Issue 27 - September 2016

SkyFoundry Insider

Real World Case Studies from the Engineering Community Show How SkySpark Drives Energy and Cost Savings and Improves Comfort

One of the major areas of adoption for SkySpark has been in the engineering community. Specialty consultants involved in commissioning, energy analysis, energy management and Monitoring and Verification have found SkySpark to be a powerful tool that enables them to transform how they offer services to their clients.

SkySpark allows them to automate the analysis that has traditionally required continuous manual effort, and provide clients with new, ongoing consultation-based service offerings to help continuously improve facility performance and eliminate the backwards-drift seen in many energy conservation projects.

In this special issue of the Insider we focus on how engineering firms are using SkySpark to deliver significant financial results and help owners and operators make energy and operational efficiency improvements permanent.

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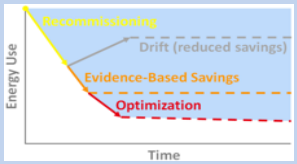
Reversing Energy Drift



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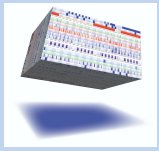

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Banner Health: Improving Energy Management to Maintain Energy Savings and Reverse the Trend of Energy Drift

Annual Savings			
$449,000	4,770,000 kwh	13,600 dtherms	194% IRR

Overview

Banner Health has a strong energy-management group and recently completed several energy-efficiency projects. Banner had observed that facility energy use tends to drift upwards over time. Energy project savings and performance gains are susceptible to this drift and Banner has seen initial gains begin to disappear shortly after projects are completed.

Banner wanted to identify ways to improve energy management to maintain energy savings for completed projects and reverse the trend of energy drift for facilities in general.

Banner partnered with ETC Group to implement a flagship monitoring–based commissioning approach to achieve these goals with a project at the Thunderbird campus.

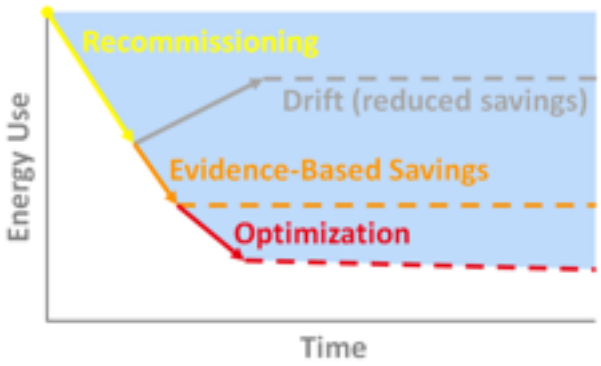
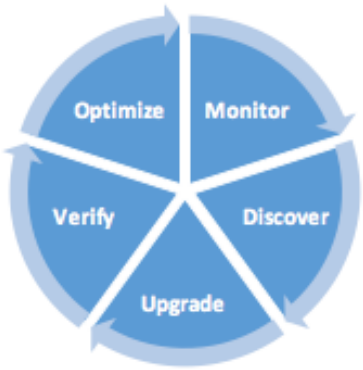


Figure 1. Energy savings can diminish over time. ETC Group uses real-time monitoring to maximize initial savings and uncover additional optimization opportunities over time.

Solution: ETC Group's Energy Performance Platform

Banner contracted ETC Group to: monitor facility performance, identify evidence-based savings opportunities, implement upgrades, verify the performance of the upgrades, and continue to optimize performance over time.



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Monitor

ETC Group deployed custom-developed energy analysis and fault detection using SkyFoundry's SkySpark® Analytics Software and connected hundreds of devices with thousands of data points to collect live, 15-minute data on everything from room temperatures and fan speeds to chiller loads and power meter readings.

Discover

ETC engineers conducted a comprehensive review and employed sophisticated automatic-issue-detection algorithms to identify a live, dynamic list of energy efficiency opportunities.

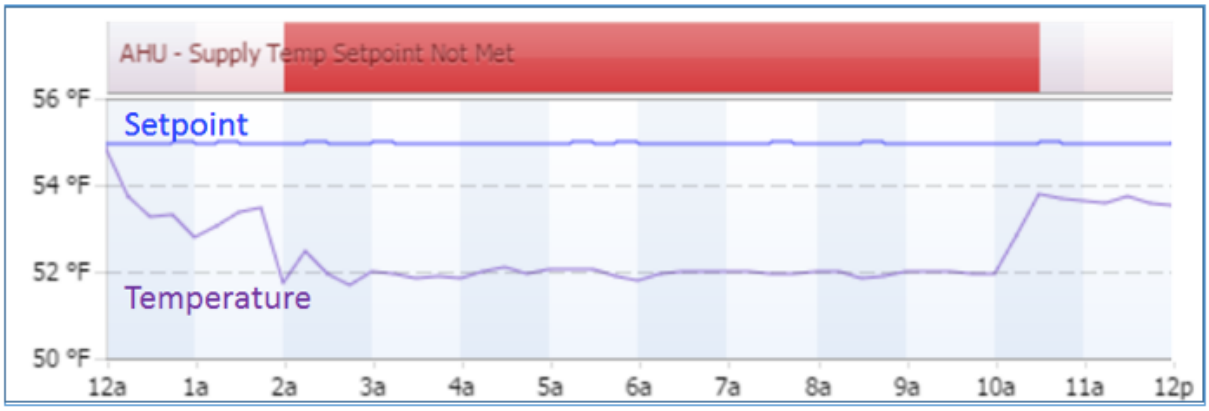

Figure 2. Automatic Fault Detection (in red above) reveals when a piece of equipment cannot meet its temperature setpoint. This fault indicates the potential to save energy by reducing unnecessary cooling.

Upgrade and Verify

ETC Group partnered with local control programming specialist Climatec to implement upgrades, starting in June 2015. These included:

- Utilizing scheduling or occupancy sensors to control ventilation levels according to space occupancy
- Optimizing controls algorithms / programming in the central plant
- Reprogramming 40 air handlers to efficiently utilize economizers and optimally reset supply air temperatures and pressures.

Once these energy efficiency upgrades were installed, Banner could see the results in both operational improvements and immediate reduction in utility usage saving $449,000 per year.

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Banner Health: Maintaining Energy Savings and Reversing the Trend of Energy Drift

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Optimize

ETC Group provides ongoing consulting for the Thunderbird campus, including monthly and weekly reports that show overall energy performance indicators along with comparisons to historical information. Fault detection rules scan for any "backsliding" on previous energy investments as well as proactively identifying new savings and performance opportunities.

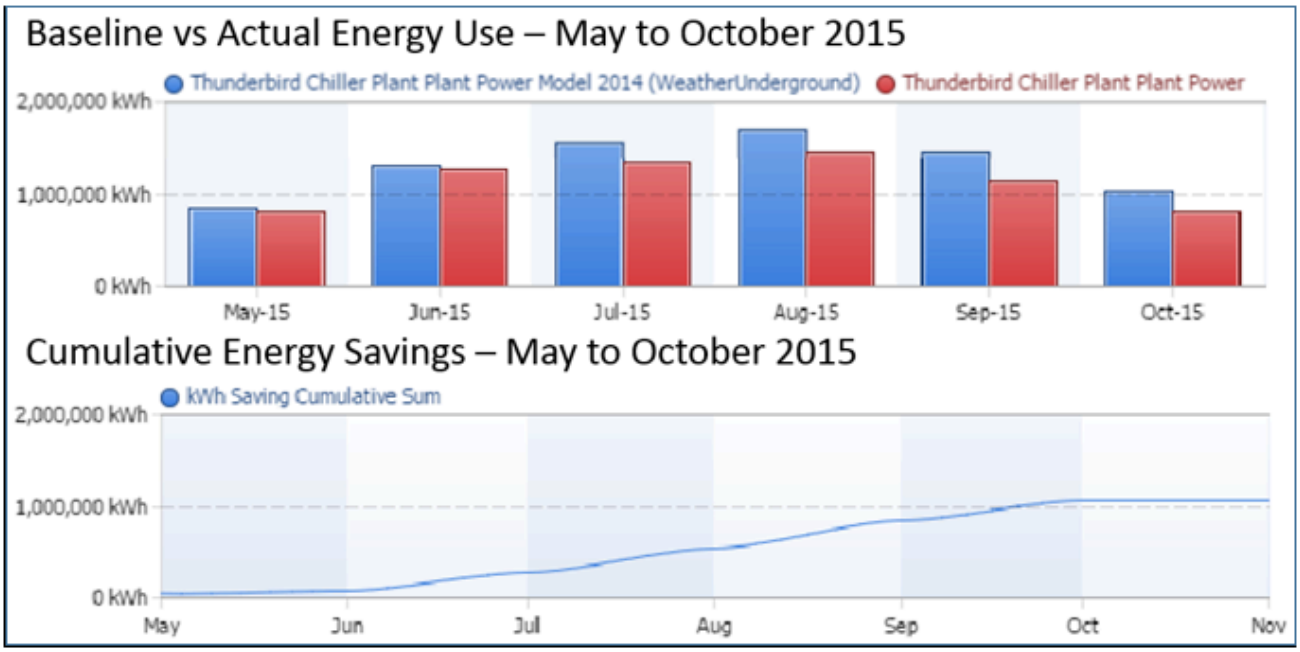

Figure 3. Chiller plant uses less power as efficiency measures are installed. Actual power consumption (red bar) consistently falls below baseline (blue bar), starting in June. The baseline is based on a linear regression model that uses outside air temperature

Additional Information

This is a summary of a case study compiled by ETC Group with help from SkyFoundry and Climatec. You can find the full Case study here: https://skyfoundry.com/file/195/Case-Study-Banner-Health---Reversing-Energy-Drift---ETC-Group--Climatec.pdf

ETC Group

AXCESS
A CLIMATEC BUSINESS SOLUTION

Data-driven HVAC Optimization Yields Higher Energy Savings While Maintaining Occupant Comfort

Overview

Citigroup Center Chicago is a mid-1980's vintage, 43-story, 1.86 million square foot, multi-tenant office building in Chicago's West Loop office market. Although operating sufficiently to meet occupants' day-to-day comfort requirements and achieving both Energy Star recognition and LEED EB certification, the building engineering staff had never undertaken a detailed study of HVAC optimization opportunities.

The engineering staff lacked visibility into the HVAC system performance data to provide empirical evidence to support operating changes that could yield significant energy savings while maintaining the present occupant comfort conditions. SkySpark® was implemented as part of an HVAC Optimization program across the facility.

Solution: Implement Monitoring-Based Commissioning Service in Conjunction with Local Electric Utility

The building management company, Transwestern, engaged Sieben Energy Associates (SEA) to provide monitoring-based commissioning services in conjunction with the local electric utility's incentive program which helped underwrite front-end integration costs and offered an outcome-based incentive for energy savings generated over an eighteen-month timeframe.

The Approach

SEA instituted a data acquisition protocol whereby HVAC system performance represented by five-minute interval data of all monitored BAS points was acquired and analyzed using SkySpark®.

SkySpark® highlighted operating anomalies and presented evidence-based HVAC performance trends as empirical support for SEA to develop proposed operating changes. The project was undertaken with a strong collaborative effort by the building's engineering staff, which had access to all analytical output via a web-based dashboard. Recommended changes were driven by results of SEA's analysis of the SkySpark® output.

Data-driven HVAC Optimization to Yield Higher Energy Savings While Maintaining Occupant Comfort

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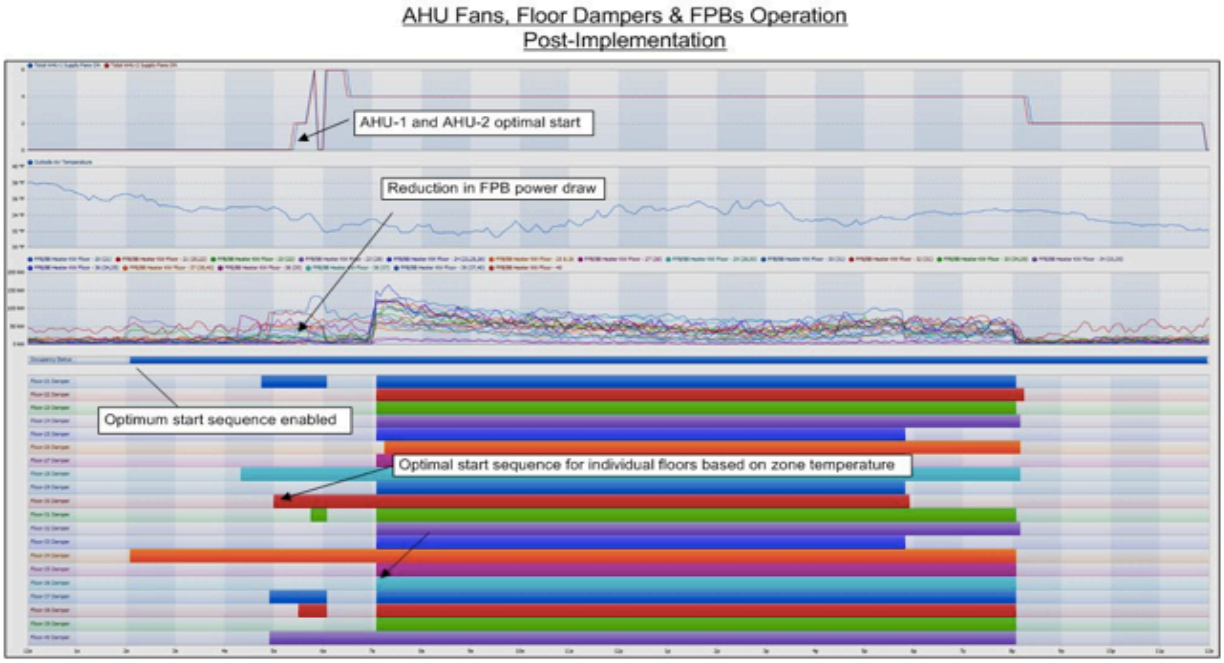
The Result

Over a two-year period ending in December 2015, seven energy reduction measures were implemented, totaling almost 2 million kWh, with a projected annual energy cost savings of $112,000.

In conjunction with the analysis of discrete energy saving opportunities, analytics on the HVAC system identified dozens of operating anomalies that were corrected by site engineering personnel before they led to extended periods of wasteful energy performance.

Using the Energy Star Portfolio Manager as a benchmarking tool, the building's steadily increasing Energy Star rating and steadily declining EUI tangibly demonstrated the impact of employing SEA's monitoring-based commissioning platform as a powerful tool for achieving energy reduction goals.



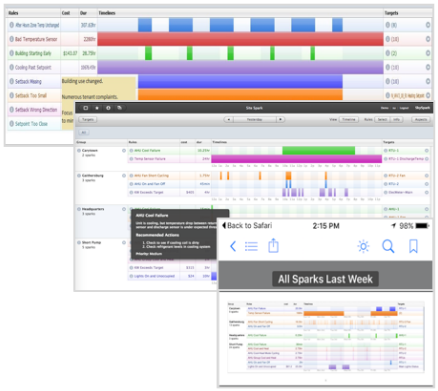
Graphic shows operation of AHU fans, floor dampers, and FPB operation after implementation of a staged optimum-start control sequence

SkySpark® helped identify system retuning strategies by analyzing years' worth of data quickly and finding operational anomalies and recurring issues. SkySpark® can utilize data from existing BAS to find issues and opportunities for savings and calculate savings without requiring the implementation of additional hardware and software temporary data logging. Applying SkySpark for ongoing, monitoring-based commissioning insures that savings will be maintained.

Our thanks to Transwestern, the end user client, and Sieben Energy Associates. This is a summary of their recent case study. You can find the full Case Study here: https://skyfoundry.com/file/183/Case-Study-Sieben-Energy---Monitoring-Based-Commissioning-with-SkySpark.pdf

The Facility Manager's Dilemma - *If I Already Know My Systems Are Not Running Properly - Why Do I Need Analytics?*

Often a facility manager's initial reaction to analytics is "I already know I have deficient systems in my buildings – so how analytics can help me." The answer is in the power of data visualization and Automated Informatics™.



One of the great frustrations of many facility managers is that they have not been able to get the financial resources to address known issues in their building systems. Deferred maintenance is a huge issue for many facility owners and operators. Without a clear understanding of financial impacts organizations often run systems to failure thinking that they are taking the lowest cost approach to operating their facilities. Typically, this is not true and that approach costs organizations more. With clear analytics results from SkySpark the entire budgeting process can take on a new, more productive approach.

So how can analytics help? SkySpark's automated informatics provides operators and financial managers with clear understandable, visually impactful results that show the extent of operational deficiencies, their frequency, comfort impacts **and their cost**.

Many facility managers tell us that with reports from SkySpark they can finally have effective discussions with financial managers and show them why budget dollars should be provided to address operational issues. For example, while it may be difficult to get a project approved that has a 2-year payback due to budgetary constraints, most organization are able to quickly find a way to dedicate funds to a project with a 1 month payback. And the reality is that many, many analytic findings have that type of near immediate financial return. But the key is to be able to clearly see the issue and the potential for rapid return on investment AND be able to communicate that opportunity clearly and effectively.

The results produced by SkySpark become the facility manager's best tool to win budget dollars and address system deficiencies that may have been occurring for a long time but have not been addressed. The results produced by SkySpark's automated informatics approach give facility managers the insight, details, proof and the tools needed to communicate with financial managers.

The net result – with better information comes better decision-making, priority selection, expense justification and financial performance.

A Definition

Automated Informatics: Informatics is the science of information and computer information systems. It involves the practice of information processing, and includes the interaction between humans and information.

We describe SkySpark as automated informatics™ because it automates the end-to-end process of generating value from data. It collects data - both live and batch, automatically processes analytics rules against the data and takes the final step by automatically generating views and reports for the user to clearly show analytic findings, completing the value creation process.

Project Haystack Simplifying data for the Internet of Things

Important Updates from Project Haystack

As a Founding member of Project-Haystack we are excited to highlight a number of important enhancements to the Project-haystack.org web site. These include:

- A new Blog feature to promote postings of general market interest for wider readership. Check it out here: http://project-haystack.org/forum/blog
- Updated documentation. There are significant enhancements to the data formats to handle nested collections (lists, dicts, and grids). Plus, there is now an official mechanism for HTTP authentication. The Java Haystack Toolkit has been updated, which provides nice reference code for the 3.0 formats and authentication protocol.
- A new reorganized Downloads section with more categories to make it easier to finds items of interest. Check it our here: http://project-haystack.org/download
- A French translation of the Haystack Connections Magazine Issue #1. You can access it at: http://project-haystack.org/file/13/Haystack-Connections-Magazine-1-French-Version.pdf
- Proposals for new system and equipment tags including:
- Enhanced weather tags, new tags for tank water level, diesel generators, ERV, HRV, variable refrigeration systems, smart grid and electrical generation tags and more
- Release of community approved additions to the Heating Plant tag set
- Release of the nHaystack module for Niagara 4

As you can see the community has been very active and continues to advance the Project-Haystack tag libraries and tools. Thanks to the volunteers that implemented these great enhancements.

In addition, Project-Haystack is excited to welcome two new Associate Members:

Project Haystack Associate Member

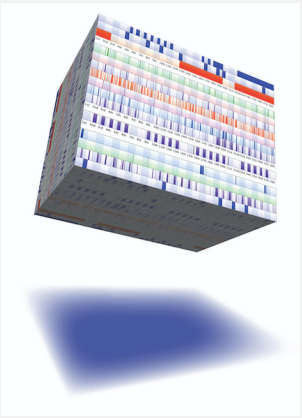
IoT Warez: http://iotwarez.com/

sensorFact: https://www.sensorfact.com/

And as a reminder, Haystack Connect 2017 has been announced for May 2017 !!!
The conference and exhibition will take place at the fantastic Saddlebrook resort near Tampa FL. Attendee registration will open in September. Exhibitor and sponsor registration is open now! You can find full details here: https://haystackconnect.org/

2017 Haystack Connect
Smart Data. Smart Devices. Smart Buildings. Smart Business.
May 8 - 10, 2017
Saddlebrook Resort Tampa
www.haystackconnect.org

SkySpark 3.0 – Features Continue to be Released with Much More to Come!



In late 2015 we announced key parts of the SkySpark 3.0 roadmap. Since that time we have been busy delivering a range of features including:

- The Tariff engine and Rate Modeler Functions - released as part of 2.1.13 in December 2015
- Historian features to address data quality, handling of missing data (known as not available or "na" data) – released as part of 2.1.14 Feb 2016
- Calculus functions to SkySpark's math capabilities – Feb 2016
- An OPC-UA communications connector - 2.1.15 April 2016

The most recent releases include:

New Folio Database: One of the most important advances in SkySpark 3.0 is a brand new Folio database designed from the ground up to provide higher performance, easier maintainability, and future support for automatic replication. Testing in real world projects show that the 3.0 Folio database is 100% faster processing queries, rules and calculations than SkySpark 2.1, which was already lightning fast! In addition, new compression techniques mean that historical data uses only 25% of the disk space versus SkySpark 2.1 already industry leading data storage efficiency.

New User Management Design

SkySpark 3.0 supports a new host level user database, which provides one login across all projects on a server streamlining management of large portfolios. New user management features include:

- Easier setup of user access access filters
- New top-level host-level views of all projects
- Stronger password cryptographic hashing
- Users can now reset their own passwords via email
- Improved login/logout auditing and session management

All New Diagnostics Dashboard

3.0 also introduces a new Diagnostics Dashboard, which provides a live, updating graphical view of all key diagnostic metrics including:

- System info (IP address, locale, directories, etc)
- Java versioning information
- CPU load
- Physical memory
- Java heap memory
- GC performance and total % of uptime
- Disk space used
- Number of open file handles (and max)
- Number of threads
- Total number of HTTP requests
- Total number of emails sent
- Folio database performance for all your projects

The diagnostics dashboard also presents live updating "sparklines" of key performance indicators on 5sec intervals over the last 15mins. If the system detects anything that might be a problem, it provides a warning icon and message making it easy way to scan the page for potential issues.

Watch for more announcements on SkySpark 3.0 releases in the coming months!