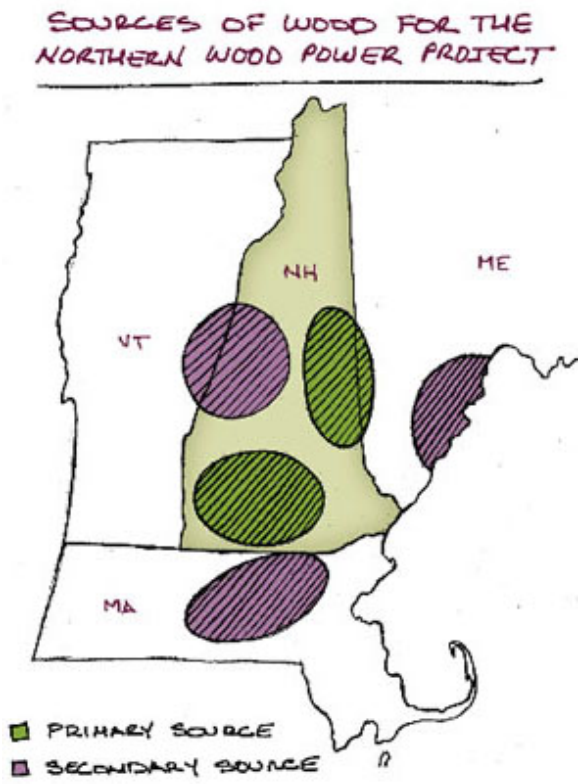
Section 4 – Renewable Energy Resources

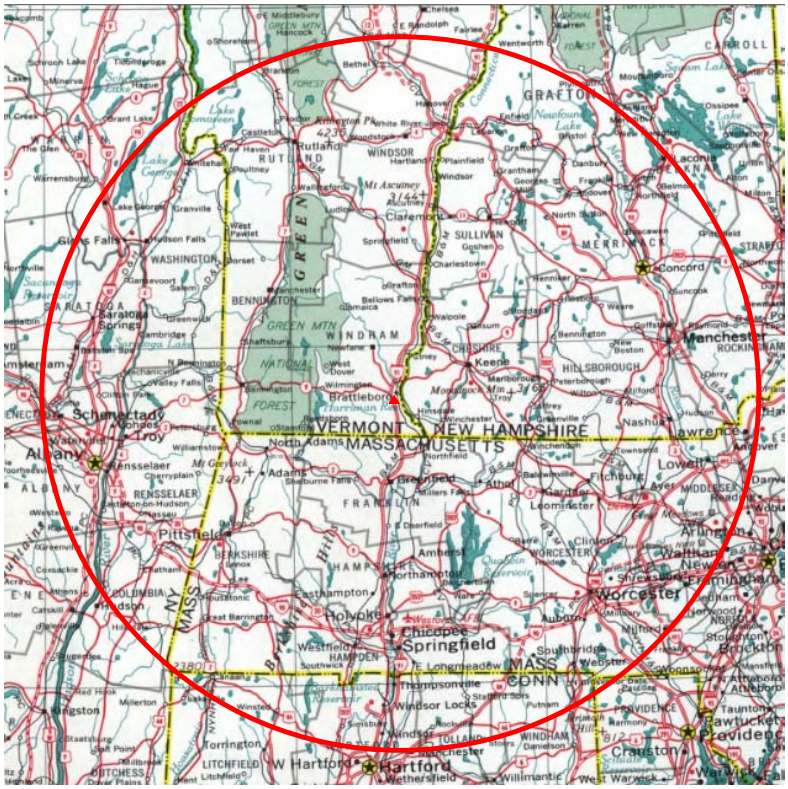
Vermont's has several renewable energy resources available, including wind, hydro, biomass and solar. Wind and hydro can produce competitively priced electricity, but using this for space and water heating is very expensive and require a large increase in generation capacity. Vermont's solar potential could be quite useful as a supplement to other resources and should be incorporated into state and local energy planning activities. The remaining renewable resource, biomass, could potentially play a large role in Vermont's energy future, but only if used responsibly. Vermont's two biomass electric plants (McNeil and Rygate) have a combined capacity of about 70 MW and consume about 600,000 tons of wood residues annually. Several other existing and proposed wood-fired electric plants in New Hampshire and Massachusetts also use large amounts of wood residues, including the 50 MW Northern Wood Power Project in Portsmouth, New Hampshire, which consumes about 500,000 tons of wood annual from the areas shown on the adjacent map.



A new district energy system sized to meet Brattleboro's thermal demands would consume about 150,000 tons of biomass annually and could consume another 100,000 tons or so annually to generate additional electricity assuming that market prices are high enough to make this economical. In order for the plant to qualify for the Vermont SPEED program or to sell Renewable Energy Credits, the fuel used would have to meet the requirements of these programs, which forbid the use of construction wood waste and any other material that might emit harmful pollutants. Two biomass resources available in the local area appear to be available in sufficient quantities and at favorable prices. The first is wood residues, which would primarily come from forest areas, but some amount is also available from tree trimming and other activities in urban areas and along utility rights-of-way. Several studies have estimated the quantities of wood residues available in Vermont and adjacent states with often contradictory conclusions. The Vermont Public Interest Research and Education Fund recent published *A Decade of Change: A Vision for Vermont's Renewable Energy Future* that includes the following:

> Presently, Vermont's forest growth-to-removal yield is 3:1, meaning that the amount of wood in our forests is increasing three times faster than it is being harvested. The state adds 11 million tons of new growth each year. Vermont's forests are part of the northern forest stretching from the Adirondacks through northern Vermont and New Hampshire to Maine. The region contains more than one billion tons of biomass and adds 23 million tons a year, almost half of that in Vermont. New biomass growth, plus the need to thin existing low-grade wood in forests, presents a tremendous source of renewable energy based in Vermont that can be used and harvested on a sustainable basis.

It is uncertain how much of this resource could actually be sustainably utilized, but an upcoming report on biomass availability in Vermont from the Biomass Energy Resource Center in Montpelier will hopefully clarify this on a statewide basis. For the immediate purpose of evaluating the potential wood residue supply for Brattleboro, however, a very useful report was prepared for the New Hampshire Office of Energy and Planning in September 2004 by Innovative Natural Resources, LLC. This report (*New Hampshire Bio-oil Opportunity Analysis*) evaluated wood residue availability in several areas of that state, including one for a 75-mile radius of Keene, New Hampshire, which is about 15 miles east of Brattleboro. This report uses USDA Forest Inventory and Analysis data to estimate that annual growth exceeds current removals by 2.2 million tons annually and that whole tree chips have been consistently available for less than $18 per green ton. A map showing a 75 mile radius around Brattleboro is shown below.



Another potential source of wood residues is to the wood fuel currently used for kiln drying and for heating the high school. Hot water from the project, perhaps combined with dehumidification, could provide heat to these consumers at some cost savings. It may also be possible to utilize black liquid and other residual products from paper mills and other industrial plants using wood products.

Although wood residues appear to be available in sufficient quantities to support the proposed Brattleboro project, future growth of renewable energy projects will increase the demand for this finite resource, potentially driving market prices higher or even limiting availability. Firm supply contracts could potentially mitigate this risk, but another alternative is to contract with local farmers and landowners to grow short rotation energy crops. Certain varieties of willow shrubs are commonly used for this purpose and are currently being grown in New York and also in northern Vermont for use in the McNeil power plant. Long-term contracts would secure the supply at a predictable price, providing benefits to both the community and the local agricultural community. Energy crops would likely be somewhat more expensive than current wood residue prices, but agricultural subsidy programs could potentially reduce the cost to some degree.

About 30,000 acres of energy crops would be required to grow all the fuel for the built out Brattleboro system. The four counties of southern Vermont have a total of 314,000 acres of farmland, of which 106,000 is cropland and 80,000 as "harvested cropland." Some portion of the 26,000 acres of "non-harvested cropland" plus other marginal lands not suitable for crops could provide a significant amount of renewable energy for Brattleboro and other systems that could be developed in southern Vermont.

One important activity to be accomplished during the development phase of the Brattleboro project is to establish a secure, economical, and sustainable renewable fuel supply for the project. The transportation, delivery, storage and handling of this fuel will also need to be carefully analyzed to avoid negative impacts on local roads. Locating the plant so that it could utilize rail delivery of fuel now or in the future is another consideration.