Energy Audit Procedures

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Audit Flow Chart

1. Obtain Utility History (Gas and Electric) & Preliminary Square Footage
2. Estimate Cooling, Heating & Electrical Loads
3. Schedule Site Visit
4. Interview Facilities Manager or Equivalent Person
5. Survey Facility
   - Power and Lighting
   - Cooling and Heating
   - Motors and Drivers
   - Domestic Hot Water
6. Analyze Data and Perform Calculations
7. Prepare Report
8. Present to Customer
Electrical & Natural Gas Meters

- Kilowatt Hour (KWH) = $ Electrical Kilowatts per hour Charge
- Kilowatt (KW) = $ Electrical Demand Charge
- Cubic Feet Hour (CFH) = $ Nat. Gas Charge
STEP 1: Obtain Utility History

- Quickly scan energy usage history of the customer.
- Separate heating and cooling information from the base load.
- Note any unusual kW demand peaks for further investigation.
- Understand facility’s energy usage.
STEP 2: Estimate Cooling, Heating and Electrical Loads

- Determine heating and cooling consumption. (ASHRAE)
- Estimate electrical lighting and power loads. (10–15 kwh per square foot)
- Compare loads with industry standards.
- http://www.eia.doe.gov/emeu/cbecs/
STEPS 3 & 4: Site Visit and Interview

- Schedule site visit and interview with Facility Energy Manager.
- Interview a person familiar with the building operation and equipment.
STEPS 3 & 4: Site Visit and Interview

- Ask questions about:
  - Building Square Footage, Occupancy and Ownership
  - Operating Hours and Equipment Operating Hours
  - Equipment Sizes and Age; New or Planned Equipment Changes
  - Motor Lists
  - Energy Management Systems; Energy Concerns; Attitudes Toward Energy Conservation
  - Computer Room or Other Separate AC Systems
  - Expansion Plans
  - Conservation Measures Planned or Done
  - Payback Criteria
  - How Are They Handling the CFC Phase-out
STEP 5: Facility Survey

- Prior to the survey, gather prints of the building.
- Tour the mechanical rooms. Obtain nameplate data, model numbers if available. (Verify database)
- Consult with knowledgeable maintenance person for information on the motors of air handling units.
- Examine the water heaters.
- Visit the lighting storeroom. Note the indoor and outdoor lighting and take a fixture count.
- Take as many pictures as you can.
## Energy Consumption Reduction Measures

<table>
<thead>
<tr>
<th>Utility Conservation Practices</th>
<th>Percentage</th>
<th>Largest Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjusted operating hours of HVAC</td>
<td>59%</td>
<td>41%</td>
</tr>
<tr>
<td>Replaced existing light fixtures</td>
<td>46%</td>
<td>28%</td>
</tr>
<tr>
<td>Retrofitted existing light fixtures</td>
<td>41%</td>
<td>24%</td>
</tr>
<tr>
<td>Set back thermostat</td>
<td>35%</td>
<td>15%</td>
</tr>
<tr>
<td>Installed energy–efficient motors</td>
<td>33%</td>
<td>14%</td>
</tr>
<tr>
<td>Installed occupancy sensors</td>
<td>31%</td>
<td>11%</td>
</tr>
<tr>
<td>Installed energy management systems</td>
<td>29%</td>
<td>19%</td>
</tr>
<tr>
<td>Installed energy–efficient ventilation equipment</td>
<td>25%</td>
<td>9%</td>
</tr>
<tr>
<td>Installed water–efficient plumbing fixtures</td>
<td>23%</td>
<td>8%</td>
</tr>
<tr>
<td>Installed energy–efficient heating equipment</td>
<td>22%</td>
<td>8%</td>
</tr>
<tr>
<td>Installed energy–efficient chillers</td>
<td>21%</td>
<td>12%</td>
</tr>
<tr>
<td>Recommissioned building systems</td>
<td>20%</td>
<td>8%</td>
</tr>
<tr>
<td>Installed new energy–efficient windows</td>
<td>11%</td>
<td>3%</td>
</tr>
<tr>
<td>Improved building shell insulation</td>
<td>6%</td>
<td>2%</td>
</tr>
<tr>
<td>Retrofitted building envelope</td>
<td>4%</td>
<td>2%</td>
</tr>
</tbody>
</table>
STEP 6: Analyze Data & Perform Calculations

- Usually performed at the office.
  - Analyze the data:
    - Identify ECMs
    - Perform calculations
    - Establish savings and paybacks
  - Evaluate other measures:
    - Measures with over a ten year payback are not listed unless by customer request
    - Simple paybacks versus life cycle costing (SP=Cost of ECM/Savings, BLCC Program)
      - Available at [www.eere.energy.gov/femp/information/download_blcc.cfm](http://www.eere.energy.gov/femp/information/download_blcc.cfm)
A comprehensive Level 3 Survey Report usually contains the following information:

- Building usage and brief description
- Construction
- Operating criteria
- Utility histories in graphical formats
- Listing of energy reduction recommendations (ECMs)
- Economic analysis for each measure including utility rebate
- Answers to customer’s questions and concerns
- Suggestions for future studies (load research, sub-metering, etc.)
Our Capabilities Include:

- Program and Project Management
- Facility Condition and Energy Assessments
- Engineering Design and Analysis
- Construction Management
- Environmental Management Support Services