Building Energy Intelligence

High-Security Government Building

A large, ten-year old, commercial office building in Baltimore with large variation in room size and strict security requirements needed to improve its energy efficiency and occupancy comfort levels year-around. Earlier attempts to enhance HVAC energy efficiency had led to mediocre results.

THE CHALLENGE:

This high-security, 125,000 sq. ft. Class A office complex, was built in 2004 with a dominant design feature—a large atrium that, while aesthetically pleasing, experienced significant heat gain during the summer months. During winter, other parts of the building experienced significant thermal stratification.

The HVAC system was under continuous stress—forced to run longer to compensate for these design issues while the building management system (BMS) lacked the advanced logic controls to correct the imbalances. The high-security environment imposed additional complexity. Energy system controls could not interfere with or compromise internal communications, and some parts of the building were off limits. Previous energy efficiency projects had not been able to overcome these hurdles. As a result, the building scored an energy efficiency rating 6 points below the average for all Maryland Energy Star buildings. A new approach was needed.

Project Technical Specifications

- kWh Blended Rate: $0.103

- Building Historical Peak Load: 700 kW

- Building Control System: Trane Tracer

- Trane Tracer BMS

- Last Substantial Plant/Controls Upgrade: 2011

- Thermal Plant: Two high-load centrifugal chillers and one small, low-load chiller. Heating by hot water with local VAV reheats in perimeter zones.

- Air Handling: Multiple heat/cool AHUs per floor

- VAV Controls: Direct digital control

- BuildingIQ Communications: Existing network-BACnet

- Measurement & Verification procedures: IPMVP and NAESB protocols

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THE SOLUTION:

The owner's energy efficiency consultant chose BuildingIQ because of its track record in meeting the energy management challenges of large, complex buildings, its ability to work with existing control systems, and its innovative, Predictive Energy Optimization™ system. BuildingIQ's platform was able to reduce the building's HVAC energy consumption by 15%, while meeting the tenant's incredibly strict data security rules.

Using industry standard interfaces to connect to the existing BMS, the BuildingIQ solution controlled the building HVAC system using proprietary algorithms that continuously optimized energy use for the building. The BuildingIQ system incorporated time-of-use charges, peak demand, historical building operations and consumption data, and three-day weather forecasts into their model.
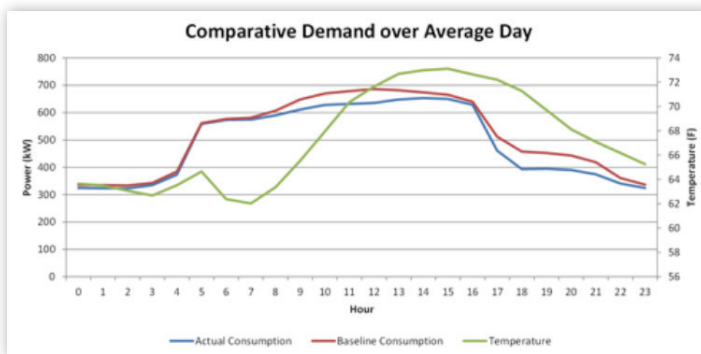
Comparative Demand Over Average Day

THE RESULTS:

Energy Efficiency and Optimization

Despite the limited capabilities of the existing BMS and challenging architectural elements, BuildingIQ's system delivered a 15% reduction in building HVAC energy usage during the "shoulder months," when both cooling and heating are minimal. They did so by providing a BMS overlay solution. Expectations for further gain are high. HVAC energy savings could well double during the more critical peak heating and cooling months.

Security Requirements

BuildingIQ was able to implement their proprietary software platform without disrupting or interfering with the tenant's strict data security requirements, or breeching security protocol in the building.

Occupancy Comfort

Maintaining year-around occupancy comfort was as a primary goal, requiring continuous adjustment of the variable air volume (VAV) with reheat system to ensure uniform temperature was maintained in each zone. BuildingIQ was able to better match the HVAC operations to the unique characteristics of the building to improve comfort levels throughout, while generating significant energy savings.

Energy Star Rating Improvement

The building's Energy Star rating was brought up to Maryland State average, a gain of six points. Energy star ratings may well improve as the building's energy efficiency gains are recognized through BuildingIQ's M&V module.

About BuildingIQ

BuildingIQ is a leading energy management software company with a mission to redefine and enhance the way energy is managed in commercial buildings. BuildingIQ's unique, patent-pending Predictive Energy Optimization™ technology is the foundation for reducing energy cost and consumption. It is designed to help building owners, managers and tenants get more value out of their existing energy systems. BuildingIQ has leveraged over 25 man-years of building controls, modeling and comfort research by world-leading experts at CSIRO, Australia's national labs, and BuildingIQ to create this innovative platform in energy intelligence. The company has been honored as Winner of the AIRAH Award for Excellence in Innovation, Tech23's Greatest Potential Award, ED+C and Sustainable Facility's Readers' Choice Award and Red Herring's Asia 100 Award.

Predictive Energy Optimization

The BuildingIQ system is the only energy management system that predicts energy demand and directly adjusts the HVAC system parameters in real time to optimize energy use. BuildingIQ communicates with your BMS—factoring in weather forecasts, occupant comfort, peak demand, and demand response signals—in order to automatically reduce energy consumption, cost, and emissions while maintaining or improving tenant comfort.

BuildingIQ