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# Case studies: Building for a sustainable future

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# Case studies: Building for a sustainable future

The Charles H. Townes Center for Science at Furman was built as a model of green architecture. With its thermal solar panels, day lighting and energy-efficient heating and cooling systems, the complex itself is a teaching tool, as students study its energy use and sustainability systems.

In recent months the south end of Townes Center, across from Stone Soccer Stadium, has sprouted some impressive appendages — an erector set of solar panels and a huge greenhouse. They represent a clear statement that Furman is committed to sustainability, energy/water conservation, and environmental awareness.

Joe Pollard, chair of the biology department, talks about putting "science in sight" as a key mission of the Townes Center. And while Furman has had a greenhouse for many years, the new one is in a prominent location and will be available for use not only in science projects, but also by members of the university community growing their own produce in Furman garden plots.

In addition to these external manifestations of the Townes Center's sustainable ethos, the complex boasts a wastewater treatment and recycling project known as the "Living Machine."

The Living Machine mimics the ecology of tides and wetlands. Wastewater is diverted from the Townes Center's sewer line, collected in a buried tank and pumped into computer-controlled wetland basins. Tidal cycles furnish the oxygen and nutrients for microorganisms that make their home in the wetland basins, and they are enlisted as nature's way of treating the wastewater. The resulting high-quality effluent can be recycled as water for flushing toilets and urinals or for washing the cages in science labs, for example.

Jeff Redderson, assistant vice president of facilities services at Furman, translates into layman's terms the expected savings from the solar concentrators and the Living Machine. According to Redderson, the solar concentrators produce 14 kilowatts of electricity and 70,000 BTUs per hour of hot water during peak operating periods — enough to meet the power and hot water needs of a small residential building.

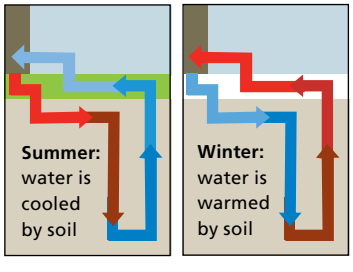
Of the Living Machine, Redderson says, "The wastewater reclaim system processes up to 5,000 gallons a day of sanitary sewer water. The reclaimed water, or graywater, can be pumped back into the building to flush urinals and toilets, which reduces our freshwater consumption by another 5,000 gallons a day. This is enough water to fill up the main campus fountain every four months, or enough water for 100 showers each day."

While it is being treated, the water is kept below the surface of a gravel-packed medium with plant life above the surface. So there's no danger of accidental human contact with untreated water or of the Living Machine becoming a breeding ground for mosquitoes, according to an official with Worrell Water Technologies, a Charlottesville, Va.-based firm that engineered the system and is partnering with Furman on the project.

The Living Machine leaves a small ecological footprint — 120 square feet. A custodian spends about 30 minutes a day making sure the system is running properly.

As for the solar concentrators, they use parabolic mirrors to concentrate the sun's energy over 1,000 times normal levels. According to Redderson, they can produce 14 kilowatts of electricity and 70,000 BTUs per hour of hot water during peak operating periods. That's enough to meet the power and hot water needs of a small residential building.

Meanwhile, on the other side of the campus, a $2.5 million grant from the U.S. Department of Energy (DOE) will allow Furman to replace the HVAC heating and cooling system in the 11-year-old North Village housing complex with a more environmentally friendly and energy-efficient geothermal heat pump system.



The geothermal heating and cooling system is expected to save the university more than $2 million in energy costs over the next 20 years and allow Furman to take a big step toward achieving its goal of carbon neutrality on campus.

Redderson says the North Village work will likely begin in the summer of 2011 and will take two years. Eighteen wells 300 feet deep are planned for each of the complex's 11 buildings, with 275 geothermal heat pumps to be installed.

More than 1,000 Furman students reside in the apartment-style complex.

A geothermal heating and cooling system uses the water stored underground, where the Earth's temperature is constant, to heat residences in the winter and cool them in the summer. It is the most environmentally responsible and energy-efficient HVAC system available.

The DOE grant is part of $338 million in Recovery Act funding for the "exploration and development of new geothermal fields and research into advanced geothermal technologies." The grants support 123 projects in 39 states. The recipients include industrial companies, academic institutions, tribal entities, local governments and DOE's National Laboratories.

Of the 28 colleges and universities nationwide to receive a grant, Furman was the only liberal arts college and the only institution from South Carolina.

"The United States is blessed with vast geothermal energy resources which hold enormous potential to heat our homes and power our economy," said Department of Energy Secretary Steven Chu. "These investments in America's technological innovation will allow us to capture more of this clean, carbon-free energy at a lower cost than ever before. We will create thousands of jobs, boost our economy and help to jumpstart the geothermal industry across the United States."

According to the Department of Energy, the grants are directed toward identifying and developing new geothermal fields and reducing the upfront risk associated with geothermal development through innovative exploration, drilling projects, and data development and collection. In addition, the grants will support deployment and creative financing approaches for ground source heat pump demonstration projects across the country.

Collectively, these projects will represent a dramatic expansion of the U.S. geothermal industry and are expected to create or save thousands of jobs in drilling, exploration, construction, operation of geothermal power facilities, and manufacturing of ground source heat pump equipment.

*Compiled from reports by Ann Green and Vince Moore.*

## In support of sustainability

Furman is seeking to forge a variety of strategic partnerships for the David E. Shi Center for Sustainability — the hub of the university's sustainability efforts — and to raise additional resources to underwrite the center's mission and endow its operations. Naming rights are available for many of these programs, including:

**Shi Center operations** — Endow core staff and functions as well as student internships and postdoctoral fellowships.

**Educational programs** — Sponsor or endow curricular and co-curricular initiatives, including degree/certificate programs and engaged learning activities for students.

**Conservation initiatives** — Sponsor or endow creative and ongoing programs related to waste management, recycling, conservation, energy generation and other areas.

**Campus features** — Underwrite ongoing developments and features of The Cliffs Cottage, subsidize lake restoration efforts and organic farm needs, and support building improvements related to energy efficiency or renewable-energy projects.

**Environmental outreach** — Sponsor an array of service projects and partnership possibilities designed to support corporate initiatives/productivity and community development.

*To learn more about supporting the Shi Center for Sustainability, contact mike.gatchell@furman.edu, (864) 294-2475.*