The Boulder County, Colorado, Parks and Open Space Department manages about 30,000 acres of forestland, in which fire has been suppressed (the practice of not allowing natural fires to burn and remove debris from forest floors) for some 140 years. Across the American West, fire suppression has led to heightened fire danger by clogging the forest with burnable biomass.

To reduce this hazard and rebuild forest health, for about 35 years the Boulder department has been thinning its woods. But “once you thin a forest, what do you do with the biomass?” That question was on the mind of Therese Glowacki, resource manager for the department, in 2001 when she traveled to a conference on potential uses for forest byproducts. She heard a presentation on using biomass for heat. At the time, Glowacki’s department was looking for a site for its new headquarters and shop campus.

“I said, ‘If we’re going to build a new building, why not heat it with chips from our forest?’ It just makes sense.”

Today, a 3.3 MMBtu/hour woodchip boiler supplies heat for the six buildings on the department’s new central office and shop campus. The chips come from the department’s own woods, where it thins 100-150 acres each year. This “vertical integration” of a biomass project, where the fuel is harvested on woodland owned and managed by the user of the heating plant, makes Boulder County a noteworthy model.

“For foresters or land managers who are already thinning a forest, the biomass energy system puts this wood to good use,” Glowacki says.

“With the state of forests in Colorado, many other municipalities, school districts, and counties are also interested in using this technology.”

For some of its harvesting, the county uses its own “roll-off” trailers, which can transport about 30 cubic yards of chips. These trailers can transport chips when they’re not in use for other purposes; they can also be used for temporary chip storage. For larger-scale harvesting, though, the county has found it’s more efficient to hire a transport company with 160-cubic-yard, live-floor vans.

“We can fill one of those in three hours, and usually get three trips a day out of it,” Glowacki said.

Planning a Sustainable System

Early in its planning process for the biomass system, Boulder County contacted BERC. Boulder staff members traveled to Vermont for a tour of chip-fired facilities before committing to their own project. BERC then served as wood-energy consultant for the plant’s construction.

“We worked closely with county staff and their professional team, the architect and engineer, on the details for how the chip system would be configured,” said Tim Maker of BERC—“including onsite storage of woodchip fuel and...”
the use of the roll-off containers to collect and store fuel prior to use. We also played a role in quantifying the size of the system based on the size of the buildings they planned to construct, at the outset and in the future.”

A feasibility study for Boulder County’s biomass system said all the needed fuel could come from the county’s own thinning operation, and that emissions from the biomass boiler would meet all state air-quality standards. The study found that a biomass system would cost about $350,000 more than a natural-gas facility—but, it predicted, fuel-cost savings would repay that difference in 7 to 10 years. At the time, natural gas prices were just beginning to rise.

Along with reducing fire danger, using thinned forest biomass for fuel may also help with another big problem in Colorado’s woods: runaway infestation by mountain pine beetles. “It will get some of the biomass out,” Glowacki says. “And it will help with generation of new forest and reducing fire risk.”

**Acting on Lessons Learned**

Boulder County’s biomass system is not the first in its area. In the early part of this decade, the nearby town of Nederland installed a biomass heating and electrical cogeneration plant. That system was plagued with problems, and shut down after a couple of years.

Glowacki says her department learned several lessons from Nederland.

“The biggest thing is to get everybody on board—especially your facilities staff—so they know what it will take to get it running and keep it running.”

Second, she said, “keep it simple.” Nederland attempted to produce both heat and power with its system; Boulder is providing only heat.

Third lesson: chip quality is crucial. As a municipal project, the Nederland plant took in chips as voluntary dropoffs from landowners who were thinning their woods. This led to wide variations in chip quality, and to problems with contaminants like dirt and rocks.

“We have a tighter control on the quality of our chips,” Glowacki says.

The new campus is highly energy efficient—so fuel cost savings are running somewhat less than expected, Glowacki says. In its first winter, 2006-07, the system saved $15,000 in fuel costs, compared to natural gas.

“From my perspective, it’s the right thing to do,” she concludes. “We’re putting our natural resources to work.”