When Ed Terceiro, then executive vice president of Mount Wachusett Community College (MWCC) in Gardner, Massachusetts, approached the state Division of Capital Asset Management in the early 1990s for approval to heat the college campus with woodchips, he remembers that he met “with a bit of skepticism.”

“The concept of heating a facility this size with wood was rather unique,” Terceiro says. MWCC is a 450,000 square-foot building complex. Within the state oversight agency for capital construction projects, people envisioned college staff and students out back of campus with chainsaws, clearcutting to fuel the furnace.

But once Terceiro had laid out the numbers and the reasons why he had grown convinced that biomass heat made sense for his campus, the state agency became a key ally.

“After their initial skepticism, they were very supportive,” he recalls.

Back then MWCC had electric heat, and its heating-related utility bills were running about $400,000 per year—double what similar-size campuses on oil heat were paying. With enrollments dwindling and costs rising, college leaders knew something had to be done.

When the college began researching its options for a new system, the assumption was that MWCC would go to oil or natural gas. But then the concept of woodchips was brought to the attention of Terceiro, a mechanical engineer by training.

“We did a lot of research,” he recalls—“and the more we got into this, the more it really started to look attractive.” MWCC is home to the Massachusetts Forest and Wood Products Institute; wood heat seemed a natural fit. Research suggested that it would have environmental as well as economic benefits. A feasibility study convinced college leaders to go ahead.

“We embarked on a mission to raise the funds,” Terceiro says. “We were thrown out of a lot of offices, believe me,” says the executive, who now serves as MWCC’s resident engineer and acting deputy commissioner for fiscal affairs at the Massachusetts Department of Higher Education.

The project’s total budget was $4.3 million—higher than it might have been, because MWCC had neither a heating plant nor distribution piping for a hot water system. The whole infrastructure would have to be built new. Along with woodchip heat, MWCC also proposed a number of energy-saving measures, such as high-efficiency lighting and water-saving plumbing fixtures.

MWCC leveraged about $1 million from the US Department of Energy, with key help from US Representative John Oliver (D-Ma.). It got $750,000 from the Massachusetts Renewable Energy Trust, which administers a pool of money raised through a surcharge on electric bills that is used to assist renewable energy initiatives. Also, thanks to its energy-conservation measures, the college secured a number of rebates from its electric utility. Even with all that bundled together, MWCC still needed to leverage another $1.8 million. To do that, MWCC signed a performance contract with an energy services company, NORESCO.
Adding up the Positive Impacts

The eight MMBtu/hour woodchip system was commissioned in late 2002—“and it didn’t cost the commonwealth a nickel,” Terceiro says. In its first year of operation, the system exceeded expectations for energy cost savings compared to fossil fuels.

It continues to prove its worth.

Between December 2002 and March 2008, “we’ve saved about $3.1 million” by heating with woodchips instead of oil, Terceiro says. “Even more significant, from my point of view, we’ve saved about 30 million kWh of electricity and almost 15.5 million gallons of water.

“As a result of this one project, we’ve reduced our CO₂ emissions by almost 13,000 tons, nitrogen oxide by 21 tons, and sulfur dioxide by 55.5 tons. That would be the equivalent of planting 3,539 acres of trees—and of removing 2,256 cars from the road.”

From the start, Terceiro says the chip system “worked pretty much flawlessly from a mechanical and heat-generation point of view.” MWCC uses a sophisticated energy-management system that allows it to remotely regulate the heat, humidity, and carbon monoxide content in each classroom and other spaces. Thermostats in classrooms give professors six degrees of flexibility in resetting temperatures for individual comfort.

“This translates into a tremendous amount of efficiency,” Terceiro notes—“but it also translates into a tremendously more comfortable environment for our faculty and staff. Our issues in terms of complaints or people looking for assistance went down to just about nothing.”

“Where we did have problems, and it took us about a year to work them through, was with emissions control,” Terceiro says.

The college started with a core separator, then added a multi-cyclone for particulate matter removal. When it still couldn’t hit its targets for emissions control, it replaced the core separator with a more conventional baghouse. MWCC has learned to leave one of its six baghouse plenums off-line at all times, and the emissions system “has been running like a champ,” Terceiro says.

The college maintains an oil-fired backup boiler, which provides heat during the “shoulder” months of fall and spring. Once the wood system is fired up about November 1st, it meets 100 percent of MWCC’s heat and hot water needs through the winter.

Biomass fuel costs for 2008-09 ran to $62,000 for 1,200 tons of chips, most bought at $58 per ton, some purchased at $50-$53 (those lesser-quality chips didn’t work as well). The college also used about 6,000 gallons of fuel oil.

If the college had stayed with electric heat, Terceiro figures its annual costs for heat and air conditioning would now approach $2 million.

“This whole process has taken on greater significance since 9/11—I think that’s obvious,” he concludes. Instead of sending 80 percent of its heating dollars “to a country that really doesn’t like us right now,” virtually all of MWCC’s energy spending stays in the local economy.

“I apologize if I sound a little bit passionate about this,” the college executive concludes. “I guess we have been.”

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