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Subject: Requests for Comments on Energy and Energy Policies

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I would make myself available to testify at a public hearing if needed.

1. What action do you anticipate from the US Congress as to climate change legislation?

The newly elected administration has made ***energy a high priority*** on their agenda. Their strategy is strongly linked to generating ***jobs*** in a 'clean energy 'economy ***promising (see Attachment A):***

- 5 million new jobs in the next 10 years through a
- Proposed investment of $150 Billion,
- 5 year Production Tax Credit,
- Carbon cap and trade system and a
- National Renewable Portfolio Standard (RPS)

The Obama energy plan calls for 10% of electricity to come from renewable energy by 2012 and 25% by 2025 and ***promotes*** an 'economy-wide' cap-and-trade program to reduce green-house gas emissions 80% by 2050. The ***legislation to meet*** these objectives could include:

- Tax incentives,
- A federal Renewable Portfolio Standard (RPS),
- Increased research and development (R&D) spending and a
- Carbon cap-and-trade system.

Given the strong ***economic downturn,*** a cap-and-trade system may be further out into in the future due to its overall cost to industry and consumers. Promoting a **'clean energy' economy most likely will take center stage** create ***new jobs*** and boost ***economic development***.

Given ***many other states*** have already enacted Renewable Portfolio Standards (RPS), a federal RPS may not be needed **if other incentives support** the continued growth of the renewable energy industry thus meeting the Obama energy plan. The ***goals set by the plan*** on energy conservation and efficiency will ***contribute*** to meeting the renewable energy goals **by** decreasing overall demand ***allowing*** renewable energy to account for larger percentage of overall use **as well as** decrease the carbon footprint of the nation.

Given the ***urgency*** of the economic downturn, ***legislation*** with positive impacts to the economy ***will most likely be pursued*** initially by the new administration including:

- Tax incentives for clean energy industries.
- Increased funding in research and development related to these industries.
- Increasing fuel standards by promoting plug-in hybrid vehicles.
- Improved electrical infrastructure.
- Promoting energy efficiency in appliances and buildings.
- Growing mass transit.

All of these would support the goals of energy independence, reducing the carbon footprint and growing a 'clean-energy' economy.

What impact may this have on South Carolina?

South Carolina would gain from the potential legislation discussed above. Legislation promoting the 'clean-energy economy' would create ***new jobs*** and ***market opportunities***. The ***key*** would be for South Carolina to ***strategically position itself*** through its existing manufacturing base and port facilities to capitalize on these gains. ***As an example***, a US Department of Energy, Energy Efficiency and Renewable Energy Report (May 2008), '20% Wind Energy by 2030' (http://www.20percentwind.org/) states that ***South Carolina*** could gain from ***10-20K new jobs*** related to the wind industry under this scenario (see Attachment B).

A ***Federal RPS mandate*** applicable to each state could have both ***positive and negative*** implications for South Carolina. **If** the state makes the decision to go out and ***purchase*** renewable ***energy credits*** from the other parts of the country to meet its federal requirement, additional ***dollars would be leaving the state*** rather than being kept within the state to generate local economic value. The ***better option*** would be for the state to ***develop its:***

- ***biomass,***
- ***offshore wind and***
- ***residential solar resources***

, ***generate*** the required renewable ***energy*** within the state and ***capture*** the economic development ***value***.

If the Federal Electrical RPS is ***promulgated*** as a 'clean-energy' standard that encompasses nuclear energy, then the ***state will benefit*** due to its history and experience with ***nuclear energy***. A carbon cap and trade system would impact the state's energy portfolio ***requiring capital upgrades*** to existing coal fired plants and ***forcing the development*** of clean energy resources. The state's plans for new nuclear power plants would assist the state in meetings it carbon cap limits if older coal fired units are decommissioned in turn. ***If*** the carbon cap and trade system is ***coupled*** with a national RPS, the state would then have to ***consider its options*** by either;

- buying renewable energy credits from other states
- accelerating the development of new nuclear capacity
- developing its indigenous renewable energy resources

2. Does South Carolina have governmental resources available to study, plan, or act upon current or future energy policies?

The South Carolina Energy Office is strategically positioned to provide the leadership needed by the State with support from other state departments including the SC Office of Regulatory Staff, Department of Agriculture, Department Health and Environmental Control, Department of Natural Resources and the strong academic resources available within the state's university system.

Are these resources sufficient?

The South Carolina Energy Office is currently funded predominantly by the US DOE. With proper funding and an assigned leadership role to bring together an expert advisory committee, the SCEO could serve in advisory role to the Public Utilities Review Committee, SC Governor and SC

Legislators. It is important that this advisory committee remain non-partisan, non-biased and provide their input and recommendations based on data and what is best for the state.

Are these resources appropriately empowered to act?

At this time, I do not believe that the SCEO is empowered to act or serve as an advisor to the state on energy related matters.

Is there any overlapping role?

I don't believe there would be an overlapping or competing role.

3. How do we use electricity in South Carolina?

Electricity consumption in South Carolina is amongst the ***highest*** in the United States ***driven by high industrial and residential use***. On a ***per capita*** basis, total energy use in South Carolina is much ***higher*** than the rest of the country at nearly 400 Million BTU (MBTU) with the national average ~ 340 MBTU and neighboring North Carolina and Georgia at 320 MBTU and 360 MBTU respectively. Although industrial use is high, the ***Gross State Product*** (GSP) per MBTU of use is considerably ***lower*** than the US average. South Carolina's GSP/MBTU is ~ $82,000 while the US average is $120,000 and neighboring North Carolina is at $125,000. Therefore volatility in primary energy prices including petroleum, coal and natural gas have a disproportionate adverse impact to the SC economy versus the US average and neighboring states. Energy use by the state can be broken down as follows (see Attachment C):

- Residential 22%
- Commercial 15%
- Industrial 38%
- Transportation 25%

How is our use different from other states with respect to amount of use and type of use?

South Carolina's residential electricity consumption on a per capita basis is higher than the rest of the country ***due to air conditioning*** needs during the long warm months, nearly ***60%*** of the population relying on ***electrical heating*** during the mild cold months and less energy efficient housing***.*** ***Industrial*** use of energy in South Carolina is higher per unit of GSP than the US average. Historically low industrial electricity costs, versus the US average, have attracted industries with a higher electricity demand per unit output. This leaves the state vulnerable to rising fossil fuel prices.

South Carolina's nuclear electrical capacity (50%) is higher than the US average (46.1%) while coal generated electricity (40%) is lower than the US average (48.3%). Hydroelectric, biomass and natural gas account for the remaining 10% electricity generation in South Carolina. In comparison, the US average for hydroelectric, biomass and natural gas generated electricity is ~6% with most of that accounted for by natural gas. The ***state's electricity*** portfolio is weighed much more ***heavily on nuclear and hydroelectric*** as a percentage of its total use as compared to the rest of the nation.

What factors drive this usage?

Residential electricity use is driven by the ***climate*** of the state and ***energy efficiency*** of the homes. If climate change predictions transpire, the state's residential electricity demand will continue to increase requiring additional electrical capacity. ***Population growth*** is expected to be higher than the US average due to an anticipated ***influx of retirees***. With a low per capita income and projected influx of residents with a ***fixed income***, ***demand for low cost housing*** will rise. Low cost housing is ***not designed*** in the most ***energy efficient*** manner therefore leading to ***higher energy costs*** in the future and a greater ***demand for electrical energy***.

What can we do to better use our energy resources?

- ***Improve*** the energy efficiency of homes and buildings through incentive programs and low interest loans that show a payback for invest of 3 years or less.
- ***Invest*** in state programs to design and showcase advantages of energy efficient homes.
- ***Include*** energy efficiency targets on building codes and provide tax incentives to reach those targets.

What demographic or other factors prohibit or inhibit our ability to be more energy efficient?

The ***low*** per capita ***income*** of the state, ranked 48th, makes introducing energy efficiency mandates and stricter building codes more difficult. Strong state ***incentives*** are needed to promote energy efficiency and support stricter building codes. These ***tax dollars*** would have the added benefit of ***reducing energy costs*** leading to more ***dollars staying in the state*** generating:

- Economic value.
- Creating new jobs and business opportunities.
- Reducing the carbon footprint.
- Increasing energy security.
- Lowering project future electrical demand.

4. What types of renewable sources of energy are available in South Carolina?

The state's indigenous renewable energy resources include:

- Biomass
- Offshore wind power
- Hydroelectric
- Solar.

Given the environmental impacts of new large hydroelectric power plants and the growing concern over water management, ***no new development of hydroelectric*** is expected.

The solar potential of the state is ***considered to be very good*** (see Attachment D) but its use is ***hampered*** by high capital costs. Solar thermal installations are becoming more economically viable and should be ***promoted within the state for residential use.*** This model has proven to be very successful in the Mediterranean regions of Europe. What is lacking in the state is supplier and installers of such units. With proper incentives, this market could emerge throughout the state especially along the coastal regions.

Per the US DOE, South Carolina possesses ***excellent*** offshore wind resources in shallow waters ***near growing demand centers***. The offshore potential for the state is estimated between 1-5 GW by the US Department of Energy (see Attachment E). Offshore wind power is seeing ***tremendous growth*** throughout Europe (see 'Delivering Offshore Wind Power in Europe', http://www.ewea.org/fileadmin/ewea_documents/images/publications/offshore_report/ewea-offshore_report.pdf) and recently is being considered by

Massachusetts (http://www.capewind.org/)

Rhode Island (http://offshorewind.net/OffshoreProjects/Rhode%20Island/Rhode_Island%20Offshore_Wind_rfp.pdf)

New Jersey (http://renewableenergydev.com/red/garden-state-offshore-energy/)

Virginia (http://www.vcerc.org/Wind%20Energy%20Poster.pdf)

Wisconsin (http://www.glc.org/email/08/newsbriefs10-08.html)

Michigan (http://www.windpoweringamerica.gov/filter_detail.asp?itemid=2045)

Ohio (http://www.ohiowind.org/Offshore-Wind-FAQ.cms.aspx)

Province of Ontario (http://www.ospe.on.ca/pdf/Ontario-to-approve-Great-Lakes-wind-power.pdf)

Delaware (http://www.bluewaterwind.com/delaware.htm)

The advantages of offshore wind power include:

- Stronger, more consistent winds.
- Proximity to growing coastal load centers.
- Less visual impacts than land based wind farms.

The US DOE EERE on '20% Wind by 2030' report released in May 2008 states that 54,000 MW of ***offshore wind power could be developed along the Northeast and Southeast coast of the United States by 2030 generating a $200 Billion market*** (see Attachment F). The US Energy Information Administration estimated that in 2006, 78% of the nation's electricity was consumed by 28 coastal states. Only six of those states have the land-based wind resources to meet a 20% goal. 26 of those states have the offshore potential in shallow waters less than 30 meters deep to meet a 20% goal with many of these state's including South Carolina having the capability to theoretically meet more than 100% of their electrical needs from offshore wind energy.

The state's ***biomass resource is extensive and very large***. Biomass in South Carolina resides in the form of woody, agriculture residues and waste including landfill and animal waste. A report generated by Harris, et al. in 2004 (see Attachment G) estimated that 22 million tons annually of recoverable woody biomass could produce up to 400 MW of electricity through a direct fire process. Woody biomass in the ***form of wood chips*** is one resource that can be transported to other location making it **susceptible** to global **pricing** pressures but also providing the economic development opportunities of a global market.

South Carolina does not possess any fossil based primary energy resources and therefore has to import 100% of its petroleum, coal and natural gas demand sending over $10Bn out of the state

annually. With rising fossil fuel prices, more dollars will leave the state rather than be kept within the state to generate local economic development.

What is the expected cost to produce and transmit electricity from those resources?

Electrical energy produced from biomass is produced using either direct fire technology or gasification where the biomass is burned in an oxygen depleted atmosphere producing a syngas which is then burned in a gas turbine. Direct fire technology requires additional capital cost for abatement of emissions while gasification is a higher initial capital cost and less tolerant to variations in feed stocks. The btu content per ton of biomass is less than coal leading to higher logistics costs. The collection of biomass is more widely dispersed than coal which increases the cost of delivery but is more environmentally friendly than coal mining. The infrastructure to efficiently collect, store and distribute biomass has not been fully developed leading to higher costs as well. Biomass does have the additional benefits of being a base-load capacity, can support smaller, distributed generation units putting less stress on the existing transmission infrastructure and potentially reducing transmission line loses and can be used as an outlet for thinnings to maintain a healthy forest system. Current electricity from biomass ranges from $60 - $100/ MWhr depending on the cost of the feedstock. Other forms of biomass including landfill gas, animal residues and waste materials can be economically viable depending on the extent of the resource, the resources proximity to a demand center and technology used to harness this resource.

Land based wind power has come down in price over the past 10 years although the rising costs of commodities including steel, weakness in the US dollar, demand for wind turbines and increased manufacturer profits in recent years has pushed the price of wind generate power up. In 2007, prices ranges from $30-70/MWhr depending on the wind resource with the lowest prices in the Midwest and highest prices along the East and West Coast. Average project costs for land-based and off-shore wind farms has increased over the past 5 years due to increased prices in steel, rapidly growing demand for wind turbines and weakness in US dollar with land-based costs in 2007 averaging $1700/kW (see Attachment G). On the other hand, offshore wind power due to its higher capital costs and being 'less' mature than land-based wind power is more costly at $2,400 to $5000 per kW based on European installations. The US Department of Energy estimates that cost reductions are likely through integration of offshore oil and natural gas practices, more efficient manufacturing and better deployment and construction practices.

5. What types of non-native renewable energy resources are available to South Carolina?

South Carolina has the ability to ***purchase Renewable Energy Credits (RECs)*** or ***invest*** in Midwest land-based wind power plants. The disadvantage of this is that the state:

- Does ***not*** see any of the economic benefits of building renewable energy facilities.
- It ***sends dollars out of the state*** rather than keeping them local to support economic development.
- Bringing electrical energy produced from wind out of the Midwest directly to South Carolina would be ***costly***.

- Large ***transmission line loses*** making the energy substantially more expensive.

6. What programs that promote energy efficiency exist in our state?

Are these programs affordable to all South Carolinians?

Most South Carolinians do not have the upfront capital dollars to invest in energy efficiency improvements. ***New programs are needed*** to provide the capital and allow residents to pay for it through reduced energy costs over a period of time.

Should they be affordable to all South Carolinians?

They **MUST** be affordable to all South Carolinians. Without improving the energy use within the state, ***state economy will remain more vulnerable*** to higher energy prices than the rest of the nation.

Are energy efficiency measures a cost-effective alternative to the construction and operation of generation facilities?

Many energy efficiency measures are cost-effective alternative to construction of new generating facilities. For example the state in 2007 consumed approximately 88,500 GWh of electricity. The state's annual demand for electricity is projected to ***grow 1.3% per year*** to an estimated 108,000 GWh by 2020 a net increase of 20,000 GWh annual. If the state could increase its energy efficiency by 5%, this would ***equate to a savings*** of 4425 GWh annually equivalent to a 500 MW power generating plant. At an estimated cost of $3000/MW for a new coal fired unit, the total capital cost would be $1.5 Bn. Promoting energy efficiency allows you to tap into the lowest cost of energy which is cost avoidance. The key is how to promote state wide energy savings to realize the level of energy savings required to offset construction of new facilities.

How should energy efficiency incentives be designed?

They should be designed to be implemented ***upfront*** on new home construction with a tax incentive once the home is purchased and allow for ***zero cost loans*** for energy efficiency improvements on existing homes with ability to ***payback through lower utility costs***.

7. The heavy use of concrete and steel to construct coal and nuclear generating facilities in China, India and other developing nations and the importation of fuel needed to create energy

from those facilities has increased the price of these raw materials and commodities beyond most projections. Is this level of growth sustainable?

Due to the recent global economic downturn, the projected growth in those developing nations ***will slow down***. As the world economy begins to recover, growth in those nations should then begin to rise once again. With China and India accounting for nearly 40% of the world's population, the need for strong economic growth and commodities to support this growth will remain through the next decade.

Will prices continue to be drive by this global demand?

Due to the globalization of the world's economies, commodity prices will continue to be driven by global demand. Energy Efficiency, wind and solar are only driven by commodity prices as they effect the initial capital cost. Coal, biomass and natural are impacted by their associated fuel costs driven by commodity prices.

How will South Carolina be affected by this global demand?

Global demand will be both a ***positive and negative*** for South Carolina. Export products will on the positive, bring higher prices. At the same time locally used commodities will fluctuate with global demand. ***By developing*** local forms of renewable energy, ***diversifying*** the state's energy portfolio ***and improving*** energy efficiency, South Carolina can:

- Decrease the impact of global demand in the energy sector.
- Support the development of a clean-energy manufacturing based industry.

If South Carolina ***does not take steps to diversify*** its energy portfolio, the state will continue to ***remain vulnerable*** to price fluctuations in commodity energy prices including petroleum, coal and natural gas.

8. How has the current economic situation affect the projections for energy use?

The current economic situation will have a ***short term impact*** to energy use. People will ***seek to cut costs*** in transportation and home energy use. The ***long term projections*** of global energy demand ***remains unchanged***.

- Large growing economies like China and India will continue to increase demand for energy leading to increases in fossil fuel prices.

- Large petroleum producing nations will use their leverage to keep prices high and their influence to resist more fuel efficient vehicles and alternative forms of energy.
- The new administration is committed to growing a 'Clean Energy Economy' not only to meet energy security and climate change goals but to create economic development.

South Carolina MUST pursue developing its indigenous clean energy resources to capture a portion of this economic development while at the same time aggressively pursuing energy efficiency to reduce future demand and dependency.