

Success Story: Ingersoll Rand Discovers Hidden Savings with a Three-Tiered Energy Audit Model

Since implementing a tiered internal energy audit program in 2005, Ingersoll Rand has saved more than \$4 million in energy costs.

Ingersoll Rand's Three-Tier Energy Audit Program

As a leading global industrial firm, Ingersoll Rand has made energy efficiency a priority by joining the U.S. Department of Energy (DOE) Industrial Technologies Program (ITP) *Save Energy Now* LEADER initiative. This partnership, is a cornerstone in Ingersoll Rand's efforts to reduce its global energy intensity 25 percent by 2019. Ingersoll Rand's energy strategy includes a 3-tiered energy audit program (shown in Exhibit 1) that helps to reduce energy use and operating costs at many of its largest manufacturing sites. In terms of global operations, Ingersoll Rand has saved more than \$4 million in energy costs since the inception of its auditing efforts in 2005.

The program relies on employee volunteers with energy and engineering expertise to join an Expanded Energy Audit team two to three times per year. In 2010 and 2011, these teams will participate in approximately 25 expanded energy audits. Each assessment may take up to three days. The audit provides a chance to not only identify opportunities for savings, but to teach plant staff about energy management and new energy-efficient technologies. Operational efficiencies are also evaluated through Ingersoll Rand's audits that include procurement, supply chain and department unification opportunities.



In recent years, Ingersoll Rand sites have received support from ITP's Industrial Assessment Centers (IACs). In fact, the Ingersoll Rand Louisville and Vidalia, Ga. plants received an assessment from the Georgia Institute of Technology IAC. Having greater access to ITP's assessment expertise is one of the reasons that led Ingersoll Rand to become a *Save Energy Now* LEADER in November 2009.

As part of the *Save Energy Now* program, Ingersoll Rand is working with the Oak Ridge National Laboratory (ORNL) to identify auditing tools for specific systems in order to reduce volunteer requirements of employees from other plants and to increase the abilities of smaller sites to manage their own energy use. The tools will be presented to all Ingersoll Rand locations during the next six months.

Implementing Energy Savings

Ingersoll Rand's approach focuses on the business case for energy efficiency projects, including identifying initial capital costs, the rate of return and other technical considerations. Ingersoll Rand operates under traditional industry payback standards for viable energy efficiency projects; however, financial incentives from a utility or other funding source can allow for project approvals that have a longer payback in order to take advantage of a limited time offer. This focus on making a sound business case for energy efficiency has helped Ingersoll Rand overcome the two biggest barriers that impact energy efficiency implementation:

1. **Visibility:** Energy faces the unique hurdle of visibility – the resource being used cannot be “seen,” so it becomes harder to conceptualize the need for savings; and
2. **Corporate Support:** Because energy efficiency projects require staff time, financial support and technical expertise, securing corporate-level buy-in is a necessity.

“We’ve developed a philosophy in our company around energy efficiency, comfort, and safety that we implement internally and bring to our customers worldwide.”

- Steve Rennie,
Vice President of Integration

One example of Ingersoll Rand implementing energy savings is with its Air Solutions complex in Tyler, Texas. After conducting a Level 3 audit in 2007/2008 and a Level 1 audit in May 2009, the facility was able to replace HVAC units, upgrade compressors and install more efficient lighting. These projects together generated more than \$750,000 in annual energy savings.

Another example is an Ingersoll Rand facility in Pueblo, Colo., which is the primary site for manufacturing energy efficient commercial chillers. Two Level 1 audits and a Level 3 compressed air audit were completed during 2009 and 2010. These audits identified more than 40 opportunities for energy efficiency improvements that generated more than \$400,000 in annual energy savings. Implemented upgrades include: upgrading chilled water systems and lighting, using occupancy sensors and using more efficient pumps.

Ingersoll Rand's largest site in Bridgeton, Mo. conducted an EHS and energy assessment in October 2007, a Level 1 Treasure Hunt in 2009, and a Level 2 and 3 audit in April 2009. The facility is scheduled for an updated Level 2 audit in early 2011. The site has implemented 15 opportunities, including lighting upgrades, compressed air system optimizations and training to achieve more than \$300,000 in annual savings.

Achieving Successes Today and In the Future

Ingersoll Rand's demand-side energy management strategy begins with defining goals and objectives and developing energy management systems tailored for ANSI-MSE 2000:2008. Ingersoll Rand's demand-side energy management strategy also includes using energy monitoring tools, sub-metering of energy use, and performing audits and trainings. Finally, Ingersoll Rand will evaluate any opportunities for the use of renewable energy and develop and implement energy standards for equipment and processes.

Exhibit 1: Ingersoll Rand's Three-Tiered Energy Audit Program

Level 1: Treasure Hunt

- An evaluation of low-cost measures.
- Focuses on energy management behavior and easy-to-implement projects.
- Typical projects include occupancy sensors, fixing air leaks, and temperature set-points.
- Modeled on kaizen process.
- Generally uses site-based employees who volunteer to participate.
- Conducted at more than 75 percent of Ingersoll Rand's manufacturing sites globally.

Level 2: Expanded Energy Audit

- A three-day site visit conducted at high priority sites (based on energy-related criteria).
- Focuses on energy-using equipment and processes.
- Typical projects include lighting system upgrades and process heating optimization.
- Also identifies whether projects may be appropriate for Six-Sigma or kaizen events.
- Uses an enterprise-wide team of experts.
- Teaches employees the American National Standards Institute (ANSI) / Management System for Energy (MSE) 2000:2008 standard.
- About 25 percent of Ingersoll Rand's manufacturing sites globally will have received a Level 3 audit by the end of 2010.

Level 3: System-Specific Audit

- Focuses on compressed air or HVAC systems.
- Uses an internal team of process-specific engineers with expertise in these systems.
- About 15 percent of Ingersoll Rand's manufacturing sites globally will have received a Level 3 audit by the end of 2010.

About Ingersoll Rand

Ingersoll Rand (NYSE:IR) is a world leader in creating and sustaining safe, comfortable and efficient environments in commercial, residential and industrial markets. The company's people and family of brands—including Club Car®, Hussmann®, Ingersoll Rand®, Schlage®, Thermo King® and Trane®—work together to enhance the quality and comfort of air in homes and buildings, transport and protect food and perishables, secure homes and commercial properties, and increase industrial productivity and efficiency. Ingersoll Rand is a \$13 billion global business committed to sustainable business practices within the company and for their customers.

Nearly 40 of its 100 plants are located in the U.S., employing more than 60,000 employees worldwide. Trane was founded in 1885 and in 2008, recognizing Trane's complementary focus on energy-efficient, integrated heating, ventilation and air conditioning (HVAC) systems and services, and high performance building solutions, Ingersoll Rand acquired Trane to form a diversified industrial manufacturing and services company.

Ingersoll Rand's success in its energy efficiency endeavors has been supported by a combination of factors that include strong corporate leadership, good cross-facility collaboration, dedication of a small group of staff willing to work off of an initial concept, and standardized procedures.

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