SkySpark

Find What Matters™

Case Study

Redmond Middle School:

Advanced Analytics to Detect Energy Waste in HVAC System

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SkyFoundry

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Redmond Middle School: Detect and Analyze Operational Issues that Waste Energy in HVAC Systems Project

Overview

Buildings and equipment systems are complex. The building automation systems that orchestrate their operation contain hundreds (and even thousands) of sensors and electronic components. When they outright fail, building occupants notice because they get hot (or cold), or the lights go out. But what happens when control systems malfunction and produce erroneous data? Typically, the control system responds to the bad data and controls equipment incorrectly, resulting in energy waste and other operational problems that can continue unobserved for years. This case study demonstrates the value of SkySpark® in detecting sensor failures that resulted in significant energy waste.

Location

Redmond Middle School, Lake Washington School District (LWSD), Washington.

Issue Description

Air Handling Units (AHUs) were simultaneously operating mechanical heating with the outside air damper open more than a predefined minimum, resulting in unnecessary energy waste. With the issue clearly identified, ATS worked with school district's Resource Conservation Manager (RCM), Jed Reynolds of Cascade Power Group, to determine the problem. Cascade Power Group provides RCM consulting services to LWSD to efficiently manage and reduce utility costs as much as possible.

Shortly after SkySpark® was implemented at Redmond Middle School the AHU Heat & Econ rule started generating sparks at a significant rate on several single-zone Air Handling Units.

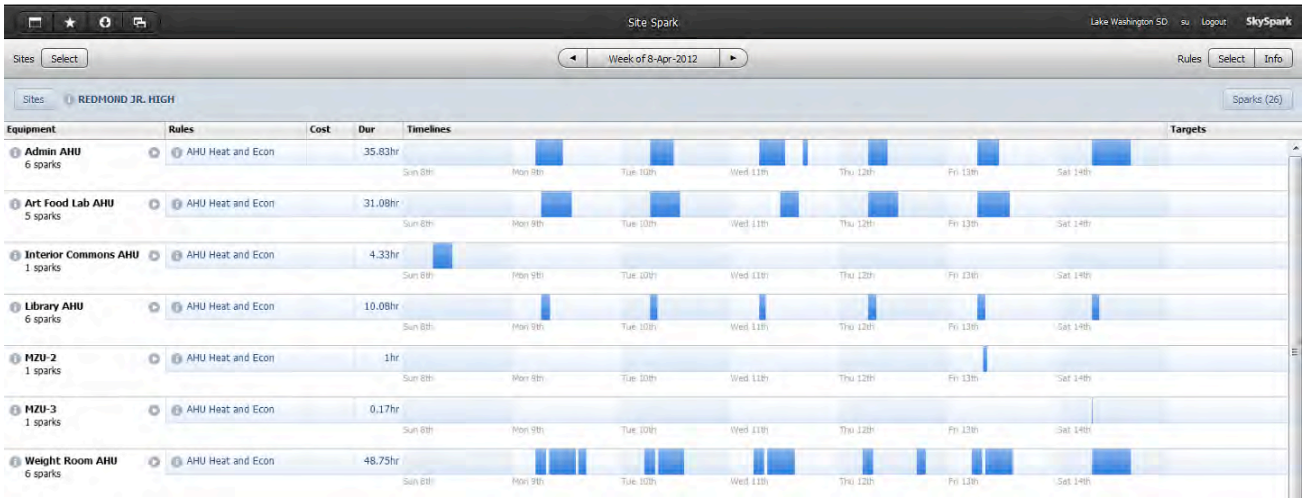
The SkySpark® rule generates sparks if the Heating Control Signal is opening the AHU's hot water valves for heating while an economizer command is simultaneously opening the outside air dampers to near maximum levels as if the unit was in a cooling mode.

Special thanks to Pete Segall, ATS Automation, and Jed Reynolds, Resource Conservation Manager, Cascade Power Group for the information presented in this case study.

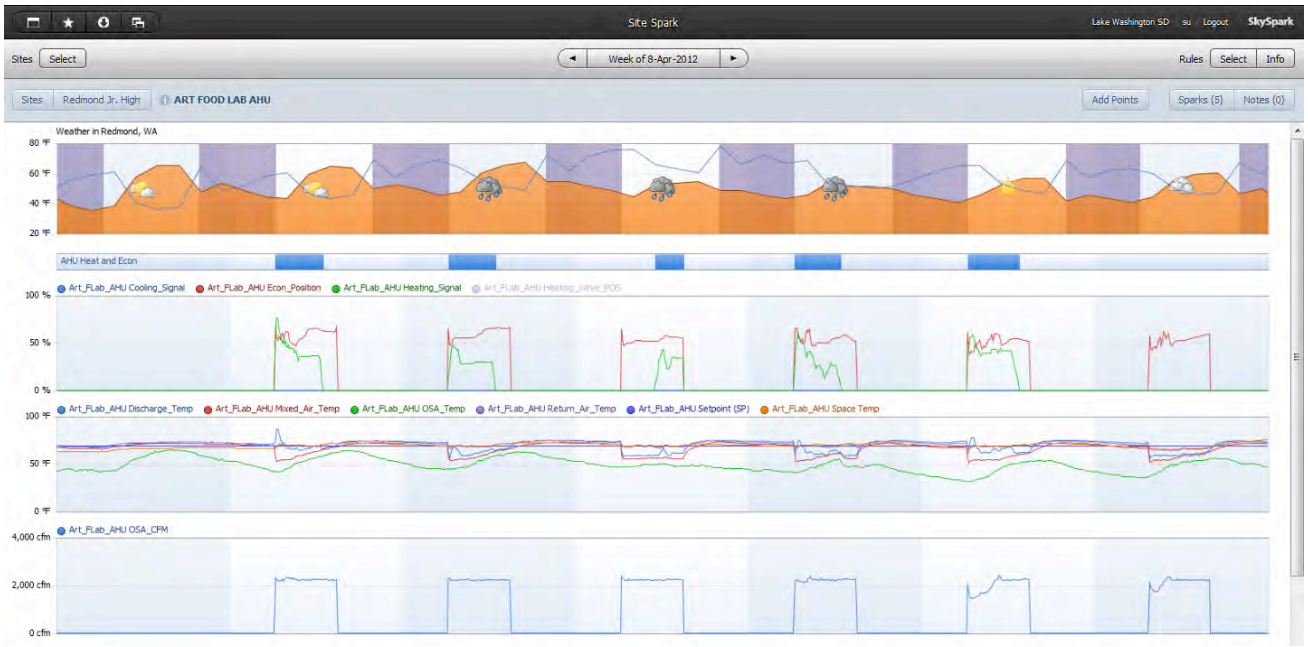
The Results

Issue 1: Efficiently manage and reduce utility costs

In the view below we see Heat and Econ sparks occurring consistently on 7 AHU's during one week in April 2012.



The following view shows full details on the Heat and Econ spark for a specific AHU during a one-week period.



Summary

All of the AHUs that had generated this spark had factory-installed outside airflow measuring sensors. The control system was using the airflow signal to maintain the design minimum outside air (OSA) flow volumes. But there was a problem! The airflow measuring stations had failed and begun to send erroneously low readings to the central controls. This caused the control system to open the outside air dampers more than necessary and bring in excessive amounts of OSA. This energy wasting failure was not visible to operators and would not have been found without SkySpark® or an extensive field balancing and verification effort.

These SkySpark® findings led the LWSD to implement a demand controlled ventilation retrofit in which the malfunctioning airflow sensors were replaced with CO2 sensors in the return duct. Outside air intake is now controlled only to maintain appropriate CO2 levels.

But wait – CO2 sensors could fail sometime in the future as well! No problem, a SkySpark® rule watches for failure of the newly installed CO2 sensors as well.

SkySpark® case studies are fascinating, but not unique. Virtually all buildings, old and new, have operational issues. The challenge is to find them in order to eliminate the waste, cost and comfort impacts they cause.

SkySpark® is unequaled in its ability to do this with systems and data of all types.

SkySpark® Analytics Software - For the World of Smart Devices

The past decade has seen dramatic advances in automation systems and smart devices. From IP connected systems using a variety of standard protocols, to support for web services, it is now possible to get the data produced by the wide range of devices found in today's smart devices and equipment systems.

Access to this data opens up new opportunities for the creation of value-added services to help businesses reduce energy consumption and operational costs and to identify opportunities to enhance operations through improved control, and replacement or repair of capital equipment.

Access to the data is just the first step in that journey, however. The new challenge is how to manage and derive value from the exploding amount of data available from these smart and connected devices. SkyFoundry's SkySpark® Analytics Software directly addresses this challenge.

The new frontier is to efficiently manage and analyze data to *Find What Matters™.*

SkySpark by SkyFoundry

About SkyFoundry

SkyFoundry's mission is to provide software solutions for the age of the "Internet of Things".

Areas of focus include:
Building automation and facility management
Energy management, utility data analytics
Remote device and equipment monitoring
Asset management

SkyFoundry products help customers derive value from their investments in smart systems.

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