



Metropolitan Office Building

Work Scope

EMAT completed an ASHRAE Level 2 energy audit of a large office building in Bethesda, Maryland.

Facility Description

The building totaled 275,000 square feet, with an 85,000 square foot parking garage. Lighting was observed to be primarily LED. Most restroom and kitchen faucet aerators had been replaced with low-flow 0.5 GPM aerators.

The top floors were similar in design, split into east and west halves. Each side had its own central air handler. The bottom floors were similar in design, with just one air handler serving the entire floor. These air handlers were all variable volume. They served VAV boxes, with the perimeter units containing electric heat. The first floor consisted of a lobby, fitness center, retail space, and a restaurant. These air handlers were all constant volume, and they each had an electric duct heater.

The building had two cooling towers that supplied condenser water. There were two separate condenser water loops: one feeding water-cooled chillers and one feeding water source heat pumps. The chiller loop utilized free cooling by incorporating a bypass plate and frame heat exchanger. Chilled water was supplied by three single speed pumps to various air handlers located on each floor. Each air handler was equipped with a three-way valve allowing for constant volume flow. All condenser water pumps were controlled by VFDs. The building was controlled through a local building automation system (BAS). There was a setback schedule in place, as well as a supply air reset schedule.

Summary of Recommendations

The overall energy consumption at the site was very low prior to the audit. The building received an ENERGY STAR® Score of 75, meaning it was eligible for certification. EMAT sought to improve this score through several different avenues. The first measure was to fully complete the LED retrofits, as there were still several areas of the building illuminated by compact and linear fluorescent lighting.

The water consumption at the site was already low, but the domestic hot water system had significant room for improvement. EMAT recommended replacing their electric storage water heaters with gas-fired instantaneous units. While the building was on a setback schedule with fairly aggressive set points, EMAT recommended implementing an optimal start strategy. This strategy would determine morning warmup times so that the building would always reach the desired temperature as occupants begin to arrive. This strategy also allows for even more aggressive setback temperatures. EMAT recommended reducing their unoccupied heating set point to 50 °F and turning off all non-essential cooling equipment during off hours. It was also recommended to implement an optimal stop strategy, which shuts HVAC equipment off several minutes prior to the end of occupancy. This measure doesn't affect occupant comfort and results in large savings over the course of a year.

EMAT also observed set leaving chilled and condenser water set points with no reset schedule in place. It was recommended to incorporate both a chilled water reset and condenser water reset strategy. The chilled water loop was constant volume, so EMAT recommend installing VFD control of these pumps and replacing all 3-way valves with 2-way valves. Other measures recommended include: static pressure reset, replacing electric duct heaters with gas-fired units, and installing a rooftop PV system.



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Potential Savings Identified

- Eighteen (18) Energy Conservation Measures (ECMs)
- Total annual savings of over 2.2 million kWh, 59,000 therms, and \$290,000 in cost savings
- Overall payback of only 2 years