He wood pellet district system that heats the small Danish town of Gjern VarmeVaerk is striking for several reasons. One is that it’s just plain hard to spot. The heating plant is fit so unintrusively into the midst of a residential neighborhood that a photographer, looking for a good view, found the plant to be almost hidden behind other buildings from almost every vantage point. Unless, of course, he looked up to notice the tall chimney, designed to keep any pollutants from affecting air quality in the village.

Another striking feature is that homes in Gjern must pay 26,000 Danish kroners (about $4,700 US), just to connect to the district system. And pellets as a fuel are more expensive than woodchips. Even so, says plant manager Børje Laursen, “most all the houses in the village are on the district system.

“What is the price of oil here? Let me think. At people’s houses they would probably be paying DKK 8-8.5 per liter ($5.50-$5.75 US per gallon) today,” Laursen estimates. “We mostly stopped using oil in this town a long time ago.”

Gjern has been heating with pellets for almost two decades. Local reasons for using this particular biomass fuel are that it can be burned in a very compact plant, and one that doesn’t need a large chip-storage area, only a modest-sized silo.

“This is a small town—we only have 490 heat customers,” Laursen says. “Our plant is right in the middle of the village, so it made sense to use wood pellets for fuel because the fuel storage and equipment don’t take up much space.”

The heating plant did originally use oil, which also can be burned in a compact facility. “Our plant is an old one, built in 1964,” Laursen says. “Sometimes it feels as old as me!”

When Gjern went to pellets, it first used a converted boiler, a smaller unit. “We started burning pellets here in 1991,” the plant manager recalls. “For a while we tried using cheap industrial-grade pellets, but they gave us problems with clinkers. So now we buy only good-quality pellets. In 2006, we put in a new pellet boiler manufactured by Lin-Ka Energy, and most of our pipe was replaced about 10 years ago.”

The price that Gjern pays for its pellet fuel is DKK 1,200 per tonne (about $195 US per US ton).

“My house is 174 square meters (1,900 square feet), and heat from the system costs us DKK 1,500 ($270 US) each month for 10 months, for all heat and hot water,” Lauren reports. Along with most local homes, the system serves a local school, some small industry, and an indoor swimming arena that uses about one-fifth of the heating capacity. It’s common in European towns with district heating systems for the local pool to be the biggest customer, with local schools usually coming in second.
The heating plant is staffed by one person at a time, from 7:00 am to 4:00 pm, seven days a week, with on-call coverage at night. Two men trade staffing duties; the one who is on call during off hours can keep tabs on the system from his home computer. A retired local woman also works part-time for the system, spending two to three hours per business day doing billing and other administrative duties.

Gjern’s is not a municipal system; its customers own it as a cooperative. Under Danish law, district heating systems that serve communities can’t earn a profit, or develop a reserve fund. With typical homes here costing about DKK two million ($360,000 US), the connection fees that homeowners pay to get on the district system can equal as much as eight percent of their home’s purchase price.

“So you can get an idea,” Lauren observes, “of how much people are willing to pay.”

**Heir to a Long Tradition**

The first district heating plant in Denmark was built in 1903, and was fueled with a form of biomass: municipal solid waste. This system, in the City of Frederiksberg, evolved over the decades to become part of the Copenhagen district energy system, now one of the largest district heat networks in the world.

The nation has long been at the forefront of district energy. Since the energy crisis of 1973-74, national policy has moved the mix of fuels in Danish district energy away from fossil fuels toward a greater utilization of biomass, including straw, waste wood, and biogas.