Wood-based Thermal Energy

Case Studies-Upper Austria

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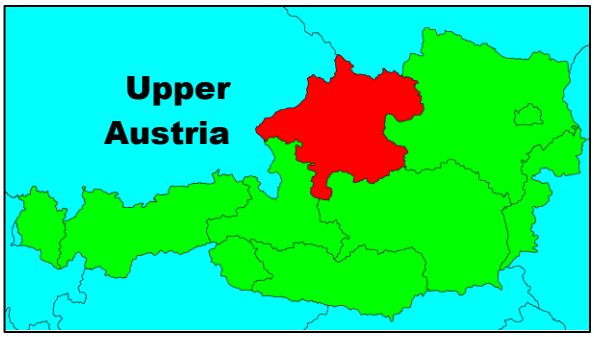
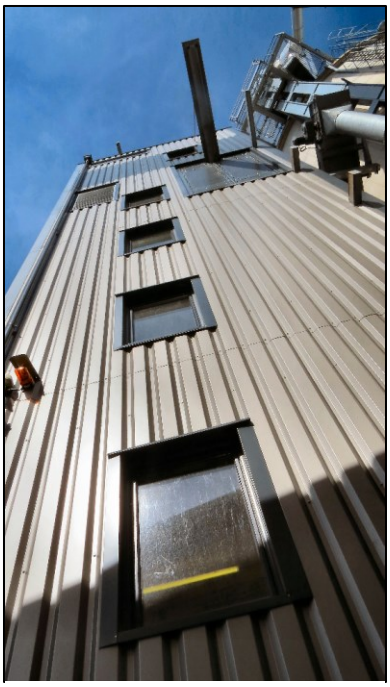
As an example of a regional wood-based energy effort, the State of Upper Austria (OberÖsterreich) offers a well-advanced wood energy economy. Beginning in the 1980s, farmer forest owners were looking to add value to their operations from forest products. Austrian citizens recognized their energy dependency on other countries, experienced increasing prices of fossil fuels, and acknowledged the need to reduce carbon emissions.



In cooperation with economic development and government agencies, a wood-based thermal energy program evolved. By 2015, 16% of the state's total energy demand (heat, cooling, power, transportation) was derived from renewable wood supplies, including firewood, pellets, and chips. The 2030 goal is 100% of heat and power derived from renewables, of which wood is a major component. Statewide policy and programs provide incentives, regulations, and recognition for outstanding operations. Boiler manufacturers in Upper Austria are known for their excellence and high efficiency. These companies hold about 45% of the European market in wood-using boilers. Energy programs integrate wood heat with other technologies such as conservation, energy-efficient devices, passive solar, geothermal, and thermal storage.



Vertically-oriented, gravity-engaged pellet plant, with hammermill and pellet press.

Home heating and small commercial buildings using wood pellets are fully automated with one or two deliveries per year. Pellets are delivered with a specially designed bulk-loading truck, in a manner similar to fuel oil or propane. Houses must have room for the boiler as well as a space for storing the pellets. Residents simply move the thermostat up or down to suit their needs. Over 50,000 fully automatic wood heat systems have been installed in homes and smaller commercial buildings. Pellets are produced locally and are also imported.

Home delivery of wood pellets using a vacuum-equipped truck.

Upper Austria provides one of the best examples of widespread, small-scale district energy networks and supply chains. Farmers produce roundwood, which is often chipped by contractors, then chips are dried using small, local passive solar energy facilities. Local district energy boilers use the wood chips to provide heat to clusters of buildings. Rural areas have micro-grids with as few as ten homes. Other district energy systems supply heat to parts of villages and towns. These systems are too small to justify the cost of electric generation. However, Upper Austria does employ combined heat and power facilities that utilize wood for at least

part of their fuel supply.

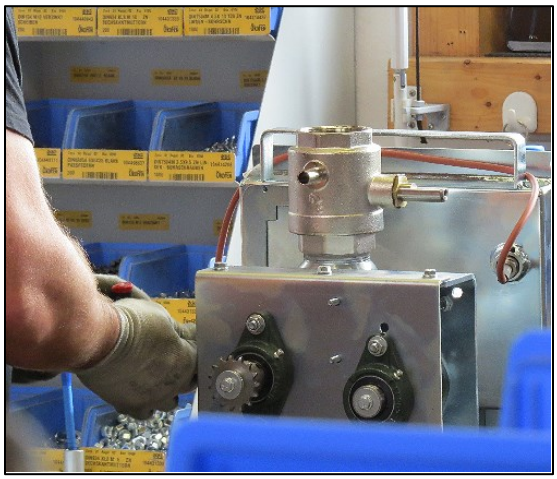
Upper Austria's wood energy economy includes over 300 wood-fired district energy systems and their related supply chains. There are $260 million in annual sales of wood fuels with $730 million from annual revenue from the production, sales, and installation of heating systems. Over 4500 jobs have been created. Collectively, the district energy systems in Upper Austria produce about 322 megawatts of energy, through over 2500 miles of piping, with 6300 customers and 5300 farmer-producers.

The environmental impacts have been positive, as well. The ability to sell lower quality wood material from regional forests has contributed to increased forest sustainability and productivity. About 1.7 million tons of carbon dioxide per year are avoided through the replacement of fossil fuels, which also retains about 1.5 billion energy dollars in the local economy.

Rural town in Upper Austria with at least two district energy systems fueled with wood chips.

Small wood chip solar dryer and storage building on a farm.

Wood pellets on a boiler burner plate.



Assembly of a wood pellet boiler.

The size of Upper Austria is about 4600 square miles, with a human population of about 1.4 million. The landscape is 41% forested. In Michigan, similar demographic and geographic characteristics exist in the seven county area of Kent, Allegan, Ottawa, Muskegon, Newaygo, Montcalm, and Ionia Counties. Given the nature of Michigan's landscape and energy consumption, various wood-based thermal technologies have a huge potential for deployment, dollar savings, contributions to more sustainable communities, and environmental benefits.