The State of Missouri a project by Johnson Controls, Inc.

CASE STUDY OBJECTIVES

With approximately 32 million square feet and hundreds of buildings in its real estate portfolio, the State of Missouri spends $300 million annually to operate and maintain existing buildings. As a result of increasing energy costs, escalating real estate costs, and an ever increasing deferred maintenance backlog, the State announced, in 2005, a plan to reduce Statewide energy consumption by 15 percent by 2010.

Under performance contracting with guaranteed savings, Johnson Controls, Inc. (JCI) was commissioned to project manage the design and implementation of people and technologies to deliver a sustainable design plan to optimize the State's real estate portfolio. The task was to upgrade facilities and control and information management systems in approximately 1,000 buildings into a shared Building Information Management System using a portal that can bring disparate applications together.

This case study will examine the following elements of the project:

- Program and project management
- Integration of existing and new systems
- Real-time communications infrastructure
- Portal, dashboard, analytics, and control technology
- Financial viability of technologies and solution using ROI and energy savings
- Impact of the chosen technologies on energy and other less tangible factors

This case study will explore how the integration of systems can provide operational excellence as well as ease in maintaining individual system functionality by continuously monitoring, diagnosing and taking preventive actions remotely or from a centralized system.

PROJECT OVERVIEW

In early 2007, Johnson Controls and TEAM CO-OP (a consortium of companies that brought technology and application elements to the bundled solution) began the implementation of a $24 million contract to upgrade facilities and control and information management systems in approximately 1,000 state-owned and operated buildings. Phase one of the project included a facilities assessment program to provide the State with a first ever comprehensive look at its real estate portfolio. To facilitate this portfolio assessment and

enable optimum management of facilities, a program needed to connect various silo systems and applications, such as:

- Utility bill management system
- Facilities communications infrastructure
- Building automation controls system
- Energy management system
- Asset condition management system
- Business process and capital planning management system
- Work order system
- Portal system for remote monitoring

Coupled with the installation of Web-enabled building control systems and a low-cost, wireless communications network, the project was guaranteed to save the State $9.5 million for the state every year through reduced energy usage, process improvements in facility automation, monitoring and management, and more efficient real estate portfolio management. On the environmental side, as a result of streaming building control and utility data into a shared network, the State can calculate its carbon footprint, regain control of the costs associated with their portfolio, and generate significant cost and energy savings.

RESULTS

By integrating individual systems and buildings at a common user interface level, operational activities in the various subsystems can be monitored to detect inefficient operating conditions and corrective action can be taken to bring the system back to normalcy. This visibility over its facilities and assets enabled the State of Missouri to achieve the following results:

- Annual savings from the combined projects surpassed $35 million per year (equal to 370 percent of the guaranteed savings of $9.5 million per year)
- Expected payback on investment is about one year
- Reduction in Carbon footprint by:
    - 205,210,232 pounds of carbon dioxide
    - 307, 933 pounds of nitrogen oxide
    - 583,539 pounds of sulfur oxide

PROJECT SCOPE

The overall scope of the project was to implement devices and systems that would allow for a much higher level of monitoring, measurement, management, verification, communication, and interoperability across the entire portfolio of buildings. A new system needed to enable the State to manage its portfolio of facilities from a total cost of ownership perspective and provide executives, managers, and staff the right information on a real time basis. The first task required was to understand how much energy is being used and collect information about expenses and resources and create a total life cycle model around decisive building assets.

Legacy system's incompatibility, outdated information, a lack of historical data, proprietary systems architectures, and dysfunctional operating processes were some of the hurdles which were resolved by the following aspects of the project:

- Integration of existing and new systems
- Design and development of real-time communications infrastructure
- Portal, dashboard, analytics, and control technology deployment

The integration between building automation systems and a wireless communications backbone helped deliver a complete building information management system to the facilities department. As it costs less to get buildings automated when they are built with wireless network infrastructure, wiring costs dropped around 30 percent, allowing Johnson Controls to justify providing enhanced sensing and control capability for the building. The building automation system greatly improved the interaction of mechanical subsystems in the buildings and lead to optimum energy consumption, cost-effective building operations, and improved occupant comfort.

GUARANTEED SAVINGS

Under performance contracting with guaranteed savings, Johnson Controls played the role of the energy service company (ESCO) and accepted the performance risk to achieve the sustainable goals set forth by the State of Missouri. In guaranteed savings contracts, the customer leases the equipment from the financing company (who thereby absorbs this risk). The State's lease payments are assured through the savings guarantees by Johnson Controls. Thus, if savings are less than lease payments, Johnson Controls would make up the difference to the State, and extra savings are retained by the customer.

In retrofit performance contracting, funds to support the performance contracts come out of non-capital budgets for utility payments or operations and maintenance. This method obviates the need to seek approval for capital purchases. In this situation, Johnson Controls not only obtained the financing but also guaranteed the savings, which reduced the State's risk. Consequently, performance contracting can allow energy efficient technologies to be implemented without necessitating capital outlays.

JOHNSON CONTROLS AND TEAM CO-OP

As the program and project manager, Johnson Controls was responsible for selecting and leveraging the cooperative efforts of companies involved in delivering the technology solutions to the State of Missouri. The Team CO-OP alliance was formed under Johnson Control's leadership to deliver a complete building information management system to the State's facilities department including a dashboard of information about their facility operating costs, capital spending and energy spending.

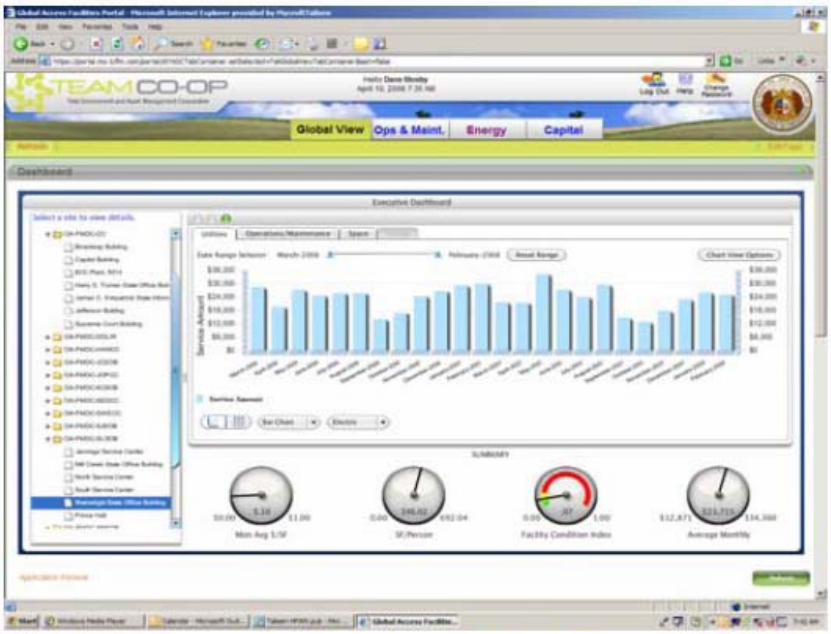
Team CO-OP direct partners for the State of Missouri project include

- ISCO International
- Talisen Technologies
- GridLogix
- Appian
- Johnson Controls, Inc.

The Team CO-OP solution, ESCO 2.0 (Enterprise Sustainability Contract), is a visionary approach to managing a portfolio of facilities from a global and total cost of ownership perspective. The integration of technologies and solutions allowed for a high level of connectivity for a variety of products from multiple manufacturers. Integrating intelligence is not only desirable but also becoming a mandatory requirement to provide clients with the best automation solutions, with the simplest connections to real-time data, Web-based data, and the corporate enterprise.

The key to the solution was to provide executives, managers, and workers with the information they required, on a real time basis, to make smart decisions. Using device networking technology and system integration, an intelligent building can be created, allowing control over virtually every system from a remote location. Based on their respective roles and access granted to individuals, detailed information can be viewed on a particular site, facility or function (that is, energy). Data and control information flow from a wide variety of software applications and Internet-enabled devices that are connected through secure communications to a user portal. Remote location access to all building systems is one of the boons of an intelligent building.

Chart 1 – State of Missouri Facilities Dashboard



There are many technologies that this project leverages to deliver a complete enterprise asset management capability and building information management system. The integration of technologies and solutions included a variety of products from multiple manufacturers, including:

- Talisen Secure Portal
- VFA Condition Assessment and Capital Planning software.
- IDS Energy Witness software
- Archibus CAFM and Space Planning software
- Appian Process Management and Orchestration software
- Armstrong SteamStar
- Microsoft SQL Server
- Cisco Systems IPICs
- Gridlogix EnNet Framework
- Dell Servers
- Sprint PCS Broadband
- Johnson Controls Metasys

Of course, an enterprise-wide project of this magnitude doesn't happen all at once. The deployment of these technologies was staged over the course of two years, delivering more value as the level of integration across the various technologies increased and facilitated the delivery of portfolio-wide facility data. Starting with the implementation of a software platform to provide facility condition and space planning information, the state of Missouri was able to rationalize their space requirements and justify the energy savings retrofit program with real data on the condition of all the major energy-consuming infrastructure in their portfolio. With the energy retrofit program came the deployment of technologies like Metasys for improved building automation and control, as well as the EnNet Framework, Energy Witness Software, Talisen Secure Portal and other IT technologies that would create the integrated system platform to provide real-time information on water, gas and electric utility usage, maintenance spending, capital investments and more. And through the creation of this platform, the state now has all the information they need to measure and verify the savings that were guaranteed by Johnson Controls as part of the overall project. This added benefit not only reduces typical measurement and verification costs, but provides the state with the information that they need to ensure that long-term energy, capital, real estate and maintenance costs remain under control and within budget.

MEASURED RESULTS

The State of Missouri is considered by many as the most comprehensive North American green and intelligent project in the industry at present today in terms of scope, size, depth, and results. The project proves that with the required level of commitment and strategy significant cost savings and other benefits can be realized, such as:

- $35.6 million in annual savings from real estate, operations, construction, and utilities budgets
- Total Johnson Controls project cost $18.5 million, of a total project cost of $24 million
- Missouri's ESCO 2.0 Project had a return on investment of about one year.
- Reduction in Carbon footprint, including:
    - 205,210,232 pounds of carbon dioxide
    - 307, 933 pounds of nitrogen oxide
    - 583,539 pounds of sulfur oxide

With approximately 32 million square feet in its real estate portfolio, Missouri spends some $300 million annually to operate and maintain existing buildings. Johnson Controls guaranteed to save the State $9.5 and facilitated savings of $35.6 million by reducing energy usage, while ensuring process improvements in facility automation, monitoring and management, and more efficient real estate portfolio management.

PILOT 1

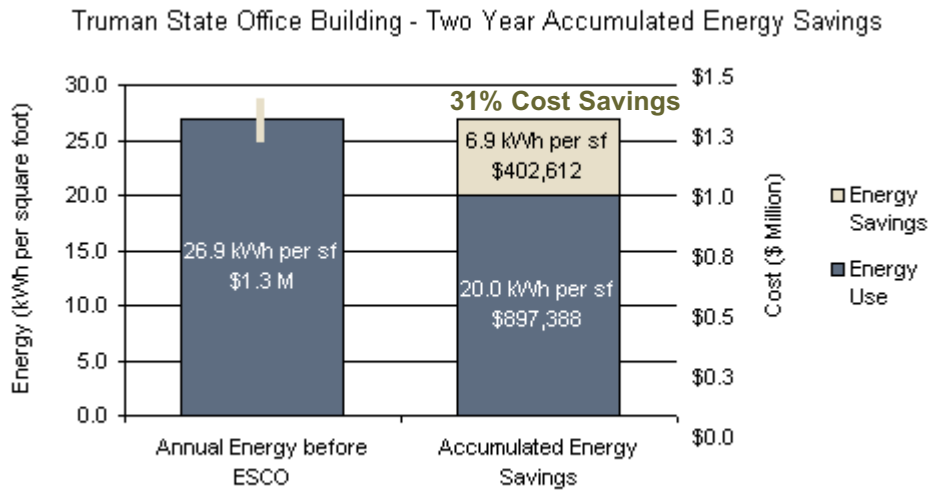
Truman State Office Building, Jefferson City, Missouri

775,000 square feet - the State's biggest office building

31 percent energy savings after two years (versus a guarantee of 17 percent)

In the base line year (the year before the ESCO), annual energy consumption for the Truman building was 26.9 Kilowatt hours per square foot or $1.3 Million in energy costs. The first year after ESCO, annual energy consumption dropped to 21.2 Kilowatt hours per square foot or $986,220 in total energy costs, generating savings of $313,780. In the second year, annual energy consumption was down to 20 Kilowatt hours per square foot and generated accumulated savings of $402,612, almost double of the guaranteed energy savings. Due to the savings and efficiency improvements achieved, the Truman State office building is now an Energy Star building.

Chart 2 – Truman State Office Building reduction in energy consuption after two years



PILOT 2

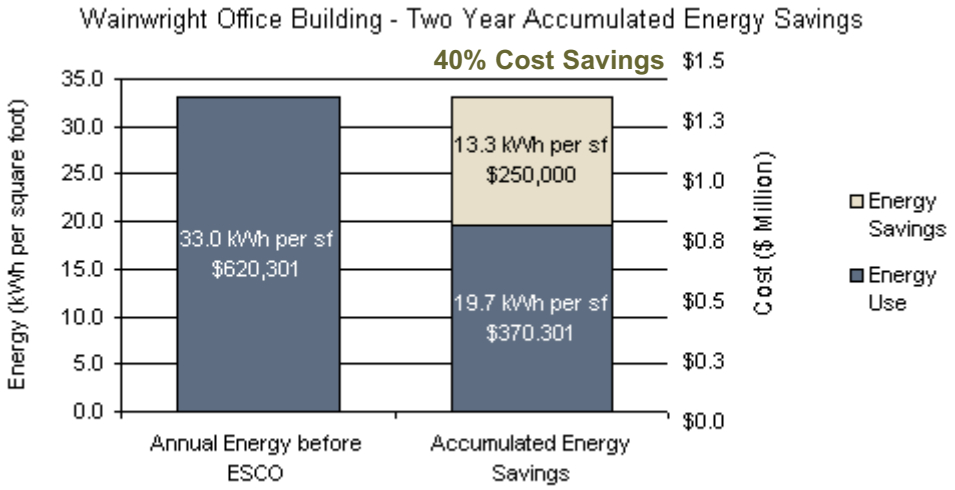
Wainwright Office Building, Downtown St. Louis, Missouri

234,000 square feet

40 percent energy savings after two years

In the base line year (the year before the ESCO), annual energy consumption for Wainwright office building was 33 Kilowatt hours per square foot or $620,301 in total energy costs. Two years after the ESCO, the annual energy consumption dropped to 19.7 Kilowatt hours per square foot and saved $250,000 in energy costs, $45,000 above the guaranteed savings anticipated.

Chart 3 – Wainwright Office Building reduction in energy savings after two years



The technologies, in conjunction with a few traditional energy conservation measures, have result in more annual savings than expected from the project. In the beginning, under performance contracting, Johnson Controls guaranteed on both buildings a total of $330,000. The State was actually able to save more than $400,000 on the Truman building alone.

The aim was to integrate all these systems into an intelligent system that can provide operational excellence as well as ease in maintaining individual system functionality by continuously monitoring, diagnosing, and taking preventive actions with scheduled maintenance. With the advancement of technology across all of the independent systems of a building, building control capability will continue to improve. Advances in networking technologies and the Internet have opened the door to a network-enabled world. Automated diagnostics supported by the latest sensors and control technologies can further lead to efficient building operations as well as to improvements in the life span of the structure. As this information is also available at remote locations, there are possibilities of achieving predictive fault detection, timely diagnosis, and prognosis. All these, in turn, makes it possible to create an intelligent building, which provides virtual control of every system from a central location.

The State of Missouri an Independent Case Study

CASE STUDY OBJECTIVES

The State of Missouri Enterprise Asset Management project is considered to be the most comprehensive North American green and intelligent project in the industry in terms of scope, size, depth, and results. This project leveraged many technologies to deliver a complete enterprise asset management solution to meet the sustainability goals set out by the State of Missouri.

State of Missouri was spending $300 million annually to operate and maintain approximately 32 million square feet spread across numerous facilities in its real estate portfolio. This case study will explore how the collaboration of companies and technologies enabled the State of Missouri to manage its portfolio of approximately 1,000 buildings from a total cost of ownership perspective. The goal of this project was to bring rapid and quantifiable cost savings and to provide executives, managers, and staff with the information they need, on a real time basis, to take smart decisions.

This case study will explore how the integration of systems has enabled the State of Missouri to have a dashboard of information about their facility operating costs, capital expenditures, and energy expenses at their fingertips, so they could make better decisions about how to manage their entire portfolio.

PROJECT OVERVIEW

In the face of increasing energy costs, escalating real estate costs, and an increasing deferred maintenance backlog, in 2005, the State of Missouri announced plans to reduce state-wide energy consumption by 15 percent by 2010.

Driven by a new administration committed to a statewide sustainability program, the State of Missouri consolidated its real estate portfolio by integrating operations, maintenance, lease management, real estate management, design and construction services, and capital planning. The goal of the new administration was to manage its portfolio enterprise and lower the cost of ownership by addressing energy efficiency, cost of deferred maintenance, operating cost, space utilization, and asset management.

The aim of this project was to bring rapid and quantifiable cost savings in five key areas, namely:

1. Utility bill management
2. Automated enterprise monitoring
3. Facilities communications infrastructure
4. Portal collaboration
5. Business process management implementation and improvement

To manage its portfolio and reduce cost of ownership, the State had to determine what it owned in terms of facilities, locations, conditions, value, office space (both leased and vacant), capital needs utilization, energy usage, and cost of energy. Integrating buildings and systems at a common user interface level enabled operational activity monitoring to detect inefficient operating conditions and allowed corrective action to be taken to bring buildings back to normal performance patterns. Legacy system incompatibility, outdated information, a lack of historical data, proprietary systems architectures, and dysfunctional operating processes were some of the challenges which needed to be addressed.

On the environmental side, as a result of streaming building control and utility data in to a shared network, the State of Missouri, is currently able to calculate its carbon footprint, regain control of the costs associated with its portfolio, and generate significant cost and energy savings.

RESULTS

By integrating individual systems and buildings in to a common user interface level, operational activities in the various subsystems can be monitored to detect inefficient operating conditions and corrective action can be taken to bring the system back to normalcy. This visibility over facilities and assets has enabled the State of Missouri to achieve the following results:

- Annual savings from the combined projects in excess of $35 million per year
- Expected ROI of about one year on the investment
- Reduction in carbon footprint:
    - 205,210,232 pounds of carbon dioxide
    - 307, 933 pounds of nitrogen oxide
    - 583,539 pounds of sulfur oxide

PROJECT SCOPE

To efficiently manage its asset portfolio, manage its utility budget, project costs, and integrate accounting and work order system, the following technology parameters were deployed:

- Condition assessment opportunities covering the entire 32 million square feet of real estate
- Energy management system covering approximately 16.8 million square feet (not all facilities have control systems)
- Work order system and CAFM covering 24 million square feet of real estate

The State of Missouri invested in an Archibus CAFM and Space Planning software system to manage leases, perform condition assessment (conditions, deferred maintenance, asset inventory, and so on), create a project outline with a budget forecast, and manage energy consumption. The CAFM system was implemented to set standards and ensure consistency in maintenance operations and to manage work orders, predict maintenance orders, on demand work orders, and combine them with the purchase order system.

Before these parameters where employed, the State's utility bills went sent directly to the accounting department. Facility managers were unable to measure how much energy they were consuming. The new system enables this level of visibility by providing facility managers and other decision makers with access to information necessary to make changes to lower energy consumption and reduce the carbon footprint. This information further enabled facility managers to take corrective action on large inefficiencies such as air handling units (AHU) running all the time.

The enterprise asset management system, connected to the work order system, allows remote control from a centralized location, making it easier to analyze all sites across the state and to perform building analysis, identify maintenance needs and capital applications, as well as more effectively manage the activities of facility managers for thousands of sites. The goal was to provide executives, managers, and staff with information to make correct decisions depending on their individual roles and needs on a real time basis. With utility bills integrated into the enterprise asset management system, the facility managers can further provide diagnostic information and present it to staff in the organization, enabling them to take immediate action instead of waiting until the end of the month before realizing the bill is too high.

The ability to mine data automatically and present it not only at the 'C' level but also at the facility level and equips them to take some immediate action to reduce the energy consumption. In order to conserve energy, it is imperative to have proper information management architecture in place, in order to make the information actionable and definable:

- Computer rated facility management system for on-demand and preventative work orders and space management
- Capital planning condition assessment
- Building information management system
- Business process management tool for automating capital planning process
- Middleware software integrating existing disparate system and different control systems
- Gateway portal that enables external vendors such as JCI to manipulate the building controlsystem remotely

INTEGRATION APPROACH

As the program manager and project manager, Johnson Controls Inc. (JCI) was responsible for selecting and leveraging the cooperative efforts of companies involved in delivering the technology solutions to the State of Missouri. TEAM CO-OP alliance was formed to deliver a complete building information management system. As a result, no company singularly contributed all the savings, but rather, the savings were the result of the combination of many technology contributors.

There were four key architectural partners at the beginning in the bid process for the State of Missouri project that formed Team CO-OP alliance, namely:

- ISCO International
- Gridlogix
- Johnson Controls, Inc.
- Talisen Technologies

The TEAM CO-OP solution, ESCO 2.0 (Energy Services Contract Organization), is a visionary approach to managing a portfolio of facilities from a global and total cost of ownership perspective. The integration of technologies and solutions allowed for a high level of connectivity for a variety of products from multiple manufacturers, such as:

- Talisen Secure Portal
- VFA Condition Assessment and Capital Planning software.
- IDS Energy Witness software
- Archibus CAFM and Space Planning software
- Appian Process Management and Orchestration software
- Armstrong SteamStar
- Microsoft SQL Server
- Cisco Systems IPICs
- Gridlogix EnNet Framework
- Dell Servers
- Sprint PCS Broadband
- Johnson Controls Metasys

Integrating intelligence is not only desirable but is also becoming a mandatory requirement to provide clients the best automation solutions with the simplest connections to real-time data, Web-based data, and the corporate enterprise. Jointly, Johnson Controls, Gridlogix, ISCO International, and Talisen Technologies delivered an integrated energy and maintenance management systems covering 17 million square feet of existing state facilities that include as many as 1,000 buildings.

Although the team of integrators experienced management and technical challenges typical to any project of this size, the end result is proof that the collaboration was a success. This approach also demonstrates that customers can assemble teams from best in class and are not dependant on a provider to deliver optimal results.

JOHNSON CONTROLS, INC.

As the program manager and project manager, Johnson Controls was responsible for selecting and leveraging the cooperative efforts of companies involved in delivering the technology solutions to the State of Missouri. Under performance contracting with guaranteed savings, Johnson Controls also played the role of the energy service company (ESCO) and accepted the performance risk to achieve the sustainable goals set forth by the State of Missouri.

On the field, Johnson Controls orchestrated the connection of software to the building controls system, which, while sometimes simple upgrades, was often more complex. Johnson Controls' main focus was on the integration between building automation systems and a wireless communications backbone to help deliver a complete building information management system.

GRIDLOGIX

GridLogix is a leading creator of XML Web Services based integration solutions for remote control and automation systems. Their solutions provided industry standard (open) interfaces to automation platforms so they can be integrated into the rest of an enterprise information network.

Gridlogix provided the core software architecture and data normalization technology as the interoperability layer. The software solution provided enabled the State of Missouri to integrate with existing control systems and applications to communicate together and help reduce energy, maintenance, compliance, and physical security cost.

In using this open technology provider, the State did not need to remove existing building controls systems. Instead, the solution allowed for fine tuning to extract the data needed from existing controls. The open system made it possible for multiple partners to work together instead of relying on one vendor, despite the different subordinate control systems.

Gridlogix agnostic middleware layer allowed the project to remove significant cost barriers to access the proprietary and legacy data from all the different systems that measure, monitor, and consume energy within a facility. Proprietary systems found in facilities often limit a customer's ability to pick the best and most affordable technologies. Gridlogix's open system architecture allowed the state and Team Coop to choose amongst best in class vendors, resulting in as much as an 80 percent reduction in total program cost when compared to a standard ESCO process. Gridlogix information management systems are optimized and used by customers aiming at almost up to 80 cents to a dollar per square foot of savings.

TALISEN TECHNOLOGIES

Talisen is partnered with Appian, a provider of business process management (BPM) software. Talisen offers business process consulting and enablement of Appian's enterprise solution as well as its Web-based, hosted solution, Appian Anywhere™. The company addressed the issues pertaining to IT network, security, and wiring that enabled systems to interact over a reliable network architecture.

Talisen managed the deployment of PC's responsibility which typically required one connectivity or PC per site that which can have multiple buildings and networks connected through the local LAN or using a data center depending on reliability considerations.

ISCO INTERNATIONAL

ISCO physically implemented the boxes and provided wireless systems solutions for subsystems and components for all wireless technology platforms. ISCO enabled seamless integration of technologies, and condition and enhance the radio frequency management and interference-control systems to provide the ultimate end-user wireless experience.

MEASURED RESULTS

The State of Missouri is considered by many as the most comprehensive North American green and intelligent project in the industry, at present, in terms of scope, size, depth, and results. The project is proof that with the required level of commitment and strategy, significant cost savings and other benefits can be realized.

- Annual savings from real estate, operations, construction, utilities budgets $35.6 million
- Total JCI project cost $18.5 million
- Missouri's ESCO 2.0 Project had a return on investment of about one year.
- Reduction in Carbon footprint:
    - 205,210,232 pounds of carbon dioxide
    - 307, 933 pounds of nitrogen oxide
    - 583,539 pounds of sulfur oxide

With approximately 32 million square feet of facilities in its real estate portfolio, Missouri spends some $300 million annually to operate and maintain existing buildings. JCI guaranteed to save the State of Missouri $9.5 and facilitated savings of $35.6 million by reducing energy usage, process improvements in facility automation, monitoring and management, and more efficient real estate portfolio management.

PILOT 1

Truman State Office Building, Jefferson City, Missouri

775,000 square feet - the State's biggest office building

31 percent energy savings after two years - almost double the guarantee

In the base line year (the year before the ESCO), annual energy consumption for the Truman building was 26.9 Kilowatt hours per square foot or $1.3 million in total energy costs. The first year after ESCO, the annual energy consumption dropped to 21.2 Kilowatt hours per square foot or $986,220 in total energy costs, generating savings of $313,780.

In the second year, annual energy consumption was down to 20 Kilowatt hours per square foot and generated accumulated savings of $402,612, almost twice the guaranteed energy savings. Due to the savings and efficiency accomplishments, the Truman State office building is currently an Energy Star building.

Chart 1 – Truman State Office Building reduction in energy consumption after two years

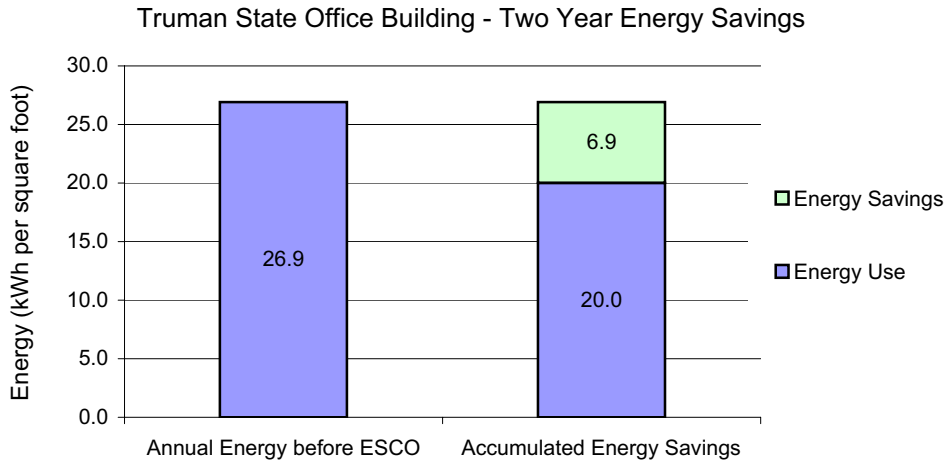
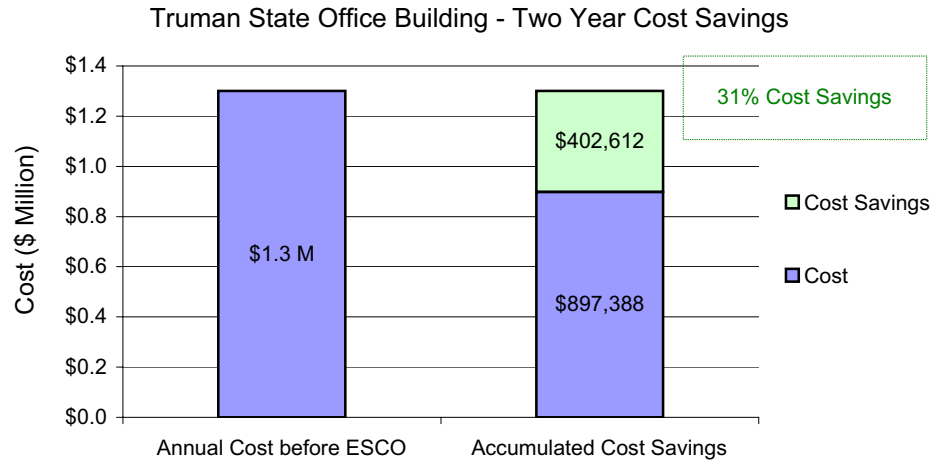


Chart 2 – Truman State Office Building cost savings after two years



PILOT 2

Wainwright Office Building, Downtown St. Louis, Missouri

234,000 square feet

40 percent energy savings after two years

In the base line year (the year before the ESCO), annual energy consumption for Wainwright office building was 33 Kilowatt hours per square foot or $620.301 in total energy costs. Two years after ESCO, the annual energy consumption dropped to 19.7 Kilowatt hours per square foot and saved $250,000 in energy costs, which was $45,000 more than the guaranteed savings.

Chart 3 – Wainwright Office Building reduction in energy savings after two years

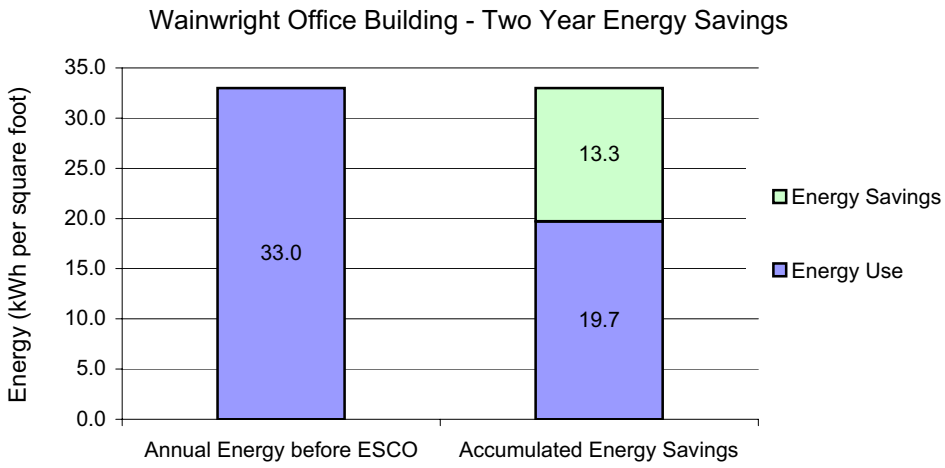
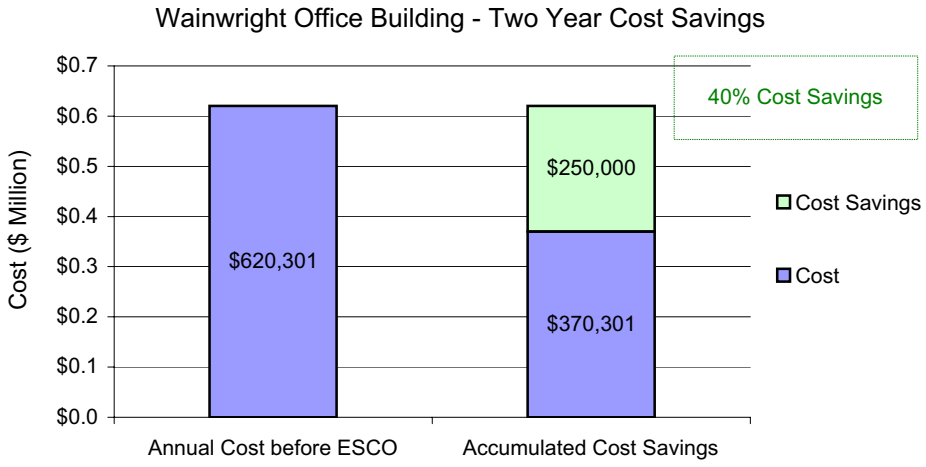


Chart 4 – Wainwright Office Building cost savings after two years



These technologies, in conjunction with some traditional energy conservation measures, have resulted in more savings than expected. The integrated solution approach enabled the State of Missouri to reduce energy and maintenance costs by as much as 40 percent with a payback period of less than two years.

The project was started in December of 2006 and was deployed through 2007. Using middleware software to connect existing building controls systems rather than replacing them enabled the project to significantly speed up the deployment time by about 30 percent to reduced the cost of implementation. The integration and interoperability features of middleware reduced the time for completion from three to four years to one to two years, and provided the data feed that allowed some of the other partners on the team to perform their jobs. As the traditional building automation systems were closed systems, using middleware enabled the content and interaction of building systems to move to the network and remove significant cost barriers to access the proprietary and legacy data from all the different systems that measure, monitor, and consume energy within a facility.

With one unified approach to monitoring facilities, the State can change the underlying infrastructure without changing the enterprise level reporting mechanisms. This allows the State of Missouri to have a heterogeneous infrastructure that creates more competition between vendors, begins to generate savings more quickly, and achieved an ROI payback in one year rather than over the course of a decade.

FUTURE OPPORTUNITIES/COMMISSIONING

The aim was to integrate all these systems into an intelligent system that can provide operational excellence as well as ease in maintaining the functionality of individual system by continuously monitoring, diagnosing, and taking preventive actions with scheduled maintenance. Integrating intelligence is not only desirable, but is becoming a mandatory requirement to provide clients the best automation solutions with the simplest connections to real-time data, Web-based data, and the real estate enterprise.

With the advent of technology in the independent systems of a building, building control feasibility will continue to develop and refine applications and implementation. Advances in networking technologies and the Internet have opened the door to a network-enabled world. Automated diagnostics supported by the latest sensors and control technologies can further lead to efficient building operation as well as to an increased life span for the structure. As this information is also available at remote locations, there are possibilities of achieving predictive fault detection, timely diagnosis, and prognosis. This makes it possible to produce an Intelligent Building, which provides virtual control of every system from a central location.