# ENERGY-SAVING TIPS FOR BUSINESS

Your guide to making your business more energy efficient

DUKE ENERGY®

BUILDING A **SMARTER** ENERGY FUTURE®

## SAVING ENERGY IS GOOD FOR BUSINESS.

Duke Energy offers a wide variety of programs to help businesses save energy and money, including a free on-site energy assessment. Duke Energy also provides incentives for qualifying energy efficiency measures for both existing buildings and new construction projects, specifically designed to improve energy efficiency for businesses.

Visit **duke-energy.com** to review current incentives for energy-efficient upgrades.

## MAKING ENERGY-EFFICIENT UPGRADES CAN REALLY PAY OFF.

If you haven't already had your FREE energy assessment, one of our Energy Advisors can walk you through the recommendations and energy-saving measures that will best benefit your business. Implementing these recommendations can earn incentives that offset project upgrade costs, make your business more energy efficient, and save you energy and money for years to come.

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**Actual savings may differ from those estimated due to difference in actual utility costs, variations in weather, specific construction materials/equipment utilized, and individual energy use habits.**

# BUILDING ENVELOPE

The building envelope is vital to protecting the conditioned environment within a building from external air, water, heat, light and noise and facilitating optimal climate control.

If doors and windows don't close completely, cooled or heated air can escape, or winter cold and summer heat can infiltrate. Even "little" cracks can be big culprits: A pair of exterior doors with no weatherstripping can easily have a quarter-inch gap where the doors meet. While this doesn't look or sound like much, on a 6-foot, 8-inch-tall pair of doors, it adds up to the equivalent of a 20-square-inch opening. A simple tightening of doors and windows may be all that is needed to fix these gaps.[1]

## Cool roof

Just as wearing light-colored clothing can help keep you cool on a sunny day, cool roofs are designed to reflect more sunlight and absorb less heat than a standard roof. Cool roofs can be made of a highly reflective type of paint, a sheet covering, or highly reflective tiles or shingles.

Standard or dark roofs can reach temperatures of 150 degrees F or more in the summer sun. A cool roof under the same conditions could stay more than 50 degrees F cooler. Cool roofs save both energy and money by requiring less air conditioning indoors, and when paired with a higher insulation R-value and a more conservative thermostat set point, they can save even more.[2]

Reasons to consider making the switch to a cool roof:

- Increase occupant comfort by keeping the building cooler during hot summer months.
- Cut energy costs by reducing the runtime of your HVAC system.

[1] *"Saving Energy Dollars: No Cost/Low Cost Solutions For The Small Business". n.d. www.savethewatts.com (formerly Progress Energy). https://www.duke-energy.com/home/savings/.*
[2] *"Energy-Efficient Home Design: Cool Roofs". n.d. Energy.Gov. https://energy.gov/energysaver/energy-efficient-home-design/cool-roofs.*



| Cool Roof Energy and Operating Cost Savings[3] | | | | |
|---|---|---|---|---|
| Building Type | Roof Area (ft²) | Full-Load Cooling Efficiency (EER) | Annual Energy Savings (kWh) | Annual Cost Savings |
| Retail | 10,000 | 12.0 | 3,170 | $412 |
| Restaurant | 5,000 | 12.0 | 1,670 | $217 |
| Office | 5,000 | 12.0 | 1,810 | $235 |

1. 12 EER = 14.4 SEER (calculation may vary slightly depending upon the manufacturer).
2. Cost savings based on 13 cents per kWh.

## Insulation

The largest exposed area of your facility is the roof. Therefore, it is very important that this area be insulated to at least R-30 to reduce heat losses and gains through the building envelope. The amount of insulation or R-value necessary for your facility will vary based on climate and type of heating and cooling system. Because the R-value of insulation can change over time due to temperature, aging and moisture accumulation, your insulation levels should be inspected regularly.[4]

## Window tinting/film

Window film increases the energy efficiency of a building by reducing heat transfer through the building envelope. This reduction in heat transfer will lower energy consumption by decreasing the runtime of the HVAC equipment while the systems are in the cooling mode. There are other options available to increase shading such as solar screens and window film, which block harmful UV rays and make the ambient temperature near the glass feel cooler to occupants within close proximity. If the windows are due for replacement, consider installing energy-efficient windows with a low solar heat gain coefficient.

[3] *Advanced Energy. (2019). Advanced Energy - Nonprofit Energy Consulting Firm. [online] Available at: https://www.advancedenergy.org/.*
[4] *Energy.gov. (2019). Insulation. [online] Available at: https://www.energy.gov/energysaver/weatherize/insulation [Accessed 5 Aug. 2019].*

# HEATING, VENTILATION AND AIR CONDITIONING (HVAC)

Though the HVAC system can consume a lot of energy, there are many ways you can reduce usage including adjusting thermostat settings by turning it off or back before closing time and keeping up with routine maintenance.

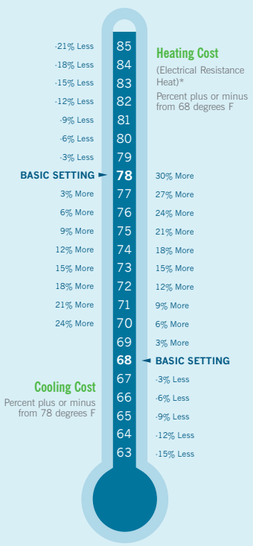
## Little changes. Big payoff.

Adjusting the temperature of your thermostat by just a few degrees can make a big difference in the amount of energy used. During the cooling season, set your thermostat higher. During the heating season, keeping it lower can really pay off.

### 6 ways to help save energy[5]

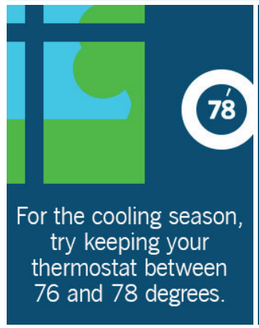
1. Make the temperature change gradually, say 1-degree difference every week, so people have time to adjust. Customers, clients or other visitors may not notice the change at all.
2. For the cooling season, try keeping your thermostat between 76 and 78 degrees. During the heating season, try keeping it between 66 and 68 degrees.
3. Keep the fan switch of a central air conditioning system set in the "auto" position. Having the fan switch set to "on" continuously could add $25 a month to your electric bill.
4. If an area is too warm for comfort, check for air leaks, poor insulation or sunlight, which can be blocked with shades, blinds or window film.
5. If an area is too cold for comfort, adjusting the register can reduce the air flow; otherwise, the thermostat setting may need to be raised.
6. Running a ceiling fan is considerably cheaper than running an air conditioner. Using a ceiling fan allows you to set your thermostat 3 to 4 degrees higher for cooling or 3 to 4 degrees lower for heating. The fan should be set to spin counterclockwise in the summer and clockwise in the winter. Turn ceiling fans off when not in the room. Fans cool people, not rooms.

**A few degrees make a big difference.[6]**

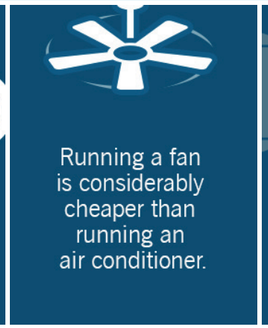



Save approximately 10% (average of $83) per year on HVAC costs by turning your thermostat back 7°-10°F from its basic setting for 8 hours a day.

*An electric heat pump can cut heating costs in half.

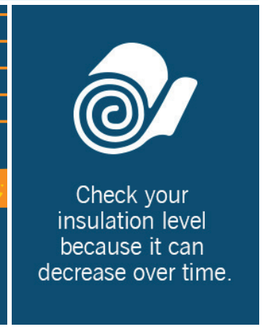



For the cooling season, try keeping your thermostat between 76 and 78 degrees.



Running a fan is considerably cheaper than running an air conditioner.

Closing the blinds keeps out the sun and the heat.



Check your insulation level because it can decrease over time.



[5] *"Saving Energy Dollars: No Cost/Low Cost Solutions for The Small Business". n.d. www.savethewatts.com (formerly Progress Energy). https://www.duke-energy.com/home/savings/.*
[6] *Energy.gov. (2019). Thermostats. [online] Available at: https://www.energy.gov/energysaver/thermostats [Accessed 5 Aug. 2019].*

## HVAC working overtime?

A half-hour to an hour before closing, turn off or reduce the air conditioning or the heat. It should remain cool or warm enough to keep people comfortable until closing time. When the building will be empty, on nights and weekends, for example, keep the HVAC off, if possible.

If there is a need to have the building at a certain temperature by the time the doors open, just turn it on right before people will arrive.

| Reduced Heating Temperature When Building Is Occupied[7] | | | |
|---|---|---|---|
| Reduction in Temperature Setting | 3° | 5° | 7° |
| Approximate Savings | 14-15% | 24-26% | 33-36% |

| Reduced Heating Temperature When Building Is Unoccupied[7] | | | |
|---|---|---|---|
| Setback Temperature | 60° | 55° | 50° |
| Approximate Savings | 12-13% | 24-25% | 36-38% |

## Maintenance matters[8]

Keeping your HVAC properly maintained and serviced by a professional can keep it running more efficiently for longer.

- Clean or replace air conditioner filters regularly. Clogged, dirty filters block normal airflow and significantly reduce a system's efficiency.
- The air conditioner's evaporator and condenser coils collect dirt over time, which can restrict airflow. To avoid this problem, check your evaporator coils every year and have them cleaned as necessary.
- Cleaning the area around the outside unit by removing debris and trimming foliage back at least 2 feet should allow for adequate airflow around the condenser.
- Clogged condensation drain channels can prevent a unit from reducing humidity, and the resulting excess moisture may discolor walls or carpet. Have these drain channels checked and cleaned periodically.
- If you have a wall unit air conditioner, inspect the seal between the unit and the frame to ensure it makes contact with the unit's metal case. Moisture can damage this seal, allowing cool air to escape from your building.
- Have your ducts checked because leaks can develop over time. Sealing these leaks can reduce the runtime of your HVAC system.

## Hiring a professional

When your HVAC system needs more than regular maintenance, hire a professional service technician. A well-trained technician can prevent, find or fix problems in your system.

## Purchasing a new HVAC system?

Seek the advice of an expert who will analyze your present system and recommend the best replacement. Choosing the right-sized unit (not over- or undersized) can maximize your energy efficiency for years to come. Oversized units will short cycle and not remove enough humidity; undersized units will run continuously.

Visit **duke-energy.com** to see what incentives are currently available for a business in need of a new HVAC.



[7] *"Motors, Machines And Compressed Air". n.d. The Checkbook, You've Got the Power. Florida Power Commercial Audit Booklet.*
[8] *"Maintaining Your Air Conditioner". n.d. Energy.Gov. https://energy.gov/energysaver/maintaining-your-air-conditioner.*

## Programmable thermostats

Programmable thermostats are designed to offer better thermostat control whether you're in the office or away, allowing for programming based on your business's hours of operation. Multiple options exist, including those offering different programming for each day of the week. Savings will depend upon selection of the right model for your business and proper programming.

## Smart thermostats

Similar to programmable models, smart thermostats can save up to 20% on heating and cooling costs. Unlike programmable models, they can be remotely operated from anywhere via smartphone (and other electronic devices). Some smart thermostats even have the capability of providing energy-usage reports to help you identify additional savings opportunities.

## Wi-Fi thermostats

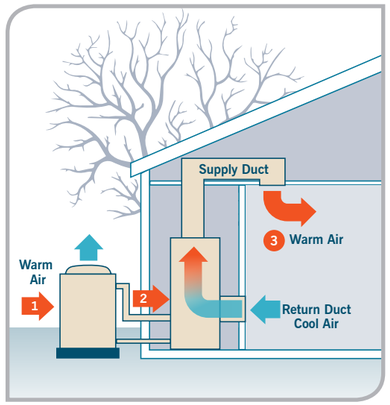
Similar to programmable models, these units elevate the functionality of the thermostats by allowing the user to control the unit from anywhere via smartphone (or other electronic device). These units can also provide outdoor temperature and humidity readings, which can assist with system setting adjustments. Some Wi-Fi thermostats have the capability of providing energy-usage reports, as well, to help you identify additional savings opportunities.



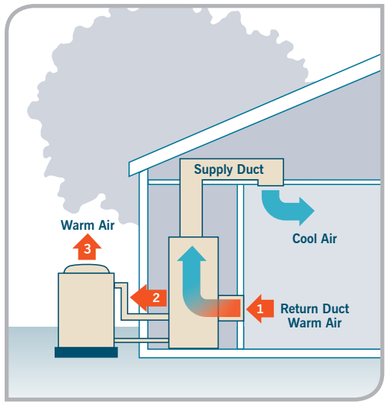


# HEAT PUMPS + VARIABLE FREQUENCY DRIVES

## High-Efficiency Heat Pumps: Where do the savings come from and how are they measured?




Winter heating




Summer cooling

A heat pump is a device that transfers thermal energy. A compressor circulates refrigerant that absorbs and releases heat as it travels between the indoor and outdoor units. Several technological advances have provided more efficient options in heat pumps. Unlike standard compressors that can only operate at full capacity, two-speed compressors allow heat pumps to:[9]

- Operate close to the heating or cooling capacity needed at any moment, which saves large amounts of electrical energy and reduces compressor wear.
- Work well with zone control systems. Zone control systems use automatic dampers to allow the heat pump to keep different rooms at different temperatures.

Some models of heat pumps are equipped with variable-speed or dual-speed motors on their indoor fans (blowers), outdoor fans or both. The variable-speed controls for these fans:

- Attempt to keep the air moving at a comfortable velocity
- Minimize cool drafts
- Maximize electrical savings
- Minimize the noise from the blower running at full speed

[9] *"Heat Pump Systems". n.d. Energy.Gov. https://energy.gov/energysaver/heat-pump-systems.*

Here are a few other terms you may see when choosing a high-efficiency heat pump:[10]

**Seasonal Energy Efficiency Ratio (SEER):** Air-cooled equipment less than 65,000 Btu/hour is rated in terms of SEER. SEER is a measure of the average efficiency of a unit throughout the cooling season that incorporates several different ambient conditions. SEER is the federally recognized efficiency descriptor for central air conditioning efficiency. The higher the SEER rating, the more efficient the system. Larger units have an Energy Efficiency Ratio (EER) rating rather than a SEER rating. The higher the EER rating, the more efficient the unit.

**Heating Season Performance Factor (HSPF):** Air-source heat pumps less than 65,000 Btu/hour are rated in terms of HSPF. It is a measure of the average efficiency of a unit throughout the heating season and is analogous to the SEER measure of cooling performance. The higher the HSPF, the more efficient the system. Larger units may have a coefficient of performance (COP) rating rather than an HSPF rating. The higher the COP rating, the more efficient the unit.

*Increase in SEER is proportional to the increase in EER

| Comparison of High-Efficiency Heat Pump to an Existing Air Conditioner with Electric Heat[11] | | | | |
|---|---|---|---|---|
| Option | Office | | Retail | |
| | Annual Energy Consumption (kWh) | Annual Electricity Cost | Annual Energy Consumption (kWh) | Annual Electricity Cost |
| Air Conditioner & Electric Heat | 14,163 | $1,841 | 17,013 | $2,212 |
| High-Efficiency Heat Pump | 8,648 | $1,124 | 10,548 | $1,371 |
| Savings | 5,515 | $717 | 6,465 | $840 |

Notes:
1. All scenarios involve units of 5 tons in cooling capacity.
2. Auxiliary heat strips on heat pump have lock out control below 30°F.
3. Constant cooling set point of 74°F and heating set point of 72°F.
4. Equivalent full-load cooling hours is 1,900 for office and 2,375 for retail.
5. Heating degree days are 550.
6. Existing air conditioner has a 10 SEER and high-efficiency heat pump has a 15 SEER.
7. Heat pump has a 9 HSPF.
8. Electric cost is 13 cents per kWh.

[10] *High Efficiency Commercial Air-Conditioning and Heat Pumps Initiative. 2016. Ebook. 7th ed. Boston, MA: Consortium for Energy Efficiency. https://library.cee1.org/system/files/library/5347/CEE_2016_HECAC_Initiative_Description_and_Specification.pdf.*
[11] *Advanced Energy. (2019). Advanced Energy - Nonprofit Energy Consulting Firm. [online] Available at: https://www.advancedenergy.org/.*



## A variable frequency drive (VFD) is like the throttle on a car[12]

- It adjusts the speed of an HVAC fan or pump motor, based on demand, to save energy and prolong motor and mechanical component life.
- Without a VFD, an HVAC fan or pump motor is either 100% "on" or 100% "off."
- A VFD eliminates the initial power surge and mechanical shock of switching the motor from "off" to "on."
- A VFD conserves energy when an HVAC control system senses that a fan or pump motor can meet heating or cooling needs by running at less than 100% power.
- VFDs can offer a quick payback period.

| Variable Frequency Drive Savings for a 10-HP Motor[13] | | | |
|---|---|---|---|
| Motor Speed | Annual Energy Consumed (kWh) | Annual Operating Cost | Savings |
| 100% | 71,032 | $9,234 | $0 |
| 75% | 39,955 | $5,194 | $4,040 |
| 50% | 17,758 | $2,309 | $6,926 |
| 25% | 4,439 | $577 | $8,657 |

Notes:
1. Motor running continuously.
2. Motor speed equivalent to its loading condition.
3. Operating cost and savings based on 13 cents per kWh.

[12] *Gibson, David. 2016. "Variable Frequency Drives (Vfds): Energy Efficiency Opportunities". Presentation, Ameren Illinois, 2016.*
[13] *Advanced Energy. (2019). Advanced Energy - Nonprofit Energy Consulting Firm. [online] Available at: https://www.advancedenergy.org/.*

# LIGHTING

Lighting is an excellent place to look for potential energy savings. Changes are often easy and can be done at a reasonable cost. With careful attention to people's needs, you can reduce lighting costs and preserve comfort, productivity and safety.

## Indoor lighting

Saving energy may be as simple as turning unneeded lights off. Turn off indoor lights when:

- An area is left unoccupied for any length of time (lunch, meetings, etc.)
- There is enough natural light near windows
- Partial lighting is sufficient to meet people's needs before and after "public" hours

Occupancy sensors are a great way to save energy with rooms that are often left unoccupied, such as break rooms, bathrooms, hallways and meeting spaces. You can also save by removing unneeded incandescent lamps where lighting levels are too high. In two- and four-lamp fluorescent fixtures with magnetic ballasts, lamps are usually wired in pairs and therefore must be removed in pairs (both lamps in a pair stop working when one is removed).

Additionally, keep lamps and fixtures clean. Dust, grease and other dirt that accumulate on lamps, lenses, globes and reflecting surfaces of the fixture can reduce light output by as much as 30%![14]

**Operating Cost Comparison per 1000 Lumens Output[15]**

| Technology | Lamp Wattage | Lamp Lumens | Efficacy (lumens/watt) | Projected Life Span (hours) | Projected Annual Energy Use 8,760 Hours (kWh) | Projected Operating Cost |
|---|---|---|---|---|---|---|
| LED | 8.0 | 1,000 | 125 | 45,000 | 70 | $9.11 |
| Incandescent | 60.0 | 1,000 | 17 | 1,100 | 526 | $68.36 |
| Halogen | 50.0 | 1,000 | 20 | 2,100 | 438 | $56.94 |
| CFL | 15.0 | 1,000 | 67 | 8,000 | 131 | $17.05 |
| Fluorescent | 17.0 | 1,000 | 59 | 22,500 | 149 | $19.40 |
| Mercury Vapor | 19.0 | 1,000 | 53 | 24,000 | 166 | $21.61 |
| Metal Halide | 12.0 | 1,000 | 83 | 15,000 | 106 | $13.72 |
| High-Pressure Sodium | 10.0 | 1,000 | 100 | 24,000 | 88 | $11.39 |
| Low-Pressure Sodium | 7.0 | 1,000 | 142 | 18,000 | 62 | $8.02 |

* Electric cost 13 cents per kWh

## The right bulb for the right fixture

Lighting levels often are higher than necessary because many buildings were designed and built when energy efficiency was not a priority. A simple way to save energy dollars is to use the most efficient bulb that is suitable for its intended purpose. For example, using a standard bulb for recessed downlights wastes energy by radiating light in all directions instead of just down. As a result, the fixture traps most of the light.

## Switch to LED bulbs

Conventional lightbulbs are extremely inefficient, have a short life and must be replaced frequently. LEDs use up to 90% less energy than traditional bulbs and can last much longer. Do not forget about exit signs. Replacing them with newer LED versions also can save a significant amount of energy and money. In general, if you have an outdated lighting system, it may be more economical to update your entire lighting system. A lighting redesign may be needed.

[14] *"Saving Energy Dollars: No Cost/Low Cost Solutions for The Small Business". n.d. www.savethewatts.com (formerly Progress Energy). https://www.duke-energy.com/home/savings/.*
[15] *Advanced Energy. (2019). Advanced Energy - Nonprofit Energy Consulting Firm. [online] Available at: https://www.advancedenergy.org/.*



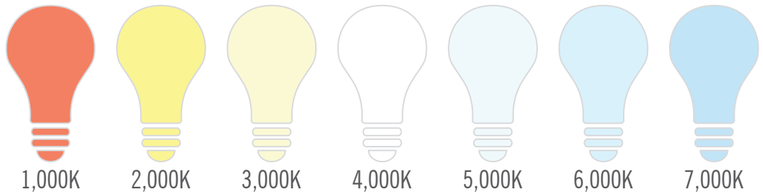
**Total Lamp Operating Cost Comparison[16]**

| | LED | CFL | Incandescent |
|---|---|---|---|
| Lamp projected life span (months) | 21+ | 13.7 | 3.4 |
| Light output (lumens) | 800 | 900 | 640 |
| Watts per lamp | 9 | 14 | 60 |
| Electricity used kWh for 1 year | 79 | 123 | 525.6 |
| Lamps needed for 1 year of continuous use | 0.9 | 0.9 | 3.504 |
| Cost per lamp | $2.50 | $1.75 | $0.50 |
| Annual lamp cost | $2.19 | $1.53 | $1.75 |
| Cost of electricity (@ 13 cents per kWh) | $10.25 | $15.94 | $68.33 |
| Total expense for 1 year | $12.44 | $17.48 | $70.08 |
| Comparative annual LED savings | | $5.04 | $57.64 |
| Comparative annual CFL savings to incandescent | | | $52.60 |

*Continuous use equals 24 hours per day, seven days per week

## The color temperature scale[17]

Color is an important factor when determining the best light for your building. To choose the color that you are looking for, refer to the bulb's color temperature, measured in Kelvin (K). A lower color temperature (approximately 1,000K) will provide a warmer light that has orange and yellow shades. A higher color temperature (closer to 10,000K) will produce a cooler white/blue light.



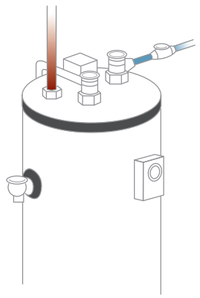

## Outdoor lighting

Foot-candles are the most common unit of measure used by lighting professionals to calculate light levels in businesses and outdoor spaces. This measure indicates how well the light source is lighting up the area intended to be lit (floors, parking lots, etc.). Use only necessary safety and security lighting at night and when areas are unoccupied. Be sure to comply with any code requirements for safety and security lighting, such as for exit signs, stairway lighting and other emergency lighting. If you use automatic controls to save energy, make sure they are working properly. Make sure timers and controls are set accurately. Just an hour or two a day of unnecessary lighting, say in your parking area, can add up to substantial energy costs.

[16] *Advanced Energy. (2019). Advanced Energy - Nonprofit Energy Consulting Firm. [online] Available at: https://www.advancedenergy.org/.*
[17] *"Color Temperature Scale For Light Bulbs". n.d. Atlantalightbulbs.com. https://www.atlantalightbulbs.com/color-temperature-scale/.*

## WATER HEATERS

Even if you rent the space you use, you can still save energy and money by using less hot water, and you may even have control over the temperature settings on one or more water heaters. Here are a few ways you can save:



- **Turn down the heat.** For every 10-degree reduction in temperature, you can save from 3% to 5% on your water heating costs. Set the thermostat low enough to minimize safety concerns (scalding) yet high enough for washing. A setting of 105 degrees generally meets most business needs, such as handwashing in the lavatory.[18, 19]
- **Use less water.** Turn off the hot water tap when not needed and only run full loads (rather than partial loads) in dishwashers.
- **Fix leaks ASAP.** Because hot water systems are pressurized, most leaks gradually get worse.
- **Insulate the tank and pipes.** If the tank feels hot or warm to you, it needs insulation.
- **Clean out sediment.** Flush the tank every six months to keep sediment from building up and reducing the efficiency of your tank.

### Other ways to save[20]

- Get a small "point-of-use" water heater installed right where the hot water is needed if your present water heater is located far away.
- Replace a failing water heater with an energy-efficient model.
- Switch to water-save showerheads (e.g., health club).
- Consider installing faucet aerators and low-flow showerheads to save on water usage.

### Switch to an energy-efficient water heater

What kind of water heater is right for your business?

**Comparison of Water Heaters[21]**

| High-Efficiency Water Heater Type | Energy Savings vs. Minimum Standards | Best Climates | Expected Energy Savings Over Equipment Lifetime | Expected Lifetime | Major Advantages |
|---|---|---|---|---|---|
| High-efficiency storage (tank) (oil, gas, elec.) | 10-20% | Any | Up to $500 | 8-10 years | Lowest first cost |
| Demand (tankless) using gas or elec. | 45-60% | Any | Up to $1,800 | 20 years | Unlimited supply of hot water |
| Heat pump | 65% (compared to electric resistance) | Mid-hot | Up to $900 | 10 years | Most efficient electric fuel option |
| Solar with electric backup | 70-90% | Mid-hot | Up to $2,200 | 20 years | Largest energy savings using a renewable energy source |

Notes:

1. Figures are based on residential applications but similar savings are expected for small businesses.
2. Expected Energy Savings Over Equipment Lifetime observes the total savings over the average life span of the product compared to that of a traditional electric/gas tank water heater that meets the federal minimum standards for efficiency only.
3. The installation of a tankless water heater may necessitate the upgrade of internal electrical distribution system.

*[18] "15 Ways to Save On Your Water Heating Bill". 2009. Energy.gov. https://www.energy.gov/energysaver/articles/15-ways-save-your-water-heating-bill. [19] "Saving Energy Dollars: No Cost/Low Cost Solutions for The Small Business". n.d. Www.savethewatts.com (formerly Progress Energy). https://www.duke-energy.com/home/savings/. [20] "Saving Energy Dollars: No Cost/Low Cost Solutions for The Small Business". n.d. Www.savethewatts.com (formerly Progress Energy). https://www.duke-energy.com/home/savings/. [21] Energystar.gov. https://www.energystar.gov/ia/new_homes/features/WaterHtrs_062906.pdf.*



## REFRIGERATION

Refrigeration is widely used in commercial facilities, but it requires a significant amount of energy. Controls, strip curtains, automatic door closers and LED lighting can all help take the heat off your energy budget. Other energy-saving technologies include:[22]

- Anti-sweat heater controls prevent moisture from forming on the glass doors of refrigerated display cases. Left uncontrolled, they can run constantly, yet they're only needed for short periods. **Humidity-sensing controls** save energy and money by making the heaters run less often and reducing the load on the refrigeration system.
- Converting standard shaded-pole motors with **electrically commutated motors (ECM)** in refrigerated display cases, walk-in coolers and freezers can reduce energy costs by up to 65%.
- Walk-in coolers and freezers are cooled by forced-circulation evaporators equipped with fans. These fans typically operate continuously, even though full airflow is required only part of the time. **Evaporator fan controllers** slow fans when full-speed operation is necessary, saving up to 50% on refrigeration costs.

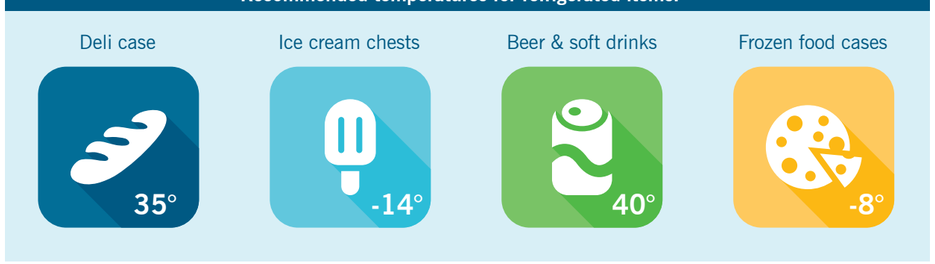
**Estimated operating costs for refrigeration equipment, based on 13¢/kWh, are below:[23]**

| Item | Monthly Cost | Cost Per Hour |
|---|---|---|
| **Small Ice Machine** | $16.41 | 5.9¢ |
| **Large Ice Machine** | $31.51 | 11.3¢ |
| **Frozen Food Box** | $22.28 | 8.0¢ |
| **Ice Cream Box** | $16.11 | 5.8¢ |
| **Ice Box** | $19.52 | 7.0¢ |
| **Produce Box** | $14.64 | 5.3¢ |
| **Walk-in Coolers** | | |
| 6' x 6' | $72.00 | 9.9¢ |
| 6' x 8' | $104.54 | 14.3¢ |
| 8' x 8' | $121.34 | 16.6¢ |
| 8' x 10' | $146.56 | 20.1¢ |
| 8' x 12' | $169.73 | 23.3¢ |
| 10' x 10' | $175.20 | 24.0¢ |
| 10' x 12' | $202.56 | 27.7¢ |
| **Walk-in Freezers** | | |
| 6' x 6' | $216.00 | 29.6¢ |
| 6' x 8' | $306.72 | 42.0¢ |
| 8' x 8' | $348.16 | 47.7¢ |
| 8' x 10' | $409.60 | 56.1¢ |
| 8' x 12' | $460.80 | 63.1¢ |
| 10' x 10' | $472.00 | 64.7¢ |
| 10' x 12' | $518.40 | 71.0¢ |
| **Water Cooler** | $2.83 | 1.0¢ |
| **Reach-in Case (50 cubic feet)** | $31.83 | 11.5¢ |
| **Drink Machine** | $12.21 | 4.4¢ |
| **Chest Freezer** | $11.49 | 4.1¢ |
| **Refrigerator (18 cubic feet)** | $17.00 | 2.3¢ |
| **Refrigerator (24 cubic feet)** | $24.00 | 3.3¢ |

*[22] ©Questline, Inc. [21] "Motors, Machines And Compressed Air". n.d. The Checkbook, You've Got the Power. Florida Power Commercial Audit Booklet. [23] "Motors, Machines And Compressed Air". n.d. The Checkbook, You've Got the Power. Florida Power Commercial Audit Booklet.*

| Estimates for standard-sized walk-in units, based on 10¢/kWh, are below:[24] | | | |
|---|---|---|---|
| Cooler Average Cost Per Month | | Freezer Average Cost Per Month | |
| 6x6 | $67.50 | 6x6 | $232.96 |
| 6x8 | $67.50 | 6x8 | $232.96 |
| 8x8 | $120.70 | 8x8 | $232.96 |
| 8x10 | $113.84 | 8x10 | $355.24 |
| 8x12 | $113.84 | 8x12 | $355.24 |
| 10x10 | $144.15 | 10x10 | $355.24 |
| 10x12 | $144.15 | 10x12 | $415.73 |

**Recommended temperatures for refrigerated items:[25]**




## Maintenance can help prevent equipment meltdowns

An untimely refrigeration breakdown can be stressful and expensive for a restaurant or food service owner. Preventive maintenance can go a long way. Here is a checklist of items you and your staff can and should perform on a DAILY OR WEEKLY basis:[26]

- **Clean the equipment.** Uncleaned spills can lead to unpleasant odors and mold growth.
- **Check settings.** If the settings are too low, you can overwork the motor, and ice can form on liquids. If it's too high, food can spoil. Check temperature and defrost frequency settings daily.
- **Defrost on schedule.** Check your manufacturer's recommendations for defrosting.
- **Clean out units to prevent overcrowding.** Make sure air can circulate freely so the unit doesn't have to work as hard to maintain its set temperature. Arrange products for best use of space. Whenever possible, consolidate items into fewer cooling units.
- **Clear the area around the unit.** Make sure nothing is blocking the air intake or exhaust vents of your unit. Keep blower fans clear of obstruction.
- **Inspect seals and fix leaks.** If gaskets or seals on doors are ripped or loose, air can leak out. Minor gasket leaks can be repaired with silicone caulk. Make sure the door's hinges and latches are tightly secured and doors are properly aligned.
- **Check interior lights.** Remember to shut off the lights in your freezer or cooler to keep the lights from generating heat.
- **Check for proper insulation** in refrigerated areas as recommended by manufacturer.

*[24] "Refrigeration". n.d. Page 7. Duke Energy Archives. [25] "Saving Energy Dollars: No Cost/Low Cost Solutions for The Small Business". n.d. Www.savethewatts.com (formerly Progress Energy). https://www.duke-energy.com/home/savings/. [26] Rosone, Michael. 2017. "The Complete Refrigeration Preventative Maintenance Checklist". Arista. https://aristair.com/blog/the-complete-refrigeration-preventative-maintenance-checklist/.*



**MONTHLY** tasks you may want to leave to the professionals, who will have the proper equipment and supplies to do the work safely:[27]

- **Clean condenser and evaporator coils.** Dirt and grime will interfere with the transfer of heat from your system, which reduces efficiency and makes your unit work overtime.
- **Clean fan blades.** Dirty blades will force the fan motors to work harder. When cleaning blades, also make sure screws are tightened.

**EVERY SIX MONTHS**, have a professional complete these tasks:

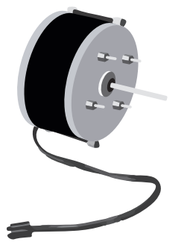
- Disassemble and clean icemakers.
- Check refrigerant levels.
- Observe motor operation.
- Examine all parts of wear and tear before a minor problem becomes a big problem.
- Check suction line insulations.
- Clean drain lines.

*[27] Rosone, Michael. 2017. "The Complete Refrigeration Preventative Maintenance Checklist". Arista. https://aristair.com/blog/the-complete-refrigeration-preventative-maintenance-checklist/.*

# MOTORS + COMPRESSED AIR LEAKS

To keep motors and equipment running at optimum efficiency:[28]

- Keep motors and equipment clean to reduce operating temperatures and energy loss.
- Inspect and adjust drive mechanisms (belts, bearings, gears, etc.) to ensure proper operation.
- Maintain and lubricate all motors and motor-driven equipment.
- Investigate motor loading to ensure that motor matches load.



## What does an electronically commutated motor (ECM) do?[29]

ECM technology is based on a direct current (DC) design that is inherently about 80% efficient, compared to the 60% efficiency of a permanent split capacitor (PSC) motor, and they run cooler than PSC motor designs. Because of their variable speed, they can run at low speeds for much of the time while PSC motors are typically on high speed all the time, so annual operating costs for ECMs can be anywhere from 25% to 75% lower. ECMs also offer a short payback period when used in a variety of settings such as compressors and condenser and evaporator fans in walk-in coolers, vending machines and other commercial refrigeration equipment.

[28] *"Motors, Machines And Compressed Air". n.d. The Checkbook, You've Got the Power. Florida Power Commercial Audit Booklet.* [29] *"Energy Savings Potential And Opportunities For High-Efficiency Electric Motors In Residential And Commercial Equipment". 2013. Energy.gov.*



## Considering a motor upgrade?

See how long it may take to pay itself off.[30]

| Motor Upgrade Payback Period for Commercial Refrigeration Equipment | | | | |
|---|---|---|---|---|
| Component | Avg. UEC (kWh/yr.) | Savings ($/yr.) | Additional Retail Cost* | Simple Payback (Years) |
| Compressor – Improved Motor | 8,442 | $18.76 | $15 | 0.8 |
| Condenser Fan | 1,150 | $ 82.13 | $30 | 0.4 |
| Evaporator Fan | 296 | $ 21.12 | $30 | 1.4 |

| Motor Upgrade Payback Period for Beverage Vending Machines | | | | |
|---|---|---|---|---|
| Component | Avg. UEC (kWh/yr.) | Savings ($/yr.) | Additional Retail Cost* | Simple Payback (Years) |
| Compressor – Improved Motor | 2,492 | $18.36 | $15 | 2.7 |
| Variable-Speed Compressor | | $37.37 | $161 | 4.3 |
| Condenser Fan | 1,533 | $109.50 | $30 | 0.3 |
| Evaporator Fan | 491 | $35.04 | $30 | 0.9 |

| Motor Upgrade Payback Period for Walk-in Coolers and Freezers | | | | |
|---|---|---|---|---|
| Component | Avg. UEC (kWh/yr.) | Savings ($/yr.) | Additional Retail Cost* | Simple Payback (Years) |
| Compressor – Improved Motor | 9,302 | $20.67 | $15 | 0.7 |
| Variable-Speed Compressor | | $139.50 | $485 | 3.5 |
| Condenser Fan | 1,875 | $109.80 | $30 | 0.3 |
| Evaporator Fan – BLDC | 1,875 | $109.80 | $30 | 0.3 |
| Evaporator Fan – ECM/VFD | | 140.66 | $300 | 2.1 |

"Additional Retail Costs" are estimates

## Got compressed air?

Inspect all compressed air lines, valves and filters regularly and correct any leaks.

| Annual Cost of Compressed Air Leaks Based on Hole Size and Air Pressure | | | | | | |
|---|---|---|---|---|---|---|
| Air Pressure (psig) | Hole Size (inches) | | | | | |
| | 1/64" | 1/32" | 1/16" | 1/8" | 1/4" | 3/8" |
| 70 | $75 | $301 | $1,201 | $4,813 | $19,229 | $43,371 |
| 80 | $84 | $336 | $1,344 | $5,365 | $21,485 | $48,385 |
| 90 | $93 | $371 | $1,484 | $5,967 | $23,766 | $53,399 |
| 100 | $102 | $406 | $1,627 | $6,518 | $26,073 | $58,664 |
| 125 | $124 | $496 | $1,981 | $7,922 | $31,588 | $71,199 |

[30] *Anon, (n.d.). [ebook] Available at: https://energy.gov/sites/prod/files/2014/02/f8/Motor%20Energy%20Savings%20Potential%20Report%20 2013-12-4.pdf [Accessed 14 Jun. 2019].*

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