Walk-through Energy Audit Form

Adapted by Shirley Thompson from Manitoba Hydro

What is an Energy Audit?

An energy audit is a procedure to identify how energy is being used in a facility and help identify practical and cost effective energy saving measures that will reduce energy use and lower operating costs. Energy audits typically produce energy savings of 10 to 35%, depending on what energy savings measures have already been undertaken. Almost every facility building in Canada can add some energy efficient measures and save energy dollars.

Types of audits

There are several different types of energy audits that are used to help evaluate the potential for energy savings. The two types of energy audits mentioned in this guide are the simple and detailed walk-through audits. The simple walk-through audit also known as the screening audit will highlight the main uses of energy use in the facility and will point out the most evident ways to save energy. The detailed “walk-through” or comprehensive audit, will provide an in-depth analysis of the energy use of a facility and a detailed energy saving implementation plan. The systems that are evaluated include the building envelope, lighting, domestic hot water, heating ventilation and air conditioning (HVAC) and controls. The two other types of energy audits that are often refereed to as the benchmark, bootstrap or yardstick audit and the engineering audit. The engineering audit includes detailed analysis of specific systems within a facility and provides information ranging from general recommendations to detailed engineering plans and costs, depending on the detail required.

Do You Need an Energy Audit to Save Energy?

It is not always necessary to start with a detailed energy audit but conducting your own simple “walk-through” audit will help you identify energy losses which can be corrected at little or no additional costs through maintenance, operational actions, or purchasing choices. If a more detailed technical analysis seems necessary then this initial energy audit will provide the important preliminary data necessary for the more detailed analysis.

Getting Started

Whether you conduct your own simple audit or have a professional conduct a detailed audit for you, the first thing you will need is at least 12 months of energy information (electricity and natural gas, propane or oil). You can get this from your utility company, your fuel supplier or from your energy bills. This information is valuable as it can tell you how much energy is used for baseload equipment such as hot water, lighting and office equipment and how much energy is used for heating and air conditioning. Energy worksheets have been provided in the Facility Building “Walk-Through” energy audit form later in this section. You can record the information on the sheets provided or plot them on graph paper which ever seems best.
The Simple Walkthrough Audit

Obtain a copy of the building plans or a sketch of the layout of each floor, then walk through the facility and identify all the equipment and processes that use or cause the use of energy. You will need lots of time to do this properly so allow yourself at least 4 – 5 hours. Make a list of the size and location of all energy using equipment such as motors, appliances and lights. Include information such as operating hours and temperatures, condition of insulation and weather-stripping, locations of gaps around doors and windows etc. To help you identify potential energy reduction measures, ask yourself the following questions.

- Do the lights or equipment need to be on as long as they are?
- Can the operating temperature be reduced?
- Can smaller more efficient equipment be installed?
- Can insulation be added?
- Can windows and doors be improved or should they be replaced?
- Can you Turn it off, Turn it down or Tune it up?

From actual energy audits it has been shown that approximately 80% to 85% of the energy used in a church is used for heating and ventilation. The balance of the energy is used for fans, water heating, lighting, motors, cooking equipment and office equipment.

Typical use of Energy for a small facility building in Northern Ontario/Manitoba

<table>
<thead>
<tr>
<th>Heating:</th>
<th>Cooling:</th>
<th>Baseload:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating</td>
<td>76.8%</td>
<td>Hot Water</td>
</tr>
<tr>
<td>Ventilation</td>
<td>7.8%</td>
<td>Lighting</td>
</tr>
<tr>
<td>Car plugs</td>
<td>0.2%</td>
<td>Motors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pilot Lights</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cooking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Misc. Equipment</td>
</tr>
</tbody>
</table>
Facility Building "Walk-Through" Energy Audit Form

Date: ____________

The first step in an energy audit is to record all energy consumption from utility bills for the last 12-months. Then walk through the facility and identify all the equipment and processes that use or cause the use of energy. Note size of the equipment, operating hours and temperatures, condition of insulation and weather-stripping, gaps around doors and windows etc. Ask yourself questions such as the following to help you identify potential energy reduction measures: Does the equipment need to run as long? Can the operating temperature be reduced? Can smaller more efficient equipment be installed? Can insulation be added? Can windows and doors be improved or should they be replaced? Can electrical equipment be operated at off-peak hours?

Can you Turn it off, Turn it down or Tune it up?

If a more detailed technical analysis seems necessary then this initial energy audit will provide the important preliminary data necessary for the detailed analysis.

General Information

(Please circle units used where applicable)

Facility Name: ____________________________________________
Mailing Address: __________________________________________
Town: ___________________________ Postal Code: ________________

Name of Facility Operator: __________________________________
Title: _____________________________________________________
Phone Number: __________________ Fax Number: ________________

Name of person completing this form: __________________________________
Title: _____________________________________________________
Phone Number: __________________ Fax Number: ________________

Brief Description of Function or Use of Facility: __________________________
______________________________________________

Total Floor area of Facility (sq. m./sq. ft.): ____________________________
Facility Building "Walk-Through" Energy Audit Form
Electrical Worksheet

Complete one form for each electric meter in your facility. The completed form is necessary, as part of the information needed to establish your energy usage and Greenhouse Gas (GHG) baselines. This information will also provide you with a much better understanding of what your actual energy costs are.

**Facility Name:**

Meter Descriptor (Entire Facility, Area, Equipment, Etc.): _______________________________

Service - Phase(s): ___________ Voltage: ___________

Utility Company Name: Kenora Hydro?

Account Number: _______________________

Hydro Rate Class (e.g. General Service Small – Non Demand): _______________________

Year: ___________ No. Of Months: ___________ First Month: _______________________

Provincial Tax (%): ___________ GST (%): ___________ City Tax (%): ___________

### Electrical Data

(A-Adjusted, R-Company Read, E-Estimated, V-Verified, M- Manual Estimated)

<table>
<thead>
<tr>
<th>Month/Year or Date Meter Read</th>
<th>Demand</th>
<th>Electrical Consumption (kWh)</th>
<th>Total Cost</th>
<th>Reading Type (A,R,E,V,M)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Actual (kVA)</td>
<td>Billed (kVA)</td>
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<tr>
<td>Totals</td>
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Facility Building "Walk-Through" Energy Audit Form

Natural Gas / Propane Worksheet

Complete one form for each natural gas or propane meter in your facility. The completed form is necessary, as part of the information needed to establish your energy usage and GHG baselines. This information will also provide you with a much better understanding of what your actual energy costs are.

Facility Name: __________________________________________________________

Units Of Metering - Imperial (Mcf, ccf): _________Or Metrics (Cubic Metres - m³): _________

Utility Company Name: __________________________________________________________

Account Number: __________________________ Rate Code: ___________________________

Fuel Use (Entire Facility, Area, Equipment, Etc.): ____________________________________________________________________________

Year: __________ No. Of Months: ____________ First Month: ______________________

Provincial Tax (%): ___________GST (%): ___________City Tax (%): _____________

Natural Gas / Propane Data

(A-Adjusted, R-Company Read, E-Estimated, V-Verified, M- Manual Estimated)

<table>
<thead>
<tr>
<th>Month/year or Date meter read</th>
<th>Natural Gas / Propane Consumption Units</th>
<th>Total Cost $</th>
<th>Reading Type (A,R,E,V,M)</th>
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</thead>
<tbody>
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<tr>
<td>Totals</td>
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</table>
Facility Building "Walk-Through" Energy Audit Form

**Bulk Fuel Worksheet**

Complete one form for each bulk fuel (propane, oil, coal, wood, etc.) used in your facility. The completed form is necessary, as part of the information needed to establish your energy usage and GHG baselines. This information will also provide you with a much better understanding of what your actual energy costs are.

**Facility Name:**

Fuel Company Name: ___________________________________________________________

Fuel Type: ___________ Fuel Delivery Units (litres, tonnes cords etc): ________________

Account Number: ______________________ Fuel cost / Unit: ___________________________

Fuel Use (Entire Facility, Area, Equipment, Etc.): ________________________________

Year: __________ No. Of Months: __________ First Month: _______________________

Provincial Tax (%): __________GST (%): __________City Tax (%): __________

**Fuel Type**

<table>
<thead>
<tr>
<th>Month/Year Fuel Delivered</th>
<th>Monthly Fuel Consumption Units</th>
<th>Total Cost $</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
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<td>Totals</td>
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</tbody>
</table>
Facility Building "Walk-Through" Energy Audit Form

Lighting

Facility: ___________________________________________________________________ Location of Lights: ___________________________________________________________________

Please use a new sheet for each area, location or room in the facility.

Existing lights and controls

<table>
<thead>
<tr>
<th>Type of fixtures (see legend):</th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
<th>Type 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of fixtures:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Number of lamps per fixture:</td>
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<tr>
<td>If fluorescent indicate length of lamps (2 ft, 3ft, 4ft, 8ft):</td>
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<tr>
<td>Watts per fixture: (Include ballast wattage if known)</td>
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<tr>
<td>Fixture height from work surface(ft/m)</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Foot-candle level (if known) – measured at work surface - foot candles</td>
<td></td>
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</tr>
<tr>
<td>Present operation of lights - hours/day</td>
<td></td>
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<tr>
<td>Present operation of lights - days/week</td>
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<tr>
<td>Present operation of lights – weeks/year</td>
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<tr>
<td>Present operation of lights - hours/day</td>
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<tr>
<td>Present operation of lights - days/week</td>
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<tr>
<td>Present operation of lights - weeks/year</td>
<td></td>
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</tr>
</tbody>
</table>

Present light levels: Bright ______ Adequate ______ Dim ______

Reflectance of walls and ceilings: Good ______ Average ______ Poor ______

Can lights be switched on and off as desired? Yes____ No____ Comment: __________________________

Can lower wattage lamps be installed? Yes____ No____ Comment: __________________________

Can existing lamps/fixtures be retrofitted? Yes____ No____ Comment: __________________________

Is there an automatic timer? Yes____ No____ Is it set properly? Yes____ No____

Is there an occupancy sensor? Yes____ No____ If No, can an occupancy sensor be installed? Yes____ No____

Energy Action Plan Ideas: ________________________________________________________________

Lighting Legend

A. Incandescent     B. Fluorescent T-12     C. Fluorescent T-12 HO (High Output)
D. Compact Fluorescent  E. Mercury Vapour  F. Fluorescent T-12 VHO (VH Output)
G. High Pressure Sodium H. Low Pressure Sodium I. Metal Halide (White Light)
J. Fluorescent T-8     K. Quartz Halogen     L. Exit lamp - incandescent
M. Exit lamp - compact fluor.  N. Exit lamp - LED  O. Other-specify ______________________
Facility Building "Walk-Through" Energy Audit Form

Envelope

**Facility:**  
**Direction Wall Faces**

For each wall area of facility (front, sides and back of a building) please use one sheet.

Windows (Please circle appropriate Yes or No)

<table>
<thead>
<tr>
<th>Are storm windows used?</th>
<th>Number of glazings</th>
<th>Description of window type (double hung, slider, casement, etc)</th>
<th>Do windows open?</th>
<th>Window fit (poor, fair, good)</th>
<th>Number of windows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
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<tr>
<td>Yes</td>
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<td>Yes</td>
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<td>Yes</td>
<td>No</td>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Doors (Please circle appropriate Yes or No) (Please circle units used)

<table>
<thead>
<tr>
<th>Are storm doors used?</th>
<th>Is door Insulated?</th>
<th>Description of door type (overhead, insulated metal, wood, etc)</th>
<th>Condition of door (warped, cracked)</th>
<th>Door Fit (poor, good)</th>
<th>Number of doors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
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<td>Yes</td>
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<tr>
<td>Yes</td>
<td>No</td>
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</tbody>
</table>

Number/Location of broken or cracked windows:________________________

Description of door or window repairs or replacements needed (including door closers):________________________

Caulking: __________ ft/metres required

Weather-stripping: __________ ft/metres required

**Inside** (Please circle appropriate Yes or No)

<table>
<thead>
<tr>
<th>Insulation</th>
<th>Insulated?</th>
<th>Present Thickness</th>
<th>Insulation Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Ceiling (Attic)</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Walls</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Basement/Crawlspace walls</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Floor / slab</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Location of drafts (use strip of tissue to locate): e.g. doors, windows, elec. outlets, attic hatches cracks etc.

Is attic ventilation installed? Yes _____ No ____ Comments:______________________________________________

**Energy Action Plan Ideas:**

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

8
Facility Building "Walk-Through" Energy Audit Form

Water System

Facility Name: 

Please fill in one sheet for each tank of hot water

System Components (Please circle units used)

Type of water heater, energy (fuel) used:

Tank storage capacity: ___________________ gallons/litres  Number of tanks: __________

Recovery rate: ___________________ gallons/litres per hour   Size of heating element: __________

Temperature setting: _______________ °C/°F

Make, Model, Age: ___________________________________________________________________

Tank insulation (Type/Thickness): if known ______________________________________________

Is tank equipped with a Heat Trap?  Yes ________ No ________

Location, description of other heaters, if any: ____________________________________________

Length of heated uninsulated distribution piping: _____________________________ feet/metres

Hot Water Temperatures (Please circle units used)

At showerhead: _______________ °C/°F.  At faucet nearest tank: _______________ °C/°F

At dishwasher: _______________ °C/°F.  At washing machine: _______________ °C/°F

At other location: (______________________) : ___________________________ °C/°F

Showerheads, faucets, toilets, Other (Please circle units used)

Showerheads:  Rate of flow: ____________________________ gal./litres/minute

Average use/day: ____________________________ minutes/shower

Faucets:  Rate of flow: ____________________________ gal./litres/minute

Number of Toilets: ________ Tank Size: ________ gallons/litres  Times used/week: ________

Dishwasher:  Capacity: _______________ gallons/litres.  Times used/week: ________

Washing Machine Capacity: _______________ gal./litres  Times used/week: ________

Have cool water washing machines been tried?  Yes ________ No ________  Comment ____________________________

Energy Action Plan Ideas: ______________________________________________________________

_________________________________________________________________________________

_________________________________________________________________________________

_________________________________________________________________________________

9
Facility Building "Walk-Through" Energy Audit Form

Heating Ventilating and Air Conditioning (HVAC)

Facility Name: ________________________________________________________________

Please use another sheet id required

Air Conditioning

Number of units: ______________________________________________________________

Make, type, size, location of each:  _____________________________________________

________________________________________ Date of last servicing: ______________

Has the HVAC system been “balanced”? Yes ______ No ______

Heat Pumps

Number of units: ______________________________________________________________

Make, type, size, location of each:  _____________________________________________

________________________________________ Date of last servicing: ______________

Do they have auxiliary heating? Yes _____ No ______

If so, do they have controls that minimizing use of that heating? Yes ______ No ______

Frequency of servicing: __________________________ Date of last servicing: __________

Central Heating Plant and System (Please circle units used)

Location: ________________________________________________________________

Type of fuel used: _______________________________________________________

Type of system (e.g., hot water, steam, warm air) ______________________________

If you have a steam system, when were the traps last checked? __________________

Number of zones: _________________________________________________________

Age of boiler or furnace: ______________ Type, condition of insulation on boiler: ______

Age of burner: ___________________________ Is domestic hot water heated by the boiler? ______

Steam pressure ________________________ ( Psi) Or hot water temperature ________ (°C/°F)

Type and condition of insulation on air ducts or on distribution piping: __________________________

Frequency of testing/cleaning adjustment: __________________________ Date of last test/service: __________

Results of test (e.g., combustion efficiency %): __________________________

Facility Building "Walk-Through" Energy Audit Form
Heating Ventilating and Air Conditioning (HVAC)

Facility Name: ____________________________

Please use another sheet if required

**Temperature set back schedule**

<table>
<thead>
<tr>
<th>Day of Week Group Meets</th>
<th>Group’s name (Scouts, Cubs, Choir etc.)</th>
<th>Room Name</th>
<th>Time of use of room</th>
<th>Can temperature be set back during unoccupied times?</th>
<th>Set back temperature °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Start-time</td>
<td>Stop-time</td>
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11
Facility Building "Walk-Through" Energy Audit Form
HVAC - Continued

Facility Name: _____________________________________________________________

Please use a new sheet for each zone, area, or room in the facility.

Controls/Use (Please circle units used)

Location(s) and description of thermostats: __________________________________________

Location of setback clock/setback thermostat: _______________________________________

Cold weather thermostat setting: _____ °C/°F. Is temperature setback at night and on weekends? _____

If Yes what are setback times and temperatures for: nighttime ________________ weekend __________

Is temperature setback automatic ________________ or manual? ________________

Hot weather thermostat setting: _____ °C/°F. Is temperature setup at night and on weekends? _____

If Yes what are setup times and temperatures for: nighttime ________________ weekend __________

Is temperature setup automatic ________________ or manual? ________________

How many hours a week and weeks per year is the system used?

Hours & weeks in hot weather ____________ Hours & weeks in cold weather ____________

When is system turned on/off in relation to daily occupancy (i.e., before, after, by how long)?

______________________________

Which areas are too hot?

______________________________

Which areas are too cold?

______________________________

Fans (Supply, Return, Exhaust, Circulating etc.) (Please circle appropriate Yes or No)

<table>
<thead>
<tr>
<th>Function: (supply, return etc)</th>
<th>Area served:</th>
<th>Fan operating hours</th>
<th>Can fans be cycled to reduce operating times?</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

Energy Action Plan Ideas: ____________________________________________________________
Facility Building "Walk-Through" Energy Audit Form
Office Machines And Equipment
(Computers, printers, photocopiers, etc)

Facility Name: ____________________________________________________________

Please use more sheets if required

Office machine:

Machine type, location ______________________________________________________

Wattage (nameplate watts, or amps x volts): _________________________________

Is it left on overnight? ____________ Over weekends? _________________________

Daily hours of operation: _______________ Hours per day it could be turned off: ____________

Office machine:

Machine type, location ______________________________________________________

Wattage (nameplate watts, or amps x volts): _________________________________

Is it left on overnight? ____________ Over weekends? _________________________

Daily hours of operation: _______________ Hours per day it could be turned off: ____________

Office machine:

Machine type, location ______________________________________________________

Wattage (nameplate watts, or amps x volts): _________________________________

Is it left on overnight? ____________ Over weekends? _________________________

Daily hours of operation: _______________ Hours per day it could be turned off: ____________

Office machine:

Machine type, location ______________________________________________________

Wattage (nameplate watts, or amps x volts): _________________________________

Is it left on overnight? ____________ Over weekends? _________________________

Daily hours of operation: _______________ Hours per day it could be turned off: ____________

Office machine:

Machine type, location ______________________________________________________

Wattage (nameplate watts, or amps x volts): _________________________________

Is it left on overnight? ____________ Over weekends? _________________________

Daily hours of operation: _______________ Hours per day it could be turned off: ____________
Facility Name: ________________________________

Please use another sheet if required

Refrigeration and Freezing (Please circle units used)

Type, age, energy used: ______________
Compressor rating: ________ hp; age: _____ years Present temperature: °C/°F __________
Hours per day of use: ________ Weeks per year equipment is used __________
Do doors close completely, by themselves? ________ Condition of door seals: ________

Refrigeration and Freezing (Please circle units used)

Type, age, energy used: ______________
Compressor rating: ________ hp; age: _____ years Present temperature: °C/°F __________
Hours per day of use: ________ Weeks per year equipment is used __________
Do doors close completely, by themselves? ________ Condition of door seals: ________

Refrigeration and Freezing (Please circle units used)

Type, age, energy used: ______________
Compressor rating: ________ hp; age: _____ years Present temperature: °C/°F __________
Hours per day of use: ________ Weeks per year equipment is used __________
Do doors close completely, by themselves? ________ Condition of door seals: ________

Cooking (Range, oven, grill, etc) (Please circle units used)

Type, age, energy used: ________________________________ Temperature now used: °C/°F __________
Is this the lowest possible temperature? Yes ___ No ___ Is equipment turned off when possible? ______
Are exhaust hoods installed over all cooking equipment? Yes ______ No ________

Cooking (Range, oven, grill, etc) (Please circle units used)

Type, age, energy used: ________________________________ Temperature now used: °C/°F __________
Is this the lowest possible temperature? Yes ___ No ___ Is equipment turned off when possible? ______
Are exhaust hoods installed over all cooking equipment? Yes ______ No ________

Cooking (Range, oven, grill, etc) (Please circle units used)

Type, age, energy used: ________________________________ Temperature now used: °C/°F __________
Is this the lowest possible temperature? Yes ___ No ___ Is equipment turned off when possible? ______
Are exhaust hoods installed over all cooking equipment? Yes ______ No ________
Facility Building "Walk-Through" Energy Audit Form

Miscellaneous Equipment

Facility Name:_________________________________________________________

Please use another sheet if required

**Washer Dyer** (If applicable)

Type, age, energy used:________________________________________________

Temperature now used: Hot_______ Warm_______ Cold_______

Are machines fully and properly loaded? Yes ______ No _________

Can lower washing/rinse water temperatures be used? Yes ______ No _________

**Dish Washing** (If applicable)

Type, age, energy used:________________________________________________

Temperature now used: Hot_______ Warm_______ Cold_______

Are machines fully and properly loaded? Yes ______ No _________

Can lower washing/rinse water temperatures be used? Yes ______ No _________

**Dish Washing** (If applicable)

Type, age, energy used:________________________________________________

Temperature now used: Hot_______ Warm_______ Cold_______

Are machines fully and properly loaded? Yes ______ No _________

Can lower washing/rinse water temperatures be used? Yes ______ No _________

**Car Plugs (Car, Block or Car & Block Heaters.)** (Please circle appropriate Yes or No)

<table>
<thead>
<tr>
<th>Function: (Car, block car &amp; block)</th>
<th>Description of parking lot served:</th>
<th>Plug operating hours</th>
<th>Can plugs be cycled to reduce operating times?</th>
</tr>
</thead>
<tbody>
<tr>
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<td>hours / day</td>
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</tbody>
</table>
This sheet is provided for those customers who wish to calculate the estimated energy and dollar savings from lighting improvements.

**Lighting Energy Saving Calculation Worksheet (Optional)**

<table>
<thead>
<tr>
<th>Lamp Type</th>
<th>Wattage per Fixture Lamps &amp; Ballasts* (W)</th>
<th>Fixure Quantity</th>
<th>Annual Hours of Operation (hrs.)</th>
<th>Energy Usage (kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Lighting System</strong> (e.g. T-12, Inc., Merc. Vap. etc.)</td>
<td><img src="image" alt="Existing Lamp Type" /> / 1000</td>
<td><img src="image" alt="Existing Quantity" /></td>
<td><img src="image" alt="Existing Hours" /></td>
<td><img src="image" alt="Existing Energy Usage" /></td>
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<tr>
<td><strong>Proposed Lighting System</strong> (e.g. T-8, CFL, HID etc.)</td>
<td><img src="image" alt="Proposed Lamp Type" /> / 1000</td>
<td><img src="image" alt="Proposed Quantity" /></td>
<td><img src="image" alt="Proposed Hours" /></td>
<td><img src="image" alt="Proposed Energy Usage" /></td>
</tr>
</tbody>
</table>

A

B

Total Energy Savings (kWh) = ![Total Energy Savings](image) 

Average Cost per kWh X $0.045** 

Total Energy Savings = ![Total Energy Savings](image) 

Energy savings = (Existing Total in kWh – Proposed Total in kWh) x Average Cost per kWh.

Notes

* Refer to Nominal Wattage Table Section 3 (page 8) of Application Guide for details (Divide total wattage by 1000 to get kilowatts).

**Contact your Energy Service Coordinator for the average cost that is correct for your facility ($0.045 can be used for an average facility).

Energy Savings may vary depending on the building's heating system and location of lighting.
Guide to Improve Energy efficiency measures for Buildings

Most people know the three R’s of recycling – Reduce, Reuse, Recycle, but in terms of saving money on energy bills they stand for:

- **reduce operating time** (lights, gas pilots in summer, ventilation systems turned off when unoccupied, connecting fans to light switches or occupancy sensors)
- **reduce operating temperature** (hot water, refrigerators and freezers, heating systems, ventilation systems)
- **reducing operating losses** (drafts, lights, insulation, appliances).

Basically, reduce time, temperature and loses. This checklist provides a list of things to do by area/system.

**Building Envelope (reducing losses)**

1. Install triple glazed units when repairing frames.
2. Install low emissivity glazing.
3. Install permanent storm windows.
4. Reduce glass area (wall up/close off) on north side.
5. Orient windows to south for heating and lighting.
6. Consider use of daylight through windows.
7. Install solar shading (shades, blinds).
8. Install insulated doors.
9. Install vestibules.
10. Wall up/close off unneeded openings.
11. Install insulation to poorly insulated attics/roofs, ceiling, walls, floor (R20 in walls, R40 in ceilings).
12. Reduce infiltration around doors and windows and through walls
   a) caulk around doors and windows
   b) Add/repair the weather stripping around doors and windows
   c) install inside plastic film on windows
   d) Repair cracks in walls

**Heating (operating times and temperatures)**

1. Replace inefficient boilers.
2. Use modular units.
3. Decentralize system.
4. Downsize system.
5. Replace inefficient burners.
6. Install automatic flue dampers.
7. Replace pilot lights with electronic ignition.
8. Preheat combustion air/make up water with waste heat.
9. Recover waste heat from exhaust air, flue gas, laundry, kitchen, engine exhaust, condenser, cooling tower.
10. Convert to radiant heat.
11. Reduce temperature during regular occupied time (20-21°C)
12. Setback temperature during unoccupied time (15-18°C)
13. Install de-stratification fans to reduce air stratification temperature

Cooling (operating times and temperatures)

1. Replace inefficient chillers.
2. Install package unit air conditioners for specific load requirements.
3. Install economizer cycles.
4. Utilize evaporative/dehumidification cooling.
5. Manifold chillers in parallel and sequence.
6. Isolate off-line chillers and cooling towers.
7. Replace air-cooled condensers with cooling towers.
8. Install heat pipe heat recovery unit.
9. Install plate and frame heat exchanger.
10. Convert mechanical chiller to absorption.
11. Ensure coils and heat exchangers are kept clean
12. Increase temperature during regular occupied time (22-24°C)
13. Allow higher temperatures during unoccupied time (24-26°C)

Ventilation Distribution (3rs)

1. Slow fans down to reduce air flow
2. Reduce air stratification.
3. Convert to variable air volume.
4. Insulate pipe and ductwork.
5. Install automatic dampers.
7. Reduce outside air percentage. Use ASHRAE guidelines of 20 cfm per person
8. Shut off/reduce heat to lobbies, stairwells, hallways.
9. Reduce/eliminate air to unoccupied areas.
10. Utilize outside air for free cooling.
11. Eliminate simultaneous heating and cooling.
12. Ensure exhaust fans are turned off when supply fans are turned off
13. Reduce hours of operation during unoccupied time
14. Ensure filters are clean
15. Ensure fresh air dampers are operating properly

**Lighting (3rs)**

1. Convert incandescent to fluorescent or high-Intensity discharge.
2. Replace incandescent lamps with compact fluorescents
3. Replace incandescent exit lamps with LED exit fixtures
4. Convert mercury vapor to metal halide or sodium vapor.
6. Replace fluorescent lamps with T-8 lamps and electronic ballasts
7. Install occupancy sensors (infrared, ultrasonic).
8. Install time-of-day controls.
9. Install automatic daylight dimmers.
10. Install day lighting.
11. Install local switches.

**Domestic Hot Water (3Rs)**

1. Install low-flow showerheads.
2. Install low-flow faucets.
3. Install flow regulators
4. Install self-shutoff faucets.
5. Decentralize hot water heating.
6. Add piping and tank insulation.
7. Install booster heaters for hot water in lieu of central system use.

**Kitchen**

1. Install makeup air supply for exhaust
2. Install timer for exhaust
3. Install heat reclamation system for exhaust heat.
4. Add/improve insulation.

Utility Plant Systems
1. Reduce steam distribution pressure.
2. Increase boiler efficiency.
3. Insulate boiler piping.
4. Install economizers.
5. Install air preheaters.
6. Install blow down controls.
7. Modernize boiler and chiller controls.
8. Ensure steam traps are in good working order. Inspect annually.

Electrical Equipment (Reduce time and temperature)
1. Convert to energy efficient (EE) motors on burnout.
2. Install variable-speed motors.
3. Replace oversized motors with properly sized EE motors.
4. Install multi-speed motors.
5. De-energize equipment when not in use
6. Reduce loads when not required/ Reduce hours of operation
7. Install capacitors or synchronous motors to increase power factor.
8. Reduce transformer losses by proper loading and balancing.
9. Ensure drive belts have the proper tension

Controls (Reduce time and temperature)
1. Install temperature/pressure reset devices.
2. Install stop/start devices.
3. Install night setback devices.
4. Replace hand valves with automatic valves.

Car Plugs (Reduce operating time)
1. Cycle car plugs 50% off/ 50% on to save demand and energy.
2. Install timer to turn car plugs off when not required
3. Install car plug management system.