[Nonprofit's Headquarters]
Energy Assessment Report & Recommendations
14 August 2024

Introduction

Sarah Lynn Cunningham, PE, Monique Tilford and Glen Dentinger of the Louisville Climate Action Network (LCAN) visited [Nonprofit's] headquarters, located [downtown], to assess opportunities to "spend less on utilities, more on mission."

Form and Function

[Downtown Nonprofit] occupies the top two floors of the three-story [office building], built in 1905, totaling approximately 19,000 square-feet (ft^2) of space, or 9,500 ft^2/floor.

[Downtown Nonprofit] operates on a traditional Monday-Friday schedule, though some staff occasionally work there on weekends. On any workday, about half of the staff of 70 works at the office, and the other half works from home. A significant portion of one floor is occupied by a related service program managed by a local university.

In 2022, [Downtown Nonprofit] renewed its lease for an additional 10 years. That [Downtown Nonprofit] is committed to eight more years in this building highlights the importance of improving energy efficiency now, as savings will be compounded.

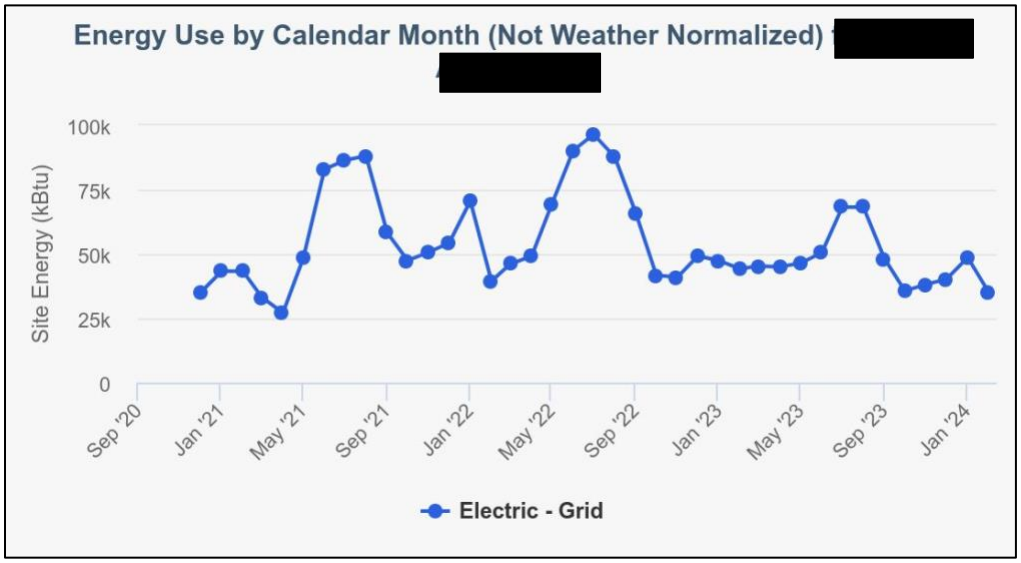
Baseline Benchmarking

For a representative picture, LCAN entered three years of the [Downtown Nonprofit]'s Louisville Gas & Electric (LG&E) bills into USEPA's Energy Star Portfolio Manager® software to benchmark energy use, and compare it to similar buildings (see graphs below).

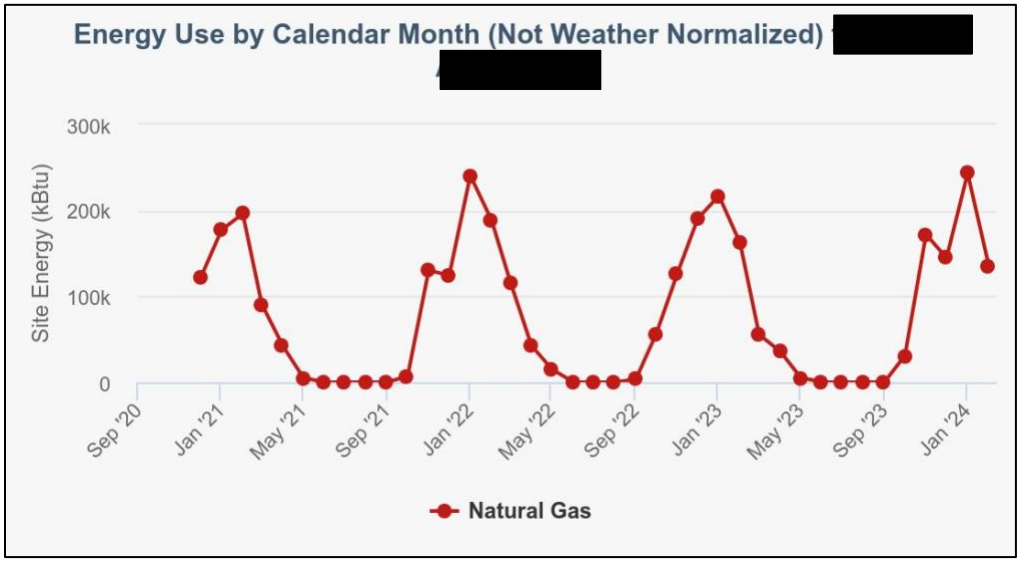
Referring to the attached Energy Performance Scorecard, [Downtown Nonprofit] is currently operating at the 47th percentile for office buildings, meaning that more than half of comparable offices use less power and fuel than does the [Downtown Nonprofit].

Perhaps a better measure is the Energy Use Index (EUI), which is based on actual usage. [Downtown Nonprofit]'s **current EUI is 73.4 kBTU/ft^2/year**. This measure should be the focal point as it is what [Downtown Nonprofit] should seek to reduce, regardless of what other building managers around the country are doing.

When we account for the relative carbon intensity of LG&E's power and fuel, [Downtown Nonprofit]'s related carbon footprint amounts to 115 metric tons (127 US tons) of CO_2 annually.



Typically, electricity consumption is highest during the cooling season. Spikes in electricity usage during the heating season nearly always means occupants are using portable electric resistance heaters for auxiliary heat. (Note: Electric resistance heaters are very expensive to operate and pose a major fire hazard. See HVAC § below).



Because natural gas usage by [Downtown Nonprofit] follows predictable seasonal trends—increased usage during winter months with little-to-no usage in summer months—LCAN

will focus on assisting [Downtown Nonprofit] in reducing its *peak* gas usage during the heating season.

Commendations

[Downtown Nonprofit]'s Director of [xxx] ably assisted LCAN by providing access and information needed to allow a thorough audit. [Downtown Nonprofit] staff cheerfully put up with our necessary interruptions. [Downtown Nonprofit] previously took the initiative to relamp its facility with LEDs. We also commend the efforts [Downtown Nonprofit] took to choose Energy Star refrigerators and water-saving toilets.

Because LCAN so appreciates the vital support that [Downtown Nonprofit] provides our fellow Louisvillians in need of [special services], we are proud to provide our services at no cost to [Downtown Nonprofit] via our Urban Energy Partnership.

Recommendations

The following recommendations generally apply to both floors, including the portion of the one floor occupied by [separately managed program]:

Lighting

[Downtown Nonprofit] took a major step toward energy-efficiency in 2022 by replacing the majority of its overhead lighting with LED fixtures. Still, it was evident during our on-site visits, the reliance on numerous, random personal light fixtures and employee responses to LCAN's lighting survey, additional steps are needed.

Individual illumination preferences naturally vary widely, even among individuals of the same age. Some people prefer warm light, some prefer daylight. Some individuals need two-four times more light than others. Flexibility is the key to keeping staff happy and performing well. Thankfully, the new fixtures offer adjustability.

1. The new LED fixtures offer three colors (temperatures in degrees Kelvin (°K)) of light, in plain-English, "warm white," "cool white," and "daylight." Seeing more than one color of light in one place is distracting and unattractive, so LCAN recommends that [Downtown Nonprofit] choose and stick with one color.

   The fixtures also allow adjustment to how much light (lumens) they deliver. LCAN recommends that [Downtown Nonprofit] allow employees to adjust the light output to their individual preference. Another option for individuals who find the new light to be "too much," is to "de-lamp," meaning, remove some of the fixture's tubes; store them in a safe place for when others burn need to be replaced.

2. Install dimmer switches to overhead lighting in employee offices and bullpens if the above efforts are not sufficient to reduce the use of personal accent lights. (Due to the brightness of the new overhead lighting, many employees rely on table and floor lamps, many of which were found to be using inefficient incandescent, fluorescent, and halogen bulbs.) Note: LCAN confirmed per the "cut sheet" for the new LED panel lights chosen by [Downtown Nonprofit] are dimmable.

3. Require all personal accent and task lamps not taken home to use LED bulbs, i.e., discontinue use of fluorescent, incandescent, and halogen bulbs. Better, also urge staff to turn off lights if vacating their private workspaces for more than 5 minutes. Best, also limit the number accent light fixtures allowed.

4. Install occupancy sensors in conference rooms, hallways, kitchens, copier rooms, bathrooms and closets, as these areas were found unoccupied with lights left on during three separate visits (one preliminary walk-through and two audit visits). Replace existing, yet failed occupancy sensors, too.

5. Replace remaining incandescent-illuminated and non-functioning exit signs with LED models, including the exit signs in the hallway near the conference rooms, near [Employee A] and [Employee B]'s offices, in the 2nd floor hallway, near the Communications Center, and in the filing area on the 2nd floor.

6. Relamp the sconces on the upper wall near the bull pen or, better, remove that unnecessary accent lighting.

7. Consider relamping the [separately managed program], too—especially if [Downtown Nonprofit] is paying its electric bill.

Envelope

A building's envelope is made up of its perimeter walls, including windows and doors, the foundation below them and the roof above them. Nearly all old buildings have leaky envelopes. The poorly optimized HVAC system often inspires uncomfortable staff to open windows, some of which can be difficult to close and properly seal, leading to air leaks and security concerns. See photos, below.

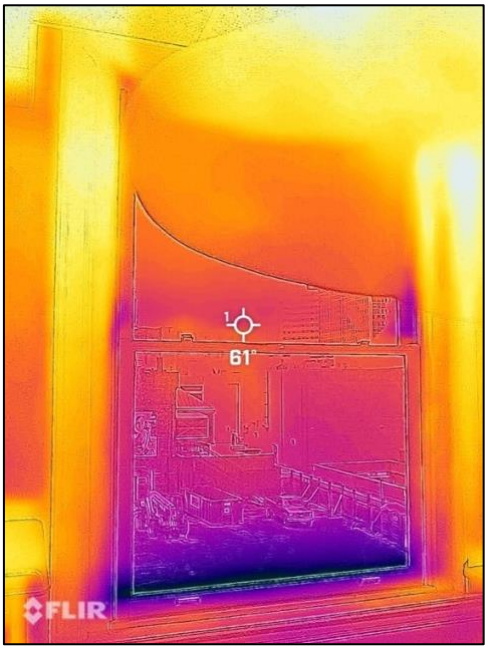
1. Replace the weatherstripping around the double, east-facing emergency exit doors on the 3rd floor.

2. Replace sash-mounted weatherstripping where window sashes meet sills.

3. Reinstall the flat-plate weatherstripping on lower sashes.

4. Post a small sign on each operable window requesting that, instead of opening a window, occupants contact the staff person assigned to control thermostats of any discomfort so thermostat adjustments can be made. (After the fine-tuning period, the signs can be removed.)

5. Replace water-damaged ceiling tiles to distinguish clearly between future versus past roof leaks.



Plumbing and Water Consumption

1. Discontinue the use of very inefficient side-by-side, hot-and-cold water machines that maintain water temperatures 24/7; instead use ice from refrigerators, and electric kettles or microwaves.

2. Improve signage regarding dual-flush toilets to clarify proper usage. (If the manufacturer can't help, LCAN might be able to produce something.)

Heating, Ventilation and Air Conditioning (HVAC)

The natural gas and electricity used by your HVAC systems are your biggest utility costs and source of carbon emissions.

Correcting HVAC problems will necessitate a commitment from staff to cease use of auxiliary heaters so central HVAC systems can be optimized—and the need for auxiliary equipment eliminated. Simply put, it is impossible to optimize thermostats if auxiliary, personal equipment is adjusting temperatures, too.

1. Make immediate corrections to the server room. Its temperature must be maintained to protect operationally critical computer equipment, but ... LCAN found the two central HVAC vents supplying heat to the room while both a mini-split unit *and* a separate conventional air conditioner ran simultaneously.

   It is possible that the central HVAC vents can be closed completely during the heating season, as the server likely generates enough heat to keep this interior room sufficiently warm. Similarly, during the cooling season, the central AC paired system with a) the mini-split system *or* b) room AC unit should cool that room adequately. Ask your HVAC contractor and IT personnel to review the following information to ensure that this room is maintained within the proper temperature range with the least HVAC equipment necessary:

   https://www.energystar.gov/products/ask-the-experts/how-balance-ambient-data-center-setpoints-it-equipment-energy-use

   https://www.energystar.gov/products/data_center_equipment/5-simple-ways-avoid-energy-waste-your-data-center/raise-temperature

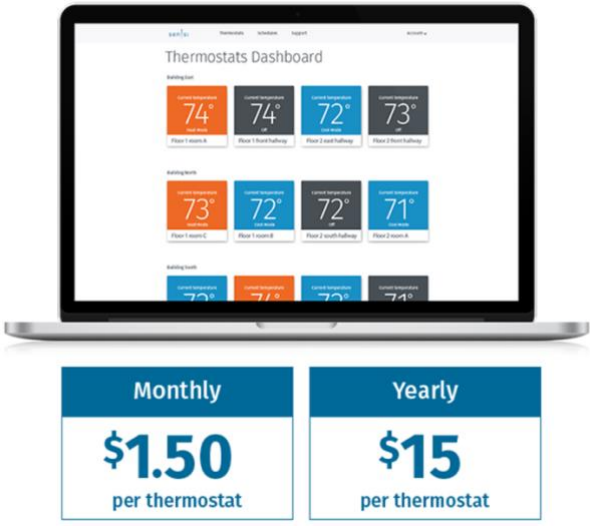
2. Replace square, ceiling HVAC supply vents with broken controls. The center adjustment control of several such vents couldn't be adjusted due to broken pieces and obstructions. Repairing them will allow optimization of temperatures in specific zones, greater occupant comfort and less need to open windows.

3. Replace the oversized filter that someone folded over and jammed to fit into the Trane unit in the mechanical room. Ask your HVAC contractor how it will ensure that only properly sized filters will be installed in the future.

4. Replace all thermostats with WiFi-enabled smart thermostats to provide much greater ability to program, monitor and control the 10 or more thermostats in the building.

   Manufacturers of WiFi-enabled thermostats provide free apps for managing multiple thermostats within a building. However, in some situations, thermostats that offer more sophisticated management programs (both phone and online), just make the task a lot easier. LCAN entertains that [Downtown Nonprofit] likely would appreciate the latter approach.

   If so, based on cost, user and professional reviews, and features, consider the Energy Star Certified, Sensi ST55 Smart Thermostat. Then, subscribe to Sensi™ Multiple Thermostat Manager and assign monitoring and control of thermostats to one person and one backup. This management software would provide them with a dashboard for the 10 or more thermostat at [Downtown Nonprofit].



Occupants can be prevented from adjusting thermostats via lockout controls or they may be allowed to adjust them in the moment; the temperature then would revert to the scheduled temperature at a set time. Because the desired schedule is stored in Sensi™ Multiple Thermostat Manager, neither a power outage nor dead battery leads thermostats to reset to no or factory settings.

Note: In zones where one thermostat controls multiple, independent spaces, e.g., the Communications Center and [separately managed program], consider the Sensi™ Touch 2 smart thermostat and multiple Sensi™ Room Sensors. The addition of sensors would balance the supply better to improve comfort.

5. Contract for bi-annual HVAC service visits to adjust vents to seasonal and zonal needs. This step assures occupants remain comfortable during all seasons and are not inspired to open windows or use inefficient personal space heaters.

6. Consider adding high-volume, circulator fans to the two bullpens to even out the temperature by moving valuable heated air down from the 12-ft ceilings. Also, these fans could be useful in large, open areas, like the Communications Center, if uneven temperatures remain an issue in those areas after HVAC optimization. Choose a quiet model that can do the job without misplacing paper on desks. (Products like the Vornado 660 Large Air Circulator move up to 1638 cubic-feet of air per minute (CFM) and can move air up to 100 feet.)

7. Discontinue use of portable space heaters. Instead, ask staff to message designated person(s) with comfort requests during the HVAC optimization period. If insurmountable problems remain thereafter, allow staff to check out space heaters on an as-needed basis and return them at the end of the workday—to prevent fire hazards—a method that has worked well for other LCAN clients.

Additional Plug Loads

1. Consider turning off the TV in the reception area. Most people are engrossed in their mobile phones anyway. (That TV displayed the ROKU screensaver during at least one LCAN visit.) One exception might be if [Downtown Nonprofit] were to offer information about its services or other educational information.

2. Discontinue the use of personal refrigerators, several of which were found empty during our visits. (Refrigerators are least efficient when nearly empty and most efficient when fairly full, making centralization helpful.) (Staff nursing or relying on refrigerated medications may need to be exceptions.)

3. Assign employees to turn off equipment with instant starts, e.g., monitors, copiers and (if practical given the number of staff working from home), printers, at the end of the workday.

4. Store and/or donate the Coway Air Purifiers not being used in common areas and conference rooms, unless and until needed for health reasons. Note that ionizing air "purifiers" produce ozone and have been shown to cause more health problems than they might reduce (by arresting allergens). Substitute "white noise" machines in Communications Center. (One employee told LCAN she used a purifier for white noise.)

Waste Management

LCAN has the impression that [Downtown Nonprofit] (or its landlord) are paying for a dumpster for waste-disposal services that Metro Government offers for free in the Central Business District. Contact [civil servant] with Metro Waste Management Services at (502) 574-[xxxx] or [email address] to discuss those cost-saving options that likely would increase the portion of [Downtown Nonprofit] wastes that are recycled.

Further Assistance

LCAN is available to assist [Downtown Nonprofit] as desired with the above items, e.g., assisting with finding the right product, soliciting and evaluating bids and confirming that installations or repairs were executed properly before you pay invoices.[1]

Should you implement any of our recommendations that earn a rebate from LG&E, LCAN can handle the rebate-application process on behalf of [Downtown Nonprofit].

Lastly, because we monitor what we measure, we highly recommend continuing to track utilities usage and costs in Portfolio Manager®; LCAN can share or completely hand off our inputs to date to [Downtown Nonprofit] or continue to maintain them for the next three years.

[1] LCAN's Executive Director is a licensed professional engineer who could lose her license if she accepted a finder's fee. You may rest assured that LCAN's counsel is based on professional experience, never kick-backs.