

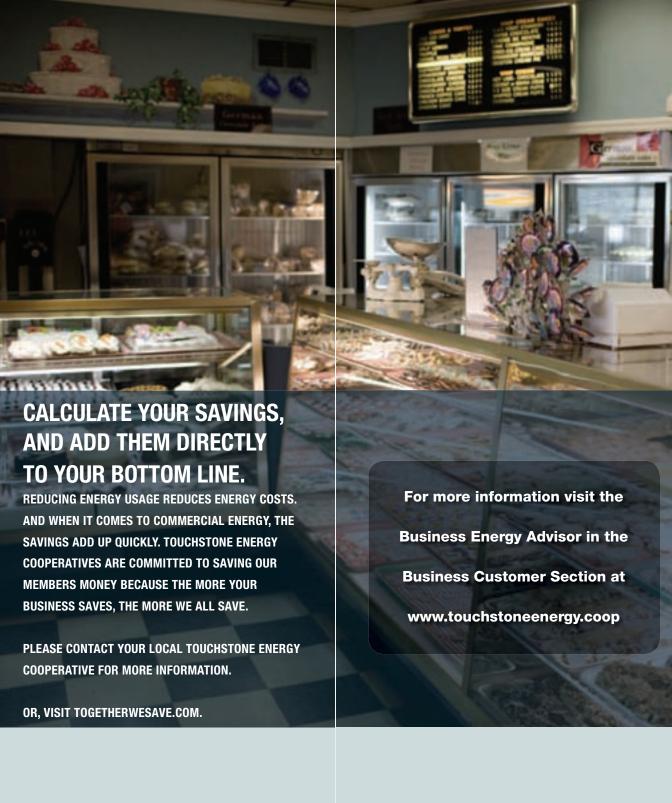






COMMERCIAL ENERGY SAVINGS GUIDE







- Even if you were on the correct rate last year, things can and do change.
- If your operating hours change, or you add equipment or other load, your electric usage profile will change. A different rate could save money.
- Your electric provider may have added rates that are more suitable for your usage profile and could save your business money.
- Review your operation's usage pattern. A change in when you operate can result in savings on your utility bill.

TIP 2: MAINTAIN YOUR HVAC SYSTEMS

HVAC equipment that is properly maintained will use less energy and enjoy a longer life. The greatest cost associated with an unscheduled HVAC breakdown may be in lost production - NOT in the repair cost.

- Keep indoor/outdoor coils and filters clean.
- Ensure that your HVAC system circulates the correct airflow.
- Lubricate. Check electrical connections and pulleys.
- Maintain correct refrigerant charge.
- Minimize duct leakage.
- Provide adequate ventilation in compliance with local applicable standards.
- Minimize HVAC runtime while facility is closed.
 - Protect temperature-sensitive materials.
 - Manage recovery if your facility is on a demand rate.

ELECTRICAL TERMS

- VOLT A unit of electrical force equal to that amount of electromotive force that will cause a steady current of one ampere to flow through a resistance of one ohm.
- AMPERE A unit of measure for an electrical current; the amount of current that flows in a circuit at an electromotive force of one volt and at a resistance of one ohm.
- $VA = Volts \times Amps$
- **KVA** = (Volts x Amps) / 1000
- **WATT** = Volts x Amps x Power Factor (Single Phase)
- **WATTS** = Volts x Amps x Power Factor x 1.73 (Three Phase)
- POWER FACTOR The ratio of actual power being used in a circuit, expressed in watts or kilowatts, to the power that is apparently being drawn from a power source, expressed in volt-amperes or kilovolt-amperes.
 - Electric resistance lamp:117.5 volts x 0.31 amps = 36 VA, 36 watts(36 watts / 36 VA = 100% Power Factor)
 - Electric compact fluorescent lamp:
 117.8 volts x 0.16 amps = 19 VA, 12 watts
 (12 watts / 19 VA = 63% Power Factor)
- KWH A unit or measure of electricity supply or consumption of 1,000 Watts over the period of one hour, or 100 watts over 10 hours; equivalent to 3,413 Btu.
- KW A standard unit of electrical power equal to one thousand watts. A unit of demand.

TIP 3: VENTILATE PROPERLY

- Meet OSHA standards for occupancy numbers.
- Kitchens should run at a slightly negative pressure.
- Bathroom ventilators should be off when building is closed – if permissible with local codes.
- Ensure make-up air is drawn from an appropriate location. (For example, don't pull from a dumpster area.)
- Ensure that kitchens have adequate air circulation.
- Do not over-ventilate. It is a waste of energy.

TIP 4: WATER HEATING

- Locate water heaters for most efficient delivery.
- Insulate water heaters.
- Ensure that the heating temperature is correct based on local requirements.
- Control water heaters based on actual periods of need during the day.
- Explore opportunities for heat recovery.
- Be familiar with your state's Board of Health requirements before making any changes that could affect hot water delivery temperatures. For example:
 - There are strict requirements for MINIMUM and MAXIMUM water temperatures for nursing homes.
 - There are strict requirements for MINIMUM water temperatures for manual and automated dish washing in retail food establishments.

TIP 5: REFRIGERATION

- Clean refrigeration coils regularly.
- Doors and seals on walk-in units should be kept in good repair.
- Make sure that refrigeration units are properly charged with refrigerant.
- Ensure units are properly defrosting. Check for ice buildup.



of different fuels

1000 X Fuel Unit Cost Fuel Unit BTU value X CO Cost per delivered

Fuel Unit Cost = Cost in \$ per KWh, MMBTU, gallon of diesel etc.

Fuel Unit BTU value - see above COP = Coefficient of Performance **COPs for Different Systems:**

- Heat Pump Use published COP
- Strip Heat Use COP of 1
- Fossil Fueled Furnace or Fossil Fired Boiler Use published Steady-state Efficiency



TIP 6: INDOOR LIGHTING

- Depending on your electric rate and hours of operation, switching from magnetically ballasted T-12 fluorescent lamps to electronically ballasted T-8 lamps may save. (T-12 = 1.5" in diameter, T-8 = 1" in diameter)
- Consider switching from incandescent to compact fluorescent in canisters.
- Consider LED exit lighting instead of incandescent.
- Assess lighting levels after closing and explore opportunities to reduce lighting levels in other areas of your business. It may be more than you need.
- Group re-lamping may save on labor costs when compared to spot re-lamping.
- Explore opportunities to switch to high-pressure sodium or metal halide lighting in warehouses.

TIP 7: OUTDOOR LIGHTING

- Make sure lighting is adequate for safety.
- Make sure lighting timers are set only for hours needed.
- Consider using sun trackers or photocells in conjunction with electronic timers on outdoor lighting.
- Evaluate converting incandescent or mercury vapor lighting to high-pressure sodium or metal halide lighting.
- Ensure adequate turn-in lighting off of the highway.

The best source of outdoor lighting design, installation and maintenance may be your electric cooperative.



- Man-made devices that produce light are called LAMPS.
- The amount of light emitted by a lamp is measured in LUMENS.
- When one lumen of light falls uniformly on 1 square foot of surface, the surface is illuminated to a level of 1 FOOTCANDLE.
- A complete lighting unit including lamp, fixture and electric components is called a LUMINAIRE.
- A lamp's ability to bring out the true colors of what it is lighting is called its **COLOR RENDERING** INDEX (CRI).
 - A scale of 0 to 100 is used.
 - The higher the CRI, the more color it will show.

TIP 8: MOTORS (OPERATING HOURS OVER 2,000/ YEAR)

- Manage motors with long run times to save energy cost.
- Replace motors under 25 hp with energy efficient motors vs. rewinding them.
- Depending on the run time, buying a new energy efficient motor can pay for itself in energy savings and may last longer than the rewound motor.
- Size loads properly for the job. Oversized motors will use more energy than properly sized motors.

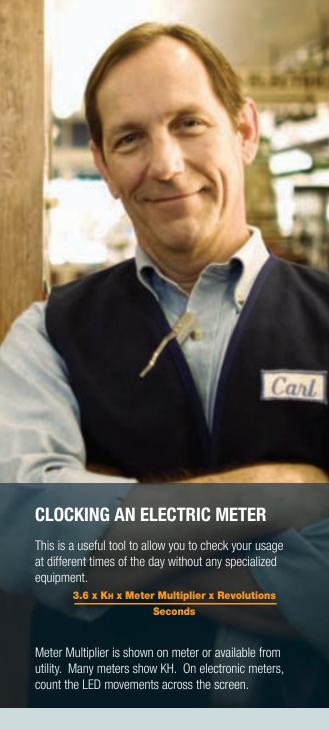


TIP 9: DUE DILIGENCE IS ESSENTIAL

All that glitters is not gold, and everything a salesperson tells you will not necessarily save you money. Asking a few good questions can save you the grief of causing more problems than you cure with new technologies.

Questions to ask a product vendor or supplier:

- Is it UL approved?
- Do you have a letter from the manufacturer stating no equipment warranties will be voided?
- Do you have reports from credible sources (ASHRAE, IES, DOE, Lawrence Berkeley National Labs) supporting the product's effectiveness?
- Can you provide the names of 10 companies, with contacts and phone numbers, who have used your product for a year or more and who will attest to its effectiveness?
- How long has your company been selling this product?





INSULATION TERMS

- U value: U is a value that expresses the number of BTU that will conduct through a combination of building materials sandwiched together per hour, per square foot, per degree difference from side to side.
- R Value: A measure of the capacity of a material to resist heat transfer; the reciprocal of U value.
- 1/U = R; 1/R = U
- You can add R-values.
- You cannot add U values; you can however convert U values to R values, add them and then convert the total R value back to a U value.
- Once R values approach 20, payback on additional insulation slows significantly.

NOTES: