Exhibit No. 139

Staff – Exhibit 139
Shawn E. Lange, PE
Direct Testimony
File No. ER-2022-0337

Exhibit No.:
Issue(s): *Variable Fuel*
Witness: *Shawn E. Lange, PE*
Sponsoring Party: *MoPSC Staff*
Type of Exhibit: *Direct Testimony*
Case No.: *ER-2022-0337*
Date Testimony Prepared: *January 10, 2023*

MISSOURI PUBLIC SERVICE COMMISSION

INDUSTRY ANALYSIS DIVISION

ENGINEERING ANALYSIS DEPARTMENT

DIRECT TESTIMONY
Revenue Requirement

OF

SHAWN E. LANGE, PE

UNION ELECTRIC COMPANY,
d/b/a AMEREN MISSOURI

CASE NO. ER-2022-0337

Jefferson City, Missouri
January 2023

** Denotes Confidential Information **

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d/b/a AMEREN MISSOURI

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DIRECT TESTIMONY

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SHAWN E. LANGE, PE

UNION ELECTRIC COMPANY,
d/b/a AMEREN MISSOURI

CASE NO. ER-2022-0337

Q. Please state your name and business address.

A. My name is Shawn E. Lange and my business address is Missouri Public Service Commission, P.O. Box 360, Jefferson City, MO 65102.

Q. What is your present position with the Missouri Public Service Commission ("Commission")?

A. I am a Senior Professional Engineer in the Engineering Analysis Department, Industry Analysis Division.

Q. Would you please review your educational background and work experience?

A. A list of the cases in which I have filed testimony and my credentials can be found in Schedule SEL-d1.

EXECUTIVE SUMMARY

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to address Staff's calculation of variable fuel and purchased power expense.

Q. In this testimony, do you provide any recommendations for expense levels to be reflected in the revenue requirement ordered in this case?

A. Yes. It is my recommendation that the revenue requirement determined by the Commission in this case should reflect Staff's calculation of variable fuel and purchased power expense, equal to $238,775,797.

Q. In this testimony, do you describe the development of a work product which you provided to another Staff witness for the development of an issue?

A. Yes. I provided the production cost model results to Staff witness Amanda C. Conner for use in determining the appropriate percentage of transmission expense for Ameren Missouri to recover, and to develop the Staff's recommended Fuel Adjustment Clause Base Factor. I also provided the production cost model results to Staff witness Matthew R. Young to include in the calculation of Staff's revenue requirement as well as to Staff witness Claire M. Eubanks, PE to include in Staff's Rush Island analysis.

VARIABLE FUEL AND PURCHASED POWER EXPENSE

Q. What is the purpose of your direct testimony regarding variable fuel and purchased power expense?

A. The purpose of this section of my direct testimony is to describe how Staff calculated its recommended variable fuel and purchased power expense for Ameren Missouri through the use of a production cost model. Staff recommends that the revenue requirement chosen by the Commission include a variable fuel and purchased power expense of $238,775,797.

Q. Explain what variable fuel and purchased power expense is and how it affects the Staff calculation of the recommended revenue requirement for the Company.

A. Variable fuel and purchased power expense is the normalized and annualized amount of fuel expense as well as market energy sales revenue and market energy purchase expenses that is reasonably expected to be incurred given the assumptions associated with the fuel model run.

Q. What does Staff recommend concerning the variable fuel and purchased power expense for Ameren Missouri?

A. Staff recommends that the revenue requirement chosen by the Commission include the variable fuel and purchased power expense calculated by Staff. Staff's variable fuel and purchased power expense is consistent with Staff's level of load and rate revenues.

Q. What is the purpose of a production cost model?

A. Staff uses a production cost model to perform a simulation of a utility's energy generation, energy sales, and energy purchases. The simulation results are used to calculate the indicated revenues and expenses.

The revenues and expenses calculated from the results of Staff's production cost modeling are:

- The purchase of the fuel necessary to support the generation of electricity at power plants;
- The costs and revenues from the purchases and sales of energy within integrated marketplace; and
- The purchases of energy through purchased power agreements.

Fixed expenses such as those related to the recovery of capital are not included in the results of Staff's production cost model.

Q. What production cost modeling software does Staff use?

A. Staff uses the PLEXOS® software for production cost modeling. This is the fourth time Staff has used the PLEXOS® software for an Ameren Missouri rate case.

Q. What modeling software is Ameren Missouri using?

A. Ameren Missouri uses PowerSimm® software for the second time in a rate case setting.

Q. What inputs are necessary for Staff's production cost model?

A. Staff's production cost model includes input data developed by multiple Staff witnesses. These include: market prices from Staff witness Justin Tevie, fuel prices from Staff witness Matthew R. Young, and system load from Staff witness Hari K. Poudel, PhD. I developed the remaining inputs: generation from wind farms, planned and forced outages, and power plant characteristics.

Q. How did you adapt the output from wind, solar, and hydro facilities for use in Staff's production cost model?

A. Typically, historic hourly generation data for each of the wind, solar, and hydro facilities that Ameren Missouri owns or purchases energy from was used to create representative average output profiles unique to each site. For sites that Ameren Missouri purchase power from, the prices paid for the energy from the purchased power agreement ("PPA") were taken from the contract that Ameren Missouri entered into with the site owner.

Q. Did Staff use a representative average output file for all wind, solar, and hydro facilities?

A. No, Staff used other methods for determining generation output for Montgomery Solar and for High Prairie. For Montgomery Solar, Staff used an hourly shape derived from

PVWatts[1], as adjusted to any contract output guarantees for the project. For the High Prairie wind farm, Staff used the generation profile used in ER-2020-0240 as adjusted to achieve no generation between sun set and the next day's sunrise for the period of April through October.

Q. How were planned and forced outages accounted for in Staff's production cost model?

A. Planned and forced outages are infrequent in occurrence and variable in duration. In order to capture that variability, the outages experienced at each power plant were normalized by averaging seven years of historic data.

Q. Did Staff adjust operating unit outages in determining the normalized level of outage?

A. Yes, Staff determined the extended outage for Callaway that occurred immediately following the late 2020 refuel is considered to be a non-recurring event and was removed from the calculation Staff performed to determine the normalized level of forced outage for Callaway.

Q. Why was that outage determined to be a non-recurring event?

A. Staff's reasons in determining whether this outage was a reoccurring event, include, but are not limited to: findings of the Nuclear Regulatory Commission ("NRC") as well as the duration of the outage.

In response to the events precipitating the Callaway outage, the NRC conducted a review. The NRC inspectors stated Ameren Missouri, "failed to properly pre-plan the work on the main generator which contributed to a reactor trip. Despite significantly changing the main

[1] PVWatts is website calculator affiliated with National Renewable Energy Laboratory that will calculate estimated output for solar facilities when provided with information such as location and physical specification of the facility.

generator work scope from problems being identified, including unusual conditions with incomplete information, [Ameren Missouri] did not implement appropriate risk mitigating actions to increase contractor oversight"[2]

The forced outage for Callaway began on December 24, 2020 at 12:35 p.m. and ended on August 4, 2021. The duration of forced outage 73 is not typically seen on a reoccurring basis for generation plant like Callaway.

Q. How were power plant characteristics for Staff's production cost model derived?

A. Staff relied on Ameren Missouri for responses to data requests and data supplied to comply with 20 CSR 4240-3.190 for inputs relating to each generating unit such as:

- Unit capacity;
- Unit heat rate curve;
- Primary and startup fuels;
- Ramp rates;
- Startup costs; and,
- Variable operating and maintenance expense.

Definitions of the bulleted terms above are included in Schedule SEL-d2.

Q. Do the power plant characteristics change over time?

A. Yes, there are many reasons why plant characteristics change. These reasons include, but are not limited to: operating hours may cause degradation of equipment, new

[2] Nuclear Regulatory Commission, "Callaway Plant – Integrated Inspection Report 05000483/2021002 and Independent Spent Fuel Storage Installation Inspection Report 07201045/2021001," NRC Accession Number ML21216A312, Pages 16-18.

equipment added may improve performance or perhaps increase auxiliary load, there may be legislation or legal findings that may impact operating characteristics and units retire.

Q. Has legislation impacted the operating characteristics of any Ameren Missouri generating facility?

A. Yes, in September 2021, the Governor of the State of Illinois signed into law the Climate and Equitable Jobs Act ("CEJA"). Provisions of this Act limit the level of emissions that a specific generating unit can produce over any rolling twelve-month period of time to no more than the annual average for that same emission, produced by that same unit, over Calendar Years 2018-2020.

Q. What facilities are impacted by this legislation?

A. The Ameren Missouri facilities physically located in Illinois are the Venice Energy Center (489 MW), the Raccoon Creek Energy Center (308 MW), Pinckneyville Energy Center (316 MW), Goose Creek Energy Center (444 MW), and the Kinmudy Energy Center (210 MW).

Q. How are these units modeled?

A. The emissions are directly correlated with unit output, therefore Staff imposed generation limits based on the annual average for the 2018-2020 time period that was used to establish the CEJA limits.

Q. Have legal findings impacted the operating characteristics of any Ameren Missouri generating facility?

A. Yes, the Rush Island Energy Center is impacted by legal findings. Staff witness Claire M. Eubanks, PE goes into more detail on the legal findings in the case impacting the Rush Island Energy Center in her direct testimony.

Q. How has Staff modeled the Rush Island Energy Center units?

A. Staff, in its variable fuel and purchase power expense calculation, evaluated Rush Island unit 1 and Rush Island unit 2 to operate consistent with how the Midcontinent Independent System Operator, Inc. ("MISO") dispatches the Rush Island Energy Center[3]. Staff strives to evaluate every Ameren Missouri generating unit consistent with how MISO dispatches that particular unit.

Q. Has MISO's dispatch of Rush Island changed?

A. Yes, On October 24, 2022, FERC accepted MISO's proposed Rush Island System Support Resource ("SSR") Agreement, effective September 1, 2022. Please see Staff witness Ms. Eubank's direct testimony for additional information on the history and legal case impacting the Rush Island Energy Center and Staff witness Karen Lyons's direct testimony for additional information on the Rush Island SSR. The SSR results in MISO committing the Rush Island Energy Center for system reliability reasons, not economics. This dispatch change results in the Rush Island Energy Center being dispatched less. In this case, Staff's production cost modeling has Rush Island unit 1 and Rush Island unit 2 as contributing, in aggregate, approximately ** [redacted] **.

Q. How does that compare to Staff's production cost model results in ER-2020-0240?

A. In Direct for ER-2020-0240, Staff's production cost model had Rush Island unit 1 and Rush Island unit 2 as contributing, in aggregate, approximately ** [redacted] **. The dispatch changes result in a reduction in contribution for Rush Island of approximately ** [redacted] **.

[3] Ameren Missouri Response to Staff DR No. 0393.

Q. Did Staff perform any other production cost model run in case number ER-2022-0337?

A. Yes, Staff modeled Rush Island unit 1 and Rush Island unit 2 consistent with the MISO dispatch prior to the SSR designation. The Rush Island unit 1 and Rush Island unit 2 generation and operating hours results for prior to and after the SSR designation was provided to Staff witness Claire M. Eubanks, PE for use in her determination of a Rush Island adjustment.

Q. Does Ameren Missouri have units that have retired?

A. Ameren Missouri's Meramec Generating Station was scheduled to be retired in December of 2022.

Q. Was this taken into account in Staff's production cost model?

A. Yes, all units at the Meramec Energy Center were assumed to be retired in Staff's production cost model calculation for direct.

Q. What are the industry best practices related to the calculation of variable fuel and purchased power expenses?

A. Production cost modeling software is widely used throughout the electric power industry in the United States and throughout the world for the calculation of variable fuel and purchased power expenses. Similar software is used by electric utilities, regional transmission operators, regulatory agencies, universities, and research laboratories for evaluating the costs related to the generation, transmission, and consumption of electricity. The use of modeling software allows for the calculation of the lowest cost method by which customer needs can be satisfied while considering a given utility's generating resources, load requirements, and other constraints.

Q. What was the Commission's decision regarding variable fuel and purchased power in Ameren Missouri's previous general rate case, ER-2021-0240?

A. The Commission made no specific decision regarding variable fuel and purchased power in Ameren Missouri's previous general rate case. There was a unanimous stipulation and agreement in which the parties agreed to set the base energy charge at $401,687,202 which was approved by the Commission.

Q. What is the recommended variable fuel and purchased power expense that resulted from Staff's production cost modeling?

A. Staff calculated that the variable fuel and purchased power expense for Ameren Missouri for test year as updated, the 12 month period, ending June 30, 2022, to be $238,775,797. The revenue requirement determined by the Commission should reflect Staff's calculation of variable fuel and purchased power expense.

REAL-TIME DEVIATION ADJUSTMENTS

Q. Are you sponsoring any other adjustments associated with fuel expense?

A. Yes, I am sponsoring a normalized adjustment amount for Real-time Deviations.

Q. What are real-time deviation adjustments?

A. The real-time load and generation deviation adjustment is intended to capture the difference in dollars between the production cost model (which looks at day-ahead) and the operation of the MISO market, which has both a day ahead and real-time component.

Q. How did Staff determine the level of adjustment?

A. Typically to determine the normal level of adjustment for real-time deviation, Staff uses a three year monthly average. In February 2021, Winter Storm Uri affected the region

with cold weather causing increased electricity demand and natural gas demand, which increased the prices of electricity and natural gas. For further explanation of the effects of Winter Storm Uri please see Staff's report in AO-2021-0264. Staff made adjustments to normalize the market effects caused by Winter Storm Uri to the real-time deviation adjustments following the same method as outlined in Staff witness Justin Tevie's direct testimony section on Market Prices. Staff will update these recommendations with the True-up data Ameren Missouri provides to Staff.

Q. What is the recommended adjustment for real-time Deviations?

A. Staff made an adjustment outside the production cost model to account for revenues earned from real time load and generation deviation adjustment. Real-time deviation of ** [redacted] ** should be utilized for this adjustment.

Q. Will Staff reevaluate these adjustments at true-up?

A. Yes, for true-up Staff will take into consideration all known and measurable changes in its true-up filing.

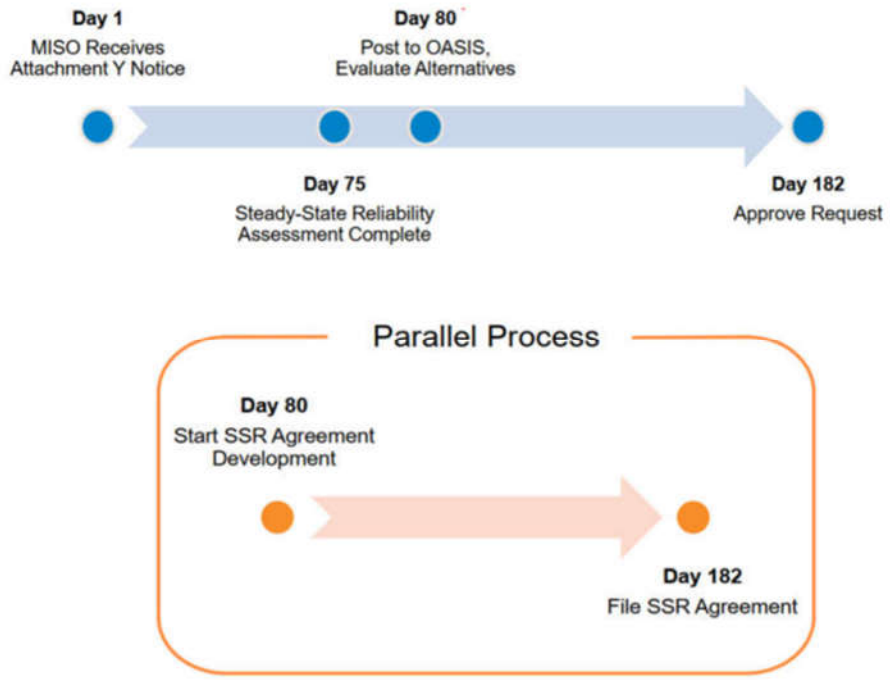
RUSH ISLAND ENERGY CENTER

Q. You have discussed Rush Island from a production cost model perspective, do you have other Rush Island Energy Center issues that you would like to discuss?

A. Yes, I would like to briefly discuss the MISO retirement process (i.e. Attachment Y study) and the transmission projects that are needed for grid reliability issues due to the retirement of the Rush Island Energy Center.

Q. Please explain the MISO retirement process.

A. MISO's retirement process requires a 26-week notice period (182 days). During this 26-week notice period, MISO will conduct a study ("Attachment Y Study") to determine whether all or a portion of the resource's capacity is necessary to maintain system reliability, such that SSR[4] status is justified. If so, and if MISO cannot identify an SSR alternative that can be implemented prior to the retirement effective date, then MISO and the market participant shall enter into an agreement to ensure that the resource continues to operate, as needed.[5] The figures below show the MISO Attachment Y timeline:[6]



Q. What was the results of the MISO Attachment Y study for Rush Island?

[4] Midcontinent Independent System Operator, Inc.'s ("MISO") Open Access Transmission, Energy and Operating Reserve Markets Tariff (Tariff) defines SSR Units as "Generation Resources or Synchronous Condenser Units (SCUs) that have been identified in Attachment Y – Notification to this Tariff and are required by the Transmission Provider for reliability purposes, to be operated in accordance with the procedures described in Section 38.2.7 of this Tariff." MISO FERC Electric Tariff, Module A, § 1.S "System Support Resource (SSR)" (39.0.0).
[5] FERC Docket No. EL14-34-003, et al. ORDER ON REHEARING AND CLARIFICATION AND ORDER ON REFUND REPORT (Issued September 22, 2016) Pg. 2 Paragraph 2.
[6] EO-2022-0215 Staff Initial Report Pg. 5 lines 2-13.

A. The Attachment Y study showed that continued plant operations are required beyond September of 2022 until additional specified transmission system upgrades are placed into service. The following transmission upgrades need to be completed before the Rush Island Energy Center can retire (the estimated completion timeline is also shown below)[7]:

Project	Estimated Completion Date
Installation of a Capacitor Bank at the Overton Substation to address voltage issues	Spring/Fall 2023
Replacement of a Transformer at the Wildwood Substation in St. Louis County to address overload concerns	Spring 2024
Upgrading of a bus bar tie position at a substation adjacent to Rush Island to address voltage issues	Spring/Fall 2023
Installation of four (4) STATCOMs in the St. Louis Metropolitan area to provide reactive power support; installations to occur as equipment becomes available 2024-2025	Final STATCOM Fall 2025, perhaps earlier

Q. What is the cost of these upgrades?

A. The Overton Substation work is estimated to cost ** [redacted] **[8]. The work at the Wildwood Substation is estimated to cost ** [redacted] **[9]. The work at the Rush Island switchyard is estimated to cost ** [redacted] **[10]. The work associated with all four (4) STATCOM units is estimated to cost ** [redacted] **[11]. This results in an estimated total of ** [redacted] **[12].

Q. Is Staff recommending a prudency disallowance of these costs?

[7] Mark Birk Direct Pg. 7.
[8] Mark Birk Direct Pg. 8 line 13.
[9] Mark Birk Direct Pg. 8 line 14.
[10] Mark Birk Direct Pg. 8 line 14.
[11] Mark Birk Direct Pg. 8 line 15.
[12] Mark Birk Direct Pg. 8 line 15.

A. Not at this time. Most of if not all of the costs associated with these projects are not in this case. Staff will address Ameren Missouri assertion of prudence in its rebuttal testimony and other cases as appropriate.

Q. Does this conclude your direct testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Adjust Its Revenues for Electric Service	)))	Case No. ER-2022-0337

AFFIDAVIT OF SHAWN E. LANGE, PE

STATE OF MISSOURI	)	
	)	ss.
COUNTY OF COLE	)	

COMES NOW SHAWN E. LANGE, PE and on his oath declares that he is of sound mind and lawful age; that he contributed to the foregoing *Direct Testimony of Shawn E. Lange, PE*; and that the same is true and correct according to his best knowledge and belief.

Further the Affiant sayeth not.

Shawn E. Lange

SHAWN E. LANGE, PE

JURAT

Subscribed and sworn before me, a duly constituted and authorized Notary Public, in and for the County of Cole, State of Missouri, at my office in Jefferson City, on this 5th day of January 2023.

D. SUZIE MANKIN
Notary Public - Notary Seal
State of Missouri
Commissioned for Cole County
My Commission Expires: April 04, 2025
Commission Number: 12412070

D Suzie Mankin

Notary Public

CREDENTIALS AND CASE PARTICIPATION OF SHAWN E. LANGE, PE

PRESENT POSITION:

I am a Senior Professional Engineer in the Engineering Analysis Department, Industry Analysis Division, of the Missouri Public Service Commission.

EDUCATIONAL BACKGROUND AND WORK EXPERIENCE:

In December 2002, I received a Bachelor of Science Degree in Mechanical Engineering from the University of Missouri, at Rolla now known as the Missouri University of Science and Technology. I joined the Commission Staff in January 2005. I am a registered Professional Engineer in the State of Missouri and my license number is 2018000230.

TESTIMONY FILED:

Case Number	Utility	Testimony	Issue
ER-2005-0436	Aquila Inc.	Direct	Weather Normalization
		Rebuttal	Weather Normalization
		Surrebuttal	Weather Normalization
ER-2006-0314	Kansas City Power & Light Company	Direct	Weather Normalization
		Rebuttal	Weather Normalization
ER-2006-0315	Empire District Electric Company	Direct	Weather Normalization
		Surrebuttal	Weather Normalization
ER-2007-0002	Union Electric Company, d/b/a AmerenUE	Direct	Weather Normalization
ER-2007-0004	Aquila Inc.	Direct	Weather Normalization
ER-2007-0291	Kansas City Power & Light Company	Staff Report	Weather Normalization
		Rebuttal	Weather Normalization
ER-2008-0093	Empire District Electric Company	Staff Report	Weather Normalization
ER-2008-0318	Union Electric Company, d/b/a AmerenUE	Staff Report	Weather Normalization

Case Number	Utility	Testimony	Issue
ER-2009-0089	Kansas City Power & Light Company	Staff Report	Net System Input
ER-2009-0090	KCP&L Greater Missouri Operations Company	Staff Report	Net System Input
ER-2010-0036	Union Electric Company, d/b/a AmerenUE	Staff Report	Net System Input
ER-2010-0130	Empire District Electric Company	Staff Report	Variable Fuel Costs
		Surrebuttal	Variable Fuel Costs
ER-2010-0355	Kansas City Power & Light Company	Staff Report	Variable Fuel Costs
ER-2010-0356	KCP&L Greater Missouri Operations Company	Staff Report	Engineering Review-Sibley 3 SCR
ER-2011-0004	Empire District Electric Company	Staff Report	Variable Fuel Costs
ER-2011-0028	Union Electric Company, d/b/a Ameren Missouri	Staff Report	Net System Input
ER-2012-0166	Union Electric Company, d/b/a Ameren Missouri	Staff Report	Weather Normalization
		Surrebuttal	Weather Normalization Maryland Heights In-Service
ER-2012-0174	Kansas City Power & Light Company	Staff Report	Weather Normalization Net System Input Variable Fuel Costs
		Surrebuttal	Weather Normalization
ER-2012-0175	KCP&L Greater Missouri Operations Company	Staff Report	Weather Normalization Net System Input
		Surrebuttal	Weather Normalization
ER-2012-0345	Empire District Electric Company	Rebuttal	Interim Rates
		Staff Report	Weather Normalization
EC-2014-0223	Noranda Aluminum v. Ameren Missouri	Rebuttal	Weather Normalization
EA-2014-0207	Grain Belt Express CCN	Rebuttal	Certificates of Convenience/Feasibility Analysis
		Surrebuttal	

Case Number	Utility	Testimony	Issue
ER-2014-0258	Union Electric Company, d/b/a Ameren Missouri	Staff Report	Net System Input Variable Fuel Costs
ER-2014-0351	Empire District Electric Company	Staff Report	Net System Input Variable Fuel Costs
ER-2014-0370	Kansas City Power & Light Company	Staff Report	Net System Input Variable Fuel Costs
		True-up Direct	Variable Fuel Costs La Cygne In-service
EA-2015-0146	ATXI CCN	Rebuttal	Certificates of Convenience/Feasibility Analysis
		Surrebuttal	
ER-2016-0023	Empire District Electric Company	Staff Report	Net System Input Variable Fuel Costs
		Surrebuttal	Variable Fuel Costs
ER-2016-0179	Union Electric Company, d/b/a Ameren Missouri	Staff Report	Variable Fuel Costs
EA-2016-0385	Grain Belt Express CCN	Rebuttal	Certificates of Convenience/Feasibility Analysis
		Surrebuttal	
ER-2018-0145	Kansas City Power & Light Company	Staff Report	Variable Fuel Costs Market Prices
		Rebuttal	Variable Fuel Costs Market Prices
		True-up Direct	Variable Fuel Costs Market Prices
EA-2018-0327	ATXI CCN	Rebuttal	Certificates of Convenience/Feasibility Analysis
EA-2019-0021	Ameren CCN	Staff Report	Certificates of Convenience/Feasibility Analysis
EA-2019-0010	Empire District Electric Company CCN	Staff Report	Certificates of Convenience/Feasibility Analysis
EC-2020-0408	MLA v. Grain Belt Complaint	Staff Recommendation	Formal Complaint
EA-2021-0167	ATXI CCN	Staff Recommendation	Certificates of Convenience/Feasibility Analysis

Case Number	Utility	Testimony	Issue
EA-2021-0087	ATXI CCN	Staff Report	Certificates of Convenience/Feasibility Analysis
ER-2021-0240	Union Electric Company, d/b/a Ameren Missouri	Staff Report	Variable Fuel Costs Atchison wind farm Construction Audit and in-service review
		Rebuttal	Atchison in-service and Variable Fuel Costs
		True-up Direct	Variable Fuel Costs
ER-2021-0312	Empire District Electric Company	Staff Report	Transmission and Distribution Investment
EA-2022-0043	Evergy Metro and Evergy West Hawthorn Solar CCN	Staff Report	Certificates of Convenience/Feasibility Analysis
EA-2022-0099	ATXI CCN	Staff Direct Testimony	Certificates of Convenience/Feasibility Analysis
EA-2022-0244	Union Electric Company, d/b/a Ameren Missouri	Staff Report	Certificates of Convenience/Feasibility Analysis
EA-2022-0245	Union Electric Company, d/b/a Ameren Missouri	Staff Rebuttal Testimony	Certificates of Convenience/Feasibility Analysis

Definitions

Unit capacity:

The maximum capacity of a power plant is equal to its maximum level of energy output in megawatts (MW).

Unit heat rate curve:

The heat rate of a power plant, typically measured in BTU/kWh, is a measure of efficiency. It shows how much energy from the fuel consumed by the power plant is required to generate one kWh of electricity. The larger the magnitude of the heat rate, the less efficient a power plant is.

Primary and startup fuels:

A power plant's primary fuel is the main source of energy that it uses to generate electricity. For example, a coal-fired power plant will have coal as its primary fuel. This is distinct from startup fuel which may be used sparingly during limited periods of time while the power plant is being started. Fuel oil might be used as a startup fuel while a coal plant is being started. Once a certain power level is achieved, the startup fuel will stop being used, and the power plant will operate solely on it primary fuel.

Ramp rates:

Ramp rates describe how quickly a power plant can change its output power level and are typically given in units of megawatts per hour or megawatts per minute. Large coal or nuclear power plants have lower ramp rates than smaller natural gas-fired combustion turbines.

Startup costs:

Startup costs are the operations and maintenance costs associated with the startup of a power plant. The magnitude of startup costs can influence how a power plant is dispatched within a market. All other factors being equal, high startup costs would tend to make a power plant less likely to be dispatched in a given situation.

Variable operating and maintenance expense:

Variable operations and maintenance expenses ("VOM") are a part of the incremental cost of running a power plant. They represent the costs related to the equipment replacement and servicing that are necessarily incurred by the wear and tear that occurs when a power plant operates. These costs are measured in dollars per megawatt-hour ($/MWh) and will affect the price at which energy from a power plant is offered into the market. All other factors being equal, high VOM costs would tend to make a power plant less likely to be dispatched in a given situation.