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Manomet Study of Woody Biomass Energy Released

Plymouth, MA, June 10, 2010—The Massachusetts Department of Energy Resources (DOER) and Manomet Center for Conservation Sciences (Manomet) have released the results of a six-month study that began last December to answer some critical questions about using forest wood for energy in Massachusetts. The Manomet-led study, commissioned by DOER last fall, was conducted by an eight-member team of policy and science experts from several organizations.

Some of the major questions addressed by the study include: (1) How much wood is available from forestland for biomass energy in Massachusetts? (2) What might be the impacts of increased biomass harvests on forest ecosystems? and (3) What are the carbon accounting (climate science) implications of using forest biomass for energy?

Many other U.S. states and countries around the world are promoting and investing in forest biomass energy because using wood for energy is commonly assumed to be "carbon neutral" and, therefore, good for mitigating climate change.

The Manomet study, which is based on a comprehensive lifecycle carbon accounting framework, reveals a more complex picture. The study shows that using wood for energy can result in an initial "carbon debt" because burning wood releases more CO_2 into the atmosphere per unit of energy than fossil fuels (oil, coal, or natural gas). But unlike fossil fuels, forests can grow back and recapture (or sequester) CO_2 from the atmosphere. Over time, through accelerated forest growth, the carbon debt can be "paid off." After the carbon debt is paid off, if the forest continues to grow, a "carbon dividend" is realized and the use of wood for energy then becomes increasingly beneficial for greenhouse gas mitigation. As a result, using wood for energy can lead to lower atmospheric greenhouse gas levels than fossil fuels, but only after the point in time when the carbon debt is paid off. Whether or not full carbon neutrality will be achieved in these circumstances will depend on if, when, and how the forest is harvested in the future.

The most innovative and policy-relevant finding in the report is the "debt-then-dividend" model that shows using forest biomass for energy can increase greenhouse gases for a period of time before it reduces them. The length of time it takes to pay off the carbon debt and begin accruing carbon dividends (i.e., greenhouse gas benefits) can vary widely, from five years to many decades. The length of time depends on a complex interaction of (1) the type of biomass energy used (electricity, heat, or combined heat and electricity); (2) the fossil fuel that biomass energy

replaces (coal, oil, or natural gas); and (3) the degree the growth potential of the forest is realized by the landowners' forest management methods.

As an example, with an electric power plant that relies on biomass using whole trees from natural forests in the Massachusetts region—and not waste wood from tree work and landscaping that has different carbon cycle impacts—the carbon debt period is likely to last for at least 20 or 30 years before carbon benefits begin to be realized. In contrast, using forest biomass in thermal applications, such as heating municipal buildings or schools, has lower carbon debts and can provide carbon dividends for the atmosphere sooner, generally within 10 to 20 years.

The study also examined woody biomass energy policies from other states, federal agencies, and international agencies, which might help inform Massachusetts policy. The team modeled forest growth rates and examined the economics of supplying forest biomass for energy. At current electricity prices, biomass for electricity generation will remain a low-value product, with prices ($1-2 per green ton) that will not motivate forest landowners to increase harvest levels very much. However, the value of wood as a heating fuel is much higher. Increased development of small-scale thermal applications could provide landowners with greater financial incentives to harvest biomass.

Thomas Walker, the study team leader, said, "Understanding the greenhouse gas impacts of woody biomass energy is extremely complex. We've come up with a comprehensive but relatively straightforward framework and methodology that can help policy makers in Massachusetts, or anywhere, better understand if and when any particular wood biomass energy scenario might be 'climate friendly.' Forests in other geographic areas can be evaluated similarly, but will yield context-specific results with respect to greenhouse gas costs and benefits."

Manomet President Dr. John Hagan adds, "Our interest is in getting the best, unbiased information in the hands of policy makers and the public so they can draw their own well-informed conclusions about whether woody biomass energy makes sense. The team has cleared away a lot of the former confusion about wood energy." Hagan says that although the study was conducted for Massachusetts, the team's carbon accounting approach has worldwide relevance for informing biomass energy policies. "Massachusetts deserves a lot of credit for getting answers to some critical questions about biomass energy that people have been asking all around the world."

For questions about the implications of this study for Massachusetts renewable energy policy, contact Lisa Capone, press secretary at Massachusetts Executive Office of Energy and Environmental Affairs (lisa.capone@state.ma.us or 617-626-1119).

The Executive Summary and the Full Report can be downloaded from the Manomet web site: www.manomet.org

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Manomet Center for Conservation Sciences is a non-profit research organization. Through science and civic engagement, Manomet works to integrate society's social, economic, and environmental values to create sustainable systems for present and future generations. Manomet's headquarters are in Plymouth, Massachusetts, with extension offices in Maine, Vermont, Mexico, and Chile. Learn more about Manomet at **www.manomet.org**.

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