Energy Management Package For Small Commercial Buildings

WORKSHEETS

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DRAFT VERSION--DO NOT CIRCULATE

Contents:

E1 Benchmarking and Monthly Data Analysis Worksheet

Building:_____ City:_____ Zip:_____ Date:_____

STEP 1 Gather Data Who pays electricity and gas bills? owner tenant Name: _____
Is energy use or cost currently tracked? yes no how?_____

Either: ☐ Get paper utility bills from owner/tenant. Two years or more if available.

☐ Download from utility website. Filename:_____ Utility: _____
Username:_____ Password: _____

☐ Other: _____

Building type (circle): office retail food service food sales other_____
Floor area: _____ **Year built:** _____
Tool(s) used: _____ Username:_____ Password: _____

Note: Some tools can automatically generate a summary report. Use this worksheet to highlight key elements on the summary report and supplement that information where needed.

STEP 2 Patterns in monthly energy usage

Total monthly energy usage	**Peak season (circle)**: Summer Autumn Winter Spring All months similar irregular/other: _____ **As expected?** yes / no Notes:
Electricity usage	**Peak season (circle)**: Summer Autumn Winter Spring All months similar irregular/other: _____ **Electric fuel source?** AC: yes / no Heat: yes / no **Pattern as expected?** yes / no Notes:
Gas/Oil usage	**Peak season (circle)**: Summer Autumn Winter Spring All months similar irregular/other: _____ **Primary gas/liquid fuel**: natural gas oil propane other: _____ **Gas/oil fuel source?** Heat: yes / no AC : yes(unusual) / no **As expected?** yes / no Notes:

STEP 3 Performance Over Time

☐ Printed a plot comparing this year's energy use with the previous year's or rolling annual average.

How does this year's monthly energy use compare with the previous year? increase decrease same
In all months/seasons?

By fuel type?

Is the baseline for comparison 'weather normalized' to adjust for that year's weather? yes no not sure

Specific changes in energy use over time. Consult with owner about changes in schedule, building usage and equipment may explain observations. Include changes in building occupancy, usage or equipment that you expect might have an impact on energy use.

Dates	**Description of change** *(ex: abrupt increase by 10,000 kBTU/month in 2/12 that continues over the next year)*	**Explanation** *(check daily load schedule, consult with owner/occupants, recent efficiency upgrades)*	**Plan to address?** (check if yes)

STEP 4 Cross-sectional Benchmarking

Energy Use Intensity (EUI):_____ (include units, ideally kBTU/sf-yr)

EUI is total annual energy use per unit floor area.

Comparison % ranking: _____ (% of buildings with higher EUI (worse performance) than yours)

Note that in some tools, percentile is defined in the opposite way.

Is this an Energy Star Rating? yes no **Peer group used** (if available):

If Energy Star Rating is 75 or higher, the building may be eligible for an Energy Star Label.

Other peer comparison: *Example: Your building's EUI is 40 kBTU/sf-yr and the average for similar buildings is 55 kBTU/sf-yr.*

Are there special considerations that might cause your building to differ from the defined peer group?

Optional STEP 5: Other analyses. Record notes here from any other monthly data analyses performed.

Notes:

STEP 6 Look forward

If Energy Star Score is **75 or less**, continue to Element 2 Interval Data Analysis.

If Energy Star Score is **better than 75** , continue to Element 2 Steps 2 & 4 , and Element 3 as seems appropriate for the specific building.

E2 Interval Data Analysis Worksheet

Building:_____
Date:_____

STEP 1: Obtain & upload interval energy use data

Either: ☐ Get file from owner. File name: _____

☐ Download file from utility website (recommended)

Filename: _____ Utility: _____

Username:_____ Password: _____

Building floor area: _____ **Operating hours**:_____

Building type:(circle): office retail food service food sales other_____

Tool used to display interval data: _____

STEP 2 Daily and Weekly Scheduling:

☐Printed a plot of a week or several weeks of daily loads

Weekly pattern (circle): Weekend load compared w/ typical: As owner expected?	all days similar weekday/weekend weekday/Sat/Sun irregular/other: _____ same slightly lower much lower base load level yes / no
Holiday loads compared w/ typical: Which holidays (circle): As owner expected?	same slightly lower much lower base load level 1/1 MLK Pres. Mem. July4 Labor Colum. Vet. ThnksGiv 12/24 12/25 other:_____ yes / no
Typical day scheduling: As owner expected?	Startup begins: _____ Startup ends: _____ Shutdown begins:_____ Shutdown ends:_____ yes / no
Notes on irregular activity: *Include times where equipment may be running unnecessarily.*	

STEP 3 Base Load:

Base load level: _____ Typical daily maximum level _____
Base load to daily maximum ratio: _____ *Divide base load by typical daily max*
• *If ratio above is greater than 0.50, look for opportunities to deepen setbacks.*

STEP 4 Load Spikes and Unusual Activity

Date & Time	**Description** *(ex: 100kWh spike above typical load)*	**Explanation** *(consult with owner/occupants)*	**Plan to address?** (check if yes)

STEP 5 Peak Loads

Time of day pricing? yes / no Demand charges? yes / no
Utility bill should include this information.

Time of peak: _____ Size of peak (kW):_____ Peak load per floor area: _____W/sf

- *If time of peak is between 2 and 6 pm and time of day pricing is applied, consider shifting scheduling to off-peak hours.*
- *If demand charges are applied, consider shifting equipment scheduling to reduce peak level.*
- *If peak load per floor area is greater than 6 W/sf for office, retail or food sales or 9 W/sf for food service, look for opportunities to reduce peak level.*

STEP 6 Changes Over Time (any changes not already addressed in E1 Step 3)

Dates	**Description of increase** *(ex: increase from 50,000 kWh/week to 60,000 kWh/week over two years)*	**Explanation** *(check changes in base load, consult with owner/occupants, recent efficiency upgrades)*	**Plan to address?** (check if yes)

E3 Walkthrough Worksheet

Building:_____ Date:_____
Facility contact name: _____
Phone: _____

Building operating hours:
Weekdays _____ to _____
Saturday: _____ to _____
Sunday: _____ to _____

STEP 1 Overview

List major energy consuming equipment in this building:_____
_____

✓	If issues were highlighted in:	Pay special attention to question number:
	E2 Step 3: High evening / weekend / base load	1, 5, 6, 7, 8, 11c, 11e, 12 (office), 13 (kitchen)
	E2 Step 2: Load schedule does not match occupancy schedule	8, 11a, 13 (kitchen)
	E2 Step 5: High peak, daytime loads	11b, 11d, 9
	E1 Step 5: High seasonal variability	10

Questions in **bold** below are the typically the most important to assess.

STEP 2 Look for these items throughout the building

#	Description	Yes	No	NA	Corrective Action / Comments	Solved?
1	**Are occupancy sensors installed and working? Are they placed appropriately?** Consult manager / occupant about functioning.					
2	**Are incandescent or T12 fixtures present?**					
3	Are fans or portable space heaters being used?					
4	Are radiators and air vents unobstructed?					

STEP 3 Consult with manager and/or occupants about these items

#	Description	Yes	No	NA	Corrective Action / Comments	Solved?
5	**Are employees trained in energy conservation measures?** Consult manager.					
6	**Are doors/windows kept closed during heating and cooling season?** Consult manager / occupant.					

7	Are computers and monitors set to sleep or off at night? Consult manager / occupant.					
8	Are lights scheduled? (time-based on/off control)? Consult manager.					
9	What is the most common HVAC complaint? Consult manager.					

STEP 4 Check specific equipment

#	Description	Yes	No	NA	Corrective Action / Comments	Solved?
10	Are vending machines set to turn off/sleep at off hours?					
11	**Are thermostats programmed? (see 8a-8e)** **Are thermostats manually setback during off-hours?**					
11a	Does the setback schedule match occupancy schedule?					
11b	Is heating setpoint for occupied hours 70°F or lower?					
11c	Is heating setpoint for off-hours 62°F or lower?					
11d	Is AC setpoint for occupied hours 75°F or higher?					
11e	Is AC setpoint for off-hours 78°F or higher?					
12	**Office: Are copy machines, printers & fax machines shut off at the end of the day?** Consult manager or occupant**.**					
13	**Kitchen: Do you have a start-up/shutdown schedule for all equipment?** **Is equipment running or idling longer than necessary?** Consult manager or occupant.					
14	**Kitchen: Is there a service maintenance schedule?** Consult manager.					
15	Kitchen: Are dishwashers only run when full? Consult occupant.					

E5 Check Results Worksheet

Building:_____ Date:_____

STEP 1 Update Data

Tool(s) used: _____ Username:_____ Password: _____

Note: Some tools can automatically generate a summary report. Use this worksheet to highlight key elements on the summary report and supplement that information where needed.

STEP 2 Savings assessment

List the measures completed:

Energy efficiency measure	Date begun	Date completed	Estimated cost

If the tool used automatically calculates savings relative to a baseline period:

Current period start date: _____ end date: _____ savings($): _____ savings(%):_____

If no automated savings calculation:

Have energy costs decreased since implementing the Energy Management Package?
decreased greatly(>15%) decreased slightly(0-15%) same increased slightly(15%) increased greatly(>15%)
Approximate % change:
Other factors that might be affecting energy cost since package implementation:

☐ Printed a plot comparing energy use before and after the actions were implemented

STEP 3 Update your energy use metrics

For most recent 12 months of billing data:

EUI (w/ units): _____ for billing period: _____ to _____
Performance percentile / Energy Star Score _____ (% of homes with worse performance)
Compare with results in Benchmarking / Monthly Data Analysis Worksheet

STEP 4 Compare daily load profiles

Has the daily load profile changed? Yes & setbacks are as expected Yes but behavior is not as expected No clear change
Describe any issues:
Describe plan to resolve, if needed:

STEP 5 Compare daily load profiles

Has the daily load profile changed? Yes & setbacks are as expected Yes but behavior is not as expected No clear change Describe plan to resolve, if needed:

STEP 6 Leveraging success

For each measure, did the owner / occupant notice any benefits beyond what you had discussed prior to implementation? Is it ok to use this building as an example in our materials? yes no