facilio

Achieving Superior Refrigeration Control and Lower Energy Costs

A SOFTWARE-LED APPROACH FOR GROCERY & LARGE FORMAT RETAIL
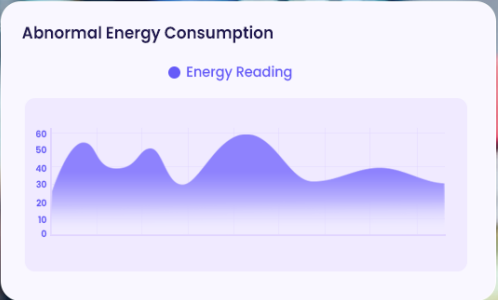

Refrigerant Tracking

CLOSED LEAK EVENTS
63

OPEN LEAK EVENTS
11

Refrigerant Usage

Total Usage: 15,000 / 10,000 / 5,000 / 0

R123 R124 R123JY R407A R125

Refrigerant Type

Alarm Duration

1 : 17 : 30
Days   Hrs   Mins

Asset Name
Oscorp 1-LVP-04

Site
Oscorp Buildings

Abnormal Energy Consumption

● Energy Reading

60 50 40 30 20 10 0

Retail Edition | Perspectives | Problems | Technology-Driven Solutions

⟩ Summary

The Retail, Food Service, and Grocery sectors spend over $41 billion on energy annually, representing 14 billion square feet of floor space in the U.S. Assuming a potential reduction of 10%, retailers have a $4.1 billion opportunity in energy cost savings or an 8% increase in sales per square foot.

Technology has revolutionized front-end retail operations using automation, machine learning (ML), and Internet of Things (IoT) to optimize in-store customer experience with wayfinding technologies like indoor mapping and tracking to simplify store navigation, seamless payments, and the like. In the last 20 years, technology for back-end operations hasn't grown at the same rate. The O&M technology has been heavily led by hardware-centric players resulting in extremely complex and decentralized access to data, applications, and services.

For instance, a food retailer with multiple stores typically has various refrigeration and HVAC systems with dedicated software, standalone edge/controller devices, and spreadsheets for analysis—making it increasingly difficult to centralize data for portfolio-level optimization.

This leaves no option but to reimagine what the power of cloud and enterprise SaaS applications that other industries have benefited from could do for the retail O&M world. Identifying and capitalizing on these opportunities with a cloud-based software approach means O&M teams would now have the flexibility to lower operating costs across portfolios with centralized optimization of energy strategies and improve resource productivity with simple integrations irrespective of vendors, helping retailers unlock savings rapidly.

In this whitepaper, we aim to focus on the key drivers for software-led energy efficiency in the retail industry, specifically in refrigeration systems; the perspective change it needs, and the solutions tools now available to measure, manage, and control energy consumption across the enterprise in real-time to realize energy savings in only weeks—not years.

Contents

Building operational resilience in volatile energy markets

2022 saw unprecedented increases in energy prices worldwide, particularly in Europe, which recorded **intraday price amplitudes reaching highs of over €400 per MWh**. Additionally, peak demand charges make up almost 70% of utility bills, which resulted in **more than a 100% increase in total operating costs** for energy-intensive sectors like Retail and other chain-like organizations with multiple locations.

In 2007, Marks & Spencers launched a 100-point energy efficiency plan spanning over 5 years with a £200 million investment. Fast forward to 2022, M&S incurred £40 million higher than planned in energy costs and estimated a £100 million hit from soaring energy costs, on top of 'unprecedented inflation in 2023, which indicatevely could have may have been a contributing factor to closing down 67 major outlets across the UK.

Stores account for 80% of their total energy bills, making energy savings on refrigeration and HVAC systems across the portfolio critical to the retailer's sustenance.

Currently, popular approaches to energy efficiency in retail include switching to renewable energy sources, installation of new lighting systems, doors for refrigerators, and the like. While these methods show results, they are capital intensive, difficult to deploy at scale, and take a long time to realize returns on investment.

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Adam Siegel of the Retail Industry
Leaders Association

A retailer's energy costs could represent 5.5% of the store's total operating costs. So if the store operates at a 4% profit margin, driving a 15% reduction in energy costs would increase profit margins to 4.57% - an 18% increase in-store profits

Retailers are taking note, making energy efficiency a part of the corporate agenda, and hiring "Heads of Digital Transformation" with mandates to lower energy costs, emphasizing on the need for software-led, IoT-based energy saving practices.

Solution

As part of their plan A for energy efficiency, M&S tested over 30 energy efficiency measures like dimmable lighting, variable speed drives, and voltage optimization and found technologies to help remotely manage their plant and equipment to be especially effective. They announced investments to develop controls to help remotely manage in-store lighting, HVAC, and refrigeration systems over a decade ago.

The realization that leveraging technology to optimize existing systems and infrastructure is a faster, more efficient, and scalable approach to energy efficiency, compared with capital-intensive measures like retrofitting or LED lighting—is familiar.

Many retailers like M&S and automation vendors have tried to build custom solutions (the challenges we will elaborate on in the next section) to help remotely manage stores with little scope for scalability.

Fortunately, today, cloud-based supervisory platforms are enabling retailers to optimize multi-store refrigeration and HVAC systems remotely, in real-time, and from centralized dashboards.

This way, you can automate and optimize your energy savings strategies across multiple system types and sites via the cloud.

Developing a detailed understanding of enterprise-wide energy use and the ability to control and optimize energy consumption across locations can help retailers build operational resilience, improve profit margins, and take a giant leap toward achieving net zero goals.

The status quo and its pitfalls

Retailers and automation solution service providers have been experimenting with many strategies to lower energy consumption across stores, only to find most approaches have a delayed time to value, spanning over years at a stretch. As discussed in the previous section, technology can help identify the low-hanging fruits to optimize energy consumption and quickly unlock portfolio scale efficiencies.

The United States Environmental Protection Agency (EPA) report–Sector Collaborative on Energy Efficiency Accomplishments and Next Step has identified up to 41% energy savings potential for retail stores.

For instance, in a typical retail store, lighting, HVAC, and refrigeration represent almost 70% of total energy consumption and 4-9% of the store's total operating costs.

Small changes like reducing heating temperatures by only 1°C can reduce energy consumption by as much as 7%. However, balancing energy efficiency and in-store customer experience is a fine balance you can only strike with real-time optimization of HVACR systems.

Many retailers who realize this have tried to build custom solutions to integrate BAS/BMS systems to enable remote management of stores and plants.

Solution

It is incredibly challenging, if not impossible, to deploy these changes at scale—not without creating silos at every level. What if you could use the cloud to remotely control and deploy different strategies across locations and realize energy savings compounded across stores, creating a much more significant impact on your operating margins?

What works for store A can be replicated and tested in stores B-Z remotely and without the need for going through painful integrations for point solutions from various vendors at every location.

Cloud-based supervisory platforms make this possible, allowing you the freedom and flexibility to deploy advanced refrigeration optimization strategies like suction pressure optimization, condenser valve strategy, dynamic electronic valve (EEV) control, and more at portfolio scale.

You can also configure rules to automatically adjust HVAC and lighting systems based on occupancy, weather conditions, and peak usage, enabling you to improve the energy bottom line and boost operational efficiency within only weeks from deployment, not years.

De-risking penalties and demonstrating energy maturity

A typical supermarket's refrigeration system holds a refrigerant charge of about 4,000 pounds and has an average annual leak rate of about 25%.

On average, leaks cause a supermarket to emit approx—1,000 pounds of refrigerant every year, which draws attention to hazard limits, incurs additional charges to procure more refrigerant inventory, and also seen as a grey mark in responsibility towards climate goals .

Additionally, leaks invite heavy penalties from compliance authorities as most common refrigerants today are super pollutants with high ozone-depleting potential (ODP) or global warming potential (GWP).

One of the biggest fines the EPA levied for faulty enterprise management for non-compliance with the Clear Air Act was over $4 million, with millions of dollars in mandatory upgrades

Another important consideration is the high insurance premium for organizations with a history of workplace accidents. A UK consortium found compulsory coverage for workplace accidents continues to increase by as much as 1000% in some cases.

The cost of undetected refrigerant leaks is incredibly high for all—the business, the environment, and the safety and comfort of employees and customers.

Solution

Human error is the underlying reason for almost <u>60-80%</u> of workplace accidents across industries. There is an urgent need for intelligent optimization and automation, which could nearly eliminate the need for human intervention and error in workplace management.

A cloud-supervisory platform monitors HVACR performance in real-time, serving as an advanced multi-side FDD solution (fault detection and diagnostics) with a drill down of root cause and alarm impacts, making it easy to detect leaks and automate remedial action. This eliminates the need for manual inspections and the chance of human error, and detects leaks before they become compliance or health and safety issues well in advance, saving time and unwanted expenses.

Here's how a platform eliminates the need for human intervention for refrigerant leak detection, repairs, and compliance reporting:

- **Automate manual inspections:** A cloud-based platform collects real-time data from equipment via IoT sensors to continuously monitor their condition and performance.
- **Identify leaks in real-time:** Any anomalies in set points will trigger a Fault Detection and Diagnostic (FDD) rules engine to identify leaks and create and assign work orders for further inspection automatically.

- **Digitize compliance reports:** A platform also simplifies sustainability audits by generating accurate reports for leak rates and periodic investigations, repairs and verifications, refrigerant inventory levels, chronically leaking components, retrofitting or retiring components not repaired, and more.

As a result, retailers remain compliant, de-risking massive fines and penalties from authorities.

Tightening leaks present an estimated cost savings of $108 million annually for the industry. Further, reporting near-zero refrigerant leak-related incidents enables brands to demonstrate their energy maturity to compliance authorities, investors, and customers to drive business value. Additionally, retailers who achieve this enjoy the benefits of lower insurance premiums, reduced operational costs, improved profit margins, higher energy efficiency, and refrigeration performance.

This is not just possible—but simple to implement, scale across the portfolio, and realize savings in a few weeks—thanks to cloud supervisory platforms!

Declutter refrigeration & energy management with a cloud-based platform

The biggest hurdle to embracing sustainability initiatives is the perception that energy is either just a cost to be managed or that strategically managing it is prohibitively expensive.

**We hope this whitepaper has disabused anyone of that notion.**

At the core of all energy management challenges is the problem of silos, which creates challenges to benchmark and manage energy strategically across the enterprise, caused by multiple point systems at every store and decentralized ownership of energy initiatives.

The Solution?

A hybrid overlay (cloud supervisory) software platform that can seamlessly apply to different retail O&M needs, scale effectively across the portfolio, and empowers O&M teams to focus less on managing data and software.

The hybrid overlay is not specific to just one system, store, or function but can be applied across silos. It combines the simplicity of point solutions and the power of platforms to make them useful in different O&M contexts to:

- **Consolidated operational data:** Overlays democratize operational data by consolidating and centralizing it.

- **Consolidated software functionality:** Overlays optimize operations by offering software functionality across silos from a single interface.

- **Enhanced stakeholder value & operational efficiency:** Unlock value for more stakeholders and enable use cases to improve O&M processes.
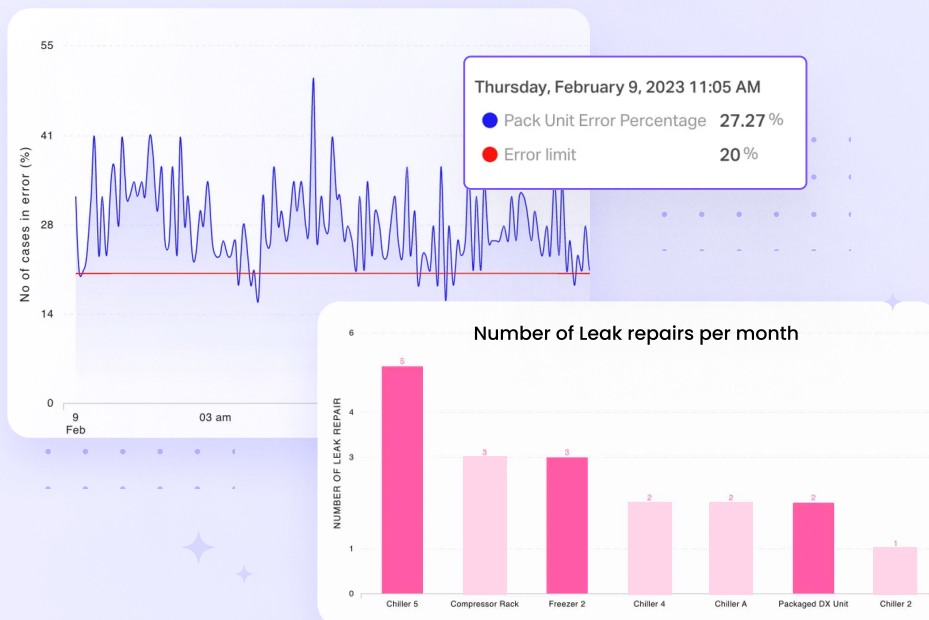
# Capabilities to look for in a cloud-based supervisory platform
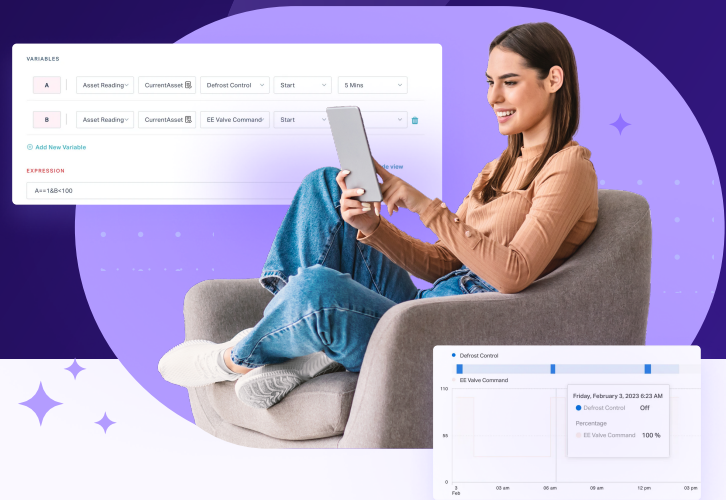
A cloud supervisory platform built on the distributed platform-based hybrid overlay principles enables O&M teams with everything they need to increase portfolio-wide profitability and consumer value.

Here are some key capabilities to look for in a cloud-based platform to enable enterprise-wide energy efficiency:

- **Connected Telemetry Data:** Reduce commissioning setup time to just days, monitor real-time equipment health and system performance, and eliminate the tedium of fragmented data analysis.

- **Energy Analytics & Dashboarding:** Drill down analytics and dashboards to study energy patterns—daily, hourly, and monthly usage, portfolio benchmarking, store-level heatmaps, and more.

- **Cloud Command and Control:** Execute complex energy optimization strategies with remote command & control; monitor system response & optimization status, and switch strategies on/off as required.

- **Fault Detection & Diagnostics + Root cause analysis:** Centralize alarm management, identify sensor faults, anomaly detection in system/asset schedule, command, performance, or energy consumption. Further, weed out false alarms with smart correlation and filter alarms based on the root cause to perform actions based on alarm rank and associated cost.

- **Automated Work Orders:** Integrate the platform with your existing CMMS/tools to automate mobile-first workorder, templates, integrated inventory, calendar-based dispatch, customized response workflows, and invoicing.
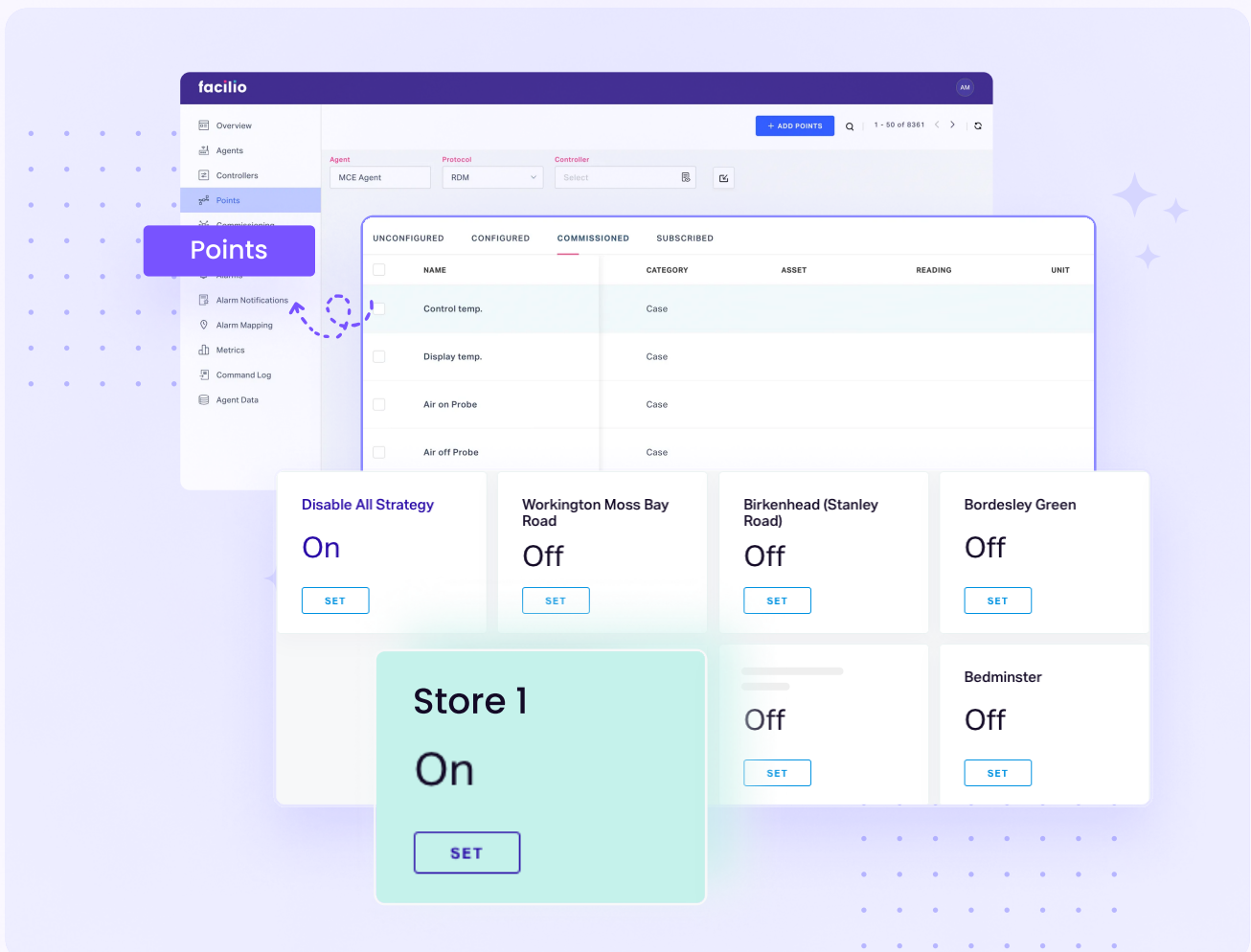
Reimagining store operations with a future-proof approach to energy management

Your current retail O&M technology, viz-a-viz, outdated software from automation vendors, dead-end alarm management tools, poor workflow stitches, or expensive system integration efforts—are primarily flawed and failing you.

Vendor data lock-in and lack of interoperability put you on the back foot to realizing any efficiency gain while revenue-generating O&M opportunities remain untapped. Often, the key is not to add new systems but to reimagine the existing ones to make the most of them.

Facilio's IoT Edge and Cloud Supervisory Platform is a revolutionary approach to connecting people, processes, and systems in meaningful ways to create truly connected stores. It enables you to modernize portfolio-wide store operations and reduce refrigeration & energy costs—with the ability to accommodate all your future needs and scale with your evolving operational needs.

A powerful platform like Facilio, coupled with the right refrigeration & energy management strategies and a thorough understanding of the current energy landscape, will be key to operational excellence in 2023 and beyond

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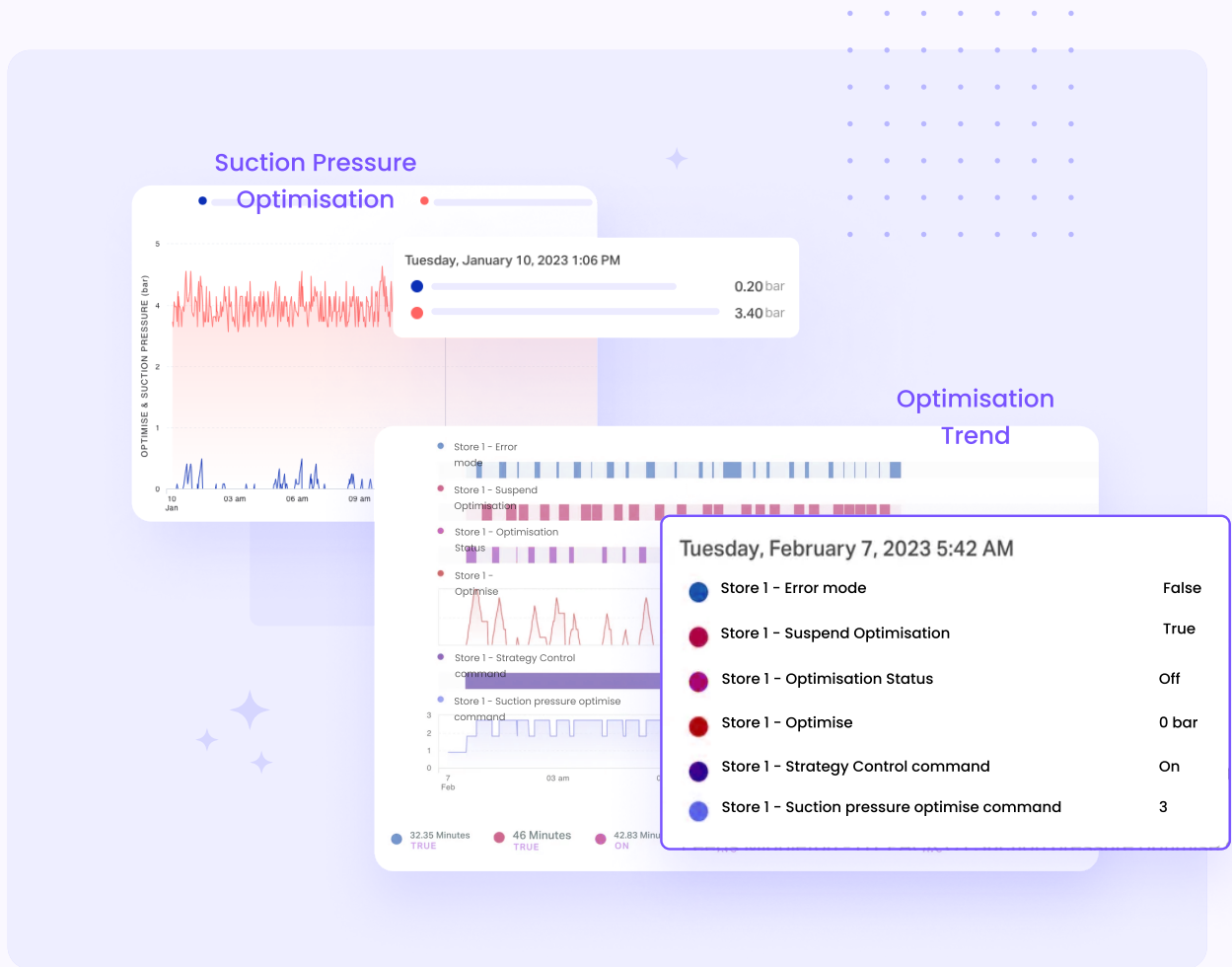
Explore Facilio's Connected Refrigeration features

Learn more

Talk to a product expert

Book a demo