cleanenergy.org
Southern Alliance for Clean Energy

1.866.522.SACE
www.cleanenergy.org

P.O. Box 1842
Knoxville, TN 37901
865.637.6055

34 Wall Street, Suite 607
Asheville, NC 28801
828.254.6776

250 Arizona Avenue, NE
Atlanta, GA 30307
404.373.5832

P.O. Box 8282
Savannah, GA 31412
912.201.0354

P.O. Box 1833
Pittsboro, NC 27312
919.360.2492

P.O. Box 50451
Jacksonville FL 32240
904.710.5538

MEMO

TO: The Honorable Co-Chairs Rep. Pricey Harrison and Mr. John L. W. Garrou, of the Legislative Commission on Global Climate Change

FROM: Commissioner Dr. Stephen A. Smith, Executive Director of Southern Alliance for Clean Energy

CC: Tim Dodge, Tim.Dodge@ncleg.net, Mariah Matheson, mariahm@ncleg.net

RE: Findings and references for Commissioner Smith's recommendations

DATE: March 22, 2010

Demand Side Management (DSM) Related Findings:

1. Energy efficiency represents the least-cost opportunity to generate additional electricity cost-effectively, with little or no additional greenhouse gas emissions.[1]

2. North Carolina has historically invested in energy efficiency at levels below those of other states.[2]

3. Investments in energy saving technology and other green building techniques will result in lower lifecycle building costs than conventional building construction and operating practices.[3]

4. There are several methods to encourage these investments in energy saving technology and other green building techniques, including the enhancement and acceleration of building energy codes; promotion and incentives to encourage "beyond code" construction; green building standards for public buildings and campuses; and the adoption of appliance and equipment standards where federal standards do not exist.[4]

5. States that invest in market transformation and technology development programs have enhanced job growth and economic development[5]; a focus on energy efficiency and renewable energy would provide additional benefits to the public such as energy cost savings and reduced greenhouse gas emissions.

6. There is an anticipated shortage of trained professionals to implement energy efficiency and renewable energy projects; and the general education and awareness of the public and

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[1] McKinsey & Company, *Unlocking Energy Efficiency in the U.S. Economy* (July 2009).
[2] American Council for an Energy-Efficient Economy (ACEEE), "The 2009 State Energy Efficiency Scorecard," Report Number E097 (October 2009).
[3] New Buildings Institute, *Energy Performance of LEED® for New Construction Buildings*, U.S. Green Building Council (March 2008).
[4] Institute for Energy Efficiency, *Assessment of Electricity Savings in the U.S. Achievable through New Appliance/Equipment Efficiency Standards and Building Efficiency Codes (2010 – 2020)*, The Edison Foundation (December 2009).
[5] Alic, J.A., D.C. Mowery, and E.S. Rubin, *U.S. Technology and Innovation Policies: Lessons for Climate Change*, Pew Center on Global Climate Change (November 2003); and Dunderstat, J. et al., *Energy Discovery-Innovation Institutes: A Step Toward America's Energy Sustainability*, Metropolitan Policy Program at Brookings (February 2009).

business leaders is inadequate to participate effectively in projects to increase energy efficiency.[6]

7. *Please also reference a relevant presentation to the NC LCGCC on November 14, 2008*: Discussion of four key action areas related to climate change (energy efficiency, clean energy, pollution capture, and long-range planning), discussed in the publication "Cornerstones," with John D. Wilson, Research Director, Southern Alliance for Clean Energy

Demand Side Management Related Recommendations:

- Direct the North Carolina Utilities Commission to require utilities to investigate and develop energy efficiency (demand side management) initiatives to the maximum cost-effective level, including technologies such as the introduction of smart metering devices for all residential and commercial customers. (Adapted from Crawford, et al recommendations February 8, 2010)

- Expand energy efficiency funds by increasing North Carolina's public benefits charge to approximately 1% of utility revenues. (CAPAG RCI-2, adopted)

- Set energy efficiency requirements for government buildings, including a goal of reducing energy conservation by 20% by 2027; revised policies to provide administrative support to monitoring and achieving the goal; extending green campus initiatives to all public academic and government campuses; and building standards such as LEED+ that include credit for wood-based materials using credible standards. (CAPAG RCI-3, adopted)

- Develop market transformation and technology development programs. (CAPAG RCI-4, adopted)

- Establish appliance and equipment efficiency standards adopted in other states for appliances not covered by federal standards. (CAPAG RCI-5, adopted)

- Upgrade and accelerate the adoption and implementation of energy codes for new and renovated residential and commercial buildings. (CAPAG RCI-6, adopted)

- Induce 5% of new residential buildings and 2% of new commercial buildings annually to go to "beyond code" energy use levels that improve energy performance through promotions and incentives. (CAPAG RCI-7, adopted)

- Create and expand consumer and primary/secondary school education programs to understand the energy and greenhouse gas emissions implications of consumer choices, particularly specific and targeted education to support the licensing required for trained professionals required to support the implementation of these recommendations. (CAPAG RCI-8, adopted)

- Establish an initiative to provide technical assistance to owners of existing homes and commercial buildings, providing recommendations on opportunities to reduce energy use and estimates on the impacts of the recommendations, including offering incentives and follow-up to encourage implementation. (CAPAG RCI-11, adopted)

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[6] Association of Energy Engineers, *Green Jobs: Survey of the Energy Industry* (2009); and Pew Charitable Trusts, *The Clean Energy Economy: Repowering Jobs, Businesses and Investments Across America* (June 2009).

Biochar Findings and References:

1. The co-production of biochar with biofuels or biopower is a form of carbon sequestration, potentially resulting in carbon-negative bioenergy production.[7, 8]

2. Within the Southeast region, North Carolina has an exceptional amount of private sector interest in biochar and related technologies.[9]

3. Biochar is at an early stage of technological development and requires incentives and support to encourage its use. [10]

4. The agricultural benefits and economic value of biochar as a soil amendment are not yet determined for the variety of soil types present across North Carolina; worldwide, research suggests promising results; without research to establish those benefit, farmers and other potential users will be reluctant to invest in biochar.[11]

Biochar Recommendation: Build on Private Sector Interest in Biochar for Carbon-Negative Bioenergy

Carbon-negative bioenergy is the production of biofuels or biopower with the co-production of biochar, a form of carbon-sequestration. Within the Southeast region, North Carolina has an exceptional amount of private sector interest in these technologies. These developments should be encouraged by the General Assembly with an eye to NC becoming a national center for carbon-negative bioenergy. State-level incentives are needed to encourage the purchase of technology that uses biomass to release energy while sequestering carbon. Statewide research is needed in different soil types to determine the benefits and economics of biochar as a soil amendment.
Note linkage with "Soil Carbon Sequestration" recommendation from Dan Crawford, et al.

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[7] October 2008, CAPAG, Option AFW-3, Soil Carbon Management (including organic production methods incentives), included biochar and gained unanimous consent from the stakeholders. Projected greenhouse gas mitigation potential from this policy option is 3 MMtCOe from 2007-2020.

[8] Report describes biochar as a method of 'Pollution Capture in the Landscape', projects 5.5 million tons of GHG reduction potential by the year 2030. Submitted and presented to the LCGCC on 14 NOV. 2008 by John D. Wilson of Southern Alliance for Clean Energy - http://www.ncleg.net/documentsites/committees/lcgcc/meeting%20documents/2008-2009%20interim/14%20november%202008/presentations/lcgcc%2014%20nov.%202008%20-%20wilson_sustainable%20energy_cornerstones.doc.pdf

[9] NC has the following institutions, individuals, and businesses with patents and interest in biomass gasification, pyrolysis, and biochar (this list is not exhaustive):

- Southern Research Institute, Stephen Piccot, Jeff Barghout, biomass pyrolysis for biofuels,
- NCSU Forestry, Chris Hopkins, torrefaction via slow pyrolysis,
- NCSU Biological & Agricultural Engineering, Michael Boyette, torrefaction via fast pyrolysis,
- Research Triangle Institute, Markus Lesemann, biomass pyrolysis,
- Integro Earth Fuels, Walt Childs, production of torrefied wood as coal substitute,
- NC Farm Center for Innovation and Sustainability, Richard Perritt, field trials of biochar as soil amendment, production of biochar using fast pyrolysis, and
- Biofuels Center of North Carolina, has funded a number of grant-projects related to thermochemical biofuels production, some of which are compatible with biochar production.

[10] Submitted Biochar recommendation from Dr. Dee Eggers, Commissioner of the LCGCC, which drafts legislation to fund biochar research - February 5, 2010. http://www.ncleg.net/documentsites/committees/lcgcc/commission%20report%202010/proposed%20recommendations%202-5-2010/dee%20eggers%20-%20biochar%20recommendations.pdf

[11] February 1, 2009, Dr. Jeff Novak (USDA Agricultural Research Service) reported and published his finding that biochar improves fertility of sandy coastal plain soils. Journal of Soil Science, Impact of biochar amendment on fertility of a southeastern Coastal Plain soil. http://bit.ly/Novak_biochar

Bioenergy Findings and References:

1. March 2010, EMC Biomass Draft Report – Draft Report to the Environmental Review Commission, Evaluation of the Natural Resource Impacts of the Woody Biomass Industry in North Carolina. Submitted by the North Carolina Environmental Management Commission.[12] The EMC found that "current data collection is inadequate to inform state policy makers and regulators of the impact of biomass harvesting. New technologies can facilitate better data collection without unreasonable expense to harvesters and power generators." The EMC recommends that the General Assembly should provide resources for data collection and monitoring efforts to better inform policy development related to woody biomass facilities.

2. 1998, The State of Virginia amended their Silvicultural Water Quality Act to require pre-harvest notification (PHN) of all timber-harvesting operations. In 2002 the law was amended to add civil penalties ($250 per violation, up to $1000 for repeated "Failure to Notify" or FTN). The Virginia forestry community (industry, landowners, and loggers) supported the implementation of PHN, and has enjoyed 95% compliance with the law.[13] The VA forest products industry has encouraged implementation of GPS technology to support PHN reporting in Virginia, with the SFI program offering 50% cost-share grants for purchase of GPS devices by loggers.[14]

3. *Please also note relevant presentation to the NC LCGCC November 27, 2006*: Discussion of the options for production and use of biofuels in North Carolina, Kurt S. Creamer, P.E., Biomass Program Manager, North Carolina Solar Center and Animal and Poultry Waste Management Center, North Carolina State University.

Bioenergy Recommendation: Ensure Sustainable Utilization of Biomass

Both biofuels and biopower rely upon sustainable supplies of biomass as a source of renewable energy (bioenergy). To ensure that bioenergy is truly sustainable and renewable, it must come from specific sources (http://bit.ly/biomass_consensus) and must be grown, produced, harvested in a manner that ensures the ability of future North Carolinians to meet their food, fiber, and energy needs. In-state consumers and processors of biomass should consider tracking biomass from the point of origin using GPS technology. The legislature should require a thorough scientific examination of the positive and negative environmental impacts of increased utilization of biomass five years after implementation of SB3, or five years after the first commercial production of cellulosic biofuels, whichever comes first.

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[12] 2010-0315 EMC BIOMASS REPORT – DRAFT, http://www.ncleg.net/documentsites/committees/lcgcc/meeting%20documents/2009-2010%20interim/march%2015,%202010/handouts%20and%20presentations/2010-0315%20emc%20biomass%20report%20-%20draft.pdf

[13] 2008 Report to Virginia House and Senate, Virginia Department of Forestry, Implementation of 1993 Silvicultural Water Quality Act. http://leg2.state.va.us/dls/h&sdocs.nsf/By+Year/RD4052008/$file/RD405.pdf

[14] Personal communication between Matt Poirot (VDOF) and John Bonitz (SACE), March 10, 2010.

Combined Heat and Power Findings and References:

1. Combined heat and power, and other energy recycling technologies, represent an opportunity to generate additional electricity cost-effectively, with little or no additional greenhouse gas emissions.[15]

2. Currently, North Carolina has a substantial presence of combined heat and power generation.[16]

3. Other energy recycling technologies include combined cooling, heating and power, and waste heat recovery.[17]

4. The development of combined heat and power generation has slowed substantially over the past decade or more.

5. One reason that combined heat and power is not installed more frequently is that the rate paid to non-utility generators does not reflect the true value of electricity.[18]

6. California and other states have established rates based on the market price of electricity that are more attractive to non-utility generators.[19]

7. Another reason that combined heat and power is not installed more frequently is that interconnection requirements are different for facilities that are located in municipal and co-op utility service territories.[20]

8. Interconnection standards require redundant electrical controls that are not included in national model codes and whose cost can eliminate the cost-effectiveness of smaller projects.[21]

9. Although combined heat and power is an eligible technology in utility energy efficiency programs, it is not actively promoted by utilities.

10. Another reason that combined heat and power is not installed more frequently is that NCGS § 62-110.2 prohibits the sale of excess hot water and steam to a neighboring facility unless those private contracts are subject to the regulation of the North Carolina Utilities Commission.

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[15] American Council for an Energy Efficient Economy, "North Carolina's Energy Future: Electricity, Water and Transportation Efficiency" (March 2010) and Combined Heat and Power Partnership, "Air Emission Benefits of CHP" Presentation (August 2004)

[16] American Council for an Energy Efficient Economy, "North Carolina's Energy Future: Electricity, Water and Transportation Efficiency" (March 2010)

[17] Southern Alliance for Clean Energy, *Cornerstones: Building a Secure Foundation for North Carolina's Energy Future*, 2008. Submitted and presented to the LCGCC on 14 NOV. 2008 - http://www.ncleg.net/documentsites/committees/lcgcc/meeting%20documents/2008-2009%20interim/14%20november%202008/presentations/lcgcc%2014%20nov.%202008%20-%20wilson_sustainable%20energy_cornerstones.doc.pdf

[18] Southern Alliance for Clean Energy, Combined Heat and Power Legislative Memo (submitted as Recommendation for LCGCC Final Report on February 2010).

[19] Southern Alliance for Clean Energy, Combined Heat and Power Legislative Memo (submitted as Recommendation for LCGCC Final Report on February 2010).

[20] Network for New Energy Choices, *Freeing the Grid: Best and Worst Practices in State Net Metering Policies and Interconnection Standards*, November 2009.

[21] Network for New Energy Choices, *Freeing the Grid: Best and Worst Practices in State Net Metering Policies and Interconnection Standards*, November 2009.

11. Concern about environmental permitting makes businesses hesitant to install combined heat and power systems that might trigger costly and time-consuming air quality permitting processes.[22]

12. The U.S. Environmental Protection Agency and others have advised states on how to improve environmental regulations to ensure that combined heat and power systems can be installed in a manner that is protective of the environment but does not trigger regulatory requirements that are not directly related to the new system.

13. The North Carolina's Renewable Energy and Energy Efficiency Portfolio Standard, NCGS § 62-133.8, has been interpreted to define any combined heat and power system upgrade as an energy efficiency measure.

14. *Please also note relevant presentation to the NC LCGCC on December 11, 2006*: Discussion of combined heat and power (CHP) as a method of reducing greenhouse gas emissions and increasing energy efficiency. Thomas R. Casten, Founder and Chair, Alliance for Clean Technology and founder and former Chief Executive Officer of Trigen Energy and Primary Energy Ventures and Raymond E. DuBose, Director, Energy Services Department, University of North Carolina at Chapel Hill.

15. *Please also note relevant presentation to the NC LCGCC on January 13, 2009*: Discussion of recycled energy and combined heat and power recommendations, with Stephen A. Smith, Executive Director, Southern Alliance for Clean Energy.

Combined Heat and Power Relevant Recommendations (extracted from larger S. Smith CHP recommendations on February 9, 2010):

- Offer a market price for electricity generated through combined heat and power and other energy recycling technologies.

- Remove remaining obstacles to interconnection of combined heat and power systems.

- Authorize sale of thermal energy, including hot water and steam, to neighboring facilities by repealing NCGS § 62-110.2 or by revising the statute to authorize the sale of heat, hot water or steam by a third party non-utility up to a cap based on the quantity of energy sold.

- Direct the Department of Environmental Protection to review and revise applicable air pollution standards, to the extent permitted by federal law, to facilitate the installation of combined heat and power systems in a manner consistent with progress towards attainment of clean air standards in North Carolina.

- Authorize the North Carolina Utilities Commission to provide that any combined heat and power system may receive full credit for renewable energy generation to the extent that its fuel is a renewable resource as defined by SB. 3 of 2007 (REPS Law).

[22] Southern Alliance for Clean Energy, Combined Heat and Power Legislative Memo (submitted as Recommendation for LCGCC Final Report on February 2010).