Two boarding schools in western Jutland are examples of the smaller end of the wide spectrum of biomass energy applications in Denmark, this smallest of Scandinavian countries.

“Biomass energy is a big industry in Denmark today, and the future holds even more promise,” says Svend Brandstrup Hanson, president of DANBIO, the Danish Bioenergy Association. “We have had great success in the use of all kinds of biomass in district energy at all scales, heating of individual buildings, biogas utilization, and more. In the future we will see a whole new industry in making liquid biofuels from farm and forest residues as well as from energy crops.”

The Verdersø Sports School and the Husby Boarding School, not far from each other, are each heated using locally produced biomass fuel, and both use boilers made by Twin Heat, a Jutland company. Verdersø School’s 250 thermal kW (850,000 Btu/hour) boiler, and Husby School’s 150 kW (500,000 Btu/hour) boiler both burn wood pellets that cost 1,200 Danish kroner ($210 US per US ton), plus 25 percent in taxes.

While these biomass fuels are not cheap, they are much less expensive than oil, and both schools save money by using this local fuel. The two schools use boilers that are on the high end of the sizes made by Twin Heat, which also makes residential boilers.

“We are not a big company, and most of our sales are here in Denmark,” says Svend Eric Sund of Twin Heat. “We make small, high-performance boilers that burn wood pellets, woodchips, and grain. Our customers are about 60 percent farms, 30 percent houses, and 10 percent institutions. We have our boilers in about 20 schools.

“We fill a niche. Our customers want small solid-fuel boilers that operate reliably at very high efficiency with very clean emissions, and they are willing to pay for performance.”

Nearby the schools are two of Twin Heat’s residential customers, more examples of Denmark’s small-scale biomass boiler market.

At an old brick farmhouse with a thatch roof, in a farm building across the courtyard from the kitchen, a 12 kW (40,000 Btu/hour) Twin Heat boiler provides all the farm’s heat by burning rye and barley that the farm grows. In the next town, a house has a woodchip silo in the back yard, with an auger that automatically moves the chips inside to the boiler. The modest home uses about 18 tonnes (20 US tons) of local woodchips each year, at a cost of DKK 7,000 ($1,300 US).
Modest Heating Bills, Tidy Heating Systems

The Verdersø Sports School caters to students who want to excel at competitive athletics. With 120 students of middle-school age, the school has a small, pleasant campus of comfortable, modern buildings and playing fields. Its pellet boiler plant—built in 2000 right in the middle of the school complex—occupies a trim, tidy building with a silo in back to store the pellets. The school uses 90-110 tonnes (100-120 US tons) of pellets per year, at a cost of DKK 200,000 ($35,000 US). The boiler system cost the school only DKK 250,000 ($45,000 US).

In Husby, the boarding school has just 70 students, and it needs only a little more than 90 tonnes (100 US tons) a year, at a cost of DKK 160,000 (less than $30,000 US), to heat its cluster of school buildings. At this school, there is no outward sign that biomass fuel is being used since the pellets are stored in a basement bin of one of the school buildings next to the boiler room where the Twin Heat system is located.

The fuel delivery truck has a hose that connects to a port on the side of the building so pellets can be blown into the bin. A second port connects to a second hose that automatically sucks out the dust in the air from the delivery, storing it back in the truck, leaving the boiler room and bin area clean.

‘Vibrant Markets’ for Biomass Fuels

“Most of our farm customers burn fuel they grow themselves and residential customers burn fuels that come from very close to where they live. They use our boilers for heat—including space heat and barn heating—hot water, and drying grain.”

“Our biomass fuel industry in Denmark is mature,” says Hanson. “We have vibrant markets in straw, mill residues, forest woodchips, grain, and plantation energy crops, with participation from large national companies and farm and forest co-ops as well as small entrepreneurs who serve local markets.”

On a tour of biomass sites in Denmark, Hanson pointed out a small wood-harvesting operation on private land.

“This is a good example of what goes on at small scale all over Denmark,” he said. “This is a one-person business, where the owner invested DKK 1.4 million ($250,000 US) in a modern tractor with a chipper and a wagon to deliver wood fuel to nearby customers. Here he is working on a Saturday morning, chipping small-diameter fallen trees, which he will deliver as fuel to a customer not far from here.

“It is not a big operation—but it is a successful business, and he is making money.”

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