

CASE STUDY

Mike Collins, Old Athens Farm, Westminster, Vermont

Waste Vegetable Oil for Heating Greenhouses

Mike Collins and his wife Rebecca Nixon own Old Athens Farm, located in southeastern Vermont. Fresh market organic vegetables and berries are grown on two acres, and their 10,000 sq. ft. of greenhouses produce tomatoes, cucumbers, and eggplant. Sales are to local farmer's markets and wholesale accounts.



The three greenhouses require heating from late winter through late spring, at different times depending on the crops they hold. In the past, over 3,000 gallons of No. 2 heating oil was required, but last year Mike switched to waste vegetable oil for heating.

Most of the waste vegetable oil is collected during the growing season, as part of Mike's vegetable delivery route. Used deep-fry oil from restaurants within a 20 mile radius of the farm is picked up in five gallon containers, although some sites use 50 gallon barrels to store the oil because their pick up schedule is less frequent.

After the oil is brought back to the farm, it is filtered through a screen as it is poured into 300 gallon plastic totes, located in the headhouse of the greenhouses, for storage. As much oil as possible is stored inside the greenhouse to keep it in liquid form. Oil that must be stored outside and pumped in the dead of winter is first heated with an electric bucket heater.

Only relatively clean, non hydrogenated oil is collected. It is allowed to settle in one storage tank and then it is pumped off the top into another tank using a compressed air pump that is reasonably fast. The remaining waste is burned in a wood-fired hot water boiler.



The oil is burned in waste oil burners made by Clean Burn. There are three burners, each producing 350,000 btu for each of the three 3,200 sq. ft. greenhouses. Each burner unit cost about \$5,000 to purchase, plus \$500 to set up in the greenhouse.

Collection of the waste oil takes about 100 hours of additional labor and management per year. The heaters require regular maintenance of about two hours each week during the peak heating season. This results in extra labor costs of between \$1,000 and \$2,000 annually, depending on hourly labor rate. Given that 3,000 gallons of fuel oil no longer have to be purchased, the savings in winter 2005-06 is about \$7,000, compared to paying \$2.20/gallon for No. 2 oil. The cost of the heaters also has to be considered, amortized over their life expectancy of more than 10 years.

A wood-fired hot water boiler back-up heating system is still in place in the event that sufficient waste oil is not available or equipment malfunctions. The wood-fired boiler is also used to provide hot water for a system that heats the soil in the greenhouses.

One constraint on this system is the limited availability of high quality waste vegetable oil. Mike typically collects oil only from small family restaurants. The poor quality of oil from fast-food chain restaurants makes it generally unsuitable for this system because it does not perform well in the burners.

Small restaurants tend to change their oil more frequently, so it is cleaner, with less garbage, water or soap ending up in the oil. Hydrogenated oil lasts longer in the fryer, so it tends to be dirtier. Another constraint to getting waste vegetable oil is that some restaurants have contracts with waste oil haulers that they are reluctant to opt out of.

Prepared by:
Vern Grubinger
University of Vermont