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*Witness:* *Michael L. Rush*  
*Sponsoring Party:* *MoPSC Staff*  
*Type of Exhibit:* *Rebuttal Testimony*  
*Case Nos.:* *ER-2022-0129 and  
ER-2022-0130*  
*Date Testimony Prepared:* *July 13, 2022*

**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*

1 **REBUTTAL TESTIMONY**

2 **OF**

3 **MICHAEL L. RUSH**

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

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

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

9 A. Michael L Rush, PE, Critical Infrastructure Security Engineer, Industry Analysis  
10 Division, Missouri Public Service Commission, 200 Madison Street, Jefferson City MO,  
11 65102.

12 Q. What are your qualifications and experience?

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

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

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

5 Q. What is the purpose of your testimony?

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

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

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

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

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

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

10 Q. Doesn't AMI already collect Customer Data?

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

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

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

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

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

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

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

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

5  
6                   (2) Customer Data is the accumulation of all the Energy Usage Profiles of all  
7                   the devices used by the customer over time.

8  
9                   (3) The Energy Usage Profile of each electrical device has been determined in  
10                  some manner prior to applying Disagg.

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

14  
15  
16           Q.     How does the Disagg process work?

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

20                   An electric clothes dryer has two main electrical components that use power; (1) the  
21 motor that turns the drum and (2) the heating element that heats up the dryer. For this example  
22 the motor will be assumed to consume 300W when running and the heating element 1500W.

23                   A prototypical clothes dryer usage profile might look somewhat similar to Figure 1.

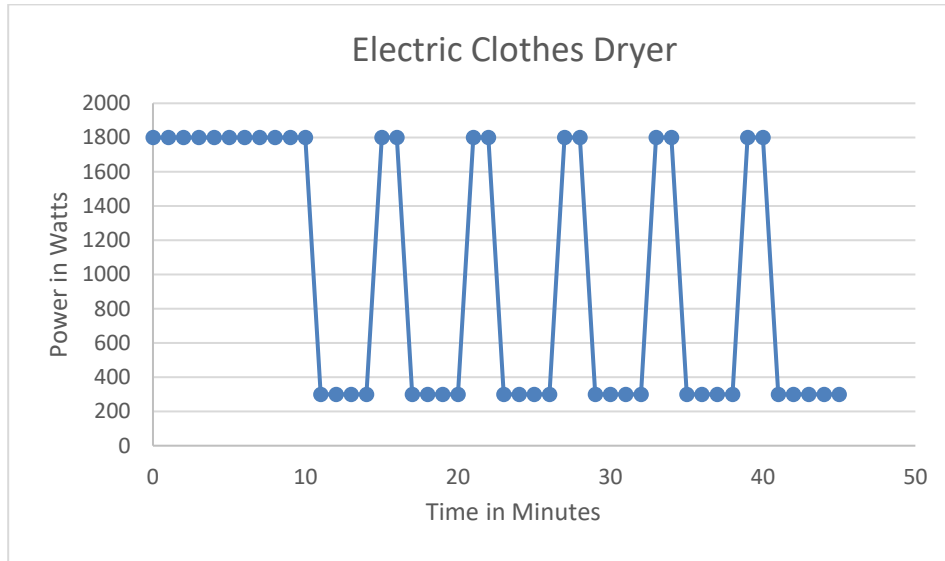


Figure 1: Prototypical electric clothes dryer usage profile

1  
2  
3  
4 When the dryer is running, for the first 10 minutes both the motor (300W) and the  
5 heating element (1500W) are operating at the same time turning the drum and heating up the  
6 cold dryer. After the dryer is up to operational temperature, most of the time the only electrical  
7 component continuing to operate is the motor with the heating element occasionally turning on  
8 for short periods to reheat the dryer as it cools. As the dryer nears the end of the cycle, only the  
9 motor runs as the dryer cools down and the cycle ends.

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

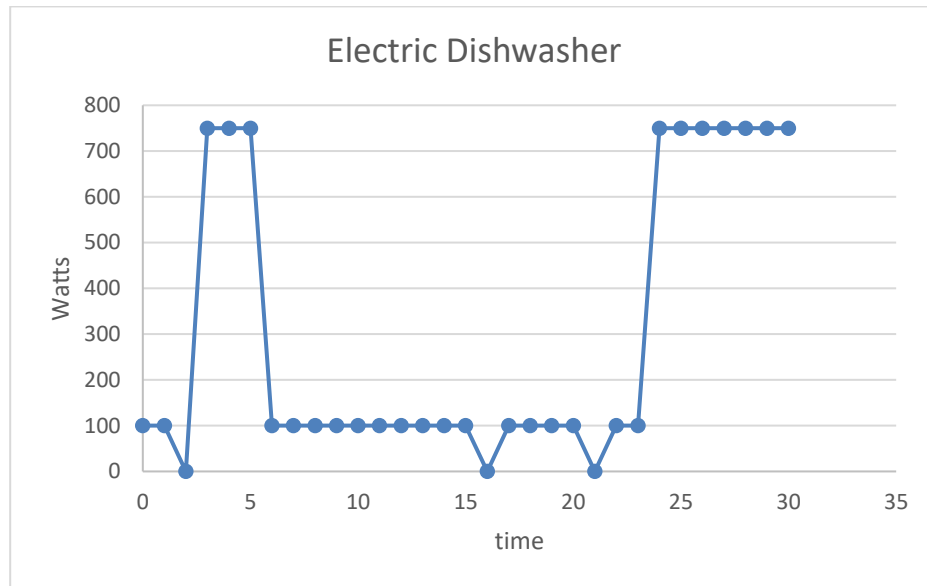


Figure 2: Prototypical electric dishwasher usage profile

1  
2  
3  
4 For the first minute the motor (100W) runs to remove any water that might remain in  
5 the washer. After the pump stops water is introduced and neither the pump nor the heating  
6 element is operating (0W). Next the heating element operates to heat the water (750W)  
7 followed by the pump operating during the wash, rinse, and emptying cycles with a stop  
8 between each cycle. Finally the heating element again runs to dry the dishes.

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

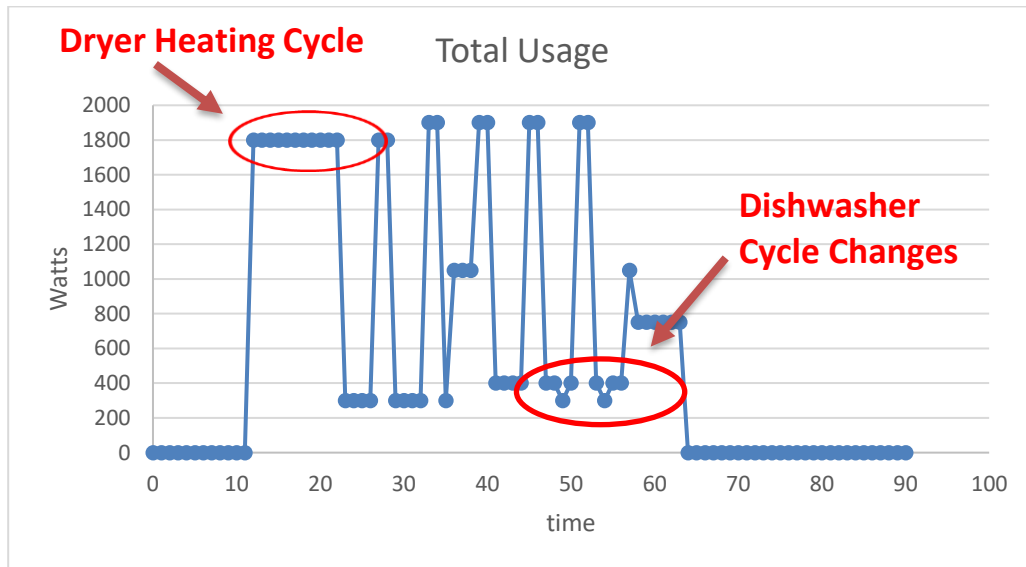


Figure 3: Prototypical total electrical usage

1  
2  
3  
4 While looking at the prototypical total electrical usage (Figure 3) it might not be  
5 instantly obvious that it is the sum of the two profiles but some identifying elements are  
6 apparent such as the long heating cycle at the beginning of the clothes dryer usage profile and  
7 the power off times between the wash, rinse, and drain cycles of the dishwasher.

8  
9 Q. How is it possible to separate out these two activities from the accumulated  
10 profile?

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

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



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

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

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

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

9 A. Yes.

10 Q. Should the production of Intelligence be transparent?

11 A. Yes.

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

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

16 Q. Are there current examples of this behavior?

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

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

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

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

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

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

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

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

11 A. The Evergy privacy policy does state:

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

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

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

19 A. Yes, the privacy statement also states:

- 20 (7) We may share your information, including personal information, with others  
21 as described below:

22 (b) Service Providers: We may share information with utility service  
23 providers that help us provide you service. These vendors, consultants,  
24 and other entities perform utility related services including emergency  
25 response on our behalf in order to:

26  
27 (4) plan, implement, or evaluate our energy assistance, demand  
28 response, energy management, energy efficiency programs, or

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

3 and:

4 (c) Anonymized or Aggregated Information: We may disclose  
5 anonymized or aggregated information and user statistics to prospective  
6 partners and other third parties, and for other lawful purposes.  
7 Anonymized or aggregated information is information that does not  
8 identify an individual person.  
9

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

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

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

21 Q. What might that mechanism look like?

22 A. All Evergy customers should have access to the details of the Disagg process,  
23 how it works, what Intelligence it produces, what the potential uses are, any future plans on  
24 expanding the analysis. These details should be communicated whenever a substantial change  
25 or expansion of the Disagg program occurs. Potential methods of communication could include  
26 any or all of the following:  
27

Rebuttal Testimony of  
Michael L. Rush

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

6  
7 Customers who prefer not to participate in the Disagg program Intelligence production  
8 utilizing their Customer Data should have an opt-out provision to the production of intelligence  
9 made available in either written or electronic form.

10 Q. Does that conclude your testimony?

11 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 ) Case No. ER-2022-0129  
Implement a General Rate Increase for Electric )  
Service )

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

**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.

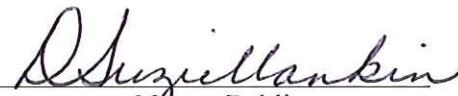
Further the Affiant sayeth not.

  
\_\_\_\_\_  
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 11<sup>th</sup> 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