



Sho-Me Power  
Electric Cooperative

A Touchstone Energy® Cooperative 



# POWERFUL TOGETHER

ANNUAL REPORT 2022

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# Our Mission

*Sho-Me Power and its employees are dedicated to providing safe, reliable, low cost power and communication services to the members we serve which improves the quality of life for their members.*

## About Sho-Me Power

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### Structure

The Missouri Cooperative Structure consists of four levels: Generation, Transmission, Distribution and the ultimate consumer, or member. The Generation Cooperative creates the power, the Transmission Cooperative delivers the power to a distribution substation, and the Distribution Cooperative then provides the power to the member-owner for final use.

The rural residents of Missouri came together in the 1930's to form local distribution cooperatives. Transmission cooperatives like Sho-Me Power were formed by their distribution cooperative owners in the 1940's to connect to various power sources. In the 1960's the transmission cooperatives banded together to create a generation cooperative, Associated Electric Cooperative, Inc. (AECI).

### Organization

The predecessors of Sho-Me Power Electric Cooperative were Sho-Me Power Cooperative, formed in 1941 as an agriculture cooperative, followed by Sho-Me Power Corporation, incorporated in 1947 as a public utility. This corporate entity, fully regulated by the Missouri Public Service Commission (MoPSC), provided wholesale electric service to its nine-member distribution cooperatives as well as retail electric service to many communities until 1984, when the remaining facilities serving retail consumers were sold to four rural electric cooperatives (REC). In 1992 the Missouri Secretary of State allowed Sho-Me Power to be converted pursuant to the provisions of the Rural Electric Cooperative Act, Chapter 394, specifically §394.070 of the Revised Statutes of Missouri, 1989, as amended, and since February 27, 1992, the name has been Sho-Me Power Electric Cooperative. In September 1993 the MoPSC released Sho-Me Power from its rate regulation, leaving it free to be regulated by its nine REC member-owners.

**Sho-Me Power, a  
Generation and  
Transmission type  
Electric Cooperative,  
serves nine distribution  
cooperatives across  
26 counties in south-  
central Missouri .**



## Transmission

Sho-Me Power provides service to 158 delivery points served by 156 distribution and transmission substations through 1,044 miles of 69 kV, 11 miles of 138 kV, and 419 miles of 161 kV electrical transmission line. Additionally, Sho-Me operates and maintains 139 miles of 161 kV transmission line owned by Central Electric Cooperative, headquartered in Jefferson City, Missouri, and approximately 228 miles of 345 kV line and three 345/161 kV substations with a combined capacity of 1,440,000 kVA owned by AECl, headquartered in Springfield, Missouri.

## Power Supply

The Little Niangua hydroelectric project, completed in 1930, continues to provide Sho-Me Power with 3 mW of river-run power, but today that accounts for less than 1% of its energy requirements. The balance of Sho-Me's power needs are provided through an all-requirements contract with AECl that extends through May, 2050.

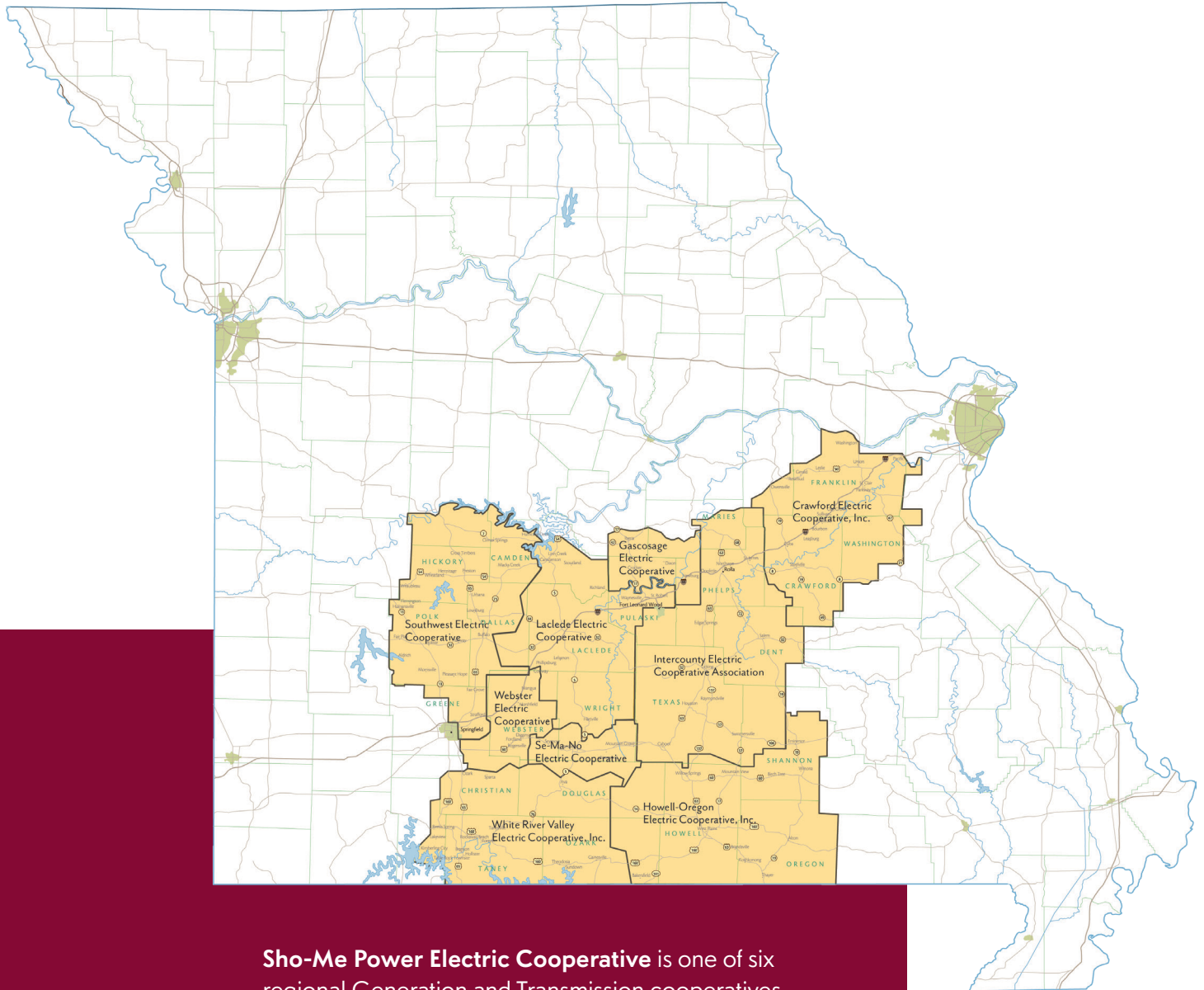
## Sho-Me Technologies

Sho-Me Technologies, L.L.C. is a subsidiary of Sho-Me Power Electric Cooperative which was formed in 1997 to operate an advanced optical network providing state of the art communications services to the rural electric members and beyond.

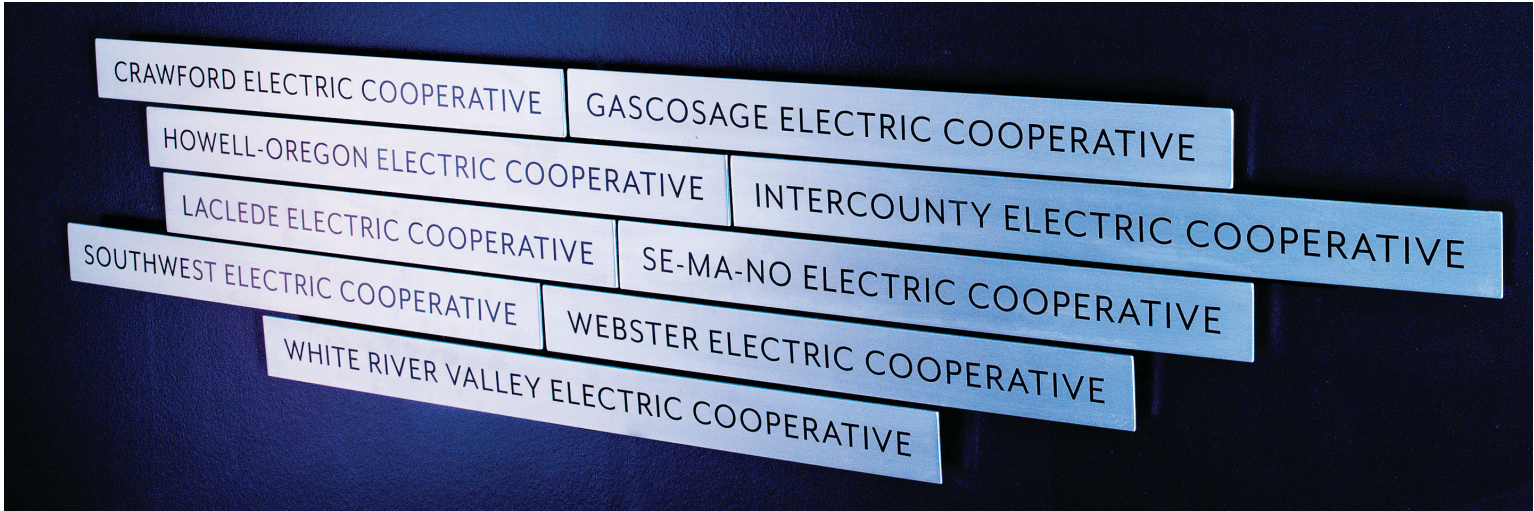
Today, Sho-Me Technologies' optical network covers most of Missouri, crossing major rivers and spanning the region both in the air and underground. What began as an upgrade to the extensive internal communications network has now grown to encompass over 8,000 miles of fiber optic connectivity. With 138 communities served, Sho-Me Technologies boasts the highest coverage of optical bandwidth to rural Missouri.

Sho-Me Power is an equal opportunity provider and employer.

## Where We Serve



**Sho-Me Power Electric Cooperative** is one of six regional Generation and Transmission cooperatives which make up the transmission tier in Missouri. Serving nine members, Sho-Me provides power for 170,300 ultimate meters from 158 delivery points via 1,841 miles of energized transmission line.



**9**  
Member  
Cooperatives



**26**  
Counties  
Served



**170,300**  
Ultimate  
Members



# Our Board of Directors

## **Standing - Left to Right**

Dan Singletary, *Howell-Oregon*; Chris Hamon, *White River*; Marc Roecker, *Laclede*; Tom Houston, *Webster*; James Cottrell, *Crawford*

## **Seated - Left to Right**

John Campbell, *Se-Ma-No*; Matt Duncan, *Intercounty*; Carmen Hartwell, *Gasco-sage*; Jack Bybee, *Southwest*





**Tony Mallory**  
CEO/General Manager  
Crawford Electric Cooperative, Inc.



**Carmen Hartwell**  
CEO/General Manager  
Gascosage Electric Cooperative



**Dan Singletary**  
CEO/General Manager  
Howell-Oregon Electric  
Cooperative, Inc.



**Doug Lane**  
CEO/General Manager  
Intercounty Electric Cooperative  
Association



**Marc Roecker**  
CEO/General Manager  
Laclede Electric Cooperative



**Dan Sisco**  
General Manager  
Se-Ma-No Electric Cooperative



**James Ashworth**  
CEO/General Manager  
Southwest Electric Cooperative



**Tom Houston**  
General Manager  
Webster Electric Cooperative



**Chris Hamon**  
CEO  
White River Valley Electric  
Cooperative, Inc.



**John Richards**  
Chief Executive Officer  
& General Manager

*"Teamwork is the ability to work together toward a common vision. It is the fuel that allows common people to attain uncommon results"*

**Andrew Carnegie**

# Our Leadership Team



**Cindy Keeler**  
Executive & HR Assistant



**Chris Bolick**  
Chief Operating Officer



**Peter Dawson**  
Chief Compliance Officer



**Rebecca Gunn**  
Human Resource Director



**Micah Johnson**  
Chief Information Officer



**Kari Harles**  
Chief Telecommunications  
Officer



**Erica Lafferty**  
Chief Financial Officer



**Tim Lewis**  
Member Service & Corporate  
Communications Director

# Message to Our Members

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**Powerful Together.** When asked about the motivation to use this phrase as our theme for this year's Annual Report, the response was that it was not just a theme, but it really is our lifestyle at Sho-Me Power and our subsidiary, Sho-Me Technologies, to encourage and support an attitude of **Powerful Together** with our member distribution cooperatives, our Class B member Fort Leonard Wood, Associated Electric Cooperative, Inc. ("AECI"), our power supply cooperative, and the five other transmission owners of AECI.

2022 was a year of successes, however some might question our definition of success, if their interpretation is limited to the Net Margins summarized in our Annual Report's 5 Year Financial Review. We shared in the success of AECI being able to cope with unexpectedly losing the use of their largest generating unit for much of the year and their ability to adapt to another record-setting hot weather event in June plus a cold weather event in December. While no emergency rate increases were required of Sho-Me from AECI, nor required of our members from Sho-Me, AECI's margins were much lower than planned, and consequently Sho-Me's share of those margins was less than budgeted. Our most critical financial metrics that we must achieve to satisfy our indenture were well above the minimum requirements, even as we established all-time summer & winter electrical peak demand records.

Sho-Me Power and its member cooperatives have been **Powerful Together** to solve electrical operations challenges for parts of nine decades. This year's Annual Report emphasizes some additional activities that have benefited from Sho-Me and our members being **Powerful Together**. Some of the items discussed are not new coordinated activities (such as our electrical safety and training programs presented to elementary and secondary students and telecommunications support), but there are some very new efforts (such as Cyber Dome and a Call Center to assist in security monitoring and broadband support), while other services that have been provided in the past have expanded those historical support activities (substation safety training to member employees, two-way radio support, upgrading member security systems and enhanced SCADA monitoring available to member offices).

Sho-Me Power, AECI and all of our Member Cooperatives and Fort Leonard Wood have been **Powerful Together** to provide the ultimate consumer a safe, reliable and economical electrical service, and through our telecommunications subsidiaries we provide unique services to our electrical footprint and beyond.

*"Coming together is a beginning;  
keeping together is progress;  
working together is success."*

**Edward Everett Hale**



2022 marked the completion of another successful year being **Powerful Together** to enhance the living experience of all our member cooperatives' member-owners. **Powerful Together** has become a habit that should be hard to break, as we all realize how so much more can be accomplished by being **Powerful Together** instead of trying to perform everything needed alone.

As your President that has had the privilege of holding this office for the last two years, and your CEO & General Manager, we say thank you for the dedicated service of our Board of Directors and the excellent performance of our employees, in helping to contribute to a great year in 2022, and the opportunity to serve the needs of our members even better in the decades to come.

*Carmen Hartwell*

Carmen Hartwell  
President

*John Richards*

John Richards  
CEO/General Manager

## Facts & Figures

Electric Revenues in 2022 totaled \$187.4 million and were significantly above the budgeted amount of \$185 million due to electric sales. All-time high peak demands in December 2022 resulted in higher than anticipated energy sales for the year. These peak demands in December 2022 also increased Purchased Power costs. Other contributing factors to the increase in Sho-Me Power's 2022 bottom line were higher than anticipated primary facility credits, lower than anticipated Administrative and General expenses, and lower than anticipated Transmission maintenance expenses.

Telecommunications Revenue in 2022 was under budget. The actual 2022 revenue was \$37.1 million compared to the budget of \$38.1 million. A decrease in End User Revenue was the main driver of the decline. While revenues were down, so too were Operating Expenses as Sho-Me Technologies paid less in Access Fees than anticipated and fewer General and Administrative labor hours were charged to Sho-Me Technologies than anticipated in 2022.

2022 ended with consolidated Net Margins of \$55,913. The 2022 Net Margins were much lower than the budgeted Net Margins of \$4.6 million. Lower Net

Margins were primarily due to lower than anticipated patronage allocations from Associated Electric Cooperative, Inc. The final 2022 Patronage Allocation from AECEI was \$4.1 million. The allocation was budgeted to be \$8.3 million.

At the end of 2022, total assets on a consolidated basis were \$485.8 million and the consolidated equity ratio was solid at 43.17%. Approximately \$18 million of plant additions were capitalized on the consolidated books of Sho-Me Power and Sho-Me Technologies during the year. At the end of 2022, \$4.8 million of deferred revenue remained of 2020's original \$6.2 million deferral. \$1.4 million of the deferred revenue was recognized in 2022.

Overall, 2022 was another financially successful year for Sho-Me Power and Sho-Me Technologies as the companies continue to focus on providing safe, reliable, low cost power and communications services to the members they serve. As a result, at year-end 2022, Sho-Me Power is pleased to report that the financial performance met Sho-Me's indenture requirements.



# \$187.4

Million in Operating  
Revenue



# \$485.8

Million in Consolidated  
Assets



# 43.17%

Consolidated Equity  
Ratio



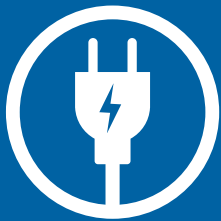
**\$6.9**

Million Capital Credit  
Retirements to Member-Owners



**5.103¢**

Per Kilowatt-Hour to  
Member-Owners



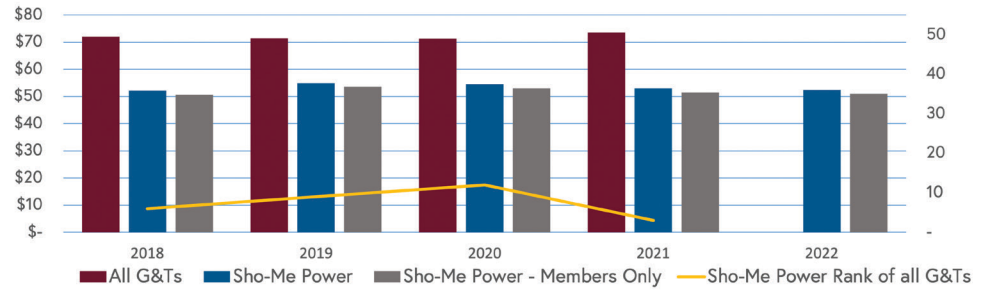
**3.4**

Billion Kilowatt-Hours Sold

Price per  
MWh

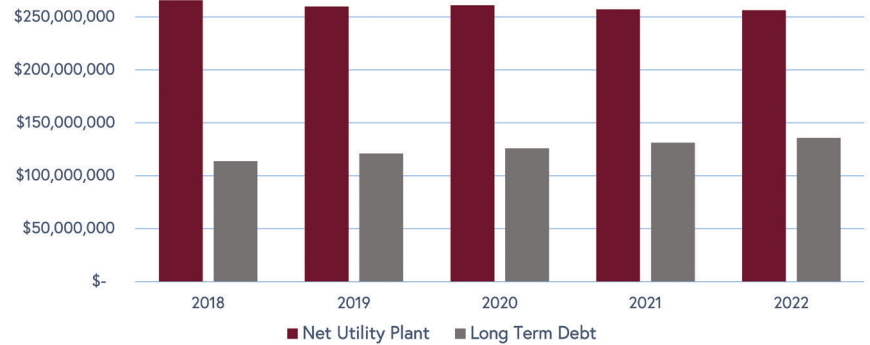
### Average Rate per mWh

Total  
number  
of G&Ts

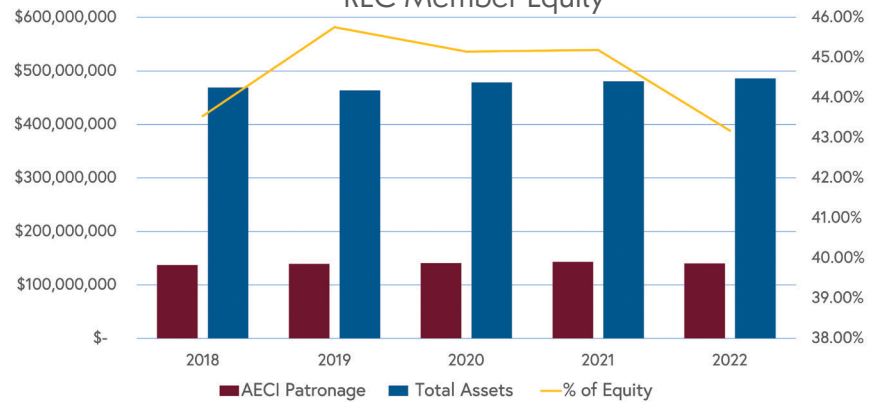


Information provided by G&T Accounting and Finance Association  
\*2022 G&T information not yet available

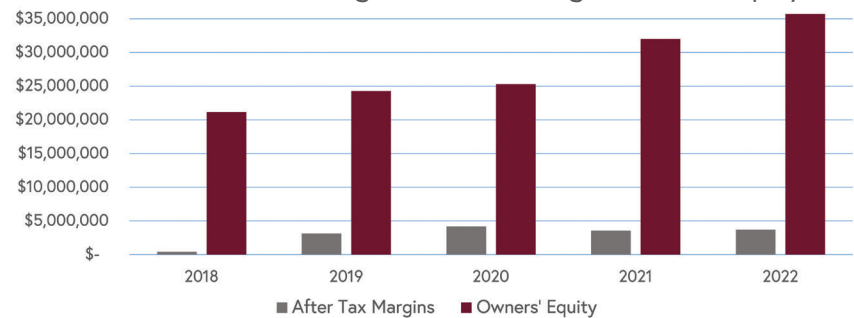
### Net Utility & Long Term Debt



### REC Member Equity



### Sho-Me Technologies Annual Margins & Total Equity



Consolidated Summary of Operations	2018	2019	2020	2021	2022
<b>Operating Revenue:</b>					
Electric Revenue	\$ 190,613	\$ 185,134	\$ 171,836	\$ 176,952	\$ 187,429
Telecom Revenue	34,564	35,135	36,119	37,355	37,106
<b>Total Operating Revenue</b>	<b>225,177</b>	<b>220,269</b>	<b>207,955</b>	<b>214,307</b>	<b>224,535</b>
<b>Operating Expenses:</b>					
Purchased Power, Net of Pooling Credits	157,128	145,772	137,734	143,657	151,687
Other Operating Expenses	73,350	72,868	72,158	74,481	77,990
<b>Total Operating Expenses</b>	<b>230,478</b>	<b>218,640</b>	<b>209,892</b>	<b>218,138</b>	<b>229,677</b>
<b>Operating Margins</b>	<b>(5,301)</b>	<b>1,629</b>	<b>(1,937)</b>	<b>(3,831)</b>	<b>(5,142)</b>
<b>Non-Operating Margins</b>	<b>2,095</b>	<b>2,080</b>	<b>1,348</b>	<b>1,119</b>	<b>1,076</b>
<b>Margins Before G&amp;T Capital Credits</b>	<b>(3,206)</b>	<b>3,709</b>	<b>(589)</b>	<b>(2,712)</b>	<b>(4,066)</b>
G&T Capital Credits	8,871	8,337	8,560	8,591	4,088
<b>Margins Before Income Taxes</b>	<b>5,665</b>	<b>12,046</b>	<b>7,971</b>	<b>5,879</b>	<b>22</b>
Income Tax Expense	179	(1,808)	(2,529)	(2,001)	(34)
<b>Net Margins</b>	<b>\$ 5,486</b>	<b>\$ 13,854</b>	<b>\$ 10,500</b>	<b>\$ 7,880</b>	<b>\$ 56</b>

Consolidated Balance Sheet Summary	2018	2019	2020	2021	2022
<b>Assets</b>					
Net Utility Plant	\$ 265,917	\$ 259,980	\$ 261,063	\$ 257,310	\$ 256,427
Investments	158,038	159,897	177,215	179,593	176,289
Other Assets	45,164	43,764	40,260	43,615	53,110
<b>Total Assets</b>	<b>\$ 469,119</b>	<b>\$ 463,641</b>	<b>\$ 478,538</b>	<b>\$ 480,518</b>	<b>\$ 485,826</b>
<b>Liabilities and Equity</b>					
Members' Equity	\$ 204,252	\$ 212,144	\$ 216,054	\$ 217,082	\$ 209,750
Long Term Debt	113,853	120,980	125,936	131,149	135,666
Other Liabilities	151,014	130,517	136,548	132,287	140,410
<b>Total Liabilities and Equity</b>	<b>\$ 469,119</b>	<b>\$ 463,641</b>	<b>\$ 478,538</b>	<b>\$ 480,518</b>	<b>\$ 485,826</b>



Consolidated Cash Flow Summary	2018	2019	2020	2021	2022
<b>Net Cash</b>					
Provided By Operating Activities	\$ 2,062	\$ 26,790	\$ 28,591	\$ 18,213	\$ 17,845
Used In Investing Activities	(12,510)	(6,874)	(29,500)	(10,481)	(13,809)
Provided By (Used In) Financing Activities	11,308	(18,067)	(105)	(1,104)	(3,149)
<b>Net Increase (Decrease) In Cash and Cash Equivalents</b>	860	1,849	(1,014)	6,628	887
<b>Cash and Cash Equivalents At Beginning of Year</b>	435	1,295	3,144	2,130	8,758
<b>Cash and Cash Equivalents At End of Year</b>	\$ 1,295	\$ 3,144	\$ 2,130	\$ 8,758	\$ 9,645

Additional Information	2018	2019	2020	2021	2022
<b>Margins for Interest - MFI (Required 1.10)*</b>	1.64	3.25	2.40	1.97	1.65
<b>Debt Service Coverage - DSC (Required 1.00)*</b>	1.96	3.75	3.61	3.70	2.86
<b>Energy Sales - MWh</b>					
Member REC Sales	3,066,455	2,948,336	2,859,040	2,928,591	3,131,789
Other	254,388	252,139	246,148	244,957	243,102
<b>Total Energy Sales</b>	3,320,843	3,200,475	3,105,188	3,173,548	3,374,891
<b>Systems Peaks - MW</b>					
Winter	874	783	751	943	994
Summer	659	643	633	658	712

All dollars in thousands

Year ending December 31st, 2022

\* Ratios are calculated per Sho-Me Power's Indenture Requirements

# NEW CHIEF FINANCIAL OFFICER

## Erica Lafferty



Erica Lafferty was promoted to the position of Chief Financial Officer (CFO) in December 2022, following the retirement of Denise Stevens, who had been the CFO at Sho-Me since 2016.

Erica graduated from Missouri State University (MSU) in 2005 with a Bachelor of Science degree in Accounting and received her Master of Accountancy from MSU in 2007.

Erica's career began with Abacus CPAs in 2005 while a student, and upon graduation was hired full-time as a Staff Accountant. She joined Sho-Me Power in 2008 as Property Accountant and became a Certified Public

Accountant registered in the state of Missouri in 2009. Erica held a few titles within the Finance & Administration Division before being promoted to Controller/Risk Manager in 2016 and then CFO.

As CFO, Erica oversees the Finance & Administration Division which includes: Finance, Physical Security, Purchasing, Facilities, Vehicle Maintenance, and Warehousing. Erica completed the NRECA Robert I. Kabat Management Internship Program in 2021. She is currently involved in the national G&T Accounting & Finance Association and is a member of the Missouri Society of CPAs.

# 2022 ANNUAL REPORT

## Powerful Together

Welcome to our 2022 Annual Report and thank you for taking time to read and learn about Sho-Me, what we have accomplished over the past 12 months, and how we accomplish the things we do.

**Powerful Together** is all about looking at the ways in which we work together as a team at Sho-Me while also working together with our Member Cooperatives to do great things.

Aristotle is given credit for the phrase “The whole is greater than the sum of the parts”, but the quote is more accurately translated to “In the case of all things which have several parts and in which the totality is not, as it were, a mere heap, but the whole is something besides the parts...” Both quotes describe the concept of **Powerful Together**. As a team, we can accomplish more than we can by ourselves. This is the spirit in which cooperatives work, and in this report, we hope to share some of the projects we have accomplished for our members and with our members.



Sho-Me Power hosted the G&T Transmission Lineman School in 2022. The group of linemen attending the conference watch a demonstration of a crossarm change-out by Dylan Stafford using a LineWise Triple Line Lifter provided by BBC Electrical Services, Inc.

# Safe Together

**S**afety is one aspect Sho-Me Power focused on extensively in 2022 while working with its members.

Annually, Sho-Me hosts a District V Safety Round Table to share best safety and compliance practices utilized amongst Sho-Me and its members. Five member cooperatives sent representatives to this year's round table. During the sessions, Sho-Me presented an overview of EHS Insight Modules, the software Sho-Me utilizes for incident root cause analysis, training, and corrective/preventative action. Also presented were vehicle incident preventability review practices as guided by the National Safety Council and a detailed process of developing tailored job briefings. To supplement those discussions, Russ Weatherly from AECl demonstrated Noise Monitoring best practices.

Sho-Me personnel provided several safety programs to members during the year, one example being a Substation Safety event with Crawford Electric Cooperative. Twenty-six people attended this event, where Sho-Me personnel reviewed safety protocols when entering, occupying, and leaving substations. Information was delivered regarding substation equipment operation, highlighting procedures for bypassing oil circuit reclosers (OCR) due to OCR failure. This training encompassed every aspect of the process, from explaining the various controls on the OCR to safely bypassing the OCR in the substation, including safety tips for working on a single feeder in the field.

Another example of a safety presentation was Confined Spaces and Rescue with Laclede Electric Cooperative. Provided at Laclede's Waynesville office, this training covered classifying confined spaces when hazards are present. Specifications



**Safety & Training  
Coordinator  
Timothy Graham  
oversees Laclede  
Electric personnel  
practicing confined  
space training.**

were discussed for utilizing a gas monitoring meter, covering the specific model in use and the pertinent roles of entrant, attendant, and supervisor. The importance of assuring a rescue plan is in place prior to entry was also thoroughly covered. The training culminated in a demonstration of a confined space rescue at a Fort Leonard Wood manhole site, where the topic of discussion shifted to atmospheric and other hazards that can classify a confined space as a permit-required space. The twenty-two participants in attendance practiced ventilating the manhole and lifting a rescue manikin out of the manhole using a confined space hoist.

**A**t the end of 2022, Sho-Me Technologies provided 601 circuits, or 12% of the 5077 total circuits on the Sho-Me Technologies network, for our member distribution cooperatives. These circuits consisted of corporate data, SCADA data, Internet, voice connections, remote radio circuits, and more. Sho-Me Technologies provides remote connection via their fiber network to 22 two-way radio base stations for members. These remote base stations allow the member cooperatives to increase radio coverage across their systems.

### Improved Two-Way Radio Coverage

Sho-Me Technologies personnel worked with White River Valley Electric and Howell-Oregon Electric to improve two-way radio coverage. White River needed to increase coverage in the eastern part of their service area, and they chose the Protem and Tecumseh substations as locations for their radios. At Protem, White River technicians installed a vault and cabinet at Sho-Me's monopole tower near the substation, and Sho-Me Technologies technicians ran fiber to the cabinet for equipment connectivity. At Tecumseh, White River located on the tower that was formerly used by Howell-Oregon for one of their remote radios, and Howell-Oregon moved their radio to a Conservation Department fire tower near Tecumseh, also served by Sho-Me fiber. In the cooperative spirit, Howell-Oregon agreed to let White River use their existing coaxial cable on the tower, and the result was better radio coverage for both cooperatives.

### Upgrade of Internet Backbone Routers

Prior to 2010, Sho-Me Technologies referred clients requesting Internet Access to its customers who were Internet Service Providers (ISPs), but in 2010 Sho-Me Technologies began offering Dedicated Internet

Access (DIA) to end customers. The internet source for Sho-Me Tech's DIA product offering was provided by Cogent, a single Tier 1 ISP in St. Louis. A Tier 1 ISP is a large provider of Internet that is peered, or connected, with every other Tier 1 ISP in the world, creating the backbone for the World Wide Web.



**Juniper MX 100003 Router and accompanying QFX5120 ethernet switch located in the Marshfield NOC.**

As Sho-Me Tech's DIA service grew over the next three years, so too did customers' dependency on it. Reliance on a single Tier 1 ISP had become a concern. In 2013, network routing equipment, referred to as a backbone router, was purchased to create a network topology that would support a second Tier 1 ISP and provide upstream redundancy. This backbone router connected multiple networks together and efficiently routed data traffic across those networks. An additional Tier 1 Internet connection to Hurricane Electric in Kansas City was established to a new backbone router in the Marshfield Network Operation Center (NOC), and the Cogent connection was rehomed to a new backbone router at Seymour, providing more network redundancy. At that point, Sho-Me Tech's DIA network was dual-homed to two different Tier 1 ISPs in different cities and routed to two different backbone routers.

In 2017, a third backbone router was added in Jefferson City to alleviate network congestion. As Internet connectivity grew worldwide, more “horsepower” was needed in routing equipment. The three backbone routers were upgraded in 2019 to meet increasing demand, and new DIA routing locations were added at St. Louis, Oxy, and Cape Girardeau to further reduce network congestion.

A decade after DIA was introduced, Sho-Me Technologies’ DIA network had grown tremendously. Not only were retail customers buying large amounts of internet service, but as highlighted in last year’s annual report, Sho-Me Technologies provided each member cooperative dual 1Gb/s DIA connections over redundant networks for their Internet needs. In 2010, Sho-Me Technologies provided around 50 megabits per second (Mb/s) of Internet service. By the end of 2022, the amount of Internet traffic had grown to over 600 gigabits per second (Gb/s). Network demand had once again placed strain on the backbone routers in Sho-Me Tech’s network. At the same time, the manufacturer of the backbone routers used by Sho-Me Tech unexpectedly announced the discontinuation of their equipment. This put Sho-Me Tech’s network designers in a position of needing to find both a replacement vendor and replacement equipment.

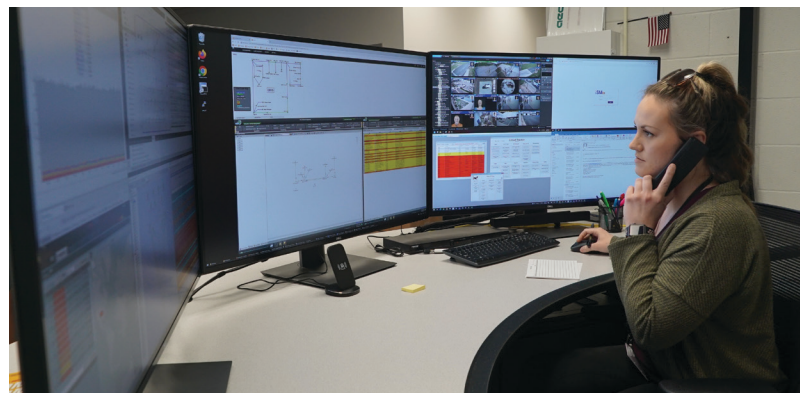
After researching vendors who offer equipment that would serve our needs for several years to come, Sho-Me Tech settled on Juniper Networks. Juniper offers backbone routing equipment capable of 2.4 terrabits per second (Tb/s) with a density of 144 10Gb/s or 24 100Gb/s interfaces. This level of horsepower would not only meet our current needs but would cover needs for the foreseeable future. In adding the Juniper equipment, the topology of the DIA network remained the same, but a new implementation allowed the topology diameter to be more easily scaled. It also added a higher level of

customer circuit protection by increasing the number and capacity of backbone delivery systems. During this conversion, upstream Internet was increased to dual 100 Gb/s at Internet Exchanges on St. Louis and Kansas City.

By the end of 2022, DIA customers had successfully migrated to the new Juniper Network routing equipment. This upgrade has provided higher reliability, greater network efficiency, scalability for the future, and improved customer service.

### Call Center Implementation

To increase the level of service for members and end customers, Sho-Me Tech began operating a call center. Located in the NOC, the call center employs three full-time representatives. In addition to providing Tier One support for Sho-Me Tech customers, this call center offers phone support for Gasco’s GTECH residential Fiber to the Home (FTTH) customers. The call center can generate trouble tickets for GTECH in their ticketing system and escalate the ticket to GTECH technicians if necessary. As the program grows to comprise a 24/7 schedule, these NOC-trained representatives will work out of the backup NOC in Seymour.

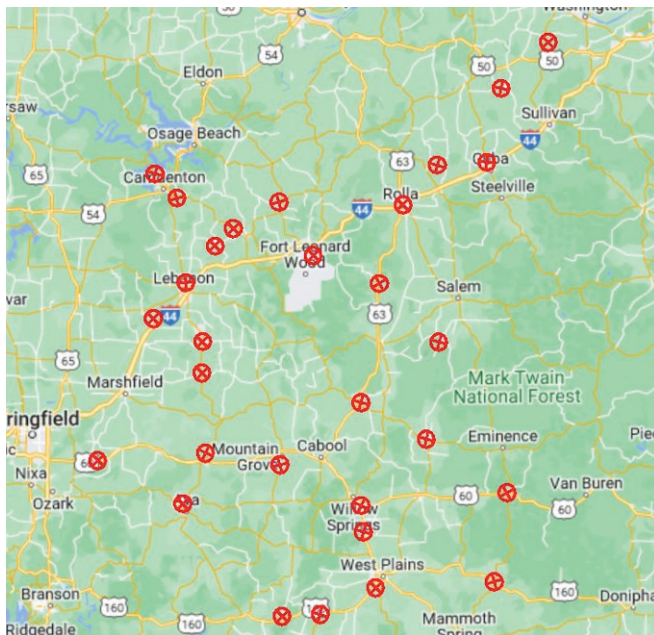


**Call Center Representative Krista Ross works the trouble desk at Sho-Me Technologies’ Network Operation Center. The Call Center is the first level of support for both Sho-Me Technologies and GTECH customers.**

As a first level of support, the call center monitors telecom alarms and security for Sho-Me Technologies. They provide after-hours monitoring of the command center, monitor member FTTH sites for unauthorized activities, and perform dig-up analysis from a location contracting service when a fiber cable is exposed or damaged. They can also provide remote access into telecommunication buildings. The call center has made the NOC more efficient by freeing up NOC Technicians to work on more advanced network issues. It also serves as a great training ground for future available technician opportunities.

### Enhanced Tower Inspections

Eighty-two communication towers across Sho-Me's system have historically been used for microwave systems to control the power system and 2-way radios. For several years, space on these towers has been leased to a few companies for their communication needs, a sort of vertical real estate. Since the installation of fiber optic



**Of the 82 towers Sho-Me currently owns, 30 were identified for “Dig to Block “ inspections for anchor grading and replacement if necessary.**

systems to all substations, the towers have become a revenue source for Sho-Me by leasing space for several different applications. Wireless Internet Service Providers, cellular companies, 2-way radio communicators, Broadcast FM radio, and Weather radio combine for tower lease income of approximately \$175,000 per year.



**A tower inspector uses a micrometer to measure an anchor to determine the extent of corrosion.**

Sho-Me's oldest tower is 64 years old, and 34 of the towers use guy wires for support, so continued inspection and maintenance is necessary for longevity and safety. A structural analysis, performed by a Professional Engineer licensed in the state of Missouri, must be conducted when a new attachment is added, or something is changed on the tower. This analysis deals with the above ground structure rather than an in-depth below-ground analysis and assumes the anchors and guy wires are operating at their potential. During regular interval tower inspections performed by a tower inspection company, it was discovered that Sho-Me has not recently performed an in-depth analysis of our guy wire anchors. The in-depth analysis is conducted in two phases,

with the first phase being a Geotechnical Analysis. Deep earth core samples are taken around the tower base and anchors, revealing what type of soils are below the tower. Soil make-up, soil frictions, soil conductivity, and acidity can help discover areas that need attention. The second phase is a Dig-to-Block inspection, exposing the guy anchor down to the concrete block used to bury the anchor. Allstate Tower from Henderson, Kentucky, was contracted to perform this service for the 30 towers identified for the Anchor Dig-to-Block inspections. Beginning in March of 2022, Allstate was able to inspect 25 of the 30 towers by the end of the year.



**17 tower anchors on the Sho-Me system have been replaced during this program, improving safety and longevity.**

During the Dig-to-Block inspections, Allstate grades the anchors to National Association of Tower Inspectors (NATE) standards by measuring cross-sectional loss and the Grade Corrosion Severity Factor (CSF) of each anchor. Anchors rated CSF 1, with galvanizing intact, no signs of rust, and no cross-sectional material loss, are marked for regular monitoring during future tower inspections. Anchors rated CSF 2, where galvanizing is compromised, rust

spots are prevalent, but no cross-section material is lost, require additional corrosion control. When an anchor is rated CSF 3, galvanizing is gone, there is heavy corrosion, deep pits or large areas of flaking are present, and there is measurable cross-sectional material loss. These anchors must be replaced. 64 anchors were identified as CSF 1 or CSF 2 during the inspection, while 17 anchors were rated CSF 3 and have been replaced.

Preventative maintenance was also performed to coat the guy anchors with an epoxy and remove dissimilar metals from the environment. Copper ground rods were replaced with galvanized ground rods. A Cathodic Protection System was also installed that uses a sacrificial anode to protect the galvanized guy anchor. This allows for base line readings via a test point. These readings will be conducted annually to see if the sacrificial anodes are active or compromised. As a result of these investigations, tower safety has been improved, the life of our tower system has been increased, we have greater inspection capability, and we have protected a financial asset.



**Aerial photograph of Clover Bottom substation showing new road construction to accommodate relocating tower anchors.**



In an ever-changing world, Information Technologies has proven to be one of the most critical aspects of day-to-day success, requiring teamwork within the cooperative network to keep us more Powerful Together. Sho-Me Power's Information Technology department is a valuable resource for our member cooperatives, providing IT infrastructure and support, IT budget planning, Cyber Dome support, hosted SCADA services, and additional services



**Crawford Electric Manager of IT Michael Cremer and Data Architect Todd Murdock of Sho-Me discuss how fault data is pushed to the Crawford IT system.**

### **Crawford Electric Field Accessible Outage Data**

During 2022, Sho-Me Power's IT department worked with Crawford Electric to enhance their field accessible outage data. When Crawford's IT department requested assistance with the project, telemetry data used to determine the location of a fault was only accessible from computers in Sho-Me or Crawford's dispatch offices. Linemen would either come into the office or rely on a dispatcher to relay the fault data. Since no personnel were in the Crawford office on weekends, field personnel needed to call Sho-Me's dispatchers to get outage information.

Using data from Supervisory Control and Data Acquisition (SCADA) systems to monitor and trouble shoot in real-time, this collaborative effort between Crawford and Sho-Me greatly reduces outage time. It is now possible for linemen to respond to outage calls directly from their location. Through remote dispatching, a dispatcher can now assess fault location data without requiring physical presence at the office. Field personnel can easily pinpoint the problem location that caused an outage to within a couple spans of line, utilizing data obtained remotely from an iPad. Because the data and infrastructure already existed, this small project did not require much of a lift from Sho-Me, but it made a big difference to Crawford's operations. Personnel from both Crawford and Sho-Me showcased this real-time monitoring at the 2022 AMEC IT Association meeting, and a request has already been made for a similar setup at another member cooperative.



**Crawford Electric Journeyman Lineman Dalton Griffin uses an iPad in the field to check outage data on the Crawford system.**

Photo credit Lori Rego

# Secure Together

The services offered by Sho-Me Power's Security Department are one of the best examples of cooperation among members to make us more Powerful Together. In utilizing Sho-Me's security services, members can avoid sales pitches, use already-vetted products, and sidestep binding contractual agreements for Preventative Maintenance Plans. With a typical next-day response time, Sho-Me's security allows members to leverage Sho-Me's Enterprise Genetec Security Platform and the Sho-Me Technologies reliable fiber network, supported by technicians and the Network Operations Center. Members enjoy the benefit of avoiding profit markup on services or materials and have accessibility to warehoused inventory. In addition, software upgrades are routinely performed when Sho-Me upgrades our system.

Photo credit Stephanie Beltz-Price



**Howell-Oregon Electric IT Network Administrator Eric Eggert and Security Systems Specialist Corben Shull from Sho-Me Power discuss coverage of the new security cameras at Howell-Oregon's headquarters in West Plains.**

## Significant Security Projects

Late in 2021, Howell-Oregon requested a physical security design encompassing the security equipment Sho-Me currently uses. After onsite walkthroughs to evaluate existing infrastructure at the Headquarters office as well as two crew facilities in Birch Tree and Couch, recommendations were made for enhancements to strengthen mitigation of incidents and risk potential while using technologies Howell-Oregon already had in place. This project was completed in 2022, with three technicians putting in a combined 441 hours to install 37 door entries, 29 cameras, and 111 alarm status points. The result for Howell-Oregon is improved access control, video management, intrusion detection, outside motion detection, fire detection, in-house dispatch operations, and manageability with Sho-Me Power support.

During the year, Sho-Me assisted Crawford Electric with rewiring security devices on mechanical gates as well as installing an interior camera and panic buttons. Gascosage Electric remodeled their headquarters, and Sho-Me provided a security design to expand their previous system as well as security technologies in their new headquarters fiber room. White River Electric installed a new video archiver on their system, and spent a considerable amount of time conferring with Sho-Me Power personnel about potential new installations and remodeling efforts. In addition to these scheduled projects, Sho-Me security personnel continued to perform preventive maintenance to methodically check every device and infrastructure, ensuring system stability cooperatively for Sho-Me and its members.

**B**eing Powerful Together sometimes takes on a different look within Sho-Me Power's Engineering and Operations group, because often the best thing we can do to assist our members is to maintain and protect our electric grid. Whether through routine upkeep or equipment upgrades, Sho-Me's personnel spent the year going above and beyond to keep the lights on.

One form of protection performed during 2022 was substation yard resurfacing. With 156 substations, and some sites over 80 years old, maintenance of the substation yard areas is crucial. The substation yard area, or the area within the security fence and 6-feet outside of the fence that contains the ground grid, is made up of gravel typically 6-inches deep. Dependent on the soil beneath the gravel and drainage around the substation, upgrades to the yard area can last more than 30 years.



**Heavy machinery seen at Ft. Leonard Wood #2 Substation yard compacting the soil in preparation for the layer of gravel to be placed.**

Due to the complex array of hardware that must be protected by the gravel, continued assessment of the yard area is crucial. Ordinarily a substation needs to be resurfaced due to construction, poor drainage, or the substation itself not providing enough slope to allow water runoff, which causes small ponding and soft spots within the substation. These conditions impede the ability to use extremely heavy equipment. When mud pushes up through substation rock, the protective layer that helps provide maximum safety during faults on the system is lost. Because Sho-Me's personnel were able to complete the yard resurfacing project, crews will find it easier to use new equipment and set heavy equipment.

### **Oil Processing Unit**

One example of heavy equipment as mentioned above is an oil processing unit. For over 100 years, mineral oil has been used in transformers to help disperse heat from the core of a transformer and prolong its life. Since the early 1990's, Sho-Me Power



**Underground conduit is just part of the infrastructure under a substation which needs to be protected.**

has performed oil processing and filtering using a trailer constructed in house. This trailer housed pumps, heaters, and filters, and was used to remove moisture and other impurities from the oil. Over the first six months of 2019, substation crews used the filter trailer in eight different locations. During the same time period, Sho-Me also rented a larger capacity filter trailer at a cost of \$80,000 to perform oil processing in some of the larger transformers.



**The new oil processing trailer in use at the Gospel Ridge substation.**

In doing a side-by-side comparison of these two trailers, it was decided that a manufactured trailer would offer several advantages. An on-board generator would power the trailer, as opposed to the Sho-Me trailer's need to be connected to a service line in the substation. The manufactured trailer had a higher capacity to process oil at 2400 gals/hour compared to 1200. It was safer to operate since a neutral connection was not required, and it provided the ability to track the amount of moisture removed from the oil.

Acquisition of an Oil Processing Unit was budgeted in 2020, but this acquisition was delayed due to the Covid-19 Pandemic and the unit was not received until October 2022. First used at Camdenton 2 in November of 2022, this unit processes quickly and removes more moisture. It offers a simplified set-up that provides a more efficient maintenance process,

and also generates data to give a clearer picture of the transformer's condition during and after processing. This data can then be used as a baseline when performing future oil processing to identify trends that might indicate transformer damage.

### Mobile Recloser Trailer

A fleet of mobile transformers allows Sho-Me Power the ability to bypass a substation transformer, but if work is required in low voltage substation bays, the mobile transformers cannot be used to adequately bypass distribution feeders. As a result, Sho-Me Power and its members spend significant labor and materials installing temporary bypass feeders while this type of work is ongoing. Once this equipment is removed, it provides no long-term benefit for members.

Sho-Me Power's solution for this problem is to install a mobile recloser trailer. This trailer will connect via cables to bypass the entire low voltage bay in a substation and allows for critical maintenance to occur without causing extensive outages to members. Mobile reclosers would also be available for emergency response restoration in the event of catastrophic failure of substation low voltage equipment. The purchase of a mobile recloser trailer has been approved, and bids will be taken in early 2023.

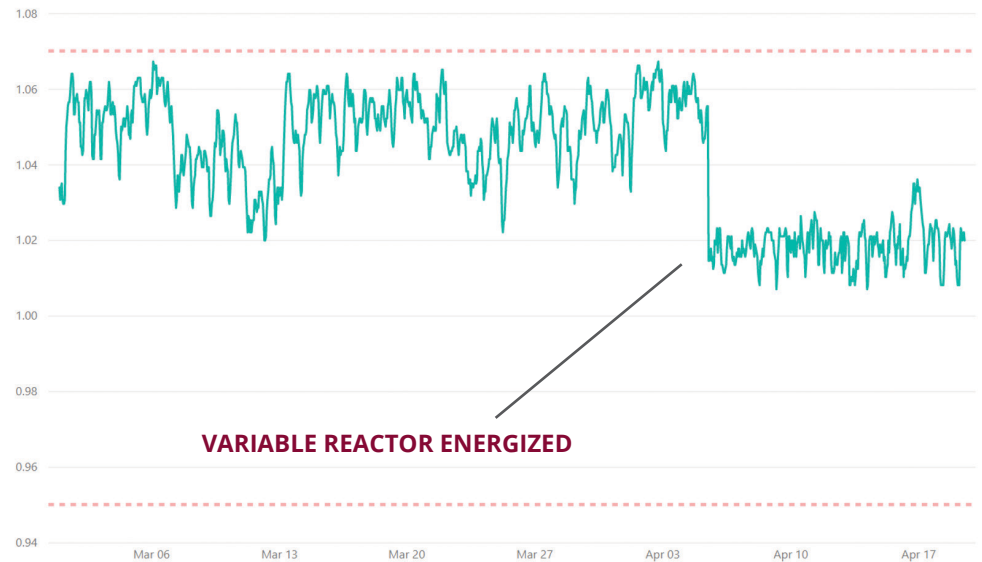
### Variable Reactor at Cuba #3 Substation

In recent years, Sho-Me Power has experienced persistent high voltage in the northeast parts of its service area due to light loading conditions and the distance from generators with voltage control. At its highest, voltage on the 161kV bus at the Cuba 3 substation was greater than 107% of nominal for 332 hours. After a substation outage in May 2016 due to high voltage, Sho-Me Power's Engineering and Operations personnel evaluated many transmission planning studies to alleviate this issue. The preferred solution was to install a variable shunt reactor at the Cuba 3 substation.



Crane contractors and Sho-Me Substation Mechanics from the Cuba Substation Crew maneuver the reactor onto its final resting place.

A variable shunt reactor, built like a single winding power transformer, is used to absorb excess reactive power (VARs) on the power system, which is often generated during periods of low load as transmission lines function much like a large capacitor (i.e. generate VARs). These excess VARs cause high voltage on the system, but the removal of these VARs by the reactor helps bring voltage back down to nominal. By having a variable output, the reactor can remain in service and regulate the 161kV voltage during most times of the year. The variable reactor put in place at Cuba #3, purchased from HICO, was built in South Korea for a price of nearly \$1.3 million (including shipping, offloading, and on-site testing). First energized in April 2022, it has a range of 10-50 MVAR, has been left in service nearly the entire time, and has only been taken out of service during times of very high load where low voltage is a concern.



SCADA readout showing unstable high voltages caused by excess VARs on the system and point at which the reactor was energized, stabilizing and lowering voltage.

# Serving Together

In the fall of 2021, Associated held its first Load Shed Tabletop exercise. Initiated as a result of lessons learned during winter storm Uri, the exercise offers an opportunity for Associated and the six G&T's to simulate and practice their load shedding procedures. Using Microsoft Teams so everyone could participate in a live environment, Associated's Systems Operations personnel initiated different levels of alerts as the simulated operations emergency progressed in severity. The G&T's then initiated their load shed procedure in a simulated fashion. After feedback from that first exercise, it was decided to include communication personnel in the next exercise to help the G&T's understand what communication needs to be provided to distribution members.

## Members Practice Emergency Communication

During the Load Shed Tabletop exercise in 2022, Sho-Me invited its members to join as well, and five distribution cooperatives participated. During the exercise, communication about each emergency alert was forwarded from Associated to Sho-Me's communication department, then filtered to all member participants to alert them to the system conditions. Each distribution cooperative then replied with the message they would send to their member/consumers and the mediums they would use to communicate in a real emergency, whether Facebook, Twitter, website, radio, or other method. Once the exercise was over, all examples of member

communication were compiled and forwarded to participants to use as a reference. Several questions were answered during the process about Sho-Me's load shed procedure, and it offered a look at how the procedure would work in a real emergency.

## Rural Readiness Workshop

Sho-Me and its nine members participated in an Economic Development Work Plan in 2020 to identify and prioritize recommended target industries for distribution cooperatives to attract and expand within their territories, resulting in load growth within the Sho-Me area. COVID-19 delayed the implementation of several of the points in the study, but the strategy of Stakeholder Involvement and Training resulted

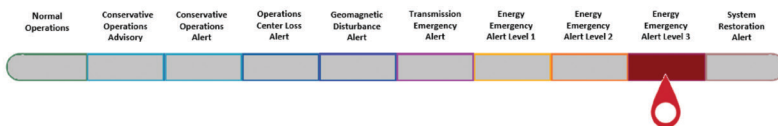


**Sallie Hemenway from The Nexis Group instructs the class on details of public financing and local incentives used for economic development.**

in a Rural Readiness Workshop on April 5 and 6, 2022. Twenty-eight participants from the Sho-Me territory attended Sho-Me's joint workshop with AECl, including representatives from city government, chambers of commerce, Economic Development Organizations, Regional Planning Centers, and Rural Electric Cooperatives.



**THIS IS A DRILL**  
**Energy Emergency Alert Level 3**  
**AECl JRO System Wide Footprint**  
**Occurring 12/15/2022 10:20**  
**Through 12/15/2022 12:00**



The first day of this workshop encompassed developing skills to effectively use of public data sources, assisting existing business, responding to a Missouri Partnership Request for Information, and applying for federal or other grants. Instructors for this day included Alan Spell, Assistant Extension Professor with the College of Agriculture at the University of Missouri, and Mark White, Ph.D., Interim Director Exceed from the University of Columbia. On day two, the focus shifted to using public financing in economic development and understanding how local incentives work and when to use them. Instructors were Mark Grimm and Jason Terry, Attorneys with Gilmore and Bell, and Sallie Hemenway from The Nexus Group.

### Co-op 101 2022

Since 2017, Sho-Me Power's Member Service division has held an annual Co-op 101 for our member cooperatives. Started as a request from several members, this meeting is open to all employees, regardless of service years. The newest employee to attend was employed for one week, with the longest-employed reaching 42 years.



**Meter and Relay Superintendent James Pekarek provides insight into the various components of power system and their purpose during a Co-op 101 session.**



**AECI's Manager of Member Services and Economic Development Kami Mohn educates the Co-op 101 class about services provided by Associated and the generation mix they provide.**

The most recent Co-op 101 had been held in March 2020, just before the COVID-19 pandemic, so the Co-op 101 class held in June 2022 was extended to provide opportunity for even more employees to attend. These two days comprised the largest class to date hosting 65 attendees over two days. To accommodate the large crowd, the unfinished upstairs of the RDC building was outfitted as a classroom including a screen and projector.

Co-op 101 explains the concept behind cooperatives, why they were formed, and the history of the Rural Electrification Act. It delves into the history of the electrical system before cooperatives and the history of Sho-Me, then shifts into the current inner workings of Sho-Me Power and Sho-Me Tech. After the history lesson, attendees are given a virtual tour of the NOC, as well as overviews of the nine member cooperatives, Associated, and AMEC.



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