

## **Appendix D**

### **Biomass Combined Heat and Power (BCHP) Potential In Vermont and New England**

Determining how many small, rural general hospitals in Vermont and New England will consider – and ultimately select – biomass combined heat and power (BCHP) is difficult to predict. The decision to develop and finance expanded facilities is an inherently complex process for these hospitals. That process is complicated by the additional analysis and costs associated with modifying an existing electric power generation system to a biomass-based system – new requirements for biomass fuel storage, handling, and procurement; assessing upfront BCHP costs against other related operational costs and long-term energy cost savings; determining overall fuel price stability; and other collateral benefits specific to each hospital.

Interviews conducted as part of this project and other research done by the Northeast Regional Biomass Program indicate that many small, rural general hospitals in Vermont or throughout New England typically have plans to expand their physical facilities, thus creating the need to expand and/or upgrade their energy systems. General research also indicates that the greater use of renewable biomass associated with the region’s rural hospitals is of such a magnitude to potentially create other public benefits, such as reducing greenhouse gases, stabilizing and reducing energy costs, and helping to create local jobs. However, estimates of these potential benefits associated with greater use of biomass by the hospital sector are predicated on the hospitals converting to biomass energy systems. The insights from the North Country Hospital case study suggest that such technical conversions are more likely if the State can ensure that the informational assistance on technical, policy, and wood supply and procurement infrastructure issues (as described in this report) is made available to these hospitals. Therefore, Vermont (and

other New England states) that seek to expand local and regional biomass markets and the concomitant benefits should consider policies and programs designed to provide information and assistance targeted to this particular market subset.

The project team's approach in estimating State and New England B CHP potential involved two steps: first, an estimate of the number of potential candidate hospitals in the six-state region; and second, an estimate of the energy savings and new market potential for biomass associated with the sector.

### **B CHP Potential - Vermont**

Vermont currently has ten rural general hospitals<sup>1</sup>. Although they vary in size, age, and layout, these hospitals all fall within the parameters of the "Elements for Successful Candidate Sites" listed in Appendix C. Several of these hospitals have long term care facilities located adjacent to the hospital, and the additional electric, heating, and cooling requirements of these facilities could enhance the economics of a B CHP project. The project team has estimated that up to five Vermont hospitals could implement B CHP over the next five years if appropriate technical, policy and financial informational assistance is available to hospital officials.

### **B CHP Potential – New England**

There are 190 small, rural general hospitals in New England, including Vermont. In the course of normal replacement schedules, approximately four to five of these hospitals are likely to make boiler replacements each year. However, as these hospitals address the need to expand facilities to accommodate expanding services, it is possible that the number of significant expansions to

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<sup>1</sup> The total does not include large general hospitals such as Fletcher Allen, Rutland, Southwest, Central Vermont, Brattleboro Retreat, Vermont State Hospital, the Veterans Administration Hospital, or any long-term care facilities.

boilers and heating and cooling systems could be as great as 15 facilities per year. Over a five year period, up to 75 rural general hospitals in New England could be candidates for biomass CHP. However, not all of these hospitals will decide to switch to B CHP, particularly since all six states are not likely to adopt state policies and/or outreach programs designed to support B CHP in hospital settings. Therefore, the project team estimates conservatively that 25 rural general hospitals in New England are prime candidates for B CHP over the next five years.

### **Energy Saving Potential and Biomass Fuel Demand**

As stated above, small, rural general hospitals in New England vary in size, age, and layout of physical plant. The project team estimates that a typical small, rural general hospital in this region has annual fuel oil use of 200,000 gallons and electric use of slightly over 3 million kWh per year. A typical B CHP system in such a facility could displace 160,000 gallons of fuel oil per year and 500,000 kWh/yr of electricity. As a result, a typical hospital's energy use profile would be reduced from 200,000 gallons to 40,000 gallons of fuel oil (80 percent decline) and from 3 million kWh to 2.5 million kWh of electricity per year (17 percent decline). The electricity savings is attributed to a combination of generation and reduced electricity use resulting from the replacement of electric chillers with steam absorption chillers.

For Vermont alone, if five typical small, rural general hospitals convert from fossil energy to renewable biomass over a five year period, the annual savings statewide – once all systems were fully operational – could be 800,000 to 1,000,000 gallons of fuel oil and 2,500,000 kWh of electricity. Statewide, this new demand for wood chips could create a market for 15,000 to 20,000 tons of wood chips annually. This projected level of savings in fuel oil and expanded market for low-value wood is equivalent to the current school wood energy program which has taken nearly twenty years and significant financial support to build. It is nearly equivalent to the 1.3 million gallons of fuel oil displaced by the State of Vermont through its use of wood and biodiesel.

For New England, a conservative estimate of the fuel oil and electricity savings that could be realized region-wide if 25 rural general hospitals converted to BCHP in the next five years is 5,000,000 gallons of fuel oil and over 7,500,000 kWh of electricity. To replace this fossil energy<sup>2</sup>, 75,000 to 100,000 tons of new biomass fuel market would be created.

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<sup>2</sup> Electricity generation in New England is from a combination of fossil, nuclear, and renewable fuels.