

Total cost of ownership analysis: supermarket alarm monitoring

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EMERSON[™]
Climate Technologies

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Preface

The typical 1,000-store supermarket enterprise spends \$380 million every year on energy, maintenance, labor and refrigerant and operates on razor thin margins of 2-5%. To businesses with such lean profit profiles, operational efficiency and best practice implementation are functional imperatives that provide a significant competitive advantage. While operational excellence is a continuous pursuit of retail businesses, innovations in information and communication technology and have unlocked unprecedented methods of cost reduction through data analysis.

Assets and support processes, once opaque cost centers, have evolved into data-creating dynamos that enable more intelligent decision making and more efficient operations. HVAC/R equipment no longer simply runs until failure, but rather provides a constant stream of data about energy consumption and performance, allowing capable retailers to respond proactively before catastrophic failures occur.

The impact of data management is evident in many facets of retail management from the transportation and storage of merchandise to the maintenance of the store itself and ultimately the point of sale. This white paper focuses on one key business development necessitated by the growing availability of smart systems and their resulting data streams – the operations monitoring center.

Monitoring centers serve many purposes and offer varying levels of value ranging from simple alarm notification to advanced failure prediction and proactive analysis and optimization. Retailers typically use monitoring centers to process and triage equipment alarms (such as high freezer case temperatures), collect and analyze energy data, and aid in the appropriate resolution of maintenance issues. Centrally aggregating store alarms allows trained technicians to remotely triage and quickly perform tasks that would require hours of manual recording and investigation by store personnel.

A monitoring center is a necessary part of capitalizing on the potential of data and analytics to reduce costs and improve profits, but many retailers wonder how to best deploy and utilize monitoring center functionality. Is it better to build capacity and monitor stores internally or form a partnership with a 3rd party provider? Unsurprisingly, the answers lie in the basic truths that have always defined retail success: focus on core competence, intimate relationships, economies of scale and comparative advantage.

Executive summary

Monitoring centers deliver value in three key ways: they ensure prompt, accurate diagnosis of alarms to prevent perishable food loss, they reduce the cost of maintaining the retail facility by optimizing service dispatches, and they enable advanced energy and operational analytics which can further reduce operating costs.

Monitoring center value drivers

- 1) Prevent food loss
- 2) Optimize service dispatches and maintenance
- 3) Enable advanced energy and operational analytics

A typical supermarket has over \$300,000 of meat, dairy, seafood and frozen foods in its cases at any one time. If refrigeration equipment fails and high-temperature alarms are not being monitored, stores risk losing valuable merchandise as well as customer loyalty. Manually monitoring these alarms at the store level requires significant employee attention as they must record case temperatures, investigate alarms, and request service dispatches when necessary. This process is imprecise, uncontrolled, and can lead to unnecessary food loss events.

By utilizing a monitoring center to collect and manage alarms that are generated by the building management system, a supermarket can avoid \$1,000,000 of labor and perishable shrink expenses every year. Monitoring centers also provide historical alarm data which allow management to identify stores with unusually high alarm counts- a sure sign of an ill-maintained store- and target those stores for improvement.

A purely quantitative analysis estimates the total cost of owning and operating a monitoring center for a 1,000 store supermarket enterprise at over \$5.5 Million per year. Over

95% of these costs are for the labor required to handle and triage the complex stream of data twenty four hours a day. Not included in these costs are the hugely daunting implementation obstacles that accompany such a large project. Horror stories abound of retailers who attempted to develop data monitoring, storage, and analysis capabilities without the proper experience in enterprise data management. These operations became plagued by unreliable systems, lost data and a myriad of problems they were ill-equipped to solve.

For this reason, Emerson recommends that retailers outsource the monitoring of business-critical refrigeration systems. Remote services providers with extensive refrigeration experience can mitigate the high costs of operating a monitoring center by aggregating services at a shared center of excellence and supporting multiple retail operations. By partnering with an industry expert with proven monitoring infrastructure, retailers can enjoy the benefits of remote alarm monitoring and diagnostics at a fraction of the cost and risk of building and maintaining a monitoring center internally. Retailers who choose Emerson as their monitoring partner also get access to Emerson’s supporting ProAct® solutions which leverage data analytics to further reduce energy and maintenance expenses.

Alarm monitoring centers

Value and cost of ownership

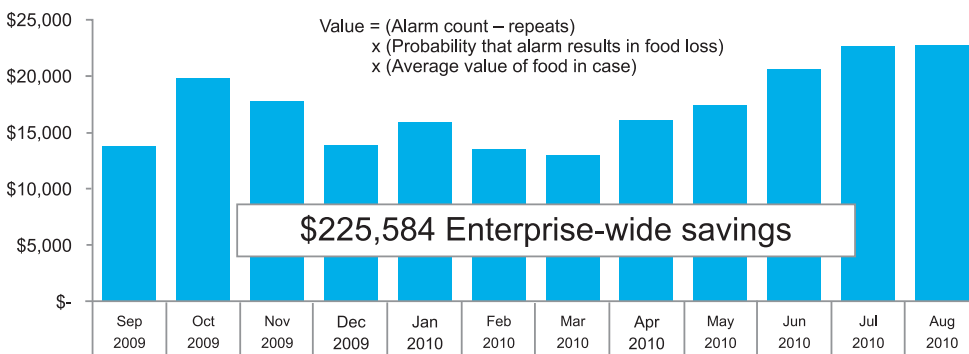
Supermarkets rely on energy management systems to efficiently operate the compressors, valves, condensers, fans, cases and lights that support a well-functioning store environment. But buying and installing an energy management system (EMS) is not the same as capitalizing on its abilities. Maintenance personnel and store management are supposed to periodically review the system and investigate alarms, but the reality of retail management is that there is

always more to do than time to do it. Alarms are ignored, equipment deteriorates, and food loss events occur.

Many supermarkets are now centrally monitoring energy and refrigeration systems to ensure their ongoing optimization. Most energy management systems are web-enabled via either a modem or IP connection, allowing refrigeration technicians to receive and triage alarms from anywhere in the world. Remotely monitoring store alarms simplifies store operations and delivers value to all levels of the organization. Executives are happy because investments in energy management systems are protected and profitability increases, energy and maintenance managers get more control over dispersed operations, store managers are able to focus on retailing, and maintenance technicians save time by having alarms remotely triaged prior to dispatch. But refrigeration systems are complex and remotely triaging thousands of alarms every day is more complex still. Effectively monitoring store alarms requires the perfect combination of refrigeration and data management expertise.

Supermarket control systems can alarm for several different reasons: the temperature of a refrigerated case could be outside of its acceptable range, a compressor could be coming out of defrost or a system component may have failed. Darrin Billotte – Operations Manager at the Emerson ProAct® Service Center – identified over 1,000 unique alarm types in a sample annual alarm registry. Without central monitoring, store personnel are responsible for identifying and resolving not only the alarm itself, but also, and infinitely more importantly, the root cause of the alarm. This process takes time and results in two diametrically opposed errors which cost retailers thousands of dollars every year: food loss events and unnecessary service dispatches.

Food loss prevention value



Assumptions for value calculation	
Average value per fixture	\$1,000
Probability that alarm condition will result in food loss	0.20%

Typical store contents	
Frozen food	\$90,000
Dairy	\$50,000
Meat, bakery, deli, seafood & produce	\$200,000
Total	\$340,000

Figure 1

Food loss prevention

Food loss events are costly, and their damaging effects extend beyond the value of the lost product to include labor costs, customer stress and the negative reputation that can accompany compromised product.

Monitoring centers with effective alarm monitoring can identify issues and respond to alarms before any product is lost. A typical supermarket has around \$340,000 of perishable contents on display at any one time. If only 2 out of every 1,000 alarms results in a lost case (a very conservative estimate), the savings from appropriately handling high-temp alarms quickly adds up to a real impact on operating profit (see **Figure 1**). During one study that Emerson conducted with a customer over the course of one year, the customer avoided \$3,000 of food loss per store- \$225,000 across the 75 store enterprise.

Maintenance efficiency

A reactionary response by store personnel to alarms results in a different kind of cost- unnecessary service dispatches and lost employee productivity. As previously noted, alarms can stem from a variety of issues ranging from those requiring immediate attention to temporary or innocuous temperature variations. Correctly identifying the severity of the alarm and the proper course of action requires historical context, industry experience and supporting data. Without these key tools, store managers are justified in defaulting to a service dispatch, but proper analytics can vastly improve this process.

Emerson's ProAct® Service Center handles over 350,000 alarms every month and of those alarms nearly 1/3 can be filtered and disregarded and still more are resolved remotely without a service dispatch. Without a remote monitoring facility, store personnel must acknowledge and assess each

alarm to determine if it will affect food quality and store operations. By avoiding the time and dispatch costs associated with handling these alarms, the same customer who avoided \$225,000 of food loss also saved \$770,000 in maintenance expense over the course of one year (see **Figure 2**).

Alarm management

If a store has an intelligent control system and is utilizing a monitoring center, alarms are automatically forwarded and logged into a central database. Some monitoring centers are able to make the significant investment in engineering to develop software programs that filter out and track previously addressed and repeat alarms, drastically improving system efficiency. These programs identify new alarms which are investigated by monitoring technicians according to custom, pre-established workflows. The technicians then filter out and monitor non-critical alarms, triage critical alarms, and provide recommended actions to store personnel along with a detailed description and real-time condition report. This process (see **Figure 3**) greatly reduces the time and energy that store personnel have to spend responding to alarms and ensures that correct preventative actions are consistently and effectively taken. Event lifecycles and history reports also provide store management with documentation of alarms and increased visibility into their store's operations.

Such detailed, systematic handling of alarms is an example of how data generation and analysis is helping retailers streamline their operations and reduce operating costs, directly improving store profitability. To match the additional profit provided by avoiding \$770,000 of maintenance expense and \$225,000 of perishable shrink, a company with a 7% margin would need to increase net sales by more than \$14 Million! But the monitoring systems that enable these savings are costly to operate and require huge investments of physical and intellectual capital.

Maintenance efficiency value

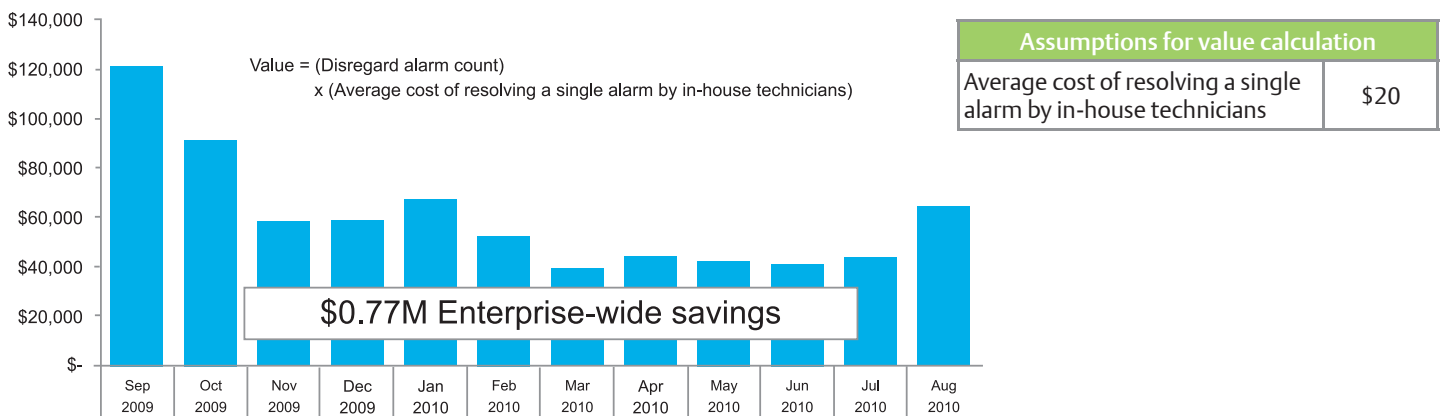


Figure 2

Building a monitoring center requires three main components in addition to immense amounts of time and creative energy: IT infrastructure, trained personnel, and supporting systems. Our conservative analysis based on actual incurred costs and alarm counts established that a chain with 1,000 stores would need \$5.5 million to operate a monitoring center for one year.

Firstly, a monitoring center must have servers to store the flow of data, software and IT systems to manage the data processes, and phone systems to handle dispatching. Secondly, monitoring centers need trained refrigeration technicians to analyze alarms, IT personnel to maintain the IT infrastructure and management to oversee the entire operation. All of these people must be available 24 hours a day, 7 days a week to handle critical alarms and ensure system continuity. Systems also must be supported by backup generators and uninterruptable power supplies,

servers need to be duplicated to prevent any data loss, and security must be ensured against foreign intrusion. Add to these responsibilities the management costs of handling additional payroll, health benefits and training costs and the total investment quickly becomes prohibitive.

However, the economic truths of economies of scale and specialization allow third party specialists to develop sophisticated monitoring systems that can support multiple operations and distribute these costs amongst several retailers. Shared services allow retailers to focus on their customers and enjoy the benefits of data monitoring at a minimum cost.

Partnering with an experienced monitoring center allows retailers access to proven alarm handling algorithms, knowledgeable personnel, and secure databases at a fraction of the price of building these capabilities from scratch. Scale and price are not the only things that differentiate companies offering energy and alarm monitoring services. Finding the

Alarm monitoring

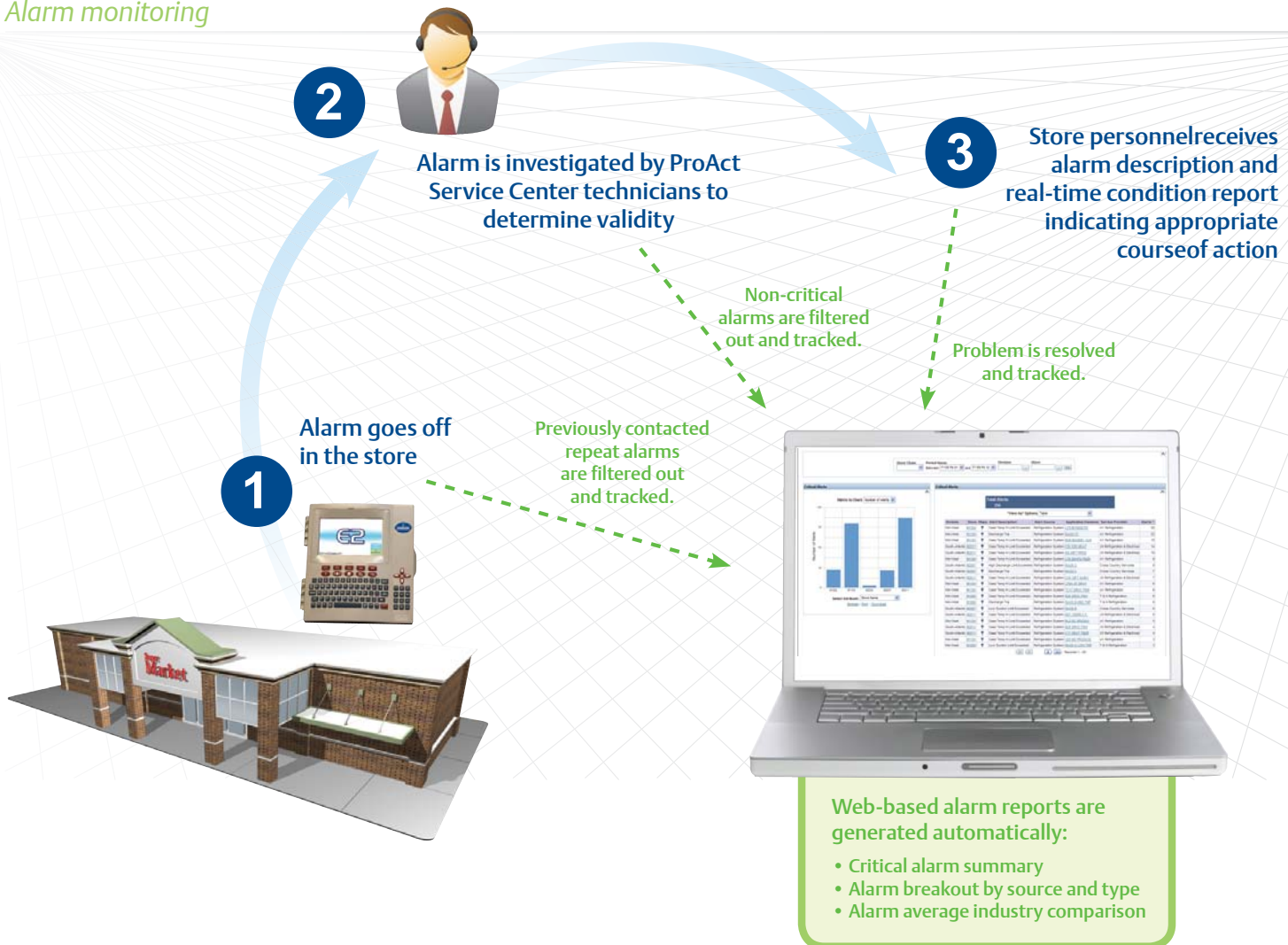


Figure 3

right monitoring partner means finding a company with proven expertise in the refrigeration and energy management field and the ability to create a complete solution tailored to your organization.

The benefits of automating the capture of refrigeration and energy data are vast and save supermarkets millions of dollars every year. As technology costs decrease and food costs increase it is more important than ever for businesses to work proactively to protect their assets and optimize their maintenance processes. The good news is that solutions exist, and they are proven. Partnering with a qualified, experienced refrigeration expert can unlock hidden profits within your organization and provide you with access to the data that will make your business more efficient today and better prepared for tomorrow.

Intelligent Store® architecture

Integrating facility hardware with Emerson’s ProAct® service offerings allows retailers to capitalize on their infrastructure investments and further reduce operational costs. Over time, efficiencies gained from infrastructure investments will erode if not properly maintained. Emerson’s facility experts offer free analysis of operational data and prescribe a customized set of solutions to target areas needing improvement. For free operational cost analysis, contact us at RetailSolutionsMarketing@Emerson.com. For more information on Emerson’s ProAct services, visit EmersonClimate.com.

Cost of monitoring center ownership*

Sites & Alarms	Number of Stores	1,000
	Calls Per Day Per Store	5
Labor	Technicians Per Shift	30
	Number of 8 Hr Shifts	3
	Cost Per Year Per Technician	\$58,000
	IT Personnel	.5
	Salary of IT	\$70,000
	Management Personnel	2
	Salary of Management	\$70,000
	Training Costs	\$10,000
Infrastructure	Call Center Software	\$20,000
	Phone Systems	\$20,000
	Number of Servers	4
	Cost Per Server	\$30,000
	Server Life (Years)	5
	Database Costs	\$10,000
Operational Costs	Cost of Phone Calls	\$124,000
Annual Monitoring Costs	Labor	\$5,405,000
	Infrastructure	\$74,000
	Operational Costs	\$124,000
Total Cost of Ownership		\$5,603,000

*1,000 store supermarket chain

About Emerson

Emerson (NYSE:EMR), based in St. Louis, Missouri (USA), is a global leader in bringing technology and engineering together to provide innovative solutions for customers in industrial, commercial, and consumer markets through its network power, process management, industrial automation, climate technologies, and appliance and tools businesses. Sales in fiscal 2009 were \$20.9 billion. For more information, visit Emerson.com.

About Emerson Climate Technologies

Emerson Climate Technologies, a business of Emerson, is the world's leading provider of heating, air conditioning and refrigeration solutions for residential, industrial and commercial applications. The group combines best-in-class technology with proven engineering, design, distribution, educational and monitoring services to provide customized, integrated climate-control solutions for customers worldwide. The innovative solutions of Emerson Climate Technologies, which include industry-leading brands such as Copeland Scroll and White-Rodgers, improve human comfort, safeguard food and protect the environment. For more information, visit EmersonClimate.com.

About Retail Solutions

Retail Solutions, part of Emerson Climate Technologies, is the leading provider of energy and site monitoring services for the U.S. supermarket, retail, convenience store and restaurant industries. The company offers a comprehensive array of technologies and services, including remote equipment monitoring, food quality and safety monitoring, power monitoring and energy efficiency analysis, mechanical and control system engineering, energy efficiency project management and service dispatch. Retail Services is headquartered in Atlanta. For more information, visit EmersonClimate.com

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