

The Use of Woody Biomass in Massachusetts A Summary

This report is the summary of a longer Study Report sponsored by the Amherst League of Women Voters. The complete Study Report can be found on the Amherst LWV website (www.LWVAmherst.org); or a hardcopy of the full report can be obtained from Richard Kofler (413-256-3517 or kofler@physics.umass.edu)

Introduction

There is, arguably, no more important aspect of modern human activity than the use of energy. It drives our economies, supports our lifestyle and greatly enhances our ability to survive and flourish. The use of energy is especially intensive in the more highly developed countries. The U.S. uses more energy per capita than almost any other country in the world. Unfortunately there are deleterious consequences to our use of energy. The overwhelming use of the fossil fuels (coal, oil, and natural gas) that constitute 83% of the U.S. annual energy supply, poses major problems: fossil fuels are polluting, they emit greenhouse gases that warm the planet and lead to climate change, and are finite and non-renewable sources that will run out in the future if their use continues unabated. Oil, the largest single source of U.S. energy is mostly imported, often from unstable, often hostile, countries, sometimes causing distorted foreign policies. A further problem with current energy technologies lies in the manner in which energy is utilized. Of the heat generated by combustion in electrical generating plants, typically only ~32% is converted to electricity; the unused 68% of the heat energy must be dumped into the environment, i.e. wasted, often with deleterious environmental consequences.

Partial solutions to some of the problems mentioned above can be found. The over-reliance on fossil fuels could be alleviated by the use of renewable energy sources: solar, wind, hydro, geothermal, tidal, etc (currently ~4% in the U.S.) and biomass (also ~4% in the U.S.) The first category of renewable fuels has the advantage of being both efficient and relatively non-polluting, but technological and/or economic improvements must be made before these sources can assume a much larger fraction of the energy supply. Biomass includes ethanol from corn and switchgrass, methane gas from landfill sites, wood for heating, and wood fired electrical generating plants. ***The problem with biomass, especially compared with the other forms of renewable energy, is that it emits greenhouse gases (GHG). In the case of woody biomass, the amount of greenhouse gas emitted per unit of energy is roughly 50% greater than coal!*** For electricity generating plants a partial solution to the low efficiency problem can be implemented: If the “waste heat” from these plants were to be utilized for hot water and space heating in nearby buildings, the effective energy efficiency would be correspondingly increased. Although this can be done in the case of small generating plants (under 10-15 Megawatts) it is impractical for larger plants because heat energy cannot be transmitted over longer distances without loss. Two local examples are: a wood burning generating plant (250 kilowatt) at Cooley Dickinson Hospital that uses the excess heat to heat the hospital buildings; and the new natural gas fueled electricity generating (10 Megawatt) plant at UMass that uses the excess heat for water and space heating on campus. Such facilities are called co-generation heat and power (CHP) plants.

Relevant Policies in Massachusetts

In 2008 Governor Patrick signed the Global Warming Solutions Act into law in Massachusetts. It sets goals for the reduction of total state GHG emissions below the 1990 levels: 5% below in 2010,

15-25% below in 2020, and a very ambitious 80% below by 2050. *The use of woody biomass is in direct conflict with this goal.*

Another Massachusetts policy that is relevant involves the use of incentives to enforce the increased use of renewable fuels in the generation of electricity. They are outlined in a set of policies entitled “Renewable Energy Portfolio Standard” (RPS). Among other things, the Massachusetts RPS obligates suppliers to provide a minimum percentage of electricity from renewable energy sources. The requirement for 2010 is 5%, increasing by 1% each year to 15% by 2020 with annual increases after that. For generating plants that exceed the minimum renewable energy requirement, the state issues to the supplier Renewable Energy Certificates (REC) on the excess renewable energy at the rate of 1 REC for each Megawatt-hour (MWH) of electrical energy from renewable fuel. These certificates can then be sold to suppliers who do not meet the minimum renewable requirement and must purchase RECs to compensate for their insufficiency. (Although it is essentially a “cap and trade” system, that terminology is not used in the state). Given the low profitability of plants generating electricity from wood fuels, the ability to sell RECs is important for the development of such plants.

Since the most abundant source of renewable fuel in Massachusetts is forest wood there have been a number of proposals to build qualifying wood fired electricity generating plants in Western Massachusetts:

- 50 Megawatt plants in **Russell** and **Greenfield** (each requiring 550,000 tons of wood per year), and
- 30-35 Megawatt plants in **Springfield** and **Pittsfield** (each requiring more than 350,000 tons of wood per year)

The Manomet Study

Given serious questions concerning the use of wood as a renewable and clean fuel source, the state of Massachusetts in 2009 commissioned a study by the Manomet Center for Conservation Sciences. The charge to the Manomet group included the following questions:

1. What are the atmospheric greenhouse gas implications of shifting energy production from fossil fuel sources to forest biomass?
2. How much wood is available from forests, on a sustainable basis, to support biomass energy development in Massachusetts?
3. What are the potential ecological impacts of increased biomass harvests on forests in the Commonwealth, and what if any policies are needed to ensure these harvests are sustainable?

In July of 2010 the Manomet group issued its full report. A Clean Energy Task Force critique of the report, authored by Mary Booth, argues that the Manomet report underestimates GHG emissions and idealizes forestry practice. In answer to the above questions, the Manomet report concludes:

1. Although proponents of wood claim that the re-growth of the forests recapture the carbon emitted into the atmosphere during the burning of wood, the Manomet analysis shows that *atmospheric carbon from wood burning exceeds that of coal burning for roughly 32 years. Furthermore it would take roughly 100 years for the re-growth of forest wood to recapture all of the carbon that was emitted in any given year.* Mary Booth points out that the continued wood burning during each succeeding year emits new carbon. Hence the recapture of carbon always lags behind its emission to the atmosphere and there is always excess carbon in the atmosphere from wood burning. Wood burning is a net contributor to global warming.
2. The sustainability of long term harvesting of wood for use as a fuel requires very careful forest management. The Manomet analysis yields the following estimates for an annual sustainable

yield of wood fuel assuming proper forest management and with two different assumptions about the price of wood:

Low Price wood: 150-250 green Tons per Year

High Price wood: 650-885 green Tons per Year

Hence, even under the most optimistic scenario, there is not a sufficient sustainable wood supply in Massachusetts to fuel the four proposed plants in the state.

3. Over 95% of forestland in Massachusetts is privately owned and proper management practices will be difficult to ensure.

Changes to the Renewal Portfolio Standards

On September 17, 2010, the Massachusetts Department of Energy Resources (“DOER”) issued draft regulation to implement proposed changes to biomass eligibility for the Massachusetts Renewable Energy Portfolio Standard (“RPS”) program (“Proposed Biomass Regulations”). Among the changes is a requirement of *Enhanced efficiency* for certain biomass units to receive full REC benefits. An electricity generation unit that uses Eligible Biomass Woody Fuel or Manufactured Biomass Fuel must achieve 60% or higher efficiency in a quarter to receive one REC for each MWH of generation. A unit achieving 40% efficiency in a quarter will receive only one-half of a REC for each MWH of generation. A unit achieving between 40% and 60% efficiency will receive a prorated REC for each MWH of generation. None of the proposed generating plants mentioned above can satisfy this requirement without extensive and costly CHP design modifications. Furthermore, existing plants would not be grandfathered beyond 2014 under the proposed changes.

There are several additional requirements related to forestry management practices, eligible fuel source restrictions, and accountability and enforcement procedures.

Consensus Question(s):

The committee, with the help of other League members, has chosen the following consensus question:

Should the Amherst LWV support the use of woody biomass as a renewable energy source in Massachusetts? If so, should any of the following conditions and/or restrictions apply?:

- types of woody biomass;
- forest management practices;
- plant size and/or efficiency restrictions;
- government regulation(s);
- enforcement procedures;
- lower emission limits;
- other conditions and/or restrictions;
- no conditions or restrictions?