The Opportunities & Challenges of Virginia's Bioeconomy

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The *Opportunities & Challenges of Virginia's Bioeconomy* white paper is the result of the Virginia State Policy Dialogue on the Bioeconomy hosted by the Southeast Agriculture & Forestry Energy Resources Alliance (SAFER), Southern Growth Policies Board, the Institute for Advanced Learning & Research, and the Center for Rural Virginia. This meeting was held on September 13, 2011 in Glen Allen, Virginia in conjunction with the Center for Rural Virginia's annual conference. The meeting brought together over 45 people to talk about how the Commonwealth of Virginia can take advantage of the economic development opportunities of the bioeconomy. This paper is a summary of the presentations and discussion at that meeting.

Bioeconomy & Economic Development

"The bioeconomy should be to the 21st century economy what fossil fuels were to the 20th Century." This quote from Liam Leightley, executive director of the Institute of Advanced Learning & Research (IALR) in Danville, Virginia set the stage for the potential of the bioeconomy at the Virginia State Policy Dialogue. The opportunity being that biopower, biofuels, and bio-based consumer products could be a sustaining component of a vibrant economy.

For economic developers, the bioeconomy is of interest in four areas:

- Job Creation – The bioeconomy has the opportunity to create new jobs and to retain jobs in industries that are in decline. The potential for both job growth and retention comes from growing and transporting feedstock to production and distribution of products including power, transportation fuel, and consumer goods.

- Cluster Development – Research has shown that industries within well-formed clusters consistently have higher wages and higher rates of innovation. Clusters in the bioeconomy may form around growing and harvesting feedstocks, storage and transportation of feedstocks, and the conversion and production of bio-based products.

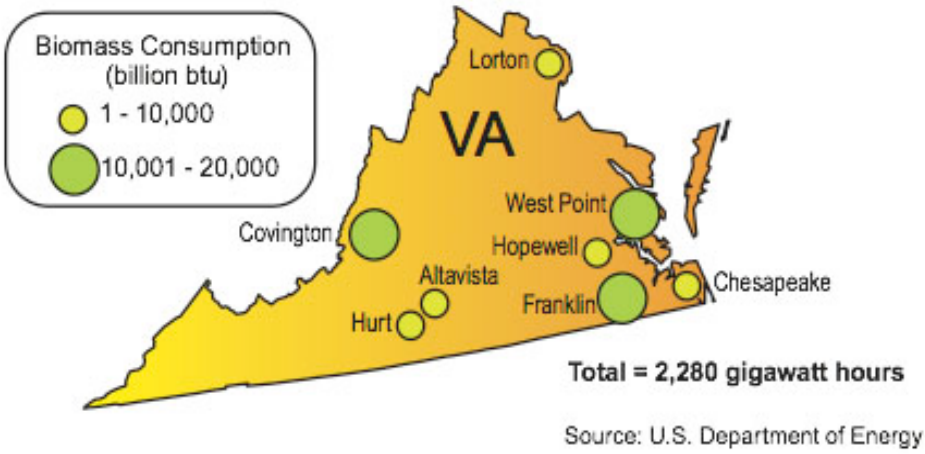
- Energy Efficiency – When households and businesses use less energy their bottom lines improve. By using less energy there are more funds available for consumer spending and for businesses to reinvest in innovation.

- Rural Development – The bioeconomy is inherently rural. Generally, companies that use biomass as a primary input need to be near their feedstock and the subsequent supply chain to be cost-competitive leading to rural economic growth.

Virginia's Bioeconomy

In Virginia, **biopower** is the primary component of the bioeconomy. In 2009, 5.6 percent of Virginia's electricity came from renewable sources.[1] Of this, 62 percent came from biomass using wood, waste, and municipal solid waste. A large portion of this biopower comes from industrial plants, such as pulp and sawtimber mills, that use biomass for both heating and electricity, called CHP (combined heat and power). In 2007, Virginia produced 2,280 gigawatt hours from CHP operations.[2]

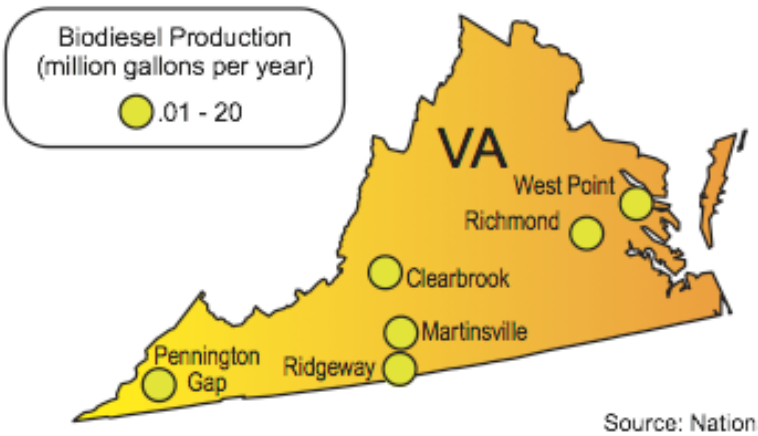
Locations and capacities of biomass fueled combined heat and electric power plants, 2007



Source: U.S. Department of Energy

In terms of transportation fuels made from biomass, Virginia has six **biodiesel** plants that produce 26 million gallons of biodiesel per year.[3] The plants use multiple feedstocks including waste vegetable oil and canola.

Locations and capacities of biodiesel plants



Source: National Biodiesel Board,
& SAFER interviews, August 2010

In 2009, Virginia consumed 2.6 million gallons of **ethanol**.[4] This is 60 percent more than the 1.6 million gallons produced in 2006. As Virginia does not produce ethanol, 100 percent of it is imported.

In addition, Enviva and Biomass Energy, will expand Biomass Energy's facility in Bumpass, Virginia to produce 350,000 tons of **wood pellets**. The pellets will then be sent for export from Enviva's Chesapeake port.

Jobs in Virginia's Bioeconomy

According to the June 2011 issue of *Wired* magazine, 7 million users of LinkedIn switched industries between 2006 and 2010.[5] Of that 7 million, 57 percent moved to the "Renewables & Environment" industry. This is just one indication of the growing number of jobs in the clean technology sector.

Clean technology jobs, which include bioeconomy jobs, are inherently difficult to count. First, there is no one universally accepted definition of what constitutes a clean technology job. Second, clean technology jobs exist across existing industries and supply chains. And third, there is no central data source to obtain clean technology job information. Given these limitations, there are a number of studies that can be used to estimate the number of clean technology jobs in Virginia. Table 1 gives an overview of three different studies and their results for clean technology jobs in Virginia.

Table 1. Clean Technology Jobs in Virginia[6]

	Clean Technology Jobs	Data Date
Brookings All	77,772	2010
Brookings Energy Efficiency & Renewable Energy Only	20,043	2010
Pew Center on the States	16,907	2008
U.S. Mayors (Includes Washington DC Metro Area)	31,516	2007

The 2011 Brookings Institution report, *Sizing the Clean Economy*, is the only report of the three that attempts to quantify the bioeconomy particularly. The report characterized Virginia's bioeconomy as follows:

- 103 biofuels/biomass jobs in 2010
- Ranked 31st in total bioeconomy jobs
- Ranked 5th in job growth between 2003 and 2010 (30%)
- Ranked 3rd in job growth between 2007 and 2010 (35%)

Virginia's Bioeconomy in Action

Representatives from Longwood University and Piedmont Geriatric Hospital gave presentations at the Dialogue describing their biopower projects.

Longwood University

Longwood University in Farmville, Virginia has produced power from biomass for the last 30 years. In the early 1980s, Longwood's primary energy source was fuel oil. During that time, a spike in the price of oil led the university to seek alternative solutions. Without access to coal or natural gas, biomass proved to be the best alternative.

Since then, Longwood has produced 85 percent of its energy for hot water and heating from biomass. The biopower program uses wood residues from surrounding sawtimber operations. All the wood residues are local, coming from a seven county area that is within 45 miles of the university. The residues are transported and stored by Longwood where they keep at least a 30-day supply of residues on site.

In 2011, Longwood saved $2.8 million dollars in energy costs. In the future, Longwood is looking into diversifying its feedstock source and to enter into longer term contacts to guarantee supply and price. In addition, they are working to ensure forest sustainability practices that are used upstream from their operation.

Piedmont Geriatric Hospital

Piedmont Geriatric Hospital in Burkeville, Virginia also uses biomass to power its facility. Piedmont began its biopower program in 2006. Because the hospital was unable to store wood residues, they also pursued the use of switchgrass, a perennial native grass, for power production.

Piedmont has a specific focus on enhancing the rural economy by (a) engaging landowners to produce switchgrass; (b) providing farmers with ash to fertilize their fields; (c) working with local machine dealers and mechanics; and (d) keeping farmland in agriculture. In addition, the project provides jobs from the processing yard to the boiler plant.

The hospital saves $43,000 a year by using biopower compared to the cost of burning fuel oil. In the future, Piedmont is looking to further engage farmers in the development of switchgrass for biopower production.

Challenges & Solutions of the Bioeconomy

Following an overview of the bioeconomy and presentations from biomass projects, participants gathered in small groups to discuss the following:

- What are the hindrances and challenges to the bioeconomy that are market driven?
- What are the public policy decisions that could impact these hindrances and challenges?

The participants worked in groups to identify the most pertinent challenges and developed potential solutions. The results of those discussions are as follows:

Challenges

- Scale

With Virginia's relatively low electricity rates, the issue of scale is important for biopower, particularly in the form of combined heat and power. By using both the power and heat generated from power production, the economics of biopower improves drastically. While Longwood currently only uses biomass for power production, they would like to expand into thermal heating.

- Sustainability

As a growing bioeconomy increases the demand for wood, the question of forest sustainability arises. Forest sustainability is important to all industries that use wood as a primary input. Industries understand that to guarantee good quality wood products in the future, using best management practices for forests is key. Questions surrounding forest sustainability include:

- What does the research say about forest health when brush and slash are removed? Can removals improve the health of the forest? Is it cost-effective to remove them?
- How much wood waste (i.e. residuals, slash, and brush) is actually available?
- How does an increase in demand for wood affect the health of the forest and existing industries?
- Can increase in demand actually aid industries such as logging that are in decline?
- Can an increase in demand encourage landowners who are currently not managing their forests well to improve?

- Infrastructure

Due to its bulky size and low-weight density, harvesting and transporting biomass from the field to the conversion site is difficult. In addition, once it reaches the conversion site, it is difficult to provide large dry spaces to store the materials

Another infrastructure problem is being able to provide the right incentives for farmers to produce bioenergy crops such as switchgrass. Because many of these crops are multi-year investments, farmers need assurance there will be markets for their crops in the future.

Solutions

- Create demand for biopower. Just as Virginia lawmakers were successful in boosting the Virginia wine industry, they can facilitate long-term demand for biopower through public policies.

- In order to ensure availability of cost-effective and sustainable feedstocks, start with small projects that are located in close proximity to the biomass resources. These projects should be co-located with entities that need both electricity and heat to maximize the use of resources.

- Commission a study by a third party such as Virginia Tech to identify how much woody biomass is available, for sale, and at what cost.

- Provide information to policymakers on how the production of switchgrass for the bioeconomy can help reduce the nutrient load in the Chesapeake Watershed area.

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[1] U.S. Department of Energy, Energy Information Administration, *State Renewable Electricity Profiles 2009,* Washington DC: U.S. Department of Energy, Energy Information Administration, July 2011.

[2] U.S. Department of Energy, Energy Information Administration, "EIA-906/920 Fuel Stock Data for Electric Power Sector Generating Facilities, 2007," 2008.

[3] National Biodiesel Board, "NBB-Member Fuel Producers/Marketers," September 2011.

[4] U.S. Department of Energy, Energy Information Administration, "Table C2. Energy Consumption Estimates for Major Energy Sources in Physical Units, 2009," 2010.

[5] Davidson, Adam, "The Economic Rebound: It Isn't What You Think," *Wired Magazine,* June 2011.

[6] Muro, Mark Jonathan Rothwell, Devashree Saha, and Battelle Technology Partnership Practice, *Sizing the Clean Economy*, Washington, DC: Brookings Institution, 2011.; Pew Center on the States, *The Clean Energy Economy*, Washington DC: Pew Charitable Trusts, June 2009.; The United States Conference of Mayors and the Mayors Climate Protection Center, *U.S. Metro Economies: Current and Potential Green Jobs in the U.S. Economy*, Lexington, MA: Global Insight, October 2008.