



## University of Alabama in Huntsville

# CARRIER HEAT RECOVERY CHILLERS PROVIDE SIGNIFICANT COST SAVINGS AND INCREASED SUSTAINABILITY FOR UNIVERSITY CAMPUS

## HEAT RECOVERY CHILLERS DELIVER ENERGY AND WATER SAVINGS



Two Carrier AquaForce® 30XW heat recovery chillers provide heat/reheat for the university, eliminating the need for boilers in the summer. In the first two years, the chillers saved the university approximately 6,000,000 gallons of water which equaled a savings of over \$23,000 for water and water treatment chemicals as well as \$385,000 in energy costs.

## Project Objectives

The University of Alabama in Huntsville (UAH), a Very High Intensity Research University, planned to build a new student center as a central location for student affairs and activities. The facility would also provide space for formal and informal meetings. The Facilities Management staff required a heating, ventilating and air conditioning (HVAC) solution for the new building that—in keeping with the school's sustainability goals—would employ energy efficient equipment to provide an appropriate indoor environment for students and administrators.

**"This system is super-efficient — we use every drop of hot and chilled water — and it has also saved a huge amount of potable water and natural gas. Show me a more sustainable design!"**

— Mark Cowherd,  
Executive Director of Facilities,  
University of Alabama in Huntsville

## Project Solution

Facilities staff explored two scenarios and their drawbacks. Their first choice was to incorporate the new building load with the existing central plant. However, the increasing load would eliminate the current redundancy unless the plant capacity was expanded, including an additional cooling tower. Due to space constraints, a cooling tower could not be added. The second choice was to house a new chiller and boiler inside a mechanical room at the student center. This scenario added considerable cost to the project. The final solution came when facilities staff at UAH, in consultation with Carrier and Mims Engineering, decided to install two Carrier AquaForce® 30XW heat recovery chillers in the central plant. Rather than sending the heat they produce to a cooling tower for dissipation, the condenser water (up to 138°F) is pumped into the existing hot water loop, while also contributing chilled water to the cooling loop that serves a total of 767,121 ft<sup>2</sup> (71,267.9 m<sup>2</sup>) of space across multiple buildings.



In the first two years, this system saved over 6,000,000 gallons of water. This is 6,000,000 gallons of water that did not have to be chemically treated. This translated into a savings of over \$23,000 for water and water treatment chemicals. Additionally, the system also saved the university \$385,000 in energy costs for a total savings of over \$400,000.

## Synopsis

The University of Alabama in Huntsville (UAH) planned to build a new student center as a central location to support student affairs and activities of some 6,800 students. The new facility also provides space for formal and informal meetings. The university's facilities staff sought a heating, ventilating and air conditioning (HVAC) solution for the new 100,000 ft<sup>2</sup> (9,290.3 m<sup>2</sup>) building that, in keeping with the school's sustainability goals, would employ energy efficient equipment to provide an appropriate indoor environment for students and administrators.

Facilities staff considered two scenarios and their drawbacks. In the first, they could incorporate the new building load with the existing central plant. The staff would not be able to use their standard "chiller and boiler" design at the central plant because of space constraints in the cooling tower yard. In the second scenario, they could incorporate a chiller and boiler at the new student center, but the cost significantly exceeded the project budget.

The final solution came when facilities staff at UAH, in consultation with Carrier and Mims Engineering, decided to install two Carrier AquaForce® 30XW heat recovery chillers in the central plant. Rather than sending the heat they produce to a cooling tower for dissipation, the condenser water (up to 138°F / 58.9°C) is pumped into the existing hot water loop, while also contributing chilled water to the cooling loop. This loop, which is also served by several Carrier AquaForce® 19XR centrifugal chillers at the university's central plant, cools a total of 767,121 ft<sup>2</sup> (71,267.9 m<sup>2</sup>) of space across several classroom, research and residential buildings. Carrier Commercial Service maintains the water-cooled chillers as well as smaller equipment around campus, so the facilities staff was well acquainted with Carrier

quality and service prior to this project. As part of their research, the facilities staff traveled to the Carrier factory in Charlotte, NC, to view a heat reclaim chiller system at work.

Mark Cowherd, Executive Director of Facilities for The University of Alabama in Huntsville, said, "I call the 30XW units heat machines, rather than chillers, because their sole purpose is to generate hot water for heating and re-heat applications. The by-product of this process is chilled water. We also use the chilled water for cooling. This system is super-efficient—we use every drop of hot and chilled water—and it has also saved a huge amount of potable water and natural gas. Show me a more sustainable design!"

Chris Folsom, Senior Sales Engineer for Carrier, said, "The system has exceeded all expectations. The savings have been even greater than predicted."

In the first two years, the UAH system saved 6,000,000 gallons of water and their associated costs, which translated into a savings of over \$23,000 for water and water treatment chemicals. The system also saved the university \$385,000 in energy costs.

In addition to these savings, the project has resulted in accolades. The Charger Union student center is expected to attain LEED® (Leadership in Energy & Environmental Design) Silver certification, and the project was awarded the 2013 Award of Merit from the North Alabama Chapter of Associated Builders and Contractors, Inc. Mark Cowherd was also named the Association of Energy Engineers' Energy Innovator of the Year 2015 for his region.

## Project Summary

**LOCATION:** Huntsville, AL

**PROJECT TYPE:** Retrofit to serve new construction

**BUILDING SIZE:** 100,000 ft<sup>2</sup> (9,290.3 m<sup>2</sup>)

**BUILT:** 2013

**BUILDING USAGE:** Student services, meeting areas, dining, and theater

**OBJECTIVES:** Provide sustainable heating and cooling to new student center

**EQUIPMENT:** Two AquaForce® 30XW heat recovery chillers

**TOTAL COOLING TONS:** 400

**CONTROLS:** BACnet® Open controls interface

**MAJOR DECISION DRIVERS:** Heat recovery capabilities of 30XW chiller; lower emissions by eliminating boiler for heating; no need for new cooling tower; previous experience with Carrier quality, efficiency and service

**UNIQUE FEATURES:** 30XW chillers have no interface with cooling tower yard: all hot and chilled water used for heating and cooling campus buildings connected to the UAH central plant.

**INSTALLATION DATE:** 2013

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