

# Energy Management at ExxonMobil

Read the whole case study!

END-TO-END SOLUTIONS  
E2 FACILITY MANAGEMENT SERVICES

Case Study

## Achieving Energy Efficiency

### Results

- 17 percent average potential reduction in electrical energy consumption
- Savings of \$4,000 to \$8,000 per store, totaling over \$2 million per year across a 500+ store U.S. enterprise, or \$7 million since program inception
- Average savings of 65,000 kWh per year per store
- Improved product quality, shelf life and safety
- Sustainable benefits equal to planting over 815,000 trees every year
- Reduced store maintenance cost
- Increased facility equipment life

### Customer

ExxonMobil is one of the world's leading gas station and convenience store chains, selling its products through 33,000 branded locations globally, including 3,000 company-operated sites.

### Challenge

Looking for a way to remotely control equipment and ultimately energy costs across a very large network of stores, ExxonMobil's company-operated sites across the U.S. ExxonMobil turned to Emerson Climate Technologies for help controlling its in-store equipment and lowering its annual energy bill.

ExxonMobil worked with Emerson Climate Technologies to install an energy management system that would deliver both energy and maintenance savings. ExxonMobil wanted to be able to communicate remotely with its stores, log data collected from the operation of HVAC, refrigeration, and lighting equipment, and to develop a real-time monitoring solution that addresses alarms automatically.

### The Emerson Solution

- E2 Facility Management System
- ProAct® Facility Monitoring Services

After successfully completing a pilot program in Houston during 2009, ExxonMobil experienced the reduced energy and maintenance costs that are inherent to Emerson's systems. As a result of their improved operation, ExxonMobil requested Emerson install the E2 CVF Facility Management System in an additional 600 stores around the world. The E2 CVF is a state-of-the-art system designed to control in-store HVAC, lighting, indoor and outdoor lighting, refrigeration systems and glass door anti-condensate heaters.

The E2 controls indoor air quality by running the HVAC systems based on common operational setpoints established by ExxonMobil's corporate offices. The E2 regularly requests changes in these setpoints. In doing so, Emerson Climate Technologies helps ExxonMobil maintain ideal comfort levels while still reducing energy levels. ExxonMobil was able to provide a consistent shopping and working environment for its customers and employees.

Emerson Climate Technologies also installed Anti-Condensate Door Heater controllers in the glass doors associated with the walk-in coolers and freezers. The E2 pulses anti-condensate heaters based on the door's dew point, ensuring the frame temperature is slightly above the ambient dew point. By reducing the run time of the door heaters, ExxonMobil was able to achieve upwards of 40% reduction in the amount of energy used by the door heaters while maintaining clear glass.

EMERSON. CONSIDER IT SOLVED.™



"ExxonMobil has saved millions of dollars in both energy and maintenance costs - more than we originally thought possible. A comprehensive program including Emerson equipment, on-site monitoring, and store employee and manager training can be very effective, both financially and environmentally. ExxonMobil has been pleased with the results that Emerson has helped us obtain."

Herb Shatzem  
Engineering Manager  
Global Asset Management,  
ExxonMobil Fuel Marketing



# Background

- Energy costs rising
- Maintenance costs increasing & not well understood
- Each location operating with different energy and maintenance policies
- Food safety was a growing concern
- ExxonMobil needed a system to help
  - Control energy usage
  - Reduce maintenance
  - Standardize HVAC, lighting, and refrigeration operation



# ***Reasons & Goals of Project***

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- Reduce Energy Consumption At Retail Sites
  - Rising Energy Cost
  - Optimize HVAC And Refrigeration Set-points
  - Maintain Uniform Control Of All Stores
  - Remove Human Element
- Assure Food Safety And Quality At Locations
  - Communication To Refrigeration Equipment
  - Logging Of Equipment Operation And Temperatures
  - Accurate Control Of Temperature
- Create A Communication Network To The Store Equipment
  - Ability To Communicate With Store Equipment
  - Portal For Additional Equipment To Communicate In Future

# Implementation

- 550 Sites Installed & Operating
- Integrated Monitoring Critical to Maximize System Benefits
- Savings Equal 23.4 Month ROI

<b>Electrical Savings</b>	Avg. Annual Savings Of \$3,050 Per Site
<b>Gas Savings</b>	Avg. Annual Savings Of \$530 Per Site
<b>Maintenance Reduction</b>	\$1,000 Annualized Per Site
<b>TOTAL ANNUAL SAVINGS</b>	<b>\$4,580/Site</b>



# ***Summary***

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- Documented Reduction in Service Calls
- 10%-15% Reduction in Energy Costs
- Documented \$1,000 per Site Maintenance Savings Annually
- Food Safety And Quality
- Product Loss Prevention
- Payback Period Within 24 Months  
(Energy & Maintenance Cost Reduction)

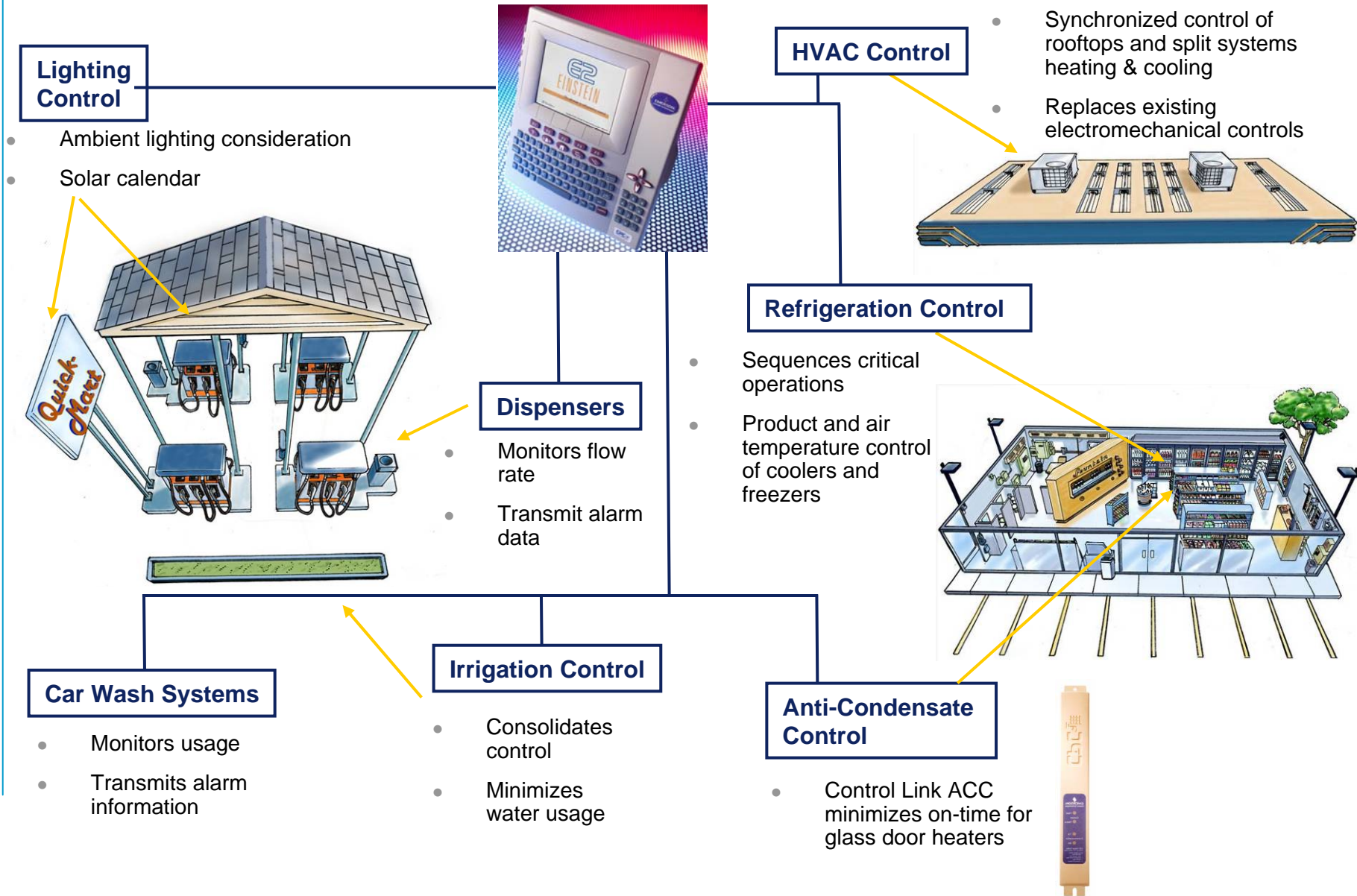
# ***About Energy Management in Convenience Stores***

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**EMERSON**<sup>™</sup>  
Climate Technologies

# What's In A Modern Facility Management System?



# Emerson's E2 CX Facility Management System

- Energy reductions average 10-15% /year
- Maintenance savings \$1000-\$2000 /year with monitoring services
- Data logging capabilities for
  - Food safety
  - Temperatures
  - Service actions
- Supports standard Internet protocols for easy external site access
- Color screen and intuitive interface with color screen reduces service time
- Field sensitive help screens makes programming and troubleshooting easier



# ***Custom Enclosures Minimize Installation Time***

- Panels contains I/O boards to control equipment and receive information from sensors throughout the store
- Compact design
- Up to 35% faster installation
- Great for retrofits or new store construction
- May be installed by Emerson or your service provider



# Anti-Condensate Control

- Minimize energy used to clear glass doors by pulsing heaters according to humidity & temperature
- Patented control algorithm maximizes energy savings
- Localized dewpoint sensor increases accuracy
- Installable by OEM's or as part of a retrofit program



# Remote Access Software

The screenshot displays the CPC Remote Access Software interface within a Microsoft Internet Explorer browser. The main window shows a tree view on the left with a selected site, and a central pane titled 'Activity History - Results' displaying a table of activities. Below this, a second table shows a detailed view of activities for a specific site.

Activity	Started	Duration	User	Target	Result
Backup Unit	2/15/05 10:40 AM	00:00:00	chasek	Store's Directory + Stores Desk + E2	Completed on February 15, 2005 10:40:43 AM EST
Backup Unit	2/15/05 10:39 AM	00:00:00	chasek	Store's Directory + Stores Desk + E2	Completed on February 15, 2005 10:39:11 AM EST
Initiating Terminal Mode	2/15/05 10:28 AM	00:00:00	user	cgi + Demo Site + E2 + E2:800.1.7853.824	Completed on February 15, 2005 10:28:59 AM EST
Initiating Terminal Mode	2/15/05 10:28 AM	00:00:00	user	cgi + Demo Site + E2 + E2:800.1.CPC-050C	Completed on February 15, 2005 10:28:48 AM EST
Initiating Terminal Mode	2/15/05 10:24 AM	00:00:00	user	Store's Directory + Stores Desk + E2 + 1 0.177.1.7853.824	Completed on February 15, 2005 10:24:38 AM EST
Backup Unit	2/14/05 11:22 AM	00:00:04	user	Store's Directory + Stores Desk + E2 + E2:800.1.CPC-050C (internal)	Completed on February 14, 2005 11:22:09 AM EST
Backup Unit	2/14/05 4:35 AM	00:00:00	user	Internal Lan / VPN + Store 153 + E2	Completed on February 14, 2005 4:35:09 AM EST
Backup Unit	2/14/05 1:08 AM	00:00:00	user	cgi + Demo Site + E2	Completed on February 14, 2005 1:08:00 AM EST
Backup Unit	2/14/05 11:52 AM	00:00:00	user	Internal Lan / VPN + Store 153 + E2	Completed on February 14, 2005 11:52:11 AM EST
Initiating Terminal Mode	2/14/05 11:52 AM	00:00:00	user	E2:800.1.CPC-050C	Completed on February 14, 2005 11:52:11 AM EST

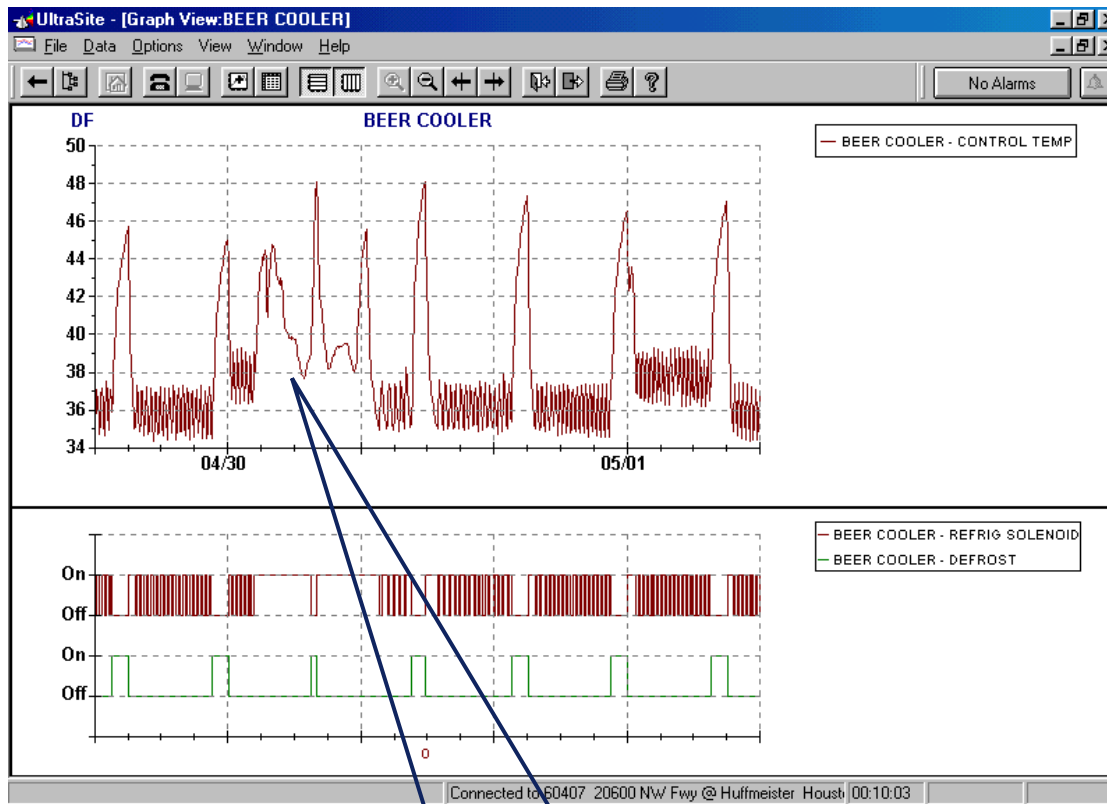
  

ActivityID	Completed	Queue	Site	Result
Media Personal Synchronization	2/15/05 17:03	00:00:00	Internet Connected + Store 101 + E2 + E2:800.1.CPC-050C	Completed on February 15, 2005 17:03:00 EST
Media Personal Synchronization	2/15/05 17:03	00:00:00	Internal Lan / VPN + Store 153 + E2 + E2:800.1.CPC-050C	Completed on February 15, 2005 17:03:00 EST
Media Personal Synchronization	2/15/05 17:03	00:00:00	Internet Connected + Store 101 + E2 + E2:800.1.CPC-050C	Completed on February 15, 2005 17:03:00 EST
Media Personal Synchronization	2/15/05 17:04	00:00:00	Internet Connected + Store 101 + E2 + E2:800.1.CPC-050C	Completed on February 15, 2005 17:04:00 EST
LAN Discovery	2/15/05 18:39	00:00:00	Internal Lan / VPN + Store 011 + E2 + E2:800.1.CPC-050C	Completed on February 15, 2005 18:39:00 EST
Media Personal Synchronization	2/15/05 19:13	00:00:00	Internet Connected + Store 101 + E2 + E2:800.1.CPC-050C	Completed on February 15, 2005 19:13:00 EST

- Server or PC based, and accessible from any web browser
- Allows automatic data acquisition from a single location or an enterprise of thousands of sites
- Easy graphical tools allow anyone to build custom floorplans and screens
- Data may be graphed for easy troubleshooting and analysis

# Remote Diagnosis Makes Troubleshooting Easy

## Door Open On Beverage Cooler



Observed temperature spikes  
(May also be monitored with  
door sensor)

### Issue

- Open doors cause increased energy usage
- Increased wear on store equipment
- Warm product

### Action

- Avoided service call
- Simple call to store manager corrected problem
- Behavior modifications when employers/vendors know they are being observed

# Facility Monitoring & Call Center Services

- Alarms from sites aggregated on secure website
  - Ensure action on alarms
  - Can be viewed at any by authorized user
  - Emerson can periodically analyze persistent alarms to determine cause and coordinate solution
- Setpoint Verification
  - Ensures only approved official setpoints are in use
- Temperature Monitoring
  - Provides data storage of case temperatures for food safety initiatives
- Dispatch —
  - Eliminate unnecessary service calls



**Typical Savings - \$1,000 Per Year Per Site**

# ***Project Management***

- Flexible project management services coordinate multiple nationwide installations with ease
- Ability to manage large nationwide projects across multiple markets
  - Anti-condensate heater controls, c-store systems, condenser fan controls, VFD systems
- Complete turnkey or installation only options:
- Timely project implementation answers foster paybacks on your investment



# Due Diligence Done



- BP
  - Interviewed 38 control companies
  - Tested 8
  - Chose Emerson

**ExxonMobil**

- ExxonMobil interviewed numerous companies
  - Tested Profile Systems & Emerson
  - Chose Emerson



- Quick Trip
  - Interviewed 10 control companies
  - Tested 2
  - Chose Emerson

# Convenience Store Experience

## Current Customers

- ExxonMobil
  - Over 1,500 sites worldwide
  - U.S., South America, Canada, Europe
  - Monitoring
  - Project Management
- Royal Farms
  - 120 sites installed
- QuikTrip
  - 500 sites nationwide
- Kwik Trip
  - Over 70 installed sites
- BP
  - 250 installed sites
- Quick Chek
  - 100+ installed sites

**ExxonMobil**



# ***In Summary***

- Reduced Maintenance Costs
- Energy Savings
- Extend Equipment Life
- Food Safety Programs
- Better Business Insight
- Enhanced Profitability

Facility controls	12-18% Energy Reduction
Maintenance	\$1,000 /site /year
Project Management	30% faster installations
Product Loss	\$500 /site /year
Food Safety (Combination of controls & Monitoring)	\$2,500 /site /year. (est.)
<b>TOTAL</b>	<b>~\$8,000 + /site / year potential</b>

**ROI of 2 Years or Less**

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## The Emerson Solution

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After successfully completing a pilot program in Houston during 2003, ExxonMobil experienced the reduced energy and maintenance costs that are inherent to Emerson's systems. As a result of their improved operation, ExxonMobil requested Emerson install the E2 CX Facility Management System in an additional 800 stores around the world. The E2 CX is a state of the art system designed to control in-store HVAC units, indoor and outdoor lighting, refrigeration systems and glass-door anti-condensate heaters.

The E2 controls indoor air quality by running the HVAC system based on common operational setpoints established by ExxonMobil's corporate office. The E2 regularly reports changes in these setpoints. In doing so, Emerson Climate Technologies helps ExxonMobil maintain ideal comfort levels while still reducing energy levels. ExxonMobil was able to provide a consistent shopping and working environment for its customers and employees.

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Engineering Manager  
Global AssetManagement,  
ExxonMobil Fuels Marketing



Realizing that the walk-in cooler and freezer are significant contributors to the energy usage of a store, Emerson and ExxonMobil initiated another pilot program in 2007. This program implemented a strategy in select sites that notified both store personnel and Emerson's ProAct Service Center if a cooler or freezer door was open for more than 10 minutes. Should the door be open for more than 10 minutes, an alarm horn sounds in the store. To encourage the door to be kept closed during stocking, the E2 keeps the interior light on for 20 minutes after the door is opened. Although a reset button is provided to temporarily silence the horn, an alarm will be sent to Emerson, should the door be open for more than 20 minutes. More importantly, the behavior of ExxonMobil's store employees has been modified to be more aware of the energy cost due to open refrigeration doors.

By maintaining proper temperature levels, automatically adjusting the temperature setback during low-demand periods and implementing glass-door heaters, Emerson Climate Technologies was able to reduce the total energy used by the refrigeration systems by as much as 30 percent. As a result of the enhancements described here, ExxonMobil also experienced improvements in its food quality and product shelf life.

Another innovative energy saving technique developed in conjunction with the 2007 pilot program is control of the water heater. During times of low usage, from 11PM to 4AM, the water heater is automatically deactivated to reduce energy usage. Furthermore, when outside lights are activated, the water heater is temporarily deactivated to limit electrical demand charges at the site. Emerson has been able to lower ExxonMobil's peak demand at each location where an E2 is installed.

Emerson also helped ExxonMobil address its outdoor lighting. Many stores did not have any lighting control before the installation of the E2. By using a light level sensor, the E2 was able to turn on individual outdoor lighting fixtures based on actual light levels. With true light level control, the exterior lighting runtime was reduced by an average of one hour per store during morning hours and one hour per store during evening hours. As a result, Emerson found that the E2 has saved an average of two hours of runtime per day at these locations.

Emerson has aided ExxonMobil's maintenance personnel in identifying system failures quickly and accurately. Through ProAct remote monitoring services, Emerson is able to pinpoint stores with equipment or setpoints that are not operating at optimal efficiency. Adjustments are often made remotely through the E2, and historical data is evaluated and analyzed. The equipment at each location is now running more efficiently, resulting in an approximate savings of \$1,000 per site per year in maintenance and equipment life.

Also in the 2007 pilot program, several stores have started to take advantage of Emerson's Enhanced ProAct monitoring services, which monitors the conditions of store equipment for energy efficiency, equipment failure and even preventative maintenance in some cases. When an alarm is received from these sites, Emerson automatically validates the alarm, filters the alarm as critical, non-critical, or notice and transfers the relevant information to the appropriate maintenance organization.

"ExxonMobil has saved millions of dollars in both energy and maintenance costs - more than we originally thought possible," said Herb Shatzen, engineering manager for the Global Asset Management division of ExxonMobil Fuels Marketing. "A comprehensive program including Emerson equipment, above-site monitoring and store employee and manager training can be very effective, both financially and environmentally. ExxonMobil has been pleased with the results that Emerson has helped us obtain."

As a result of their experience with Emerson Climate Technologies, ExxonMobil has called upon Emerson's expertise to help lay the groundwork for future new-store designs, and has partnered with Emerson to develop new energy saving technologies. Thanks to this relationship, future stores will become even more efficient and reliable, resulting in millions of dollars in maintenance and energy savings over the course of several years and a more positive impact on the environment.