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Fuels for Schools and Beyond

Fuels for Schools was started in Vermont as a statewide initiative to promote and encourage the use of renewable, local natural resources to provide reliable heat for schools. It has since grown into a multistate program, and has recently expanded its scope beyond schools.

by Anduin Kirkbride McElroy

The Fuels for Schools program is a continued success story of local biomass utilization. The program started in Vermont in the 1980s, when most of the schools were heated using pricey electricity, according to Program Director Kamalesh Doshi at the Biomass Energy Resource Center (BERC). Substantial woody biomass waste was available from saw mills and other timber processing industries, and the connection was drawn to reduce the cost of heating schools. The first successful project was installed in 1986. Today almost 20 percent of Vermont public school students attend a school heated with wood. Thirty-two schools operate wood chip systems and more installations are being considered.

In late 2001, Fuels for Schools was started in the Northern and Intermountain regions of the USDA's Forest Service. The previous summer, fires ravaged much of the Bitterroot Valley of Montana and Idaho, says Dave Atkins, the Fuels for Schools program manager for the Forest Service's Northern and Intermountain regions. Following the fires, Congress passed the National Fire Plan, which was aimed at reducing wood that could possibly fuel fires and fire suppression. It included funds to help with small-diameter wood utilization, which is not as valuable to the wood industry, is fuel for fire and costly to dispose of. A community group saw Vermont as an example, and applied for funds from the Forest Service for the first school demonstration project in Darby, Mont. From there, a regional program was developed.

There are now systems operating in Montana, Nevada, Idaho and North Dakota. Wyoming and Utah are working to identify their demonstration communities. Within these states, 16 projects have been installed or are in the design phase.

Atkins says the localized systems fill an important niche. "The advantage is you're closer to your source of material, so you keep transportation costs down," he says. "If you are consuming heat and energy on site in your local area, you don't need a lot of transmission lines for moving the energy product to the end user."

There are also challenges to localized systems, as discovered by Nick Salmon, who has served as senior project manager of several projects through the architectural and engineering firm CTA Architects Engineers. "One of the challenges of these projects is they all have their unique challenges," he says. "As much as we've tried to standardize them, we always encounter something different, whether that's bidding or integration of the boiler or working with vendors."

A recent challenge has been dealing with fuel quality. "As the program has become more focused on diverting fuel that would otherwise be burned in a slash pile and getting that material in a school campus, we're encountering more debris," Salmon says. "It takes more time to screen that debris out."

Wood consistency is a new problem for boiler vendors. "I would say, in the big picture, the biggest challenge is that the majority of vendors work directly for the wood products industry," Salmon says. "They're designing for a mill or wood processing plant of some kind. So they have certain ways used to solve a certain problem and a certain way of handling it, because that's their livelihood. The end users are typically not used to working with solid fuel and the vendors aren't used to designing systems for those types of facilities."

In Doshi's experience in Vermont, many of the vendors are comfortable working with solid fuel, but not necessarily accustomed to working with wood. He says there are about 10 active boiler vendors, and two or three that dominate the market with up to 70 percent of the market share. "Others are new and trying to increase their market share," he says. Most of the vendors also manufacture boilers for solid fuel, such as coal.

Designing wood boilers for schools requires unique considerations compared with other boiler systems. Salmon explains that most boilers are designed to meet peak load, but that peak load happens very infrequently—less than 15 minutes every five years. With conventional gas boilers, this usually isn't a problem, as they operate efficiently at a small fraction of their capacity. "Wood boilers function well at high fire, and less so at lower fire," Salmon says. "In general, we design wood boilers for less than peak load, to work productively for much of the year."

Salmon says they are always learning something new, such as the importance of involving the state's environmental permitting agency, even though most projects are so small they don't require an air quality permit. "They do an analysis of future emissions and quantify whether

the system will require a permit, and they also determine the optimal stack height," he says.

Both Salmon and Atkins emphasized the savings—both time and money—in implementing a biomass system in new construction. "The cost of the system is a good one-third less than a retrofit," Atkins says. "There is no cost to integrate the plumbing and connections, and it's part

of a bigger project, so the building permits and design fees are spread over a bigger project." This savings was demonstrated this spring at a new high school in Kalispell, Mont.

Expanding to Other States

The Fuels for Schools program may expand to other states. The Farm Bill, which is in Congress right now, includes a section on wood-to-energy within the forestry title. "If that legislation passes, that would likely be an opportunity for our effort to be expanded throughout the United States in a similar fashion to what we've done," Atkins says.

Although the BERC in Vermont is not funded through the Forest Service Fuels for Schools program, its expertise has proven useful to school districts in Maine, Massachusettes, New Hampshire, New Mexico, Pennsylvania and South Dakota.

As the program expands into less forested states, the motive in pursuing these biomass projects becomes less about managing excess biomass supply and more about utilizing renewable energy sources. Nevada, which has a renewable energy portfolio, is such a state. Through the process of developing two projects, it has learned lessons in versatility.

Ironically, one of the most recent Fuels for Schools projects, and also the largest, is not in a school. Nevada has few schools that are close to sufficient biomass resources and also have a large enough population to justify the capital costs, according to Jason Perock, state coordinator of the Nevada Fuels for Schools.

Enter the Northern Nevada Correctional Center in Carson City, Nev., which was slated to complete the installation of a $6.4 million biomass system in June. The combined-heatand-power system, producing one megawatt of electricity, will require 16,000 tons of wood per year. This is huge compared with the other Fuels for Schools project in Nevada, which only requires 150 tons of wood per year.

The biomass boiler and a 200-kilowatt photovoltaic solar component will provide all of the electricity, heat and hot water for the 408,000 square-foot facility. The project took 1½ years to plan and about seven months to construct. The system is estimated to save the NNCC $1 million per year. "The payback will be very quick," Perock says.

The quick return is due in part to the continuous operations of the facility. "When producing electricity, you really need a 24-hour need for electricity if you're going to produce it economically," Perock says. "In prisons, they have a high energy demand."

The size also makes the project economical, but sourcing the biomass has not been an easy feat. Part of the 16,000 tons will come from standard forestry management scrap, but Perock says it has been difficult to get supply commitments. The biggest challenge in Nevada is that there is no timber industry infrastructure. "We're still struggling with the economics of transportation," he says. "We're recreating our own biomass infrastructure when it comes to hauling, processing and storage. Part of my job is to look for contractors to do the fuels reduction work and the hauling. We're basically starting from scratch in Nevada."

Perock notes that this program is actually costing the Forest Service more money than traditional forest management. "Forestry agencies are driven by the number of acres treated, not by biomass removed," he says. "In Nevada, we're trying to make a market for wood waste. When the market goes up, it will be easier to justify going out and getting the wood from the forest."

Fuels for Schools requires that half of a project's fuel supply comes from the forests. But Perock says he is not holding the correctional facility to those standards. "We have to get the supply wherever we can, because it all counts—whether you're pulling it out of the woods where it's going to be burned in piles or pulling it out of the landfills where it's going to be buried," he says. The plan is to buy wood from Carson City Renewable Energy, a wood processing facility that diverts and processes wood waste from the local landfill.

For a future project, Perock is considering the urban forest of Las Vegas. The amount of wood waste from tree trimmings is estimated at 500,000 tons per year. Perock says this is a more reliable source because it's already being collected.

Like it is in Nevada, the regional Fuels for Schools program will continue to expand beyond schools, where appropriate. In an analysis of all buildings with boiler systems in Montana and Michigan, CTA's Salmon says that only about 10 percent are strong projects, meaning that the cost of converting to a wood heating system would generate a positive cash flow in the first year.

"We've also determined that there are certain projects where energy conservation is more important than conversion to wood," Salmon says. "There's no point in burning wood to burn wood. If the existing system isn't very efficient, then we're burning wood inefficiently instead of natural gas. Energy conservation should be the first thing that everybody considers."

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