

Concord Monitor

November 22, 2010

Canterbury

Upgraded maple

Farm's sugar shack benefits from energy-saving equipment



Photo by [Alexander Cohn](#) / [Monitor staff](#)

Hoses that will carry sap in the early spring run from some of the 1,800 maple trees at the North Family Farm in Canterbury. The farm received a \$6,282 grant for a more efficient evaporator and an upgraded reverse osmosis water set-up to sharply reduce the fuel consumption of their maple operation; November 18, 2010. Last year Tim Meeh produced 1,100 gallons of syrup from 1,800 trees on his Canterbury farm. The new equipment, installed last week, is the first of its kind.

By [Tara Ballenger](#) / [Monitor staff](#)



Photo by [Alexander Cohn](#) / [Monitor staff](#)

Tim Meeh empties water that collected in his new evaporator after testing it shortly after testing it out. North Family Farm received a \$6,282 grant for a more efficient evaporator and an upgraded reverse osmosis water set-up to sharply reduce the fuel consumption of their maple operation; November 18, 2010. Last year Meeh produced 1,100 gallons of syrup from 1,800 trees on his Canterbury farm. The new equipment, installed last week, is the first of its kind.



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Tim Meeh stands in the doorway of the barn his father built in 1950 on the foundation of a barn built by the Shakers in the nineteenth century. North Family Farm received a \$6,282 grant for a more efficient evaporator and an upgraded reverse osmosis water set-up to sharply reduce the fuel consumption of their maple operation; November 18, 2010. Last year Meeh produced 1,100 gallons of syrup from 1,800 trees on his Canterbury farm. The new equipment, installed last week, is the first of its kind.



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A small wind turbine provides electricity to the farmhouse at North Family Farm. The farm received a \$6,282 grant for a more efficient evaporator and an upgraded reverse osmosis water set-up to sharply reduce the fuel consumption of their maple operation; November 18, 2010. Last year Meeh produced 1,100 gallons of syrup from 1,800 trees on his Canterbury farm. The new equipment, installed last week, is the first of its kind.

Tim Meeh and his wife, Jill McCulloch, have been working to make their Canterbury farm more environmentally friendly for over two decades - a single wind turbine towers over the family's Shaker-style home and a solar panel twinkles in front of the picturesque red barn Meeh's father built half a century ago.

But something far less idealistic prompted Meeh to make his maple syrup production more energy efficient: He hurt his arm cutting wood.

The machines in the farm's sugar shack - where watery sap gets boiled down into sugary syrup - are powered by wood, and they were taking so much of it that Meeh and his wife spent as much time hacking down their birch and pine as they did tapping their maples. When all the cutting caught up with him and landed him with an injury, he realized it was time to re-evaluate.

"I started thinking 'Gosh, how am I going to keep doing this?' " Meeh said. "We needed to use less wood. We needed to be more efficient."

The inside of Meeh's small, rustic sugar shack is now gleaming with \$24,000 worth of new stainless steel contraptions. When spring arrives and harvesting begins, the new equipment will use 75 percent less wood than his old system. That means fewer emissions coming out of the smokestack and less chopping for Meeh.

It wasn't easy to foot the bill for the upgrade, Meeh said, but a \$6,282 grant from the U.S. Department of Agriculture will help them recoup some of the costs. Funded by the department's Rural Energy for America Program, the grant is aimed at giving a boost to farmers and businesses for projects that increase efficiency and decrease impacts.

This year's recipients were announced this month, and New Hampshire projects received over \$620,000 in loans and grants, including a \$7,379 grant to the Miles Smith Farm in Loudon to install a solar energy system to heat its sales office.

Meeh's sugar shack sits at the nucleus of a stand of maples and an intricate network of small blue tubes that transport the sap from the trees to a holding tank outside the shack. Inside, three new pieces of equipment will make the production process nearly twice as efficient: a reverse osmosis machine, a steam-away and a cleaner-burning evaporator.

The sap gets to the holding tank through a vacuum system. At that point, it's watery and full of various minerals and is only about 2 percent sugar. From the holding tank, the sap goes into the reverse osmosis machine, which runs the sap through a series of thin-walled tubes (called membranes) that have tiny holes in them. The holes are big enough for a molecule of water to fit through but not big enough for a molecule of sugar to fit through - so when the sap is run through the membrane, the water seeps out but the sugar stays in.

All the water lost during reverse osmosis would otherwise have to be evaporated away using heat.

"The first thing producers do when they want to reduce energy is get reverse osmosis," said Timothy Perkins, director of the Proctor Maple Research Center at the University of Vermont. "The energy savings is just tremendous."

Reverse osmosis is not a new technology, but newer models can handle more sap more efficiently. Meeh first got a reverse osmosis machine 25 years ago, but his new one will be able to squeeze even more water out of the raw sap - once it works its way through membranes, it will be as much as 14 percent sugar, he said.

From there, the sap goes into a steam-away machine. It preheats the sap using heat from the evaporator below. It also recycles the steam to power the evaporator, making it run more efficiently.

After that, it goes into the flue pan, which sits on top of the fire pit that is housed in the evaporator. Here, the syrup really starts to heat up and lose water through evaporation. By the time it leaves the flue, it's between 30 percent and 40 percent sugar - a big change from the raw sap, Meeh said.

Then it's on to the final step - the syrup pan, which also sits on top of the evaporator. The syrup flows through a metal maze and more water evaporates off. By the time it reaches the end of the maze, it's 67 percent sugar and ready to be filtered and bottled.

The evaporator's fire pit is deeper than Meeh's old one, and it has air jets that blow oxygen into the pit to keep the flames hotter than before. It also has mechanisms to burn its own smoke for energy. That means less wood will be needed and fewer emissions will leave the smoke stack.

"I used to look up and see black smoke going into the air, but with this, it's clear," Meeh said.

Meeh and McCulloch make 1,100 gallons of syrup each season on about 1,000 acres.

The couple's maple farm is like many in New England - not large but enough to realize big savings through energy-efficient equipment, Perkins said. But the cost can be a barrier for independent producers.

"There are a substantial number of producers - big and small - who would benefit from this technology, but they don't have it yet," he said.

Meeh is looking forward to chopping less wood, but he also sees energy efficiency as a responsibility. His home and farm are powered from the wind turbine and solar panels he installed, and his tractors and cars are powered from biodiesel that he makes with used cooking oil from local pizza joints. "The wind, the sun, the rain, the life force in the trees - I'm lucky to get a ride on that for a while," Meeh said. "I don't want to mess the place up."