



Putting WaterSense® to Work

# University Makes the Most of Onsite Alternative Water Sources

*Sector: Universities; Focus: Onsite Alternative Water Sources*

## Project Summary

Once the largest water-using entity in the city of Austin, the University of Texas at Austin (UT Austin) has been implementing programs to reduce its water use for three decades. Although UT Austin continues to expand its campus, its comprehensive water conservation program has resulted in declining water use over the years.

The 400-acre campus, comprised of 17 million square feet of building space, serves approximately 51,000 students and nearly 24,000 faculty and staff. The campus includes administrative offices, academic lecture buildings, dormitories, research laboratories, cafeterias, museums, libraries, athletic venues, and industrial facilities. UT Austin has focused on recovering and reusing onsite alternative water sources in these facilities to serve non-potable water needs around the campus.

### Single-Pass Cooling Water Recovery

Historically, UT Austin used single-pass cooling to supply chilled water for dormitory drinking fountains. Water was used to cool the drinking fountain chillers, then sent down the drain at a rate of 1 gallon per minute (gpm), 24 hours per day, 365 days per year. In addition, several pieces of laboratory equipment used single-pass cooling. Recognizing this opportunity for water savings, UT Austin installed a network of PVC pipes within existing underground tunneling to send the single-pass cooling water as make-up water to the campus' cooling tower. All onsite alternative water sources directed to the cooling tower are now collected through this piping system.

At one point, UT Austin maintained nearly 250 pieces of equipment connected to the recovery system. Over time, UT Austin has replaced some of the older single-pass cooling equipment with more efficient, air-cooled equipment to eliminate some unnecessary water use, including replacing the old drinking fountain chillers with air-cooled heat exchangers.

### Ground Water Sump Recovery

Some buildings on campus sit two or three stories below ground level and, as a result, ground water must be removed from these foundations to prevent building flooding. Before the mid-1980s, all of the recovered foundation ground water was pumped to the storm sewer. However, UT Austin saw this as an opportunity to use water that otherwise would go down the drain, as long as the hard water is treated prior to use in the cooling towers.

## Case Study Highlights



- **Facility name:** The University of Texas at Austin
- **Location:** Austin, Texas
- **Number of occupants:** 51,000 students and nearly 24,000 faculty and staff
- **Size:** 400-acre campus with 17 million square feet of building space
- **Water savings:** Reduced potable water use by more than 33 percent and saved more than 1.6 billion gallons of water in total since the program began in the 1980s.
- **Cost savings:** \$7.5 million since the program's inception

### Air Handler Condensate Recovery

In 1985, UT Austin began recovering air handler condensate and using it as make-up water for the cooling tower. Air handler condensate has relatively low conductivity and is cold, so it provides a good source of make-up water for the cooling tower. In addition, it is produced during the hot, humid summer months, when the cooling towers are running constantly and generate the highest demand for make-up water.

With the use of air handler condensate as make-up water, UT Austin was able to increase the average cycles of concentration of the cooling tower from five to an average of nine and a peak of 14 cycles in the hottest summer months. Due to the success of air handler condensate recovery, UT Austin now constructs all new buildings with air handler condensate recovery systems.

Approximately 40 buildings recover condensate from 100 air handler units. UT Austin has also been working to retrofit existing buildings to recover air handler condensate. Because the generation of single-pass cooling water has diminished due to the installation of air-cooled equipment, UT Austin now relies primarily on air handler condensate, rainwater harvesting, and some recovered foundation ground water to provide cooling tower make-up.

### Rainwater Harvesting

Rainwater harvesting has been a relatively new addition to the UT Austin's alternative water source repertoire. Over the last five or six years, all newly constructed buildings on the campus have been equipped with rainwater harvesting capability, some with 5,000-gallon storage tanks, which collect rainwater for lawn irrigation. The rainwater harvesting system at UT Austin recovers 40 to 50 million gallons of water per year, depending upon the amount of rainfall.



**Two 2,500-gallon tanks storing air handler condensate and harvested rainwater for irrigation**



**Construction of city-supplied reclaimed water distribution lines**

### Reclaimed Wastewater

After capturing all feasible sources of onsite alternative water that would otherwise be wasted, UT Austin is now preparing to use city-supplied reclaimed water as an additional source of make-up water to help achieve its goal of using non-potable water wherever possible. UT Austin is currently reengineering the campus' infrastructure to be able to use reclaimed city water in its processes. This includes installing water meters, replacing valves where needed, and installing additional piping at the property boundary to connect the city-supplied reclaimed water to the cooling towers.

In addition to water efficiency, UT Austin is focused on sustainability as a whole. As of 2007, all new buildings on the UT Austin campus have received at least LEED Silver certification, and several are LEED Gold certified. To continue with its water efficiency initiatives, UT Austin has begun focusing on measurement and verification and has installed submeters on water, steam condensate, and chilled water lines. Newly constructed buildings have all of these techniques incorporated into the design phase, while existing buildings are being retrofitted.

## Savings Summary

In the early 1980s, UT Austin's facilities were using 1 billion gallons of potable water per year. In 2010, UT Austin reduced this potable water use to 668 million gallons. This decrease in total potable water use was achieved despite a 70 percent increase in overall building square footage. Much of this reduction is attributed to the use of onsite alternative water sources.

In 2009, UT Austin used approximately 395 million gallons of water for cooling, 11 percent of which was supplied from onsite alternative water sources, including recovered single-pass cooling water, foundation groundwater, air handler condensate, and rainwater. The University also recovers rainwater to provide supplemental irrigation. UT Austin has recovered and reused more than 1.6 billion gallons of water since the water conservation program began, saving \$7.5 million in water and sewer costs.

## Acknowledgements

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## Learn More

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