

Wood Pellet Heating System**Heating Capacity (output): One 40 kW (135,000 Btu/hr) boiler and one 25 kW (85,000 Btu/hr) boiler****Emissions Reduction and Combustion Control Equipment: O₂ sensor control****Year Installed: 2005****Thermal Output: Hot water****BERC**

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Biomass Energy Resource Center**CHRISTIANSHEDE ZOO SCHOOL, BORDING, DENMARK****Danish School's Pellet Heat Saves on Cost and Adds Comfort**

At a boarding school in Denmark for troubled young people, switching from an electric heating system to one fueled by wood pellets has been one small part of a national movement away from fossil fuels.

By improving comfort at the school, biomass heat may also be helping to improve student behavior.

“When we were on oil and electric heat it was really expensive heat, so we kept the buildings cooler,” says Bue Grunnet, head of maintenance at the Christianshede Zoo School in Bording, Denmark. “Now, with pellets, we keep the buildings warm. These kids have a lot of issues, and they do much better now that we have a higher level of comfort from pellets.”

The Christianshede School is on the site of a former zoo and still houses a number of zoo animals, which the students care for as part of their therapy. Twenty-two resident students here are served by about the same number of teachers and staff. The school's two pellet boilers—with heating capacities of 25 thermal kW (85,000 Btu/hour) and 40 kW (135,000 Btu/hour)—use about 40 tonnes (35 US tons) of pellet fuel per year, at the equivalent of \$325 US per US ton.

In a country where the price of oil is the equivalent of \$5.75 US per gallon, pellet fuel's relatively low cost has made it a natural alternative.



“In areas where there is wood, there is no reason not to heat with pellets, woodchips, or logs,” Grunnet says. “I like the idea of pellets being cheaper than oil, but I know I have to spend a little time on cleaning the pellet boilers.”

Otherwise, he adds, “this pellet system is really automatic!” It has automated boiler controls, based on oxygen sensing using a lambda sensor, and has automatic ash removal.

There's not much to show off with the heating plant for the school. Call it hidden infrastructure: You can't see the buried pipes that are the arteries of the system. Compared to the size and number of buildings on the school campus, the boiler plant is tiny.

The unassuming, closet-sized concrete block boiler house sits off behind one of the dormitory buildings—but its function is big.

Pictured on front: This small pellet boiler plant heats all the buildings of the Zoo School. Right: Baxi pellet boiler representative Hans-Jørn Rasmussen (on right) discusses combustion questions with the school's head of maintenance, Bue Grunnet.



It connects to all the buildings using insulated pipe, just like larger plants that heat university campuses or whole towns. The two residential-size pellet boilers put out enough heat to keep the entire campus warm.

Biomass Market ‘a Good Place to Be’

The Zoo School bought its pellet system from the Danish boiler manufacturer Baxi, which 15 years ago purchased TARM, a pioneering line of pellet-heating products.

“The TARM name is known in a lot of countries,” notes Baxi representative Hans-Jørn Rasmussen. “We sell small pellet boilers, residential and light commercial up to 40 kW thermal (135,000 Btu/hour)—but they can burn lots of biomass fuels, like grain, chips, and mustard seed.

“Being in the biomass market is a good place to be. We sell a lot of boilers in Denmark, Sweden, Germany, Austria, Italy, and Ireland as well as in the United States and Canada.

“Here in Europe we are very worried about relying on the Russians for natural gas. One year they may treat you well and sell gas at reasonable prices, but the next they may chase the Chinese market and leave us high and dry. Our government used to say that we had 20 years of our own natural gas, but now there’s not much left. Using local biomass fuel is much better than relying on gas.”

“As a country,” Rasmussen concludes, “Denmark has committed to get off imported fossil fuels like oil, gas and coal in all sectors—including gasoline for transportation—within 10 years, so we don’t have to rely on Russia or the Arab states.”

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