SkyFoundry Insider

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"Tell me again what you are doing?"

The start of 2020 marks 10+ years for us here at SkyFoundry. From the earliest days when people said, "*tell me again what you are doing*", to deployment of SkySpark across more than 1 Billion square feet worldwide, it continues to be a fascinating journey.

What we have seen throughout this time is that, as a whole, the industry is still very much at the early stages of learning how to effectively use data to improve performance, occupant satisfaction and financial results of their facilities, equipment systems and processes. While society in general has raced ahead, with the use of data science, and analytics and AI now impact virtually all facets of business, large portions the facilities market are still in the very early stages, or in some cases, sitting on the sidelines.

With so many successes to point to we often ponder the reasons that organizations hesitate to start their journey towards data-driven facilities, and the differences between the organizations that do adopt analytics and those that do not. We find a few common themes…

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“Tell me again what you are doing?”

(cont. from pg. 1) … The good news is that organizations that adopt analytics don’t turn back. Once they see the results that can be achieved, they move forward to expand their use of analytics. They add more sophisticated analytic rules and algorithms, they do more facilities, they reach deeper into their equipment systems. They make data-driven-facilities management the core principle of their operational practices.

For organizations that hesitate, more often than not, it boils down to the conundrum we refer to as ***“it's not an LED lightbulb.”*** By this we mean that you can’t perform a simple calculation to show the savings that will result from the application of analytics before you get started. A huge volume of case studies from a wide range of customers show evidence of results, but there is no way to calculate those savings ahead of time - ***it’s the application of analytics that identifies the opportunities for savings***. Equally important, until organizations address the issues found they do not realize energy and financial savings. Put another way, the challenge with analytics is that *until you apply analytics to find what matters ™ you don’t know what faults or inefficiencies your systems are experiencing and the improvements you can make.*

This is a real challenge that needs to be taken seriously by all of the suppliers of analytics products and services if we want the industry as a whole to reach its potential. Education is key and SkyFoundry has been a leader in providing non-commercial education to the industry.

You can’t score sitting on the sidelines!

1+ Billion Square Feet

SkySpark Now Applied to More Than
15,000 Buildings
> 1 BILLION square feet!

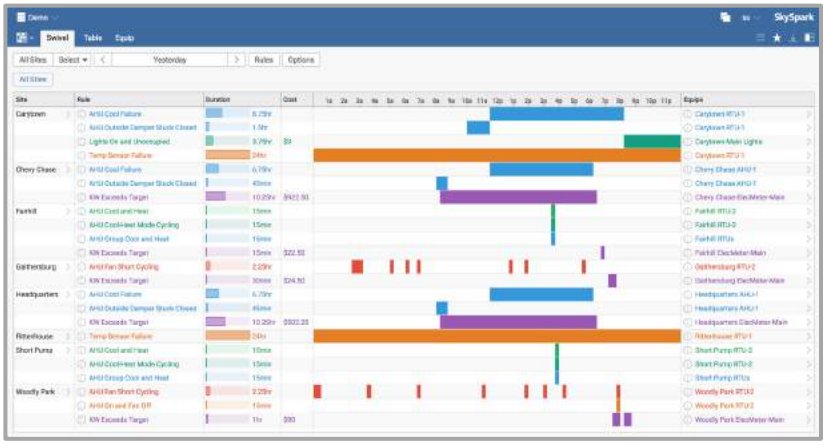
There has to be something to this ☺

Data Analytics Is About More than FDD

In our fast-paced world, we often look for simple definitions of new technologies. Mention the term "analytics" and many people will immediately think – "Fault Detection – analytics is used to detect faulty operation of equipment systems". While FDD is an important use of analytics, it's not the only one. Organizations that embrace the full capabilities of true data analytics are able to address a range of financial and organizational needs faced in operating and maintaining facilities and equipment systems and move to data-driven facility management.

Automatically Tracking and Reporting Key Performance Indicators – KPI's

Data means different things to different people in an organization. Managers responsible for tracking and ensuring operational performance and meeting financial goals need to be able to quickly and easily see key performance indicators, and their trends over time.



FDD is one subset of the overall capabilities provided by data analytics. This image shows fault patterns as timelines

Analytics provides continuous calculation of KPI's and presentation of KPI's data in a range of formats and report types. Examples of common KPI's include:

- Energy use (and cost) per sq. ft. (or sq. meter), unit of production, occupancy metric, revenue generation per facility, Power Usage Effectiveness (a valuable metric in data centers)
- Delta KPI's that compare current KPI's previous periods of time
- Run time summaries per equipment system
- Number of faults per period of time, per site and per equipment type
- With full programmability, KPI's can be defined to meet virtually any need and operational data

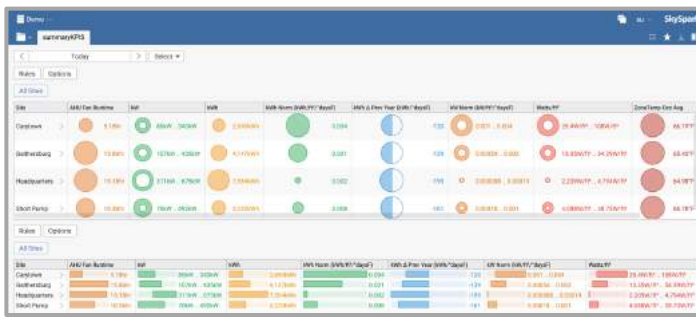


Image showing typical KPI's visualized as bubble charts and bar charts

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Data Analytics Is About More than FDD

Energy Analysis and Reporting

Energy data is commonly used with analytics software. The key to creating value is what you can do with it.

One common challenge is that energy data comes from many different sources and is stored in many different formats. You might have a smart meter provided by the utility, submeters connected to a Building Automation System, or years of historic energy data stored in files, along with tariff rate information on hardcopy paper. SkySpark brings all of this energy data is brought together in a unified format, enabling operators to easily view, compare and analyze energy performance, no matter what the original source or format of the data.

Automated System Optimization

SkySpark provides two-way communication with control systems to modify setpoints and other operating parameters enabling control decisions to be based on deeper insights into performance and system operation than possible with typical control systems.

Image showing correlation of energy consumption and demand (line charts) with tariff-based cost calculations (bar charts)

Benefits include:

- Benchmarking (comparing) buildings across a portfolio and/or with industry standards.
- Normalizing energy data for factors such as weather, occupancy and site-specific production activity.
- Combining energy usage data with tariff rate charges to calculate true energy costs. (See image).
- Visualizing and understanding energy use profiles, demand peaks, usage history over time.
- Reporting – bringing all of these tools together to provide reports to operators, energy managers and financial managers.
- Automatically posting energy data to **Energy Star Portfolio Manager™**, eliminating hours of manual effort that is required to meet regulations for energy reporting in many jurisdictions.

Confirming and Reporting Proper Operation

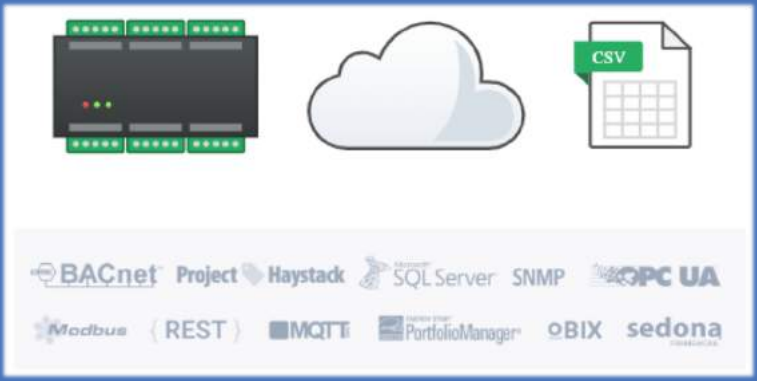
Analytics aren't just used to find things that are wrong. They are also used to confirm that systems are operating as expected, investments are achieving desired results. SkySpark's automated reporting features provide that information to users in a range of formats that meet their needs. Reporting can include export of in Microsoft® Excel™, or PDF documents that include graphics and charts.

SkySpark's analysis and reporting can support detailed Monitoring & Verification in accordance with IPMVP protocols. This document provides a detailed overview of the IPMVP and shows how SkySpark can be applied to meet specific requirements: https://skyfoundry.com/file/337/Applying-SkySpark-for-MV-Using-the-Intl-Performance-MV-Protocol.pdf

Justifying Expenditures

One of the benefits facility managers realize from utilizing analytics is the ability to better justify expenditures – both capital and operating. By automatically calculate operating costs and the impact of detected issues AND creating reports that put that information into a format that speaks to financial analysts and managers, SkySpark helps bridge the gap in understanding between operations and financial staffs.

What data do you have? SkySpark works with it all – live data, batch data, historical data



See Real World Results in Our Many Case Studies

Proven in applications of all types

SkySpark is used successfully in all types of facilities with deployments across well over **1 Billion square feet** (over 92,903,040 m²) of space on 6 continents. Applications include:

- Commercial office buildings (owner occupied, REITs)
- Utilities (demand response, load management)
- Government and Military facilities
- Data Centers
- Industrial facilities
- Multi-site Retail and Quick Serve Restaurants
- Higher Education
- Indoor Agriculture
- Laboratories (Government, research and universities)
- Entertainment/Hospitality (casinos, shopping centers, hotels)
- Smart Cities
- Facility management service providers
- Oil Rigs

SkySpark is available through a worldwide network of authorized partners, providing maximum choice for best-of-breed implementation services.

Learn more at: http://www.skyfoundry.com/partners/

What's New?

We never stop advancing SkySpark's capabilities and features – see some of the latest advances here

User Management: Codeless Set up of LDAP!

Many organizations leverage Lightweight Directory Access Protocol (LDAP) authentication to provide a single login across multiple applications. It is important for users to have the same username and password across all their applications for a couple reasons. First, it offers a better user experience because it avoids having to remember and manage yet another username and password. Second, it ensures new processes don't have to be created for managing the user lifecycle and existing cyber security protections are automatically applied to each application.

For example, when a user changes their role or leaves the organization, the changes are made in one place and all applications are automatically updated. If the user account in the LDAP server is disabled, that user will not be able to login to any applications using their credentials. More importantly, if a suspicious login occurs at 3 AM, the LDAP server will see that login and an administrator can take action. Or if multiple incorrect logins occur in a short window of time, potentially indicating malicious activity, the user account can be automatically locked. If an organization is not using a central login capability, such as LDAP authentication, every single application must be configured correctly to support these automated actions and often times manual work arounds must be followed, which is risky to assume will be completed.

SkySpark 3.0.23 includes built-in support for LDAP authentication via the LDAP SysMod. Prior to this release, if you wanted users to authenticate with LDAP you would have to write an AuthPlugin using additional code to handle the authentication. While that wasn't a major effort, SkyFoundry saw an opportunity to simplify LDAP implementation for the SkySpark Community. *Now, you can enable the ldap SysMod and configure its settings for your LDAP environment - the mod will handle LDAP authentication for you, no additional code required!*

As the projects you work on continue to expand and grow, the number of users that will want to access the value created by SkySpark will also increase. Simplify the user account management processes of your SkySpark deployments by using LDAP authentication and stop worrying about how to meet all the various password policies of each environment because that is handled automatically by their existing LDAP server!

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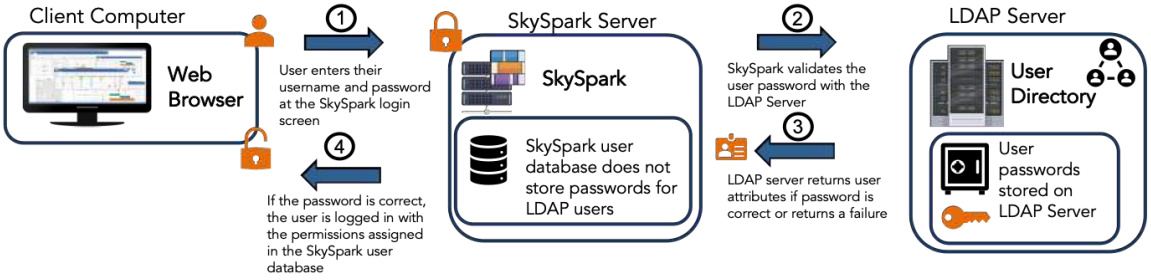
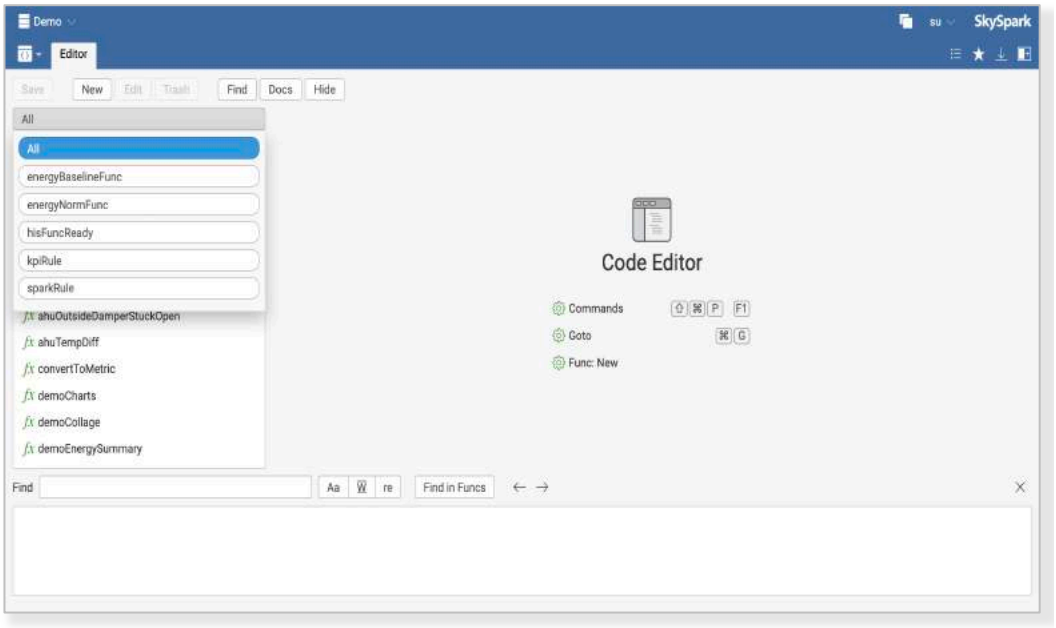
What's New

LDAP – *cont.*

Most importantly, the user experience for logging into SkySpark does not change!
You can also confidently respond that SkySpark does not store user passwords for LDAP users. Those are safely stored on the LDAP server. Here is a high-level overview of how LDAP authentication works:



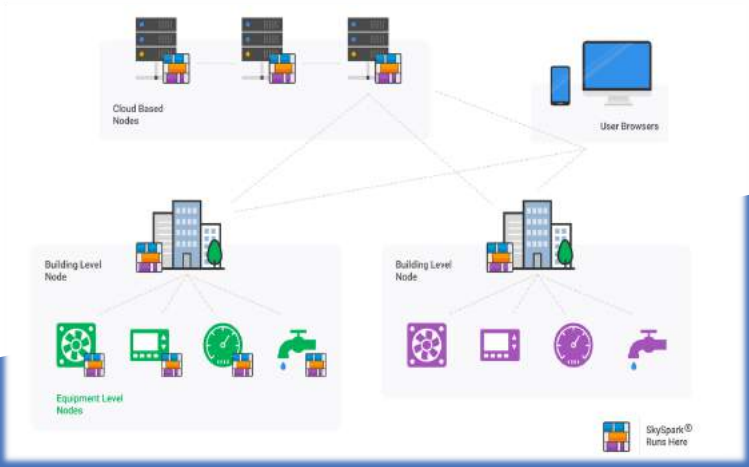
The All-new Code Builder App – Providers a Full Function, Programmer-level, Integrated Development Environment Features



These are just a few highlights of new features added to the ever-advancing SkySpark Informatics software platform. Contact SkyFoundry for more information or a live demonstration.

Distributed Architecture, Clustering, Replication and Provisioning – the What and the Why

SkySpark is unique in the world of software for device and equipment data because it can be applied from the "edge" to the "cloud" providing a fully distributed data and compute platform. Sounds cool, but what does that really mean and why is it important? Let's start with a brief look at **"what"** these terms mean.



Distributed Architecture – By this we mean that SkySpark can be deployed on multiple nodes (computing devices) distributing the work of data collection, analytics processing and presentation of results to users.

Clustering refers to the ability of distributed SkySpark nodes to be connected into a seamless unified system over SkyFoundry's highly efficient and secure Arcbeam protocol. Once connected into a cluster, users interact with their data, analytic results, reports and views as if they were interacting with a single computer and single database. The result is a seamless user experience even as data and processing are distributed across many computing nodes.

Replication is a SkySpark feature that enables copies of SkySpark databases from distributed nodes to be automatically copied (replicated) to one or more servers. But SkySpark replicas are not simple data backups. Rather SkySpark replicas are fully operational copies of individual distributed nodes. They provide the full user experience even when the original data source(s) are not available (offline) allowing users to work with the last available data and analytic results.

Provisioning. And finally, if I have a system made up of numerous individual nodes, I need an easy way to update them with new software revisions, new analytic rules, and other new features. That's the role of SkySpark's Automated Provisioning features.

That's the "What". Now let's talk about the Why?

Why? Addressing Key Challenges for Next Era of the IoT With an Edge-to-Cloud Data Architecture

So why does any of this matter? The reasons are actually quite compelling…

- Greater fault tolerance
  - For data collection, storage & processing – Collect data, process analytics and create visualizations for users as close to the source as possible
  - Allow in-building personnel full access to their data and analytic results even if they cannot communicate to an external cloud
- Low latency
  - Provide near real-time data acquisition, processing of analytic rules and algorithms
- Support applications with "constrained networks"
  - IoT devices and equipment are often connected to slower, bandwidth limited or intermittent networks, or use cellular connections with high data transfer costs. By processing analytics at the edge, network traffic can be reduced by as much as 1000:1 !!!
- Security
  - Keep data on premise - Meet requirements for projects that cannot send data to an external cloud
  - Isolate in-building systems from the Internet – SkySpark acts as a security barrier to connected equipment with its Arcbeam, websocket-based protocol
  - Meet regulatory requirements for data storage location - keep data within a region or jurisdiction
- Save Engineering Costs – using SkySpark from the edge to the cloud means you engineer once – set up data acquisition and tagging once with one uniform set of tools
- Reduce hardware costs – eliminate gateways and security appliances in many applications
- Provide a Seamless User Experience – across multi-node systems that include data from multiple systems – they appear as a single system
- Digital Data Replication
  - SkySpark provides automated replication of the distributed nodes in clustered systems
  - Replication provides a fully operational replica of each node that users can interact with - EVEN WHEN the actual node is OFFLINE
  - User queries do not have to penetrate down to the actual nodes – can work with last available data – saving significant data transfer costs
  - Replication also provides a full automated backup of individual nodes – saves time and work

State and Local Energy Benchmarking Policies; *SkySpark Makes Compliance Simple*

15 percent of the commercial building floorspace in the US is now covered by an energy benchmarking and disclosure policy. These local and state level ordinances are an established and growing stategy for governments to understand the amount of energy commercial buildings consume, establish their greenhouse gas footprints, and to develop strategies to mitigate resulting greenhouse gas emissions. With the building sector consuming 40% of total US energy consumption (and representing up to 80% of a city's greenhouse gas emissions), state and local governments have targeted a more efficient built environment as critical to their environmental and economic improvement goals. Since SkyFoundry partners can play a role in supporting compliance, you may want to know what these requirements are, what markets are they in, how these initiatives are evolving, and how you can help your customers comply. As you begin supporting compliance, you can use the results to engage customers in discussions about energy and water efficiency improvement projects to improve their publicly disclosed scores.

Fortunately, SkyFoundry has made it easy to benchmark and report to these requirements through a readily available feature of SkySpark. SkySpark's integration with ENERGY STAR Portfolio Manager was completed in 2011 to increase the energy benchmarking capabilities of our tool. We adopted it because it takes something complicated, building energy use, and distills it down to a score that someone without a background in facilities can understand. It just so happens that a growing number of state and local governments saw the same benefits of the tool and adopted it as their standard for energy and water benchmarking and disclosure. The SkySpark ENERGY STAR integration is available to support compliance, where needed, but it is also a valuable feature for building owners seeking an easily understood mile-marker on their journey to better energy performance and utility cost savings. It also helps our users gain recognition for improvements (e.g. achieving a score improvement from 45 to 55) and provides an opportunity to obtain recognition for achieving and maintaining high performance.

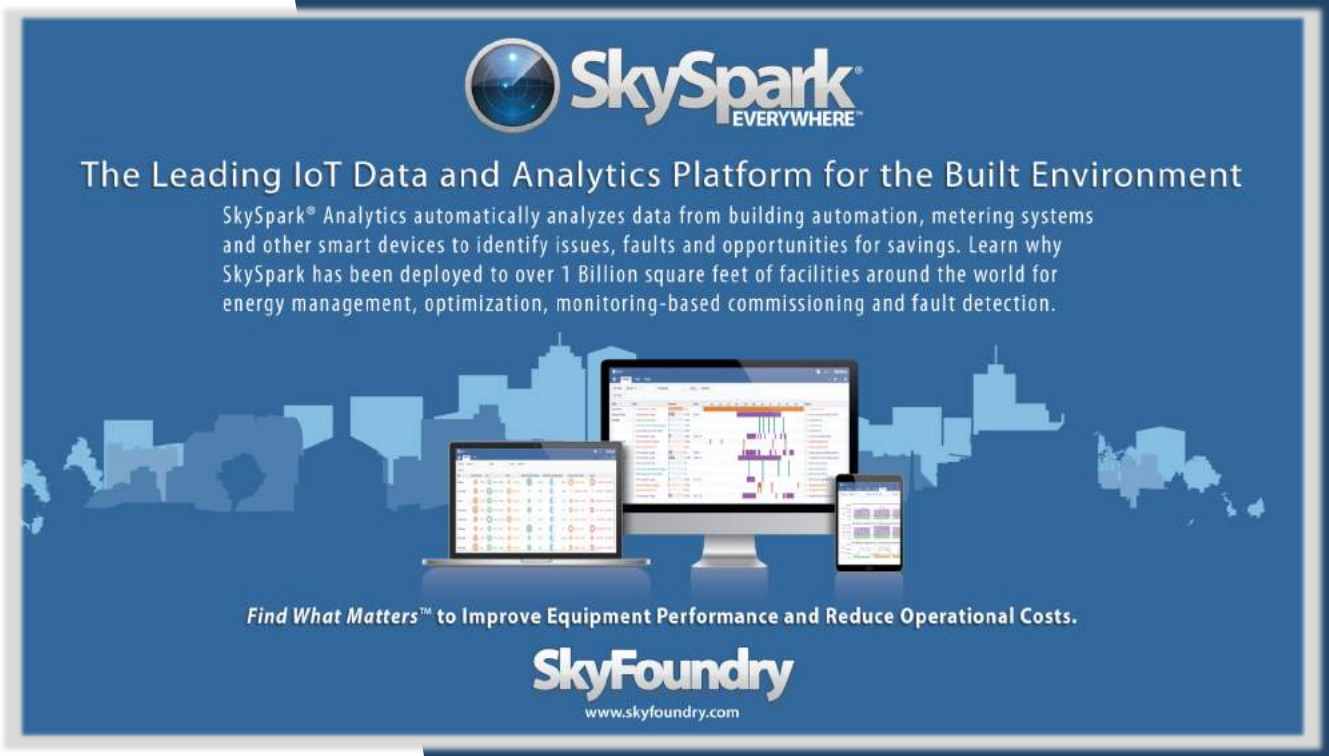
The ongoing story of state and local benchmarking ordinances dates back over a decade. In 2005, Washington State legislation required that all state buildings benchmark using Portfolio Manager. Shortly after, in 2007, California followed suit and went beyond state-owned and managed properties to include larger private sector buildings in its legislation. The trend has continued, with more local governments passing their own variations of ordinances that require owners to benchmark in Portfolio Manager and share the results with the city for compliance and public disclosure. Since the initial efforts by Washington and California, the list of cities and municipalities with benchmarking ordinances has grown to nearly 30, including those show in the graphic below.

An interactive version of this map can be found at www.energystar.gov/policiesandprograms.

Altogether, nearly 15 percent of the commercial building floorspace in the US is now covered by an energy benchmarking policy. Furthermore, a number of these ordinances (including those in Atlanta, New York City, San Francisco, and Seattle) require buildings to take the next step in identifying and implementing energy performance improvements via energy audits and retro-commissioning (often with an exemption available for properties that have earned the ENERGY STAR certification). This increase in the scope of benchmarking laws also encompasses water tracking, with 19 cities now requiring that water data be submitted to Portfolio Manager. These additional requirements create significant business opportunities for SkyFoundry partners to help owners access, optimize, and/or upgrade buildings to meet compliance.

Starting in 2019, the next evolution of this trend has rolled out, which entails building energy efficiency disclosure labels for commercial and government buildings in two cities. The laws will require that building energy performance be disclosed in a standard format at each main entrance to a building. Chicago's label will use a star rating system, with zero stars indicating non-compliance with the city's benchmarking ordinance and four stars indicating an ENERGY STAR score over 80 or a score over 60 and a recent 10-point improvement. New York's Local Law 33 is similar with the label having an A to F rating system. An A equates to an ENERGY STAR score over 90 and an F is non-compliance.

With varying scopes and approaches, benchmarking ordinances are a significant trend, and one that SkySpark users should be aware of, regardless of whether there is currently a benchmarking and disclosure ordinance in their local jurisdictions.



Learn More About SkySpark® and How to Apply Analytics to Your Application

Join us for a comprehensive demonstration webcast.

We publish our calendar of upcoming sessions and other events here: https://skyfoundry.com/calendar

Or contact us at: info@skyfoundry.com