

A photograph of a modern office building with a curved, glass-walled atrium, viewed from a low angle looking up. The building is partially obscured by a large, curved, white and green graphic element that frames the top of the page.

High-Performance Building

CASE STUDY

The owners of a relatively new, high-performance office building in Australia invited BuildingIQ to test its Predictive Energy Optimization™ (PEO) cloud-based solution on the building to determine if further improvements in energy efficiency were possible. The 15,000 square meter (150,000 sq.ft.) building already had a five-star NABERS energy efficiency rating, but was designed without considerable thermal mass to retain heat. It has a glass façade and a prominent glass-walled atrium to establish a striking entrance for clients.

THE CHALLENGE

The primary challenge facing BuildingIQ was the exceptionally low power consumption of the building as a result of energy-efficient design and a building management system (BMS) that was well installed, well commissioned, and well tuned. The building was offered as a test subject, a pilot project that would put BuildingIQ's PEO through a series of trials to establish proof-of-concept that improvement in an energy-efficient building was possible. BuildingIQ would take one of the client's most exceptional buildings and use it as a point of departure for its optimization process.

The high-profile tenants imposed strict requirements on the degree of freedom BuildingIQ had in implementing its platform, including maintaining temperature within a 1.5 degree band. Further, tenants were not to be disturbed and the

pilot project should be inconspicuous to the point where there would almost no awareness that a pilot project was underway. Installation was to be fast, and the startup learning process, in which PEO learns the thermal dynamics of the building, completed in a matter of weeks.

THE SOLUTION

BuildingIQ installed its platform working closely with the building's BMS system immediately to find how responsive it would be to the platform's signals—an important first step in determining the state of BMS functionality and to identify any areas of inefficiency, or any control loops or components in need of adjustment. They found the BMS extremely responsive and very well tuned, up to the highest standards. The interaction between the two systems was seamless.

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The learning process proceeded smoothly over the first few weeks as the software assimilated the historical record of the building and began to learn how it behaved thermodynamically under different weather conditions and occupancy levels. Full-scale optimization of the HVAC system began in the winter and proceeded for several months in order to get the first set of results to use as a benchmark.

Since this was a pilot project, the BuildingIQ system was put through its paces in an effort to differentiate the results of BuildingIQ's software deployment from those attributable to chance, weather, or other causes. The procedure was to turn off the BuildingIQ system for a period of time, record the levels of energy consumption, and then turn it back on.

One of the advantages of the BuildingIQ platform is that it does allow this clean-break approach for data gathering and performance monitoring. In this case, it was essential because the first results were so astoundingly high that the client was skeptical.

THE RESULTS

Initial expectations of the performance improvements by BuildingIQ were quite low, a few percent at most. The building was, after all, at the apex of energy-efficient design and performance, and the BMS provider had provided excellent service and attention to every possible detail.

The initial results astounded the client. After just a few months of optimization, the system showed an HVAC efficiency gain of more than 15%. The client was dubious of the results and asked that the pilot be shut off for a matter of weeks to gather comparative data on energy consumption as a benchmark. The client's request was honored, energy consumption climbed to historical levels before PEO was turned back on.

The concerns were put to rest. Combining the flexibility of its software with the precision of its built-in measurement and verification (M&V) module, BuildingIQ was able to validate these exceptional results. PEO has now been operating successfully for over three years, showing positive cash flow.

The three graphs below show the results of the first three years of performance improvements in energy consumption of the building's HVAC system:

Figure 1 contrasts the actual monthly energy consumption in kWh (in red) with the historical baseline energy consumption (in green) from 2015 through 2017. Actual consumption is measured with BuildingIQ's PEO turned on. Energy savings is the difference between the two curves. With the notable exception of the first two months of 2017, actual consumption was consistently below the historical consumption baseline.

Figure 2 shows these monthly energy savings converted into dollar terms. Savings have averaged roughly \$1,000 per month over the first three years of PEO operation. It's important to keep in mind that this is a highly efficient building.

Figure 3 shows cumulative energy savings in dollar terms over the first three years of BuildingIQ operation, 2015-2017. Savings took off in 2016, and continued to climb, reaching a total of nearly \$39,000 by December 2017. This is an average of almost \$13,000 per year.

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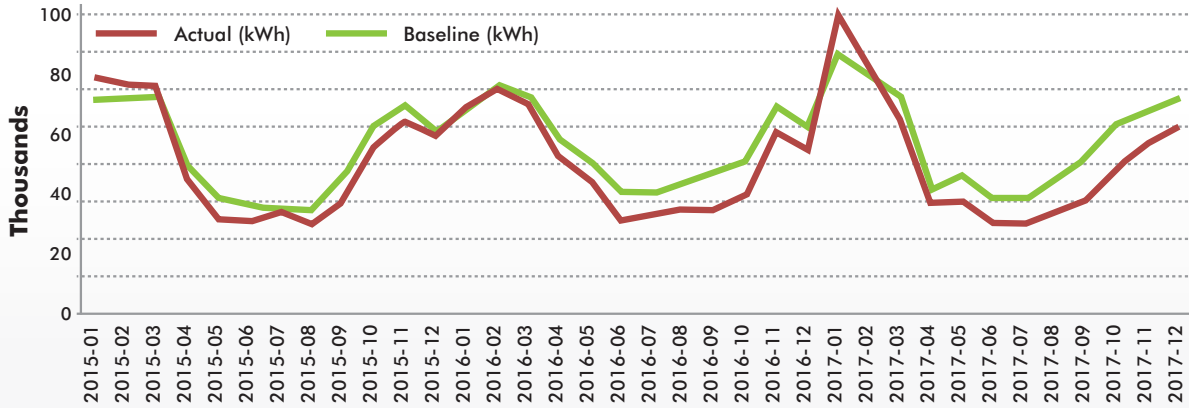


Figure 1—Monthly HVAC energy consumption in kilowatt-hours, 2015-2017. Actual energy consumption is shown in red; the historical baseline consumption is shown in green.

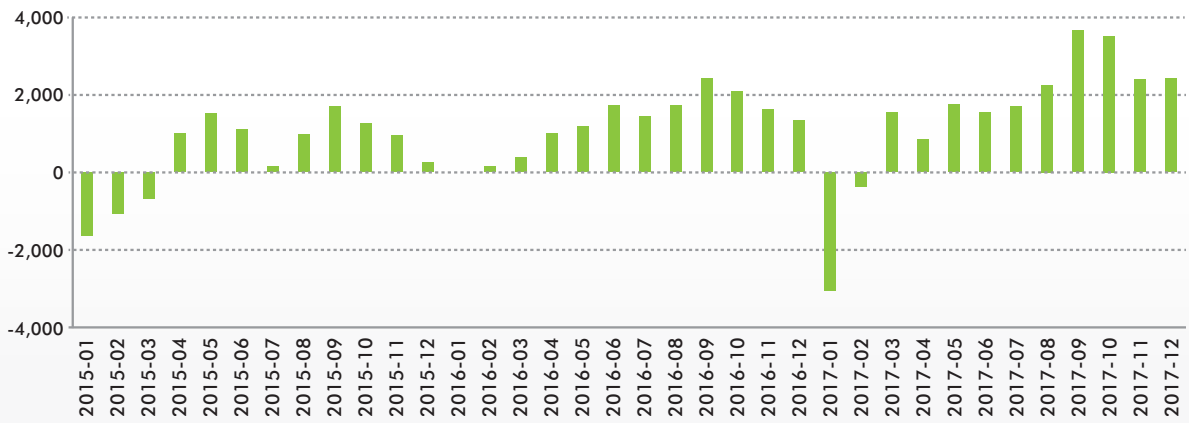


Figure 2—Monthly HVAC energy consumption in dollar terms, 2015-2017.

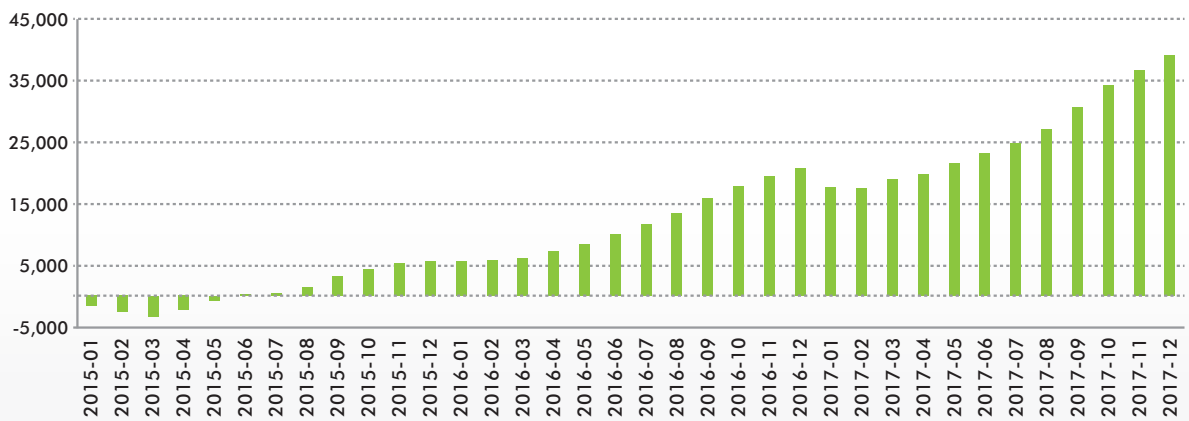


Figure 3—Cumulative energy savings in dollar terms, 2015-2017.

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.



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