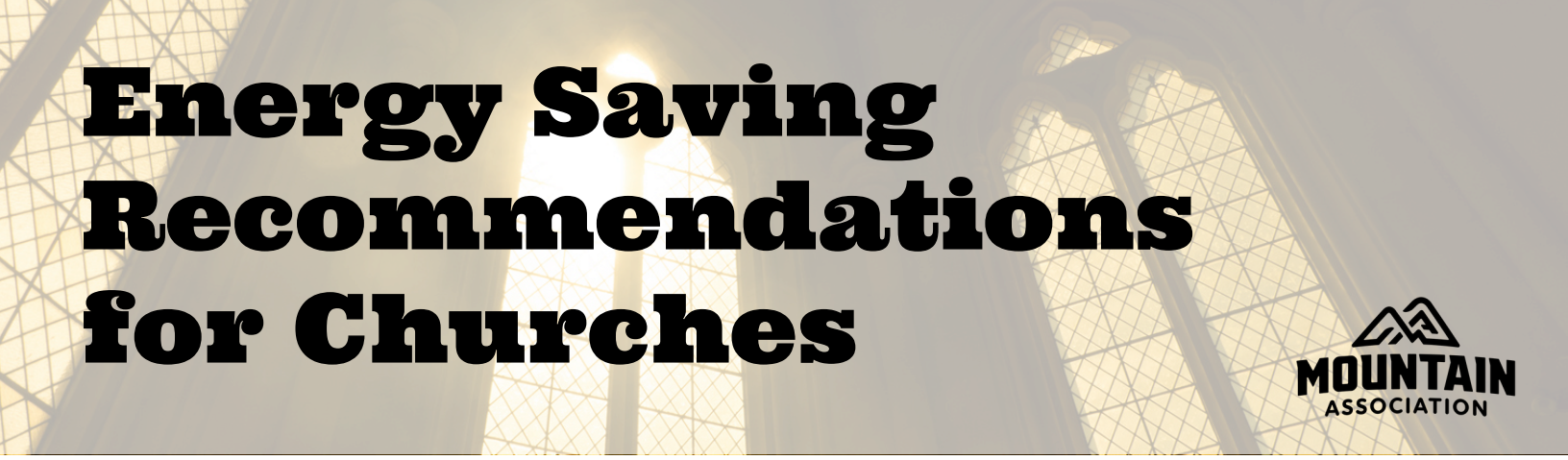


Energy Saving Recommendations for Churches

MOUNTAIN ASSOCIATION

The Mountain Association's Energy Team assists businesses and organizations in Eastern Kentucky with finding savings on their utility bills. These are our standard recommendations and can serve as a guide as you plan your church's path to cost savings!

Understanding Your Electric Bill

The first step to lowering your bills is understanding what's in them. While each utility provider's bills look different, and some have charges that others don't, there are some common basics:

Rate Class: Your rate class is determined by how much energy your facility uses. Most utilities have both small and large commercial classes that have different rates, monthly fees, and demand charges.

- The **usage charge** is what you pay for the electricity you use, measured in kilowatt-hours (kWh). When people talk about their electric rates, this is what they normally think about.
- The **monthly fee** is the flat amount you pay per month, regardless of how much energy you use. It's also known as a base fee or service charge.
- The **demand charge** is an additional fee for many commercial customers that measures the rate at which you use energy in kilowatts (kW). If you think of kilowatt-hours as the amount of water that fills up the sink, kilowatts are the speed at which it comes out of the tap. The faster it comes out, the higher your demand charge. Demand is explained in detail on the next page.

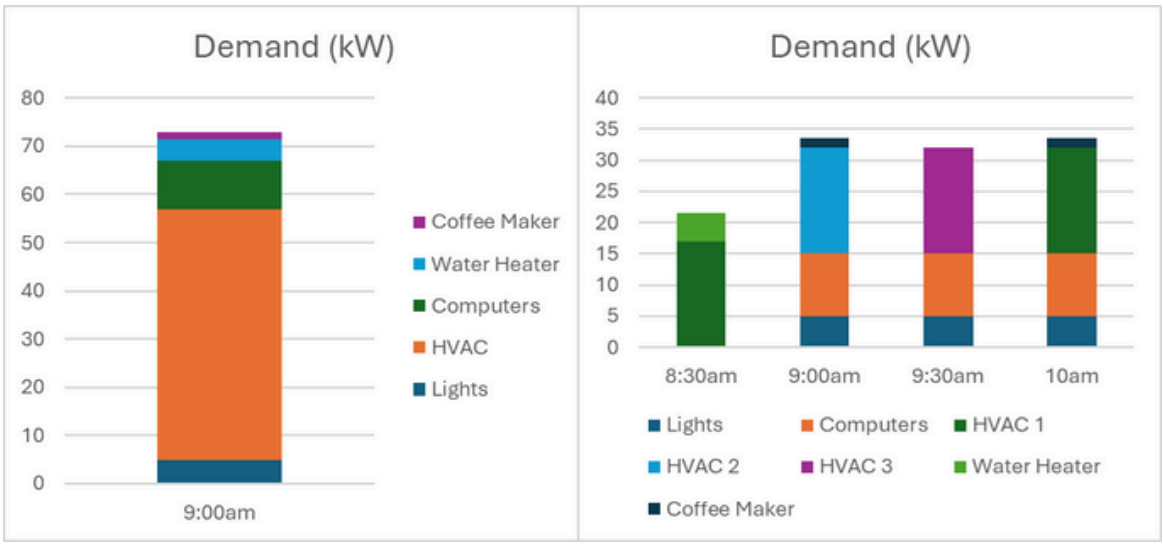
Things to Look For On Your Bills:

- Sales Tax: As a nonprofit, you shouldn't be paying sales tax. Check your bills to make sure! (You're not exempt from school taxes or franchise fees.) If you are paying sales tax, call your utility and ask to have it removed. Be sure to also ask for a refund. Some utilities, including Kentucky Power, will issue refunds for up to 4 years of overpaid taxes!
- Rectory Accounts: If you've got a rectory where a priest is living, it should be on a Residential rate, which is typically cheaper than a commercial rate. If it's not, call your utility and ask to have it changed.
- Demand Charge: If you're on KU or a rural electric co-op and are being charged for demand, contact the Mountain Association to have a billing evaluation done. We'll check to make sure you're on the right rate class. (If you're on Kentucky Power, you're out of luck. All their commercial rates have a demand charge, though you don't get charged for the first 10 kilowatts.)

Understanding Demand

Demand can be a big part of a church's bills and you may not even know it! If your utility is Kentucky Power or a rural electric coop, there's a good chance you're paying a demand charge. Your demand charge is determined by the most power you pull through your meter in a 15-minute period over the course of your billing cycle. The more power you use at once, the higher your demand.

Churches, which typically are quiet most of the week but then turn everything on come Sunday morning, can have very high demand charges. In the chart on the left, everything is turned on at one time, leading to a peak demand of about 72kW. In the chart on the right, it's staggered so that things turn on at different times, leading to a peak demand of about 33 kW. If you're on Kentucky Power, this would reduce your demand charge that month by $320. If you're on KU, it could be $875!



How to find your usage & demand on your bill:

Kentucky Power

Meter Read Details:

Meter #436035118					
Previous	Type	Current	Type	Metered	Usage
10811	Actual	10909	Actual	98	7,840 kWh
-	-	0.320	Actual	0.32	25.6 kW
Service Period 07/23 - 08/21					Multiplier 80
Next scheduled read date should be between Sep 20 and Sep 25 .					

Usage reading

Demand reading

Rural Electric Co-Op (co-op bills vary by utility, yours may look different)

Meter Information			230035
Previous Reading	03/01/24		14109
Reading	04/01/24		14194
Multiplier	40	kWh Used	3400
kWh Reading	0.932	KW Used	37.280

Usage reading

Demand reading

Kentucky Utilities

CURRENT USAGE

ELECTRIC

Meter Reading Information	Meter # 5334243
Actual (R) kWh Reading on 6/21/24	3691
Actual (R) kWh Reading on 5/21/24	1811
Actual (R) kW Read on 6/21/24 (Information Only)	12.8160
Current kWh Usage	1880
Meter Multiplier	1
Demand	12.8
Metered kWh Usage	**1880**

Usage reading

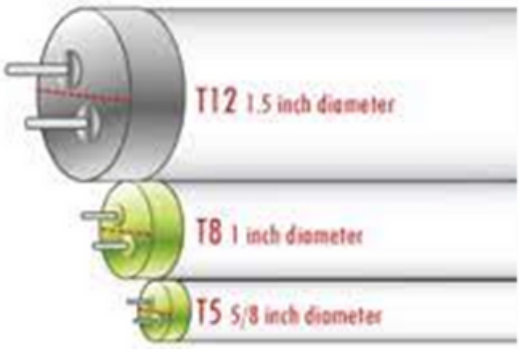
Demand reading

Typical Energy-Saving Upgrades

These recommendations are intended to be general advice and not specific to your particular situation. Please consult with a licensed contractor before making any investments into energy upgrades. If you have any questions, please contact our Energy Team at energy@mtassociation.org or 859-544-0023.

LED Lighting

Upgrading to LEDs is typically one of the most cost-effective energy upgrades you can make. How much you'll save depends on your existing lights and how often you use them. Churches often have lights that are rarely in use, but keep in mind that some fluorescent lights (especially older ones) pull power even when the lights are off!



Typical fluorescent bulbs, with the least efficient on top. LED bulbs use 50-70% less energy than fluorescent bulbs.

Tube Fluorescent

If you have fluorescent lighting in use for 20+ hours per week, upgrading to LEDs will likely save you money. Since LEDs are brighter than fluorescents, you can typically "de-lamp," or reduce the number of bulbs by half (i.e., going from a four-tube fixture to a two-tube fixture) unless your current lighting is too dim.

We recommend ballast-bypass bulbs rather than "plug-and-play." While the "plug-and-play" bulbs don't require any rewiring, these use more electricity since the ballast is still drawing power, and often shorten the life of the LED bulb. We recommend spending a little more in labor costs now to save more long term.

Assuming your lights are in use 20 hours per week, upgrading 4-tube fixtures to 2-tube LED fixtures will save you about $15-$20 annually per fixture if you have T12 tubes (1.5" diameter). If you have T8 tubes (1" diameter), you'll save around $10-$15 annually per fixture.*

Pin-Base CFLs

Pin-based CFL bulbs are often found in wall sconces or recessed ("can") lighting. Like with tube fluorescents, we recommend replacing these with ballast-bypass LEDs rather than plug-and-play. There are multiple different base types for these bulbs so make sure you're replacing them with the right base!

Pin Base

Recessed "Can" Lighting

If your can lights are in a drop ceiling, we recommend replacing them with integrated LED fixtures with gaskets. Recessed lighting has air gaps that allow conditioned air to leak into your drop ceiling, creating drafts and increasing your heating and cooling costs. Fixtures like these do double-duty by sealing these gaps while also lowering your lighting costs.

Screw-In Bulbs

Incandescent, halogen, and CFL bulbs with a normal screw-in base can simply be swapped out for equivalent LEDs.

Key Points About Lighting

- Many electric utilities are now offering lighting rebates. Make sure your lights meet their requirements and don't forget to apply!
- LEDs come in a variety of "color temperatures." Be sure to research which color you are choosing for which area of your church as some LEDs can be very bright white and create a sterile type environment!
- Fluorescent bulbs contain mercury and can't be thrown in the regular trash. Be sure to properly dispose of any old bulbs. Check at hardware stores or with your city for recycling information.

Occupancy Sensors

If you have spaces where lights are left on when nobody's using them, we recommend installing occupancy sensors. Occupancy sensors can be set so that lights will automatically turn off after there is no motion for 5-15 minutes. They flip on as soon as motion is detected within the space. Bathrooms, break rooms, stairwells, and storage areas are common places for occupancy sensors. There are multiple options that you can discuss with your lighting vendor.

Outdoor Lighting

Outdoor lights are typically metal halide or high-pressure sodium bulbs which cost a lot to run. Upgrading a 250W bulb to an LED will save you about $60-$80 per year if the light is on from dusk to dawn!* Keep in mind that even if the existing bulbs look like they're standard screw-in bulbs, for outdoor bulbs, the fixture will likely need to be rewired to accommodate an LED.

Make sure your outdoor lights have dusk-to-dawn sensors so that you're not running your lights when you don't need to.

Some of your outdoor lights might be provided by your utility, in which case you can't make upgrades to them yourself. Check your electric bill to see if there are any outdoor lighting charges listed. If you do have utility-provided lights, you may be able to save money by canceling your lighting service and installing your own. Lights that are attached to your building (rather than up on poles) are usually the best candidates for this.

** Actual savings estimates will depend on the age and wattage of your existing lighting, the wattage of replacement lights, your rate class, and your building's usage patterns.*

Wi-Fi Thermostats

Wi-fi thermostats make sense in almost every situation, but especially for churches that aren't being used every day. Instead of heating and cooling your buildings when nobody's there, or coming in early to make sure the church is comfortable enough before services start, you can simply control the temperature from your phone or computer!

If you have electric heat, wi-fi thermostats are especially helpful. When you raise the temperature on your thermostats more than 2-3 degrees in the winter, it can force the heat pump into emergency (or auxiliary) heat, which can use 3 times as much electricity and contribute to big spikes in your demand charge. Wi-fi thermostats let you raise the temperature slowly, either manually or through scheduling. We recommend scheduling whenever possible, but when doing it manually, just raise the temperature by 2 degrees and allow the thermostat to reach that point before raising it another 2 degrees until you get to your desired temperature. (Note: your heat pump will go into emergency heat mode no matter what when the outside temperature is around 35 degrees or lower.)

The Department of Energy estimates a 1% savings on energy costs for each degree of setback as long as it's kept that way for at least 8 hours. Adjusting the thermostat by 10 degrees at night could save you 10% on your heating and cooling costs! Some thermostats we recommend are:

- Emerson Sensi Wi-Fi Thermostat. This is a great option if you have multiple thermostats. It has a really nice dashboard to control all thermostats from one location and allows scheduling so that your HVAC units don't all kick on at the same time, which adds to your electric bill.
- Honeywell RTH6580WF. This has a lower up-front cost but fewer bells and whistles than more expensive options. However, if your heating and cooling needs are pretty straightforward, this might be the right option.

Both of these options provide alerts when your heat pump is going into emergency heat mode, which allows you to lower the temperature on your thermostat.

Heating & Air Conditioning

To ensure your units last as long as possible, we recommend yearly maintenance visits from a professional, as well as replacing the air filters every 30-90 days. If you don't already have a schedule for replacing your filters, we recommend starting by checking them monthly. If it's heavily coated with dust or has changed color significantly, it's time for a replacement. If not, check again at the 60 and 90 day marks until you know what's best for your filter changing schedule. Don't forget to check any window units! This will also improve the air quality in your building.

TIP: If the "fins" on your air conditioning units are bent like this, straighten them out with a fin comb. Bent fins keep the AC unit from running as efficiently.

Because replacing HVAC equipment is so costly, we don't usually recommend replacing units until they're failing. However, if you've got older units, make a plan for replacement now so you're prepared when the time comes. Keep in mind that AC units manufactured before ~2010 likely use R-22 refrigerant, which is now illegal to sell, so these AC units may be impossible (or very expensive) to repair.

We recommend minimum efficiency ratings of 15 SEER2 for commercial standalone AC units and heat pumps, and 92% AFUE for commercial gas furnaces. Mini-splits can also be a good option, especially if you don't have ducts or your ducts are in poor condition. If you're ready to make an HVAC upgrade, let us know and we can help talk through your options.

If you have a **boiler system,** you can install an outdoor reset control, which adjusts the water temperature according to outdoor temperature. For example, without this control, a boiler will heat the water to the same temperature regardless of whether it's 35 degrees outside or 60 degrees. Boiler controls will adjust the water temperature accordingly. You can also install a warm weather shutdown, which keeps the boiler from turning on if outdoor temperatures are high enough. Both of these would require a contractor to install; however, bill savings can be as high as 15% in the spring and fall months when they are most in use.

If you have an **electric boiler,** you may be able to disconnect some of the heating elements. It may take a little longer to heat up, but it can really cut down on your usage and demand charge.

If you have **gas heat,** but don't use gas for other purposes (cooking, water heating), consider turning off your gas service in the spring. Most gas companies only charge a small fee to reconnect your service, and you'll save monthly meter fees, taxes, and surcharges. Just remember to set a reminder to have it turned back on!

Finally, if you have a large space with a tall ceiling alongside high winter bills, you may want to consider installing an industrial high-volume fan. These fans help to circulate the heated air that rises up into the high ceiling, lowering your heating costs and making the space more comfortable.

Air Sealing & Insulation

Churches are often in older buildings which are likely full of leaks that cause uncomfortable drafts and raise heating and cooling bills. Air sealing is a low-cost, high-impact way to fix this problem by closing gaps where conditioned air gets out and outside air gets in. Much of this can be done as a DIY project using tools from your local hardware store like caulk, canned spray foam, weather stripping, and door sweeps. Caulk is best for small cracks, but use spray foam for larger gaps. (We recommend DAP canned spray foam – it's easier to clean up than other options and can be painted.)

The biggest culprits for air leaks are:

- Where the floor and ceiling meets exterior walls
- Where plumbing or wiring comes through walls or floors
- In your ductwork (you may need an HVAC professional for this)

If you have double-hung windows (the kind that can be opened from both the top and bottom), make sure that they stay locked! The upper sash in an unlocked window can slide down over time, leaving large gaps that often go unnoticed.

If you have an attic that's accessed by a hatch in the ceiling, make sure it's well insulated and sealed. You can do this as a DIY project, or install a new insulated hatch.

Insulation is a costlier upgrade, but is critically important. Options for attic and crawlspace/basement insulation include:

Typical Recommended Minimum Insulation Levels	
Attics	R-30
Walls	R-13
Basements	R-21
Crawl Spaces	R-21

"R-value" refers to a material's resistance to heat flow, with higher R-values indicating better insulation performance.

- Spray Foam: This is the ideal solution for efficiency, plus it provides air sealing as well as insulation. However, it can be costly. If you have ductwork in your attic or crawlspace, spray foam encapsulation is recommended.

- Blown-in: This type of insulation is usually fiberglass or cellulose. This can be installed as a DIY project with equipment rented from Lowe's or Home Depot, or done by a contractor. Blown-in insulation can settle over time, reducing its effectiveness. You will need about an 8" depth for cellulose and 12" for fiberglass to reach R-30. (Blown-in insulation cannot be used in basements or crawlspaces.)

- Batt: These are typically fiberglass and come in big foil-lined rolls. This is the cheapest option for insulation but is also the least effective. It can be done as a DIY project using appropriate protective gear. You can layer batts to reach the desired R-value, just make sure the paper side faces the interior of your building.

Note: Make sure any big air leaks in the floor/ceiling are sealed before adding batt or blown-in insulation.

Water Heating

Install an insulating blanket and a timer on your tank storage water heaters. Water heater blankets are inexpensive, simple to install, and can be purchased at most hardware stores. They simply insulate your tank, reducing the amount of time it runs to keep the water warm.

A water heater timer is like a programmable thermostat, it can be set to turn your water heater down (or off) when you're not using the building. If you pay a demand charge, you'll want to program the timer so that the water heater isn't kicking back on during likely times of peak demand. Timers cost around $100 and can be installed by an experienced handyman or a plumber.

As with HVAC units, we don't typically recommend replacing water heaters before they break. When the time comes to replace, we recommend a heat pump water heater. Like an HVAC heat pump, these use the surrounding air to heat water and are 2-3 times more efficient than standard electric heaters. They can be noisy, and need to be in a space with airflow, so a utility room or larger storage room are good locations. Tankless electric water heaters are not recommended if you pay a demand charge or are close to having to pay one – they cause big demand spikes!

Energy Efficiency DIY Checklist

- [ ] Get familiar with your bills, check your rate class, and confirm that you aren't paying sales tax
- [ ] Change out screw-in bulbs to LEDs
- [ ] Program thermostats
- [ ] Change air filters & create schedule for replacement
- [ ] Figure out age & refrigerant type of HVAC units
- [ ] Make plans for replacing old HVAC units
- [ ] Straighten bent fins on air conditioners
- [ ] Seal up big air leaks
- [ ] Install water heater blankets

If you have any questions, please contact the Mountain Association's Energy Team at energy@mtassociation.org or 859-544-0023.