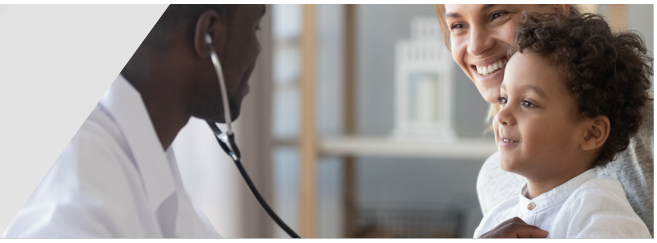
CLEAResult®

Design Build Solutions



A cure for high energy costs

Hospital achieves huge energy savings and improved systems reliability.

Technology Improvements

In 2013, a large southeast health care organization wanted to reduce energy use and operating expenses at one of its flagship facilities. With a behavior-based utility efficiency program already in place, the organization reached out to CLEAResult in hopes of delivering additional energy efficiency measures.

CLEAResult engineers provided a detailed analysis of the organization's one million square foot medical center, focusing on its 24-hour HVAC system and chiller plant with an annual average load of one thousand tons and electrical demand in excess of 4.6 MW. There, our engineers found tremendous opportunities for savings.

Based on these findings, our Design Build Solutions team set out to enhance energy performance, reliability, and resilience of the main hospital's systems, along with those of two auxiliary outpatient facilities. To complicate matters, the upgrades had to be made without interrupting the hospital's 24/7 operation.

Our Solution

Our Design Build Solutions team created a bundled solution to deliver electric and natural gas savings as well as positive economic performance (return on investment). The strategic solution was centered on chiller plant optimization and the installation of a CLEAResult-designed water-side economizer in the primary hospital central chiller plant.

Components included:

- A new, efficient 1,500-ton water-cooled chiller and a new 1,500-ton plate and frame heat exchanger
- A new high-efficiency cooling tower with variable frequency drives (VFDs)
- Six VFDs installed on three existing primary chilled water pumps, one condenser water pump, and two new pumps
- A complete redesign and overhaul of the cooling plant sequence of operation
- Eight VFDs to convert various air handlers from inlet guide vane or constant volume systems to VFD variable volume systems
- Chilled-water pump sequence optimization
- Daylight and occupancy sensor lighting controls

CLEAResult's Design Build Solutions Team also implemented various retrocommissioning measures on air handling units (AHUs), to maximize air-side economizer operation and reduce overall energy use from chilled water systems, hot water reheat systems and pumping systems.

Project by the numbers

$450,000
annual energy expense savings (electricity & natural gas)

5.5M kWh
annual savings

161,000 therms
annual savings

5 Years
simple payback

0.5 kW/ton
annualized chiller performance

60%
Cooling plant performance improvement

12%
EUI reduction, from 276 down to 244

Facility size and shape

- One million sq. ft., three-building, 750-bed complex
- 4,000-ton chiller plant with severn chilled water loops
- 2,100 HP boiler plant
- 76 AHUs, 1,500-100,000 CFM
- 117,000 sq. ft. outpatient facility

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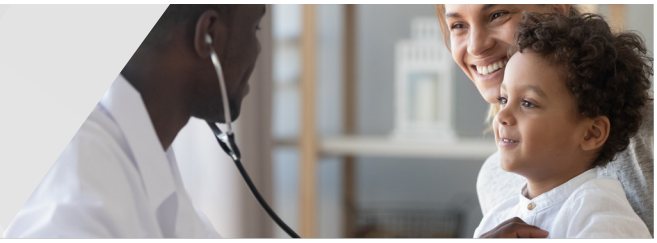
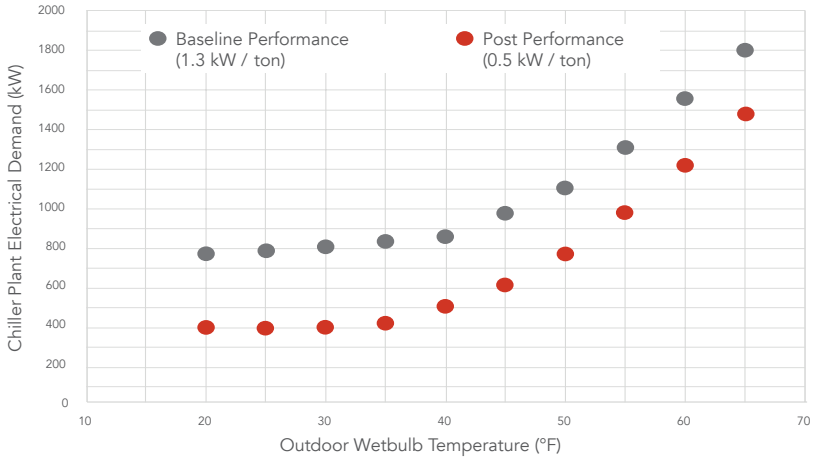


These included:

- Replacement and/or calibration of existing temperature and humidity sensors
- Calibration of existing dampers, valves and actuators
- Modification of existing economizeer program and implementation of new enthalpy-based AHU economizer control, to maximize the period of free cooling
- Modification of existing preheat and humidifier control logic in AHUs to prevent simultaneous heating and cooling.
- Optimization of AHU sequence of operations to improve supply air temperature and fan VFD control

The project team coordinated with hospital staff on shutdowns and system adjustments to avoid negative impacts on day-to-day performance, 24-hour operations, and surgery areas.

Our Results



Across all three buildings, the organization saved an annual $450,000 in electricity and natural gas costs, with 5.5 million kWh and 161,000 therms in total annual energy savings.

- Chiller plant optimization reduced annualized efficiency from the baseline of 1.3 kW/ton of cooling to 0.5 kW/ton, a 60 percent improvement in the main hospital facility's central plant performance.
- Building HVAC system retrofits, retro commissioning, and lighting improvements yielded 1.5 million kWh and 145,000 therms savings per year, from measures unrelated to chiller plant upgrades.
- Cost savings of ten percent at LEED certified outpatient facility after retro commissioning and sequence optimization
- Simple payback period of five years

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