CLIMACOOL®
THE ULTIMATE CHILLER SOLUTION®

The Buck Institute for Research on Aging
Novato, CA

SHC onDEMAND® Modular Chillers from ClimaCool help The Buck Institute save $150,000 annually in utility costs – even after expanding facility by 30%

The Challenge

The Buck Institute for Research on Aging, a non-profit, biomedical research facility based in Novato, California, is the nation's first independent research facility focused solely on understanding the connection between aging and chronic disease. When the Buck Institute began construction of a 60,000 square foot building addition to expand its current 185,000 square foot research campus, it needed a solution that could provide the necessary additional HVAC capacity for the expansion. That solution also needed to optimize energy efficiency while minimizing overall consumption.

Goal of Managing Operational Costs

"As a non-profit entity working toward notable advancements in aging medicine, we want to keep our operational costs down so we are able to focus funding on actual scientific research," said Ralph O'Rear, Vice President of Facilities & Planning at the Buck Institute.

In addition to expanding capacity, the original HVAC system, designed in 1995, required upgrading to improve its efficiency. Recognizing this, the Buck Institute facility management team commenced a three-part evaluation that began with an in-depth analysis to fully understand current energy consumption. The team then looked for immediate and less invasive ways to reduce energy use, such as motion sensing lighting systems, adding VFDs to motors in the central plant, purchasing ENERGY STAR® rated electrical devices and equipment, and performing tasks that require high levels of electrical use in off-peak hours. This led to the ultimate development of a campus-wide cooling technique and central plant plan which incorporated consideration of new technologies in solar, wind, coal, co-generation and geothermal exchange.

The Solution

Due to the critical and ongoing nature of the scientific research being conducted at the Buck Institute, reliability, efficiency and redundancy were of utmost importance in designing the new mechanical system. Running on 100-percent single-pass outdoor air, the institute required six air changes per hour. Thus, any HVAC component downtime that could impede this process would require a complete shutdown of the facility.

Using a Renewable Energy Source

Also, as evaluation of the existing system showed that cooling load created a substantial energy demand at the facility, the team sought a new geothermal exchange system to better manage load requirements.

"In addition to being a renewable energy source, geo-exchange facilitates a 'flattening out' effect using the ground to cool the condensing water in the chiller system rather than employing the typical evaporative cooling tower system used in most large buildings. The ground based condensing water system discharges heat from the condensing water system into the ground. The cooling capacity in the ground is fairly consistent and allows the supply and return water temperatures to temper the temperature differentials," O'Rear said. "This equates to a notable overall reduction in the amount of energy required for cooling."

Modular Chillers for Simultaneous Heating and Cooling

Buck Institute's new HVAC system solution, designed by PAE consulting engineers and interior mechanical system installed by Sacramento, California-based Lawson Mechanical, primarily included two 70-ton, water-cooled, cooling-only modular chillers and four 70-ton, simultaneous heating and cooling heat recovery modular chillers from ClimaCool, fed by a geothermal exchange system to its supply. Also, instead of an evaporative cooling system, the Buck Institute decided to install a geo-exchange ground loop coupled with an existing cooling tower and 500-ton centrifugal chiller to provide redundancy in the central plant.

Using a geo-exchange system at The Buck Institute offered a means of better managing load requirements and energy demand at the facility.

Six modular chillers from ClimaCool, including four 70-ton simultaneous heating and cooling heat recovery chillers and two 70-ton cooling-only chillers, are part of The Buck Institute's geo-exchange ground loop system.

"The geothermal loop and modular chillers are our primary system for most of the year," O'Rear explained. "In California, we get 30 to 40 days of really intense heat each year, and that's when we utilize the secondary system to meet the additional load requirements." According to O'Rear, "In addition to the groundwater loop for cooling, the facility is using heat recovery to further equalize the temperature range to reduce energy generation required in heating mode. The ClimaCool modular units allowed us to cover a cooling load range of 35 to 320 tons in energy-efficient stages and turn over the load to a 500-ton centrifugal chiller when needed."

"The Buck institute's need for simultaneous heating and cooling really fits the ClimaCool modular chiller design, where individual modules can recover heat from one of the cooling modules to increase energy efficiency of the overall system," said Tom McDermott, Director of Sales at ClimaCool.

The Benefit

"We chose ClimaCool's chiller bank because it required a smaller physical footprint, allowing us to get additional modular chillers for added capacity into our existing space," O'Rear said. "ClimaCool's design made for easier maintenance than other alternatives that we considered. The modular management of load demand allows the Buck Institute to make only as much chilled water as we need to meet the load. The ClimaCool units also have a bank that is used to take heat from the return water loop and use it to make domestic hot water for campus buildings."

Remarkable Utility Cost Savings

Even after increasing total facility footprint by 30%, The Buck Institute saved $150,000 per year in utility costs.

The new HVAC system has provided the Buck Institute with load and supply matching for exceptionally improved efficiency, according to O'Rear. "After increasing our total facility footprint by more than 30 percent, we have saved about $150,000 per year in utility expenses, and our operating expenses have remained about the same as they were for our original square footage."

"As a technology and market leader, ClimaCool strives for a culture of continuous development and to create a product that goes beyond industry trends," said McDermott. "Specifically, our geothermal solutions are among the most energy efficient and environmentally friendly heating and cooling products in the world today, matching renewable with non-ozone depleting to save projects money, maintenance, and the footprint that comes with a large-scale build. Using the most advanced fabrication equipment, quality components, and testing facilities, ClimaCool will continue to push both the HVAC community and ourselves into a more sustainable and cutting-edge future."

The small physical footprint of the ClimaCool modular chillers allowed the Institute to get additional chillers for increased capacity into the existing space.

The Buck Institute for Research on Aging
Novato, CA; expansion project

Mechanical Contractor:
Lawson Mechanical

Consulting Engineer:
PAE

Equipment:
Four 70-ton ClimaCool SHC onDEMAND®
& two 70-ton Water Cooled Modular
Chiller Units

ClimaCool Representative:
DMG North Inc.
4795 Heyer Ave.
Castro Valley, CA 94546

ClimaCool's modular chillers are utilized in a wide variety of commercial and industrial applications such as cooling, heat recovery, geothermal heat pump and simultaneous heating and cooling. When compared with conventional chiller and boiler systems, ClimaCool solutions occupy a minimal footprint and are easily maneuverable to create lower installation costs and improved placement flexibility. ClimaCool systems are more serviceable, maximize energy efficiency, provide true redundancy, offer expandability, have low operating noise levels, and utilize a micro charge of non-ozone depleting, chlorine-free refrigerant.

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