

Your Family's Energy Guide



In 1935, the introduction of electricity set a new standard of living for rural Minnesota and North Dakota residents. In homes, farms and businesses, the newest electric services brought light to the dark and heat to the cold.

Since then, electricity and its uses have multiplied so much that we hardly ever think about how often we use it. Even though we can't touch it or see it, electricity is always there ready to make our lives a little easier whether we're using it to wash dishes, dry grain or do our taxes on the computer. In fact, it seems that every day a new electrotechnology is introduced that will make our lives that much better.

But because electricity and its millions of uses are such a prevalent part of our lives, it is sometimes hard to gauge exactly how much of it we use as we work, farm or play.

This guide will give you the information you need to calculate your electric usage and ways to make your farm, home or business even more energy efficient.

What determines your electric usage?

Any number of factors can affect your electric usage each month. Was it colder or hotter than normal? Did you finally buy that new stereo system you've been saving up for? Was it time for a visit from your mother-in-law?

The graph at right estimates what most people buy with their energy dollar. While your usage may vary, these figures give an accurate guideline of typical usage.

Let's take a detailed look at the main factors that can impact your electric usage.

FAMILY SIZE

There is a direct relationship between the number of people living in a home and the amount of energy that is used. That's especially true if you have teenagers at home. In addition, if friends and relatives are visiting, you can expect to use more energy for cooking, baking, laundry and hot water.

SPACE HEATING & COOLING

It should come as no surprise that heating and cooling your home accounts for 58 percent of your electric usage. However, there are several factors that can affect how much electricity you need to comfortably heat or cool your home, including:

- Whether your house is well-insulated with the proper levels of weatherstripping, caulking or storm windows
- Whether you have trees to shade your house in the summer
- Whether you use space heaters in the winter
- Whether you use ceiling fans in the summer



Refrigeration

12%

Water Heating

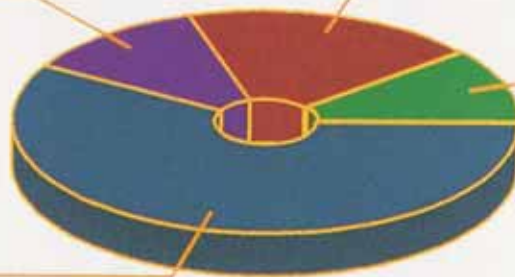
19%

Lights and Appliances

11%

Heating and Cooling

58%



WATER HEATING

About 20 percent of the energy used in the average American home is for water heating. How much and how often you use hot water affects how much electricity you need.

To use hot water most efficiently, try some of these ideas:

- Take showers rather than filling up a spacious tub for a bath
- Repair leaky faucets immediately so they don't drip and waste hot water
- Operate automatic washers and dishwashers only when there is a full load

APPLIANCE USE

We have a host of time- and labor-saving appliances to help us do our work whenever we need their service. These appliances work around the clock whenever we need them.

The number of electric appliances you have, as well as how often you use them, will affect your bill.

For example, do you:

- Leave the lights, television, radio, or other appliances on when not in use?
- Have kids who open the refrigerator to see what's to eat every time they walk by?
- Leave the oven on "warm" for an extended period of time?
- Own more than one freezer?
- Leave the porch light on during the day?

USING YOUR METER

Your meter is a highly accurate tool that, if used properly, can give you the most precise picture of your electric usage. Historical data shows that the meter is an accurate measuring tool more than 99 percent of the time.

The most important thing to remember in reading your meter is to read it on the same day of each month. Billing cycles may fluctuate between 20 and 40 days, but if you check your meter every 30 days, you'll be able to monitor your usage more accurately. In addition, checking your meter on a regular cycle can alert you to possible equipment failure sooner.

WE'RE HERE TO HELP

As you can see, electricity touches nearly every part of our lives. The good news is that you control your electric usage.

The even better news is that your local cooperative or municipal is willing and ready to do whatever it takes to help you make your home, farm or business as energy efficient as possible.

Off-peak heating, for example, is one of the best cost-savings options available for heating your home. Ask the energy experts at your local cooperative or municipal what else they can do to help you get the most from your energy dollar.

How to estimate energy 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.

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

EXAMPLE: $\frac{\$72}{1,200 \text{ kWh}} = \0.06 per kWh

Step 2

Since the wattage of an appliance (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. But it is possible that the electrical equipment will be expressed in volts and amperes, rather than watts. If so, multiply volts times amperes to determine the wattage.

EXAMPLE:

$$120 \text{ volts} \times 12.1 \text{ amps} = 1,452 \text{ watts}$$

MICROWAVE OVEN			
AMPS	<input type="text" value="12.1"/>	VOLTS	<input type="text" value="120"/>
HERTZ	<input type="text" value="60"/>	WATTS	<input type="text" value="1452"/>
FORM NO.	<input type="text" value="00000"/>	MODEL NO.	<input type="text"/>
CODE	<input type="text" value="0"/>	SERIAL NO.	<input type="text" value="000000"/>

Step 3

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

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

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

$$\text{Your cost} = 1.5 \text{ kWh} \times \$0.06 = \$0.09 \text{ or } 9 \text{ cents}$$

Step 4

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

EXAMPLE: $\frac{\$72}{30 \text{ days}} = \2.40 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.

EXAMPLE: $\frac{\$2.40}{4} = \0.60 per person per day

What does it cost?

<i>Appliance</i>	<i>Average Cost per Month at 6¢/kWh</i>	<i>Average Wattage</i>	<i>Estimated Monthly kWh</i>	<i>Your Estimated Cost</i>
Air conditioner (<i>central</i>)	\$13.56	2,500 - 3,500	2.5 - 3.5 per hour	
Air conditioner (<i>room</i>)	\$3.72	1,000	1 per hour	
Barn lighting	\$3.60		60	
Barn ventilation			2.5 per cow	
Car engine heater	\$1.20 - \$66.00	1,000	20 - 1,100	
Clothes dryer	\$4.38	4,350	5 per load	
Clothes washer (<i>doesn't include hot water</i>)	\$0.48	600	8	
Computers	\$0.36	150	6	
Dairy water heater			1 per 4.1 gallons	
Dehumidifier	\$12.00	300	200	
Dishwasher	\$1.80	1,500	30	
Engine heater (<i>tractor or truck</i>)			1-2 per hour	
Fence	\$0.42	1,000 - 2,000	7	
Freezer (<i>15 cu. ft. chest</i>)	\$6.00 - \$11.40	350	100 - 190	
Freezer (<i>15 cu. ft. frostless</i>)	\$9.00 - \$14.40	450	150 - 240	
Grain dryer (<i>no heat</i>)			1 per bushel	
Grain dryer (<i>with electric heat</i>)			2 per bushel	
Grain grinder			.2 /100 lbs.	
Hot tub/spa heater	\$2.40	1,800	40	
Incubator			1 per 25 eggs set	
Lighting (<i>varies widely</i>)	\$6.00 - \$9.00	1,600 - 4,000	100 - 150	
Microwave oven	\$0.96	1,450	16	
Milk cooler (<i>bulk</i>)			11 per 100 gallons	
Milk cooler (<i>can</i>)			1 per 10 gallons	

* 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.

<i>Appliance</i>	<i>Average Cost per Month at 6¢/kWh</i>	<i>Average Wattage</i>	<i>Estimated Monthly kWh</i>	<i>Your Estimated Cost</i>
Milking machine (<i>pipeline</i>)			2.5 per cow	
Milking machine (<i>portable</i>)			1.5 per cow	
Pool pump	\$10.14	600 - 1,500	169	
Poultry house lighting			6 per 100 birds	
Poultry water warmer			1 per day	
Range	\$6.00 - \$9.00	12,000	100 - 150	
Refrigerator (<i>standard 12' - 16'</i>)	\$6.00 - \$7.20	265	100 - 120	
Residual (<i>small electric appliances such as: VCRs, aquariums, ceiling fans</i>)	\$6.78	various	113	
Security light (<i>high pressure sodium</i>)	\$2.34	100	39	
Security light (<i>mercury vapor</i>)	\$4.38	175	73	
Silo unloader (<i>corn</i>)			2.5 per ton	
Silo unloader (<i>grass</i>)			4 per ton	
Space heater	\$1.98	1,500	1.5 per hour	
Sump pump	\$0.60 - \$0.90	100	10 - 15	
Television (<i>color</i>)	\$1.80 - \$5.40	250-350	30 - 90	
Water heater (<i>quick recovery</i>)	\$30.00	4,500	500	
Water heater (<i>standard</i>)	\$21.00 - \$24.00	2,500	350 - 400	
Water pump	\$2.40 - \$4.80	750 - 2,000	40 - 80	
Water stock tank heater				
Hog (<i>sheltered area</i>)			193 per season	
Cattle (<i>in barn</i>)			193 per season	
Cattle (<i>open shed</i>)			469 per season	
Cattle-hog combo (<i>open shed</i>)			535 per season	
Waterbed heater	\$6.00	300	100	
Welder	\$0.48	varies	8	

Trouble-shooting tips

If results of the meter monitoring chart (*back cover*) show that your daily electrical use has increased and you have ruled out lifestyle considerations and other unusual uses, you can use the following procedure to locate sources of trouble with the aid of your electric meter.

Step one – Turn off the main disconnect. Because the disk in the electric meter only turns if electricity is being used, the meter should have stopped. If the disk is still turning, check to see that the water pump is turned off at its own fuse box. Sometimes the water pump is wired ahead of the main disconnect for fire protection purposes.

Once the meter stops, you can proceed with trouble-shooting. The idea is to energize as much of your electrical wiring system as possible, one circuit at

a time, and still have a stopped meter disk.

Step two – Turn off the main fuse or breaker in all buildings. Then turn on the main disconnect. If the meter disk is still stopped, all wiring from the main disconnect to each building main fuse or breaker is okay.

Step three – Proceed with each individual building by unplugging or turning off everything that could use electricity. Then turn on that building's electrical box or breaker. To further pinpoint possible trouble, turn on each main fuse or circuit breaker in each building one at a time.

If the meter disk is stopped, you're okay; but if the disk is turning and the appliances are off, you have discovered a source of trouble.

Common sources of trouble include electrical faults in wiring systems that

are usually due to physical damage, moisture and dirt, or improper connections.

Sometimes you'll find equipment using electricity that you thought was turned off. It could be a stock waterer, thermostat, or basement and attic lights.

If no problems are found, your cooperative or municipal has test meters available to record the electrical consumption of whatever is plugged into them. By comparing your recorded use with the average use information on pages 3 and 4, you can determine whether the equipment is using an unusually high amount of electricity.

However, if all methods fail, contact your electrician or seek proper advice from the energy experts at your local cooperative or municipal.



Heating options increase savings

You won't find a cleaner, safer or more reliable way to heat and cool your home than with electricity. Today's electric heating and cooling technologies are designed to provide comfortable, clean heating and cooling at a price you can afford. Several options are now available for your home, farm or business.

According to the energy experts, the most efficient and affordable way to heat your home is with an off-peak electric heating system.

An off-peak electric heating system consists of an electric heat source as its main component and a supplemental heating source which will operate only during times of peak electrical usage.

There are many ways to heat your home with off-peak heating. Options include:

Convective heating

These systems heat cool air which is then circulated through ducts where needed. This can be accomplished through an electric furnace, plenum heaters or electric baseboards.

Electric hydronic heating

Electric resistance coils heat a liquid (water or ethylene glycol) which is then circulated to transfer heat. Electric boilers convey heat either through piping or ductwork. Underfloor tubing heat provides the comfort of warm floors similar to floor cable heating.

Radiant heating

Heat is moved in the form of waves or rays which, upon contact with a person or object in the room, transform from light energy into heat energy. This can be accomplished by ceiling cable, a heating cable installed in a plaster ceiling, floor cable, installed in a bed of sand under a concrete floor, or cove heating, a heating source located near the ceiling (*photo below*).

Thermal storage systems

These units use a special ceramic brick to store a large amount of heat produced by electric resistance coils during off-peak times. The stored heat is released during on-peak control periods (*photo above*).



Geothermal and air-to-air heating systems

Also known as a ground-source heat pump, a geothermal system does not consume fuel to produce heat. Instead, it captures some of the virtually limitless heat constantly available a few feet below the surface of the earth. The operation of geothermal systems is based on the physical law that heat flows from a warmer place to a cooler place.

That same physical law can be used in an air-to-air heat pump. Just as heat is present in the ground, it is also available in the outside air – even on a cold day. An air-to-air heat pump collects this warm air and transfers the free heat into the house or other structure.

Because the heat-moving feature is reversible, these systems can also be used to remove heat from your house or building in the summer. In addition, this surplus heat can be used for water heating.

Your electric cooperative or municipal representative is happy to help you decide which heating system would be best for your home, business or farm.



Meter monitor chart

Using this Meter Monitor Chart, take a few minutes each day (preferably at the same time) and jot down the reading on your electric meter. Start the first of the month.

By subtracting the previous day's

reading from the current reading each day, you get the number of kilowatt-hours used during that 24-hour period. By adding the daily figures into a weekly total, you can see how much – and when – your family used power during that month.

As you know from reading this guide, your energy usage will fluctuate with your daily activities.

Monitoring your kilowatt-hours is the first step to understanding your electric usage.

Daily Reading	kWh Used Daily	Record of Daily Activities that Affect Your Energy Use
1		
2		
3		
4		
5		
6		
7		
Weekly Total		
8		
9		
10		
11		
12		
13		
14		
Weekly Total		
15		
16		
17		
18		
19		
20		
21		
Weekly Total		
22		
23		
24		
25		
26		
27		
28		
Weekly Total		
29		
30		
31		
Extra Days Total		
MONTHLY TOTAL		