

Landowner Coops for Sustainable Forest Biomass Production

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Overview

Heating oil prices this season will be about \$3/gallon. The heating value of oil is about 140,000 BTUs/gallon so one million BTUs costs about \$20. Wood pellets are selling for about \$200/ton and have a heating value of about 7000 BTUs/lb so one million BTUs costs about \$14. Cordwood is selling for \$150/cord and has a heating value of about 25 million BTUs/cord so one million BTU's costs about \$6. Chipped wood waste costs about \$30/ton and has a heating value of about 6000 BTUs/lb so one million BTUs costs less than \$3. At current market prices, heating with wood chips is cheapest presuming that you already have equipment suitable for burning it.

In our region, abundant wood chips derived from a variety of sources are readily available and demand for them is limited, hence their price has remained low. Rising fossil fuel prices will force a transition to renewables including biomass. Conversion of biomass to liquid fuels (e.g. cellulosic ethanol) has been receiving much attention as has biomass CHP. Inevitably, prices being paid for low-grade wood will rise as demand for this feedstock rises.

In our region, about 60% of the land is forested and the bulk is privately owned in relatively small parcels. Although ubiquitous, forests represent a relatively diffuse source of biomass because their productivity is low (approximately 1 ton/acre-year) compared to short rotation crops. As such, forests would appear to be an unlikely source of biomass to a centralized liquid fuel or power generating facility compared to dedicated high productivity short rotation biomass crops because production and transportation costs for forest biomass will render it uncompetitive.

There may, however, be an economically viable niche for forest biomass in community scale space heating. For example, Tompkins County has about 160,000 forested acres which could, if fully utilized, sustainably supply space heating for 30,000 of the county's 36,000 households⁽¹⁾. This level of forest utilization will not be achieved and represents an upper limit. Furthermore, domestic hot water represents another 30% more demand above space heating.

(1) $(160,000 \text{ acres})(1 \text{ ton/acre-year})(2000 \text{ lb/ton})(6000 \text{ BTU/lb})=2 \times 10^{12} \text{ BTU/yr}$ and NYSERDA statistics give 60 million BTU/yr to heat an average household

Forest owner coops

How can the local forest biomass resource be tapped in an economically viable manner? One approach is a forest owner coop. Generally, a cooperative is a business that is owned and controlled by members who use its services. Each member has one vote. People typically unite in a cooperative to: (1) pool expertise; (2) gain access to new and more profitable markets; (3) increase their bargaining power when buying and selling goods and services; and (4) be in business with others who share common values. When cooperatives generate a profit, earnings are returned to members in proportion to their use of the cooperative.

The forest coop is formed to pool the resources necessary to harvest sawlogs and low-grade wood from member forests. The coop may also add value to its products by converting the sawlogs to boards or millwork and delivering fuel chips to local customers. The forest coop idea is not new; there are a number of coops in operation across the US but biomass production has not yet received much attention. Higher fossil fuel prices are now motivating a reexamination of the potential value in low grade wood. Forest coops in Europe have already been exploiting this resource for some time.

The majority of privately held forests are unmanaged or poorly managed. Typically, owners will extract value from the property by high-grade harvesting, leaving behind the poor quality trees. This practice is not sustainable because the value and health of the forest inevitably declines. Long-term, sustainable production and income can be achieved by harvesting both low and high-grade trees on a regular cycle. This requires long-term commitment of the land to the harvesting cycle which will be on the order of 10-15 years, similar to the yearly ten year commitment made when a property is enrolled the New York 480a Forest Tax Law program.

Coop organization

Coops typically have a board of directors, elected from its membership, that oversees operations and makes business decisions. The coop may also have permanent staff to handle forestry, harvesting, value added and office work. The coop can enter into contracts with other business to outsource certain work. For example, harvesting could be handled by a contractor rather than coop staff.

Coop economics

Consider a model coop with 10,000 acres which is harvested at a rate of 1000 acres/year by a 2 man crew using \$1 million worth of equipment having a 10 year life expectancy. Suppose each year's harvest generates 5000 tons of low-grade poles and 2500 tons of high-grade sawlogs. Tops are left behind for habitat and organic input to soil. (Ash collected from consumers' wood burning can also be

returned to the forest.) After minimal air drying, the poles are chipped and delivered to customers as heating fuel at \$100/ton for \$500,000 gross income. The sawlogs yield about 500,000 board-feet worth about \$1/bdft delivered to a local mill. This value could be doubled if the coop operated its own mill and sold boards and millwork. The conservative gross annual coop income will be \$1 million which must cover equipment depreciation (\$100,000/yr), crew costs (\$200,000/yr including salaries, insurance, and other benefits), operating expenses (\$200,000/yr fuel, equipment maintenance, and supplies) leaving \$500,000/yr net income to coop members as income at 50% ROI for their initial investment of \$100/acre for original equipment purchase. The profitability of the coop is highly dependent on market prices for lumber and fuel. There are many strategies to mitigate the risk. For example, in off years it may be possible to recoup some expenses by leasing the equipment. It is not clear that the scale of this model coop is well suited to every locale. Smaller scale coops might work well with much less investment in capital equipment and/or member labor contributions. It is also possible that government grants or other incentives may become available to an energy coop.

Several challenges must be met in the coop startup process. Most importantly, the coop needs to have a ready market for its products, and the local market envisioned for biomass heating fuel does not yet exist. It may be possible to build this market by promoting clean, convenient biomass heating with the assurance of a guaranteed fuel supply at a fixed, attractive price. The coop might consider entering the business of selling or leasing combustion equipment to provide customers with a single source for all biomass heating needs. Incentives to consumers similar to those currently offered for solar installations would be very helpful to accelerate adoption of modern biomass heating technology.

Another difference between startup and long term conditions is related to the current preponderance of low-grade wood caused by years of high-grade only harvesting. This implies that income from high-grade will be low until the fraction of high-grade trees can be increased. This situation may actually present financial benefits during startup because standing low-grade will be harvested at higher than sustainable rates to thin and make room for remaining small, high value trees to flourish. (Some stands are likely to lack sufficient remaining high value stock and should be cleared. In these cases, a choice could be made to replant with short rotation biofuel crops or do conventional reforestation.) In the startup phase, it may be best for the coop to delay capital expenditures and bid the initial thinning operation to competent, low-impact logging contractors. Discussions with Jim Shuler, a forester in our area who specializes in low-grade harvesting, indicated that it is possible to do this type of selective thinning, pay the advising forester and the logging contractor while selling the low-grade at current market prices (\$30/ton). If the resulting wood-chip fuel is marketed at \$100/ton it would be sufficiently attractive to consumers to induce them to convert from fossil fuels. The margin would also provide startup income to the

coop and cover costs for processing and delivering the chips. The coop would enter its steady, sustainable production mode after all its acreage completes the startup phase. In sustainable mode, the bulk of the coop's income will likely come from high-grade trees. While simple in concept, many details of successful coop startup and long term operation need to be determined based on prevailing conditions which cannot be predicted (e.g. fossil fuel and lumber prices). Preplanning is essential so that options are available for dealing with these contingencies. Clearly, even if a coop member joins with good faith intent to abide by a long term management commitment, unforeseen conditions may require premature withdrawal from coop membership. Mechanisms must be in place to handle this eventuality. Another potential threat to coop viability may arise if higher biomass fuel prices induce non-coop forest owners to make fast profits by unsustainably harvesting their forestland. The coop must be able to survive these temporary price competitions. The coop should seek certification of its timber and fuel products so responsible consumers can identify its products as sustainable.

Conclusions

Coops offer many advantages to members, not the least of which is realization of a larger share of the profit from their working forests.