One Austrian company’s goal has been to build an industrial facility that will, in time, require virtually no external heating fuel or heat supply. Xolar Group, a fast-growing maker of solar hot water panels, is on a path to succeed. Biomass plays an important role, in the form of three relatively small wood pellet boilers tucked away in a basement of this large building.

Xolar Group’s new headquarters and manufacturing center, completed in 2008 in Eberstalzell, Upper Austria, is a 21,900 square meter (235,000 square foot) building that is the largest passively heated and cooled structure in Europe. It uses a huge array of solar hot-water panels on the roof to provide thermal energy for heating and cooling.

“Our manufacturing processes produce a lot of heat, so we have to do a lot of cooling,” notes Andreas Ebner, Xolar Group’s maintenance manager.

“This building has the highest level of air tightness of any industrial building ever built,” he adds. “The heat requirement is almost zero. And we use natural passive cooling, in addition to the solar cooling.”

It’s below ground that Xolar Group’s system really gets interesting. In its floor slab, the building has radiant heating—a grid of hot water piping. In most buildings, a radiant floor is used to heat the space above, but here it serves an additional function: The radiant floor also heats the soil below, to a depth of three meters (10 feet), all of it surrounded by insulating walls that hold in the heat.

Xolar Group has installed three modest-size wood pellet boilers, each with a capacity of 100 thermal kW (340,000 Btu/hour). The boilers provide supplemental heat that is gradually raising the temperature of the soil beneath the floor to 22 degrees centigrade (72° Fahrenheit), the temperature called for in the system design.

At that point—which Xolar Group estimates will take seven years to reach—the boilers, if all works according to plan, won’t be needed any longer. The slab floor, kept always at comfort temperature, will serve to heat the space when heat is needed, and to cool the space when heat from the manufacturing process tends to make it too warm.

In essence, the pellet boilers are injecting biomass heat into the soil beneath the building like electricity charges a battery. Once the soil mass under the floor is up to temperature, the only heat input will be from the solar system.

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At this point the pellet boilers will retire and the “heating system”—the ground and the floor slab, with daily solar input—will be self-contained and self-recharging.

**Europe’s Largest ‘Passive’ Plant**

“We are very proud of our new plant,” says Rainer Opletal, Xolar Group’s marketing director. “To achieve the European Union ‘passive building’ designation, the building must use less than 10 kWh of thermal energy per square meter each year for space heating.” That’s equal to using 0.03 gallons of heating oil per square foot.

Xolar Group’s heating and cooling system is computer controlled. At the heart of the system is a large, insulated “buffer tank” for storing hot water. The computer decides whether to dump heated water from the solar array or the pellet boilers into the buffer tank, or to circulate it directly to the radiant floor system that charges the soil. Heat stored in the buffer tank can also be directed, as hot water, either to the underground heat storage or to the air conditioning equipment that cools the office space.

Xolar Group is at the leading edge of renewable-energy use in Upper Austria, and the state is among the leaders in Europe. Thirty-two percent of the total gross energy consumption in Upper Austria is provided by renewable energy sources, of which biomass constitutes 13 percent. The state aims to reach 100 percent of renewables (including biomass) by 2030.

As a renewable-energy business, Xolar Group is also growing fast.

“Our founder, Herbert Hümer, started Xolar Group in 2000,” Ebner says. “We sold 180,000 square meters (1.9 million square feet) of solar panels in 2008. Our goal is to sell one million square meters.”