

Case study

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Executive House

HVAC upgrades increase comfort, earn energy company rebate Hackensack, New Jersey

Resting on 3.5 acres of land, the Executive House condominium building includes 124 residential units, with four doctors offices on the lobby level. First built in 1962 as a luxury residential rental property, the building was converted to a residential condominium building in 1984. Faced with an aging infrastructure and the cost of maintaining outdated HVAC equipment, the Executive House sought ways to efficiently manage expenses and reduce energy use, while maintaining a comfortable indoor environment for its condominium owners.

Challenge

Frequent HVAC equipment breakdowns and increasing maintenance costs were putting a severe strain on the Executive House's budget. The building's existing absorption-style chiller was now over nineteen years old and was beyond repair. Infrastructure upgrades were needed to ensure the long-term success of the building.

It was important to condo owners and the Executive House Board of Directors that energy and operational costs be managed efficiently, while providing the highest quality of comfort for residents. They sought to improve the indoor environment without facing a large upfront capital expenditure. The upgrades needed to be completed with minimal disruption to residents' day-to-day routine.

Solution

The Executive House Board called on Trane, its trusted partner for many years, to assist in upgrading the facility. Trane began by evaluating the entire HVAC system to determine how to best build upon the existing cooling tower to maximize overall efficiency.

Using Trace™ 700 computer modeling software, an engineering study was conducted to evaluate their options: replace the existing steam absorption chiller with an electric centrifugal chiller utilizing R-123 refrigerant, or replace it



Infrastructure upgrades were needed for the long-term success of the Executive House.

with a new steam absorption chiller. The Trace 700 model generated annual building demand and capacity requirements for the Executive House and annual energy usage for both chiller options. The electric and steam absorption chiller design options were evaluated over a twenty-year life cycle, comparing the present value and simple payback for each design and analyzing the capital cost for each, along with their yearly maintenance and energy costs.

Although the steam absorption option had the lowest initial costs and would be the simplest to install, the electric chiller was more efficient, used less energy and produced significantly less greenhouse gases. The decision was made to replace the existing chiller with an electric centrifugal chiller.

Increasing efficiency and energy savings

A review of existing electrical equipment determined that new electrical service would need to be brought into the building to accommodate the integration of the new chiller. Trane provided the necessary infrastructure improvements and worked with the utility company to ensure that there was sufficient electrical capacity.

Working on the dual temperature system during winter months required that the heat remain on to keep owners comfortable while the old cooling system was being removed. The 290-ton steam absorption chiller was replaced with a more economical and efficient Trane 290-ton centrifugal chiller with variable frequency drive. The electric chiller requires about 30 percent less condenser water pumping and cooling tower capacity than the absorption chiller. The condenser water pump was also replaced with a 30 HP high-efficiency condenser water pump to provide proper water flow rates to the new chiller. The new pump draws less electricity for additional energy savings.

Optimizing performance

A Tracer Adaptiview™ chiller control with LCD panel display allows staff to gain insight into the operating patterns, energy use and performance of the system. A new communication link was installed between the chiller and the Trane Tracer Summit® building automation system (BAS). To optimize the performance of the chiller and minimize energy use of the chilled water system, all operating and diagnostic information is displayed on the BAS workstation.



A 290-ton centrifugal chiller with a variable frequency drive provides energy savings and enhances resident comfort.

Results

Infrastructure upgrades at the Executive House, including the replacement of the outdated steam absorption chiller with a more economical and environmentally conscious centrifugal chiller, have improved comfort for residents and tenants. Compared to a steam absorption chiller, the electric centrifugal chiller provides over \$45,000 in energy savings and nearly \$800,000 less in present value life cycle costs. The initial cost differential between the electric centrifugal chiller and the steam absorption chiller has a simple payback of less than one year. In addition, the project realized a larger-than-estimated \$30,160 Smart Start Rebate from the utility company, with Trane managing the rebate process for the Executive House.

"Trane did a great job of coordinating the electrical service upgrade with our power company," said Marlene Costagliola, board president, Executive House Condominium Association. "They delivered on all their promises and we are thrilled with the outcome of this project."



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