



OCTOBER 2012 • VOLUME 2, NUMBER 1

Overcoming Barriers to Forest Bioenergy Production in Minnesota

EXECUTIVE SUMMARY

As a state with no coal, oil, or natural gas production, the development of renewable energy is vital to Minnesota's future. Forest biomass used for heating, electricity, and biofuel production is one potential source of energy that could significantly reduce carbon emissions and dependence on energy imports while reinvesting in local communities. Yet bioenergy investments have been slow to materialize despite an assortment of state and federal incentives. To determine why, researchers from the University of Minnesota's Department of Forest Resources interviewed state bioenergy experts from a number of sectors to assess the current market, identify policy barriers to bioenergy development, and articulate principles and a framework for a statewide bioenergy strategy.

HIGHLIGHTS

- The lack of coordination and shared responsibility among various state agencies, industry, associations, and nonprofit organizations has resulted in a fragmented set of policies and implementation governing bioenergy production.
- There is a need to create durable long-lasting incentive structures for bioenergy production that are integrated with other bio-based markets, including traditional forest products markets upon which bioenergy production is highly dependent.
- Existing policy tends to favor traditional fossil fuels and large-scale energy applications at the expense of community-scaled bioenergy production.
- There are significant opportunities for community-scale bioenergy investment that capitalizes on existing best management forest practices, reinvigorates the biomass supply chain, and that promotes community economic development.
- However, there is insufficient experience and shared know-how among communities, agencies, and the forest products industry to efficiently implement and operate appropriately-scaled projects.
- Public-private partnerships are needed at multiple scales and among various supply chain actors to reduce bioenergy investment exposure and to build shared technical expertise.

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This research was funded by a grant from CURA's Faculty Interactive Research Program, and the Institute on the Environment's Initiative for Renewable Energy and the Environment (IREE), both at the University of Minnesota.

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KEY FINDINGS

Bioenergy experts identified seven primary barriers to bioenergy production along with several recommendations for developing a cohesive statewide strategy.

Problem #1: Existing energy policy gives preference to traditional energy sources, putting bioenergy at a competitive disadvantage.

- *At the federal level, traditional energy sources, such as fossil fuels, receive greater governmental support in the form of subsidies.*
- *At the state level, biomass receives less preference in the Renewable Portfolio Standards.*

Problem #2: Bioenergy incentives that create competition for raw materials are mutually counterproductive.

- *The biomass industry is dependent upon the primary forest products industry to generate low-cost residuals during timber harvesting; policies creating preferential competition of biomass resources at the expense of primary forest products risks cannibalizing future bioenergy production.*

Problem #3: Existing policies and procedures fail to adequately integrate bioenergy and traditional forest-products industries.

- *Current energy markets do not financially incentivize landowners to harvest biomass when performing a timber sale.*
- *Agencies and traditional logging businesses lack critical experience and equipment to conduct biomass harvesting.*

Problem #4: The various efforts and authorities that exist statewide related to bioenergy are uncoordinated and lack a unified strategy.

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BACKGROUND

Minnesota is home to vast quantities of biomass, which can serve as a significant source of renewable energy. Forest biomass—which includes the tree tops and limbs left over from timber harvesting, as well as wood waste from manufacturing—offers a particularly interesting opportunity for expanding Minnesota's energy portfolio. A recent study estimates that use of forest biomass for energy production could sustainably produce upwards of one million dry tons of biomass annually, enough to generate 150 megawatts of electricity per year to power more than 120,000 homes or (converted into thermal heat) to warm more than 400,000 homes.

Governor Tim Pawlenty signed the Next Generation Energy Act in May 2007, which requires that 25% of the total energy used in the state be derived from renewable-energy resources by the year 2025. The act provides a framework for more locally produced renewable energy and reduced carbon emissions, and establishes forest biomass as a qualifying source. However, a number of barriers exist to taking advantage of sustainable bioenergy production in Minnesota.

METHODOLOGY

Researchers interviewed 40 bioenergy experts in the spring of 2011 to identify barriers to production in the state and possible solutions. Those interviewed included forest industry and manufacturing representatives, public-utility officials, economic development experts, state-agency representatives, technical-assistance organizations and conveners, conservation organizations, and university and private-sector researchers. Questions focused on the institutional design and governance structure of policies related to the bioenergy supply chain, allocation of raw materials and access to financial capital, industry leadership and accountability, and types of innovation needed. The researchers analyzed transcripts of the interviews to identify common issues and themes. Key findings from these interviews are summarized in the sidebars on pages 2 and 3.

POLICY IMPLICATIONS AND RECOMMENDATIONS

The development of renewable energy technologies is vital to Minnesota's energy future. Even though bioenergy will never entirely replace fossil fuels, the days of inexpensive energy without concern for environmental and human health impacts are limited. We no longer have the luxury of ignoring these costs and must find financially feasible, sustainable domestic energy alternatives that reinvest in the economic future of our communities. Scaled appropriately and making use of the right technology, bioenergy can provide new jobs, reduce carbon pollution, and increase wealth in communities that would otherwise spend their hard-earned dollars on energy purchased from another state or outside the United States.

The following principles emerged from interviews with bioenergy experts and offer a guide to near-term bioenergy policy development:

- **Integrate bioenergy production with new market development.** Minnesota possesses abundant forest and agriculture resources, which if effectively mobilized could bypass obsolete investment pathways. A heightened focus on producing multiple products out of a single feedstock, for instance, would significantly improve financial feasibility. Recent biorefinery innovations in the pulp and paper industry allows for the co-production of heat, electricity, and lignin for textile production, in addition to traditional product areas. Capturing the waste heat from the manufacturing process, and combined-heat and power applications, are examples of integrated production.
- **Demonstrate new models for integrated bioenergy supply chains.** In addition to new market development, there is an opportunity to better integrate biomass harvesting with traditional forest products industries. Countries like Sweden and Finland are world leaders in biomass harvesting with more than 20% of their domestic energy production derived from forest residuals from timber harvesting. Integrated harvesting practices with an emphasis on feedstock quality and energy optimization are critical to their success. Emulating practices that make sense in Minnesota would reinvigorate the forest products industry while enhancing the financial feasibility of bioenergy as a viable fossil fuel alternative.



Forest biomass—which includes the treetops and limbs left over from timber harvesting—can serve as a significant source of renewable energy in Minnesota. (Photo by Dennis R. Becker)

- *Lack of clarity about roles and responsibilities of organizations (state agencies, nonprofits, university) and supply chain actors (loggers, wood manufacturers, utility companies) within and across supply chain steps results in an unorganized and inefficient system.*

Problem #5: Lack of policy coordination has resulted in an overly complicated structure of governing rules and procedures concerning biomass.

- *Differences in federal and state policies dictating forest management and bioenergy market incentives in Minnesota can result in uncoordinated efforts and failure to create durable policies that provide continuity needed for market establishment.*
- *Involvement of multiple state agencies across the supply chain is necessary but also results in disjointed policy implementation (for example, makes the permitting process difficult to navigate).*

Problem #6: Existing bioenergy policy gives preference to large-scale applications.

- *Existing energy policy is often designed to only be applied at too large of a scale, and is not easily adapted to smaller community scales, despite associated financial and ecological benefits.*

Problem #7: Lack of public awareness about the benefits of forest bioenergy reduces support and potential impact.

- *Communities and businesses lack awareness of available technologies and potential savings achieved by switching to biomass heating and electricity production.*

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- **Reduce support structures for fossil fuels.** For many of those we interviewed, fossil fuels are a luxury we can no longer afford, and at the very least should account for the full costs of their production. The gradual elimination of production incentives would enhance bioenergy competitiveness and reduce the risk of investment in renewable energy ventures. Simultaneously establishing market values for the benefits provided by bioenergy (via product premiums) would also create greater parity in the marketplace and encourage technological innovation. Finally, a broader portfolio of state energy investments would enhance long term security with increased use of homegrown energy resources.
- **Capitalize on existing best management forest practices.** Minnesota is a national leader in the development of sustainable biomass harvesting practices and related environmental protection. More than 7.5 million acres of public and private forest lands are certified sustainable, and Minnesota was the first state in the country to implement biomass harvesting guidelines, which stipulate the amount of biomass left behind for soil and habitat enhancement. The degree to which these best practices are recognized in the marketplace can provide a competitive advantage, as well as assurances about the economic and environmental benefits being delivered.
- **Mobilize support to leverage public-private partnerships.** The lack of technical experience with bioenergy systems, the amount of capital investment required, and the low cost of fossil fuels inhibit new bioenergy investments. Despite the long-term financial and environmental benefits of such investments, and the fact that natural gas prices are projected to increase, many public entities and private businesses are content to send dollars out of state and perpetuate fossil fuel impacts. Several experts stressed the need to inform communities and businesses of the benefits of bioenergy and to mobilize public-private partnerships that could reduce investment exposure and share technical experience.
- **Develop a bioenergy roadmap to coordinate disparate efforts.** Despite frequent efforts to coordinate state agency and stakeholder actions to encourage business investment, the institutional structures guiding these actions lack durability and are subject to political priorities. Developing a bioenergy roadmap to guide creation of durable incentive structures, aligning state policies with administrative actions and supply chain needs, and stimulating research and business innovation for technology deployment would be important initial steps in coordinating public-private partnerships.