What became Alaska’s first fully automated, woodchip-fired district heating system began as a sort of afterthought.

When Craig City Manager Jon Bolling commissioned a 2003 analysis on the prospects for converting the municipal aquatic center’s heating system from costly propane to diesel fuel, the analysis also mentioned another alternative: wood.

“I was not particularly interested,” Bolling recalls. But the Alaska Energy Authority, a state agency, offered to commission a report on the wood-heat idea from Tom Miles, a wood-energy consultant in Portland, Oregon.

Miles found that a wood-fired system could not only heat the aquatic center, which provides a pool, spa, and workout facilities for the tiny city, population 1,300—it could also provide heat for the nearby Craig elementary and middle schools.

Still, diesel oil looked like the lower-cost option. Miles estimated it, looking ahead, at $1.46 per gallon.

“A year later, we were paying $3-$5 per gallon,” Bolling says. Wood was looking more and more attractive.

So the city manager joined Karen Petersen, Cooperative Extension Service agent for Prince of Wales Island—the landmass in southeastern Alaska that includes Craig—and five others on a trip to see a chip-fired system in Darby, Montana.

Bolling still had concerns.

“I didn’t want there to be a potential blue haze of smoke over our town, and I didn’t want people complaining and coughing because of effluent in the air,” he says. “Of course, we discovered when we got [to Darby] that their system burned very clean. You couldn’t even see effluent coming out of the stack.”

Walking around Darby, Bolling asked locals how they felt about the system. “Nobody said it made them cough or made their kids sick,” he said. “People were generally supportive.

“We left Darby convinced that we could apply the technology we saw there in southeastern Alaska.”

‘A Bit of Selling, But Not a Lot’

The Craig City Council was interested enough to join the US Forest Service (USFS) and the Alaska Energy Authority in each providing $30,000 for a design and engineering study. The study projected at $1.5 million the cost of a chip system to serve the aquatic center and both schools. The city assembled about $1 million in grant funding from the federal Natural Resources Conservation Service (NRCS), the USFS, the state Energy Authority, and the Denali Commission. Craig borrowed the remaining needed funds at 4.8 percent through a low-interest loan program for renewable energy projects.
In town, “there were people who had the same concerns I did—so I gave a few presentations,” Bolling says. “There was a bit of selling to be done, but not a lot.”

When bids came in higher than expected, project planners downsized the building that would house the system, and broke ground in August 2006.

“We were fortunate to have some good skilled labor in town—people who were willing to work as temporary city employees for the duration of the project,” says Bolling. “Still, it was an expensive building.”

The Craig Wood Energy Project—including the wood system supplied by Chiptec, a Vermont-based manufacturer—was commissioned in April 2008.

A Unique Feature: Chip-Drying with Heated Air
Craig has an abundance of chips, with an active sawmill nearby; but Prince of Wales Island is a rainy region, so the fuel, mostly western hemlock, often came in wet. During the system’s first year of operation, moisture content of the chips varied from 40-70 percent. So, the Craig system includes a forced-air chip-drying system—a feature that is unique, as far as its operators know.

Some of the system-generated heat is vented into the chip bin through perforated hot-air ducts under its floor. The ducts push the warm air through the chips, drying them in the process. An evacuation fan moves the now-humid air outdoors.

“We can manually adjust the drying system to increase the temperature of the warm air that’s being forced through the chips, and increase the volume of the air that’s going through the chips,” explains Paul Coffey, who lives in Craig, works for NRCS, and has been closely involved with the system.

“A little bit of moisture is good,” he adds. “It acts as a lubricant to move the chips through the augers.” But if the chips are too dry they tend to get pulverized by the augers, create dust, and the fuel burns too hot and fast. So, as different chip loads come in with varying moisture contents, adjusting the system for optimum efficiency is an ongoing challenge. Still, air quality has not been an issue.

“We’ve had people ask why we’re not operating our wood boiler,” the city manager says. “Sometimes when it’s running, you can’t see steam coming out of the stack.”

Through its first heating season, the Craig system burned about 800 tons of wood-chips, at about $20 per ton, for a fuel cost of roughly $16,000, plus about $20,000 for backup propane. Compared with what the costs would have been to heat entirely with propane, the city saved about 70 percent on its heating bill.

Both the aquatic center and the schools used their backup diesel system more than they wanted to, because the chip-system operators were learning how to optimize chip moisture and run at full efficiency. But looking ahead, says Cooperative Extension Agent Petersen, “the desire is that this chip plant will replace 100 percent of the propane and diesel systems in the months when the schools are open.”

“There’s no reason this facility couldn’t be replicated all over Alaska—at least where there is a wood supply,” Bolling concludes. “Wood is carbon-neutral, and the supply is controlled locally. As the years progress, there’s no reason these plants can’t be built as combined heat and power (CHP) plants, and thereby remove the need for non-renewable petroleum products.”