

PSC *Connection*

Missouri Public Service Commission Publication — SPRING 2017

**When I turn
on my lights,
where does my
power come from?**

Chairman's Corner

Welcome to another edition of the *PSConnection* magazine.

Electric service is a vital part of our everyday lives. When it is dark, you can flip a switch and you have lights to see. For many consumers, electricity is involved with heating or cooling a home or business. It is also there to help prepare food for your family. We know how to get electricity to work at our homes and businesses, but you may not know where it comes from and how it gets to you in a safe and useful form. We examine that very issue in our cover story **“When I Turn on My Lights, Where Does My Power Come From.”**



It is in the news almost daily: cyber security and threats to it. We take this issue very seriously at the Public Service Commission as it relates to the utilities that provide essential services in our state. In the article, **“Keeping Your Utility Services Safe & Secure,”** we explore the creation of a new position at the Public Service Commission to handle those important cyber security issues. The Critical Infrastructure Security Engineer will work with utilities, law enforcement agencies and the Missouri Highway Patrol’s Missouri Information Analysis Center reviewing the current state of physical and cyber security of utilities in Missouri and the threats those security measures must address.

Consumer education is an important priority at the Public Service Commission. When you call the Commission with a utility related question or complaint, it is important to us that you get not only a quick response but one that is accurate and understandable. We are always seeking input from consumers on how we serve them. In the article, **“Consumer Services Unit: Making a Difference,”** the results of a consumer survey are revealed, and you can find out how well we did. Often, your first experience with the Commission comes when you call, write or visit with a member of the Commission’s Consumer Services Unit. We all strive for that first experience to be a positive and helpful one for you.

This publication also contains information on such topics as making sure you call before doing any digging or excavation work around your home or business to prevent damaging underground utility lines and things that you can do in your home to help reduce your energy consumption.

I hope you will visit the Public Service Commission website (psc.mo.gov), which is a great source for consumer information. Whether it is a local public hearing or a community outreach event, we hope to see you in the future. If you have any questions or seek additional information, please contact our Consumer Services Unit at **1-800-392-4211**.

I hope you enjoy this issue of the *PSConnection*.

- Daniel Y. Hall

PSConnection

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The Missouri Public Service Commission regulates investor-owned electric, steam, natural gas, water and sewer utilities in Missouri. The Commission also has limited jurisdiction over telecommunications providers in the state. Our mission is to ensure Missouri consumers have access to safe, reliable and reasonably priced utility service while allowing those utility companies under our jurisdiction an opportunity to earn a reasonable return on their investment. The PSC also regulates manufacturers and retail dealers who sell new and used manufactured homes and modular units. The Commission was established in 1913. The PSC is comprised of five commissioners, who are appointed by the governor.





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Our Mission

Ensure that Missourians receive safe and reliable utility service at just and reasonable rates.

When I turn on my lights, where does my power come from?



In many ways the flow of water helps us visualize the flow of electricity. Just like water follows the path of least resistance, so does electricity. You may not be able to identify where the individual droplets of water in a lake came from but you can define the watersheds that feed it. We can't say for certain where the electricity powering your home comes from but we can tell you more about the system that makes it possible.

Electricity begins its journey to your home at a power plant which may be the coal or nuclear plant hundreds of miles away, the wind turbines you saw on a recent trip, or your neighbor's solar panels. Generation facilities are sited in large part by the availability of certain resources such as rail or barge access for bringing in fuel, water availability for thermal steam generation, or in the case of renewables, adequate flows of wind, water, or adequate sunlight.

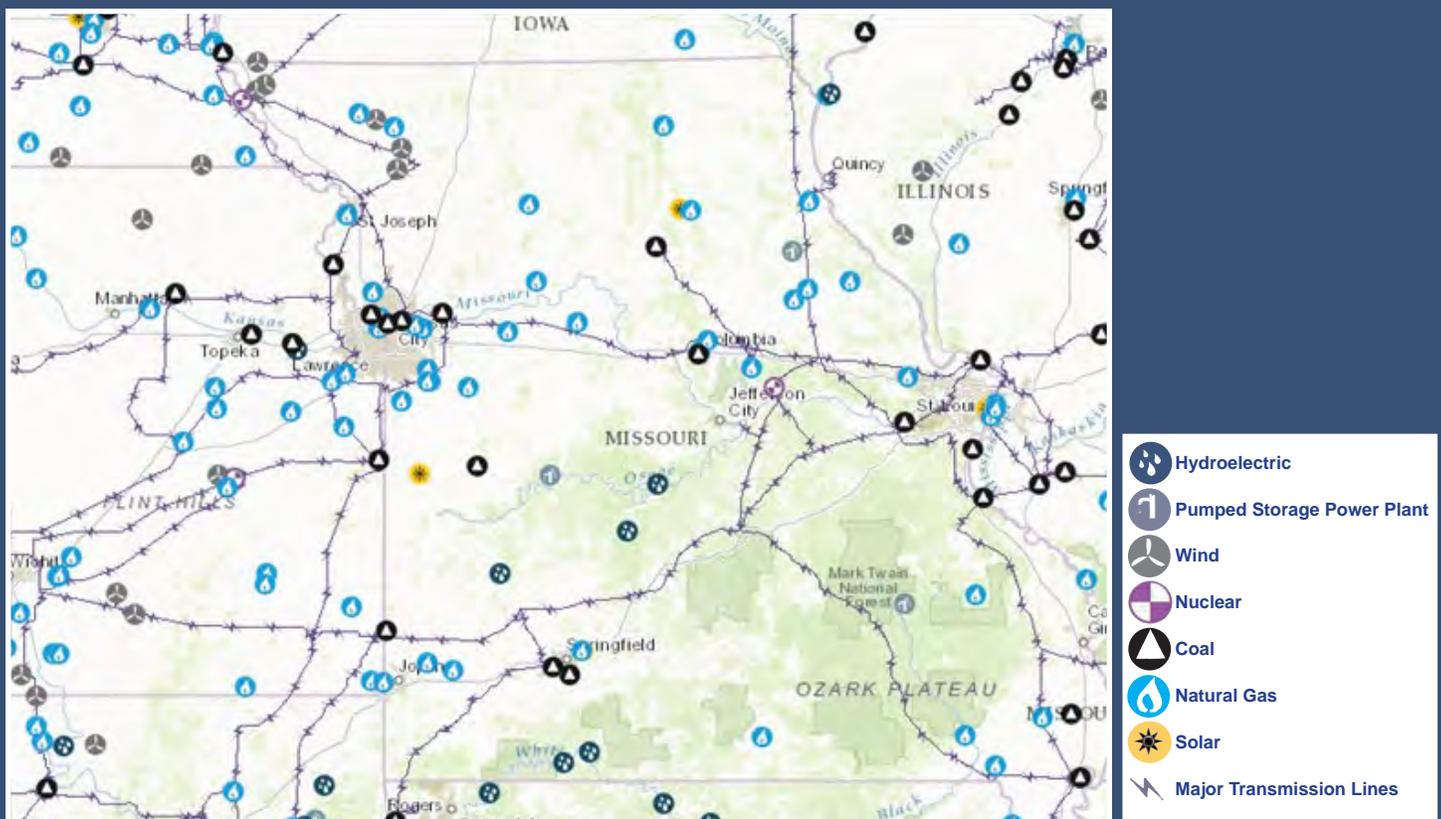
Electricity is transported from power plants long distances via transmission lines and then brought to homes and businesses via distribution lines. Regional Transmission Organizations (RTOs) coordinate and monitor the electric grid over multiple states. Currently, Missouri's investor-owned utilities participate in two separate RTOs, the Southwest Power Pool (SPP) for the utilities in the western part of the state and the Midcontinent Independent System Operator (MISO) for the eastern part of the state.

But where does my power come from?

Depending on the time of day and the time of the year, it could be coming from nearly anywhere in the Midwestern United States or beyond. On a mild fall evening, a few nuclear plants, several large coal plants, hydroelectric dams, and thousands of wind turbines are likely providing all of the energy that is needed to meet customers' load requirements. The transmission system spreads the output of these plants from the Missouri, Meramec, White, and Mississippi River valleys, as well as the wind farms of Northern Missouri,

Southwestern Kansas, Iowa, and even the Dakotas. The locations of coal, nuclear, wind farms, and hydroelectric dams are provided in the map below, as well as major transmission lines.

On a hot summer day, natural gas generation throughout Missouri and other states will be called upon. Also, solar generation on individual homes and businesses and utility-scale solar in St. Louis and Kansas City are all part of the mix to keep your home powered.



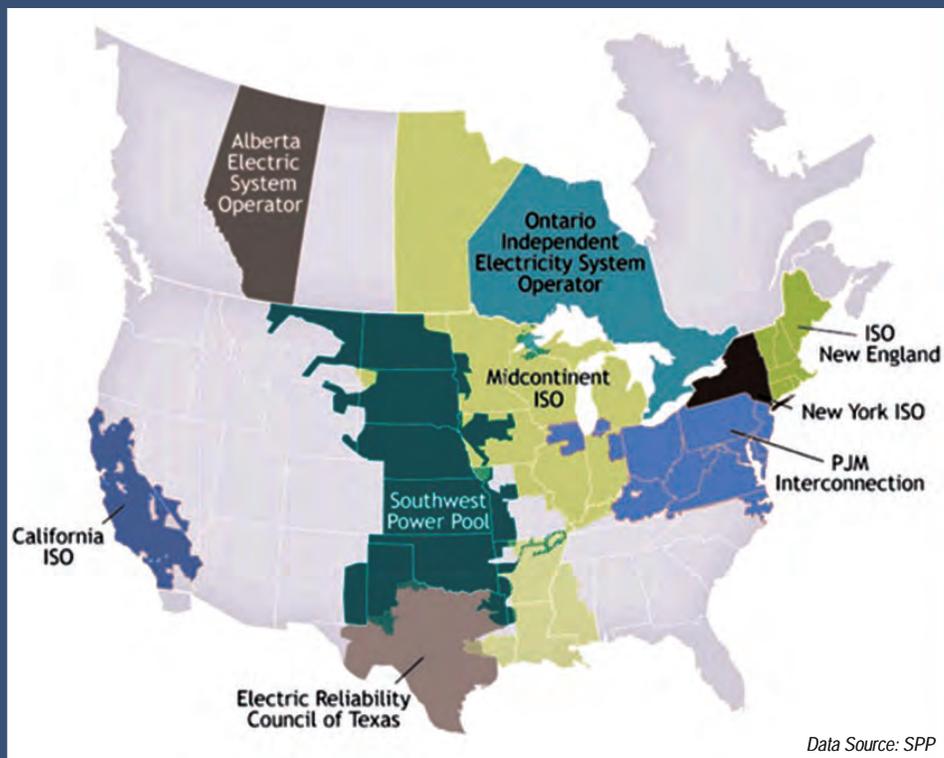
Data Source: EIA

Who decides how energy is generated?

Every utility participating in the RTOs energy market will report how much energy they expect their customers to need in each hour of each day. The utilities also provide the RTO information on what plants the utility has available to generate electricity, and what the cost of the fuel is for each plant to generate electricity. This process also includes renewable generation, such as wind and solar, that has little or no cost of generation. The RTOs use sophisticated computer modeling each day to determine which plants should run at what capacity in each hour, and relay this information back to their member utilities. Like a neighborhood coordinating a carpool to soccer practice, this sharing of information results in the most efficient use of available resources.

By considering the capabilities and needs of multiple utilities together, the RTO energy markets allow individual utilities to operate their plants more efficiently than would otherwise be possible. For example, nuclear units and large coal units operate most efficiently if they produce a steady amount of power, and less efficiently if they are required to “ramp up” when customers require more energy during the day, or “ramp down” when customers use less energy overnight. By spreading the steady energy from these large units out over the load requirements of more customers, the plants can be run more efficiently.

RTO ENERGY MARKETS

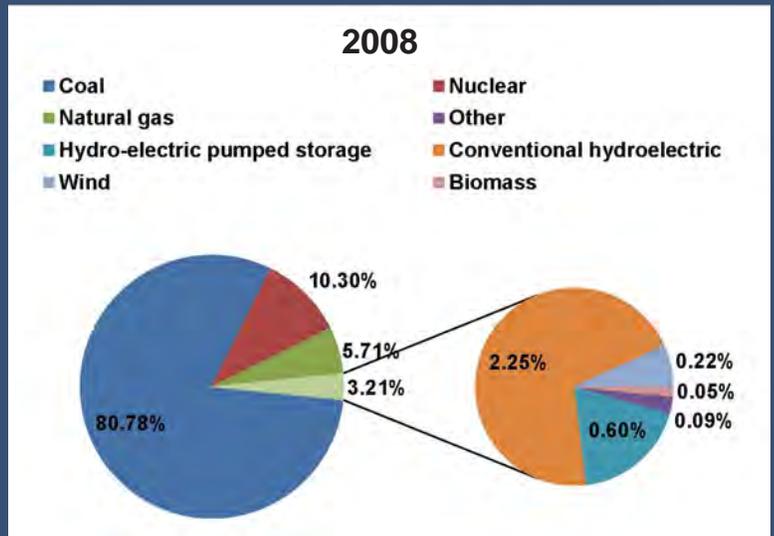


How much of my energy usage is powered by renewable sources?

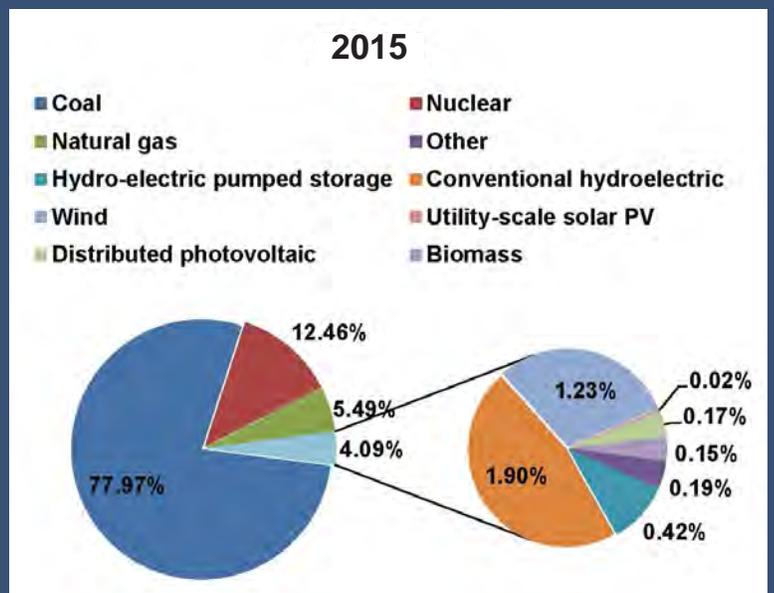
Although renewable energy resources do not make up a large portion of Missouri's current generation portfolio, new renewable resources are being constructed every year. Further, Missouri's mix of renewables is becoming more diverse. The Renewable Energy Standard (RES), passed in November 2008 by voter initiative, requires investor-owned utilities to use eligible renewable energy resources to meet 15% of annual retail sales by 2021. Missouri's RES includes a carve-out for solar electricity and a credit multiplier for in-state generation. Compliance with the RES can be achieved through the procurement of renewable energy or renewable energy credits (RECs) from renewable energy resources inside or outside the state of Missouri.

In comparing the total Missouri generation by fuel type in 2008, the year the RES was passed, and 2015 you see that the diversity of renewables in Missouri has increased¹. It is important to note that the charts at right are based on generation data from all sources within the state of Missouri, not solely the investor-owned utilities which are subject to Missouri's Renewable Energy Standard (RES). Two additional Missouri wind farms were completed in 2016, more than doubling the 2015 wind capacity.

MISSOURI'S ENERGY PORTFOLIO



Data Source: EIA



Data Source: EIA

— Dan Beck, PSC Utility Regulatory Engineering Manager
 Claire Eubanks, PSC Utility Regulatory Engineer II
 Sarah Kliethermes, PSC Regulatory Economist III
 Shawn Lange, PSC Utility Engineering Specialist III

¹Data Source: EIA

KEEPING YOUR UTILITY SERVICES SAFE & SECURE



— Michael Rush, PSC Critical Infrastructure Security Engineer

The Missouri Public Service Commission (PSC) has undertaken the task of addressing the state of physical and cyber security for essential utility assets and services within Missouri. The creation of a new position dedicated to Critical Infrastructure (CI) security was the first step toward evaluating and improving the protection of these essential systems, data, and other assets in Missouri.

The National Institute of Standards and Technologies (NIST) has issued guidelines on a more focused approach to security. The guidelines focus on risk management using continuous monitoring and real-time security assessments. The core of these guidelines is a framework whereby the most critical assets are identified; procedures are developed to

protect those critical assets; resources are applied to detect security threats and respond in a timely manner; and preplanned recovery efforts are developed if a threat were to successfully interrupt or disable the asset. These guidelines are applicable to both physical and cyber security. While some Missouri utilities already utilize this approach, the Commission is dedicated to ensuring all regulated Missouri utilities employ a similar approach to protecting the states utility assets and services.

WHAT ARE PHYSICAL & CYBER SECURITY?

Physical security naturally involves cameras and other surveillance systems, guarded entrances, fences and other

barriers to physical entry into a facility. However, physical security also includes securing facilities and equipment from physical harm due to weather, vandalism, energetic attacks, or electromagnetic disturbances. Physical security is an all-inclusive topic, which uses an all hazards approach to threats which can cause any type of physical harm to facilities and/or equipment.

In the world of computers, security *means* cyber security. Cyber security is generally defined as the technologies, processes, and practices designed to protect networks, computers, software and data from attack, damage, or unauthorized access. Making sure that things are protected in the cyber world includes securing the applications that operate the system, the information needed to operate the systems, user and

customer information, and the restoration of those systems and/or data in the event of damage or loss.

One of the largest issues in addressing cyber security is the rapid changes in technology which lead to evolving security threats. A traditional approach to security that singularly focuses on the protection of individual components is no longer a viable methodology. Therefore, it is necessary to use a layered approach because the layered approach will require each attack to penetrate each successive layer of a system. This allows the entity protecting the system to secure a layer to a threat, while simultaneously protecting the many system components that reside under that layer. The protecting entity can also rank the current set of threats by reviewing the depth to which the attacks were successful.



An often overlooked and critical part of both physical and cyber security is the idea of resilience. Resilience is defined as the ability to adapt to changing conditions and withstand and/or recover rapidly from disruptions. Unfortunately, security measures will not withstand all threats. In the event that a natural disaster or successful attack against critical

infrastructure occurs, the ability to rapidly restore services is an extremely important aspect of security.

WHAT IS CRITICAL INFRASTRUCTURE?

Critical Infrastructure (CI) provides essential services necessary to serve the economy, security, and health. Each of us recognize it as the power we use at home and at work, the water we drink, the roads and bridges on which we drive, the stores at which we shop, the hospitals and emergency services we rely on when in need, and the communication systems we use to stay in touch with doctors, schools, family and friends. The Department of Homeland Security (DHS) has identified 16 CI sectors vital to the health and welfare of the nation and its citizens. Among these sectors are



energy, dams, nuclear facilities, water and wastewater systems, transportation services, commercial facilities, healthcare, emergency services, communications and information technology.

WHAT DOES THE PSC CRITICAL INFRASTRUCTURE ENGINEER DO?

The Critical Infrastructure Security Engineer (CISE) is responsible for engaging both regulated and non-regulated utilities and encouraging compliance to NIST guidelines on physical and cyber security.

The CISE will work with utilities, law enforcement agencies, and the Missouri State Highway Patrol's Missouri Information Analysis Center (MIAC) to review the current state of physical and cyber security of utilities in Missouri and the threat landscape those security measures must face. The CISE will also make suggestions about improving CI security as well as collect, analyze, and disseminate security related information to utilities throughout the state in partnership with the MIAC.

Utilities regulated by the PSC are granted certificates to solely operate in a specific area in exchange for Commission oversight on costs, investments

and rates. The Commission develops rules in accordance with state statutes to ensure safe and reliable utility services at just and reasonable rates. In today's computerized environment, 'safe and reliable' services require strong cyber and physical security measures. Physical or cyber penetrations or disruptions can lead to loss of critical services or loss of customer data to unauthorized persons.

While the Commission does not have direct regulatory oversight of all utilities in the State, the Commission does regulate the operational safety of the state's rural electric cooperatives and municipally owned natural gas utilities. The Commission has a good working relationship with the non-regulated utilities and is exploring methods to coordinate with regulated and non-regulated utilities on security issues.

WHAT IS THE PSC'S RELATIONSHIP WITH THE MIAC AND SEMA?

The Missouri Information Analysis Center (MIAC) is a public safety partnership between local, state and federal agencies, as well as private sector members.



The purpose of the MIAC is to gather, analyze, and disseminate information in a timely and effective manner. Reports of suspicious activities inside and outside of Missouri are analyzed to determine their effect on the safety of Missouri citizens and infrastructure. The MIAC is a two-way communication link between partner organizations to enhance the safety and security of our community. The CISE will be working directly with the MIAC and will be the bridge between the information available at the MIAC and Missouri utilities.

The PSC also works with the State Emergency Management Agency (SEMA) to carry out the mission to protect the lives and property of all Missourians. SEMA responds to both natural disasters and those caused by man. It is also responsible for developing State Emergency Operations Plans and putting those plans into action when a disaster strikes. Coordination of local, state and federal agencies during a disaster is the backbone of these emergency plans. SEMA has various Emergency Support Functions (ESFs) that coordinate efforts to respond to emergencies and natural disasters. The PSC actively participates in the ESFs for energy, communications and to a lesser degree, water

and sewer. In this role, the PSC serves as a liaison between the utilities and SEMA, answers questions and works with the utilities on such things as response and restoration times, and addressing utility needs of critical functions such as those required by hospitals. The PSC also participates in periodic mock emergency exercises.

WHAT IS THE ROAD FORWARD FOR THE PSC AND CRITICAL INFRASTRUCTURE SECURITY?

The PSC is committed to its mission of ensuring safe and reliable utility services at just and

reasonable rates to Missourians. The CISE will be enhancing the safety component of the Commission's mission by helping Missouri utilities improve both their physical and cyber security. Through the new relationship with the MIAC, the CISE will be enabling dissemination of pertinent security information to Missouri utilities thereby enhancing reliability. Along with the continuing relationship with SEMA, these are positive steps to furthering safe and reliable service to Missouri citizens.



CONSUMER SERVICES UNIT:

If you have a complaint or question regarding the utility services you receive, you are encouraged to contact your utility provider to see if it can work out a resolution to the issue. If you can't get the issue resolved, call the Consumer Services Unit (CSU) of the Missouri Public Service Commission (MPSC or Commission). Each year, CSU handles thousands of calls and written contacts regarding various utility issues.

In 2016, the Commission received over 10,000 customer-related contacts including complaints, inquiries regarding rules and regulations, information requests, non-jurisdictional requests and public comments related to pending utility cases. Often, CSU receives calls and letters regarding billing and service related issues.

CSU's primary focus is to ensure that Commission rules, regulations and Commission-approved tariffs are being followed by the regulated utilities and that the utility companies are applying them to customers in a just and reasonable manner.

Each telephone call received within the CSU is recorded with several being monitored on a monthly basis for quality purposes. In an effort to further monitor quality of service, CSU conducted a customer service survey in June 2016. This mail survey was designed to help determine consumer perception of the services provided by the CSU.

Customers were asked various multiple choice questions including: how they learned about the MPSC; handling time of issues; politeness of CSU staff; satisfaction with findings on issues; CSU staff

knowledge; and overall satisfaction with the service(s) provided. The survey also provided space for any additional comments the consumer would like to provide.

According to the survey results, a majority of the customers indicated they contacted the MPSC based upon information received from the Internet, utility company or legislative contact.

CSU is not only charged with making sure regulated utilities are in compliance with Commission rules, regulations and tariffs but to also provide consumer education. CSU Staff are often called upon to explain difficult and complex utility issues in a manner that can be easily understood.

CSU Staff can investigate an inquiry or dispute regarding rates, charges, service installations or disconnection of service, deposits, billed line items, quality of service, utility refusal to provide service as well as compliance of a utility's policies and procedures with Commission rules and regulations.

CSU Staff can also provide additional information to customers related to energy assistance and consumer fraud involving utility rates. However, the MPSC and CSU do not regulate and cannot handle disputes regarding cellphones, Internet providers, cable television rates or service, trash pick-up service, retail telecommunications services, or rates of municipally-owned utilities, rural electric cooperatives or public water and sewer districts.

If you have a question or are uncertain about an issue or topic, it is always best to ask. If we are not able to help you, we will try to direct you to the person or agency that may be able to answer your question(s). We look forward to serving you.



HOW TO CONTACT THE CONSUMER SERVICES UNIT

Missouri Public Service Commission
P.O. Box 360, Jefferson City, Missouri 65102
ATTN: Consumer Services Unit
1-800-392-4211 or email pscinfo@psc.mo.gov

MAKING A DIFFERENCE

What consumers are saying

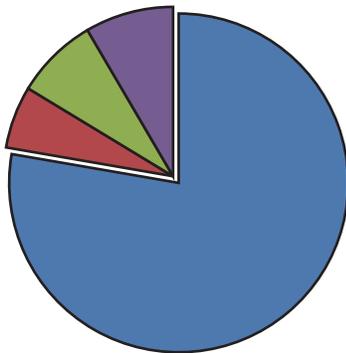
Of those customers who responded to the survey:

93% felt their matter was handled by CSU in a very timely manner.

98% stated that the person they talked to was very polite.

74% stated that they were either very satisfied or satisfied with their complaint resolution. The remaining 26% indicated they were not satisfied because the Missouri Public Service Commission did not have jurisdiction over their particular issue.

FY2016 SAVINGS
\$382,529



■ \$30,204	1st Qtr
■ \$32,268	2nd Qtr
■ \$297,292	3rd Qtr
■ \$22,765	4th Qtr

100% felt that the CSU representative understood their complaint or questions very well and that they would contact the MPSC again if they experience another problem or have additional problems.

93% felt that their complaint or question was handled thoroughly.

62% responded that they felt their complaint or questions were resolved in their favor.

93% stated that they would rate the overall service they received as excellent or good.

CONSUMER SERVICES UNIT
Betsy Huhn, Consumer Services Specialist II,
assists a caller with questions.





Summer **ENERGY SAVING** Tips

COOLING SYSTEMS

- Don't move the thermostat up or down throughout the day as this will waste energy and money.
- Make sure furniture and draperies are not blocking cooling outlets. Blocked outlets restrict air circulation, overwork the cooling equipment and increase operating costs.
- Use ceiling fans to assist in cooling. In the summer, blades should rotate counter-clockwise when viewed from below.
- Make sure your air conditioner filter is clean and replace filters as needed. Also consider letting a professional tune-up your air conditioner to maximize its efficiency.

LIVING AREAS

- Close off rooms that are not used directly for cooling, so rooms most used by the household will remain cool.
- Caulk and weather strip doors and windows that leak air.
- Adding insulation and sealing air leaks will help keep the cool air inside.
- Close drapes, shades and blinds during the day to keep the sunlight from heating up your home.
- Take short showers instead of baths.
- Turn off lights when they are not needed.
- Turn off computers, monitors, printers and televisions during periods of non-use. These devices use energy even when in stand-by mode.

KITCHEN / LAUNDRY AREAS

- Vacuum the coils of your refrigerator and check for frost buildup in refrigerators and freezers which causes an appliance to work harder.
- Shift the use of heat-producing and major appliances such as ovens, dishwashers, clothes dryers and irons from mid-day to early in the morning or later at night when possible.
- Try to wash full loads in the dishwasher, and use the short cycle.
- Use your microwave, toaster oven, slow cooker, broiler oven or other energy saving appliances for cooking food.
- Turn down the temperature on your water heater to 115 degrees.
- Cover pans when cooking on a stove top and use exhaust fans periodically, as required, to reduce indoor humidity.
- Avoid using extension cords with appliances because they cut the efficiency of the appliance.
- Wash clothes in cold water with a cold water detergent. Wash full loads of laundry for maximum efficiency.

BEFORE YOU DIG

Call 811 or 800-DIG-RITE (344-7483) — *it's the law*

1

Missouri law

requires that any person excavating or digging must notify all underground facility owner(s) that may be affected. You can do this by calling the Missouri One Call System, which will notify the facility owner(s) for you.

2

Contact Missouri One Call at 811 or 800-DIG-RITE (344-7483)

between 3 and 10 working days before any digging starts, except in case of an emergency.

3

The Missouri One Call System

will notify the facility owner(s) who will determine if the planned dig is near any underground facilities.

4

The facility owner(s)

will mark the site using paint, stakes or flags, according to specific guidelines and color codes.

5

Do not begin digging

until all of the utilities in the area have been located and marked.

6

Carefully avoid digging

near any of the flags or marks placed by the facility owner(s). If underground facilities are damaged, you could create a dangerous situation and you may be required to pay for the damage you cause.



Know what's below.
Call before you dig.

According to a 2015 *Common Ground Alliance* report, damage to underground utility lines can be avoided 99% of the time by calling 811 before digging.

E • M • P • L • O • Y • E • E

SPOTLIGHT

Adam McKinnie
Chief Regulatory Economist
PSC Regulatory Analysis Department

What are your main job duties?

I collaborate with Commissioners and staff on federal electric issues. Primarily, I work on how Missouri electric utilities buy and sell electricity, and build and pay for projects planned by Regional Transmission Organizations (RTOs). I represent the Commission at meetings and work with Commissioners and staff from other states around the Midwest to ensure Missouri utilities and ratepayers benefit from Missouri utilities belonging to RTOs.

What did you do before working at the PSC?

I had a lot of interesting jobs and adventures before I started working at the PSC in 2002. I graded fifth grade language proficiency essays, studied to be a high school English teacher, and packed food for Boy Scouts to take out on the trail at Philmont Boy Scout Ranch in Cimarron, New Mexico. Not all at the same time, of course.

Why did you choose to work at the PSC?

I was looking for jobs that took a Master's Degree in Economics after I finished my graduate work at the University of Illinois. My grandfather had worked for the government in soil conservation jobs and both of my parents have worked for Southwestern Bell, so a job involving utilities and working for the government seemed like a natural fit to me.

What is the most interesting thing about your job?

I think it is the people I get to work with from outside the state of Missouri.

While I benefit highly from my colleagues in Jefferson City, I often work with staff from other state commissions, as well as RTO employees, representatives from utilities and other stakeholders. I've met a lot of wonderful, intelligent people since I started this role in 2008, and I sometimes spend more time with them than my coworkers in Jefferson City.

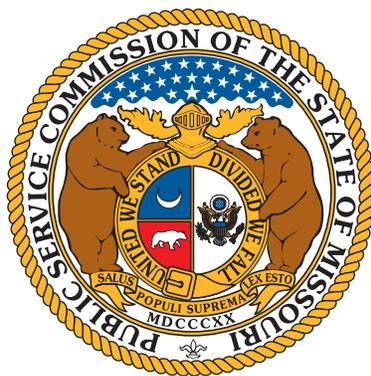
... I work with other states to “ensure Missouri utilities and ratepayers benefit from Missouri utilities belonging to RTOs”.

What is one thing people do not know about you?

I'm currently the 54th ranked pinball player in the world by the International Flipper Pinball Association. I travel around the country, and occasionally to other countries, to compete in pinball events. Along with many of my friends in the region, we host pinball events in Columbia. People from the state of Missouri and neighboring states come to Columbia to compete.



Adam McKinnie



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or call 1-800-392-4211

