

School's Cool

■ Yucca Elementary turns on geothermal system

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Thanks to a new addition to Yucca Elementary, school is finally cool for students and teachers.

The school's new geothermal system started cooling the school July 27, said Dave Flood, Alamogordo Public Schools Operations and Transportation director.

Geothermal systems circulate water or fluid through a series of pipes, called loops, buried underground. The Yucca system uses water in its loop, which is buried 300 feet beneath the soccer field behind the school.

The temperature below the surface of the earth remains at a relatively constant temperature — anywhere from 45 to 70 degrees Fahrenheit depending on the location. In Alamogordo, the temperature is around 65 degrees, Flood said.

The water circulating through the loop collects Earth's natural heat in winter and carries it through the pipes. The heat runs through a ground-coupled heat pump and is put into the classrooms via units that look like air conditioners, Flood said.

Electrically driven compressors and heat exchangers — the same systems used in a home's refrigerator — concentrate the Earth's heat and release it inside the building at a higher temperature.

In summer, the process is reversed in order to cool the building. Excess heat is expelled to the loop and absorbed into the ground. Geothermal systems provide cooling in the way that a refrigerator keeps its contents cool, by drawing heat from the interior, not by injecting cold air.

This process is far more efficient at cooling air than traditional swamp coolers, Flood said, which only produce a 15 to 20 degree difference in air temperature.

"Now at your house, that's probably good enough because you have a table lamp and you," he said. "You go into a classroom where you've got four computers and 28 bodies — that swamp cooler isn't working."

Though not all Alamogordo schools are cooled and heated by swamp coolers, other cooling systems are also less efficient than the geothermal system, Flood said. When those systems break down, it can take several weeks to repair them, Flood said.

"Three or four classrooms sometimes share one unit," he said. "If I have a rooftop unit go down, I'm losing several classrooms, I have to hire a contractor, he has to order the unit, which may take four weeks."

Each classroom has a geothermal unit so if one ever breaks down only one class is affected, Flood said. Because APS keeps spare parts available, fixing the geothermal system only takes about four hours.

Yucca was chosen as the first school to receive a complete geothermal overhaul because it needed it most, Flood said.

"It was, as far as air conditioning goes, our school that was most broken," Flood said. "While it was refrigerated air, these units were 40 years old. We couldn't find any parts for them. We were kind of wiring them together, and eventually we didn't have any cooling in there at all, other than opening the windows."

That made for some very uncomfortable classrooms, said Adrienne Salas, Yucca Elementary School principal.

"If you're hot, you want to take a nap. It really takes a toll on you," Salas said. "Teachers were doing the best they can, but you have a tendency to look at your kids and say, 'Let's do something else.'"

During the winter, the heater didn't keep classrooms warm and students were wearing jackets and gloves, Salas said.

"With the new air conditioning and heating system, teachers won't have to worry about how they're going to keep the kids at a climate that will make them able to learn," Salas said. "They'll be able to teach what they need to teach with the kids staying on track — not getting sick, not constantly saying 'I'm hot, I'm

hot, can I get a drink of water?' The whole learning environment is going to improve."

Yucca was also chosen for the geothermal system because it had a two-pipe boiler heater already in place, Flood said. SPS was able to reuse pipes for the geothermal system, which saved money.

Flood said funding for the project came from a property tax that is renewed every six years and were limited. Yucca was in such dire need of a new heating and cooling system other projects were pushed back to allocate \$1.2 million for the ground-coupled heat pump installation, Flood said.

Though the initial system is more expensive to install, Flood said the geothermal units will pay off in the long run.

"We believe it will be less expensive over the lifetime of the system," he said. "It's more expensive to put in than conventional units initially, because we have to put the bore fields in. But we think that because the classroom units themselves are so much less expensive to put in, we believe over lifetime of system, over 25 years, it will be less expensive."

Also, the system is safe for the environment.

"We estimate that when we move the entire district to ground-coupled heat pumps, we will save 7 million gallons of water a year that we currently use in swamp coolers," Flood said. "Seven million gallons of water in a drought in the desert should mean something."

Geothermal heat pumps reduce electricity use 30 to 60 percent compared with traditional heating and cooling systems because the electricity powering them is used to move heat, not to produce it. Also, the system doesn't burn gas, unlike the old two-pipe boiler system.

"It does two things," Flood said. "Saves money on buying gas and reduces pollution."

Flood said benefits to the environment were an added benefit in the decision to use geothermal ground-coupled heat pumps.

"When Governor Richardson pitches his energy policy — and what we're doing here is considered renewable energy technology, so we're trying to meet the governor's goals — but when the governor pitches his program, he'll say there's two reasons you have to (switch to renewable energy). First, it's a good business decision. Second, it's good for the planet."

"We mainly concentrated on it being a good business decision," Flood said. "It's great that we can help out the planet too."

APS wanted to transfer all schools in the district to geothermal systems, but the bond for the \$10 million needed for the project was voted down in September 2004, Flood said.

"We wanted to move all of the schools out of old, inefficient swamp coolers and into a system that could actually heat and cool the classrooms," Flood said. "Our citizens voted it down."

The voter turnout was very low, Flood said, and he wants to propose the bond again in 2007.

"We wrote a fairly technical explanation when we proposed the bond," Flood said. "In retrospect, maybe we should have just said, 'All we want to do is to be able to heat and cool the classrooms so kids can be comfortable and can learn.'"

Flood said another reason the bond may have failed is voters thought APS was trying to use a new, unproven technology. However, geothermal ground-coupled heat pumps have been in use in more than 200 Houston schools for 10 years, he said.

"It's not a new technology," Flood said. "New to New Mexico, but not new."

Construction began at Yucca in February. Work on the inside of the school started in May and the system will be completely functional before school starts Aug. 17, Flood said.

Alamogordo High School also uses geothermal ground-coupled heat pumps to heat and cool parts of its building.

As for whether or not the system will work for the long-haul, Flood said he's positive it will.

"I don't think the Houston independent school district would have had all those buildings on it for 10 years if there were any major downsides," he said.



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