When a very small school district serving a low-income community was looking for ways to save on costs, its superintendent looked into wood pellets. The numbers made sense.

“Our existing fuel-oil system, from the early 1990s, was working fine,” says Brian Patrick, the superintendent, whose Townsend, Montana district serves about 730 students grades K-12 in two school buildings. But when Patrick attended a December 2003 US Forest Service (USFS) workshop on heating system options he thought wood pellets seemed worth investigating.

Back then, he notes, no one was predicting that fuel oil prices would rise as steeply as they have.

In 2004, the Montana Fuels For Schools and Beyond program, a USFS initiative, paid for an engineer’s pre-feasibility study on Townsend’s existing system. Townsend next sought and received a Fuels For Schools grant to install a pellet system to heat its elementary school.

After installing its system in 2007, Townsend, one of Montana’s first schools to use wood pellets, also became the first Fuels For Schools project to sell carbon offsets. The district has received $12,420 from The Climate Trust for selling more than 130 metric tons per year of carbon-dioxide emission offsets.

“We make an annual report to them, on total energy costs involved in delivering the pellets here and burning them, along with use and consumption here,” Patrick says.

Those welcome funds complement a package of financing that Townsend put together to meet the pellet system’s $432,000 design, engineering, and construction costs. Along with more than $46,000 of its own funds, the school district brought in the $190,080 Fuels For Schools construction grant, a $15,000 grant from the local conservation district, and a $14,000 grant plus a $140,000 low-interest loan from the USDA Rural Development Community Facilities Grant and Loan Program.

The pellet system was retrofitted into two existing oil boilers that heated the elementary school only, with the oil burners in those boilers left in place and fully functional for backup. The high school has a separate propane boiler system.

Patrick is also now president of the School Administrators of Montana—and in January 2009, he organized an “Energy Summit” for schools across the state that covered, among other options, woodchip and pellet systems.

“In Montana,” he says, “we do a good job of sharing what works.”

First-Winter Lessons Learned

The Townsend project has had its learning curve. The Fuels For Schools grant required it to use fuel drawn at least half from forest-management practices—such as slash from timber harvests or forest thinnings to reduce fire hazards. So, although the pellet system was designed for standard, residential-grade pellets, the district began fueling it with whole-tree pellets. These include bark, needles, and branches, along with bolewood, while standard pellets are pressed entirely from bolewood.

“If you bought a new Mercedes Benz and put bad fuel in it, you’d wonder why it didn’t work so well,” Patrick quips. This is roughly what happened during the Townsend system’s first winter.
For Townsend, Eureka Pellet Mills developed a pellet that is half forest-management slash and half wood material from other sources commonly used for pellets, such as wood pallets and sawmill residues.

But the bark, branches, and needles in these pellets created “clinkers,” very hard lumps, in the Townsend system’s combustion chamber. Clinkers are made when partially combusted ash and minerals within the pellet fuel fuse together—and Townsend’s ash-removal mechanism wasn’t designed to handle them. During that first winter, the system had to shut down several times for repairs and modifications to the ash-removal mechanics.

“The school district burned through this first load of whole-tree pellets, then ordered a delivery of higher-grade pellets,” says a report by the Fuels For Schools Program. “While still producing ash and clinkers, the amounts generated by the higher-grade pellets are much more manageable.”

“The issues and setbacks in the beginning took time to work through,” but “my attitude through it all remained positive,” said District Maintenance Supervisor Jim Riddle, quoted in the Fuels For Schools report. “I can foresee this system will work well for us in the future as non-renewable energy costs continue to rise ... Now, when problems do arise they are fairly easy to troubleshoot and resolve.”

‘For Us, This Made Sense’

One reason Townsend went with a pellet system was that it’s compact, and space was at a premium: The system had to be placed beside the elementary-school playground. Also, compared to woodchips, pellet systems require fewer deliveries—and with this one’s location by the playground, that was also a factor.

“We receive approximately three deliveries per year,” Patrick says. “For us, this made sense. It’s a little more expensive for fuel,” compared to woodchips, “but it’s a lot less labor intensive” to operate.

Townsend’s Solagen biomass system is integrated directly with its fuel oil boilers, saving space and allowing for easy switchover when needed. To heat its elementary school during the 2008-09 heating season, Townsend burned 296 tons of pellets, delivered by Eureka Pellet Mills, at a total cost of $38,604. The system also burned about 1,500 gallons of diesel fuel, using its backup oil burners for 25 heating days.

“On 10 of those days we used fuel oil because it was severely cold and the pellets would not keep up,” Patrick says. “Because the system was running continuously with no problems, we burned through a silo of pellets and ran out—our error—and had to wait for more pellets to be delivered.”

“Quite honestly, I look at our biomass system as an insurance policy,” he concludes. “If there was a world crisis revolving around oil, we would still be able to heat our schools, and we wouldn’t be held hostage.”