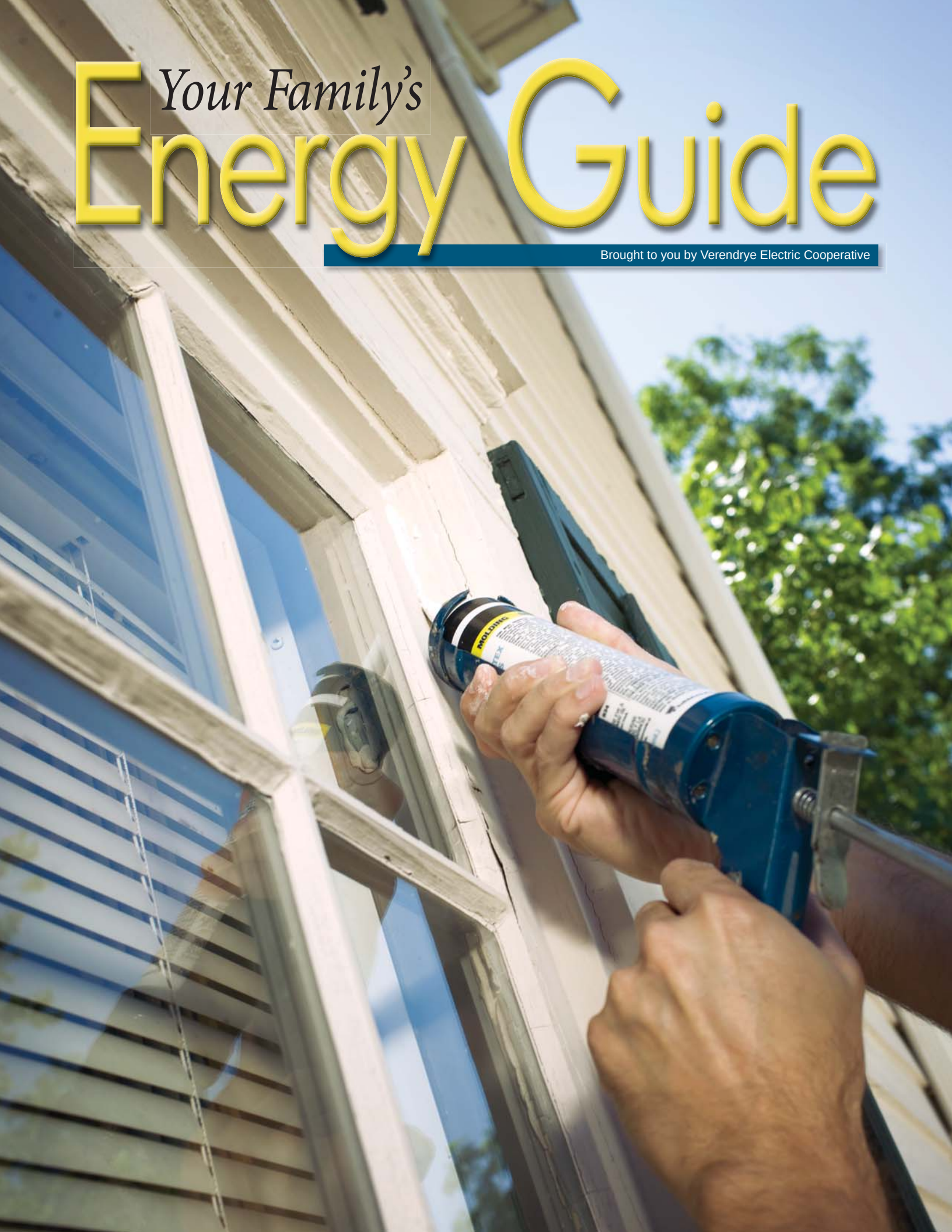
Your Family's Energy Guide

Brought to you by Verendrye Electric Cooperative



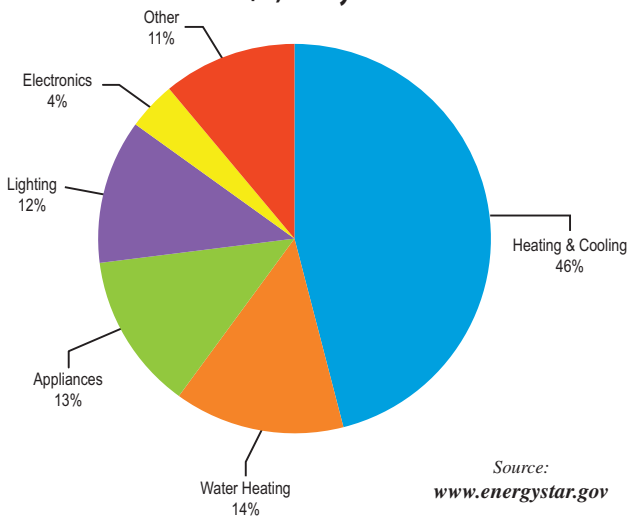
The energy efficient home

In an era of rapidly rising energy costs, having an energy-efficient home is important. The size of your home and your family's lifestyle are key factors in the amount of energy consumed. Your electric cooperative or public power district works hard to hold down energy prices. You, too, can play an important role in controlling your energy costs by evaluating your home and taking simple steps to trim unnecessary energy consumption.

The best way to start this process is by taking a whole-house approach to understanding the main factors that contribute to your energy usage. We will start with the structural design and orientation of your home and then go through each of the major rooms to determine the best ways to utilize energy efficiency and conservation.

This guide is a starting point to get you on the way toward better energy management. It will provide you with the information you need to estimate your electric use. You'll also find valuable tips to create greater home comfort and improve performance. By using energy efficiency and conservation strategies in your home, you'll be able to reduce your electric energy usage, and ultimately your bill.

Average Energy Bill for a Single Family Home
$2,200/yr.



Source:
www.energystar.gov

Lighting

Making improvements to your home's lighting is one of the fastest and easiest ways to cut your energy bill. Follow these tips when upgrading your home lighting.

- A 100-watt lamp costs roughly a penny an hour to operate.
- Consider replacing incandescent bulbs with energy-saving compact fluorescent or LED lamps. They use a fraction of the wattage, last much longer and give off less heat.
- A 12.5 watt LED bulb is equal to a 60 watt incandescent bulb. A 13-watt compact fluorescent bulb is equal to a 60-watt incandescent bulb, saving you 47 watts.
- When you finish cooking, turn off the kitchen lighting and the range exhaust fan.
- Don't leave unnecessary lighting on during the day.
- Take a look at the lighting you use at night for security. Check with your local cooperative or municipal to see if they can help you save money by installing a pole-mounted outdoor light.
- Use motion sensor, photocell or LED lights, which can provide security lighting while saving energy.
- LED Christmas lights use up to 90 percent less energy than traditional lights, last for many years and require no bulb changes.

Energy Efficient Light Bulb Cost Comparison

Watts Incandescent	Watts CFL	Watts LED	Annual Cost Incandescent	Annual Cost CFL	Annual Cost LED
100	23	—	$22.00	$5.06	—
75	18	17	$16.50	$3.74	$3.74
60	13	12.5	$13.20	$2.86	$2.75
40	9	8.7	$ 8.80	$1.98	$1.91

Example:

$$\frac{\text{wattage (100) x cost per kilowatt-hour (.11) x average rated life (2,000*)}}{\text{1,000 (watts per kilowatt)}} = \text{Annual Electricity Cost}$$

*Assumes bulb is used five and one-half hours per day on average.

Water heating

Water heating is the second largest energy expense in your home. It typically accounts for 14 percent of your utility bill each month. By reducing your hot water usage and turning down the thermostat on your hot water heater, you can save significantly on your electric bill.

- Make sure your water heater is set at the lowest point. Try to set it at 120 degrees.
- Insulate your electric hot-water storage tank. If your water heater is located in an unconditioned space, consider installing a thermal wrap around it. Take care to install it in accordance with the tank and wrap manufacturer's instructions.
- Buy a new, more efficient model.
- Try washing clothes with warm water and rinsing with cold water.
- Repair leaky faucets immediately so they don't drip and waste hot water.
- Drain a quart of water from your water tank every three months to remove sediment that impedes heat transfer and lowers the efficiency of your heater.

Estimating your family's hot water usage:

Step 1

# of occupants x 18 =Total household gallons of water used/day*

4 x 18* = 72

Step 2

Total household gallons x 30 days/month = Total household gallons used/month

72 x 30 = 2,160 household gallons used/month

Step 3

*Total household gallons used/month x .18 kWh/gallons** = Total kWh*

2,160 x .18 kWh/gallons** = 389 kWh

Step 4

Total kWh x cost per kWh = Estimated cost to heat water for family for one month

389 kWh x cost per kWh (.11) = $42.79

(estimated cost per month to heat water for this family of four)

*Estimated gallons of hot water used/day by each family member

**Amount of energy (609 Btus) needed to heat one gallon of water from 47 degrees to 120 degrees F.

Your home's design

A truly energy efficient home begins with the orientation and design of the structure itself. Most modern energy-saving ideas can be seamlessly integrated into any type of home design without sacrificing comfort, health or aesthetics.

Home heating and cooling

Because heating and cooling account for nearly half of your electric usage, here are a few simple suggestions you can try to help you save on your electric bill:

- Turn down the thermostat. Reduce the temperature from 70 degrees to 65 degrees while you're home. Turn it down to 60 degrees or 55 degrees while you're away or asleep, and cut your heating bill by 10 to 15 percent.
- Setting your thermostat lower in the winter and higher in the summer will save you 3 percent per degree on heating and cooling costs.

- Open shades to let in the sun's warmth – close them at night to keep heat inside.
- By installing a ceiling fan, you can make a room feel up to 7 degrees cooler during the warmest months of the year. In the winter, you can run the fan in reverse to recirculate the hot air trapped near the ceiling.

- Heating, ventilation and air conditioning systems should be checked to verify they are moving the correct amount of air. A qualified technician can assist you.
- Heat pump and air conditioning systems should be checked annually to verify they are properly charged, strictly in accordance with manufacturers' guidelines.
- Keep inside and outside coils clean and free of debris.
- Gas furnaces should be tuned for maximum combustion efficiency.
- Return filters should be changed monthly.
- Have a technician check carefully for duct leaks. Leaks that are found should be sealed with fiberglass and mastic sealant.
- Rather than turning on the central air conditioner, use a fan to circulate air and open windows.

Windows

A considerable amount of heat transfers through windows. If you have single-pane windows, consider doing the following:

- Tighten and weatherstrip your old windows and then add storm windows.
- Compare the above cost with replacing your old single-glazed windows with new double-glazed windows.
- In colder climates "low-e" coatings on glass can help reduce heat loss through windows.
- In warmer climates, consider adding solar screening to west-facing windows that catch a lot of heating late in the day.
- Close your curtains and shades at night; open them during the day.
- Lock windows. It tightens the seal to stop heat leaks.

Insulation and air infiltration

Air that transfers in and out of homes through cracks, crevices and holes can increase energy consumption. Here are some helpful tips to avoid air infiltration and improve your home's insulation:

- If you have R-19 or less insulation in your attic, consider bringing it up to R-38 in moderate climates, R-49 in cold climates.

- In cold climates, if you have R-11 or less floor insulation, consider bringing it up to R-25.
- Seal around pipe penetration coming through the walls.
- During hot and cold weather, ensure windows are closed tightly and locked.
- Ensure that the weatherstripping around doors and windows is tight.
- When your fireplace is not operating, its flue should be closed tightly, with a sign hanging from the flue handle warning it is closed.
- Check the ceiling behind the crown molding of built-in bookshelves for holes cut during construction.
- Drop-down stairways should fit tightly into the ceiling and be carefully weatherstripped.
- Whole-house attic fans should be sealed tightly during the winter.
- Make sure the outside dryer vent door closes when the dryer is not in use.

It's easy to save on home energy costs

Your family is unique. A direct relationship exists between the number of people living in a home and the amount of energy used. Each room in your home has a different set of appliances that can account for about 20 percent of your monthly electric bill.

Did you know that your television uses power even when it is turned off? In fact, your TV probably uses more energy during the 20 hours it's turned off — and in the "stand-by" power mode, than it does during the time that you're actually watching it.

Stereos, coffeemakers, microwave ovens, cell phones and MP3 chargers, cable boxes, video consoles, computers and other electronics that are left plugged into outlets can contribute to "phantom loads" that waste electricity and add up to as much as $200 on your annual energy bill.

Slaying those vampires and saving energy in your home doesn't require a major investment or significant change in your lifestyle. Following are a few tips that will cost you little or nothing. Some of these suggestions will save you a lot and some only a few dollars a year. But, add them up and you could reduce your annual energy bill by 25 percent. Read on to learn how.

Family room

- Make sure draperies or furniture do no block heat registers.
- Use a power strip to turn off electronic appliances completely. Eliminating this standby electricity loss from home appliances could save up to 25 percent on electrical bills.
- Select energy-efficient entertainment and home office equipment.
- Multifunction devices that combine several capabilities (print, scan, copy, fax) can provide additional savings.

Kitchen

- Make sure refrigerator and freezer seals fit tightly with the doors closed.
- Keep outside refrigerator coils clean. Dirty coils make your compressor work longer to remove heat.

- Setting your refrigerator below 37 degrees uses extra energy.
- Setting your freezer below 0 degrees uses extra energy.
- Defrost foods before baking or cooking to save as much as 50 percent of the total cooking time.
- Replace aging, inefficient appliances. Even if the appliance has a few useful years left, replacing it with a top-efficiency model is generally a good investment.
- Use small appliances where possible; a larger cooking appliance will use more energy and may not be required. A toaster, electric skillet, waffle iron, crockpot or popcorn popper uses less energy than a stove.
- An electric kettle uses less energy than stove top boiling.
- Coffee makers with an automatic shutoff can save you energy dollars.

- Preheat oven only when necessary and try not to open the oven while food is cooking.
- Use the “energy saver” setting on your dishwasher and air dry whenever possible.
- Operate the dishwasher only when there is a full load.
- Hand washing dishes with a lot of hot water can cost more than using a dishwasher.

Bathroom

- Take short showers instead of baths. A typical bath uses 30 gallons of hot water compared to 18 gallons used for a five-minute shower.
- Turn off bathroom fans after use.
- Install low-flow showerheads and faucet aerators.
- Clean your showerhead periodically; scaling and sediment can collect and reduce water flow, using more hot water than needed.

Laundry room

- Don’t over-dry your clothes. If 50 minutes works, don’t set it to 70 minutes.
- Make sure to clean the inside lint filter before each drying cycle.
- Periodically check your flexible metal dryer vent hose to ensure it is still tightly connected and not kinked.
- Use warm or cold water settings on the clothes washer. Each load of laundry washed in cold water saves enough energy to power a television for up to 34 hours.

- Wash and dry full loads of laundry.

Bedroom

- Use electric blankets that have dual settings for each side. Turn your blanket on just prior to bedtime, then turn off when going to bed.
- Draw curtains to keep the heat in when you go to bed.
- Make sure all the lights are turned off or use an energy-saving night light if you do need to leave one on.

Appliance energy usage

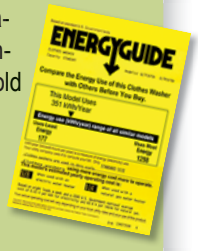
The average monthly kilowatt-hour consumption figures shown on this chart are based on normal use. Your electrical consumption may be higher or lower, depending on how you and other people in your home and on your farm use the various appliances and equipment.

	Approx. Average wattage	Estimated hrs. used per month	Estimated monthly kWh	Cost per month at $.11/kWh
Air conditioner (central)	3,500	100	350	$38.50
Air conditioner (room)	1,000	360	360	39.60
Automatic waterer for livestock	1,452	43	62	6.82
Block heater (8 hrs./day)	500	248	124	13.64
Cable box without DVR (when turned off)	33	744	25	2.75
Clothes dryer	5,000	16	80	8.80
Clothes washer (doesn't include hot water)	500	16	8	0.88
Coffee maker	1,050	16	17	1.87
Computer (with monitor and printer)	200	240	48	5.28
Dehumidifier	785	240	188	20.68
Digital Cable DVR set-top box (when turned off)	44	744	32	3.52
Dishwasher (doesn't include hot water)	1,300	15	20	2.20
Electric blanket	80	120	10	1.10
Freezer (frostless 15 cu. ft.)	335	334	112	12.32
Furnace fan – variable speed motor (24 hrs./day)	75	744	56	6.16
Furnace fan – conventional blower (24 hrs./day)	400	744	298	32.78
Hot tub/spa heater	1,500	40	60	6.60
Hair dryer	1,200	5	6	0.66
Iron	1,000	10	10	1.10
Microwave oven	1,100	10	11	1.21
Nintendo Wii	20	31	1	0.11
Radio	70	100	7	0.77
Range with oven	3,500	15	53	5.83
Refrigerator/freezer (frost-free, 16 cu. ft.)	725	250	181	19.91
Sony PlayStation 3	200	31	6	0.66
Space heater (8 hrs./day)	1,500	248	372	40.92
Television – 32-46" LCD	110	180	20	2.20
Television – 32-46" LED	100	180	18	1.98
Television – 50-60" plasma	300	180	54	5.94
Toaster	1,100	3	3	0.33
Vacuum cleaner	1,220	6	7	0.77
Water heater (varies widely)	4,500	90	405	44.55
Water pump (deep well)	1,000	15	15	1.65
X-box 360	185	31	6	0.66

Replace old, inefficient appliances with energy-efficient models

EnergyGuide labels

If you live in a typical U.S. home, the appliances are responsible for about one-fifth of your energy bill. Electric appliances like refrigerators, freezers, clothes washers, dryers, dishwashers, ranges and ovens are the primary energy-using appliances in most households. Taking steps to save energy while using these appliances, and replacing old, inefficient appliances with modern ones, can save you money.



In the U.S., all refrigerators, freezers, clothes washers and dishwashers are sold with yellow EnergyGuide labels to indicate their energy usage. These labels provide an estimated annual operating cost for the appliance and also indicate the cost of operating the models with the highest annual operating cost and the lowest annual operating cost. By comparing a model's annual operating cost with the operating cost of the most efficient model, you can compare their efficiencies.

ENERGY STAR labels

Another label to help you identify energy-efficient appliances is the ENERGY STAR® label. Promoted by the Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA), the ENERGY STAR is only awarded to appliances and lighting products that significantly exceed the minimum national efficiency standards.

The ENERGY STAR label can help make purchasing decisions easier. These products not only save energy, they can also save money, frequently with better performance.

Major appliance shopping guide

This easy-to-read guide may help you understand how appliances are rated for efficiency, what the ratings mean and what to look for while shopping for new appliances.

Appliances	Rating	Special Considerations
Air-Source Heat Pumps 	Check the Energy Guide label that lists the SEER (Seasonal Energy Efficiency Ratio) and HSPF (Heating Seasonal Performance Factor) for heat pumps. SEER measures the energy efficiency during the cooling season. HSPF measures the efficiency during the heating season. The ENERGY STAR minimum efficiency level is 14 SEER/ 8.0 HSPF or higher.	It is important for your contractor to properly size your heating and cooling equipment to the requirements of your home especially when installing an air-source heat pump, as they will switch to an alternative backup fuel under extremely cold conditions. It is also important to consider the sizing of the ductwork. Inadequate ductwork will cause fans to work harder than necessary and waste energy. ENERGY STAR-qualified electric air-source heat pumps have higher SEER and HSPF levels than today's standard models, making them about 9 percent more efficient than nonqualified models.
Central Air Conditioners 	Look for the Energy Guide label with a SEER for central air conditioners. The ENERGY STAR minimum efficiency level is 14 SEER/8.0 HSPF or higher.	Air conditioners that bear the ENERGY STAR label have higher SEER and energy efficiency ratio (EER) ratings, making them about 14 percent more efficient than standard models.
Room Air Conditioners 	Look for the Energy Guide label with an EER for room air conditioners. The higher the EER, the more efficient the unit is. ENERGY STAR units are among the most energy-efficient products. Two major factors should guide your purchase: correct size and energy efficiency.	ENERGY STAR-qualified room air conditioners are 10 percent more efficient than nonqualified models. See www.energystar.gov for help in determining the proper sized needed.
Programmable Thermostats 	Thermostats should have at least two programs, four temperature settings each, a hold feature that allows users to temporarily override settings, and the ability to maintain room temperature within 2°F of desired temperature.	Look for the thermostats that allows you to easily use two separate programs.
Water Heaters 	Check the Energy Guide label that tells how much energy the water heater uses in one year. Also, look for the FHR (first hour rating) of the water heater, which measures the maximum hot water the heater will deliver in the first hour of use.	If you typically use a lot of hot water at once, the FHR will be important to you. Sizing is important – contact your local utility for assistance.
Refrigerators and Freezers 	Check the Energy Guide label to see how much electricity, in kWh, the refrigerator will use in one year. The smaller the number, the less energy it uses. ENERGY STAR-qualified refrigerators are 20 percent more efficient than nonqualified models and are more efficient than models that simply meet the federal minimum standard for energy efficiency.	Refrigerators with freezers on top are more efficient than those with freezers on the side. Also look for heavy door hinges that create a good door seal.
Dishwashers 	Look for the Energy Guide label that tells how much electricity, in kWh, the dishwasher will use in one year. The smaller the number, the less energy it uses. ENERGY STAR-qualified dishwashers are 10 percent more efficient than nonqualified models and are more efficient than models that simply meet the federal minimum standard for energy efficiency.	Look for features that will reduce water use, such as booster heaters and smart controls. Ask how many gallons of water the dishwasher uses during different cycles. Dishwashers that use the least amount of water will cost the least to operate.
Clothes Washers 	Check the Energy Guide label for how much electricity, in kWh, the clothes washer will use in one year. The smaller the number, the less energy it uses. Clothes washers that have earned the ENERGY STAR rating are 37 percent more efficient than nonqualified models and are more efficient than models that simply meet the federal minimum standard for energy efficiency.	Look for design features that help clothes washers cut water usage such as: water level controls, "suds-saver" features, spin cycle adjustments and large capacity.

Before replacing your appliances or heating and cooling equipment, be sure to contact your local utility for possible incentives they may have available to help you in making an energy efficient upgrade. Source: www.energystar.gov.

Optimizing energy usage

More than half of all electrical energy consumed in the United States is used by electric motors. Motors used within your home turn at almost constant speed; however, most often the electric loads being driven may not require the full load power that the motor can supply. This power shortfall means that energy is being wasted. By controlling the speed of the motor so that it more closely matches the load's requirements, you'll be able to control your motor's running cost.

Electronically commutated motors (ECMs)

ECMs (electronically commutated motors) are brushless, direct-current motors that contain built-in speed and torque controls. This means that the motor has the ability to adjust its speed to ensure optimal airflow at all times. Without a mechanical system of brushes, an ECM is quieter and will have a longer life than a typical motor.

With its adjustable speed design, furnaces with an ECM motor operate with as little as 80 watts of electricity. That's 10 times less than standard fan motors that run on high all the time.

Variable frequency drives (VFDs)

Adding a variable frequency drive (VFD) to a motor-driven system can offer major energy savings to a system where load varies. The operating speed of a motor connected to a VFD is varied by changing the frequency of the motor supply voltage.

VFDs save energy because they are able to regulate speed while still delivering the full torque of power. A VFD varies the amount of frequency and regulates the voltage that is being sent to the motor.

This lowers the operating speed, allowing a longer life span for your motor. VFDs can reduce energy usage by 35 to 50 percent compared to conventional constant speed equipment in certain applications. Contact your utility to learn more about these specific applications.

Energy Terms

Adjustable speed drive – An electronic device that controls the rotational speed of a piece of motor-driven equipment. Speed control is obtained by adjusting the frequency of the voltage applied to the motor.

Air retarder – A material or structural element that inhibits airflow into and out of a building's envelope or shell.

Air sealing – Sealing penetrations in the walls, floor and ceiling where outside air enters the home. It's often the most cost-effective way to improve energy efficiency.

Air-source heat pump – A system that can supply both space heating and cooling. In the heating cycle, the heat pump removes heat from outside air and pumps it indoors. When cooling, the heat pump absorbs heat from the indoors and releases it to the outside.

Ampere – The unit of measurement of electrical current produced in a circuit by 1 volt acting through a resistance of 1 Ohm.

Annual Fuel Utilization Efficiency Rating (AFUE) – The most widely used measure of a furnace's heating efficiency. It measures the amount of heat actually delivered to your home compared to the amount of fuel that you must supply to the furnace. A furnace that has an 80 percent AFUE rating converts 80 percent of the fuel that you supply to heat.

Ballast – A device used to control the voltage in a fluorescent light.

Baseload – The minimum amount of electric power delivered or required over a given period of time at a steady rate.

Biomass conversion – The production of fuel or energy from organic waste, whether it be plant material, animal manure, municipal sewage sludge or solid waste.

Blower door – A device used by energy auditors to pressurize a building to locate places of air leakage and energy loss.

British thermal unit (Btu) – The quantity of heat required to raise the temperature of 1 pound of liquid water by 1 degree Fahrenheit at the temperature at which water has its greatest density (approximately 39 degrees Fahrenheit).

Coefficient of Performance (COP) – Energy-efficiency measurement of heating, cooling and refrigeration appliances. COP is the ratio of useful energy output (heating or cooling) to the amount of energy put in. A heat pump with a COP of 10 puts out 10 times more energy than it uses.

Degree day – Used to estimate energy requirements for heating and cooling a building, this is a measure of the deviation of the mean daily temperature from a given standard.

Demand – The amount of electricity a customer takes at any given moment.

Electric thermal storage (ETS) – A type of heater that uses electricity during periods of low use to heat a ceramic material in an insulated cabinet to high temperatures. It then releases the stored heat when electric use is high.

Energy Efficiency Ratio (EER) – A standard method for measuring the efficiency of heat pumps and other cooling units. The ratio of heating/cooling capacity in Btus, divided by power input in watts. The higher the EER, the more efficient the unit.

Electronically commutated motor (ECM) – An electronically commutated motor (ECM) is a brushless DC motor that contains all of its speed and torque controls. This means that the motor can adjust its speed to ensure optimal airflow and that energy is used efficiently.

Energy conservation – An effort to reduce or better manage energy consumption in a cost-effective manner.

Energy efficiency – Refers to programs that are aimed at reducing the energy used by specific end-use devices and systems, usually without affecting the services provided.

Energy costs of electric motors

Find the horsepower (h.p.) rating on the nameplate of the motor. Multiply kilowatts (kW) of corresponding horsepower on the chart by the total number of hours the motor is used. This figure – kilowatt-hours (kWh) – multiplied by the applicable rate, will give you the cost of operation.

How much would it cost to operate a 10 h.p. motor 24 hours per day for three weeks?

EXAMPLE:
10 h.p. 230V 1Ø, 24 hours/day for 3 weeks.

ANSWER:
(assuming the electric rate is $.11)
8.625 kW x 24 hours x 21 days = 4,347 kWh
4,347 kWh x $.11 = $478.17
Note: No capacity charge included.

Squirrel cage motors with average efficiency and power factor for each size.
1Ø = single-phase; 3Ø = three-phase.

h.p.	115V 1Ø kW @ Full Load	230V 1Ø kW @ Full Load	230V 3Ø kW @ Full Load
1/6	.329	.329	
1/4	.447	.447	
1/3	.571	.571	
1/2	.800	.800	.568
3/4	1.159	1.159	.774
1	1.380	1.380	.999
1 1/2	1.794	1.794	1.335
2	2.180	2.180	1.893
3	3.167	3.167	2.868
5		4.701	4.478
7 1/2		6.808	6.310
10		8.625	8.724
15			12.269
20			16.679
25			20.197
30			24.858
40			33.044
50			38.752
60			48.078
75			60.105
100			82.253

Energy Star®-qualified products – Energy Star labels appear on appliances and home electronics that meet strict energy efficiency criteria established by the U.S. Department of Energy and U.S. Environmental Protection Agency.

Geothermal energy – The heat or energy produced by natural processes inside the earth. A geothermal heating and cooling system, also known as a ground-source heat pump, has the highest efficiency for the combination of space heating and cooling of any system on the market.

Heat pump – A system supplying both space heating and cooling. The heat pump removes heat from outside air and pumps it indoors. The heat pump can also function as an air conditioner, absorbing heat from indoors and releasing it outside.

Heating Season Performance Factor (HSPF) – The total heating output of a heat pump during its normal annual usage period for heating divided by the total electric power input in watt-hours during the same period.

Home energy audit – An assessment to determine the energy efficiency of the home and its equipment. An audit will provide information to effectively help conserve energy and become more efficient.

Horsepower – A unit for measuring the rate of power equivalent to 33,000 foot-pounds or 746 watts.

Infrared thermography – The science of using infrared imaging to detect radiant energy or heat loss in a building.

Kilowatt (kW) – A unit of measurement equal to 1,000 watts. The average household demand is 10 to 20 kilowatts.

Kilowatt-hour (kWh) – The basic measure of electrical demand, equal to 1,000 watts.

Load – The amount of power drawn from an electrical system at a specific time, or the total power drawn from the system.

Load management – The reduction of electric load during times when electric demand is high. Load management can involve such techniques as voltage reduction, shutting off air conditioners and water heaters for short periods of time by remote control and controlling time of day usage.

Megawatt (MW) – A unit of electrical power equal to 1 million watts.

Occupancy sensor – An electronic device used to switch a light on when motion is detected and switch off after no motion is detected in a room. It consists of a motion detector, electronic control unit and a relay.

Off-Peak/On-Peak – Blocks of time when energy demand and price is low (off-peak) or high (on-peak).

Phantom load – Any appliance that consumes power even when it is turned off. Examples of phantom loads include equipment chargers, televisions and even clothes washers.

R-Value – A measure of the ability of a material or a combination of materials to resist heat flow. The higher the R-Value, the greater the insulating capabilities.

Ripple control – The remote control of switching devices which uses power lines as signal carriers. A coded audio frequency "ripple" is superimposed onto the power lines at one or more injection points. The signal is detected by receivers situated at the loads to be controlled. Generally used for load management purposes.

Seasonal Energy Efficiency Ratio (SEER) – A standard method of rating the yearlong efficiency of an air conditioner or the cooling side of a heat pump.

Renewable energy resources – Energy generated from natural resources such as sunlight, wind, rain, tides or geothermal heat. Renewable energy can be replenished as it is used.

Solar energy – Energy from the sun's radiation converted into heat or electricity.

Therm – A unit of heat containing 100,000 Btus.

U-Value – A measure of air-to-air heat transmission (loss or gain) due to thermal conductance and the difference in indoor and outdoor temperatures.

Variable Frequency Drive (VFD) – A system for controlling the rotational speed of an alternating current (AC) electric motor by controlling the frequency of the electrical power supplied to the motor. A variable frequency drive is a specific type of adjustable-speed drive.

Volt/Voltage – A volt is a unit of electric force that measures the pressure of electricity. Voltage is the "pressure" that causes electrons to flow.

Watt – A unit of electrical power equal to one ampere under a pressure of one volt. A watt is equal to 1/746 horsepower.

Weatherization – The practice of protecting a building and its interior from the elements, particularly from sunlight, precipitation and wind, and of modifying a building to reduce energy consumption and optimize energy efficiency.

Comparative energy costs for heating

Electricity (Cents/kWh)	Fuel Oil Regular Furnace ($/Gal.) - 70% Efficiency	Fuel Oil Super Efficient Furnace ($/Gal.) - 80% Efficiency	Propane Regular Furnace ($/Gal.) - 70% Efficiency	Propane Super Efficient Furnace ($/Gal.) - 90% Efficiency	Natural Gas Regular Furnace ($/MCF) - 70% Efficiency	Natural Gas Super Efficient Furnace ($/MCF) - 90% Efficiency
4.0	1.15	1.31	0.75	0.97	8.20	10.55
4.2	1.21	1.38	0.79	1.01	8.61	11.08
4.4	1.26	1.44	0.83	1.06	9.02	11.60
4.6	1.32	1.51	0.86	1.11	9.43	12.13
4.7	1.35	1.54	0.88	1.14	9.64	12.39
4.8	1.38	1.58	0.90	1.16	9.84	12.66
4.9	1.41	1.61	0.92	1.18	10.05	12.92
5.0	1.44	1.64	0.94	1.21	10.25	13.18
5.1	1.46	1.67	0.96	1.23	10.46	13.45
5.2	1.49	1.71	0.98	1.26	10.67	13.71
5.3	1.52	1.74	1.00	1.28	10.87	13.98
5.4	1.55	1.77	1.01	1.30	11.08	14.24
5.5	1.58	1.80	1.03	1.33	11.28	14.50
5.6	1.61	1.84	1.05	1.35	11.49	14.77
5.7	1.64	1.87	1.07	1.38	11.69	15.03
5.8	1.67	1.90	1.09	1.40	11.90	15.29
5.9	1.69	1.94	1.11	1.43	12.10	15.56
6.0	1.72	1.97	1.13	1.45	12.31	15.82
6.5	1.87	2.13	1.22	1.57	13.33	17.14
6.7	1.92	2.20	1.26	1.62	13.74	17.67
6.9	1.98	2.26	1.30	1.67	14.15	18.20
7.0	2.01	2.30	1.32	1.69	14.36	18.46
7.5	2.15	2.46	1.41	1.81	15.38	19.78
7.7	2.21	2.53	1.45	1.86	15.79	20.30
8.0	2.30	2.63	1.50	1.93	16.41	21.10
8.5	2.44	2.79	1.60	2.05	17.43	22.41
8.6	2.47	2.82	1.62	2.08	17.64	22.68
8.7	2.50	2.85	1.63	2.10	17.84	22.94
8.9	2.56	2.92	1.67	2.15	18.25	23.47
9.0	2.58	2.95	1.69	2.17	18.46	23.73
10.0	2.87	3.28	1.88	2.42	20.51	26.37
10.5	3.01	3.45	1.97	2.54	21.54	27.69
12.0	3.45	3.94	2.25	2.90	24.61	31.64
14.0	4.02	4.59	2.63	3.38	28.71	36.92

The above figures are based on the assumptions and formulas listed below.

Assumptions

Fuel Source	Btu Heat Content	Annual Seasonal Operating Efficiency: Regular Furnace	Annual Seasonal Operating Efficiency: Super Efficient Furnace
Electricity	3,413 Btu/kWh	100%	100%
#2 Fuel Oil	140,000 Btu/Gal.	70%	80%
Propane	91,600 Btu/Gal.	70%	90%
Natural Gas	1,000,000 Btu/MCF	70%	90%

Formula

Alternate fuel price to electric rate conversion formula:

(Fuel Price) ÷ (Efficiency) x (341,300) ÷ (Btu Heat Content) = Electric Rate

Example of $1.45/Gal. Propane to Electricity with a Super Efficient Furnace:

(1.45) ÷ (0.90) x (341,300) ÷ (91,600) = 6.0¢/kWh

How to compare cost

When comparing the price of electricity for heating to the price of alternative heating fuels, it is important to compare equipment efficiency, energy rates and monthly service charges.

The seasonal efficiency for electric heating systems ranges from 100-300 percent or more. The comparable efficiency for gas and oil heating systems ranges from a low of approximately 70 percent to a high of 95 percent. Most older gas and oil systems have an efficiency of 70 to 80 percent and most newer models have an efficiency in the 90 percent range.

Cost comparisons must also take into account actual energy cost and facilities charges or service charges that often are required by utilities.

An energy specialist from your local electric cooperative or public power district will be happy to help you sort out all the factors that should be considered in your energy cost comparisons.

BE SAFE ON THE JOB

Things to remember when working around power lines

It is important to be aware of possible hazardous conditions. Here are some important safety tips to keep in mind when working.

- Do not assume all power lines have the same clearance height. Height can vary by year built, location and voltage.
- Your old machinery clears the lines, but how about your newer, bigger machinery?
- The roof of your machinery might clear the lines, but how about the radio antenna?
- If snow or other debris is piled up beneath a power line, it will reduce your clearance.
- Make sure you call 811 before you dig post holes or dig for other projects on the farm.
- Be careful not to hit guy wires that support poles.
- Avoid storing hay or other material near power lines because it can be a hazard when loading.
- Always lower an auger or other boom before moving it.
- Be careful when working near trees that may block the view of power lines.
- If equipment gets hung up on a power line, the operator should NOT get off the machinery unless in immediate danger.
- If you must leave the equipment, jump as far away from the machinery as possible. Never get back on machinery that touches a power line until the utility company disconnects the line.
- Train all workers and your children about safety near power lines.

Online safety resources:

Verendrye Electric Cooperative
www.verendrye.com

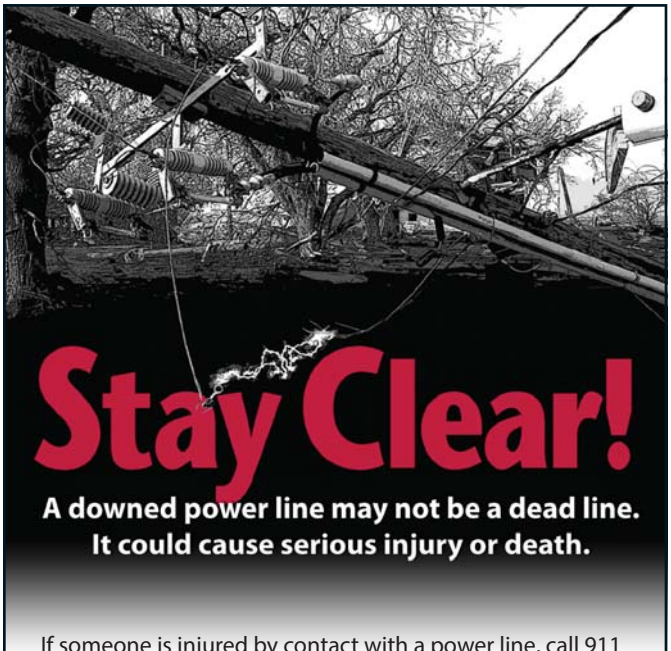
North Dakota Association of Rural Electric Cooperatives
www.ndarec.com

North Dakota One Call
www.ndonecall.com

811®

Know what's below.
Call before you dig.

Verendrye lineworkers repair an underground power line after it was damaged by a backhoe. Hitting an underground power line can be dangerous and can also cause outages.



Stay Clear!

A downed power line may not be a dead line. It could cause serious injury or death.

If someone is injured by contact with a power line, call 911 and keep others away until help arrives.

If a power line falls across or near your vehicle while you are in it, stay inside until help arrives. If you must exit, jump clear so that no part of your body is touching the car when you land. **KEEP BOTH FEET TOGETHER**, and shuffle or hop at least 30 feet away from the vehicle.

Verendrye Electric Cooperative
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Email: rec@verendrye.com

How to estimate energy usage and cost

The wattage of appliances and equipment as well as the amount of operating time can vary greatly. The following information will show you how to determine where the energy dollars are going in your home.

Step 1

Since the cost of electricity is determined by the number of kilowatt-hours (kWh) used during a billing period, the first step is to determine your average cost per kilowatt-hour.

$$\text{Avg. kWh cost} = \frac{\text{\$ amount of electric bill}}{\text{kWh used}}$$

$$\text{EXAMPLE: } \frac{\$132}{1{,}200 \text{ kWh}} = \$.11 \text{ per kWh}$$

Step 2

Since the wattage of an appliance or electrical equipment determines the electrical usage per hour, the second step is to determine the wattage.

The wattage of an appliance is found on the serial plate. It is possible that electrical equipment will be expressed in volts and amperes rather than watts. If so, multiply volts times amperes to determine the wattage.

MICROWAVE OVEN			
AMPS	12.1	VOLTS	120
HERTZ	60	WATTS	1,452
FORM NO.	00000	MODEL NO.	0000
CODE	0	SERIAL NO.	000000

EXAMPLE:
120 volts x 12.1 amps = 1,452 watts

Step 3

Use the formula shown in the following example to estimate usage and cost.

EXAMPLE:
A light uses 100 watts and is left on 15 hours. How many kWh are used and what does it cost you?

$$\text{kWh use} = \frac{100 \text{ watts x } 15 \text{ hrs.}}{1{,}000 \text{ watts}} = 1.5 \text{ kWh}$$

Your cost = 1.5 kWh x $.11 = $.17

Step 4

To find your daily cost for electricity, divide your bill by the number of days in the month.

$$\text{EXAMPLE: } \frac{\$132}{30 \text{ days}} = \$4.40 \text{ which is your daily cost.}$$

To find the daily cost per person in your family, divide the daily cost by the number in your family.

$$\text{EXAMPLE: } \frac{\$4.40}{4} = \$1.10 \text{ per person per day.}$$

TOGETHERWESAVE

Saving energy from the Web

The "Together We Save" campaign is an effort to motivate electric utility customers to take action to save money and energy at home.

An online interactive tool is available for those looking to conserve energy or make energy efficiency upgrades. To use this customizable tool, Internet users need to go to www.TogetherWeSave.com.

When arriving at the site, users will find 11 animated, interactive applications. Each application focuses on a different energy and money-saving action that, once completed, outputs an actual savings calculation. The site has many videos and applications that show energy-saving techniques, ideas, a virtual home tour and more.

For more ideas, contact your local electric cooperative or public power district or visit these websites:

www.aceee.org
www.eere.energy.gov
www.energystar.gov
www.energy.gov
www.touchstoneenergy.com

Notes:

Rebates and incentives

Heat pumps

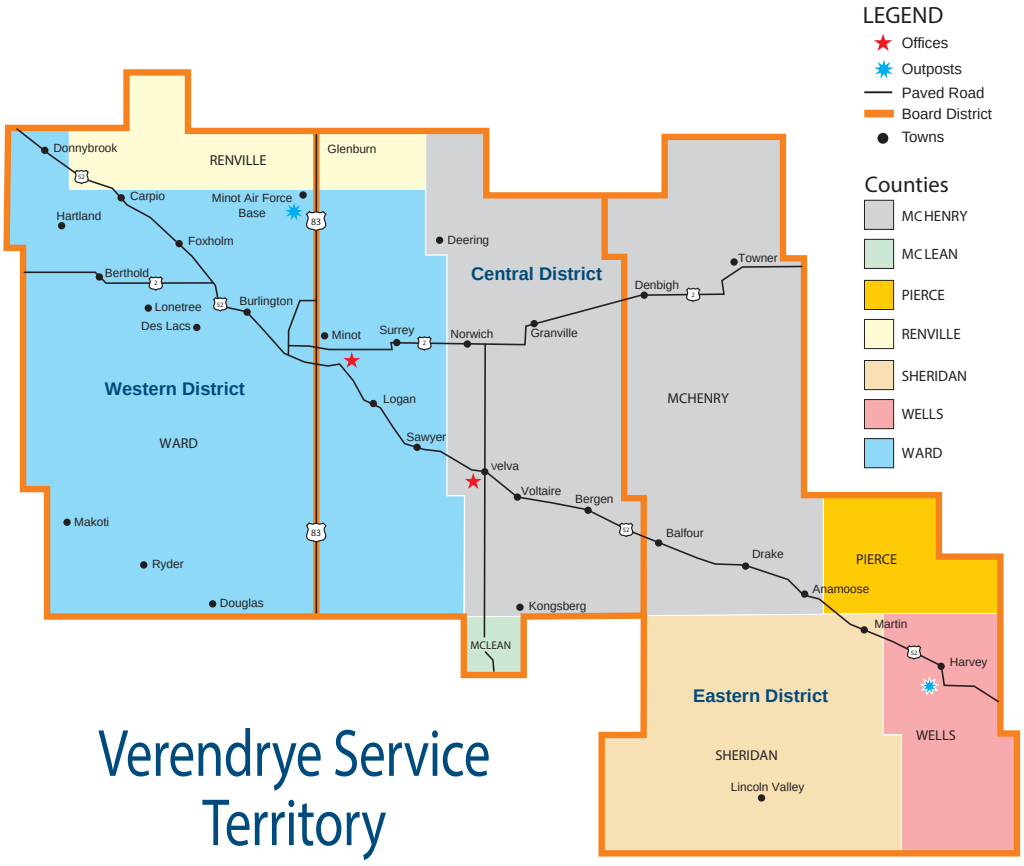
To encourage the use of heats pumps, Verendrye Electric Cooperative (VEC) provides incentives for installing them and will continue to offer 5 percent financing for installation. The rebates are $125 per ton on air-source heat pumps and $250 per ton on ground-source heat pumps. The maximum rebate is $500 per building for an air-source heat pump and $1,000 per building for a ground-source heat pump. To qualify for rebates, the heat pump must meet Energy Star® minimum efficiency requirements.

Water heaters

VEC will continue to offer rebates for Marathon water heaters. The water heater rebates are $200 for an 85-gallon water heater and $400 for a 105-gallon water heater.

Financing

VEC will finance electric heating systems at 5 percent interest with a seven-year term. The maximum loan amount is $5,000, but ground-source heat pumps and commercial installations would be exempt from the limit with approval of the VEC board.



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