion. PHMSA's accelerated approach has made high-

pressure bare steel replacements its highest priority. South Carolina is a leader in this area with no uncoated steel transmission pipelines and only six 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 South Carolina at the close of 2015. Pennsylvania takes the bottom ranking with bare steel transmission at 963 miles, and Ohio has the lowest distribution ranking at 7,672 miles of pipe in service.

## Natural Gas Main and Service Infrastructure

The infrastructure of a gas system consists of two main components: mains and services. The figure below illustrates how a gas main comes from a transmission 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



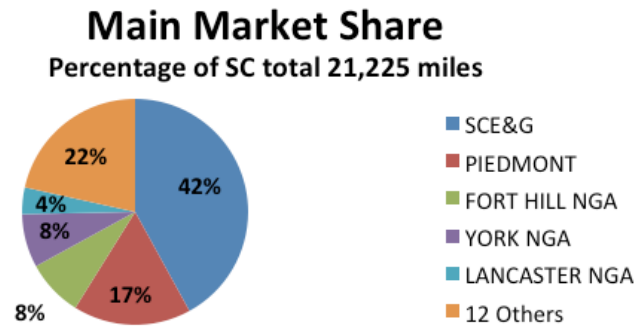
Source: SoCal Gas

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 20 years polyethylene pipe use has increased due to its longer lifespan and affordability as compared to steel, which naturally corrodes from elements in the ground and moisture. South Carolina gas utilities report that no cast 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 before 1950 that are still in service. The largest portion of gas utility infrastructure construction occurred between 1990 and 2009.

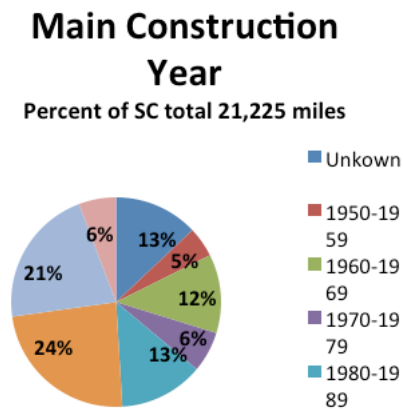
## Main Infrastructure

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 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 (PHMSA)



### SOUTH CAROLINA GAS UTILITY – CONSTRUCTION YEAR OF MAINS (PHMSA)



### SOUTH CAROLINA GAS UTILITY – MAINS BY SIZE (PHMSA)

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
	14,092	4,478	2,361	286	7	21,225
	66%	21%	11%	1%	0%	

## SOUTH CAROLINA GAS UTILITY – MAINS BY MATERIAL (PHMSA)

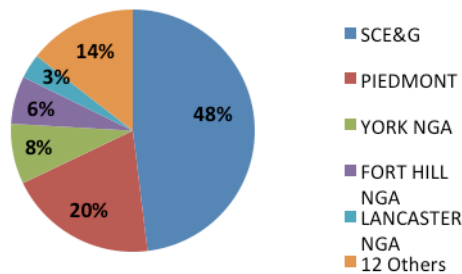
SC GAS UTILITY	Steel	Plastic	Total	% Steel	% Plastic
SOUTH CAROLINA ELECTRIC & GAS CO	3,905	5,013	8,918	44%	56%
PIEDMONT NATURAL GAS CO INC	1,461	2,116	3,577	41%	59%
FORT HILL NGA	742	988	1,730	43%	57%
YORK COUNTY NGA	358	1,264	1,622	22%	78%
LANCASTER COUNTY NGA	234	579	813	29%	71%
GREENWOOD CPW	332	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.

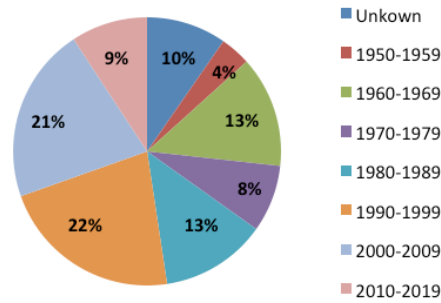
## SOUTH CAROLINA GAS UTILITY – SERVICE MARKET SHARE (PHMSA)

**Service Market Share**  
Percent of SC total 784,081 Services



## SOUTH CAROLINA GAS UTILITY – CONSTRUCTION YEAR OF SERVICES (PHMSA)

**Service Construction Year**  
Percent of SC total of 784,081 Services



## SOUTH CAROLINA GAS UTILITY – SERVICES BY SIZE (PHMSA)

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 (PHMSA)

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%	

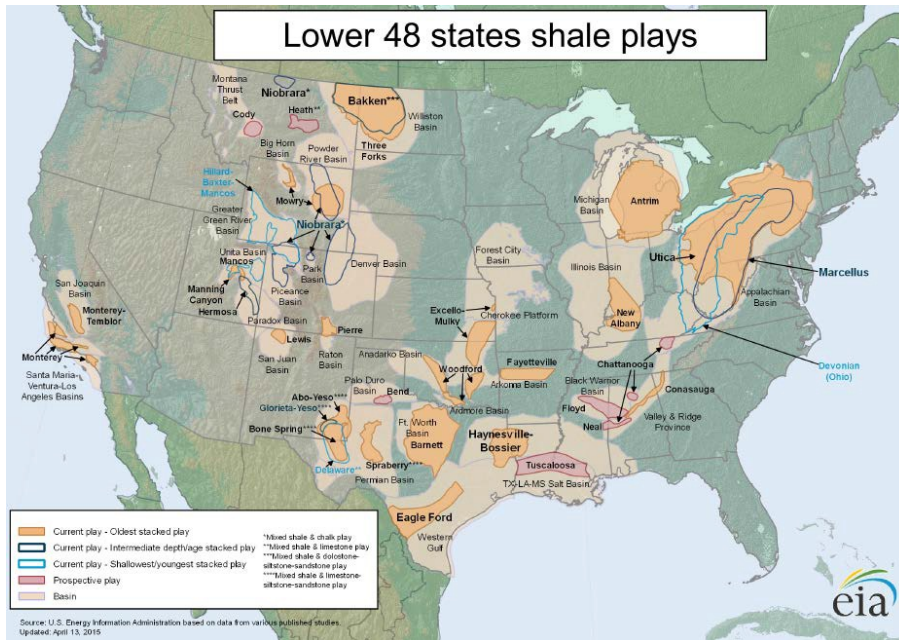
## Natural Gas Supply and Delivery

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.

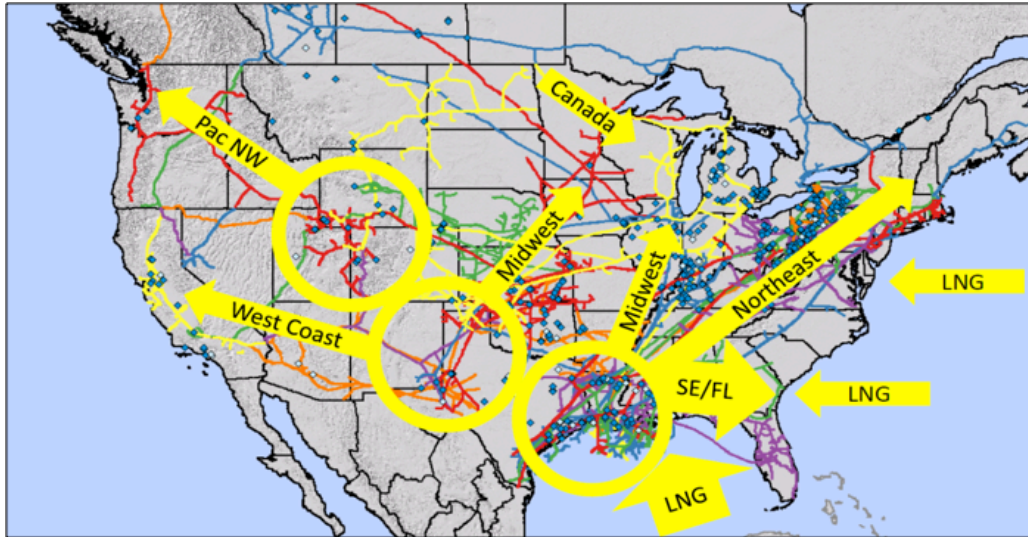
### Major shale basins in the United States



Source: EIA

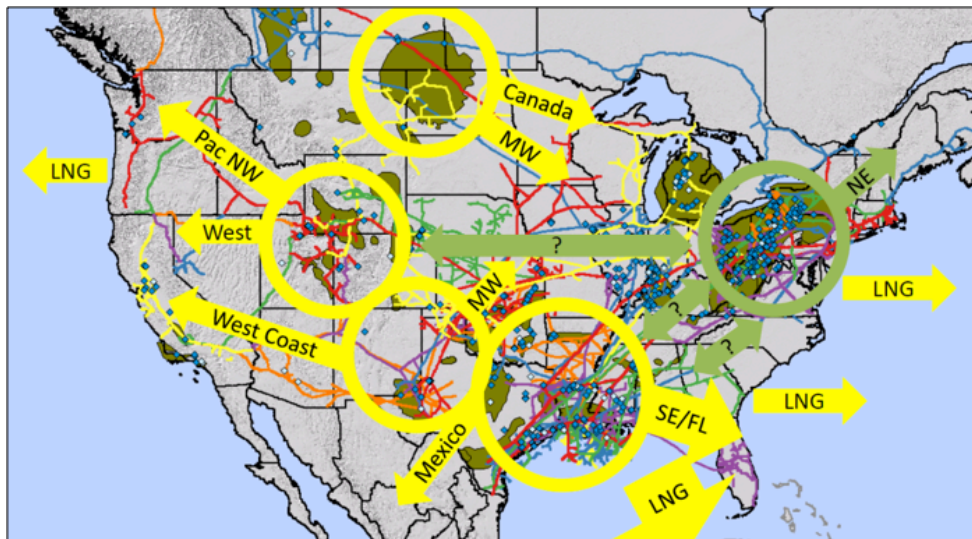
The change in the pre-shale to post-shale supply flow is illustrated in the following figures.

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



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

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

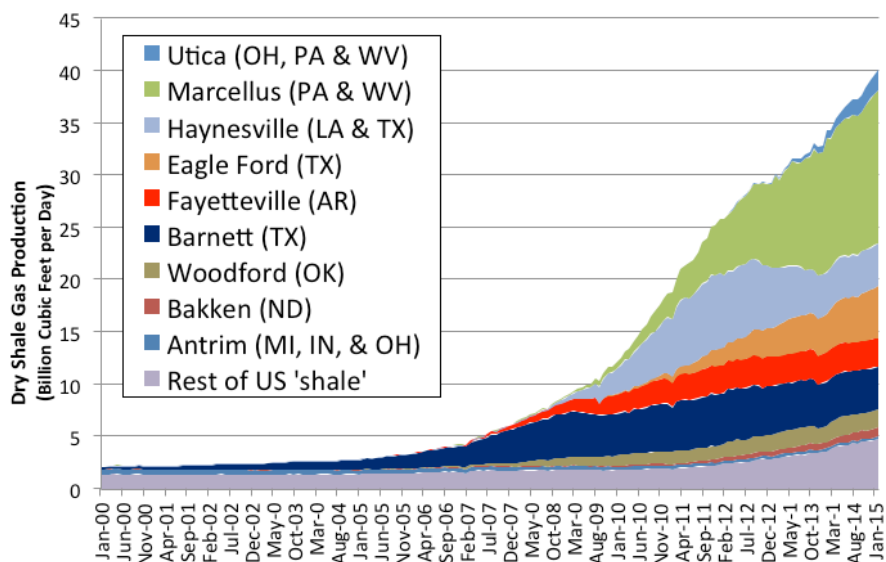


Source: America's Natural Gas Alliance (now part of the American Petroleum Institute)

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.

## Interstate Pipelines

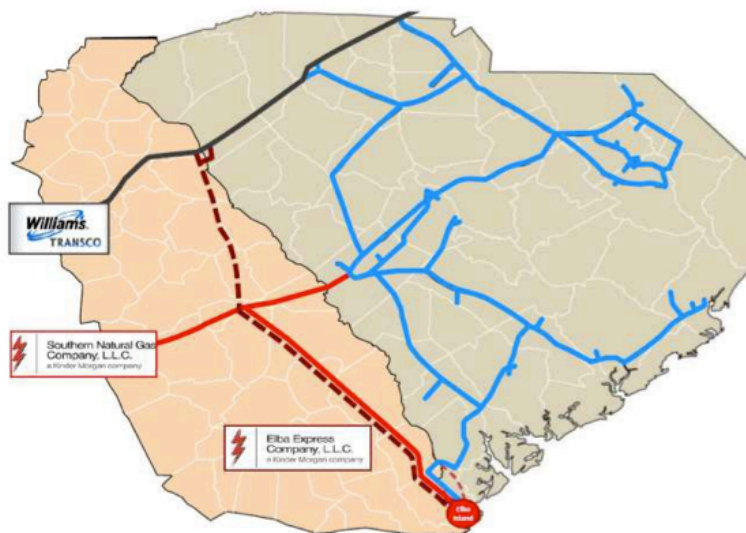
Three interstate natural gas pipelines deliver natural gas from out-of-state sources to support the needs of South Carolina end-users. These interstate pipelines are DCGT, SNG, and Transco.

### Dominion Carolina Gas Transmission

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 in South Carolina and Georgia 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 pipeline between two inches to 24 inches in diameter operating at pressures up to 1200 psi. The majority of the natural gas that flows into DCGT is sourced from Sonat and Transco.

## DCGT MAP WITH INTERSTATE INTERCONNECTS



Source: DCGT

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% between 2010 and 2014. DCGT has two proposed expansion projects: a \$119 million Transco-to-Charleston project and a Columbia-to-Eastover project.

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

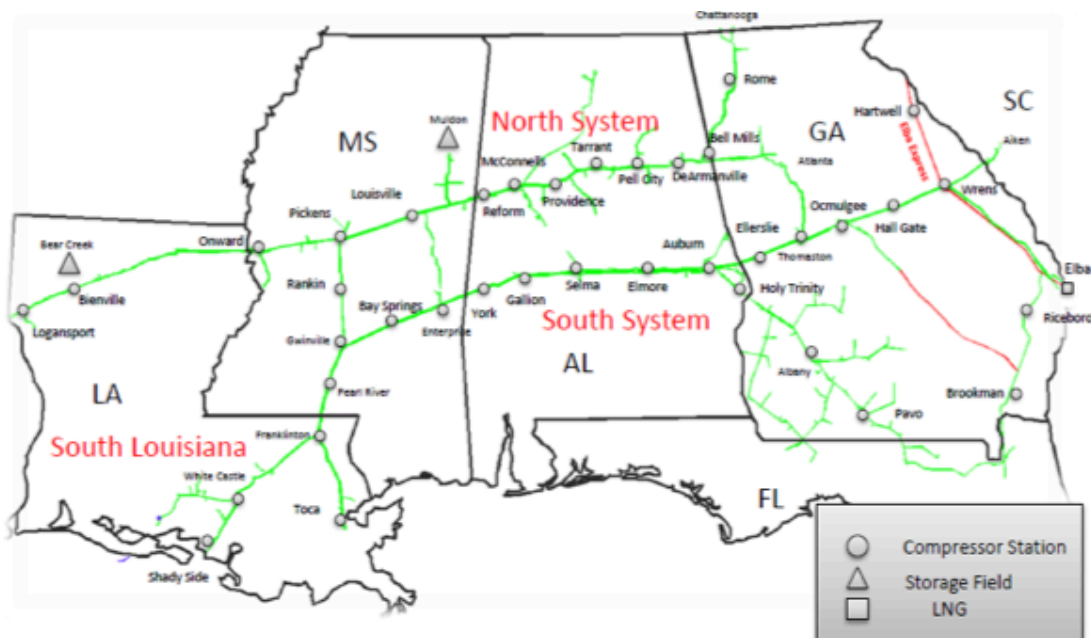
## Southern Natural Gas

SNG 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, SC and in Chatham County, GA. SNG has other direct customers in Aiken County, SC, 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

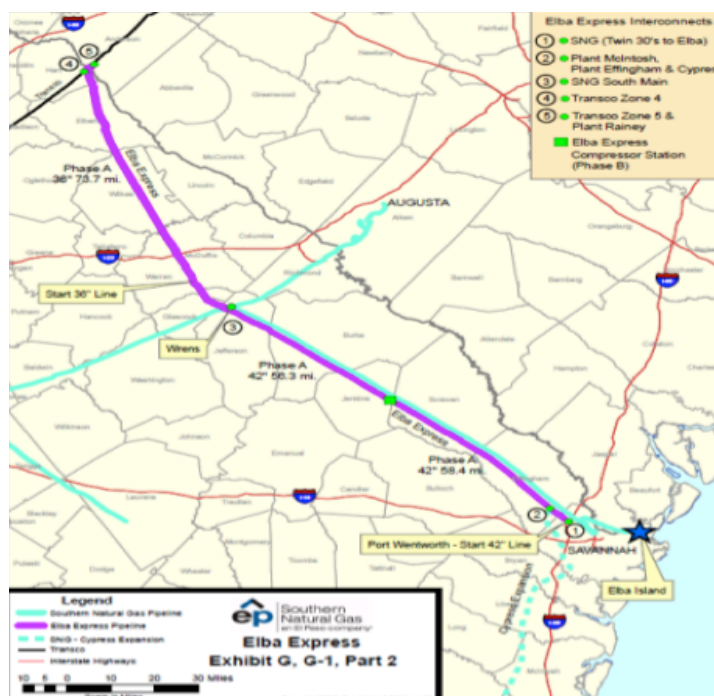


Source: Kinder Morgan

## 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, SC 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 US, imports of LNG into Elba Island and across the US 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 is an interstate natural gas transmission company that owns and operates an approximately 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, DC, 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. According to Transco operational data, the design capacity of the pipeline into South Carolina is approximately 3.8 BCF/day.

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.



Source: Williams

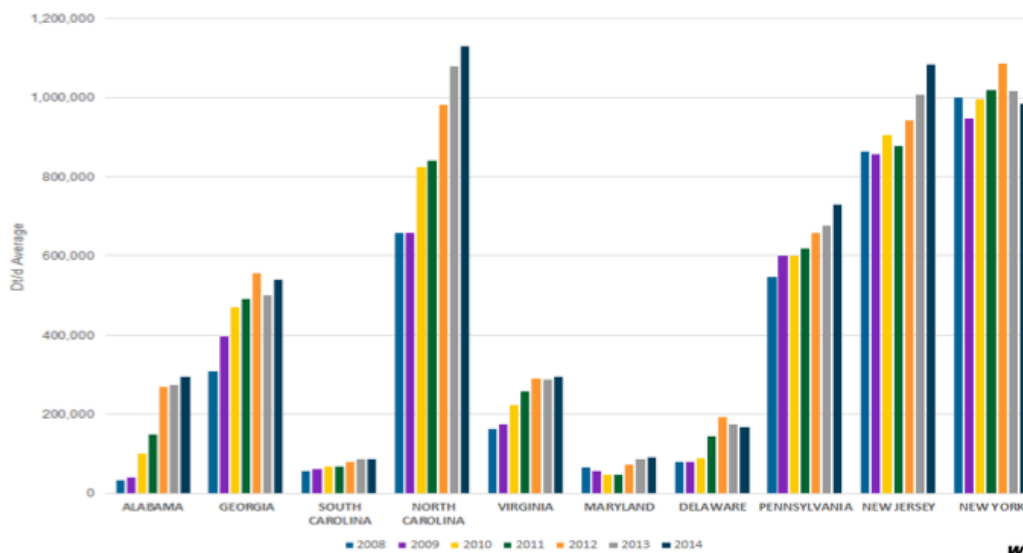
The 717 BCF is lower than previous years as south-to-north flow displacement continues as a result of Marcellus Shale production growth. Historical flows on Transco into South Carolina were 805 BCF in 2013, 977 BCF in 2012, and 1,034 BCF in 2011.

As of December 31, 2015, Transco's system had a mainline delivery capacity of approximately 6.4 million dekatherms 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 5.1 million dekatherms of natural gas per day for a system-wide delivery capacity total of approximately 11.5 million dekatherms 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% equity-method investment in Pine Needle LNG Company, LLC, and an LNG storage facility with four BCF of storage capacity.

# Appendix M: 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). The ACP is an approximately 600-mile, FERC-regulated pipeline originating in Harrison County, West Virginia. The southern termination of the ACP is in Robeson County, North Carolina, which borders South Carolina.

The 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 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

DCGT is proposing to construct and operate approximately 28 miles of new eight-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% 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 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 LNG export facilities. According to 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, eight 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.

# Appendix N: 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 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 proved 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 one 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.

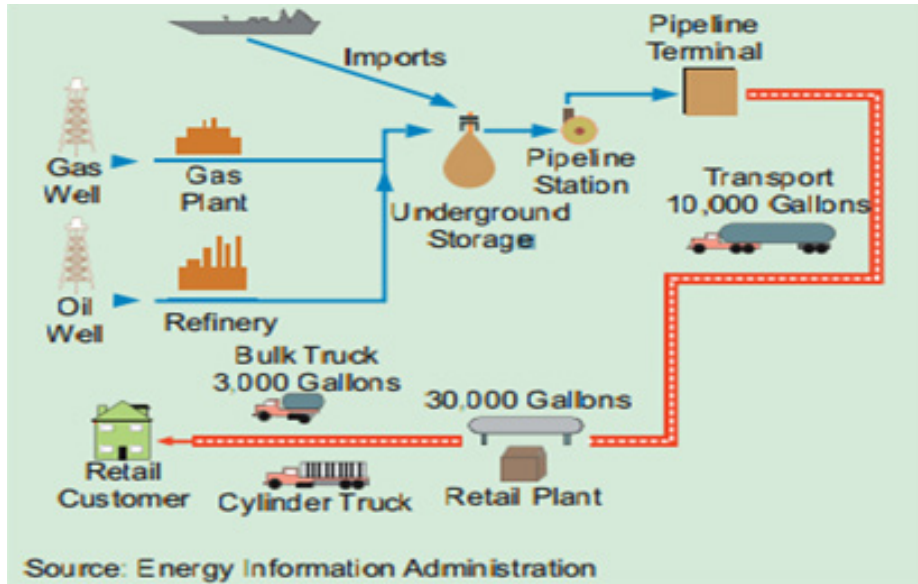
## Where Does Propane Come From?

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% of domestic supply. North American supplies of propane are adequate to meet the entire US 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 with the demand for 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 and 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 SC.

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 SCPGA 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.

# Appendix O: 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>

## DEC

Generation Capacity (MW) *Only Including Operating Units		
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) *Only Includes Operating Units		
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>

## 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>

# Appendix P: 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		Electric	
2015		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	Electric	
2015	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.	Electric Cooperatives Total	
2015	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	
2015	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>	<b>11,125,584</b>	<b>MWh</b>	<b>54,891,036</b>	<b>MBtu</b>

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

Municipal Electric Systems	Electric	
2015	Consumption (MWh)	Customers (#)
Residential	1,578,989	132,446
Commercial	1,534,748	47,915
Industrial	782,957	392
<b>Total Consumption</b>	<b>3,896,694</b>	<b>180,753</b>

# Appendix Q: Energy Efficiency and Renewable Energy Programs

## Energy Efficiency

The LBNL defines EE as using less energy to provide the same service. EE 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

### What is EM&V?

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

Customer-funded EE programs are commonly subject to this process. The EM&V process includes determining and documenting the results, benefits, and lessons learned from EE programs. The overall evaluation objectives are to assess EE 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 ACEEE reported that “when quantifying and reporting energy efficiency program savings,” 19 of 43 states surveyed (or 44%) responded that they use both net and gross savings, 15 states (35%) use net, and 9 states (21%) 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 customers 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 EE and Renewable Energy Programs available in South Carolina.

DEC 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
<b>Appliance Recycling program</b>	Energy Efficiency	Residential	Promotes the removal and responsible disposal of older, inefficient appliances	10,550,952	1,424	5,213,450	705
<b>Energy Assessments Program</b>	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
<b>Energy Efficiency Education Program</b>	Energy Efficiency	Residential	Engages schoolchildren with an in-school theatrical presentation regarding energy efficiency and provides each child a home energy efficiency kit featuring weather stripping and LED bulbs.	4,417,898	827	4,160,489	779

DEC 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
<b>Energy Efficient Appliances and Devices</b>	Energy Efficiency	Residential	The company provides financial incentives for customers to install energy-efficient equipment. Program consists of measures related to all types of lighting and hot-water heating.	145,723,780	16,986	119,224,428	13,887
<b>HVAC Energy Efficiency Program</b>	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
<b>Multi-Family Energy Efficiency Program</b>	Energy Efficiency	Residential	Targeted at getting energy-efficient water-saving measures and lighting installed into multi-family residences.	14,970,512	1,436	13,173,090	1,261
<b>My Home Energy Report</b>	Energy Efficiency	Residential	A periodic report is sent to customers to engage them around their energy usage by providing them a normative comparison to similar customers; also provides customers with actionable energy-saving tips.	228,776,428	61,770	215,446,739	58,171
<b>Income-Qualified Energy Efficiency and Weatherization Program</b>	Energy Efficiency	Residential	Provides income-qualified households 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
<b>Power Manager</b>	Demand Response	Residential	Program provides customers with a financial incentive to allow the company to cycle customers' air conditioners during peak events.	-	457,528	-	430,870
<b>Non-Residential Smart \$aver® Energy Efficient Food Service Products Program</b>	Energy Efficiency	Commercial and Industrial	The company provides financial incentives for customers to install energy efficient equipment. Program consists of measures related to food processing and preparation.	10,691,281	1,722	7,047,846	1,135

DEC 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
<b>Non-Residential Smart \$aver® Energy Efficient HVAC Products Program</b>	Energy Efficiency	Commercial and Industrial	The company provides financial incentives for customers to install energy efficient equipment. Program consists of measures related to heating and cooling.	7,718,198	2,299	5,087,947	1,515
<b>Non-Residential Smart \$aver® Energy Efficient IT Products Program</b>	Energy Efficiency	Commercial and Industrial	The company provides financial incentives for customers to install energy-efficient equipment. Program consists of measures related to computer systems and information technologies.	7,423,871	772	4,893,923	509
<b>Non-Residential Smart \$aver® Energy Efficient Lighting Products Program</b>	Energy Efficiency	Commercial and Industrial	The company provides financial incentives for customers to install energy-efficient equipment. Program consists of measures related to lighting.	87,851,745	15,050	62,592,188	10,752
<b>Non-Residential Smart \$aver® Energy Efficient Process Equipment Products Program</b>	Energy Efficiency	Commercial and Industrial	The company provides financial incentives for customers to install energy-efficient equipment. Program consists of measures regarding process-related energy usage.	1,161,907	242	765,946	160
<b>Non-Residential Smart \$aver® Energy Efficient Pumps and Drives Products Program</b>	Energy Efficiency	Commercial and Industrial	The company provides financial incentives for customers to install energy-efficient equipment. Program consists of measures related to motors, pumps, and drives.	6,208,214	803	4,092,544	529
<b>Non-Residential Smart \$aver® Custom Program</b>	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 incentives based on a specific customer application.	79,519,597	11,396	67,614,517	9,775

DEC 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
<b>Non-Residential Smart \$aver® Custom Energy Assessments Program</b>	Energy Efficiency	Commercial and Industrial	The company provides financial incentives for a customer to undertake an energy assessment that can be used to identify projects and helps them through the custom application process.	765,303	87	720,713	82
<b>PowerShare®</b>	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
<b>Small Business Energy Saver</b>	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
<b>Smart Energy in Offices</b>	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
<b>Business Energy Report Pilot</b>	Energy Efficiency	Commercial	Designed to engage commercial customers around understanding their energy usage by providing them periodic reports that feature a normative comparison to similar types of businesses and that include targeted, actionable tips to become more energy-efficient.	-	-	-	-
<b>EnergyWise for Business</b>	Demand Response	Commercial	Program provides small-business customers with financial incentives to allow the company to cycle customers' air conditioners during peak events.	-	14	-	13

DEP 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
<b>Residential Appliance Recycling Program</b>	Energy Efficiency	Residential	Promotes the removal and responsible disposal of older, inefficient appliances.	8,303,006	1,061	4,195,361	538
<b>Residential Energy Assessments</b>	Energy Efficiency	Residential	Provides customers with an energy audit of their home and an energy efficiency starter kit including LED bulbs.	-	-	-	-
<b>My Home Energy Report</b>	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 with actionable energy-saving tips.	132,315,687	35,955	125,895,040	34,211
<b>Energy Efficient Lighting Program</b>	Energy Efficiency	Residential	The company provides financial incentives for customers to install energy-efficient lighting. Program provides incentives in the form of discounts applied at retail stores and online.	136,848,030	19,715	77,265,505	11,131
<b>EnergyWise Program</b>	Demand Response	Residential	Program provides customers with a financial incentive to allow the company to cycle customers' air conditioners during peak events.	-	266,272	-	266,272
<b>Neighborhood Energy Saver Program</b>	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
<b>New Construction Program</b>	Energy Efficiency	Residential	Company provides financial incentives to builders to build new homes to a high efficiency standard.	7,046,952	2,741	5,699,247	2,217
<b>Home Energy Improvement Program</b>	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
<b>Energy Efficiency Education Program</b>	Energy Efficiency	Residential	Engages schoolchildren with an in-school theatrical presentation regarding energy efficiency and provides each child a home energy efficiency kit featuring weather stripping and LED bulbs.	2,284,689	226	2,173,824	215

DEP 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
<b>Multi-Family Energy Efficiency Program</b>	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
<b>Save Energy and Water Kit Program</b>	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.	-	-	-	-
<b>EnergyWise for Business</b>	Demand Response	Commercial and Industrial	Program provides small-business customers with a financial incentive to allow the company to cycle customers' air conditioners during peak events.	-	-	-	-
<b>Business Energy Pilot Program</b>	Energy Efficiency	Commercial and Industrial	Designed to engage commercial customers around understanding their energy usage by providing them periodic reports that feature a normative comparison to similar types of business and that include targeted, actionable tips to become more energy-efficient.	-	-	-	-
<b>Energy Efficiency for Business</b>	Energy Efficiency	Commercial and Industrial	The company provides financial incentives for customers to install energy-efficient equipment. Program consists of both prescriptive and custom incentives.	53,633,706	6,172	47,007,975	5,383
<b>Small Business Energy Saver</b>	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
<b>Commercial, Industrial, &amp; Governmental Demand Response Automation Program</b>	Demand Response	Commercial and Industrial	The company provides customers with financial incentives for the ability to require customers to shed load during peak events.	-	23,159	-	23,159
<b>Energy Efficient Lighting Program</b>	Energy Efficiency	Commercial and Industrial	The company provides financial incentives for customers to install energy-efficient lighting. Program provides incentives in the form of discounts applied at retail stores and online.	94,343,748	19,433	37,102,850	7,642



SCE&G Programs				2014-15 Gross Savings		2014-15 Net Savings	
Program Name	Program Type	Target Consumer	Brief Description	MWh	MW	MWh	MW
<b>Appliance Recycling Program</b>	Energy Efficiency	Residential	Incentives for allowing SCE&G to collect and recycle less efficient, but operable, secondary refrigerators and/or standalone freezers, which permanently removes the units from service. Units are recycled under an environmentally responsible process.	1,343	0.30	1,343	0.30
<b>Home Energy Reports</b>	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
<b>Home Energy Check-up</b>	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
<b>Neighborhood Energy Efficiency Program (NEEP)</b>	Energy Efficiency	Residential	Provides energy efficiency education to income-qualified customers, including an in-home energy assessment and direct installation of low-cost energy-saving measures delivered in a neighborhood door-to-door sweep approach.	1,543	0.19	1,543	0.19
<b>Heating &amp; Cooling</b>	Energy Efficiency	Residential	Incentives to residential electric customers for the purchase of new ENERGY STAR®-qualified HVAC equipment that replaces older inefficient equipment. In addition, 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
<b>ENERGY STAR® New Homes</b>	Energy Efficiency	Residential	Incentives provided to builders for homes built to ENERGY STAR® standards.	248	0.13	223	0.12
<b>ENERGY STAR® Lighting</b>	Energy Efficiency	Residential	Incentivizes residential customers to purchase and install high-efficiency ENERGY STAR® light bulbs.	1,811	0.04	1,811	0.04
<b>EnergyWise For Your Business Program</b>	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>Small Business Energy Solutions Program</b>	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 equipment; financial incentives and other strategies to encourage early replacement of existing equipment with high efficiency alternatives.	2,254	0.74	2,254	0.74

SCE&G Programs				2014-15 Gross Savings		2014-15 Net Savings	
Program Name	Program Type	Target Consumer	Brief Description	MWh	MW	MWh	MW
<b>Interruptible electric rider</b>	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.	---	---	---	---
<b>Interruptible gas</b>	Demand Response	Commercial & Industrial	Commercial and industrial contracts for interruptible gas service. 2015 Average Interruptible Commodity Margin Revenue per DT = \$0.726.	---	---	---	---

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

Municipal Utilities (Piedmont Municipal Power Agency Members representing 10 of 21 municipal utilities)				Projected Annual Gross Savings		Projected Net Savings at the Meter	
Program Name	Program Type	Target Consumer	Brief Description	kWh	kW	kWh	kW
<b>Demand Side Management Program</b>	Residential	Program provides customers with a financial incentive to allow the Agency to cycle the customer's heat pump compressor.	Program in deployment		21,016		21,016

Municipal Utility: City of Rock Hill			
Program Name	Program Type	Target Customer	Program Description
<b>Smart Choice Program</b>	Energy Efficiency	Residential	Rebates to builders, HVAC contractors, homeowners to install high eff. heat pumps & electric water heaters. Helps to qualify a customer for special electric rate.
<b>Voltage Reduction</b>	Demand Response	Residential	Voltage reduction on circuit feeders that primarily serve residential customers
<b>LED Light Replacement</b>	Energy Efficiency	Residential	Replacing HID backyard/residential streetlights with LED lights
<b>On-line Energy Audit</b>	Energy Efficiency	Residential	On-line Energy Audit free to Residential Customers
<b>Capacity-Based Interruptible Rider</b>	Demand Response	Commercial & Industrial	KW credits for load shedding
<b>Net Metering</b>	Demand Response	Residential, Commercial & Industrial	

# Appendix R: South Carolina 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	

Merchant Biomass Facilities						
Name	Winter (MW)	Summer (MW)	Location	Resource Type	On Line Date	
Ameresco No 1 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	

# Appendix S: Bureau of Ocean Energy Management - Wind Task Force

While a state may promote offshore wind development, the BOEM has the exclusive authority to issue leases, easements, and ROW on the 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 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 resources and concluded that winds sufficient for economical 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 Energy Office.

Also in 2008, South Carolina, with multiple partners, obtained a 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 waters. 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 consists 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 MW and 15 MW, 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 Energy Office used DOE funds to contract with Clemson University to conduct two studies measuring the impact of a pilot-scale wind farm on South Carolina's economy and its 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 ORS 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 addressing 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 the 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.

# Appendix T: Distributed Energy Resource Program Act (Act 236)

Act 236 is landmark renewable energy legislation passed unanimously by the South Carolina General Assembly and signed into law by the Governor 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 SC. In addition, 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 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 DER programs 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 & Gas Company

SCE&G received PSC 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 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 IOUs in a similar fashion. Both DER programs include (1) the use of Requests for Proposal (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

	SCE&G <sup>1</sup>	DEC <sup>2</sup>	DEP <sup>3</sup>
<b>Total DER Program Goals<sup>4</sup></b>	84.50 MW	80 MW	26 MW
<b>Utility Scale<sup>5</sup></b>	42.25 MW	40 MW	13 MW
<b>Programs to meet goal</b>	RFPs PPAs (variable terms but generally 20 years) EPCs	RFPs PPAs (15 Year) EPCs	RFPs PPAs (15 Year) EPCs
<b>Customer Scale<sup>6</sup></b>	42.25 MW	40 MW	13 MW
<b>Programs to meet goal</b>	NEM w/ PBI NEM w/ incentive 10-Year BCAs 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

<sup>1</sup>Docket No. 2015-54-E, Order No. 2015-512

<sup>2</sup>Docket No. 2015-55-E, Order No. 2015-515

<sup>3</sup>Docket No. 2015-53-E, Order No. 2015-514

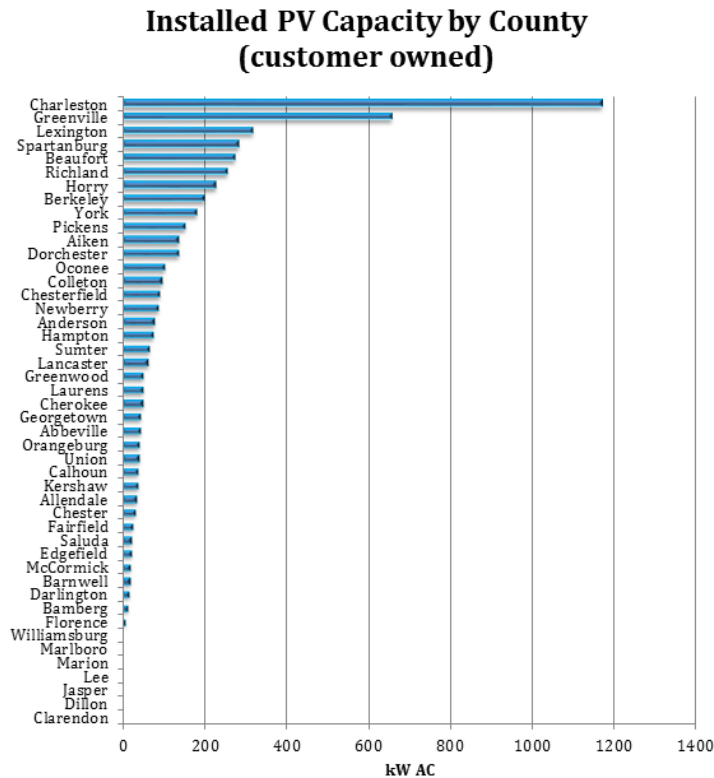
<sup>4</sup>2% of 5-year average South Carolina retail peak demand

<sup>5</sup>Half of the 2% shall be met by facilities sized between 1 and 10 MW (utility scale)

<sup>6</sup>The remaining half of the 2% shall be met by facilities sized less than 1 MW (customer scale)

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.

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 photovoltaic 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>



# Appendix U: Transportation

## 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 Baptist*)
- 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 Health Richland*)

## North Augusta Park-and-Ride

Located off of Exit 5 at I-20 West/US Hwy 25; 220 parking spaces; federally funded (through DHEC); 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

## 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

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
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

## 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 December 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 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, and 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 categorized as follows:

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

Paratransit is divided as follows:

- 3 cutaway, 15-passenger vans

Greenlink has spares as follows:

- 9 heavy-duty, 35-foot buses
- 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 that connects 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 some bus stops are located. This route uses 29-foot diesel buses.

### *York County Access*

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



# GLOSSARY



**American Council for an Energy-Efficient Economy (ACEEE)** A nonprofit corporation established in 1980 to advance energy efficiency policies, programs, technologies, investments and behaviors.

**Anaerobic Decomposition** Decomposition in the absence of oxygen, as in an anaerobic lagoon or digester, which produces CO<sub>2</sub> and CH<sub>4</sub>.

**Billion Cubic Feet/British Thermal Unit (BCF/BTU)** Natural gas unit of measure (1 BCF = 1 trillion BTUs).

**Biomass** Organic nonfossil material of biological origin constituting a renewable energy source.

**Bureau of Ocean Energy Management (BOEM)** Located within the US Department of the Interior, the BOEM is responsible for overseeing offshore renewable energy development in federal waters.

**Capacity** The maximum electric output a generator can produce under specific conditions measured in MW.

**Clean Air Act (CAA)** A federal law enacted in 1963 and amended in 1990 that defines the Environmental Protection Agency's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer.

**Clean Power Plan (CPP)** A final rule enacted by the EPA in 2015. The rule provides the final guidelines for states to follow in developing plans to reduce greenhouse-gas emissions from existing fossil fuel-fired electric-generating units.

**Clean Water Act (CWA)** A federal law that establishes the basic structure for regulating discharges of pollutants into the waters of the US and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972.

**Commission of Public Works (CPW)** Various city commissions throughout South Carolina that provide electricity, water distribution, and sewer collection/treatment to residents.

**Compact Fluorescent Light (CFL)** A type of energy-efficient fluorescent light that produces the same amount of light while consuming less energy.

**Compressed Natural Gas (CNG)** Naturally compressed to a pressure at or above 200-248 bar (that is, 2900-3600 psi) and stored in high-pressure containers. It is used as a fuel for natural gas-powered vehicles.

**Consumption** The amount of electricity used by an electric utility's customers.

**Corporate Average Fuel Economy Standards (CAFE Standards)** Enacted by Congress in 1975 to decrease energy usage of vehicles by increasing standards for the fuel economy of cars and smaller trucks.

**Distributed Energy Resources (DER)** Smaller power sources, such as solar farms, wind turbines, and microgrids that can be aggregated to provide power necessary to meet regular demand.

**Dominion Carolina Gas Transmission (DCGT)** A natural gas transportation company serving wholesale and direct industrial customers throughout South Carolina.

**Eastern Interconnection** One of the major AC (Alternate Current) electric grids in North America. This grid reaches from Canada to the Atlantic coast (excluding Quebec), south down to Florida, and west toward the Rocky Mountains.

**Emergency Management Assistance Compact** A natural disaster relief compact established in 1996 and ratified by Congress. EMAC offers assistance to states during governor-declared states of emergency through a responsive, straightforward system that allows states to send personnel, equipment, and commodities to help disaster relief efforts in other states.

**Federal Energy Regulatory Commission (FERC)** The federal agency with jurisdiction over interstate electricity sales, wholesale electric rates, hydroelectric licensing, natural gas pricing, oil pipeline rates, and gas pipeline certification. FERC is an independent regulatory agency within the DOE and is the successor to the Federal Power Commission.

**Greenhouse Gases** Those gases — such as water vapor, CO<sub>2</sub>, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride — that are transparent to solar (short-wave) radiation but opaque to long-wave (infrared) radiation, thus preventing long-wave radiant energy from leaving Earth's atmosphere.

**Gross Domestic Product (GDP)** The total value of goods and services produced by labor and property located in the US. As long as the labor and property are located in the US, the supplier (that is, the workers and, for property, the owners) may be either US residents or residents of foreign countries.

**Investor-Owned Utilities (IOUs)** Utility distributors and generators managed as a private enterprise, as opposed to a state or federally owned distributor.

**Liquefied Natural Gas (LNG)** Natural gas (primarily methane) that has been liquefied by reducing its temperature to -260 degrees Fahrenheit at atmospheric pressure.

**LNG Export Facilities** Plants that distribute liquefied natural gas to natural gas companies for the purpose of energy distribution among residential, industrial, and commercial consumers.

**Mass-Based Program** An approach to CPP regulations; a state's goal is expressed by a maximum number of tons of CO<sub>2</sub> emissions.

**National Ambient Air Quality Standards (NAAQS)** A set of standards for pollutants (established by EPA as required by the CAA) that are common in outdoor air, considered harmful to public health and the environment, and that come from numerous and diverse sources.

**North American Electric Reliability Corporation (NERC)** A nonprofit corporation formed in 2006 as the successor to the North American Electric Reliability Council established to develop and maintain mandatory reliability standards for the bulk electric system, with the fundamental goal of maintaining and improving the reliability of that system. NERC consists of regional reliability entities covering the interconnected power regions of the contiguous US, Canada, and Mexico.

**NERC Reliability Standards** Standards enforced by the Federal Power Act that help sustain the reliable transmission and delivery of electricity in the country.

**Petrochemical Plants** Facilities that convert crude oil, minerals, and natural gas into products used in industrial processes.

**Piedmont Natural Gas Company (PNG)** A natural gas company that serves customers in North Carolina, South Carolina, and Tennessee.

**Pipeline and Hazardous Materials Safety Administration (PHSMA)** Department of Transportation agency that regulates and enforces safe and reliable operations of US pipeline transportation.

**Public Service Commission (PSC)** Regulates rates and services of public utilities in South Carolina.

**Rate-Based Program** An approach to CPP regulations; a state's emission goal is expressed as emissions of CO<sub>2</sub> per MWh of electricity generated.

**Shale Gas** Natural gas found trapped underground between shale formations in the US.

**South Carolina Department of Health and Environmental Control (DHEC)** A state agency responsible for the welfare of public health and the environment in South Carolina.

**State Regulation of Public Utilities Review Committee (PURC)** Evaluates the actions of the PSC, the members of the PSC, the ORS, and the Executive Director of the ORS on an annual basis and appoints the PSC Commissioners.

**Supervisory Control and Data Acquisition – Electric (SCADA)** A system of remote control and telemetry used to monitor and control the transmission system.

**System Average Interruption Duration Index (SAIDI)** The average electricity outage duration for each customer served. Used as a reliability indicator of electric distributors.

**System Average Interruption Frequency Index (SAIFI)** The average number of electricity interruptions of each customer served, usually in a given year.

**Volt** Electric unit of measure (1 kilovolt = 1,000 volts)

**Watt** A measure of energy per unit of time (1 kilowatt = 1,000 watts, 1 gigawatt = 1,000,000 kilowatts)



*Large-scale manufacturing facility in South Carolina*

# thank you

to the following stakeholders who helped develop the State Energy Plan.

*American Institute of Architects*

*Berkeley-Charleston-Dorchester Council of Governments*

*Capital Consulting*

*Central Midlands Council of Governments*

*Central Electric Power Cooperative, Inc.*

*City of Rock Hill*

*Clemson University*

*Clemson University International Center for Automotive Research*

*Coastal Conservation League*

*Conservation Voters of South Carolina*

*Department of Energy - Savannah River National Laboratory*

*Dominion Carolina Gas Transmission*

*Duke Energy*

*Electric Cooperatives of South Carolina*

*Federal Highway Administration*

*Fujifilm*

*Green Energy Fuels, LLC*

*Gregory Electric Company, Inc.*

*Greenville Technical College*

*InterTech Group*

*Keith Sanders Architecture & Consulting Services*

*Kimberly-Clark Corporation*

*League of Women Voters of South Carolina*

*Michelin*

*Midlands Technical College*

*Mount Vernon Mills*

*Municipal Association of South Carolina*

*Myrtle Beach Regional Economic Development Corporation*

*Nucor Corporation*

*Palmetto Cycling Coalition*

*Piedmont Natural Gas Company*

*Santee Cooper*

*Savannah River National Laboratory*

*South Carolina Electric & Gas Company*

*SC Association for Community Economic Development*

*SC Clean Energy Business Alliance*

*SC Conservation Voters*

*SC Department of Administration, Division of General Services*

*SC Department of Commerce*

*SC Department of Disabilities and Special Needs*

*SC Department of Education*

*SC Department of Health and Environmental Control*

*SC Department of Public Safety*

*SC Department of Transportation*

*SC Energy Users Committee*

*SC Office of the State Engineer*

*SC Propane Gas Association*

*SC Small Business Chamber of Commerce*

*SC Solar Business Alliance*

*SC Solar Council*

*Shiver & Associates, LLC*

*Sierra Club*

*Southern Alliance for Clean Energy*

*Southern Current*

*Southern Environmental Law Center*

*State Regulation of Public Utilities Review Committee staff*

*Sustainability Institute*

*Sustaining Way*

*Terreni Law Firm, LLC*

*Upstate Forever*

*University of South Carolina Upstate*

*Winthrop University*

*WNA Consulting (Woodberry & Associates)*



**ENERGY.SC.GOV**

