

Turnbull utilizes sustainable technology in new construction



Photo by Becky Thomas

Solar thermal panels return heat to the ground that was removed by the Turnbull shop's ground source heating system.

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When the time came for Turnbull National Wildlife Refuge to get new facilities, it wasn't enough just to replace the aging office and bunkhouse.

Refuge leaders decided to create a comprehensive energy efficient system, relying heavily on renewable natural surroundings—the heat from the ground and the energy from the sun—to power its buildings. For refuge manager Don Matiatos, it was pretty simple.

“Well, we were building a new office so we might as well make it as energy efficient as possible,” Matiatos said. “We wanted to incorporate what we could.”

The project started with the new office and visitor's center, completed in the fall of 2009. The 6,957 square-foot building features a concrete mass construction, triple-paned windows and sprayed-in insulation to insulate the structure, low-flow water fixtures to reduce water waste, solar panels to generate electricity and a 14.35-ton ground source heating system to heat and cool the building. These components add up to a 32 percent reduction in energy use over an average building.

The ground source system, commonly known as geothermal, uses liquid that is pumped underground through pipes, absorbing heat that is then compressed and released into the building through a forced air system. In the summer, the heat in the air is absorbed into the liquid and pumped into the ground, where it is released and returns cooler to the building.

Travis Thompson is the site superintendent for Northern Management Services, Inc., the contractor on Turnbull's project. Thompson said the ground source system releases 2.5 units of energy for every unit used to extract it.

“The heat's essentially free. It's the mechanism that it takes to get the heat,” he said. “It's more than double what would be considered to be 100 percent efficient.”

Turnbull was recently given a 2010 Federal Energy and Water Management Award for the office's sustainable design and conservation features.

Matiatos said the construction costs were higher than for a traditional structure, but he and other refuge leaders placed sustainability on a high priority due to the refuge's purpose of conserving nature.

"It is more expensive, but with utilities you're saving long-term costs and from an environmental standpoint it's a cleaner system," he said. "You're putting less pollutants into the environment like carbon or propane or natural gas."

Along with the office, construction is ongoing on a new 13-person bunkhouse behind the office to house fire crews and workers for various refuge projects. The ground source heating system for that building was being installed earlier this month, and an eight-foot-deep trench the length of a football field was lined with PVC pipes that would be buried and shot full of a solution of water and methanol to extract the ground's natural heat.

Matiatos pointed a few hundred feet away from the trench, where a line of solar panels stood behind the refuge shop. The shop, completed this summer, also employs ground source heating, but it gets a boost from the solar thermal panels, which are filled with a solution similar to antifreeze. The solution absorbs heat from the sun and sends it into the ground in pipes that run alongside the ground source pipes, replacing heat that the ground source pipes remove.

"So we aren't dropping that ground temperature way down low, it's more efficient," Matiatos said. "I think we're looking at 500 percent efficiency on this."

Thompson worked with subcontracted engineers to design the hybrid system, which is one of just a few in existence. Though Northern Management Services doesn't specialize in sustainable energy sources, Thompson said the field was of personal interest for him.

"I've probably thought about doing this same thing since I was little," he said, recounting the long hours he spent talking with engineers about the details of the system and creating formulas to track its efficiencies. Now that it's completed, Thompson said the system is working as well as he had hoped.

"The office was as good as you could get, up until we did this," he said.

Although he admitted the system was a lot of work, Thompson said he hoped it would advance sustainable heating and cooling and inspire new ideas.

"By building these new projects they get more refined and once they're done, a person can figure out how to do them more efficiently just through the process of doing them," he said. "The more people get involved, the more interest in it, that's what really promotes it."

Turnbull has set up online links to the office and shop's solar panels where the public can view electricity generation. The links and more information about sustainability efforts can be found at www.fws.gov/turnbull/refuge_planning/html.

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