Adoption of the North Carolina Renewable Portfolio Standard – A MODEL FOR KENTUCKY?

IVAN URLAUB
North Carolina Sustainable Energy Association

This article reviews the actions and motivations of the legislature, regulators and other policy actors that led to North Carolina’s historic decision to adopt the first renewable energy and energy efficiency mandate in the Southeast. North Carolina’s experience may provide potential insights for Kentucky and 20 other states in evaluating a mandatory commitment to energy diversification sufficient to support additional green job creation, new market development and greater energy savings.

After more than four years of work by The North Carolina Sustainable Energy Association and others, the North Carolina legislature passed Session Law 2007-398 in August 2007, creating the southeast’s first Renewable Portfolio Standard law, commonly referred to as an RPS or REPS. The law requires regulated utilities to meet 2.5% of the state’s electric retail sales in 202 using a combination of renewable energy resources (at least 7.5%) and energy efficiency measures (up to 5.0%). Electric membership cooperatives and electricities are allowed to meet their own requirement by year 2018 entirely with energy efficiency, or some combination with renewables.

Unlike Kentucky, North Carolina exhausted its few economical coal resources decades ago, leaving us with no in-state traditional energy resources like petroleum, coal, uranium and natural gas. As market and utility contract prices for conventional fuels steadily increased from 2002 to 2006, state decision makers began responding to sustainable energy advocates promoting diversification of North Carolina’s energy resources. Renewable energy tax credits adopted in 1999 helped cultivate a small community of renewable energy businesses who increasingly ran into barriers with regulated utilities as they worked to sell renewable systems to utility customers.

To continue moving the market forward, an RPS was proposed in the NC legislature in 2003, and again in 2005, but was strongly opposed by the state’s regulated electric utilities because, they argued, it would significantly reduce their projected sales and earnings. Industrial interests and some consumer advocates joined the utilities on the assumption that renewable energy would raise electricity rates.

As the energy debate heated up in late 2005, both regulators and legislators wanted more information before requiring Duke Energy, Progress Energy and Dominion NC to begin using renewables and energy efficiency measures in the state, which would be a major change to their existing generation portfolio and long-term integrated resource plans.

In January 2006, the legislative Environmental Review Commission requested the NC Utilities Commission (NCUC) study an RPS law, which was produced through an RFP by La Capra Associates and GDS Associates, and delivered 12 months later to decision makers at a cost of about $125,000. The final study report is online at http://www.ncuc.net/reps/reps.htm.

What is now known as the “La Capra Study” clearly answered four critical questions for state regulators, legislators and policymakers:

QUESTION 1. What amount of new (additional) renewable resources and energy efficiency measures are feasible in North Carolina?

NC has a technical potential for 13,000 megawatts (MW) of new renewable energy generation with a practical potential of at least 3,400 MW. This

<table>
<thead>
<tr>
<th>RESOURCES</th>
<th>TECHNICAL POTENTIAL (MW)</th>
<th>PRACTICAL POTENTIAL (MW)</th>
<th>PRACTICAL ENERGY POTENTIAL (GWh*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill Gas</td>
<td>240</td>
<td>150</td>
<td>1,000</td>
</tr>
<tr>
<td>Biomass (Wood and Ag. Crops Waste)</td>
<td>2,270</td>
<td>1,100</td>
<td>8,700</td>
</tr>
<tr>
<td>Co-Firing**</td>
<td>1,875</td>
<td>384</td>
<td>2,500</td>
</tr>
<tr>
<td>Poultry Litter</td>
<td>175</td>
<td>105</td>
<td>800</td>
</tr>
<tr>
<td>Hog Waste</td>
<td>116</td>
<td>93</td>
<td>600</td>
</tr>
<tr>
<td>Wind (on-shore)***</td>
<td>9,600</td>
<td>1,500</td>
<td>3,900</td>
</tr>
<tr>
<td>Wind (off-shore)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Hydro****</td>
<td>508</td>
<td>425</td>
<td>1,700</td>
</tr>
<tr>
<td>Solar PV</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Total In-State Potential</td>
<td>12,909</td>
<td>3,373</td>
<td>16,700</td>
</tr>
</tbody>
</table>

*Energy estimate rounded to nearest hundred GWh.  **Co-firing is a subset of the Biomass assessment.  ***Includes wind development in the western mountains.  ****Includes hydroelectric generation larger than 10 MW.

Figure 1. Estimated North Carolina Renewable Resource Potentials (La Capra, 2006)
Adoption of the North Carolina RPS (cont.)

estimate excludes offshore wind, which could one day exceed 8,000 MW in North Carolina.

The study found NC could not only meet 5 percent of its energy demand with energy efficiency measures, but state energy demand could be reduced by 14% by year 2017 using identified energy efficiency measures with a levelized cost per lifetime kilowatt hour of less than five cents.

Notably, solar photovoltaics’ (PV) potential was excluded, noting in 2006 that solar was “not limited by technical or practical considerations, but rather by current levels of installed costs,” which have since decline by 25%.

QUESTION 2. If an RPS were implemented in North Carolina, what would be the impact on electricity rates?

Due to the inclusion of energy efficiency, NC would experience a maximum potential electricity rate increase of less than 1% and a reduction in the average consumer’s electricity bill due to lower overall electricity usage. By allowing regulated utilities to meet a quarter of the RPS requirement with energy efficiency, NC would realize an estimated “$476 million to $577 million savings in Net Present Value over 20 years relative to the Utilities’ Portfolio.”

QUESTION 3. What other potential benefits and costs, aside from rate impacts, might result from an RPS?

A combination of renewables and efficiency showed the greatest job creation potential, offering a net gain of more than 50,000 job-years over the utility portfolio’s creation of 146,000 job-years in the next decade. Also, renewable energy projects are more capital cost intensive, resulting in a net increase over the utilities’ portfolio in property tax generated. The study found a lack of energy diversification exposes NC to significant, unpredictable financial risk as the cost of coal and uranium fuel rises, carbon dioxide regulations become more likely, and the issue of nuclear fuel waste storage remains unresolved. Furthermore, the state will experience a reduction in greenhouse gas emissions and other air pollutants, which will result in improved air quality and health.

QUESTION 4. What other key issues must be considered relative to renewable energy development or an RPS in North Carolina?

North Carolina’s wholesale avoided cost rates were found to be insufficient to drive market development of renewable energy resources, and to be much lower than the cost of building new coal, nuclear and natural gas power generation facilities. The dynamic of declining renewable energy costs and rising conventional energy costs is therefore not recognized by traditional regulatory decision-making processes and utility resource planning.

FROM INFORMATION TO ACTION

Overall, the La Capra study confirmed for legislators what advocates had been claiming for several years – that a combination of renewable energy resources and energy efficiency measures would be more cost effective and beneficial to the state’s economy, environment and public health than meeting the same need with a combination of coal and natural gas – regardless of whether Congress regulates carbon emissions. Recent increases in utility cost estimates for new nuclear also exceed the combined cost of efficiency and renewables.

The results of La Capra enabled legislators to make an informed paradigm shift in state energy policy toward creating a diversified, lower risk energy portfolio driven by private sector investment, and to reduce the state’s heavy dependence on the unpredictable, rising costs of new coal, nuclear and natural gas options. Several months before passage of the RPS, the NCUC authorized Duke Energy to build what may be the last new coal unit in NC that cannot control carbon emissions and ordered Duke to spend 1% of annual revenues on energy efficiency.

ALREADY SEEING RESULTS

The NC RPS law is just one of several key policy drivers that have led to robust job creation and market growth of our sustainable energy industry. In May 2008, the North Carolina Sustainable Energy Association conducted the “NC Energy Efficiency and Renewable Energy Industry Census,” identifying nearly 500 companies employing an estimated 6,400 people – a 19% increase over 2007.

In 2008, North Carolina’s installed solar capacity increased 6-fold, launching NC into the top 10 US solar states. The RPS law will drive an additional 25 MW of solar installation by the end of 2010. NC now boasts three solar end-product manufacturers and numerous solar, wind, battery, and smart grid component manufacturers, many of whom chose NC because of the RPS law.

Newly-elected Gov. Bev Perdue has pledged to expand North Carolina’s “green economy.” In anticipation of further market development, the community college system announced its “Code Green Initiative” in early 2009 to deliver increased green jobs training.

In February 2009, the NC Sustainable Energy Association hosted a first-of-its kind major forum entitled, “Making Energy Work: Creating a Sustainable Energy
Adoption of the North Carolina RPS (cont.)

SuStAINAble gRowINg NC’S Energeia Vol. 20, No. 3, 2009 |

After several years of work, North Carolina took a major step forward in August 2007 with the passage of the first RPS in the Southeast. North Carolina can continue to be a leader in the emerging new energy economy with a combination of state legislative actions and changing regulations to ensure utilities make reasonable profits and predictable earnings when citizens, business and industry choose to maximize their use of in-state renewable energy resources and lower their utility bills using reliable, energy saving measures.

These much-needed steps will continue to advance our state down the path of removing regulatory barriers as North Carolina works to cost-effectively align the public’s economic interests with the utility’s financial interests.

**NEXT STEPS IN GROWING NC’S SUSTAINABLE ENERGY ECONOMY**

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Ivan Urlaub is Executive Director of The North Carolina Sustainable Energy Association (www.energync.org), a 31-year-old 501(c)3 membership-based non-profit located in Raleigh, NC. Urlaub was instrumental in leading the dialogue, analysis and legislation that created NC’s RPS law.

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### Table 3: 2006 Summary of Costs and Operational Characteristics (La Capra)

<table>
<thead>
<tr>
<th>Resources (Technology)</th>
<th>Practical Resource Potential</th>
<th>Modeled Size</th>
<th>Installed Cost</th>
<th>Fixed O&amp;M</th>
<th>Variable O&amp;M</th>
<th>Heat Rate</th>
<th>PTC</th>
</tr>
</thead>
</table>
| (Costs in 2006$)       | MW   | kW | $/kW | $/kW-year | $/MWh | Btu/kWh | MW /
| Renewable Technologies |                  |              |               |           |            |          |      |
| Eastern Wind Farm      | 500  | 30 | $1,700/$1,417 | $45        | $2        | -         | 100% |
| Eastern Wind Cluster   | 5    | 2,000 | $2,000/$2,000 | $65        | $2        | -         | 100% |
| Western Wind Farm      | 1,000 | 30 | $1,700/$1,417 | $45        | $2        | -         | 100% |
| Western Wind Cluster   | 5    | $2,000/$1,417 | $45        | $2        | -         | 100% |
| Biomass (Co-Fire with Coal) | 20-69 | $75-$230 | $12        | $5        | 12,000     | -     |
| Biomass (Stoker Technology) | 25 | $2,700 | $75        | $10       | 13,000     | 50%   |
| Biomass (Fluidized Bed Technology) | 950-1,240 | $3,000-$2,618 | $75        | $10       | 13,800     | 50%   |
| Biomass (Gasification) | 25  | $3,700-$2,946 | $100       | $10       | 12,500     | 50%   |
| Incremental Hydro      | 13   | 13  | $1,100     | $5($3)    | -         | 50%     |
| Hydro without Power*   | 350  | 2.5 | $3,000($2,750) | $20($10)  | $5($3)    | -         | 50%   |
| Undeveloped Hydro*     | 45   | 2.5 | $4,400($3,850) | $20($10)  | $5($3)    | -         | 50%   |
| Landfill Gas (ICE)     | 150  | 5   | $1,450     | $200      | -         | 12,000   | 50%   |
| Poultry Litter (Stoker) | 175 | $2,927 | $75        | $10       | 13,000     | 50%   |
| Hog Waste (Anaerobic Digester) | 150 | 90 | $4,000     | $270      | -         | 14,000   | 50%   |
| Solar PV**             | 2 kw (25 kW) | $10,000 | $75        | -         | -         | -       |

**Conventional Technologies**

| Pulverized Coal        | 750  | $1,600 | $30        | $5        | 9,100     | -       |
| Gas Combined Cycle      | 250  | $700   | $12        | $2        | 7,000     | -       |
| Gas Combustion Turbine  | 150  | $500   | $12        | $8        | 10,200    | -       |
| Nuclear                 | 1,000 | $2,000-$4,000 | $60        | $3        | 10,000    | 50%**  |

*Values denoted to parentheses are for hydro projects greater than 10 MW that do not presently qualify as a NC GreenPower resource. **Values denoted in parentheses are for larger installations at commercial/industrial sites.

[Note: costs of new coal have increased to $5,000 / kW for Duke’s new plant and Progress and Duke new nuclear proposals now exceed $5,000 / kW. NC is now seeing residential Solar PV at $8,000 / kW, down from the 2006 industry estimate of $10,000 / kW.]

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### Figure 3: 2006 Summary of Costs and Operational Characteristics (La Capra)

Economy in the Southeast.” The forum attracted top energy, economic and legal experts, focusing on the five basic ingredients for growing the region’s sustainable energy economy: a skilled workforce, infrastructure, finance, research, and most importantly, a supportive policy and regulatory environment for sustainable energy market growth. Readers can listen to and download forum presentations online at: http://www.energync.org/makingenergywork.html.

Over the past several years, North Carolina has realized that the greatest barrier to green job creation and robust energy savings in the Southeast is not technology or cost. Instead, it is the threat of these diverse solutions to projected regulated utility revenues and the utility’s ability to predict future earnings.

For more information, contact Tom Feldkamp (859-257-3183) or go to the web site: www.agglomeration.org.
**Spring News**

We rarely devote so much space to CAER news as we are in this issue of Energeia. However, spring 2009 was very busy with events. Along with the typical exemplary research that takes place at our lab, we have had cause to celebrate on many fronts. We invite you to read about the recent happenings.

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**Energizing Kentucky III**

“Energizing Kentucky,” the creation of Berea College President Larry D. Shinn, Centre College President John A. Roush, University of Kentucky President Lee T. Todd Jr. and University of Louisville President James Ramsey, encouraged Kentucky to focus on a coherent and integrated energy policy by bringing together state and national energy experts to discuss the economic, educational, and environmental opportunities and challenges presented by the world’s energy situation. The last of these meetings took place in April and focused on energy education. This conference emphasized developing the next generation of science, technology, engineering and math professionals essential to pursuing new energy knowledge and technologies. One of the meeting’s highlights was the K-12 and postsecondary energy poster session. It included science fair winners from Fayette County; elementary, middle and high schools from throughout the state; and undergraduate and graduate students from private and public Kentucky colleges and universities.

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**Advisory Board**

The CAER Advisory Board met in April, with the five new board members attending. The new members are: Joe Craft (Alliance Resource Partners, L.P.), Rick Honaker (UK Dept. of Mining Engineering), Len Peters (Kentucky Secretary of Energy & Environment), Sara Smith (Smith Management Group), and John Wright (Owensboro Grain Co.).

Returning members are: Robert Addington (EnviRes LLC), Rocky Adkins (State Representative), David Boswell (State Senator), Frank Burke (Consol Energy, Inc.), Bill Caylor (Kentucky Coal Association), Jim Cobb (Kentucky Geological Survey), David Drake (retired, EKPC), David Gray (Noblis), John Larsen (The Energy Institute), Paul Thompson (E.ON), Robert Wombles (Koppers Industries, Inc.), and William Sturgill (East KY Investment Co.).

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**Carbon Management Press Conference**

Teaming with utilities, the CAER’s Power Generation Group has formed an industrial-governmental-academic consortium called the Carbon Management Research Group (CMRG), which anticipates carrying out a $24M ten-year research and development program. On April 27th representatives from those utilities (Duke Energy, E.ON, East Kentucky Power Cooperative, Kentucky Power Cooperative), along with EPRI, the industry’s national research arm, joined Governor Beshear, UK President Todd, and Ky. House Majority Leader, Rocky Adkins, and CAER Director Rodney Andrews at a press conference held at the CAER. The Kentucky Dept. for Energy Development and Independence is also supporting this project with a yearly $1M match in funding.

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**World of Coal Ash**

The third biennial joint WOCA conference was held May 4-7th in Lexington. Several years ago, the American Coal Ash Association (ACAA) and the CAER saw the benefit in hosting one, definitive international conference on coal ash and have successfully blended cutting edge, relevant science with practical applications of importance to industry to form the backbone of this conference. Even in this weak economy, the meeting drew over 500 attendees, which is equivalent to the
WASHINGTON should TURN OFF Its Air Conditioning

BY DON SURBER
Charleston Daily Mail

Of West Virginia’s 55 counties, 54 are below the national average in wage earnings. Only one county was above the national average: Boone. Boone County happens to be the state’s leading producer of coal. Much of the coal in Boone County comes from mountaintop mining.

This upsets Washingtonians, who want West Virginia to be a nice, hilly green place where the deer and the black bears play - and the people are friendly, if a little naive and uneducated. They like us poor but proud.

The reality is that roughly two-thirds of Washington’s electricity comes from coal, and according to the Washington Post, one-third of that coal comes from mining the mountaintops of Appalachia. That works out to 22 percent of Washington’s electricity coming from coal that was mined from the mountaintops of Appalachia.

Mountaintop mining is safer and cheaper than underground mining. But if Washington insists on banning mountaintop mining, then Washington must lead the way and cut its use of electricity by 22 percent overnight to protect our hills.

Heating, ventilation and cooling accounted for 31 percent of the household consumption of electricity in 2005, according to the Department of Energy. Almost half of that HVAC consumption was from air conditioning.

So our leaders should shut off all the air conditioners in Washington. That should cut back their use of electricity by 15 percent, if my calculations are correct. I would allow some rooms in hospitals to use them, of course. I don’t want a surgeon having a sweaty palm when she is wielding a scalpel.

But if coal is evil - if coal is filthy, if coal is sick - then federal officials should be the first to turn the AC off. We do not want our politicians to get ill. If Washington really thinks going green is so good, let the people in the nation’s capital power their lights and air conditioners with wind power. They can line their streets with windmills - or turbines as they call them now. The Washington Monument would be the perfect place for a few turbines. Maintenance should be no problem. I keep hearing about all these spin doctors in Washington. Wind turbines should be set up in the cities that use electricity but hate coal and not in the hills of West Virginia.

After all, the turbines would ruin our beautiful hills and scare the deer and the black bears. If we are not going to be allowed to have flat land in West Virginia for aesthetic reasons, then Washington should not be allowed to mar the landscape of the state with wind turbines. Save our trees. After all, they consume the carbon dioxide that Washington says is killing us. And until the turbines are set in place, Washington must cut back.

A version of this editorial appeared in the Charleston (West Virginia) Daily Mail on May 7th.
The state, UK, and U of L are partnering with Argonne National Lab to establish a national Battery Manufacturing R&D Center. The purpose is to develop a domestic supply of advanced battery technologies for transportation applications that will support US energy independence, reduce greenhouse gases and strengthen the economy. The Battery Center, which will be situated next door to CAER, will benefit from the expertise of the CAER’s Electrochemical Group, headed by Steve Lipka. Lipka was the recipient of a recent $1.2M award from utility giant, E.ON AG of Dusseldorf, Germany to investigate innovative energy-storage technology ideas.

World of Coal Ash (cont.)

previous years. The 2011 conference will be in Denver, Colorado, home of the ACAA headquarters.