OFFICE OF THE SUPERINTENDENT

Millburn Public Schools

INFORMATION ITEM

March 8, 2011

To: Board of Education Members

From: Ellen E. Mauer, PhD

Subject: Energy Audit Update

Fanning Howey had presented us with a two options for an energy audit at our last meeting. Shawn indicated that he had researched SEDAC and would be ready with a presentation for tonight to compare the two programs and explain more about the process SEDAC would use.

Fanning Howey came up with their own list of pros and cons from what they had researched and listed the following:

Pros for FHAI to do the audit:
- We're ready to start now
- Consistency in approach possible if both buildings are analyzed
- Focus on gas and electricity
- Understanding the unique characteristics of school design and operation

Cons for FHAI doing the audit.
- Cost of audit in addition to any implementation costs

Pros for SEDAC to do the audit:
- Audit is free

Cons for SEDAC to do the audit:
- Application process may defer/delay analysis
- District must agree to spend at least $10,000 to implement short payback items (18 months or less) or pay for the audit.
- Focus is electricity only
- This process could not be used at West because the building age does not meet the specification for what SEDAC is doing

Illinois Smart Energy Design Assistance Center

The Smart Energy Design Assistance Center

Retro-Commissioning Participant Manual

Sponsored by the *Illinois Department of Commerce and Economic Opportunity*

Conducted by the *University of Illinois at Urbana-Champaign*

In Partnership With

The 360 Energy Group, LLC

ILLINOIS
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DCEO

Last Updated: January 3, 2011

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BACKGROUND

The Smart Energy Design Assistance Center (SEDAC) is sponsored by the Illinois Department of Commerce and Economic Opportunity (DCEO) in partnership with Ameren Illinois Utilities and Commonwealth Edison. SEDAC is implemented by the Illinois School of Architecture at Urbana-Champaign (UIUC) in partnership with the 360 Energy Group, LLC (360EG) and serves as a statewide resource working to eliminate barriers to the adoption of energy efficient building technologies by small businesses and public facilities.

The SEDAC is now delivering the Public Sector Retro-Commissioning (RCx) Program, providing in-depth energy analyses that will achieve significant demand and energy savings. These savings will be realized through a systematic evaluation of facility systems and the program participant's implementation of cost-effective measures targeted to improve facility operations that, in many cases, also improve occupant comfort and production efficiency.

The RCx services are delivered through a "service-incentive" program. This means the retro-commissioning analysis is the incentive to the customer and is fully funded by Illinois Department of Commerce & Economic Opportunity (DCEO). Participants are expected to cover the costs associated with implementing the measures recommended by the retro-commissioning analysis, attending meetings, and assisting Retro-commissioning Service Providers (RSPs) in acquiring facility information. Incentives for capital improvements such as lighting or HVAC may be available under DCEO's Public Sector Standard Incentive Program or Custom Incentive Program (www.ILEEPS.org).

ELIGIBILITY

Eligibility for the 2010-2011 program year is limited to public sector program participants in Ameren Illinois Utilities or ComEd service territory, including units of local government, K-12 school districts, community colleges, public universities and State buildings. All public sector facilities taking delivery service from Ameren or ComEd are eligible for this program regardless of their choice of supplier.

The facility owner must express a willingness to commit funding for participating in the process, completing the project plan, and implementing measures. The owner must be prepared to assume costs and expenses of at least $10,000 for agreed-upon measures that result in an estimated simple payback of 18 months or less based upon electrical savings. If at least $10,000 worth of recommended measures are not implemented within one calendar year from receipt of recommendations, the owner will be responsible for reimbursing the SEDAC program for the cost of the analysis.

The estimated time commitment from the customer to support the RCx program project is likely to total 60 to 100 hours of a senior facility manager over the 10 to 12 month project duration. Costs associated with internal labor to achieve energy savings through implementation may be considered as "in kind" contributions toward the $10,000 expense total.

In reviewing program applications, SEDAC will look for evidence that cost-effective retro-commissioning opportunities exist at your facility. The following factors will be considered when reviewing your application:

- The facility should have accessible and up-to-date building documentation and records.
- The facility should have a relatively high energy usage compared to the average energy usage of buildings of the same class and/or have a low ENERGY STAR rating from Portfolio Manager.
- Preferably, the facility should be at least 5 years old and exceed 150,000 ft^2 in air-conditioned floor space.
- The facility should be free of major problems requiring capital repairs or replacements and have no planned major system renovations or retrofits.
- A major renovation is defined as a change in facility use or where the existing system will not meet owner / customer projected requirements within existing facility square footage.
- A retrofit is defined as changes, modifications, or additions to systems or equipment in existing facility square footage.
- The facility should have an existing and functional building automation system (BAS) or energy management system (EMS) with direct digital control (DDC).
- The facility owner and O&M staff should express a commitment to be actively involved in the retro-commissioning process. Active involvement will include:
  - Providing access to the facility.
  - Providing time for facility personnel to interface with the Retro-Commissioning Service Provider.
  - Providing and assisting with the reporting and collection of information pertaining to the retro-commissioning of the facility.

SEDAC will select program participants based on the above considerations and the level of opportunity for savings.

INCENTIVES

The Retro-Commissioning (RCx) Program is a "service-incentive" program. This means the retro-commissioning analysis and implementation technical assistance is itself the incentive to the customer and is funded by the Illinois Department of Commerce and Economic Opportunity (DCEO).

In the program, Retro-Commissioning services are conducted exclusively by either SEDAC staff or pre-approved service providers. The SEDAC covers RCx service costs at 100% for a program service provider to investigate and identify savings opportunities *if implementation of measures are initiated during the same fiscal year (by May 31st) of the start of the project under the program and are completed within twelve months of receipt of the Retro-Commissioning Plan.* For projects that are not completed within this timeline, the customer will be expected to reimburse SEDAC for the full cost of any completed RCx planning costs, program-funded investigation activities, and verification report costs.

Program participants are expected to cover the costs associated with contracting or arranging for the implementation of recommended measures, attending meetings, and assisting RSPs in acquiring facility information. No additional incentives will be available to participants through this Program. However, if energy efficiency measures are identified that are beyond the scope of the Retro-Commissioning Program, the customer may seek to qualify those measures through DCEO's Prescriptive or Custom programs.

RETRO-COMMISSIONING SERVICE PROVIDER

A qualified Retro-Commissioning Service Provider (RSP) team will be provided by the program administrator to conduct the retro-commissioning services at no cost to the customer.

During the retro-commissioning process, the facility's staff will assist the RSP in acquiring access and information regarding the building systems, operation, controls system, and any other pertinent information necessary to identify and evaluate potential retro-commissioning measures. The RSP will use the information gathered from the site visit to generate the Retro-Commissioning Plan.

The RSP is not responsible for implementing the Retro-Commissioning Plan measures. However, the RSP will provide guidance and technical assistance during the Implementation Phase to aid in the successful implementation of the agreed upon measures. Implementation of the retro-commissioning measures is the responsibility of the facility owner.

Upon completion of the customer's implementation activities, the RSP will return to inspect the facility to verify the installation and proper operation of the retro-commissioning measures. The RSP will prepare and submit the Verification Report that summarizes the final findings and impacts from the project.

FACILITY OWNER

The facility owner shall make available to the RSP a competent facility representative who is knowledgeable in the building systems, equipment, and operation. The individual shall provide the RSP access to the building, its Building Automation System (BAS), and any pertinent building documentation necessary to develop a thorough understanding of the operation, systems, equipment, and use of the building.

The estimated time commitment from the customer to support the retro-commissioning effort is likely to total 60 to 100 hours of a senior facility manager over the 10- to 12-month project duration.

The facility owner is responsible for implementing the agreed upon retro-commissioning measures. The owner may exercise the option to subcontract the effort to a contractor or use his own staff to complete the work.

THE RETRO-COMMISSIONING PROCESS

The RCx provider will conduct a facility assessment to diagnose problems and make recommendations for minor low-cost adjustments that can be made immediately, as well as recommendations for more substantial improvement opportunities. This will include an assessment of cost, savings, and payback. Where applicable, the RCx study may involve an assessment of energy savings opportunities eligible for incentives through DCEO's program offerings. In such cases the incentive levels established by those programs will be used.

The standard process for SEDAC retro-commissioning will consist of four primary steps, or phases, for each individual project:

1. **Application Phase** *(approx. 1-2 weeks)*

   The retro-commissioning project begins with the Application Phase. Project applications are completed by the facility owner or representative and submitted to SEDAC. Based on a review of submitted applications, SEDAC will select facilities that have the highest perceived opportunity for savings to participate in the program. SEDAC may conduct an on-site or telephone interview with facility personnel to gauge building and system condition as well as potential retro-commissioning opportunities. Upon acceptance of a participant application, the SEDAC will assign the project to a qualified Retro-commissioning Service Provider (RSP).

   In cases where a participant application is not accepted for enrollment, the applicant will be given the specific reasons the application was not accepted (e.g. the facility is not a good candidate for retro-commissioning because there are several major equipment renovations that should be completed prior to retro-commissioning). In addition, the customer will be directed to the appropriate DCEO programs (e.g. the Public Sector Electric Efficiency Standard and Custom Incentive Program for capital investment projects).

   - **Customer Role: Complete Application and Agree to Terms & Conditions**
   - **Deliverable: Program Acceptance or Rejection**
   - **Duration: 1 to 2 weeks**

2. **Planning Phase** *(approx. 4-6 weeks)*

   Following acceptance of a project into the program and selection of an RSP, work begins to establish the scope and timeline for the balance of the project. This Planning Phase typically takes about four to six weeks. This phase commences with a project kick-off meeting with the owner representative, the customer's facility staff and contractors, the RSP, and SEDAC. A site assessment and data acquisition plan is also completed by the RSP during this phase, where findings are used to generate the Retro-commissioning Plan for the project and assess potential measures and project economics. The Retro-commissioning Plan establishes the framework and direction for the Implementation Phase. Upon its completion, another meeting is held with the owner representative and engineering staff to review the scope of the plan and the impacts and

economics of the identified potential measures. At the completion of the Planning Phase, the facility owner enters into the formal Program Agreement.

The Program Agreement includes several components that define the roles and responsibilities of each party and the project goals. The primary goal is to require the customer to commit to spending at least $10,000 for agreed-upon retro-commissioning measures that result in a bundled estimated simple payback of 1.5 years or less. Implementation of these measures must begin before May 31, 2011, and must be completed within twelve months from receipt of the Retro-Commissioning Plan. For projects that are not completed within one calendar year, the customer will be expected to refund the cost of the retro-commissioning study. Additionally, the agreement acts as a decision point where the customer selects measures from the Planning report they wish to pursue for further investigation in the next phase.

- **Customer Role: Provide building documentation and support RSP's information collection process.**
- **Deliverable: Retro-Commissioning Plan Program Agreement**
- **Duration: 4 to 6 weeks**

3. **Implementation Phase** *(approx. 8-20 weeks)*

The Implementation Phase builds upon the Planning Phase, typically including activities such as conducting detailed site assessments, diagnostic testing, and trending analyses to evaluate current facility operating procedures and equipment functionality. In this phase, the RSP works hand-in-hand with the customer's implementation team to fully investigate, implement, and verify (where possible) the recommended measures. The implementation team typically includes the facility engineers and the mechanical, electrical, and controls contractors.

Throughout the Implementation Phase, the retro-commissioning measures and associated costs, savings, and economic impacts will be updated and summarized in the Customer Selection Form. This document will be utilized throughout the entire retro-commissioning process to communicate retro-commissioning opportunities and seek customer approval to proceed with implementation. In the event that additional retro-commissioning measures are discovered or existing measures are modified, the RSP will update the Customer Selection Form and review such measures with the owner.

During the Implementation Phase, the RSP works hand-in-hand with the customer's implementation team to identify the recommended measures and provide recommendations to "fix" the problems. The implementation team includes the facility engineers, operational staff, and the mechanical, electrical, and controls contractors. As retro-commissioning measures are approved by the customer, the implementation team will be asked to "fix" the items associated with the relevant measures. The goal of this phase is to fully implement all agreed-upon retro-commissioning measures and stand ready for final verification.

The implementation costs used to calculate project economics under the program of the measures are based upon reasonable market costs as determined solely by the program team. Resources to obtain market costs include, but are not limited to industry accepted project estimation resources, vendor quotes, or professional judgment. The customer is afforded the flexibility to utilize in-house staff or an outside contractor to implement retro-commissioning measures implementation. Final implementation costs may vary from the estimated market costs; however, the market costs will be utilized to support contractual obligations.

- **Customer Role: Assist in RSP's investigation activities, contract or arrange for implementation activities, and manage completion of recommended measures.**
- **Deliverable: Implementation of Retro-commissioning Measures**
- **Duration: 8 to 20 weeks, depending on the month in which Implementation activities commence.**

4. **Verification Phase** *(approx. 3-10 weeks)*

During the Verification Phase, the RSP evaluates facility trending data (from the building EMS, facility sub-meters, or utility meter) and revisits the site to verify that measures have been properly completed (e.g. new control strategies are functioning properly, repairs have been made, etc). The RSP prepares and submits the Verification Report that summarizes the final findings and impacts from the project.

- **Customer Role: Support RSP's verification process**
- **Deliverable: Verification Report**
- **Duration: 3 to 10 weeks, depending on the month in which Verification activities are completed.**

SEDAC RETRO-COMMISSIONING CUSTOMER APPLICATION

The Public Sector Retro-Commissioning (RCx) Program is available to qualifying public sector customers within the Commonwealth Edison and Ameren Illinois Utilities service areas. The goal of this program is to help you identify and implement opportunities to improve the efficiency of major electrical systems and reduce energy costs without adversely affecting facility or system operations.

PRE APPLICATION CHECKLIST

Please confirm you meet the following minimum eligibility requirements before submitting an application to participate in the program:

- ☐ Are you an Ameren Illinois Utilities or Commonwealth Edison delivery services customer, regardless of which electric supplier you have chosen to purchase power from?
- ☐ Do you have a peak demand of 500 kW or greater? (You may still be eligible with lower peak demand. Please contact SEDAC program manager for verification of eligibility.)
- ☐ Is your building a public facility, such as government, municipal, or public school?

IF SELECTED FOR PARTICIPATION, CAN YOU ACCEPT THE FOLLOWING RESPONSIBILITIES?

- ☐ Are you willing to commit to spending $10,000 on the implementation of identified retro-commissioning measures with an estimated simple payback of 18 months or less based upon electrical savings?
- ☐ Provide access to the facility and time for facility personnel to interface with the retro-commissioning service provider during all phases of the project?
- ☐ Provide and assist with the reporting and collection of information pertaining to the operation of the facility during all phases of the project?
- ☐ Initiate implementation of the mutually accepted retro-commissioning measures according to the scope and procedures outlined by SEDAC no later than the end of the current fiscal year (May 31st) and complete implementation within 1 calendar year?

NEXT STEPS

If you answered yes to the above questions, please complete this application and submit it to SEDAC for consideration. In reviewing your application, SEDAC will look for evidence that cost-effective retro-commissioning opportunities exist at your facility. SEDAC's decision regarding selection of program applicants and the retro-commissioning program will be final and binding for all parties.

Customer Acceptance of Application Terms

By signing below, I certify that:

- ☐ The information contained in this application is accurate and complete to the best of my knowledge, and will provide additional information if requested;
- ☐ I have read and understood the obligations of program participants, including the commitment of $10,000 to implement identified retro-commissioning measures, and agree to a make a good faith effort to comply with all requirements if selected for participation in the program;
- ☐ Ameren Illinois Utilities and/or Commonwealth Edison may release historical account data to the program administrator (including SEDAC (University of Illinois/360 Energy Group, LLC), and the assigned Retro-Commissioning Service Provider) for the facility under consideration.

(Signature of individual with authority to bind applicant to these terms required)

Signature: _____

Name (printed): _____

Title: _____

Date: _____

Submit Completed Applications To:

For SEDAC RCx service, please send this completed application to:
312-264-2379 (fax) OR email to RCx@SEDAC.org (email)

Questions may be directed to:
Jessica Commins, 360EG SEDAC Program Manager
312-962-3102 (voice) or Jessica@SEDAC.org (email)

Contact Information

Facility name: _____

Facility owner name: _____

Facility address: _____

_____

Project contact name: _____

Project contact title: _____

Project contact phone: _____

Project contact fax: _____

Project contact email: _____

Property manager: _____

Property management firm: _____

Facility engineer: _____

Facility engineering firm: _____

Program referred to you by: _____

Facility Information

Name of facility: _____

Facility type: _____

Year of construction: _____

Number of floors: _____

Total floor area (ft^2): _____

Total conditioned area (ft^2): _____

Percent currently occupied: _____

ComEd account number(s): _____

_____

ComEd meter number(s): _____

_____

Ameren Illinois Utilities account number(s): _____

_____

Ameren Illinois Utilities meter number(s): _____

_____

Total energy use (kWh/yr): _____

Peak demand (kW): _____

Month of peak demand: _____

Facility General Description

Outline the major facility space types, their scheduling, and typical occupant density (e.g. 10,000 ft^2, 24-hour computer center that is unoccupied).

Describe the major interior loads of the facility and identify any that dictate how the HVAC system is operated. (Add additional rows as necessary.)

Space / Location	Type	# of Occupants	Scheduled Hours and Days of Occupancy

Briefly describe past energy efficiency projects or studies completed for the facility.

_____

_____

_____

Describe any currently planned energy efficiency, renovation, or equipment replacement/upgrade projects for the facility.

_____

_____

Are there any scheduling issues that could affect the retro-commissioning work (e.g. major renovations or equipment replacements/upgrades)?

_____

_____

Facility Staff

Please identify key individuals responsible for the operation of the facility and state how long they have held their current positions.

Contact Name	Position	Years in this Position	Facility Responsibilities

Please indicate the level of access and capability the chief facility engineer, staff, and/or controls contractor have to interact with the facility's energy management control system (select one):

_____ None

_____ Some (e.g. able to adjust set points and schedules)

_____ Full (e.g. able to modify control logic and trend facility data)

Indicate what training resources are available to the facility staff (check all that apply):

_____ None

_____ In-house

_____ Manufacturer or vendor courses

_____ Utility courses

_____ College/vocational schools

_____ Professional associations

_____ Other: _____

Describe the facility manager's and staff's receptiveness to and interest in improving the energy efficiency of the facility.

_____

_____

If accepted into the program, designate individuals that will act as a part of the owner's project team and the amount of discretionary time to assist in the retro-commissioning process:

Position	Name	Amount of Time to Assist (per week)
Building Chief Engineer:		
Operations Manager:		
Safety Manager:		
Internal Controls Specialist:		
External Controls Contractor:		
Others:		

Identify the type and manufacturer of the facility's energy management control system (EMS). If the facility does not have an automated control system, please indicate.

_____

_____

Is the EMS capable of trending and storing data for numerous points simultaneously?

_____

_____

When is the EMS likely to be replaced or receive a major upgrade?

_____

_____

What components of the facility are controlled with direct digital control (DDC) equipment?

_____

_____

What components of the facility are controlled, not just actuated, pneumatically?

_____

_____

Summarize any peak load shedding strategies currently being used.

_____

_____

Is the EMS managed internally or through an external controls contractor? _____

If managed externally, please provide the following:

Company Name: _____

Name (of the company specialist): _____

Phone Number (of the company specialist): _____

Email Address (of the company specialist): _____

Please complete the following table listing the facilities major HVAC and lighting system components. Add more rows as necessary.

Equipment	Type	Size	Age
Cooling equipment			
Chiller 1 (example)	Centrifugal	300 tons	15 years
Heat Rejection equipment			
Cooling Tower 1 (example)	Open, cross flow, induced draft	350 tons	15 years
Air handling equipment			
AHU 1 (example)	VAV w/hot water reheat	25,000 CFM	5 years
Lighting systems			
Main office area (example)	32W T8s w/electronic ballasts	40% of occupied ft_2	4 years

Outline the current control strategies of the facility's HVAC and lighting systems.

Strategy	Description
Cooling Equipment	
What is the operating schedule of major cooling equipment?	
What is the chilled water supply temperature set point?	
What is the condenser water set point? Is it reset?	
Are there VFDs on the cooling tower fans?	
Describe the cooling equipment staging strategy	
Describe the use of any air-side or water-side economizers	
Air Handling Equipment	
Does the HVAC system have an automatic shutdown?	
Is an optimum start/stop strategy used?	
Is the air distribution system VAV or CV?	
Are the VAV boxes Fan Powered?	
For VAV systems, what is the supply static pressure set point?	
For VAV systems, is a supply static pressure reset strategy used? If yes, please indicate the strategy(ies) used.	
Are VAV terminal units DDC controlled through a global controller?	
Do the VAV terminal units' DDC controllers have capability to be scheduled?	
Does the facility use a zone temperature setback/setup strategy?	
What is the supply air temperature set point during the summer?	
Is a supply air temperature reset strategy used? If yes, please indicate the strategy(ies) used. If there is not enough room on the application please attach information to the application.	
What type of reheat does the air distribution system have, if any?	
What is the heating energy source (e.g. gas, electric)?	
How is outdoor air intake controlled?	
What is the minimum outside air fraction setting?	
Is the system equipped with zone isolation devices for minimizing energy use in off-peak hours?	
Is there exhaust air heat recovery?	
Lighting systems	
Describe the lighting system controls and current scheduling	

What type of glazing is installed at the facility (e.g. single-pane tinted)?

_____

_____

Describe the age and availability of any as-built drawings and sequences of operation for the facility's HVAC system?

_____

_____

Summarize problems or opportunities for improvement that currently exist related to the HVAC and lighting systems.

_____

_____

Describe any opportunities for improved operation and maintenance procedures at the facility.

_____

_____

What is currently the most prominent issue related to operation of the HVAC and lighting systems, and how is it being managed?

_____

_____

What is the primary source of occupant complaints within the facility?

_____

_____

Facility Compressed Air, Processing, and Refrigeration System Information

Complete this section only if your facility has compressed air systems, process equipment and/or refrigeration systems. Examples of these systems include, but are not limited to:

- Compressed Air Systems – Air compressor(s) and refrigerated air dryers that serve a manufacturing or process related activities.
- Process Equipment – Equipment such as conveyor lines, manufacturing equipment or equipment that; run continuously or for significant periods of time, have motors, and/or have specific heating/cooling requirements.
- Refrigeration Systems – Refrigeration equipment that is used to satisfy supply cooling requirements for food storage, manufacturing, or process equipment.

What are your primary objectives in managing your systems (check all that apply)?

Compressed Air	Process	Refrigeration	Objective
			Maintain continuous operation
			Improved or increased production
			Control and/or reduce energy use and costs
			Reduce capital costs
			Meet process quality standards
			Improve safety
			Reduce equipment maintenance
			Other:

What management approaches and tools do you currently employ (check all that apply)? What are the top two barriers to more effective operation of your facility's systems?

Compressed Air	Process	Refrigeration	Resources
			Preventative diagnostic testing
			Short term monitoring
			Long term monitoring
			Leak detection and repair
			Tracking energy use/costs
			Improving control strategies
			Using life-cycle costing to select opportunities
			Other:

What are the top two barriers to more efficient operation of your facility's systems?

Compressed Air	Process	Refrigeration	Barriers
			Not enough staff time
			Lack of budget for efficiency improvements
			Capital expenses are too high
			Paybacks are too long
			Primary focus is on production
			Lack of accountability for system energy costs
			Lack of information about opportunities
			Lack of in-house technical expertise
			Lack of training
			Management approval
			Other:

What influences you the most in terms of adopting new management tools or approaches (rank on a 1 to 10 scale, where 10 is high)?

Compressed Air	Process	Refrigeration	Barriers
			Books
			Industry articles and professional publications
			Peers / Professional organizations
			Classes / continuing education
			Demonstrated success of others in the market
			Internal pilot program success
			Outside consultants
			Equipment vendors and manufacturer reps
			Other:

Compressed Air Systems

Complete this section only if applicable for the facility being submitted for consideration in the retro-commissioning program

Please list all air compressors that are currently located at your facility (add more rows as necessary).

Air Compressors					
Equipment ID/Manufacturer	**HP**	**Compressor Type** (E.g. Scroll, Screw, Reciprocating, Centrifugal)	**Capacity Control Mode** (E.g. Load/Unload, VFD, Inlet Modulation, Blow-off)	**Age (years)**	**Annual Operating Hours**
CNP 75588-750 (example)	150	Screw	Load/Unload	15	4,000
Dryers					
Equipment ID/Manufacturer	**Type**	**Status (Op/standby)**	**Age (years)**		
Dryer #1 (example)	Refrigerated	Operational	15 years		
Storage					
Equipment ID/Manufacturer	**Size (Gallons)**	**Status (Op/standby)**	**Age (years)**		
Receiver A (example)	600	Operational	15 years		

Describe the compressed air system operating schedule at the facility.

_____

_____

What is the system pressure? Do you have trouble maintaining this pressure?

_____

_____

Describe the staging of the air compressors (e.g. manual, automatic, always on, etc.).

_____

_____

Is there a management system or manual procedure in place to shut compressors OFF sometimes? If so, do you think the system is properly tuned?

_____

_____

Are you willing to change your control strategy or usage of compressed air if recommended in the retro-commissioning study?

_____

Processing Equipment

Complete this section only if applicable for the facility being submitted for consideration in the retro-commissioning program. Please list all major processing equipment currently located at your facility (add more rows as necessary).

Equipment Description/ID	HP or kW	Average loading (% full capacity)	Status (Op/standby)	Age
300 ton Servo Press – SP1 (example)	180 HP	50%	Operational	6 years

Describe the process equipment schedule at your facility.

_____

_____

What percentage of the facility electric use is attributable to operation of processing equipment?

_____

Are there any current operational issues with your equipment?

_____

Refrigeration

Complete this section only if applicable for the facility being submitted for consideration in the retro-commissioning program. Please list all major refrigeration equipment that is currently located at your facility (add more rows as necessary).

Unit description/ID	Absorption unit	Tons	Average loading (% full capacity)	Status (Op/standby)	Age
Walk in cooler – RS60A	No	60	60-80%	Operational	8 years

Describe the loads served by equipment identified above.

_____

_____

Describe the temperature and pressure set points for the identified refrigeration equipment.

_____

_____

Outline the sequencing of refrigeration equipment at the facility.

_____

_____

Is floating head pressure control utilized?

_____

Describe defrost schedules/controls for refrigeration equipment at the facility.

_____

_____

What type of capacity control does the refrigeration equipment have (e.g. hot gas bypass, VFDs, etc.)?

_____

_____

What percentage of the facility electric use is attributable to operation of the refrigeration equipment?

_____

_____

Is there an energy recovery system in place to capture waste heat?

_____

_____

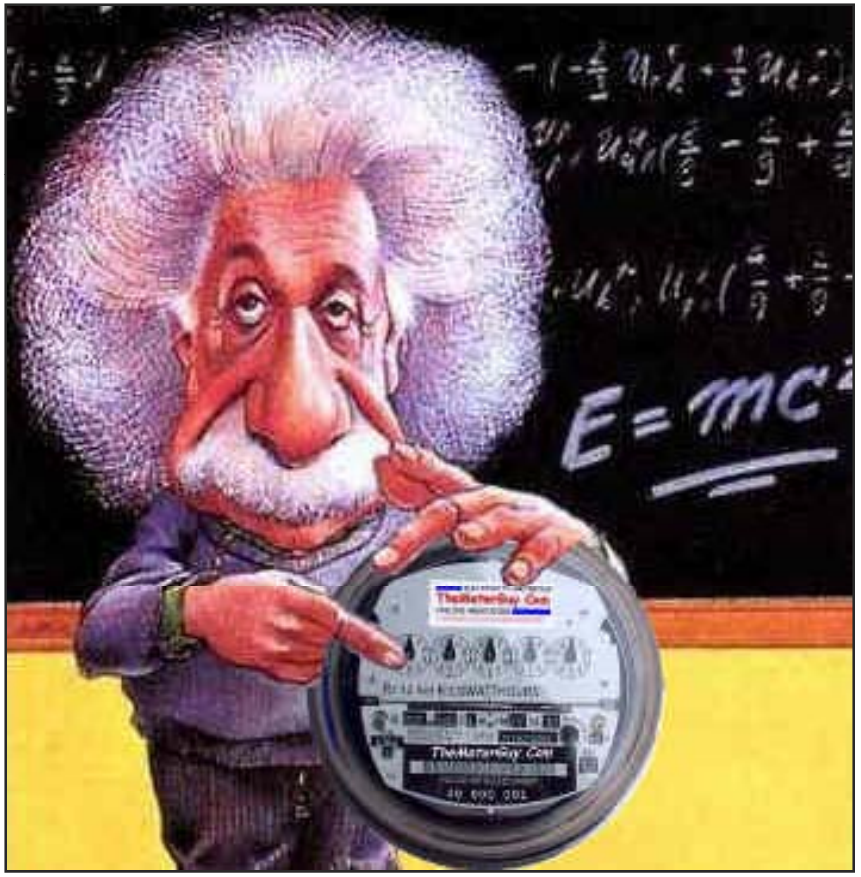
Energy Conservation Seminar March 2009

Smart Energy Overview

Donald Fournier
SEDAC Program Manager
Chair, Building Research Council
School of Architecture
University of Illinois at Urbana-Champaign

Overview

- Smart Energy Design Assistance Center
- SEDAC Schools Top Ten Recommendations
- Results to Date
- Funding from Utilities and DCEO



Drivers for Efficiency

- It is a new world out there:
  - Oil rollercoaster on availability and prices,
  - Natural Gas availability and prices,
  - Electrical deregulation.

Energy Efficiency

- The cost of saving energy is going down while the price of energy is going up.
- Efficiency is the cleanest, cheapest, safest, and most secure source energy we have.
- These savings from energy efficiency to date have not yet come close to tapping the full potential for savings.
- Incentives are available under Illinois EEPS for energy efficiency and renewable energy. ARRA (stimulus) money coming.

Illinois Concerns

- In 2003 annual energy expenditures in Illinois were $27.0 billion (Commercial, Industrial, and public sector were $10.7 billion).

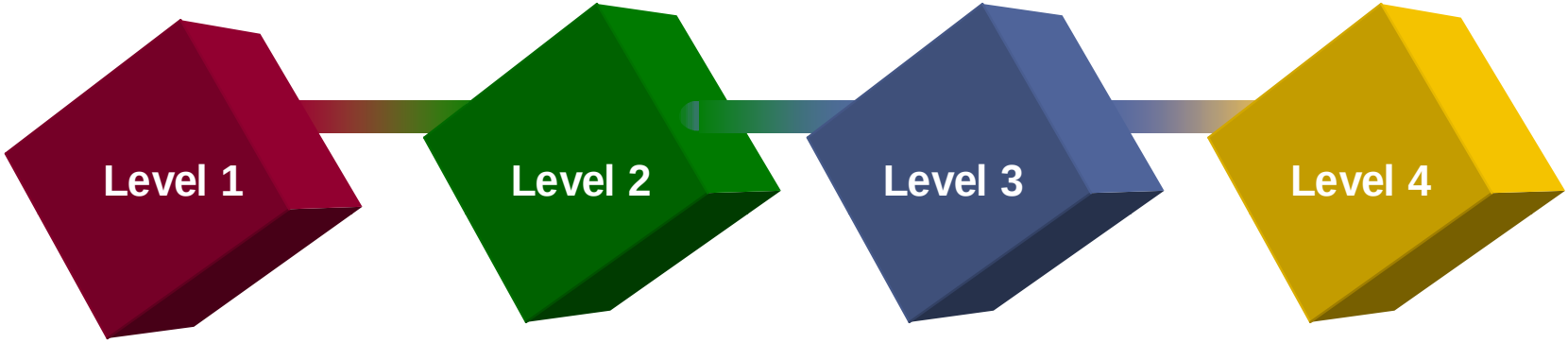
In 2006 total energy expenditures were $43.3 billion (Commercial and Industrial — $14.5 billion — a 36% increase to those sectors).

- These costs have increased considerably and will continue to increase once the recession is over.
- The vitality the entire economy and of small businesses in Illinois are affected by these costs.

Smart Energy Design Assistance Center (SEDAC)

- Sponsored by ILDCEO, Ameren Illinois Utilities and ComEd.
- Implemented by UIUC and 360 Energy Group plus Design Assistance experts on contract.
- Provides Energy Conservation advice and guidance.
- Targets Illinois small businesses, both commercial and industrial, municipal, K-12 schools, & community colleges.

SEDAC: Four Levels of Design Assistance



INITIAL SEDAC CONSULTATION

- Pre-screening
- General support
- Information dissemination to customers and design teams

ENERGY AUDIT AND DESIGN REVIEW

- Walk-throughs
- Plan review
- General support to architects and engineers

DETAILED DESIGN ASSISTANCE

- In-depth building analysis
- Life Cycle Cost analysis
- Software energy simulation
- Detailed recommendations

FOLLOW-UP AND FIELD SUPPORT

- Overcome technical and knowledge barriers
- Implementation assistance
- Ongoing support

SEDAC Program Results

- Clients assisted (as of December 31, 2008):
  - Level 1 – 1,318
  - Level 2 – 363
  - Level 3 – 168
  - Level 4 – 165
- Completed studies of over 17 million square feet with over 43,000 employees.
- An additional 7.5 million sf underway.
- Recommended energy savings of $11.8M.
- Energy impact of 672,675 million Btu (4.3 million therms & 86,147 MWh) and a demand reduction of 19.8 MW.

Program Potential Results

- The environmental benefits of the recommended energy savings are:
  - 100,976 tons of carbon dioxide (CO2)
  - 285 tons of sulfur dioxide (SO2)
  - 136 tons of nitrogen oxides (NOx)
  - 15.3 tons of carbon monoxide (CO)
  - 5.15 tons of particulate matter (PM10)
  - 2.55 tons of volatile organic compounds (VOCs)

Energy Saving Opportunities

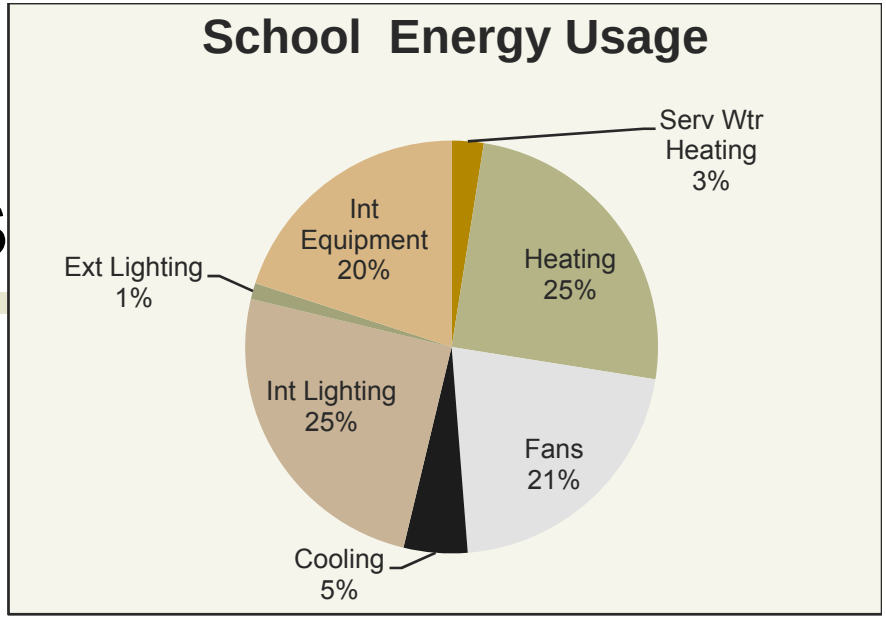
- Potential energy savings ranged from a high of 100% to a low of 3%for existing buildings and between 96% and 12% for new designs.
- Data from 107 existing buildings shows:
  - 46% energy savings (includes renewables).
  - 35% energy cost savings.
  - Typical savings of $45k per year.
- Data from 30 new building designs shows:
  - 42% energy savings (includes renewables).
  - 40% energy cost savings.
  - Typical savings of $60k per year.

SEDAC School Audits

- We have audited 6 educational facilities and have 4 more in progress.
- Energy savings ranged from 15 to 70 percent with an average of 29%. The high one included renewables.
- Cost savings ranged from 17 to 70 percent with an average of 31 percent.
- Average for K-12 was $48,636.

Photo courtesy of Fossil Ridge High School, Fort Collins, Colorado

The SEDAC Top Energy Measures



- Lighting:
  - Super T8 fluorescent lighting with electronic ballasts and high-bay T5s:
    - Existing buildings need retrofits and controls.
    - New buildings benefits from more efficient fixtures, better layouts, & motion detectors (integrated classroom lighting systems).
  - Compact fluorescent lamps/LEDs for single lamp fixtures, floods, and spotlights in place of incandescent lights.

The SEDAC Top ECRMs

- Building & Envelopes (beyond code):
  - Increased insulation levels.
  - Infiltration air sealing and duct sealing.
  - Better windows (Low-E, with U-values of 0.4 or less).
  - New designs should incorporate daylighting.
  - New designs should consider builidng orientation and massing.

The SEDAC Top ECRMs

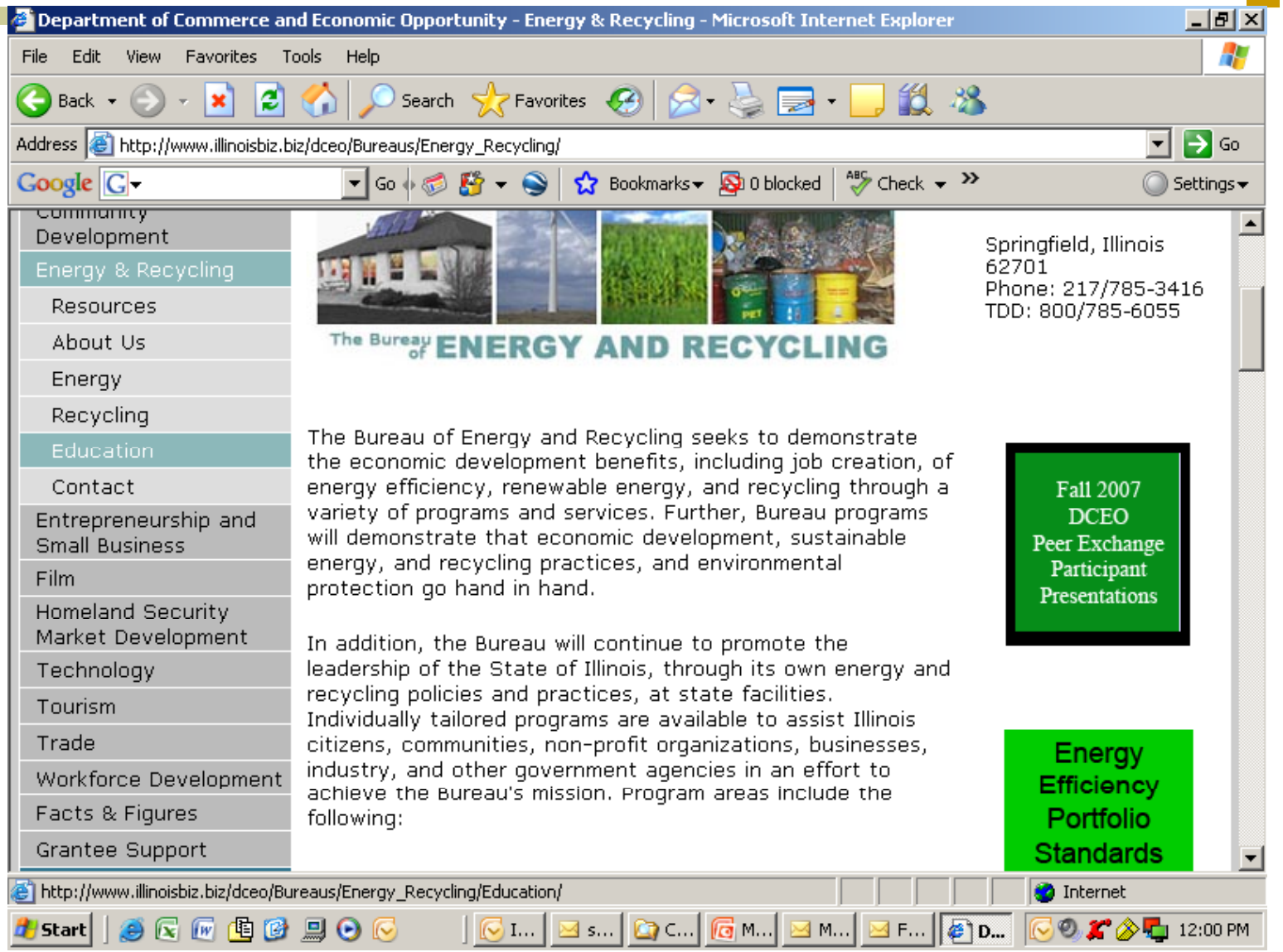
- Heating, Ventilating, & Air-Conditioning:
  - Sealed combustion high efficiency boilers and furnaces (>90%).
  - High SEER/EER Air-Conditioning units (13).
  - Geothermal heat pumps.
  - Programmable thermostats.
  - DOAS/Ventilation heat recovery systems.
  - Demand control ventilation, or at least the ability to schedule ventilation rates.

Treat code requirements as minimums not maximums!

Illinois EEPS

- Energy Efficiency Portfolio Standard part of Illinois Power Agency Act.
- Major Electrical IOUs must play (Ameren & ComEd).
- DCEO has 25 percent of the program for public sector and low income housing.
- Plan to reduce state electrical growth by 2 percent/yr by 2013.
- Natural Gas utilities also starting programs.

illinoisenergy.org



Incentive Levels

Standard

- Set incentives for a standard list of equipment upgrades.

Custom

- 7 cents/kWh for measures with 1-7 year payback.

Caps

- $100,000 per program year (June to May).
- ≤ 100% of Incremental Measure Costs (added cost of increasing efficiency beyond standard replacement option).
- ≤ 50% of Total Project Costs.

Key Web Links

Link	Information
www.illinoisenergy.org	DCEO Energy Programs: guidelines, RFPs, contacts, applications, and other resources
www.ComEd.com	ComEd Smart Ideas guidelines, applications, and resources, including on-line application system
www.ileeps.org	EEPS Information for DCEO, ComEd and Ameren EEPS programs
www.sedac.org	Smart Energy Design Assistance Center: Technical assistance for businesses and public sector providing energy information, news and trainings, energy service provider list
www.illinoisrecycles.com	DCEO Recycling Programs for local government, businesses and non-profits
www.illinoiscleanenergy.org	IL Clean Energy Community Foundation: grants for energy efficiency, renewable energy and natural areas for local government and non-profits

Conclusions

- SEDAC program provides a centralized mechanism for clients to obtain:
  - Energy conservation information.
  - Energy audits.
  - Detailed simulations and analyses.
  - Direct implementation assistance.
  - Funnel projects to DCEO.
- The time is now. We expect significantly more implementation with the Energy Efficiency Portfolio Standard and ARRA funding and incentives.

Illinois Smart Energy Design Assistance Center

Web site:
www.sedac.org

Contact:
info@sedac.org

1-800-214-7954