BuildingiQ

Building Energy Intelligence

Art Museum

A world-class art museum, that exhibits art from around the world to over 2 million visitors annually, invited BuildingIQ and one of its trusted global partners in energy efficiency, to provide a comprehensive solution to the museum's inefficient HVAC system. This premium art museum facility had in recent years gone through a major renovation and expansion. One half the building space is currently dedicated to office and conference activities, the other dedicated to art galleries.

THE CHALLENGE:

The temperature and humidity controls for the two halves—art and administration—are quite different. The art galleries operate within tight international standards 24/7, while occupancy patterns in the office and conference areas afford much greater flexibility, and therefore greater savings potential through BuildingIQ's Predictive Energy Optimization™ (PEO).

The immediate challenge was to fine-tune the controls of the central plant. The air supply temperatures were relatively unstable, cycling up and down, leading to high-energy consumption. The plant relies upon district cooling, in which water is taken from a nearby source, used as a heat exchange medium before being recycled back to the source.

Power for the building was costing the museum in excess of $800,000 per year. A major economic problem stemmed from the fact that the existing system could not control load, and could not keep demand from spiking to unacceptable levels when outside temperatures soared. The building exceeded the state established "demand threshold." The law requires an excess-charge added to the bill when the threshold is exceeded. Furthermore, once the threshold is exceeded, the state imposes the additional charge for the remainder of the year.

THE SOLUTION

BuildingIQ was initially invited to present its capabilities to the museum's staff, including facilities, financial, and IT. They were in agreement on the potential benefits of Predictive Energy Optimization. But first they wanted to bring in an external consultant, and the existing BMS provider, to get the main plant under control. The staff at the museum understood that for PEO to perform effectively, the central plant had to be stable enough for the building to follow the PEO signals. Once installed and the learning phase completed, the BuildingIQ system imports zone temperature set point controls. If the building can't follow the signals, benefits are lost.

The staff at the museum knew of BuildingIQ's and the long-time collaborative relationship with the existing BMS provider, and the fact that the two organizations are now working as global partners in energy efficiency. The museum asked the two organizations to work together to deliver a comprehensive solution.

A joint effort by the BMS provider and BuildingIQ diagnosed the core-tuning problems within the central plant. Engineering solutions were brought to bear, and both organizations put dedicated staff on site to maintain a diagnostic presence. The operation of the central plant was brought under control and fully commissioned in 2014. Predictive Energy Optimization began in August 2014 for the 50% of the building devoted to offices and conference space.

Optimization procedures for the more critical half of the building, the art galleries, will await full understanding of the results in the administrative half. The plan is to proceed cautiously, one gallery at a time. The museum has to follow international protocols for gallery space, including standards that constrain the galleries to a narrow temperature band between 22.2 and 23.7 degrees Celsius. Energy savings are directly correlated with the size of the allowable temperature band, and the narrow 1.5 degree C band will present a long-term challenge.

THE RESULTS:

The results for the administrative half of the museum have been recently updated to reflect three full years of PEO operations, from January, 2015 through December 2017.

Figures 1 show the monthly energy savings in kWh. Savings are the difference between baseload consumption, graphed in blue, and the actual energy consumption with the PEO system turned on, graphed in red.

The bar chart in **Figure 2** shows these monthly energy savings converted into dollar terms. Steady savings continue throughout 2016 to a peak of over $8,000 in December. Savings seen in 2017 go between $1,400 to over $7,000.

Figure 3 shows the cumulative energy savings over the three-year period, 2015-2017, in dollar terms. The results are impressive. The energy savings have been consistent. The museum has saved over $87,000 in electricity costs, which averages $29,000 per year.
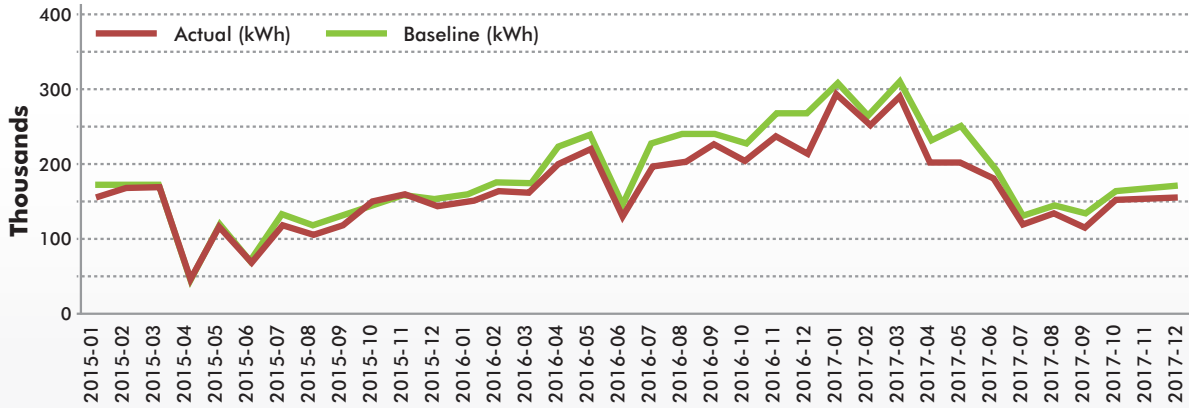
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Figure 1 – Comparison of Baseline versus Actual Energy Consumption in kWh by month for 2015-2017. Baseline in green, actual in red.
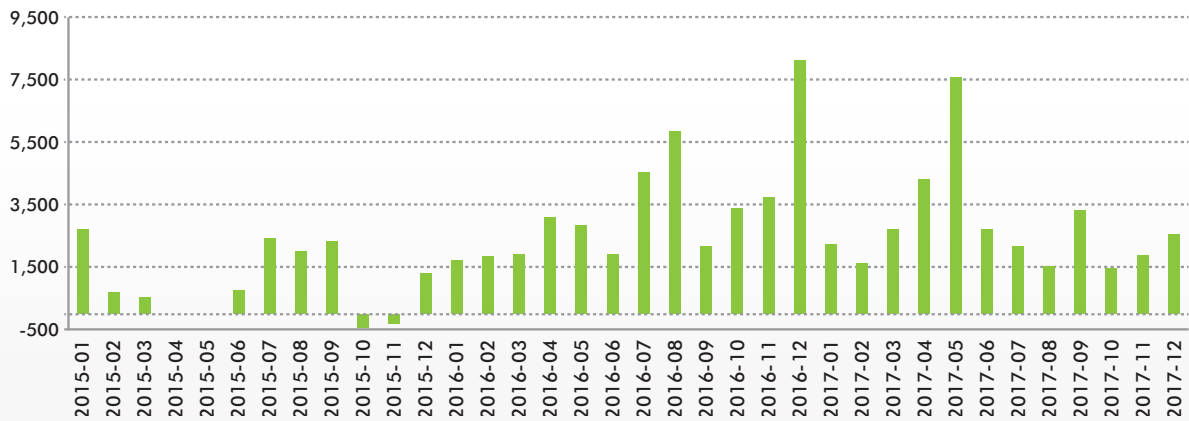

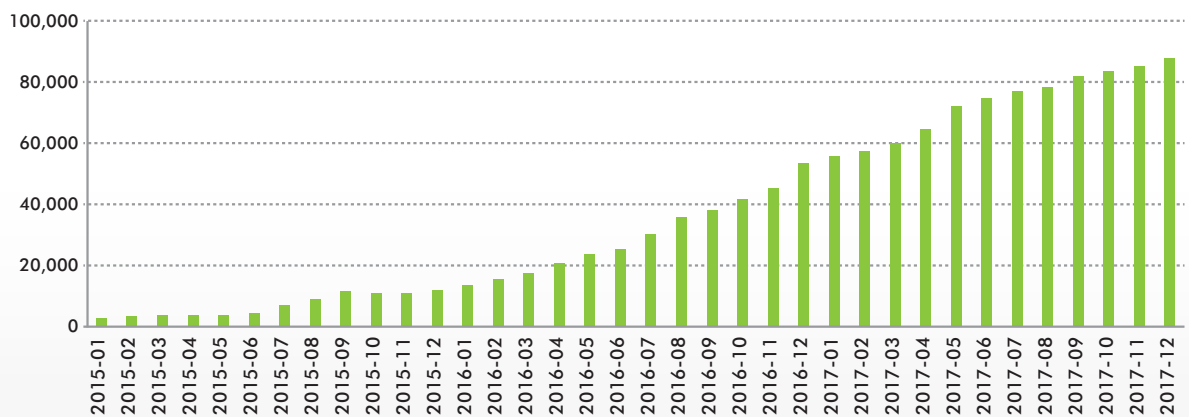**Figure 2 – Monthly Energy Savings in Dollars for 2015-2017**

Figure 3 – Cumulative Energy Savings in Dollars Over the First Three Years, 2015-2017

About BuildingIQ

BuildingIQ (ASX: BIQ) helps building owners and operators worldwide lower energy use, increase building operations efficiency, and tenant comfort. The company's 5i cloud-based platform and managed services deliver on the promise of IoT for buildings with none of the drawbacks. Investors in BuildingIQ include the Venture Capital unit of Siemens Financial Services, Paladin Capital and Exto Partners.