

The University of Iowa Energy Hawks

“Collaboration yields a whole greater than the sum of its parts”

By Wendy Moorehead



Statement of Program/Practice and Results



Photo: Energy Hawk Carl Stieglitz explains the temperature control system in the Lindquist Center building.

Faced with grim state budget reductions in FY09, The University of Iowa (UI) started looking for additional innovative ways to improve energy efficiency and save utilities costs as part of a campus-wide plan to meet financial obligations.

Facilities Management (FM) had already begun to reduce energy usage on campus by conducting lighting audits, automating heating and cooling schedules and upgrading control components. However, this process often depended on managing multiple priorities and tasks.

FM was challenged to accelerate these energy-saving efforts by assembling a cross-organizational team to streamline processes and develop new methodologies for identifying and correcting operational inconsistencies, equipment deficiencies and system imbalances.

The Energy Hawks, named for the Iowa Hawkeyes, took flight in July 2009 to further reduce energy costs in 60 major buildings across campus. Since July, this quick-hit, high impact team has completed approximately 300 improvements in eight buildings, triggering noticeable changes in energy efficiency, building function and occupant comfort.

Each year, the Energy Hawks program is expected to discover an additional \$1 million in savings. As this team migrates from building to building with a keen eye toward reducing energy waste, the Energy Hawks give new meaning to the phrase “Watching like a Hawk!”

Each year, the Energy Hawks— an initiative to reduce energy waste and costs in 60 University of Iowa buildings— is expected to discover an additional \$1 million in savings.



Institutional Benefits

The Energy Hawks is a cross-functional team of specialists from various Facilities Management units including maintenance services, building commissioning, controls engineering and energy management. To maximize efforts, the team searches out opportunities where a concentrated minimal investment produces a major return. Drawing from a rotating group of energy engineers, building controls technicians, maintenance personnel and operations engineers, the group members work in synergy to evaluate and resolve energy issues in buildings quickly and efficiently. The team inspects and analyzes building equipment components and systems, and evaluates historical energy data in buildings across campus.

Saving energy and reducing utilities costs is the chief goal of the Energy Hawks. Improving occupant comfort is also at the top of the list of priorities and can be achieved through a parallel process. The Energy Hawks focus on issues related to Heating, Ventilation, and Air Conditioning (HVAC) systems. The team seeks out short-term projects that result in quick fixes like the replacement of thermostats and tuning, calibrating and adjusting controlling devices, as well as projects with longer-term paybacks like replacing dampers and louvers.

Outcomes

The Energy Hawks are creating real energy savings and improving occupant comfort in the following ways:

- Program is expected to discover an additional \$1M in savings each year through immediate and long-term projects.
- Holistic approach brings together utilities and building maintenance staff to problem-solve the system as a whole instead of as individual components.
- Dedicated team of experts can perform a more thorough and detailed analysis of energy efficiency and performance in the building and give increased attention to uncovering root causes.
- Improved communication between energy side and maintenance side allows for better flow of information and increased collaboration and troubleshooting.
- Building occupants report more comfortable and productive work environments.
- Effective monitoring of systems and data collection helps identify maintenance and energy usage trends for future.
- Mechanics can increasingly operate in a predictive mode, which saves time and money.
- Lessons learned can be incorporated into operational practices.
- Communication with the occupants and greater presence in the building expands and improves relationships with building occupants. Because occupants are more aware of energy usage in the building, they may be able to influence behavior.



Characteristics or qualities that make this program or practice different or innovative

Holistic Approach

The Energy Hawks take a holistic approach to analyzing, identifying and correcting energy inefficiencies as well as fine-tuning controls that will affect energy costs and occupant comfort. Team members look at the building as a whole by scrutinizing energy data — chilled water usage, air flow, average temperatures— before a building walk-through to get a comprehensive view of how the building is using the energy that is sent to it. At the same time, energy engineers analyze data and complete the information feedback loop. By starting with the big picture and then concentrating on the relationship between components, team members can isolate the part that isn't working well and make adjustments to keep the building functioning at a 90-100% efficiency level. This holistic approach saves time and money.

Dan Heater, director of Building & Landscape Services says, "At any time, if one device is out of tune, it can have a domino effect on the other system components, causing a cumulative drop-off in energy efficiency."

Cross-organizational and cross-functional team

The Energy Hawks employ a cross-organizational and cross-functional method that facilitates collaboration across the borders of Facilities Management departments. Historically, utilities departments manage the systems leading up to the envelope of the building, and building maintenance departments manage the building systems. Under this arrangement, utilities and maintenance may fall out of sync. Both sides need to work collaboratively to optimize systems.

Glen Mowery, director of Utilities & Energy Management, says, "An organization can't optimize demand or supply functions independently. Bringing the two groups together as one functional and comprehensive team merges the various multiple disciplines, creating a best practices approach for saving energy."

Al Culbert, Energy Hawks coordinator, says "Flexibility of the staff is the key. There is a roster of players. At any given time, the players change depending on what type of work is involved and the systems expertise that is needed. We assign people to the project based on their strengths." This philosophy has larger implications for the way Facilities Management runs business.

Evolved practices

In the past, core issues could go unresolved because there simply were not enough resources or time to commit to the process. "Band-aid" fixes were made and "best we can do" thinking prevailed. The Energy Hawks go beyond asking routine operational questions like "is it running and is everyone comfortable?" to the more comprehensive evaluation of "is it performing optimally?" Dedicating a full-time team to this challenge reveals opportunities for energy-efficient and better systems management solutions.



How this practice can be used by others

The Energy Hawks work methodically throughout each stage of the process to build on their experience and knowledge and ensure best practices are documented, followed, and communicated:

1. **Determine priority of buildings.** Evaluate historical data and schedule building inspections primarily as a function of past energy usage on a per-square-foot basis comparing similar occupancy and usage.
2. **Review building systems and assign team members.** Review drawings, testing and balancing reports and operating sequences for the control systems, ascertain the type of system(s) involved and skill sets needed for the job, and assign team members.
3. **Communicate with each other and occupants.** Meet with Building Coordinators, area maintenance manager, trades supervisor, and area mechanic. At this meeting occupants are asked for their input on heating/cooling problems or other issues the occupants are experiencing. Due to cost or complexity, some issues may need to be addressed outside the program.
4. **Conduct walkthrough of building.** Conduct a walkthrough of the entire building and all the systems with area maintenance personnel and some of the Energy Hawks –this is the first on-site step. The Energy Hawks typically start at the outside air entry point for the air handlers and follow the system to every room. They also follow the flow of energy (steam and chilled water) in a similar fashion.
5. **Make a list and prioritize.** Generate an “issues log” during the walkthrough. This list is a detailed account of findings and also differentiates between short-term, intermediate, and long-term projects. The “issues log” drives the team’s efforts forward and helps track progress.
6. **Work as a team.** Complete tuning and calibrating work. Work falling outside the scope of the Energy Hawks is communicated to the appropriate work area or contractor. Issues of greater expense or magnitude, or those requiring further investigation, e.g., chilled water flow study, are taken to the Energy Hawks “steering group” for discussion/direction.
7. **Complete the circle.** Maintain periodic contact with the Building Coordinators throughout the process to ensure the needs of the occupants are being met and that they are aware of the timeline of the project, findings, and any work being done.



Photo: Energy Hawk Scott Sellner repairs an actuator in the Lindquist building.



Demonstration of management involvement and employee commitment

The UI administration supports the Energy Hawks program in both policy and funding. On Earth Day 2007, President Sally Mason announced a strengthened emphasis on sustainability and challenged the University community to move up its target date from the year 2013 to 2010 for 1) 10 percent energy reduction and 2) 15 percent renewable energy use. She commended the energy-savings efforts that were already in progress and challenged the University to do more. Since the Energy Hawks have a very attractive return on investment, the Senior Vice President for Finance & Operations gave a direct financial infusion of \$1M in reallocated funds to support the team during a time when almost all University budgets were being reduced.

The Energy Hawks utilize other sources of financial support to execute their recommended improvements such as reinvesting utilities savings from previous years, leveraging deferred maintenance and recurring maintenance funds and taking advantage of a local utility company rebate program (MidAmerican Energy). Due to this financial and administrative support, Facilities Management was able to hire two additional controls engineers to support the Energy Hawks at a time when other departments were cutting back their workforce and the UI instituted a temporary hiring freeze.



Photo: Energy Hawks team members meet with Building Coordinators from the Hardin Health Library as part of a planning meeting.

Several groups help facilitate the efforts of the Energy Hawks. The Energy Hawks steering committee meets once a week to plan the sequence of buildings to be inspected and to discuss issues that are more complex or expensive or require further investigation.

The Energy Hawks also work with Building Coordinators and the respective Facilities Management area managers to ensure collaboration and continued best practices. These Building Coordinators help facilitate communication between the occupants of their assigned building(s) and the

Facilities Management staff who are working in the building.

Employee commitment is a major component of the success of the Energy Hawks. FM staff members know the work they are doing helps the University save energy dollars and improves occupant comfort. Carl Stieglitz, FM Electronics Technician II, says, "Being a part of the Energy Hawks is like solving a puzzle. We work together to find opportunities to save energy by evaluating each of the pieces and how they fit together as a whole to help the entire system run more efficiently. It's an important way to help the University save money, look after the building systems, and get to know the occupants' needs better."



Documentation of results, analysis, customer feedback, and resulting benchmarks

While some of the work of Energy Hawks will result in long-term paybacks, there are already a number of favorable outcomes with respect to energy savings and improved occupant comfort.

In Trowbridge Hall, one of the first buildings visited by the Energy Hawks, energy engineers have estimated annual savings of nearly 13.7% in electricity, 3% in chilled water and 5% in steam from improvements such as adding a supply duct static pressure sensor for the variable frequency drive (VFD), adding a VFD control to the hot water pump, changing the chilled water pump set point,

rewiring the off season chilled water pump and cleaning reheat coils.

“[The Energy Hawks] provided a complete list of action items identified during the investigative phase, explained what they found, and the steps that would be taken to address the issues.”

Jan Waterhouse, Assistant Dean for Operations and Finance, UI College of Nursing.

The Energy Hawks documented 60 energy-efficiency fixes at the UI Nursing Building in October. The list includes everything from replacing thermostats to air intake shutters. The team found that more than 20 percent of the thermostats were not functioning satisfactorily, causing heating and cooling problems. These older pneumatic models are being replaced with more accurate electric models.

Jan Waterhouse, Assistant Dean for Operations and Finance, UI College of Nursing, stated, “The team was in the Nursing Building for about two weeks. They provided a complete list of action items identified during the investigative phase, explained what they found, and the steps that would be taken to address the issues. The repairs included replacing our outside air dampers and a large number of old, faulty thermostats in individual offices, which has really improved our temperature control and air flow throughout the building.”

In the Lindquist building, occupied by the College of Education, the Energy Hawks discovered that exhaust fans were not cycling off at night in accordance with HVAC (Heating, Ventilation, and Air Conditioning) scheduling in the rest of the building. This was causing negative pressure inside the building with cold air being drawn in through entrances and seals in the single-pane windows. Perimeter rooms were considerably cooler than desired, and systems were working overtime to keep up. With adjustments to the exhaust fan scheduling and other fine-tuning, the systems in the building are working in synchronization to create a comfortable environment with improved efficiency.

Tina Hass, assistant to the Dean, says, “The experience with the Energy Hawks has been seamless and painless. They came in and got to work with no disruption to the building occupants. Faculty and staff have commented on how much more comfortable their offices are, space heaters are gone, and we have noticed a difference in energy efficiency and comfort levels throughout the building.”

The ongoing analysis of data and customer feedback will help Facilities Management document best practices and train the next generation not only to recognize and treat the symptoms of energy inefficiency but also to repair the root cause.