

Exhibit No.:
Issue(s): *Weather Normalization*
Witness: *Michael L. Stahlman*
Sponsoring Party: *MoPSC Staff*
Type of Exhibit: *Direct Testimony*
Case No.: *ER-2024-0261*
Date Testimony Prepared: *July 2, 2025*

MISSOURI PUBLIC SERVICE COMMISSION

INDUSTRY ANALYSIS DIVISION

TARIFF/RATE DESIGN DEPARTMENT

DIRECT TESTIMONY

OF

MICHAEL L. STAHLMAN

**THE EMPIRE DISTRICT ELECTRIC COMPANY,
d/b/a Liberty**

CASE NO. ER-2024-0261

Jefferson City, Missouri
July 2025

DIRECT TESTIMONY

OF

MICHAEL L. STAHLMAN

**THE EMPIRE DISTRICT ELECTRIC COMPANY,
d/b/a Liberty**

CASE NO. ER-2024-0261

Q. Please state your name and business address.

A. My name is Michael L. Stahlman, and my business address is Missouri Public Service Commission, P.O. Box 360, Jefferson City, Missouri 65102.

Q. By whom are you employed and in what capacity?

A. I am employed by the Missouri Public Service Commission (“Commission”) as a Regulatory Economist for the Tariff/Rate Design Department, in the Industry Analysis Division.

Q. Please describe your educational and work background.

A. Please see Schedule MLS-1.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to describe the weather normalization adjustments, 365-day adjustments, and rate block adjustments I provided to Staff Witness Kim Cox and the Load Requirement at Transmission I provided to Staff witness Shawn E. Lange.

Q. Please summarize your testimony.

A. I performed regression analysis using weather information provided by the Midwest Regional Climate Center and load information provided by The Empire District Electric Company, d/b/a/ Liberty (“Empire”) to estimate the impact of weather on the test year

1 and update period, including the changes to which rate block energy was billed.
2 This information was provided to Staff Witness Kim Cox.

3 Further, I estimated the impact of weather on Load Requirement at Transmission, which
4 was provided to Staff Witness Shawn E. Lange.

5 Q. Do you have any concerns about the load data provided by Empire?

6 A. Yes. Some of the data points do not appear to be internally consistent with the
7 remaining data. On January 16, 2025, I notified Empire of issues in the daily load data, provided
8 in response to Staff Data Request 0102, which is used in the regression analysis for weather
9 normalization. The response, attached as Schedule MLS-2 indicated that there were issues in
10 retrieving the data on key dates. For those days, I used a function of MetrixND, which is a
11 regression analysis software package, to essentially ignore those dates in the
12 regression analysis.

13 There was also an issue with the bill cycle data provided in response to Staff Data
14 Request 0100.

15 **



16 **

1 For this data, I used the total revenue month data provided by Staff Witness Kim Cox and
2 proportioned it to the bill cycles based on the data provided. This did not impact the weather
3 normalization percentage, but did impact the 365-day adjustment.

4 Another data issue was that the winter blocked usage for April of the Non-Standard
5 General Service Rate Plan (Schedule NS-GS) was inconsistent with the blocked percentages in
6 the other months. For my blocked-usage analysis, I excluded that month from the regression
7 and used the estimated percentage for the weather-normalized block percentage.

8 Q. What is weather normalization?

9 A. Weather normalization is the process of adjusting billing determinants to
10 account for differences in weather from year to year. Electricity consumption is highly
11 responsive to the weather, specifically temperature for many rate classes. As the temperature
12 reaches higher levels, the demand for cooling, air conditioning and fans increases the
13 customers' consumption of electricity. As the weather becomes colder, the demand for
14 additional heating, via electric space heating, also forces an increase in electricity consumption.
15 Electric air conditioning and space heating is prevalent in Empire's service territory; therefore,
16 it follows that Empire's electric load is linked with and responsive to temperature. Therefore,
17 Staff uses the correlation of customer class usage with weather and other variables to estimate
18 usage for a year as if the weather was "normal."

19 Q. What is "normal weather"?

20 A. Normal weather is an estimate of what the average temperatures would be for a
21 typical year at a given location. Staff witness Randall T. Jennings provided the normal and
22 actual temperatures for the weather normalization process.

23 Q. What is a weather normalization adjustment factor?

1 A. The weather normalization adjustment factor is a percentage value that I provide
2 to Staff witness Kim Cox that is the end result of the weather normalization process. It is a
3 monthly value specific to a particular class of Empire's customers that adjusts actual usage in
4 a given revenue month to an estimate of what usage would have been under normal weather.
5 This factor also considers the mismatch of when a customer uses the energy with when a
6 customer was billed for that energy.

7 Q. What is the 365-day adjustment?

8 A. The 365-day adjustment accounts for certain bill cycles having greater, or less
9 than, 365 days of consumption. Empire bills its customers in a given revenue month over 21
10 different bill cycles. A bill cycle is period between the dates on which a customer's meter(s) is
11 read. These cycles typically have usage in two different calendar months and, due to weekends
12 and/or holidays, will often have more or less than 365 days of usage. Staff developed the
13 365-day adjustment by calculating how many days each bill cycle was over/under 365 days,
14 then subtracting/adding an average use day for each over/under day for each cycle, and then
15 calculating a percentage adjustment factor for each class based on the sum of the adjustments
16 for each bill cycle. This 365-day adjustment factor was provided to Staff Witness Kim Cox.

17 Q. What are the rate block adjustments?

18 A. Some of the residential and SGS rate schedules have two winter block rates; one
19 rate for usage at or below 600 kWh for residential [700kWh for Small General Service ("SGS")]
20 and another rate for usage above 600 kWh [700kWh]. The rate block adjustments estimate how
21 the overall energy consumption in a given revenue month will be distributed into the different
22 rate blocks.

1 Q. Why is it important to estimate the distribution of usage in the different
2 rate blocks?

3 A. Empire's customers do not have identical usage, so an increase of usage may be
4 in Block 1 for one customer and Block 2 for another. Thus, applying the changes incorrectly
5 will have an impact on the revenues.

6 Q. How did Staff estimate the rate block adjustment?

7 A. A regression analysis was performed on Residential and SGS Block 1 usage
8 percentage as a function of the total rate schedule usage per customer. Weather-normalized
9 usage was then substituted to have an estimated Block 1 usage percentages for each month,
10 which was used to adjust the actual Block 1 usage percentages for each month. These results
11 were given to Staff Witness Kim Cox.

12 Q. What is the Load Requirement at Transmission analysis?

13 A. This analysis provides an estimate of the normalized amount of electricity
14 required to meet the energy demands of both the company's customers and its own needs at the
15 transmission level. This analysis is used by Staff Witness Shawn E. Lange. The hourly loads
16 used in the analysis was obtained from Empire's data provided in accordance with 20 CSR
17 4240-3.190(1)(C).

18 Q. How was this analysis performed?

19 A. The analysis is performed nearly identically as the rate classes with Time of Use
20 ("TOU") rate schedules discussed above. Regression analysis with actual loads and
21 temperatures is performed for both peak and average energy consumption, then simulated with
22 normal weather. The difference is that the results are also scaled to equal the final total Missouri

Direct Testimony of
Michael L. Stahlman

1 Normalized load, calculated by Staff Witness Kim Cox, with a loss factor for transmission
2 losses, provided by Staff witness Alan J. Bax.

3 Q. Does this conclude your testimony?

4 A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the Matter of the Request of The Empire)
District Electric Company d/b/a Liberty for)
Authority to File Tariffs Increasing Rates)
for Electric Service Provided to Customers)
in Its Missouri Service Area)
Case No. ER-2024-0261

AFFIDAVIT OF MICHAEL L. STAHLMAN

STATE OF MISSOURI)
)
COUNTY OF COLE) ss.

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

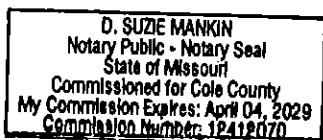
Further the Affiant sayeth not.

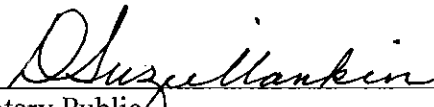


MICHAEL L. STAHLMAN

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 26th day of June 2025.





Notary Public

Michael L. Stahlman

Education

2009 M. S., Agricultural Economics, University of Missouri, Columbia.
2007 B.A., Economics, Summa Cum Laude, Westminster College, Fulton, MO.

Professional Experience

2010 - Regulatory Economist, Missouri Public Service Commission
2007 – 2009 Graduate Research Assistant, University of Missouri
2008 Graduate Teaching Assistant, University of Missouri
2007 American Institute for Economic Research (AIER) Summer
Fellowship Program
2006 Price Analysis Intern, Food and Agricultural Policy Research Institute
(FAPRI), Columbia, MO
2006 Legislative Intern for State Representative Munzlinger
2005 – 2006 Certified Tutor in Macroeconomics, Westminster College, Fulton, MO
1998 – 2004 Engineering Watch Supervisor, United States Navy

Expert Witness Testimony

Union Electric Company d/b/a AmerenUE GR-2010-0363
In the Matter of Union Electric Company d/b/a AmerenUE for Authority to File
Tariffs Increasing Rates for Natural Gas Service Provided to Customers in the
Company's Missouri Service Area

Union Electric Company d/b/a Ameren Missouri GT-2011-0410
In the Matter of the Union Electric Company's (d/b/a Ameren Missouri) Gas
Service Tariffs Removing Certain Provisions for Rebates from Its Missouri Energy
Efficient Natural Gas Equipment and Building Shell Measure Rebate Program

KCP&L Great Missouri Operations Company EO-2012-0009
In the Matter of KCP&L Greater Missouri Operations Company's Notice of Intent
to File an Application for Authority to Establish a Demand-Side Programs
Investment Mechanism

Union Electric Company d/b/a Ameren Missouri EO-2012-0142
In the Matter of Union Electric Company d/b/a Ameren Missouri's Filing to
Implement Regulatory Changes Furtherance of Energy Efficiency as Allowed by
MEEIA

Kansas City Power & Light Company EO-2012-0323
In the Matter of the Resource Plan of Kansas City Power & Light Company

KCP&L Great Missouri Operations Company EO-2012-0324
In the Matter of the Resource Plan of KCP&L Greater Missouri Operations
Company

Kansas City Power & Light Company, KCP&L Great Missouri Operations Company, and Transource Missouri EA-2013-0098
EO-2012-0367
In the Matter of the Application of Transource Missouri, LLC for a Certificate of
Convenience and Necessity Authorizing it to Construct, Finance, Own, Operate,
and Maintain the Iatan-Nashua and Sibley-Nebraska City Electric Transmission
Projects

cont'd Expert Witness Testimony
Michael L. Stahlman

Kansas City Power & Light Company	EO-2012-0135
KCP&L Great Missouri Operations Company	EO-2012-0136
In the Matter of the Application of Kansas City Power & Light Company [KCP&L Great Missouri Operations Company] for Authority to Extend the Transfer of Functional Control of Certain Transmission Assets to the Southwest Power Pool, Inc.	
Kansas City Power & Light Company	EU-2014-0077
KCP&L Great Missouri Operations Company	
In the Matter of the Application of Kansas City Power & Light Company and KCP&L Greater Missouri Operations Company for the Issuance of an Accounting Authority Order relating to their Electrical Operations and for a Contingent Waiver of the Notice Requirement of 4 CSR 240-4.020(2)	
Kansas City Power & Light Company	EO-2014-0095
In the Matter of Kansas City Power & Light Company's Notice of Intent to File an Application for Authority To Establish a Demand-Side Programs Investment Mechanism	
Veolia Energy Kansas City, Inc	HR-2014-0066
In the Matter of Veolia Energy Kansas City, Inc for Authority to File Tariffs to Increase Rates	
Grain Belt Express Clean Line, LLC	EA-2014-0207
In the Matter of the Application of Grain Belt Express Clean Line LLC for a Certificate of Convenience and Necessity Authorizing It to Construct, Own, Operate, Control, Manage, and Maintain a High Voltage, Direct Current Transmission Line and an Associated Converter Station Providing an Interconnection on the Maywood - Montgomery 345 kV Transmission Line	
Union Electric Company d/b/a Ameren Missouri	ER-2014-0258
In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariff to Increase Its Revenues for Electric Service	
Empire District Electric Company	ER-2014-0351
In the Matter of The Empire District Electric Company for Authority to File Tariffs Increasing Rates for Electric Service Provided to Customers in the Company's Missouri Service Area	
Kansas City Power & Light Company	ER-2014-0370
In the Matter of Kansas City Power & Light Company's Request for Authority to Implement a General Rate Increase for Electric Service	
Kansas City Power & Light Company	EO-2014-0240
In the Matter of Kansas City Power & Light Company's Filing for Approval of Demand-Side Programs and for Authority to Establish a Demand-Side Programs Investment Mechanism	
KCP&L Great Missouri Operations Company	EO-2014-0241
In the Matter of KCP&L Greater Missouri Operations Company's Filing for Approval of Demand-Side Programs and for Authority to Establish a Demand-Side Programs Investment Mechanism	

cont'd Expert Witness Testimony
Michael L. Stahlman

Ameren Transmission Company of Illinois EA-2015-0146
In the Matter of the Application of Ameren Transmission Company of Illinois for
Other Relief or, in the Alternative, a Certificate of Public Convenience and
Necessity Authorizing it to Construct, Install, Own, Operate, Maintain and
Otherwise Control and Manage a 345,000-volt Electric Transmission Line from
Palmyra, Missouri to the Iowa Border and an Associated Substation Near
Kirksville, Missouri

Empire District Electric Company ER-2016-0023
In the Matter of The Empire District Electric Company's Request for Authority to
Implement a General Rate Increase for Electric Service

KCP&L Great Missouri Operations Company ER-2016-0156
In the Matter of KCP&L Greater Missouri Operations Company's Request for
Authority to Implement a General Rate Increase for Electric Service

Kansas City Power & Light Company ER-2016-0285
In the Matter of Kansas City Power & Light Company's Request for Authority to
Implement A General Rate Increase for Electric Service

Union Electric Company d/b/a Ameren Missouri ER-2016-0179
In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariff to
Increase Its Revenues for Electric Service

Grain Belt Express Clean Line, LLC EA-2016-0358
In the Matter of the Application of Grain Belt Express Clean Line LLC for a
Certificate of Convenience and Necessity Authorizing it to Construct, Own,
Operate, Control, Manage and Maintain a High Voltage, Direct Current
Transmission Line and an Associated Converter Station Providing an
Interconnection on the Maywood-Montgomery 345kV transmission line.

Spire Missouri, Inc. GR-2017-0215 and GR-2017-0216
In the Matter of Spire Missouri, Inc.'s Request to Increase Its Revenues for Gas
Service

Liberty Utilities GR-2018-0013
In the Matter of Liberty Utilities (Midstates Natural Gas) Corp. d/b/a Liberty
Utilities' Tariff Revisions Designed to Implement a General Rate Increase for
Natural Gas Service in the Missouri Service Areas of the Company

Spire Missouri, Inc. GO-2019-0058 and GO-2019-0059
In the Matter of Spire Missouri, Inc. d/b/a Spire's Request to Decrease [Increase]
WNAR

Grain Belt Express Clean Line LLC EM-2019-0150
Invenergy Transmission LLC
Invenergy Investment Company LLC
In the Matter of the Joint Application of Invenergy Transmission LLC, Invenergy
Investment Company LLC, Grain Belt Express Clean Line LLC and Grain Belt
Express Holding LLC for an Order Approving the Acquisition by Invenergy
Transmission LLC of Grain Belt Express Clean Line LLC

cont'd Expert Witness Testimony
Michael L. Stahlman

Union Electric Company d/b/a Ameren Missouri In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Increase its Revenues for Natural Gas Service	GR-2019-0077
Union Electric Company d/b/a Ameren Missouri In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Decrease Its Revenues for Electric Service	ER-2019-0335
Empire District Electric Company In the Matter of The Empire District Electric Company's Request for Authority to File Tariffs Increasing Rates for Electric Service Provided to Customers in its Missouri Service Area	ER-2019-0374
Union Electric Company d/b/a Ameren Missouri In the Matter of the Application of Union Electric Company d/b/a Ameren Missouri for Permission and Approval and a Certificate of Public Convenience and Necessity Under 20 CSR 4240-3.105	EA-2020-0371
Spire Missouri, Inc. In the Matter of Spire Missouri Inc.'s d/b/a Spire Request for Authority to Implement a General Rate Increase for Natural Gas Service Provided in the Company's Missouri Service Areas	GR-2021-0108
Union Electric Company d/b/a Ameren Missouri In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Adjust Its Revenues for Electric Service	ER-2021-0240
Union Electric Company d/b/a Ameren Missouri In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Adjust Its Revenues for Natural Gas Service	GR-2021-0241
The Empire District Electric Company In the Matter of the Request of The Empire District Electric Company d/b/a Liberty for Authority to File Tariffs Increasing Rates for Electric Service Provided to Customers in its Missouri Service Area	ER-2021-0312
The Empire District Gas Company In the Matter of The Empire District Gas Company's d/b/a Liberty Request to File Tariffs to Change its Rates for Natural Gas Service	GR-2021-0320
Ameren Transmission Company of Illinois In the Matter of the Application of Ameren Transmission Company of Illinois for a Certificate of Convenience and Necessity Under Section 393.170.1, RSMo. Relating to Transmission Investments in Southeast Missouri	EA-2022-0099
Evergy Metro, Inc d/b/a Evergy Missouri Metro 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	ER-2022-0129
Evergy Missouri West, Inc. d/b/a Evergy Missouri West 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	ER-2022-0130

cont'd Expert Witness Testimony
Michael L. Stahlman

Spire Missouri, Inc. In the Matter of Spire Missouri, Inc. d/b/a Spire's Request for Authority to Implement a General Rate Increase for Natural Gas Service Provided in the Company's Missouri Service Areas	GR-2022-0179
Union Electric Company d/b/a Ameren Missouri In the Matter of the Application of Union Electric Company d/b/a Ameren Missouri for Approval of a Subscription-Based Renewable Energy Program	EA-2022-0245
Union Electric Company d/b/a Ameren Missouri In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Adjust Its Revenues for Electric Service	ER-2022-0337
Grain Belt Express Clean Line LLC In the Matter of the Application of Grain Belt Express LLC for an Amendment to its Certificate of Convenience and Necessity Authorizing it to Construct, Own, Operate, Control, Manage, and Maintain a High Voltage, Direct Current Transmission Line and Associated Converter Station	EA-2023-0017
Union Electric Company d/b/a Ameren Missouri In the Matter of the Application of Union Electric Company d/b/a Ameren Missouri for Permission and Approval and Certificates of Public Convenience and Necessity Authorizing it to Construct Renewable Generation Facilities	EA-2023-0286
Evergy Metro, Inc d/b/a Evergy Missouri Metro Evergy Missouri West, Inc. d/b/a Evergy Missouri West In the Matter of Requests for Customer Account Data Production from Evergy Metro, Inc. d/b/a Evergy Missouri Metro and Evergy Missouri West, Inc. d/b/a Evergy Missouri West	EO-2024-0002
Liberty Utilities (Midstates Natural Gas) Corp. d/b/a Liberty In the Matter of the Request of Liberty Utilities (Midstates Natural Gas) Corp. d/b/a Liberty to Implement a General Rate Increase for Natural Gas Service in the Missouri Service Areas of the Company	GR-2024-0106
Evergy Missouri West, Inc. d/b/a Evergy Missouri West 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	ER-2024-0189
Union Electric Company d/b/a Ameren Missouri In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Adjust Its Revenues for Electric Service	ER-2024-0319
Spire Missouri, Inc. In the Matter of Spire Missouri Inc. d/b/a Spire's Request for Authority to Implement a General Rate Increase for Natural Gas Service Provided in the Company's Missouri Service Areas	GR-2025-0107

RE: ER-2024-0261, DR 102

From Charlotte Emery <Charlotte.Emery@libertyutilities.com>

Date Tue 1/21/2025 10:52 AM

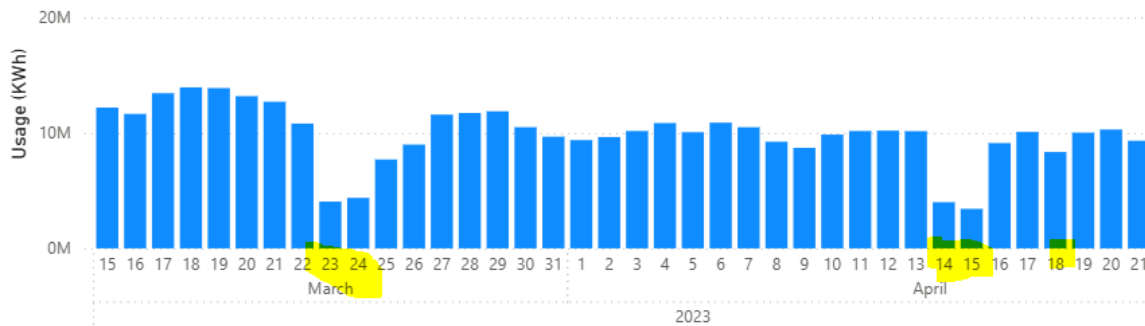
To Stahlman, Michael <Michael.Stahlman@psc.mo.gov>

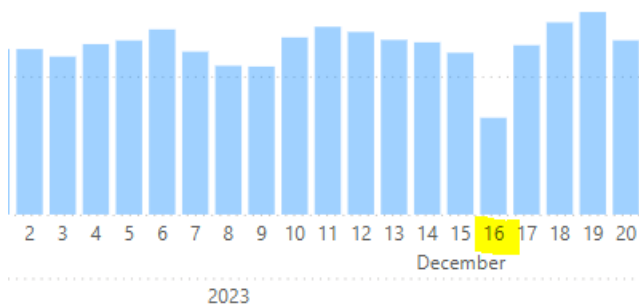
Cc Luebbert, J <J.Luebbert@psc.mo.gov>; Leigha Palumbo <Leigha.Palumbo@libertyutilities.com>

Hi Michael-

As a follow-up to your inquiry below we wanted to provide you feedback that we received from our Load Research team member. She indicated we had several days in 2023 that Itron was unable to recover the data for us. This issue occurred during the initial set up of the data lake and we were still working through sanitizing the data and have since come up with a better process of contacting Itron when we are missing large chunks of meter data to hopefully reduce this issue from occurring in the future. Below are screenshots of the days in question and how they compare to the surrounding days. We also had an issue on 12/16/23 and we were not able to recover the data that day either. At the time of these AMI issues, the majority of LP customers would most likely still have been on the MV90 system...which we will note was manually provided to entered into the data lake, so they wouldn't have been as impacted by an AMI issue as other classes like Residential that are mostly AMI. Please let us know if you have any additional questions/comments. Thanks!

Total Usage per Rate Plan





From: Stahlman, Michael <Michael.Stahlman@psc.mo.gov>
Sent: Thursday, January 16, 2025 12:58 PM
To: Charlotte Emery <Charlotte.Emery@libertyutilities.com>
Cc: Luebbert, J <J.Luebbert@psc.mo.gov>
Subject: ER-2024-0261, DR 102

As part of the response to DR 102 in the rate case, we've received a file entitled "LoadData.xlsx" as part of the zipped files. I can send a snapshot of the data if it would help, but the load for 3/23/2023-3/25/2023, 4/14/2023-4/15/2023, and 4/18/2023 seems to be unreasonably low. I mainly looked at residential on those dates, but the other classes except LP and Trans seem to be low as well. This data was also used in Eric Fox's workpapers which were attached to that same DR.

Can you verify if that data is correct, and if so, an explanation on why there was seemingly a general system outage or provide an update if that information is not correct? Let me know if you need more help in understanding what I'm looking at.

Michael Stahlman

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