Appreciating Electricity a Penny at a Time

BY CURTIS CONDON, EDITOR OF RURALITE MAGAZINE

FROM JULY 2017 *KANSAS COUNTRY LIVING* CENTER PAGES

I'm old enough to remember when penny candy actually cost a penny. For a nickel, you could buy enough candy to rot your teeth out, as my mother used to say.

But what does a penny buy these days? Not much. The government can't even make a penny for a penny anymore. According to the U.S. Mint, it now costs 1.5 cents to produce one.

About the only thing of value you can still get for a penny is electricity. You might call it "penny electricity."

No, I'm not kidding. Think about it.

To make the math easier, let's say the average rate for a kilowatt-hour of electricity is 10 cents. That is 60 minutes of 1,000 watts of electricity for a dime, so a penny of electricity equates to 100 watts. It's enough to power a 9-watt LED lightbulb—the equivalent of a 60-watt incandescent bulb—for 11 hours, all for only a penny.

Where else can you get that kind of value?

How many eggs will a penny buy? How much milk, bread, coffee, medicine or gasoline?

Gas has come down from its stratospheric levels of several years ago, but there is still no comparison to the value of electricity. For example, if a gallon of gas costs $2.50 and your car gets 25 miles to the gallon, you can drive 176 yards—about two blocks— on a penny's worth of gas.

I will take 11 hours of lighting for a penny over a two-block drive any day.

The value is just as evident when powering things other than lighting. Take, for instance, your smartphone. Using the same 10 cents per kWh price, penny electricity allows you to fully charge your iPhone more than 18 times for a penny. You can charge it once every day of the year for about 20 cents total.

Not impressed? Well, how about these other examples of what you can do with just a penny's worth of electricity: power a 1,000-watt microwave on high for 6 minutes; run a 200-watt desktop computer for 30 minutes; watch 2.5 hours of your favorite shows on a 40-watt, 32-inch, LED television or 1.3 hours on a 75-watt, 75-inch mega TV.

The examples are endless.

We are fortunate electricity is such an excellent value because we have a huge appetite for it. We tend to forget that.

Electricity is not expensive. It's that we use it for so many different things: lighting, heating, cooking, cooling, refrigeration, cleaning, washing, pumping, entertainment, communications—even transportation these days.

Few corners of our lives are left untouched by electricity.

Unfortunately, we don't always appreciate it. When our monthly electric bill comes, we open it and may complain about the cost. It's a knee-jerk reaction ingrained in us as consumers. We don't stop to think about the value we received for the money.

Early in my career, I had the pleasure to interview an elderly woman who vividly remembered the day electricity came to her farm. Her name escapes me, but I do remember she proudly showed me the worn, dog-eared membership certificate the co-op issued to her husband.

"You young people will never know what it was like to have electricity for the very first time," she said. "It was glorious. Nowadays, you take it for granted."

Her farm was energized in 1940. She said the price of electricity at the time was slightly less than a penny a kilowatt-hour—true penny electricity.

A lot has changed since then. Wages and the cost of living today are a far cry from 1940, when the average annual wage was less than $150 a month and the average cost of a house was $3,920.

But one thing that hasn't changed is the value of electricity. In 77 years, its price has risen much slower than the rate of inflation.

A penny in 1940 had as much buying power as 17 cents today, which means the residential price of electricity—which now averages 12 cents a kWh nationally and less than 10 cents in the Pacific Northwest—is actually a better deal today than it was in 1940.

So to my way of thinking, the value of electricity is like the bygone days of penny candy, and it's OK to indulge yourself a little. But, unlike penny candy, penny electricity won't rot your teeth out.

Is a Geothermal Heat Pump Right for You?

BY PATRICK KEEGAN AND AMY WHEELESS

FROM SEPTEMBER 2016 *KANSAS COUNTRY LIVING* CENTER PAGES

Dear Pat:
I am planning to replace my current heating system with a geothermal heat pump. It is comparatively pricey to other options, but it seems like an efficient option, and I like the fact that it includes air conditioning. Would a geothermal heat pump be a good choice for me? – **RALPH D.**

Dear Ralph: In most areas of the U.S., space heating and cooling account for a large percentage of overall home energy use. Upgrading to a more efficient HVAC system is a great way to reduce your monthly energy bill. A geothermal heat pump, also known as a ground source heat pump, is among the most efficient types of home heating and cooling systems currently available.

Even when it is extremely hot or cold outside, the temperature a few feet below the ground remains relatively constant and moderate. A geothermal heat pump system uses this constant ground temperature to heat and cool your home. As a result, geothermal heat pumps are quite efficient. For example, according to the U.S. Environmental Protection Agency, geothermal heat pumps use up to 44 percent less energy than traditional air-source heat pumps, and up to 72 percent less energy than electric resistance heaters combined with standard air conditioners.

A geothermal heat pump system is made up of three main components:

1. The collector, or loop field, which is in the ground and cycles a liquid, like antifreeze, through dense plastic tubing;
2. The heat pump in your home; and
3. The duct system that distributes the heated or cooled air throughout your home.

During the winter, the collector absorbs the heat stored in the ground and the liquid carries that heat to the heat pump, which concentrates it and blows it into the duct work, warming your home. In the summer, the heat pump extracts heat from the home and transfers it to the cooler ground.

The collector that exchanges heating and cooling with the ground can be set up in one of three ways:

- **Horizontal system:** Plastic tubing is placed in trenches 4 to 6 feet below the surface of the ground. This system works well when a home or business has sufficient available land, as these systems may require up to 400 feet of trenches to be dug.
- **Vertical system:** If the site does not have sufficient space for a horizontal system, a collector can be placed vertically. In this system, a drill digs 100 to 400 feet below the surface and places the tubing. This system can be more costly than a horizontal system, but will have less impact on any existing landscaping and can be used on smaller lots.
- **Pond system:** If a home has access to a pond or lake, a pond system (also known as a water source heat pump) may be an option. The loop field is connected to the heat pump and then placed at least 8 feet below the surface of the water. If a homeowner has access to a pond that is sufficiently wide and deep, this option can be the lowest cost.


Patrick Keegan

Geothermal systems typically cost more than other heating systems, largely because of the collector and the associated digging or drilling, but their high efficiency can help reduce the payback time. The cost varies based on whether new ductwork is needed and the type of collector you install. However, there are incentives available for those who install qualified geothermal heat pumps. Most notably, there is a 30 percent federal tax credit for installing an Energy Star-rated system before the end of 2016—so, if your system and installation cost $20,000, you could take $6,000 directly off your federal tax bill. Some states also offer tax incentives, and your electric co-op may offer rebates or financing to help you pay for the system.

Those building new homes should consider whether to install a geothermal heat pump. With new construction, the system can be included in the mortgage and installed before the home is completed.

Talk with a qualified energy auditor who can help you evaluate the different heating and cooling options that would be best for your home.

This column was co-written by PATRICK KEEGAN and AMY WHEELESS of Collaborative Efficiency. For more information, visit www.collaborativeefficiency.com/energytips.

Energy Savings Tips for Every Season FROM BLUESTEM ELECTRIC

While saving money through greater energy efficiency may be a year-round objective for many consumers, the way to achieve this goal varies by season. There are a number of factors that impact energy efficiency, including weather, the age and condition of the home and desired comfort levels. During the fall and winter months, when the outdoor temperature is chilly, consumers desire a warm home and seek to keep the cold air out. Conversely, in the spring and summer, the focus is on keeping the hot air from infiltrating cool abodes.

Fall and Winter: Keeping Heat In

To maintain a warm indoor environment in chillier weather, you can take simple steps to increase energy efficiency. Fall is a great time to examine seals on doors and windows to check for air leaks. Caulk and weatherstrip as needed to seal in warm air and increase energy savings. Similarly, examine outlets for air leaks, and where necessary, install gaskets around the outlet to prevent drafts. During the day, open curtains or drapes on south-facing windows to enable sunlight to heat your home naturally. Close curtains or drapes at night for an added layer of window insulation.

As the temperature drops with the onset of winter, schedule a service appointment for your heating system to ensure it is operating at an optimal level. Low-cost or no-cost steps for energy savings include taping or affixing heavy, clear plastic to the inside of your window frames to create an additional barrier against cold air. Ensure that the plastic is tightly sealed to the frame to help reduce infiltration. Use a programmable thermostat to set the temperature as low as is comfortable when you are home (ideally around 68 degrees). When you are asleep or away, turn the temperature down 10-15 degrees for eight hours. According to the Department of Energy, this small adjustment can help you save approximately 10 percent a year on heating and cooling costs.

Spring and Summer: Keeping Your Cool

During warmer months, energy savings and efficiency will require different measures, many of which are inexpensive. If you live in a climate that is cool, open your windows in the evening and turn off your cooling system while sleeping. In the morning, shut the widows and blinds to hold in the cool air. Where practical, plant trees and shrubs that provide shade in warm months and sunlight in winter. In addition to the aesthetic value, well placed trees can take heat gain from the sun and provide needed shade by creating a canopy for the house.

In extremely hot weather, your cooling system works harder to close the gap between the high outdoor temperature and the cool indoor thermostat setting. To lessen the difference between the two—and to lower cooling costs—set the thermostat as high as you can while maintaining your comfort level. Moreover, using a ceiling fan in conjunction with your air conditioning can allow you to increase the thermostat setting approximately four degrees with no reduction in comfort levels.

During the hottest months, it's all the more critical to replace any remaining incandescent bulbs with LEDs. The wasted heat from the old bulbs impacts energy use and creates unwanted heat. For additional energy savings and efficiency, employ a programmable thermostat to adjust the settings a few degrees higher when no one is home or when your family is sleeping.

Let There Be Light AND *Savings!* FROM BUTLER ELECTRIC

REPLACING your traditional light bulbs with **LEDs** can save **UP TO 80%** on your cost for lighting. Combine that with decreasing energy usage **FROM 3-6 P.M.** and you can **MAKE A BIG DIFFERENCE** on your energy bill.

According to the Consumer Federation of America, LED light bulbs can save homeowners an average of $1,000 over 10 years. LED light bulbs last longer and are ultimately going to save you money. Cut your demand even more by ***not*** operating electrical appliances—like dishwashers, dryers and ovens—between 3 and 6 p.m., Monday through Friday.

Energy Providers Strive for BALANCE

BY TRAE GREEN, FROM JULY 2017 *KANSAS COUNTRY LIVING* MAGAZINE

Generation and transmission suppliers use a mix of fuels to supply Kansas electric co-op members with safe, reliable and affordable power.

The two feelings are unmistakable. First, the rush of adrenaline, then an overwhelming sense of relief. You just realized your phone was on its last leg of battery, but you somehow managed to get it plugged into the charger before its screen went black.

Electricity's instantaneous nature is truly something to behold. Within a split-second of plugging the charger into the phone's battery it is revived and able to maintain its functionality. This instant response to our need for energy is made possible by a diverse mix of on-demand fuels: coal, natural gas and nuclear. Intermittent renewable energy sources—wind, hydro and solar—enrich the generation portfolio of suppliers.

New ways of thinking and even newer methods of keeping your lights on continue transforming the energy industry. With the rapid rise in renewable energy sources and the fluctuation in costs for some fuels, energy providers balance their power supply with two key goals in mind: reliability and affordability. Both Sunflower Electric Power Corporation, Hays, and Kansas Electric Power Cooperative, Inc., Topeka, provide power to Kansas electric cooperatives throughout the state of Kansas and both echo the sentiment the consumer and their needs are always top priority.

"Sunflower is not resource biased—it is member biased," said Sunflower Electric communications manager Cindy Hertel. "Our board makes every decision, whether it be a generation or transmission decision, with the best interest of the members and the thousands of Kansans they serve in mind."

Les Evans, senior vice president and chief operating officer for KEPCo, explained the necessary forward-thinking suppliers must have when making decisions on resource diversity.

"Our board makes policies that will impact not only this generation of consumers, but the next generation of consumers," Evans said. "Decisions involving how we manage carbon, the Clean Power Plan, integrating renewables and figuring out what the best mix is will impact not only today's customers and environment, but generations to come."

A report by a panel of electric co-op experts in the Business and Technology Strategies Department at the National Rural Electric Cooperative Association (NRECA) identified natural gas as the biggest growing competitor to coal—as long as prices remain affordable.

Energy providers are aware of the benefits of natural gas and have been using it for decades.

"From the beginning, Sunflower had natural gas in its system. In fact, in August we will celebrate 60 years of natural gas," Hertel said. "The history of the price of coal has remained stable in contrast to the price of natural gas. While the price of natural gas has been low recently, in the past the price rose above $12 per MMBTU. Having low-cost coal energy as part of our generation portfolio means we have hedge against those high prices."

When the conversation shifts to capitalizing on renewables like wind and solar, finding a balance that maintains reliability and affordability is at the forefront of decisions made by power providers, like KEPCo and Sunflower Electric. Without their diverse generation mix of coal, natural gas, nuclear, wind, solar and hydro, the rapid performance of electricity we expect, whether plugging in a phone charger or coffee

pot, would not be available.

Even though it seems the wind gusts across the plains of the Sunflower State almost daily and the sun beams down on the population, Kansas has both cloudy and still days. Wind energy and solar energy can only be harnessed when weather conditions make renewable generation possible. Until battery storage technology is developed at a commercial level to store energy, relying solely on these resources for energy is not possible.

"Electricity has to be generated in real-time to meet the consumers' demands," Evans said. "Electricity also has to be used in real-time because we don't have battery storage or any type of storage that is economically feasible for large quantities for a long duration of time."

Although renewable energy is growing fast, it's only beginning to make a difference in the share of electricity it generates. In 2013, non-hydroelectric renewables generated 6 percent of the nation's power. By 2015, that number grew to 7 percent, and the NRECA says it is projected to reach 10 percent by 2018.

"They're not something like a conventional fossil technology where I can control it by turning it up and dialing it back," Evans said. "I'm at the mercy of when the wind blows and when the sun shines."

Energy providers must balance intermittent resources like solar and wind with on-demand fuel sources like coal & natural gas.

Energy providers must balance intermittent resources like solar and wind, with on-demand fuel sources like coal and natural gas to offer consumers reliable electricity at the most affordable costs

"Sunflower understands each generation resource has its strengths," Hertel said. "Having a diverse energy portfolio and having energy resources complement each other has been a priority for our board."

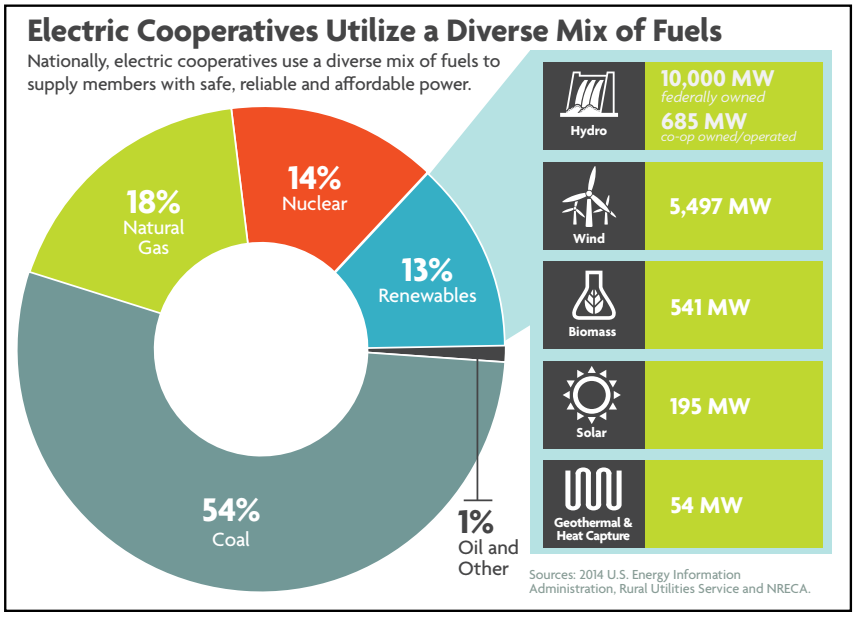
KEPCo also supplies power through renewable means, utilizing hydro, nuclear, wind and solar, with its most recent addition of Prairie Sky Solar in Butler County.

"We have a significant amount of hydro, Wolf Creek Generating Station is non-greenhouse gas emitting and we get wind renewables through our purchase power agreements," Evans said. "We have recently invested in a solar power installation. If you put all of those together, our carbon free footprint for the last 30 to 40 years has been nearly 50 percent or greater. We have always been on the very leading edge of that."

The responsibility of continually juggling consumers' expectations on cost and reliability, while incorporating renewable energy sources and making lasting decisions on behalf of people who are years away from paying their own energy bills, is a tall task.

"It's a constant balance," Evans said. "Kind of like the three-legged stool, where each one of the legs has to be in balance or it will tip over."

Energy providers like KEPCo and Sunflower Electric balance a diverse portfolio of energy resources every day to ensure your phone's battery can be charged at a moment's notice, at an affordable cost. **KCL**



Incandescent, Halogens, CFLs, LEDs—What's the Difference?

BY MATT LAMBERT, ENERGY USE COORDINATOR, FROM FREESTATE ELECTRIC

Matt Lambert

How many of you have stood in the lighting isle at the store and thought, "It used to be simple?" You purchased a light bulb by determining how many watts the light bulb you were replacing required. Sure, you might get fancy and want a softer or brighter light, maybe a little more of a yellow tint or a little less, but it basically came down to a simple equation—more watts equal a brighter light. Simple, right? Well, it used to be. As any of you who have purchased a light bulb in the last few years can attest, what was once the simplest of purchases is now one of the most complicated.

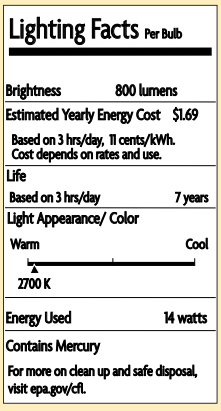
To help make this complicated purchase simple again for our members, we would like to provide you with a few helpful guidelines.

First, a little history on how we got here—the Energy Independence and Security Act of 2007. The long definition for this act is as follows: an Act to move the United States toward greater energy independence and security, to increase the production of clean renewable fuels, to protect consumers, to increase the efficiency of products, buildings, and vehicles, to promote research on and deploy greenhouse gas capture and storage options, and to improve the energy performance of the Federal Government, and for other purposes.

Confused yet? What does this mean for you while you're standing in the light bulb isle? It means most of the incandescent light bulbs with the familiar 60- 75- and 100-watt ratings have been phased out, replaced by more efficient incandescents, compact florescent lights (CFLs), halogens and light emitting diodes (LEDs). Before explaining their differences, let's review their commonalities. They all produce a visible light that can be rated in something called lumens, which is the unit of measure that tells you the brightness of the bulb. Packaging of these new light bulbs includes the wattage they are equal to along with a lumen rating.

In addition, the labeling on light bulb packaging has become standardized, as you can see in the example above. As for your lighting choices, let's break it down.

Understanding Bulb Labels



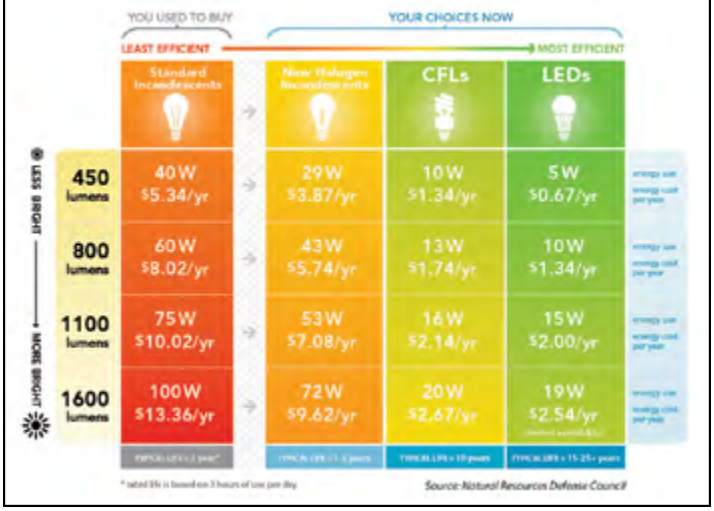
Life- Estimates in years how long the bulb will last. The longer the life, the more you save on the hassle of changing bulbs frequently.

Light Appearance/ Color- Indicates the shade of light. Incandescents produce warmer white lights— 2,700 to 3,000 K. Bulbs producing cooler or blue light have higher ratings— 4,000 to 6,500 K.

Energy Used (watts)- Measures bulb energy use (does not indicate brightness).

Contains Mercury- CFLs have very low levels of mercury (less than 5 mg) and are safe for normal operationg usage. If a CFL breaks inside your home, use common sense cleaning procedures— keeping children away, opening a window and cleaning up pieces for proper disposal. Retailers such as Home Depot and Lowes also offer free CFL recycling.

Selecting the Right Light Bulb



Incandescent Light Bulbs

These are what most of us think of when we think of a light bulb. Thomas Edison filed his patent for "improvement in Electric Lights" in 1878 and this type of bulb has been with us ever since.

- ▶Average Cost $1 to $10
- ▶Average Wattage 40W to 150W
- ▶Average Life expectancy 1,000 hours

These bulbs are inexpensive on the front end, dimmable and produce the nice warm light we are familiar with; however, they use the most energy. The older versions of this light bulb are being phased out in favor of more efficient light bulbs.

Halogens

These are a type of incandescent light

bulb that use halogen gas.

- **Average cost** $2 to $15
- **Average wattage** 29W to 72W
- **Average life expectancy** 1,000 hours

Halogens offer a low initial cost and are about 20 to 30 percent more energy efficient than the old incandescent bulbs. Halogens are usually dimmable but less efficient and with a shorter life span than CFLs and LEDs.

Compact Florescent Lights

The curly-shaped energy saving light bulbs, otherwise known as CFLs, were originally proclaimed to be the replacement to the incandescent.

- **Average cost** $2 to $20
- **Average Wattage** 9W to 52W
- **Average Life expectancy** 10,000 hours

These are slightly more expensive then incandescent bulbs, but last longer and are more energy efficient. Many are not dimmable and often don't last as long as advertised if turned on and off frequently. CFLs are not as efficient in cold areas, and they contain mercury that requires proper disposal.

Light Emitting Diodes

Commonly known as LEDs, these bulbs are the hot new option taking the lighting isle by storm.

- **Average cost** $3 to $20
- **Average Wattage** 4W to 22W,
- **Average life expectancy** 20,000 hours

LEDs offer the longest life span and highest energy efficiency than any other bulb. Many manufacturers offer 10-year warranties; however, most LEDs are not dimmable and they cost the most initially.

If saving money over time is your primary goal when buying your new light bulb, then the chart in diagram 3 should help you.

LEDs and CFLs save consumers the most money but consider these questions before purchasing:

- Where will I use this bulb? If outside, will it be turned off and on a lot? If so, then CFLs are not the best choice.
- Does the bulb need to be dimmable? Although you can find dimmable LEDS and CFLs, they may cost a lot more. Here, a halogen bulb may be your best option.

When shopping for a new bulb, pay attention to the color appearance section on the label. Warmer light is produced by the older incandescent bulbs. Neutral white lights are often used for task and office spaces, while cool white lights mimic daylight, which is good for reading and high contrast. Overall, it comes down to individual preference.