Exhibit No. 249

MoPSC Staff – Exhibit 249
Michael L. Rush
Rebuttal Testimony
File Nos. ER-2022-0129 & ER-2022-0130C

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MISSOURI PUBLIC SERVICE COMMISSION

INDUSTRY ANALYSIS DIVISION

REBUTTAL TESTIMONY

OF

MICHAEL L. RUSH

Evergy Metro, Inc. d/b/a Evergy Missouri Metro
Case No. ER-2022-0129

Evergy Missouri West, Inc. d/b/a Evergy Missouri West
Case No. ER-2022-0130

Jefferson City, Missouri
2022

REBUTTAL TESTIMONY

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MICHAEL L. RUSH

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Evergy Missouri West, Inc. d/b/a Evergy Missouri West
Case No. ER-2022-0130

Q. Please state your name, title, and business address.

A. Michael L Rush, PE, Critical Infrastructure Security Engineer, Industry Analysis Division, Missouri Public Service Commission, 200 Madison Street, Jefferson City MO, 65102.

Q. What are your qualifications and experience?

A. I hold both a bachelor's degree in Mechanical Engineering and a master's degree in Computer Science from Arizona State University. I have been a practicing professional engineer since 1995 and have been in my present position since November 2021. I am responsible for interfacing with Missouri utilities on physical and cyber-security issues. I am also the critical infrastructure intelligence liaison to the Missouri Information Analysis Center ("MIAC") as well as a lead responder for the energy sector emergency response function at the Missouri State Emergency Management Agency ("SEMA"). I previously held PSC staff positions in the Industry Analysis Department and the Procurement Analysis Unit. Other experience includes employment as an Engineering Research Scientist at Lincoln University of Missouri, a civilian instructor at the Army Corps of Engineers' Prime Power School, a Researcher at the Arizona State University Center for Cognitive Ubiquitous Computing ("CUbiC"), and a Sr. Project Engineer at the General Motors Corporation.

Q. Have you previously filed testimony with the Missouri Public Service Commission?

A. Yes in cases GR-2015-0271, GA-2017-0016, AW-2015-0203, and ER-2018-0145 and ER-2018-0146.

Q. What is the purpose of your testimony?

A. My testimony focuses on the topic of the disaggregation of customer energy usage sometimes referred to as energy disaggregation or just 'Disagg' (as noted in the direct testimony of Company witness Bradley D. Lutz and the attachment to the Evergy data request responses to DR456 in ER-2022-0129 and DR450 in case ER-2022-0130). Disagg is a process whereby customer activities occurring behind an Advanced Metering Infrastructure (AMI) Meter are identified by analyzing the time based customer kilo-watt usage often referred to as the customer usage data or, for the purposes of my testimony, 'Customer Data'.

Q. Would you like to highlight any specific distinctions in the 'terms of art' used in your testimony prior to the discussion of Disagg?

A. Yes; I would like to start by highlighting the difference between data, information, and intelligence. While these terms are often used loosely and interchangeably, it is important in the context of my testimony that they be used specifically and concisely. I will clarify the difference of these three terms in the context of my testimony:

Data: Factual information such as the measurement of the amount of energy consumed and the time at which it was consumed – the values collected and stored by the AMI system to be used for later evaluation, analysis, and/or calculations – the raw numbers.

Information: The data after it has been processed, stored, or transmitted by the AMI or other computer systems – the aggregate knowledge gained through mathematical calculations performed on the data – the accumulated power usage, billing dollar values, time of peak use, etc. – values calculated from the data.

Intelligence: Reasoned evaluation of the data and information to make judgements about the underlying causes and/or conditions under which the data and information may have been produced – knowledge of activities and/or circumstances under which the data was produced.

Q. Doesn't AMI already collect Customer Data?

A. Absolutely and rightly so. Collection of Customer Data is necessary to the operation of the electrical system.

Q. Isn't Information already created using Customer Data?

A. Absolutely and rightly so. Knowledge of how much and when power is consumed is necessary to system operations. Knowledge of billing, identities, and other information about customers and the system is also necessary to the operation of the electrical system.

Q. Isn't Intelligence already produced using Customer Data?

A. No. There may be some limited examples where this may be occurring but in general, this is a new endeavor in this space.

Q. How is it possible to identify customer activities behind a customer meter using Disagg on Customer Data?

A. There are a variety of ways to identify the existence of, and the time when, a customer activity occurred from Customer Data using Disagg. To explain Disagg simply:

(1) Every customer activity utilizing any electrical device produces an Energy Usage Profile for that device.

(2) Customer Data is the accumulation of all the Energy Usage Profiles of all the devices used by the customer over time.

(3) The Energy Usage Profile of each electrical device has been determined in some manner prior to applying Disagg.

(4) Disagg extracts each Energy Usage Profiles from within the Customer Data producing Intelligence on if, when, and how many times an individual customer activity has occurred.

Q. How does the Disagg process work?

A. To explain what Disagg is, how it works, and what the result is I will use an example using two common household devices; an electric clothes dryer, and an electric dishwasher.

An electric clothes dryer has two main electrical components that use power; (1) the motor that turns the drum and (2) the heating element that heats up the dryer. For this example the motor will be assumed to consume 300W when running and the heating element 1500W. A prototypical clothes dryer usage profile might look somewhat similar to Figure 1.

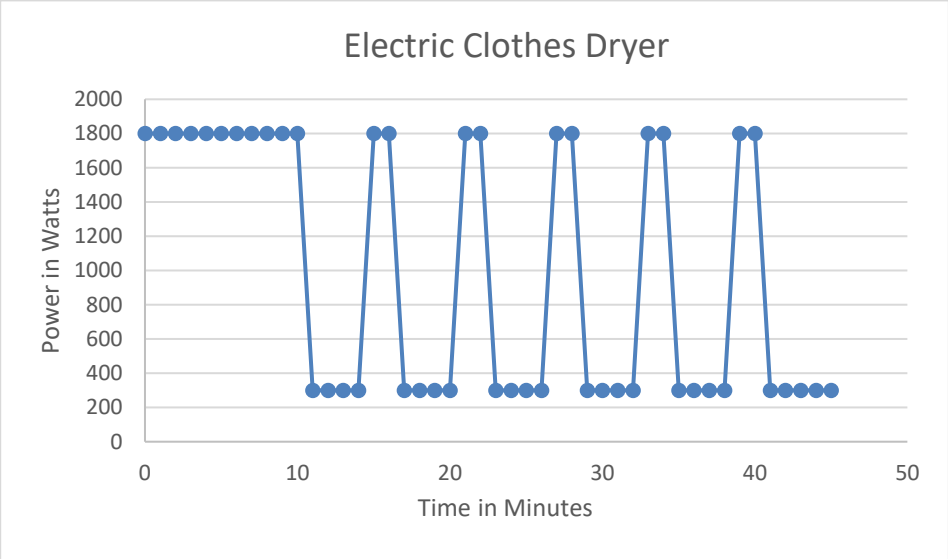

Figure 1: Prototypical electric clothes dryer usage profile

When the dryer is running, for the first 10 minutes both the motor (300W) and the heating element (1500W) are operating at the same time turning the drum and heating up the cold dryer. After the dryer is up to operational temperature, most of the time the only electrical component continuing to operate is the motor with the heating element occasionally turning on for short periods to reheat the dryer as it cools. As the dryer nears the end of the cycle, only the motor runs as the dryer cools down and the cycle ends.

An electric dishwasher also has two main electrical components that use power; (1) the motor that pumps water during both cleaning and draining cycles and (2) the heating element that heats water prior to washing and the air during while drying. For this example the motor will be assumed to use 100W and the heating element 750W. A typical usage profile for this device might look somewhat similar to this:

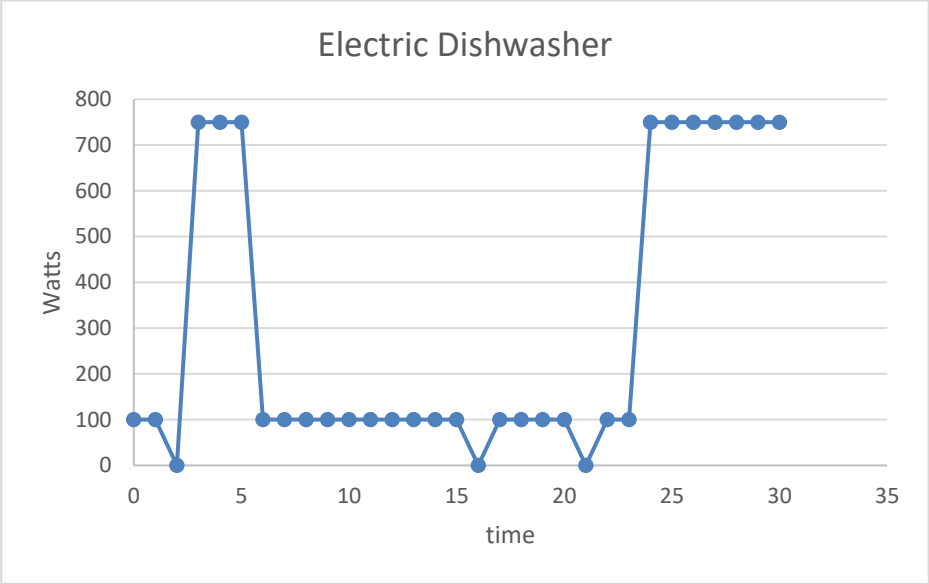

Figure 2: Prototypical electric dishwasher usage profile

For the first minute the motor (100W) runs to remove any water that might remain in the washer. After the pump stops water is introduced and neither the pump nor the heating element is operating (0W). Next the heating element operates to heat the water (750W) followed by the pump operating during the wash, rinse, and emptying cycles with a stop between each cycle. Finally the heating element again runs to dry the dishes.

It is understood that each of these devices operating behind the meter can operate at any time of the day, may be run at the same time, or at different times. However, for our example we will assume that both run and in some arbitrary overlapping timeframe. We will also assume that these are the only two devices operating behind the meter. Given those assumptions, the total electrical usage profile (the accumulation of both profiles) might look something similar to this:

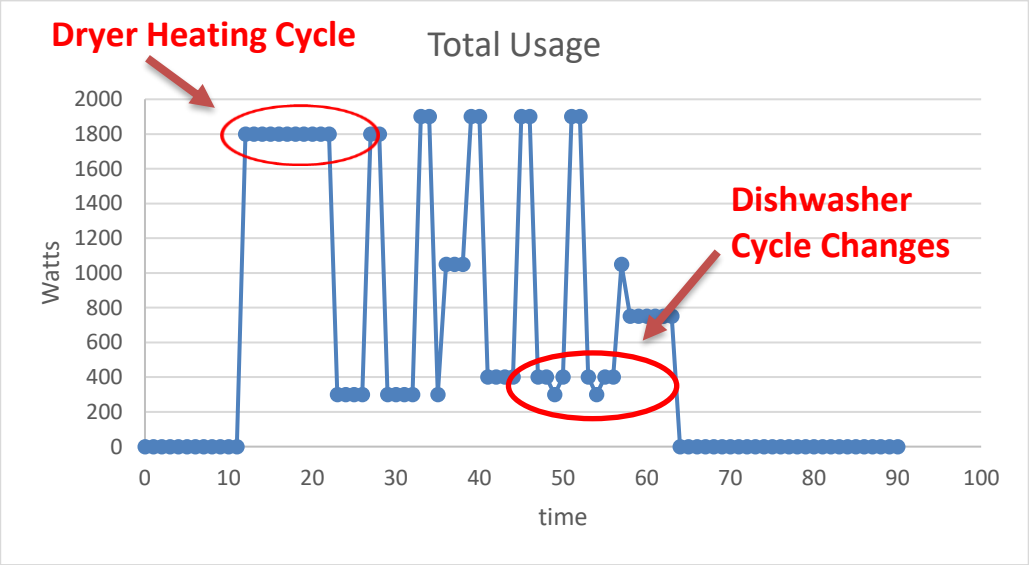

Figure 3: Prototypical total electrical usage

While looking at the prototypical total electrical usage (Figure 3) it might not be instantly obvious that it is the sum of the two profiles but some identifying elements are apparent such as the long heating cycle at the beginning of the clothes dryer usage profile and the power off times between the wash, rinse, and drain cycles of the dishwasher.

Q. How is it possible to separate out these two activities from the accumulated profile?

A. While the specific technical details of this 'disassembly' process are not relevant from a policy standpoint, when described there will more than likely be a mention of one or more methodologies with sophisticated sounding names such as 'Deep Learning', 'Big Data Analytics', 'Artificial Intelligence', 'Neural Networks', 'Machine Learning', 'Supervised Learning', 'Unsupervised Learning', etc.

The simple answer to understanding these methodologies is it is all just math; sophisticated math undoubtedly, but it is all just math. While one methodology may produce more precise results than another, it really does not matter from a policy perspective. Each and

every methodology has the same goal – Intelligence – what electrical devices are operating, when and for how long are those operations occurring.

Q. Can't the production of Intelligence be used to perform useful tasks and make better decisions?

A. Maybe. Production of Intelligence may be a useful tool for operating a system more efficiently but the question is does this Intelligence production produce a public benefit that is apparent to the rate payer and transparent in its production.

Q. Should the production of Intelligence be apparent to the consumer?

A. Yes.

Q. Should the production of Intelligence be transparent?

A. Yes.

Q. How can the benefits of Intelligence production be apparent to the ratepayer and transparent in its production?

A. By ensuring that customers have the ability to understand what the utility is or may be doing with the Customer Data.

Q. Are there current examples of this behavior?

A. Yes. Other programs such as the Residential Thermostat Program where (from the Evergy Tariff):

> 'Customer Program Participation Agreement outlining Customer and Company responsibilities, and additional information concerning data privacy and Program termination for customers who participate in any studies that will analyze and evaluate customers' behavior and usage of thermostat, and associated software.'

which is a detailed explanation of an explicit agreement of customer participation of informed consent on the roles and responsibilities of each party to the agreement.

Q. Does the Evergy Disagg program include a way for customers to get information about the production of Intelligence based on Customer Data?

A. No. There does not appear to be this sort of process outlined in the company direct testimony of Bradley D Lutz or the previously mentioned Data Requests.

Q. Is it Staff's position that Intelligence production is an inappropriate activity for Evergy to undertake?

A. No. Staff's position is that a customer should be able to find out what types of Intelligence Evergy is producing on activities occurring behind the meter using Customer Data.

Q. Doesn't the Evergy privacy statement published on its website authorize the use of Customer Data for this type of analysis?

A. The Evergy privacy policy does state:

> (6) We may use advance metering technology to automatically collect your energy usage information for various purposes, including to:
> (c) Monitor and analyze individual customer trends and usage

However, it is not apparent that this would include Intelligence production on customer activities occurring behind the meter.

Q. Does the Evergy privacy statement mention other instances of the use of Customer Data?

A. Yes, the privacy statement also states:

> (7) We may share your information, including personal information, with others as described below:
> (b) Service Providers: We may share information with utility service providers that help us provide you service. These vendors, consultants, and other entities perform utility related services including emergency response on our behalf in order to:
>
> (4) plan, implement, or evaluate our energy assistance, demand response, energy management, energy efficiency programs, or

> other utility related programs which may include survey, research, program promotion, and enrollment activities.

and:

> (c) Anonymized or Aggregated Information: We may disclose anonymized or aggregated information and user statistics to prospective partners and other third parties, and for other lawful purposes. Anonymized or aggregated information is information that does not identify an individual person.

But again, neither of these would imply Intelligence production on customer activities occurring behind the meter. Additionally it could be argued that other programs such as the Residential Thermostat Program would also fall under activities outlined within the Evergy privacy statement but the Company is required and has agreed to operate those programs with customer participation agreement and informed consent.

Q. Would you like to summarize Staff's position on Evergy's application of the Disagg program?

A. Yes. Staff's position is that while Disagg may provide some public benefit, the application of such Intelligence production should be done with great care and with a mechanism in place to ensure that customers are made aware of the production of intelligence within the Disagg program.

Q. What might that mechanism look like?

A. All Evergy customers should have access to the details of the Disagg process, how it works, what Intelligence it produces, what the potential uses are, any future plans on expanding the analysis. These details should be communicated whenever a substantial change or expansion of the Disagg program occurs. Potential methods of communication could include any or all of the following:

(1) Inclusion of the Disagg program within Evergy privacy statement(s)
(2) Outreach through bill inserts and/or on billing notices
(3) Direct mailings
(4) Electronic communications
(5) Other methods of direct or mass communications

Customers who prefer not to participate in the Disagg program Intelligence production utilizing their Customer Data should have an opt-out provision to the production of intelligence made available in either written or electronic form.

Q. Does that conclude your testimony?

A. Yes it does.

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the Matter of Evergy Metro, Inc. d/b/a Evergy Missouri Metro's Request for Authority to Implement a General Rate Increase for Electric Service	))))	Case No. ER-2022-0129
In the Matter of Evergy Missouri West, Inc. d/b/a Evergy Missouri West's Request for Authority to Implement a General Rate Increase for Electric Service	))))	Case No. ER-2022-0130

AFFIDAVIT OF MICHAEL L. RUSH, PE

STATE OF MISSOURI)
) ss.
COUNTY OF COLE)

COMES NOW MICHAEL L. RUSH, PE and on his oath declares that he is of sound mind and lawful age; that he contributed to the foregoing *Rebuttal Testimony of Michael L. Rush, PE*; and that the same is true and correct according to his best knowledge and belief.

Further the Affiant sayeth not.

MICHAEL L. RUSH, 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 11th day of July, 2022.

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

Notary Public