



# M&V for a Commercial Fan VFD

Key Findings from a Wireless Monitoring Installation



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OPERATIONS & ENERGY MANAGEMENT

## Summary

The presented case study involves a channel partner's installation of a variable speed device on existing air handling unit supply and return fans. The partner engaged with SiteWatch to provide hardware and ongoing support with measurement and verification. The result was a successful energy efficiency measure reducing utility costs and an incentive from the local electric utility. The incentive was based on actual equipment performance, so baseline and post-installation energy measurement was critical to the project's success.

The customer deployed SiteWatch monitoring on the supply and return fans, along with a single bridge located near the panel. Data was sent through a cellular signal, so to interacting was required from onsite IT personnel, reducing time to deploy and commission the system.

**Identifying Wasted Energy** – Reviewing equipment operation through Power Radar, the customer can quantify the cost of equipment operating outside its typical schedule or load profile. As a result of monitoring, this customer identified equipment schedules and established a baseline for updating equipment schedules.

**Early Indication of Measure Non-Performance** - By programming custom alerts pushed in real-time (e.g. fans running during off hours, fans exceeding new max power setpoints) the installing contractor identified how the measure was not performing as intended. Without this early identification, the site was in danger of losing access to utility incentives while the site was also not benefitting from reduced energy usage.

**Troubleshooting and Commissioning** – SiteWatch personnel engaged to find how the issue of measure non-performance could be addressed. Relying on a wealth of engineering experience, the issue causing device non-performance was identified and rectified with the installing contractor and the equipment manufacturer. Engagements were short and effective with all parties, resulting in a correctly operating device that met the design intent of the measure.

## SiteWatch Successes

**SiteWatch used to develop baseline energy use** – The existing supply and return fans ran at a constant speed regardless of ambient conditions or building occupancy. Baseline annual energy cost for this single air handling unit was more than \$60,000.

Figure 1: Baseline AHU Fan Heat Map

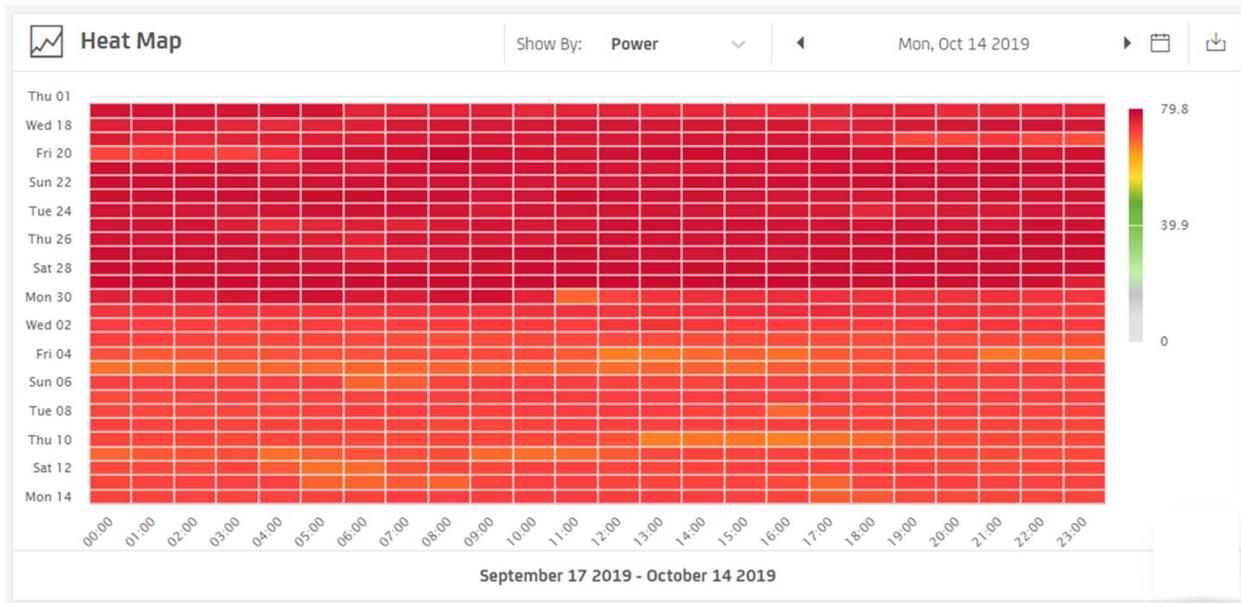
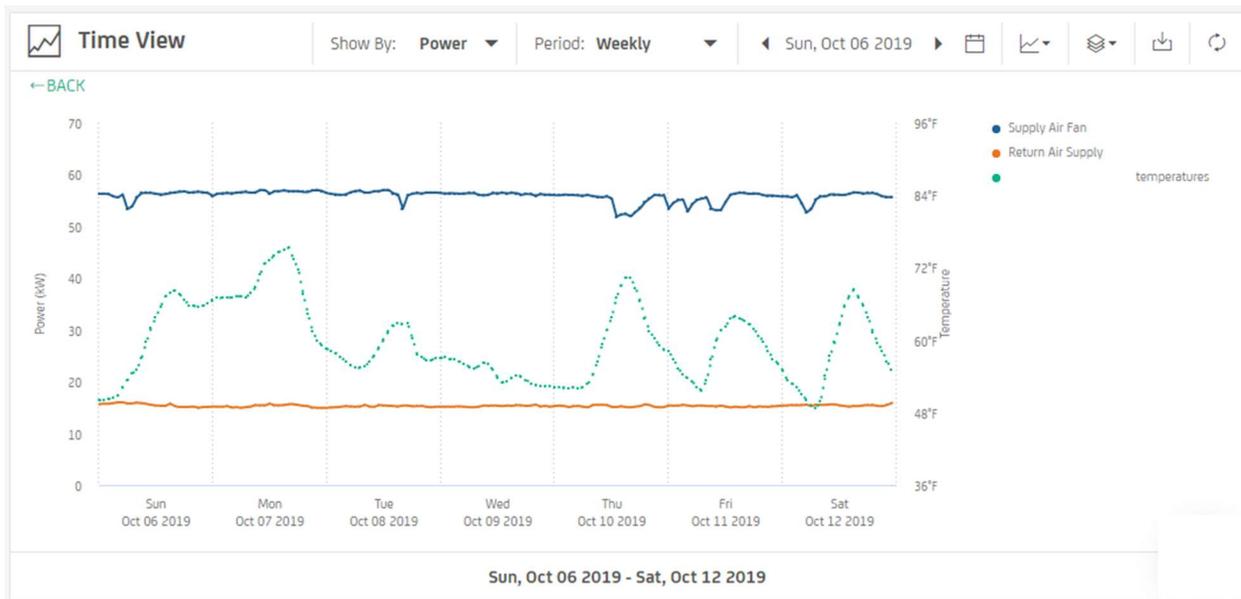


Figure 2: Baseline AHU Fan kW



*Site Watch Application* – Baseline usage was calculated on an annual basis using a custom report generated from downloaded .CSV data. The heat map application verified there was very little variation in fan energy use over time and through day types (weekday, weekend, holiday)

Variable speed device was installed, but not saving as expected – The channel partner installed the variable speed device and programmed an operating schedule to match building occupancy. With the new schedule in place, the fan was operating less than in the baseline period. However, the

fans were not “unloading” to match the system demand, so energy use when the fans were operating increased.

Figure 3: Initial Post Period AHU Fan kW



*Site Watch Application* – The channel partner identified excessive kW during operating periods when the variable speed device should have allowed motors to unload. Energy use during operating periods was higher than in the baseline.

Channel Partner uses SiteWatch to help commission VFD – SiteWatch contacted the equipment manufacturer on behalf of the channel partner, sending energy use and control signal (supplied by the site EMS) trends to demonstrate how the VFD was not unloading as intended. A simple programming change was identified, which the channel partner deployed in the field.

Figure 4: Final Post Period AHU Fan kW



*Site Watch Application* – Using Time View and downloaded .CSV data, SiteWatch worked with the channel partner and equipment manufacturer to identify the VFD programming issue and assisted with real-time verification the drive was operating as intended. Ongoing measurement in the post-installation period was used to secure utility incentives.

## How does the customer benefit from SiteWatch?

Using SiteWatch’s low-cost energy monitoring solution, along with included engineering support, a key performance issue with the energy efficiency measure was identified and rectified, allowing the installation to be considered a success. The customer now has access to real-time energy use for a critical device and can easily confirm the fans are operating as designed.

Over time, the system may fall out of commissioning as facility personnel override automated controls or equipment begins to fail. With SiteWatch involvement, these issues can be immediately rectified, allowing the customer to benefit from reduced energy use for the life of the equipment.

Accounting for only the VFD issue rectified directly with SiteWatch support (not the scheduled operation improvements), the first-year savings paid of the first year of energy monitoring and support in less than 6 months. After the first year (which include hardware costs), ongoing support will be paid for within the first two months of fan operation from identifying this single issue.

This payback does not include additional benefits to the site from automated alarming and reporting, early warning of equipment failure, continuous commissioning of the AHU, and data collected in perpetuity to support future energy saving measures. The site also has monitoring devices on chillers, allowing future energy improvements to be identified. The customer may even engage with SiteWatch to identify inefficient operation, finding further savings without any additional investment in consulting or engineering time.