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State Regulation of Public Utilities Review Committee

Dear Sir/Madam:

This is my response to your call for comments on the eight questions on the South Carolina energy policy. Since retiring from intense engineering and management functions 16 years ago, I have been devoting my time to current engineering problems, mainly in the electrification of mass rail transportation. I currently have some time that I can devote to local South Carolina concerns.

Mr. Philip Hopkinson and I have been cooperating in our study of energy efficiency. Our studies include the Institute of Electrical and Electronic Engineers, (IEEE) and the National Electrical Manufacturers Association, (NEMA). Mr. Hopkinson is chairman of the IEEE Transformer Committee's Working Group on Transformer Energy Efficiency, a member and past Chair of the IEEE Policy Development Coordinating Committee of the Power and Energy Society, a member and past Chair of NEMA's Policy Committee on Energy Efficiency, and a member of IEEE USA. All of these organizations work closely with the US Department of Energy (DOE). His address is:

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I suggest you add his name to your mailing list along with mine.

I am willing to appear in person in Columbia for any conferences and meetings.

I have answered your request for comments on the following pages to facilitate extracting comments from this letter.

Alexander D. Kline P.E.

1.- The only probable change in Congressional legislation is a "Carbon Cap and Trade Tax". Congress might pass such an act but will instruct the Executive branch of the government to implement the tax by publishing a regulation in the Congressional Federal Register. One example can be cited to illustrate such a regulation:

Congress passed the Energy Efficiency Act in 1990 which was signed into law January 1991. One clause in this law instructed the Department Of Energy, (DOE), to formulate a regulation for the minimum efficiency of distribution transformers. The DOE formed a task force of engineers from the IEEE, technical representatives from NEMA and several environmental stakeholders as well as engineers from the Oak Ridge National Laboratory. The task force worked for several years with limited results. The NEMA members accumulated a data base of losses and issued a NEMA Standard, NEMA TR1, along with an implementation standard, NEMA TR2, in 1994. Some of the environmental stakeholders claimed that there was insufficient input to the NEMA data base and suggested that DOE proceed to accumulate its own data base, which it did several times over the next 10 years. The DOE efficiency standard was finally published in the Congressional Federal Register in 2007, 16 years after the task force was formed.

Congress may pass a Cap and Trade carbon tax but the details are so convoluted that Congress will probably do its usual thing, passing it off to the Executive branch of the government to implement. This may take 1 year or 16 years. The State of South Carolina may elect to perform its own project and let the Federal government catch up sometime in the future.

The impact of a carbon cap and trade tax is immense. The idea of the tax is to raise money for the Federal Government. The tax will hinder any attempt for South Carolina to start new businesses or to entice new businesses to locate here.

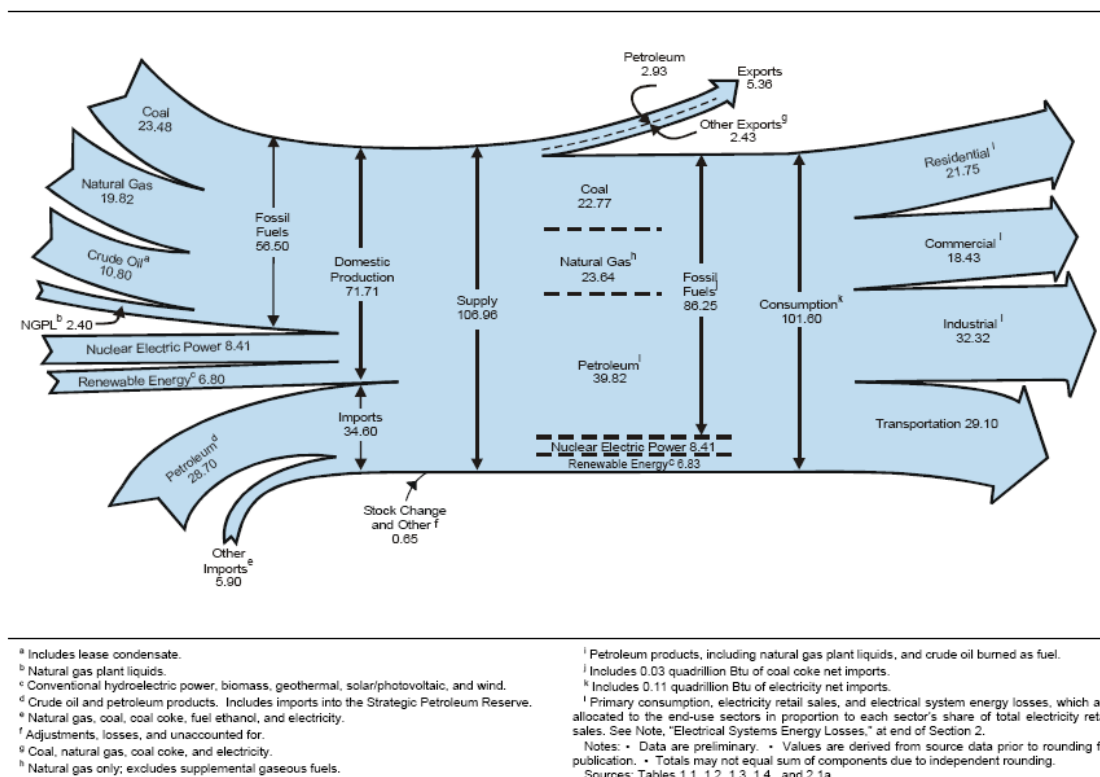
Another action by the Federal Government is the limitation of pollution by coal fired electric power generating plants. South Carolina uses coal for only 41% of its electric energy generation, consequently minimizing the impact of new regulations on emissions. This is covered in the comments on section 3.

2.- I do not have sufficient first hand knowledge of the South Carolina resources to comment except to say that there are about 3,000 retired engineers here in the Low Country that will be willing to help!

3.-The use of electrical energy in South Carolina offers one of our best opportunities to promote our state. Electrical energy is so versatile that it can be used to solve other problems, such as oil independence. This is covered below. First we can look at the overall energy picture as shown below taken from the EIA.DOE.Gov website,

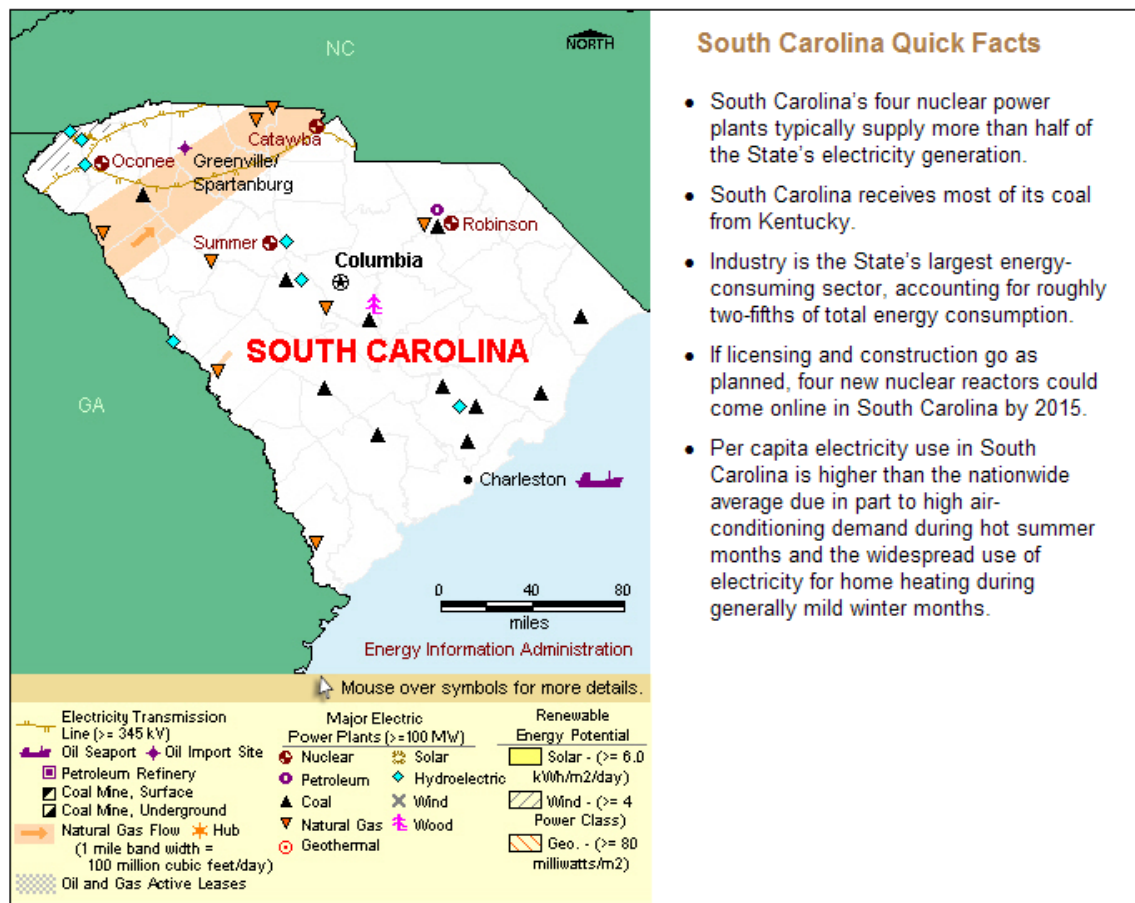
http://www.eia.doe.gov/emeu/aer/pdf/pages/sec1_3.pdf:

Diagram 1. Energy Flow, 2007
(Quadrillion Btu)



This chart shows that coal supply only 22.88% of our total energy needs. It also shows that nuclear and hydro energy supplies 15.24% of our energy needs. These figures are for the United States. The chart on the following page shows that South Carolina generates more than 50% of its electric generation by nuclear generation. This source of energy produces no pollution to the atmosphere including CO₂. Therefore South Carolina should look into ways of using nuclear electric energy to supplement other forms of energy, such as petroleum and natural gas, in order to reduce our carbon footprint. The above chart shows that electrical energy can be substituted for petroleum to save our imported oil. This will be covered on the next page.

The above graph shows energy usage in the United States. The graph on the next page from the EIA.DOE.GOV web site shows energy generated in South Carolina.



The above chart shows that South Carolina has good opportunities to minimize the use of oil by using electrical energy. Several ideas are reviewed below.

The United States can save the oil we import from Saudi Arabia by electrifying our railroads. A letter to the editor of the Island Packet newspaper describes this as reported below:

"I must agree with the conclusion offered by the Island Packet in the article on Energy, Monday Oct 8th. It concluded that the presidential candidate's proposals fall short of our energy requirements. Fortunately, there is a solution to our energy independence. This solution is to electrify the nations railroads thereby saving almost all of the oil we import from Saudi Arabia.

The United States is the only industrialized country in the world still using oil fueled freight trains. All of the other countries use electricity thereby saving the oil and carbon emissions. The United States already has the technology for rail electrification and can proceed with a nation wide project. The Northeast corridor from Boston to Washington DC is already electrified. The Keystone line from Philadelphia and Harrisburg was electrified just three weeks ago. General Electric Company has an electrification kit

for all of its oil fueled engines. All we need for rail electrification is the go-ahead and the finances.

There is one problem. The nation's electric generation capacity must be expanded 25% to provide the energy for running the trains. Solar and wind is not a source as the trains must run 100% of the time. The only reliable electric power source is nuclear power. Over 200 nuclear power plants will be required to provide the necessary energy. We must start now to build the nuclear power plants so as to supply the necessary energy."

The above covers the railroads. Oil used by trucks can be reduced by transporting the truck containers on electrified freight trains as advertised on TV by CSX and Norfolk-Southern. Anyone who travels with all of the trucks on I95 can attest to the possibility of trucking oil savings by using the railroads.

Another major saving in residential energy usage is the geo-thermal heat pump. South Carolina has the climate and ground structure that is ideal for the residential geothermal heat pump. The energy cost of a home with a geo-thermal heat pump will experience a 50% saving in energy costs. The one obstacle is that some local building codes do not allow geothermal heatpumps. I am told that this is due to political reasons.

Industry was converting to electrical energy back in the 1970's but discontinued when nuclear power plants stopped being constructed. The glass industry and the steel industry are two examples.

One new example of future energy requirements is the need for reverse osmosis water plants along the South Carolina coast. These plants require a large amount of electrical energy to run the pumps. There is a state task force looking into the need for domestic water along the coast.

The expanded use of electric golf carts has opened the question of electric 40 MPH electric cars. This will increase the demands of the electric generation plants.

Future electrical energy use in South Carolina should be studied from the viewpoint of an expanded future economy, not just the reduction in electrical use.

4.- and 5.- Renewable energy, notably wind energy and solar energy, have been classified as renewable. Both have very little future in South Carolina as the output can not be connected to the power grid of South Carolina due to the interrupted nature of the energy sources, wind and sun. Congress passed the national grid reliability act in 1990 assuring the public the quality of electrical power we require. Wind power and solar power can be used provided dedicated fossil generating plants be provided to substitute for the renewable plants during the energy interruptions. This doubles the cost of the renewable plants making it more economical to build nuclear power plants instead.

There might be a need for renewable power in the coastal area of South Carolina. Reverse osmosis water plants can be scheduled to operate with the wind or sun. The water can be stored and used as needed. The output of the task force can be used as a guide for this future use of electrical energy.

It has been suggested that renewable energy sources have their own grid to distribute interruptible energy to mills etc. This is a special situation requiring a specific study. T.Boone Pickins has proposed this special grid. This will increase the renewable energy costs without the standby power coal or gas as described above.

An unbiased study into the advantages and disadvantages of renewable energy sources should be made. South Carolina can not afford to have a split energy program.

6.- The electric utilities, such as Palmetto Electric, have the only visible program for energy efficiency. This is useful for public awareness purposes, but has little effect on the overall energy use as shown in the chart on page 1. Palmetto Electric recently initiated the geo-thermal heat pump with a demonstration home in the new development in Hardeville, Traditions. However, little notice of this program has been published. The "Pink Panther" advertisements on home insulation have proven successful.

There is a self made major energy saving program in the "gated communities" of South Carolina. This is the use of electric golf carts for general transportation. Sun City now has 8 restaurants, a major shopping center and major medical center all within golf cart accessibility. A state regulation has been made making the "blue" sticker golf carts usable in designated city streets.

"Efficiency" has meant reducing the use of electric energy. This should be changed to the reduced use of energy by the best balance of generation, transmission and usage of energy.

7.- China was about to capture the world market on steel in the year 2000. However, China now must subsidize the industry by \$545 billion. This China should not be a factor in steel and concrete for the near future. The United States must analyze the steel and concrete industry as both are very intensive energy dependent. This must be a study for South Carolina.

8.- The current economic and financial situation shows the need for new growth in the United States and energy must take the leadership. The current electric generation of the United States must double in the next 20 years if we are to continue the world leadership.

TASK FORCES.- A thorough study of South Carolina's energy needs in the near future will require a statewide input. I suggest local task forces be formed to implement more personal input. "3000 engineers" was mentioned above as being available in the Low

Country. This can support several task forces with directed scopes to study and make monthly reports to SRPURC.

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