



UNIVERSITY OF CENTRAL FLORIDA UTILITIES & ENERGY SERVICES

Newsletter July, 2016

Project team:

A/E

RLF

CMs:

(CPPI) Plant Building

(C&T) Utility
Infrastructure

Commissioning Authority:

exp

Project Completion:

August 2017

Construction Cost:

\$10M

Plant Features:

- ◆ LEED Certified
- ◆ No CFCs used in the refrigeration process
- ◆ High efficient LED lighting
- ◆ .508 kW/ton full load chiller efficiency
- ◆ Low ratio of horsepower for cooling towers
- ◆ Heat recovery providing 140F heating hot water
- ◆ 8160 tons of total cooling capacity



Figure 1: Conceptual District Energy Plant IV Rendering

UCF's District Energy Plant IV

In support of UCF's commitment to climate action, and pursuant to UCF's utility master plan for an ever-growing campus, the new 8000RT District Energy Plant IV will incorporate both energy and environmentally conscious design features. The new plant will simultaneously provide centralized cooling and heating campus-wide.

Progressive energy modeling was used to optimize the design process and select the most life cycle cost-effective chillers. The energy model evaluated hourly data on climate, utility rate structure, and budgetary pricing from three, 2000-ton centrifugal chiller manufacturers. Since utility rate structures are commodity and market-driven, a discount rate of 3% was applied, yielding an annual ROI of 7.8% on the high efficiency chiller selections. The chillers selected will save UCF over a \$100,000 annually in plant operations costs.

Since UCF has varying and diversified cooling loads based on building occupancy, coupled with seasonal, and time-of-day utility rate structures, a direct digital control (DDC) system was also incorporated into the design to enable precise plant equipment control. Through the automation platform, UES will be able to trend, schedule, and optimize energy performance, as well as improve alarm response management, with fault detection and diagnostics.

A heat recovery system will provide 140-degree water to UCF's new 105,000 GSF Leadership in Energy and Environmental Design (LEED) Silver-Certified *Interdisciplinary Research and Incubator Facility*, to support the building's HVAC system. This measure will save UCF over \$21,000 annually in natural gas that would have otherwise been needed to fuel local boilers.

Since 2007, UCF's focus has been on constructing high performance buildings. The District Energy Plant will be UCF's first LEED-certified industrial facility, and will be the 20th LEED-certified building on campus. These (20) high performance buildings constitute 19.8% of the main campus heated and cooled space.

The design of the District Energy Plant focused on reducing energy use in the production of chilled water, when compared to an ASHRAE 90.1 2010 baseline for chiller plant installations.

Project Team:

A/E: SWC

GC: Trane Company

Controls: UES

Partnership I

(2) Chillers \$384K

Controls \$200K

Energy Savings

April 15' – April 16'

\$103,414

Reduction in electrical cost

37%

PI Return on

Investment 17.7%

Partnership II

(2) Chillers \$492K

Controls \$180K

Energy Savings

April 15' – April 16'

\$56,126

Reduction in electrical cost

19%

P II Return on

Investment 8.1%

UES Engineering & Energy Services

UES began HVAC renovations at Partnerships I and II in early 2014. As HVAC systems consume more than 50% of a building's energy, two high efficiency Trane Stealth 600-ton, air-cooled chillers were chosen for Partnerships I and II. The chiller replacements were accomplished over a 48-hour period on two weekends in June. Upon successful installation, UES designed, programmed, and installed new building automation control systems with strategies to reduce energy consumption, in accordance with ventilation standards under ASHRAE 62.1, as follows:



Figure 2: Partnership II air-cooled chillers arriving and being crane-lifted to the rooftop

1. **Demand control ventilation:** using CO₂ sensors to measure interior spaces and limit the amount of outside air entering the building to condition
2. **Occupied and un-occupied ventilation rates:** using pre-determined facility operating hours to reduce the amount of time the air handlers are running and reducing the amount of outside air to be conditioned
3. **Static pressure reset:** using the supply air static pressure transmitters to poll all the building's maximum static pressure controls and optimize the space comfort by monitoring the position of all variable air volume dampers in the facility
4. **Discharge air temperature reset:** using relative humidity to control the discharge air temperature when levels drop below 55%

Cost Avoidance Results

Partnership I

Partnership II

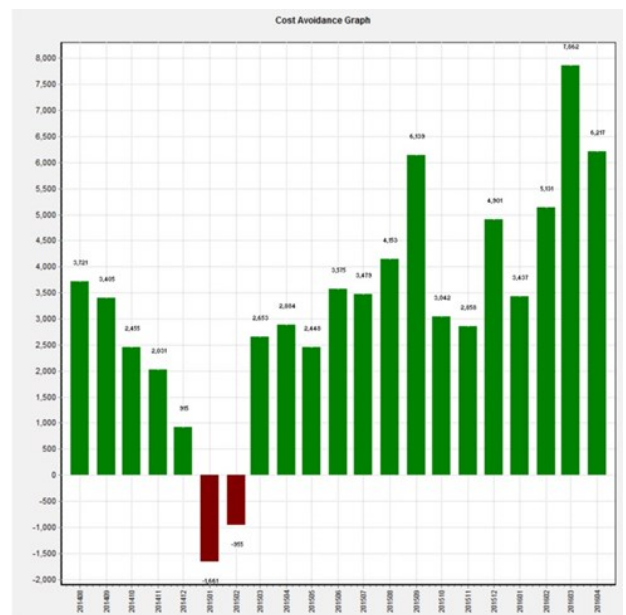
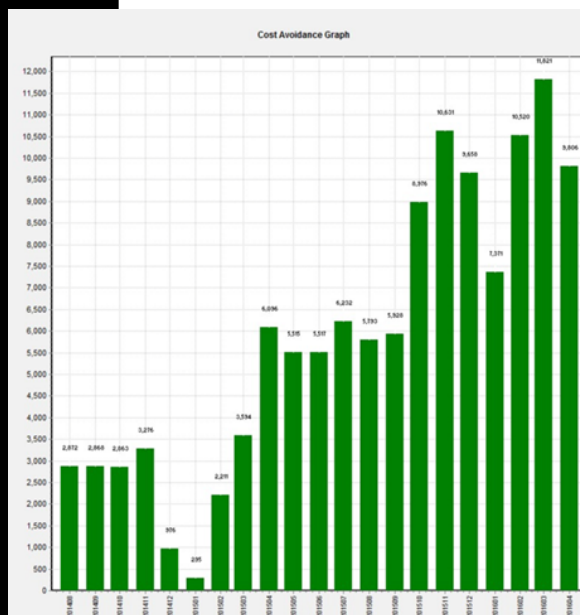




Figure 3: a natural gas valve that was previously buried and brought back to grade. The service lines are then located for campus map updates.

Utilities

In an effort to enhance UCF's knowledge, understanding, and expertise regarding its campus utility infrastructure, UES has employed both internal and third-party resources to validate underground infrastructure dating back to the late 1960s, using non-destructive dig methods and ground penetrating radar (GPR).

This 2D mapping project consists of field locating over 32 miles of underground infrastructure within the UES division of responsibility. To date, UES has located an estimated 30% of utility appurtenances that were not previously identified on campus as-builts, and has captured over 3,700 GPS points since July 2015.

CUSTOMER QUESTIONS, COMMENTS, AND FEEDBACK

For utility emergencies, outages, or hot and cold calls, please contact UCF's Work Control Center (WCC), 24/7, 365 days a year, at 3-5223, or at wcc@ucf.edu.

To contact Utilities & Energy Services staff with questions, comments, concerns, or feedback, please email us at energy@ucf.edu or call M-F 8:00AM-5PM at 407-823-6789.

Our Mission

To obtain energy efficient buildings through the production, delivery, optimization, and management of safe, reliable, and efficient utility and energy systems to reduce the university's impact on the environment.

Our Commitment

U&ES is committed to curbing utility cost and strengthening the university's ability to secure reliable, affordable, and sustainable energy for future generations in support of the President's Climate Action Plan.

For more information, visit <http://www.energy.ucf.edu>

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