Three Realities of Wood Bioenergy and Forest Owners

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Executive Summary

Recent white papers and media coverage of wood bioenergy projects and policies raised questions about carbon accounting, the role of subsidies and biomass definitions. However, policy-makers and forest owners can benefit from a rooted understanding of what we know versus technologies and markets shrouded in uncertainty. Here are three areas of direct relevance to timberland owners and legislators that forest analysts understand well and can address with authority and data:

- Half of announced wood-consuming bioenergy projects will fail. Basic analysis of publicly-available data indicates that a large number of announced projects will never come on line. Why is this important? Because assessments of emerging wood bioenergy markets that assume all projects succeed are misleading and do not account for best available information.
- Forest owners are long-term managers, not day traders. Recent analysis confirms decades of forest economic research into forest owner behavior in light of evolving bioenergy markets and concludes "…landowner responses clearly increase supply and decrease raw materials costs in the long-run…"
- Wood suppliers and loggers adapt to new markets incrementally. Loggers – those tasked with working with forest owners to harvest residues to wood bioenergy facilities – apply systems that integrate smoothly and inexpensively with their existing forest operations. New wood markets do not create a frenzy of forest harvesting. Parallel concerns arose when pulp mills expanded in size and scope during the twentieth century. Throughout this period, forest owners and wood suppliers adapted through improved forest management, incremental growth of logging operations and utilization of previously underutilized wood raw materials.

Introduction

Recent white papers and media coverage of wood bioenergy projects and policies raised questions about carbon accounting, the role of subsidies and biomass definitions.[1] However, policy-makers and forest owners can benefit from a rooted understanding of what we know versus technologies and markets shrouded in uncertainty. Here are three areas of direct relevance to timberland owners and legislators that forest analysts understand well and can address with authority and data.

1. Half of announced wood bioenergy projects will fail.

Vibrant investor interest in renewable energy sources and parallel legislative activities[2] ignited a rapid increase in announced and under-construction wood-using bioenergy facilities across the US. A key challenge becomes tracking and evaluating the progress of wood bioenergy markets and projects over time to make better investment and policy decisions. Forisk tracks US wood bioenergy markets and documented its project screening methodology in a white paper published by the National Alliance of Forest Owners (Mendell and Lang 2010). The screen relies on two criteria for wood-consuming projects:

- Technology: projects that employ currently viable technology pass the technology screen. These include pelletizing technology and wood-to-electricity projects. Cellulosic ethanol from wood feedstock is still a developing technology and is currently not operational.
- Status: projects that are operational, under construction, or received or secured two or more necessary elements for advancing towards operations pass the status screen.

As of June 16, 2010, Forisk indentified 351 wood-consuming, announced or operating bioenergy projects in the continental US (Figure 1).

Figure 1: Number of Announced Wood-Using Bioenergy Facilities by Type and Region, Continental US

	Type			
Region	**Electricity**	**Liquid Fuel**	**Pellet**	***Total***
Appalachian	19	4	30	***53***
Lake States	13	2	29	***44***
Northeast	35	2	22	***59***
South	76	12	43	***131***
West	31	8	25	***64***
Total	**174**	**28**	**149**	***351***

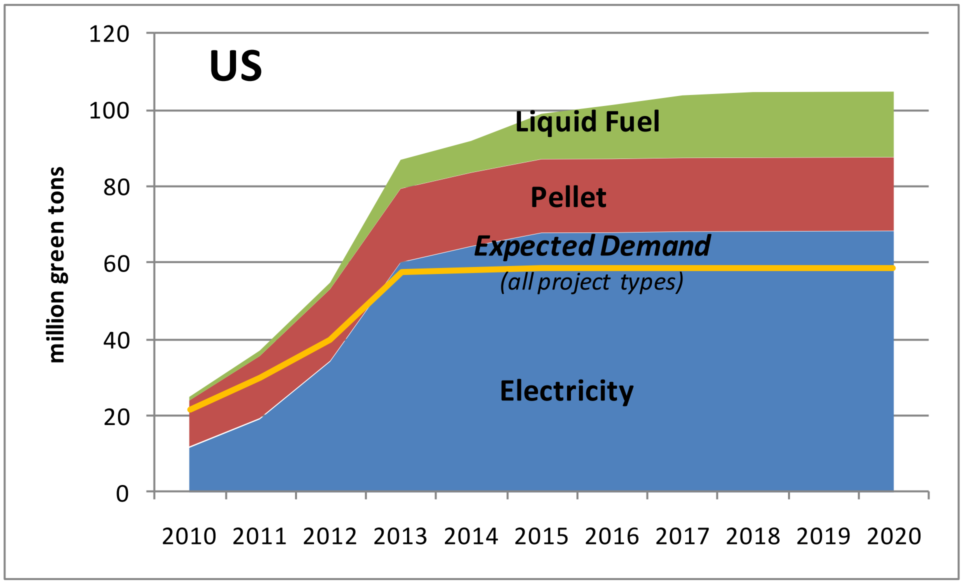
Source: Forisk *Wood Bioenergy US* database

[1] Two studies include the "Biomass Sustainability and Carbon Policy Study" of wood energy in Massachusetts published by Manomet (available at: http://www.manomet.org/node/322) and "Clearcut Disaster: Carbon Loophole Threatens US Forests" published by the Environmental Working Group (available at: http://www.ewg.org/clearcut-disaster). Tom Zeller's coverage at the New York Times includes "Net Benefits of Biomass Power Under Scrutiny", which initiated a dialogue with Manomet's president (article available at: http://www.nytimes.com/2010/06/19/science/earth/19biomass.html?_r=1&scp=1&sq=biomass&st=cse; Q&A with Manomet at: http://green.blogs.nytimes.com/2010/06/22/q-and-a-woody-biomass-pros-and-cons/).

[2] Including the Energy Independence and Security Act of 2007 (EISA), the 2008 Farm Bill, and the Biomass Crop Assistance Program (BCAP) in 2009.

The projects accounted for in Figure 1 represent potential, incremental wood use of 104.8 million green tons per year by 2020. Figure 2 shows the wood use of announced projects in the US through time and by type as they come online from 2010 to 2020. The "expected demand" line on the figure indicates demand by projects that passed the technology and status screens and includes all project types. Based on Forisk analysis, **56% of the potential announced wood demand – projects representing 58.7 million tons per year – passes the basic screening**. This provides an indication of how much actual, incremental wood demand we might expect given what's known today about these projects.

Figure 2: Estimated Wood Use by Announced Bioenergy Facilities, US[3]



Source: Forisk Consulting

While the number could be 60% or 40%, we can establish with a high level of certainty using publicly-available data that a large number of these projects will never come on line. Why is this important? Because assessments of emerging wood bioenergy markets that assume all projects succeed are unrealistic, misleading and do not account for best available information.

2. Forest owners are long-term managers, not day-traders

The history of US forests tells a story of resilience and market equilibrium. Douglas MacCleery, in *American Forests: A History of Resiliency and Recovery*, details the resurgence of US forests since 1920 and the active management initiated by major forest owners that have produced long term increases in forest productivity. Timber per acre in the US has increased nearly one-third since 1952 and US forest growth has exceeded harvest since the 1940s.

Forest economists have long studied forest owner responses to market changes. We think through these events with respect to prices paid for wood and optimal harvest decisions. Generally, researchers found that timber markets – and forest owners – gradually achieve or return to market equilibriums through adjusting to changes in prices, supplies, rotation ages and harvest levels (Brazee and

[3] Based on actual, estimated and claimed production volumes for 262 (75%) of the announced and operating projects in Forisk's Wood Bionergy database. Of the 89 projects not accounted for in the volume numbers, 39 are small-scale pellet facilities.

Mendelsohn 1990; Yin and Newman 1999; Prestemon and Holmes 2000). Forestland owners consistently make decisions with respect to long-term economics and, implied in the research, they feel neither compelled nor obligated to satisfy third-party targets (i.e. for energy production or to sell wood to new bioenergy plants) unless the economics make sense. Clutter et al (2010), in a recent white paper, revisit this research to model forest owner behavior in light of evolving bioenergy markets and conclude "…**landowner responses clearly increase supply and decrease raw materials costs in the long-run**…"

3. Wood suppliers and loggers adapt to new markets incrementally.

According to a study in Massachusetts, there are 101 approaches to harvesting forest biomass (RE Consulting and INRLLC 2007). However, a select subset of these approaches is common in each region across the US. Why? Because loggers – those tasked with the job of working with forest owners to harvest and haul logs to mills and logging residues to wood bioenergy facilities – operate in an industry with limited capacity. Therefore, they apply systems that integrate smoothly and inexpensively with their existing forest operations. There is no chainsaw-toting army at the border waiting for the erection of wood bioenergy projects across the US; rather, forestry benefits from a profession populated by locally-known entrepreneurs with a long-tradition of adapting to shifting markets.

Parallel concerns regarding an impending vacuum of forests occurred when pulp mills expanded in size and scope during the twentieth century. In 1910, US pulp mills consumed eight million tons of pulpwood for paper and paperboard. By 1965 that number increased to 135 million tons and, in 1994, it peaked at 265 million tons (Harris et al 2005). Throughout this period, forest owners and wood suppliers adapted through improved forest management, incremental growth of logging operations and utilization of previously underutilized wood raw materials. In addition, forest industry growth led to an increased focus on safety, certification and environmental management. For example, Best Management Practices (BMPs) have evolved and been shown to provide effective means for maintaining and protecting water quality (Gravelle and Link 2007; Harris et al. 2007; Jackson et al. 2007; Karwan et al. 2007; Carroll et al. 2004; Aust and Blinn 2004).

While the paper and paperboard industry increased in size, scale and wood use through the twentieth century, more recent data highlight an industry that has contracted and provided opportunities for new wood users. Figure 3 summarizes the 12-year trend from 1997 through 2008, a decrease of 9.5%, in US paper and paperboard production. Analysis of US Forest Service data from 1996 through 2006 indicates that, nation-wide, **the forest industry harvests 16.3 million fewer green tons of pulpwood annually**. This decline in pulpwood removals, the actual harvesting and transporting of pulpwood from forests to mills, reflects a net change.

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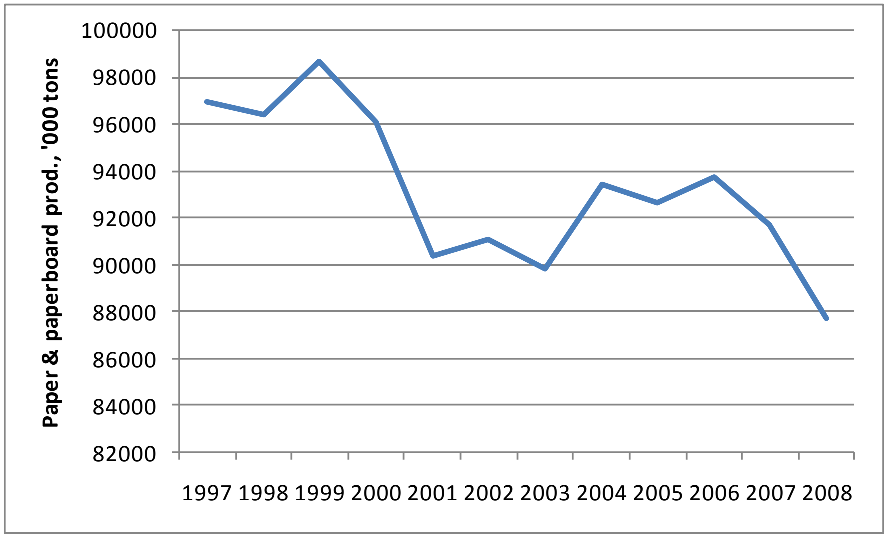
Figure 3: US Paper and Paperboard Production, 1999-2008, '000 tons



Data source: AF&PA

Conclusions

In forestry, where land ownership and management plans span decades, we benefit by understanding, for starters, the markets and technologies as they actually function today. Basic, practical screening of wood-consuming projects indicates that current legislative expectations for wood-based bioenergy markets exceed the likely capacity of these markets to produce energy. Why? The process for locating, financing, constructing and operating these projects is complicated and difficult. In addition, forest owners, and the supply chain upon which they depend to harvest logs and biomass, change incrementally, adapting to new markets as part of a diversified set of activities.

Bibliography

Aust, W. M., & Blinn, C. R. 2004. Forestry best management practices for timber harvesting and site preparation in the Eastern United States: An overview of water quality and productivity research during the past 20 years (1982-2002). *Water, Air, and Soil Pollution: Focus* (4), 5-36.

Brazee, R. and R. Mendelsohn. 1990. A dynamic model of timber markets. *Forest Science*. 36(2): 225-264.

Carroll, G., Schoenholtz, S., Young, B., & Dibble, E. 2004. Effectiveness of forestry streamside management zones in the sand-clay hills of Mississippi: Early indications. *Water Air Soil Pollution: Focus , 4*, 275-296.

Clutter, M., R. Abt, D. Greene, and J. Siry. 2010. A developing bioenergy market and its implications on forests and forest products markets in the United States: economic considerations. *National Alliance of Forest Owners White Paper*. April: 1-10. Available at: http://nafoalliance.org/clutter/

Gravelle, J., & Link, T. 2007. Influence of timber harvesting on headwater peak stream temperatures in a northern Idaho watershed. *Forest Science , 53* (2), 189-205.

Harris, R. R., Sullivan, K., Cafferata, P. H., Munn, J. R., & Raucher, K. M. (2007). Applications of turbidity monitoring to forest management in California. *Environmental Management , 40*, 531-543.

Harris, T., S. Baldwin and B. Mendell. 2005. Pulpwood and pulp: long-term history. *Forest Landowner*. January/February.

Jackson, C. R., Batzer, D. P., Cross, S. R., Haggerty, S. M., & Sturm, C. A. 2007. Headwater streams and timber harvest: Channel, macroinvertebrate, and amphibian response and recovery. *Forest Science , 53* (2), 356-370.

Karwan, D. L., Gravelle, J. A., & Hubbart, J. A. 2007. Effects of timber harvest on suspended sediment loads in Mica Creek, Idaho. *Forest Science , 53* (2), 181-188.

MacCleery, D.W. 1996. *American Forests: A History of Resiliency and Recovery*. Forest History Society Issues Series. 58 pages.

Mendell, B. and A.H. Lang. 2010. A practical guide for tracking wood-using bioenergy markets. *National Alliance of Forest Owners White Paper*. April: 1-10. Available at: http://nafoalliance.org/wp-content/uploads/Forisk-A-Practical-Guide-for-Tracking-Wood-Using-Bioenergy.pdf

Prestemon, J.R. and T.P. Holmes. 2000. Timber price dynamics following a natural catastrophe. *American Journal of Agricultural Economics*. 82: 145-160.

RE Consulting and Innovative Natural Resource Solutions. 2007. Forest harvesting systems for biomass production. Massachusetts Division of Energy Resources and Massachusetts Department of Conservation & Recreation. 87pages.

Yin, R. and D.H. Newman. 1999. An intervention analysis of Hurricane Hugo's effect on South Carolina's stumpage prices. Canadian Journal of Forest Research. 29(6): 779-787.