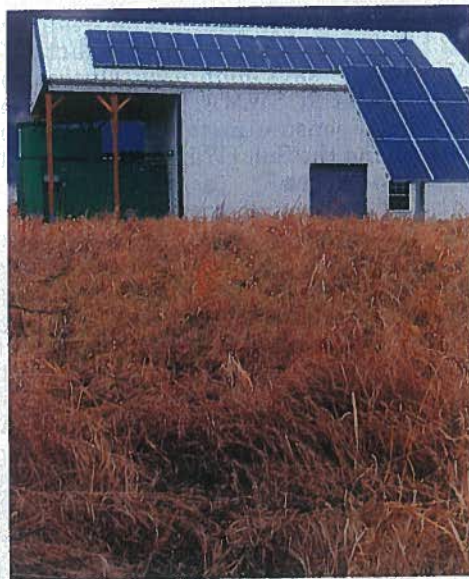


sion of the building, but provide insulation. "We also installed new, high speed fabric overhead doors that reduce energy loss due to less opening time," adds Fleury. "With the combination of the SolarWall preheating system, and the energy conservation impacts of the coating and the overhead doors, it is likely that significant amounts of energy costs are being saved."

Barbara Petroff, Business Development Specialist with Siemens IPS Composting System, reports that other facilities using its systems have developed innovative means of saving energy, particularly the composting plant owned by Delaware County, New York. "Energy efficiencies have become increasingly important for in-vessel systems," she explains. "Electrical costs can represent one-fourth to a third of a typical operating budget, with HVAC accounting for the majority of that demand. To mitigate winter heating costs, Delaware County captures heat released from the composting process, using an IPS bay wall as a conduit for tubes that transfer heated water between the front and the rear sections of the facility for the radiant floor



PV panels at Ohio University's in-vessel composting system are projected to generate 12,000 kWh/year, or 60 percent of the site's energy needs.

heating system. The passive heat in the 235-foot long wall succeeds in maintaining a temperature range of 120° to 140°F in the returning water. This measure results in minimizing the use of the boiler to reheat the water."

OHIO UNIVERSITY FOOD WASTE COMPOSTER

Ohio University in Athens, Ohio, launched its solar-powered, in-vessel composting system in February 2009, "claiming to be the largest of its kind at any college or university in the nation." As of July, it had processed over 70 tons of organic waste, and produced more than 6,000 kWh of energy from its PV array. The Wright Environmental composting system is designed to process two tons/day of organic material, with an overall vessel capacity of 28 tons.

A PV array mounted on the pole barn's roof, which goes over the vessel, was installed by Dovetail Solar & Wind, an Athens renewable energy system provider, and is projected to produce 12,000 kWh of electricity annually, about 60 percent of total electricity needed for operation of the site. The pole barn roof was built with daylighting panels to illuminate the space be-

SOLAR INNOVATION

WHILE not related to composting (yet), a solar collector developed by an engineer in Boothbay Harbor, Maine for his home illustrates the potential of harnessing the sun's power. Michael Mayhew of Heliotropic Technologies describes his innovation as a "concentrating hybrid solar-electric and hot water system," essentially capturing heat and electricity.

Mayhew estimates the unit will provide one quarter of the energy needs of his already efficient home. "What I'm trying to do is increase the output of standard solar modules by concentrating light on them," he explains. "To keep the solar panels' efficiency up I have to cool them. I end up with a waste product of heat, which is useful, and increased output from my solar panel."

On the southern side of his home there are two prototypes, mounted on an adjustable rack that allows the panels to be tilted at a right angle to the sun in every season. On the sides of each solar panel there are

parabolic mirrors designed to bounce sunlight into another reflector. "Those secondary panels are substantially different on each prototype," says Mayhew. "One of them is curved and the other has two flat plate mirrors on either side of the center line. There are advantages to each design: one is a little easier to manufac-

ture, and I predicted that the other would produce more heat and energy, our primary concern." The light is finally redirected from these secondary reflectors into the solar panels.

The main reflectors, called parabolic troughs, gather about three times the sunlight the solar panel would collect on its

own. However, the hotter the panel gets the less efficient it becomes. To compensate Mayhew built a cooling circuit beneath them. "Part of the energy gathered runs a little circulator pump, and when the sun shines it circulates cool water on the back of the plate to try to keep the panel under 200 degrees," says Mayhew. The heated water is used in his home.

Next year a new generation of solar panels will be available to the public and Mayhew estimates that they will triple the output of the device from roughly 500 watts per hour of sunlight to 1500 watts. For more information visit heliotropictech.com or contact Mayhew at coolsolarguy@yahoo.com.

- Rob Goszkowski



Parabolic reflectors gather three times the typical sunlight for PV panels, boosting electricity generation and creating excess heat that is captured for heating.

neath the roof. Capital costs for the composting system, building, PV system, access road, utilities, leach field, concrete pad, rain collection system and other equipment were about \$800,000. Grants from Ohio's Department of Natural Resources and Department of Development provided \$335,000.

Molly Shea, a student staff member in the Ohio University Office of Sustainability, explains that the University initially thought that solar power might not be the most cost-effective green power option at the site since "this area of Ohio is not very sunny. We thought wind power might have worked as the facility sits on a ridge, but it turned out solar PV would give us more power per dollar invested." The Office of Sustainability estimates that the avoided electricity usage will save 450 metric tons/year of carbon emissions, and the compost system will divert 25 percent of the Athen's campus waste from the landfill, which translates into an annual greenhouse gas emission reduction of approximately 1,200 metric tons of CO₂ equivalent.

SOLAR-POWERED HORSE MANURE COMPOSTING

Peter Moon, President and Owner of O2 Compost in Snohomish, Washington, estimates that at least one third of his customers are interested in utilizing solar energy to power the aerated static pile systems O2 Compost designs and installs. The company currently has two horse farms that use PV to supply power for the two or three fans that aerate the compost piles, which range between one-quarter to one-half horsepower each.

Laurra Maddock and Kent Lane, owners of a 20-horse stable located at Ortega Mountain Ranch in Laguna Niguel, California, decided to invest in the solar system because their property is completely off the grid for electricity, as well as water. "Our goal is to run everything on solar and we are working in that direction with our electrical system comprised of a diesel generator, solar panels (PV), and storage batteries," explains Maddock. "We currently generate 70 percent of our power through solar, and within two months will double our solar capacity."

The aerated static pile manure composting system is tied into the main electrical system and does not have its own separate power source. "The reason for composting our manure is a no-brainer, and having it operate from solar power allows us to reduce our carbon footprint even more," adds Maddock. "Our overall goal is to be as environmentally responsible as possible in all aspects of our operation."

The O2 Compost system is also installed at a 6-horse stable in Gales Ferry, Connecticut. Although the farm is connected to the grid, the owners decided to invest in the PV system. Moon says the biggest challenge for solar applications is the initial capital expense, but it can make a horse stable feasible where the cost of connecting to the power grid is high.

"We have teamed with a PV system supplier to provide the panels, batteries and converter that allows a horse stable, or other composting application, to be totally off the grid," Moon explains. "We can generate

Ortega Mountain Ranch, which is completely off the grid, uses PV solar panels to power the motors for its aerated static pile manure composting system.



power for the aeration fans, as well as lighting, heating, and wash water for the barn and animals."

Moon reports that they are conducting research on applications of solar power to different sizes of stables. He is working with Steve Hauser, a consulting solar engineer, to assemble solar powered systems for two sizes of composting bins, one for 1 to 4 horses, and one for up to 10 horses. "These bins require only a one-quarter to one-half horsepower motor to power the aeration systems, and can be installed to run off AC or solar," says Hauser. "The blowers typically run just 1.6 hours per 24 hour period, so the power savings from using solar are not as significant as the ability to have an aerated composting system off the grid." Other equipment includes a sealed gel marine battery, an inverter to convert DC to AC, a controller to prevent the battery from overcharging, a circuit breaker box, and Kyocera PV panels — at a cost of about \$2,000.

Moon adds that although O2 has one PV system operating in the northeast U.S., "it obviously can't generate as much power when compared to areas with abundant sunshine such as southern California, Arizona, and Florida. PV systems still can be attractive, however, since they can power composting systems in areas that do not have electrical service, or where it is very expensive to obtain." ■

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