

# **Commercial, School & Industrial Energy Audits**



This program provides energy audits for industrial members, commercial businesses, local government units, community colleges, K-12 school systems, and non-profit organizations that have potential for energy efficiency savings.

## **Requesting a Commercial, School & Industrial (CS&I) Energy Audit**

LEC will work with the member to complete an Energy Audit Cost Proposal worksheet for a cost estimate for the audit from an approved auditor.

The auditor will need to have the following information from the cooperative/member in order to provide a cost estimate:

1. A twelve (12) month history of energy usage; including kWh, therms, and cost.
2. General information about the member such as contact name, title, company name, address, type of business/operation
3. Business/operation square footage to be audited
4. Correct cooperative member's information
5. Year facility was built
6. Main function of facility (office, retail, manufacturing, etc.)

Commercial and industrial customers must pay an initial 25% of the audit fee directly to the cooperative prior to the audit. This fee is reimbursable from the cooperative when one or more of the recommended measures are implemented within twelve (12) months of the audit date.

## **Energy audit procedure**

1. The auditor will meet with the cooperative and member key personnel for preliminary interview to identify the audit scope.
2. The auditor will conduct a walk-through of the facility to observe equipment, processes, and to identify energy management opportunities.
3. After the walk-through for basic audits, the auditor will conduct a post audit interview with member key personnel to discuss audit findings and share energy management opportunities identified.
4. For more extensive audits, a follow-up meeting, by phone, may be scheduled with the auditor, cooperative and member to review the final results and recommendations. If it is necessary for the auditor to make a return trip to share energy management opportunities with member or a governing board, additional travel expenses for 2nd trip will be incurred.



## **Program Guidelines**

### **Prior to Audit:**

Member must provide necessary information to receive energy audit cost proposal: business type, square footage, and 12 month history of energy usage (gas & electric). Member and Cooperative sign off on energy audit proposal agreeing to the price and cost share.

### **The Audit Procedure is generally as follows:**

1. Preliminary interview with key customer personnel to identify projects and areas of customer interest.
2. Walk through of the facility to look at equipment, processes and identify Energy Management Opportunities (EMO).
3. Post survey interview to discuss EMO's identified which will be evaluated in the report and report delivery issues.
4. Delivery of energy audit report, generally by phone, but in person under unique circumstances.

The following survey procedure, although not applicable in all cases, should be used as a general guideline for data gathering during the survey: The object is to identify Energy Management Opportunities and concentrate the time and effort available in these specific areas.

1. Conduct an on-site inspection of the facility. Walk through the building, examining all major energy using systems including electrical systems, lighting, auxiliary and process systems, envelope, HVAC, service water heating, and controls. Record the following information for major energy-using equipment: age, condition, operating problems, environmental problems, operating schedules and set points, and identity and responsibilities of maintenance contractors.
2. Determine the building use, equipment operating schedule(s), number of occupants, and occupancy schedules. Document schedule and occupant variations during typical weekdays, weekend days, and for various periods of the year.
3. Evaluate existing energy management procedures. Identify opportunities for formalizing an energy policy, increasing energy awareness, installing an on-site energy team, improving monitoring & targeting and benchmarking energy usage.
4. Complete a Utility Cost and Consumption Analysis. Calculate Greenhouse Gas Emissions and Carbon Footprint of the facility for electricity and natural gas (if available).

### **Typical data to be obtained for each building system is listed below.**

#### **Electrical Systems:**

Electric motors of major equipment: location, service, age, horsepower, RPM, enclosure type, efficiency rating, connected load, annual operating hours, and maintenance schedule. Note if the motor is controlled by a variable speed drive, inlet vanes etc.

#### **Lighting:**

- A. Interior lighting: number and type of fixtures in each space. Identify the ballast and lamp type used in each fixture, lighting fixture controls, operating schedules, and age of equipment.

- B. Exterior lighting: number and type of fixtures. Identify the ballast and lamp type used in each fixture, lighting fixture controls, and operating schedules.

Auxiliary and Process Systems:

- A. Examples: manufacturing equipment, process ovens, compressed air equipment, vacuum systems, process heating and cooling, etc.
- B. Collect pertinent nameplate data for major equipment, including location, manufacturer name, age, energy source, equipment rating or capacity, energy consumption, service, and maintenance schedule.
- C. Record the type of refrigerant used in refrigeration equipment. Also, note the size of refrigeration system compressors.
- D. Determine operating set points, annual number of operating hours, and other pertinent operating data.

Building Envelope Analysis:

Examine and document major building components, including the size and construction of walls, insulation, roofs, windows, and doors. Determine the age of various components.

HVAC Systems:

Identify and document each piece of heating, cooling, and ventilation equipment.

Heating:

- A. Description of space temperature controls and temperature set points (occupied and unoccupied).
- B. Furnaces: location of furnace, location of area served, floor area served, energy source, age, manufacturer name, rated heating output, efficiency rating, and description of the associated distribution system, controls, annual operating hours, and maintenance schedule.
- C. Boilers: location of boiler, location of area served, floor area served, energy source, age, manufacturer name, rated heating output, efficiency rating, description of the associated distribution system, controls, annual operating hours, and maintenance schedule.
- D. Piping: Look for leaks and un-insulated pipe. Note number and condition of steam traps, condensate receiver tanks and condensate pumps for steam systems.
- E. Pumps: location of pump, description of system served, age, manufacturer name, rated flow (GPM), motor size (HP) and motor efficiency rating, type of drive, description of the associated piping system (e.g. primary, secondary, variable flow), controls, annual operating hours, and maintenance schedule.

Cooling:

- A. Description of space temperature controls and temperature set points (occupied and unoccupied)
- B. Chillers: location of chiller, location of area served, floor area served, energy source, age, manufacturer name, rated cooling capacity (sensible and latent), efficiency rating, refrigerant type, description of the associated distribution system, controls, annual operating hours. Record the chilled and condensed water supply temperature and reset schedules.
- C. Roof top air conditioning systems, heat pumps, split system air conditioners, PTAC units, and other cooling equipment: location of unit, location of area served, floor area served, age, manufacturer name, rated cooling capacity, efficiency rating, refrigerant type, type and rating of any space heating equipment, description of the associated distribution system, controls, and annual operating hours.
- D. Window air conditioners: location of unit, location of area served, floor area served, age, manufacturer name, rated cooling capacity, efficiency rating, refrigerant type, controls, and annual operating hours.

### Ventilation:

- A. Fans and air handling units: location of unit, location of area served, floor area served, age, manufacturer name, rated air flow (CFM), motor size (HP) and motor efficiency rating, fan drive, description of the associated duct system (e.g. VAV, dual duct, exhaust duct with back draft damper, etc.), controls, and annual operating hours. Air handling units only: give space heating and/or cooling ratings, coil type (hot water, chilled water, refrigerant), amount of outside air, associated heating and cooling equipment, and controls.
- B. Ductwork: Observe condition of ductwork, insulation, and lining. Note un-insulated ducts in unconditioned spaces and significant duct leaks.

### Service Water Heating:

- A. Water heaters: location of water heater, description of area and equipment served, energy source, age, manufacturer name, rated recovery, efficiency rating, storage capacity, heating element ratings (electrical), controls, and water temperature set point.
- B. Piping: Look for leaks and un-insulated hot water pipe.

### Controls:

- A. Building automation systems (BAS): location of BAS, areas and equipment served by the BAS, number of points, age, manufacturer, BAS functions, and equipment/building operating schedules and set points.
- B. Controls: type of controls (pneumatic, DDC), age, condition, and maintenance schedule. If pneumatic controls are used, give the following information for the air compressor: age, manufacturer, motor rating (HP), motor efficiency, receiver capacity, air drier type and condition, and evidence of leaks (frequent compressor cycling).
- C. Thermostats: type, function, set points, equipment controlled, and areas served.

### **Post Audit Report Deliverables**

Based on interview, customer preferences, and site observations, develop a list of potential energy conservation measures. Analyze the energy and dollar savings potential for each measure as follows:

- A. Calculate the Energy Savings and Carbon Reduction (CO<sub>2</sub>) of each conservation measure. Document the basis for the anticipated energy savings.
- B. Estimate the cost of implementing the energy conservation measures.
- C. Calculate the Simple Payback of each measure up to ten (10) years or life of the equipment.
- D. Investigate possible operations and maintenance procedures that would contribute to energy savings.
- E. Prepare a written report following the report format provided in the section below.

### Report Format:

Executive Summary  
Facility Description, Utility History and Carbon Footprint  
Operation and Maintenance Recommendations  
Energy Management Opportunities  
Appendix  
Calculations Worksheets  
Product and Manufacturers Information