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Energy Supply Technical Work Group

Summary List of Recommended Priority Policy Options for Analysis

Option No.*	Policy Option	GHG Reductions (MMtCO ₂ e)			Net Present Value 2008–2020 (Million \$)	Cost-Effectiveness (\$/tCO ₂ e)	Level of Support
		2012	2020	Total 2008–2020			
ES -1	A thorough study of energy options for portfolio standards including renewables, energy efficiency, nuclear power, waste to energy, landfill gas, offshore wind, and hydro	<i>Not Yet Quantified</i>					Pending
ES -2	Technology Research and Development, including state funding	<i>Not Yet Quantified</i>					Pending
ES -3	Renewable Energy (full range) financing, tax incentives, loans	<i>Not Yet Quantified</i>					Pending
ES -4	Regulatory model to equalize utility returns on energy efficiency with returns on traditional power supply to allow investment in efficiency and renewables to be considered in parity with investment in new conventional capacity	<i>Not Yet Quantified</i>					Pending
ES -5	New Nuclear Power, including reprocessing	<i>Not Yet Quantified</i>					Pending
ES -6	Green power purchases and marketing	<i>Not Yet Quantified</i>					Pending
ES -7	Attract renewable energy technology businesses to South Carolina	<i>Not Yet Quantified</i>					Pending
ES -8	Distributed renewable energy incentives and/or barrier removal (Including Interconnection Rules)	<i>Not Yet Quantified</i>					Pending
	Sector Total After Adjusting for Overlaps						
	Reductions From Recent Actions						
	Sector Total Plus Recent Actions						

*The numbering used to denote the above policy options is for reference purpose only; it does not reflect prioritization among these policy options.

NOTE: This document was edited by CCS following the most recent TWG meeting on November 16, 2007. These edits were circulated for comment by TWG members. There is continuing discussion about the

intention of the CECAC on what scenarios should be considered under ES-1 (Portfolio Standards), as well as on the wording and content of ES-4 (Investments in Energy Efficiency).

General definition: For the purposes of the policies discussed here, and unless otherwise noted, “renewable energy” shall be defined as follows:

A renewable energy resource includes solar (including...); wind; small hydroelectric geothermal; ocean current or wave energy; biomass resource including agricultural waste, animal waste, wood waste, spent pulping liquors, combustible residues, combustible liquids, combustible gases, energy crops, or landfill methane; waste heat derived from a renewable energy resource and used to produce electricity; or hydrogen derived from a renewable energy resource.

ES-1. Energy Options for Portfolio Standards

A thorough study of energy options for portfolio standards including renewables, energy efficiency, nuclear power, waste to energy, landfill gas, offshore wind, and hydro

Policy Description

A renewable portfolio standard (RPS) is a requirement that utilities must supply a certain, either fixed or increasing percentage of electricity from an eligible renewable energy source(s). An environmental portfolio standard (EPS) expands that notion to include energy efficiency, nuclear energy, or other low or zero GHG technologies as eligible resources.

The CECAC accepted this policy priority for analysis in order to identify and evaluate a comprehensive range of options for portfolio standard options, including to analyze the impact of including or not including nuclear resources as an eligible resource. Capture and combustion of methane gas from landfills and combustion of municipal solid waste are also to be considered.

Policy Design

Goals: A 20% renewable and energy efficiency portfolio standard by 2020, starting in 2010, with a minimum of 10% renewable generation by 2015. Renewable Energy Credit (REC) trading is allowed. Out of state resources can be used to meet goals, but are limited to 25% of the annual target.

The TWG proposes considering targets of 5%, 12.5%, & 20% renewables and efficiency by 2020.

The TWG further recommends a specific set-aside for solar resources.

The TWG suggests some accommodation for regions such as PMPA which are already served by a high percentage of low- or non-CO₂ resources.

Timing: As noted above.

Parties Involved: All electric power and distribution entities in South Carolina.

Other: Analysis of this policy should explicitly value external costs associated with each energy resource evaluated, including but not limited to decommissioning costs, health impacts of lifecycle pollution, and implicit taxpayer subsidies such as government-assumed risks. Analysis of this policy should include the following options:

- Renewables only;
- Renewables and energy efficiency. A minimum of 75% of the goal must be met with renewable energy;

- Renewables, municipal solid waste incineration, nuclear energy and energy efficiency. A minimum of 75% of the goal must be met with renewable energy or energy efficiency.

Energy efficiency includes applications that provide measurable, verifiable, long-term savings to the retail customer compared with current technology in use, including but not limited to appliances, lighting, HVAC, building envelope and efficient motors.

Related Policies/Programs in Place

SC Energy Efficiency Act, Title 48, Chapter 52.

Pending – [until CECAC moves to final agreement at Meeting #5 or #6]

ES-2. Technology Research and Development

Technology Research and Development, including state funding

Policy Description

R&D funding can be targeted toward a particular technology or group of technologies as part of a state initiative to build or expand an industry or core technical competency around that technology in the state, and/or to set the stage for adoption of the technology for use in the state. (For example, part of the SC Hydrogen and Fuel Cell Alliance's mission is to help develop and deploy hydrogen technologies in the state). R&D funding can also be made available to any renewable or other advanced technology (including nuclear) through an open bidding procedure (i.e., driven by bids received rather than by a focused strategy to develop a particular technology). Funding can also be given for demonstration projects to help commercialize technologies that have already been developed, but which are not yet in widespread use. Finally, funding could be targeted to increase collaboration among existing institutions in the state for R&D.

A number of energy technology research and development (R&D) programs are already underway at organizations and academic facilities throughout South Carolina, as noted below.

Policy Design

- Establish an energy technology roadmap for South Carolina to focus on those efforts that have the greatest potential for achieving reduced GHGs, economic development opportunities, national security and energy independence for the state. Include Department of Commerce, economic development organizations, utilities, as well as state technology providers in the process.
- Support and provide funding opportunities/incentives for developing and implementing new technologies for GHG reduction that encourage collaborations between R&D, government, academic and commercial sectors.

Goals:

- Additional state funding of \$20M for R&D initiatives in clean energy (Maybe 3-5 years?)
- Establish hydrogen infrastructures that are accessible to at least 80% of the population. (5 strategically-located stations)
- Complete a least one high visibility research and development demonstration to showcase alternative energies.

Timing: [TBD]

Parties Involved: [TBD]

Other: [As needed]

Related Policies/Programs in Place

- University of South Carolina’s National Science Foundation Center for Fuel Cells and Clean Coal Center of Excellence
- Energy research conducted at the Savannah River National Laboratory and Center for Hydrogen Research
- Clemson’s University Restoration Institute’s research in bio-energy and wind
- International Center for Automotive Research (CU-ICAR) automotive system integration and material science program
- The Greater Columbia Fuel Cell Challenge -creating a plan to make the region a center for fuel cell use.
- South Carolina Research Authority’s clean energy initiatives programs
- Non-profit organizations that promote researchers, entrepreneurs, and businesses preparing for the emerging technologies in energy, as such as EngenuitySC, Concurrent Technologies, New Carolina, FuelCellSouth, etc.
- State supported organizations that encourage R&D, such as SCBIO, South Carolina Hydrogen and Fuel Cell Alliance, South Carolina Biomass Council, South Carolina Institute for Energy Research, etc.
- in a position to benefit from the research and development focus on nuclear production of hydrogen (as was recommended in the National Research Council’s, *Review of DOE’s Nuclear Energy Research and Development Program, October, 2007*).
- Additional benefits of reduced dependence on foreign oil and improved environmental conditions can be realized.

ES-3. Renewable Energy Financing

Renewable Energy (full range) financing, tax incentives, loans

Policy Description

This policy option concerns financial incentives to encourage investment in the full range of renewable energy resources.

The intent of these financial incentives will be to help overcome barriers for renewable energy development. Institutional and market barriers include price distortions, inadequate information, institutional barriers to grid interconnection, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk. These can be overcome through a suite of financial and regulatory redresses as well as through information and public education campaigns.

Financial obstacles can also be addressed through property tax exemptions, exclusions, and credits; personal income tax credits or deductions to cover the expense of purchasing and installing renewable energy equipment; loan programs to aid in financing the purchase of renewable energy equipment; and grant programs designed for research and development or to help a project achieve commercialization.

Policy Design

Goals: The initial evaluation should include several different types of financial incentives to represent the range of opportunities.

- tax credits of \$3,500 per kW-equivalent for small solar PV, solar and geothermal hot water systems, micro-hydro and small wind up to 50 kW grid-connected generation
- subsidy to renewable energy generators of 1 cent per kWh for electricity generated from a renewable resource on or directly connected to the South Carolina grid, unless that electricity is used to meet a federal, state or voluntary renewable energy standard
- feed-in tariffs for large-scale zero-pollution renewable generation projects, providing a guaranteed price for electricity or the market rate (if higher) by guaranteeing rate base recovery, as follows:
 - first 100 MW – 15 cents per kWh
 - second 100 MW – 14 cents per kWh
 - third 100 MW – 12 cents per kWh
 - fourth 100 MW – 10 cents per kWh
 - fifth 100 MW – 8 cents per kWh
- low-interest loans for feasible and desirable biomass generation that meets exemplary environmental performance standards with partial loan forgiveness for equipment that fails to perform to standard

Timing: Tax credits and subsidies are available from 2009 through 2025; feed-in tariffs are guaranteed for the lifetime of a project, up to 25 years, for projects brought online between 2009 and 2015; loans available for projects brought online between 2009 and 2015.

Parties Involved: All power producers operating qualifying facilities for incentives other than tax credits, which would be available to any grid-connected customer.

Other: TWG members were divided on whether or not this policy should apply to municipal solid waster incineration.

Related Policies/Programs in Place

See list of current and pending legislation posted by the SC Energy Office, at <http://www.energy.sc.gov/index.aspx?m=1&t=67>. [TWG volunteers to identify legislation which applies.]

TBD – [as needed and approved by the TWGs]

ES-4. Investments in Energy Efficiency

Regulatory model to equalize utility returns on energy efficiency with returns on traditional power supply to allow investment in efficiency and renewables to be considered in parity with investment in new conventional capacity.

Policy Description

Traditionally, the revenues of utilities are determined by their volume of electricity sales. Because energy efficiency and distributed generation renewable energy sources decrease the volume of electricity that the utilities must produce using central generation, rate-based regulation creates a financial disincentive to utility support for energy efficiency and renewables.

In the short run (between rate cases) lost sales due to energy efficiency programs reduce revenue by the full tariffed rate. When this net lost revenue is taken into account, utilities face profit losses for energy efficiency and distributed generation measures.

The goal of this policy is to remove the disincentive faced by utilities for actions that lower sales volumes through timely recovery of costs and appropriate financial incentives. . By equalizing utility returns on demand-side management and energy efficiency programs with returns on traditional power supply, utilities will consider investment in energy efficiency in parity with investment in new conventional capacity.

Decoupling marginal revenues from sales levels does not by itself encourage superior performance in delivering efficiency services, but it removes a powerful disincentive and provides a level basis upon which an efficiency business plan can be developed. Thus, this strategy is intended to be coupled with energy efficiency strategies being evaluated in the Residential, Commercial and Industrial Technical Workgroup to achieve actual reductions in energy demand and in greenhouse gas emissions.

Policy Design

Goals:

- ***Timely recovery of costs.*** Utilities should be provided timely recovery of all costs associated with the implementation of DSM and energy efficiency programs or recovery of avoided new construction costs that directly correspond to the megawatts avoided through efficiency and DSM programs. These costs would be recovered through an annual DSM/EE adjustment clause and rider.
- ***Recovery of Lost Revenues.*** Lost revenues experienced by the utility as a result of the implementation of DSM/EE programs should be included in the costs recovered through the annual DSM/EE rider.
- ***Financial Incentives.*** Utilities should be allowed to earn a financial incentive for the implementation of DSM/EE programs. Incentives may include sharing of savings achieved

by the DSM/EE programs, or could be based on the capitalization of a percentage of avoided costs achieved by the programs.

Timing: Decoupling implemented in 2008 and fully available in 2009.

Parties Involved: South Carolina Public Service Commission to implement rule affecting all investor-owned utilities.

Other:

Related Policies/Programs in Place

TBD

ES-5. New Nuclear Power

New Nuclear Power, including reprocessing

Policy Description

Nuclear power currently provides about 20% of U.S. electricity and accounts for approximately 50 % of the electricity produced in South Carolina. South Carolina currently has seven nuclear reactors, making it the state with the third highest total nuclear generating capacity. During operation, nuclear plants generate no greenhouse gases (GHGs), although there are GHG emissions associated with the mining, refining, and transport of nuclear fuel and the construction and decommissioning of plants.

Estimates are that it would take approximately 10 years to design, permit, and construct a new nuclear plant, making rapid action in this area imperative if expanded nuclear power generation is to play a role in mitigating greenhouse gas emissions in the near future. Recently enacted federal energy legislation includes financial incentives for new nuclear plants in an effort to jump-start the nuclear power industry, providing cost savings in-state for new nuclear facilities.

Reprocessing spent nuclear fuel results in a significant reduction in the volume of high level radioactive waste. Through reprocessing, the recovered uranium and plutonium can be recycled into new fuel. Recycling involves the re-enrichment of the recovered uranium for use in light water reactor fuel assemblies and the conversion of the recovered plutonium into mixed oxide fuel assemblies, which also can be used in light water nuclear reactors. This approach offers the benefits of significantly reducing the inventories of commercial spent nuclear fuel and plutonium, as well as reducing the total volume of waste requiring geologic disposal.

Nuclear fuel reprocessing technologies have evolved significantly since the U.S. abandoned commercial recycling in the 1970s and many believe that they can be deployed in a manner consistent with U.S. and international safety and nonproliferation standards.

The focus of this particular policy should be to recommend actions, e.g. state legislative and regulatory actions, that would support the construction of new nuclear power generating facilities in South Carolina, and to address the nuclear waste disposal issue by supporting the reprocessing and recycling of nuclear fuel.

Policy Design

Goals: The goals of this policy are:

(1)(a) To quantify the costs (including the full cost of disposal and any taxpayer-assumed liabilities and risks) and identify the benefits (to include avoidance of greenhouse gas emissions) associated with building new nuclear power plants in South Carolina;

(1)(b) To evaluate the economic, environmental, waste reduction, national energy security, and other implications of nuclear waste reprocessing-recycling in the state of South Carolina; and

(2) If new nuclear power is shown to be a viable option for new base load generation in South Carolina, expeditiously implement applicable regulatory and legislative actions to support the construction of new nuclear plants in South Carolina and to promote the reprocessing and recycling of spent nuclear fuel.

Timing: This policy would become effective immediately upon approval by the S.C. General Assembly.

Parties Involved: Electric utilities, environmental advocacy groups, state legislators, county government and economic development leaders, manufacturer- business advocacy groups, and energy users/energy ratepayer advocacy groups.

Other: [As needed]

Related Policies/Programs in Place

- SCE&G/Santee Cooper - new nuclear plant planned (plans are to apply for permits for two 1100 MW units.)
- Savannah River National Laboratory, which is partnered with the Economic Development Partnership of Aiken and Edgefield counties, and EnergySolutions will each receive a part of the \$10 million in Global Nuclear Energy Partnership grants to allow for detailed studies of the proposed nuclear waste recycling plants.
- Savannah River National Lab is applying for the nuclear recycling program.
- Duke Energy – William S. Lee Nuclear Station (possibly two 1100 MW units) in Cherokee County

ES-6. Green power purchases and marketing

Policy Description

Establish a voluntary green power program offering a green power option to consumers throughout the State. The green power purchases are comprised a variety of consumer-driven strategies to increase the production and delivery of low-GHG power sources.

Palmetto Clean Energy (PaCE) is an independent, nonprofit organization established in August 2007. The organization consists of representatives from the SC Office of Regulatory Staff, SC Energy Office, Duke Energy Carolinas, Progress Energy Carolinas and SCE&G. PaCE is a renewable energy program designed to encourage the development of renewable energy resources that improve the environment through reduced greenhouse gas emissions. Consumers can elect to fund Green Power purchases by South Carolina investor-owned electrical utilities. Contributions to the program help provide financial incentives for generators of electricity from renewable sources.

To supplement the activities of voluntary green power programs in SC (PaCE and Santee Cooper Green Power), this policy provides support for marketing green power to consumers and for the developers of renewable generation through state funded green power initiatives coordinated by the SC Energy Office.

Policy Design

Goal #1: Establish a Voluntary Green Power Utility Program

- **Palmetto Clean Energy (PaCE):** An independent, nonprofit organization established in August 2007.
- **Green Power Definition:** as noted above.
- TWG divided on whether Municipal solid waste should be included

Timing: Operational by April 2008; 1% participation on a kWh basis of retail customers by 2012. Unspecified preference for in-state resources.

Parties Involved: SC Office of Regulatory Staff, SC Energy Office, Duke Energy Carolinas, Progress Energy Carolinas, SCE&G, Santee Cooper, Lockhart Power Company and the Public Service Commission of SC, Municipals and Cooperatives.

Other: [As needed]

Goal #2: State Sponsored Green Power Initiatives

- To supplement the activities of voluntary green power programs in SC (PaCE and Santee Cooper Green Power), this policy also provides marketing and renewable resource development assistance through state funded green power initiatives coordinated by the SC Energy Office.

Table 1. Demand- and supply-side recommendations

Demand-Side Recommendations	Supply-Side Recommendations
Provide consumer education programs and green power promotional materials.	Support for R&D on new and developing renewable energy technologies.
Encourage state facilities to purchase a certain percentage of their power through voluntary green power programs.	Provide support for feasibility studies of various renewable energy technologies.
Provide incentives for new or expanding businesses to purchase power through voluntary green power programs.	Provide a mechanism for long-term contract guarantees for renewable energy producers.
Provide tax credits for companies purchasing from power through voluntary green power programs.	Provide support for renewable energy development projects, thereby leading to more options and sales tools.
Provide incentives for home builders to include one year of green energy through PaCE with the purchase of new homes.	Provide low or no interest loans for qualified developers of renewable energy projects.
Provide assistance and participation in consumer and business marketing programs.	

Timing: Fully implemented by 2012.

Parties Involved: SC Energy Office, Duke Energy Carolinas, Progress Energy Carolinas, SCE&G Santee Cooper, Lockhart Power Company, the Public Service Commission of SC and PaCE.

Other: [As needed]

Related Policies/Programs in Place

- Green Power program through Santee Cooper (landfill methane – 5 sites,) expanding into solar. Eighteen electric co-ops also participate in the green power program through Santee Cooper.
- Palmetto Clean Energy (PaCE)

ES-7 Renewable Energy Technology Businesses

Attract renewable energy technology businesses to South Carolina

Policy Description

Renewable energy has recently developed into an immediate and long term growth industry. South Carolina can capitalize on this economic potential by working to attract companies that specialize in this industry. Incentives to attract renewable energy businesses should be designed to create South Carolina as a partner in the renewable energy world. The goal of this policy is to create a strong local market for renewables in South Carolina and for the state to become a vocal advocate of these energy solutions. Luring these types of businesses has become a primary economic target for many states and competition will be tough.

The CECAC accepted this policy priority for analysis in order to capture a comprehensive range of options for attracting renewable energy technology businesses to South Carolina.

Policy Design

Goals:

- South Carolina has a internationally respected renewable energy business cluster making it an obvious destination point for company facilities.
- South Carolina is a top-5 U.S. state (per capita) for new renewable energy installations per year.
- South Carolina ranks as a leader in higher education and technical education for R&D and implementations of renewable technologies.

Timing:

- January 2009: State legislators educated on magnitude of economic potential for renewable energies in South Carolina.
- July 2009: Incentives in place for promoting widespread adoption of renewable energy in South Carolina.
- December 2009: Plan in place for luring businesses to South Carolina. Info Packet, Materials, Policies, Marketing, etc.
- October 2010: Programs in place at universities, colleges, and technical schools for renewable energy programs (R&D, Training, Education).
- January 2010: Renewable Energy cluster in place with 2 to 5 businesses signed on.
- 2012: South Carolina cracks the top-5 list of states with new renewable energy installations.
- 2015:

Parties Involved: State and local governments, community and business leaders, citizens, education facilities, students, and visitors.

Related Policies/Programs in Place

None identified.

ES-8. Distributed renewable energy

Distributed renewable energy incentives and/or barrier removal (Including Interconnection Rules)

Policy Description

Distributed generation refers to the production of electricity at or near the sites of consumption. Distributed renewable energy¹ is energy specifically generated by naturally replenishing resources. The production of renewable energy results in few or no greenhouse gas emissions. Institutional and market barriers to distributed renewable energy include:

- Inadequate information
- Institutional barriers to grid interconnection
- Community barriers (e.g. local covenants and restrictions)
- Limited availability of qualified contractors
- High transaction costs
- High financing costs (e.g. due lender unfamiliarity and perceived risk).
- Interconnection rules (e.g. standby fees, exit fees)
- Ownership of Renewable Energy Credits (RECs)
- Pricing of net generation
- Failure of the market to value the public benefits of renewables and the social cost of fossil fuel technologies

These can be overcome through a suite of financial and regulatory redresses as well as through information and public education campaigns.

This policy should identify all renewable energy sources that could lead to possible distributed generation options for residences, commercial, and industrial facilities as well as the uncertainties and risks associated with greater adoption of these resources. In addition, this policy should identify and examine current and potential barriers impeding current and interested participants. Finally, it should identify and propose specific incentives or policies that would eliminate or limit barriers and expand distributed generation in South Carolina. It should also quantify the impact of distributed renewable energy goals.

¹ For the purpose of this policy description, please consider Solar Hot Water systems apart of distributed renewable energy.

Policy Design

Definition: Distributed renewables include solar PV and solar thermal; wind power; micro-hydropower (< 20MW); fuel cells using renewable fuels; biomass including non-woody energy crops, wood wastes and agricultural waste; methane from animal waste; and geothermal.

Goals:

- 3 MW per year of new distributed renewable generation (this numerical goal is for analysis purposes only and does not carry TWG's endorsement of the "best" number)
- Solar hot water systems installed in __ % of homes and suitable business by 2020.
Recommendation: put solar hot water into RCI, ES keeps renewable generation.

Timing: Beginning in 2009, __% per year of all South Carolina homes and suitable business facilities have solar hot water installed; new distributed renewable generation beginning at __ MW in 2009 increasing to __ MW per year by 2014 and thereafter.

Parties Involved: Any industrial, commercial, or residential entity operating qualifying distributed renewable energy systems whether directly connected to the South Carolina grid or otherwise could participate.

Other:

Related Policies/Programs in Place

None identified.