



Case Study – 1515 Market Street

EDUCATION / HEALTH CARE / LODGING / MANUFACTURING / OFFICE BUILDING / RETAIL / SPECIAL



System Retrofit Achieves 30% Energy Savings with 25% Fewer Tons of Cooling

Project Objectives

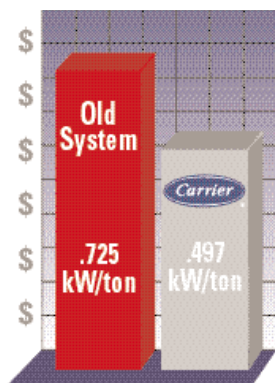
The 20-story 1515 Market Street office building in Philadelphia, PA, had been upgraded for energy efficiency, with new windows and sealing of leaks in the steel and limestone curtainwall. But its two 800-ton chillers were old and inefficient – and they used R-12, an ozone-depleting refrigerant banned from production. The project called for replacement chillers, as well as a controls system that would optimize the new equipment's utilization, performance and energy efficiency. Particularly challenging was the location of the mechanical room in a 30- by 50-foot underground pit.

Solution

Carrier's analysis revealed an oversized, inefficient system. Replacing the two 800-ton chillers with three high efficiency 400-ton Evergreen® units correctly matched cooling capacity with building load, saving up to \$80,000 in equipment costs, and reduced total cooling capacity from 1600 to 1200 tons. With staged operation, at part-load conditions the building can be cooled using as little as 400 tons. The bolt-together design and smaller footprint saved up to \$75,000 on the installation, for a combined savings up to \$155,000. Product integrated controls (PICs), linked with the Carrier Comfort Network® (CCN), digitally monitor more than 100 functions. It all adds up to an integrated system solution with an expected payback in fewer than eight years – less than a third of the system's life expectancy.

With a system part-load value (SPLV) of .497 kW/ton, Carrier's system reduced annual operating costs by 30%.

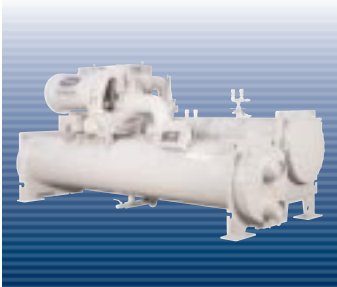
Annual Operating Cost Savings





Case Study – 1515 Market Street *continued*

EDUCATION / HEALTH CARE / LODGING / MANUFACTURING / OFFICE BUILDING / RETAIL / SPECIAL



“Normally we don’t need more than one 400-ton unit in operation during intermittent seasons and non-peak times. During heavier use periods we never need more than two units running at once. Having a third unit means we always have a backup in the event that one chiller needs to be shut down for maintenance.”

Bob Freeman,
property manager, West
World Management, Inc.

Project Synopsis

With a complete exterior facelift that had stopped leakage in the building shell and considerably reduced cooling and heating requirements, 1515 Market Street needed new HVAC equipment to realize the potential for substantial energy savings. But there was a formidable challenge to be met before new chillers could be installed. The building’s small mechanical room was located seven feet underground. With its bolt-together construction and 35% smaller footprint, Carrier’s Evergreen® chillers were the answer, saving up to \$75,000 in installation costs – they required no piping relocation and no wall tear-down.

Carrier’s expert analysis correctly sized the system for the building cooling load, allowing the two 800-ton chillers to be replaced with three high efficiency 400-ton Evergreen® units. This saved as much as \$80,000 in equipment costs, for a total savings on equipment and installation of up to \$155,000. Not only did the new chillers reduce the building’s total cooling capacity from 1600 to 1200 tons, but the new system part load value (SPLV) of .497 kW/ton, as compared to .725 kW/ton for the old system, made the chilled water system annual operating cost savings of 30% possible. Using three, smaller chillers increases operational flexibility, allowing cooling to more closely match building load and substantially increasing efficiency. The building’s electric costs have been reduced by nearly 10% overall, due in large part to the new chiller system efficiency. And the new, leak-tight units use HFC-134a, the safest, most viable chlorine-free, non-ozone depleting refrigerant. No leakage translates to refrigerant cost savings.

Carrier controls tie the system together for centralized monitoring and management. User-friendly product integrated controls (PICs) digitally monitor over 100 functions and display more than 125 operating and diagnostic conditions. The Carrier Comfort Network® (CCN) links this information to a personal computer, where the ComfortWORKS® software interface is used to monitor and control the chillers, as well as auxiliary equipment, such as pumps, cooling towers, heat exchangers and air handlers.

To ensure maximum operating efficiency, Carrier’s Chillervisor™ system is used to automate chiller startup, shutdown, sequencing and staging. Automatic lead chiller rotation optimizes chiller life. And building managers now take advantage of Philadelphia Electric Company’s off-peak rates by automatically precooling the building before 7 a.m.

The Carrier system delivers sophisticated control, vastly improved operating efficiency, superior reliability and unsurpassed environmental compatibility. The significant efficiency gains translate to energy cost savings and an estimated payback of less than eight years. All this in addition to perhaps the most important consideration – exceptional tenant comfort.

Project Summary

Location: Philadelphia, PA

Building Age: 40 years

Project Type: Retrofit

Building Type/Size: Steel and concrete/20-story, 564,000 sq. ft.

Building Usage: Mixed use office

Objectives: Replace old, inefficient chillers; install controls to maximize performance and management of chillers and auxiliary equipment.

Major Decision Drivers: Efficiency; energy savings; environmental compliance

Design Considerations: Small mechanical room located in an underground pit

Total Cooling (tons): 1,200

HVAC Equipment: Three 400-ton model 19XR Evergreen chillers using HFC-134a; PICs, linked with CCN; ComfortWORKS; Chillervisor

Unique Features: Chillers’ bolt-together design & small footprint simplified potentially complex installation

Project Cost Range: \$500,000 to \$1 million

Installation Date: 1997

Consulting Engineer: Bruce Brooks & Associates

Contractor: SDA Mechanical

For more information, contact your nearest Carrier Representative, call 1.800.CARRIER or visit our web site at www.carrier.com