

# Exhibit No. 210

*Exhibit No.:*  
*Issue(s):* *Market Prices*  
*Witness:* *Saeid R. Dindarloo*  
*Sponsoring Party:* *MoPSC Staff*  
*Type of Exhibit:* *Direct Testimony*  
*Case Nos.:* *ER-2022-0129 and*  
*ER-2022-0130*  
*Date Testimony Prepared:* *June 8, 2022*

**MISSOURI PUBLIC SERVICE COMMISSION**

**INDUSTRY ANALYSIS DIVISION**

**TARIFF AND RATE DESIGN DEPARTMENT**

**DIRECT TESTIMONY**

**OF**

**SAEID R. DINDARLOO, PH.D., P.E.**

**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*

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**SAEID R. DINDARLOO, PH.D., P.E.**

**Evergy Metro, Inc. d/b/a Evergy Missouri Metro  
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3 **OF**

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

9 Q. Please state your name and business address.

10 A. My name is Saeid R. Dindarloo and my business address is Missouri Public  
11 Service Commission, P.O. Box 360, Jefferson City, Missouri, 65102.

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

13 A. I am employed by the Missouri Public Service Commission (“Commission”) as  
14 a Professional Engineer in the Engineering Analysis Department, Industry Analysis Division,  
15 Commission Staff Division.

16 Q. Please describe your educational background and work experience.

17 A. Please see Schedule SRD-01 for my educational background and work  
18 experience.

19 Q. Have you previously filed testimony before the Commission?

20 A. Yes, I have filed rebuttal testimony in previous electric and gas rate cases.

21 Q. What knowledge, skills, experience, training and education do you have in the  
22 areas of which you are testifying as an expert witness?

23 A. I have received continuous training at in-house and outside seminars on  
24 technical matters since I began my employment at the Commission. I have been employed by

1 this Commission as an Associate/Professional Engineer for 2 years, and have submitted several  
2 rebuttal testimonies and technical memorandums before the Commission.

3 **EXECUTIVE SUMMARY**

4 Q. What is the purpose of your direct testimony?

5 A. The purpose of my direct testimony is to describe Staff's method for estimating  
6 the wholesale market prices for Evergy Missouri West ("EMW") and Evergy Missouri Metro  
7 ("EMM") using actual, historical day-ahead locational marginal market prices, calculated by  
8 SPP, for the three-year period ending December 31, 2021, to be used in Staff's production  
9 cost model.

10 Q. Through this testimony, do you describe the development of workproduct which you  
11 provided to another Staff witness for the development of an issue?

12 A. Yes. I provided the estimated wholesale market prices to Staff Witnesses  
13 Charles Poston and Shawn Lange to calculate Staff's recommended level of variable fuel and  
14 purchase power expense.

15 **WHOLESALE ELECTRICITY MARKETS**

16 Q. What are market prices?

17 A. Market prices are the prices for energy at a particular place and time, as  
18 determined in an integrated electricity marketplace ("IM") by the applicable Regional  
19 Transmission Organizations/Independent System Operators ("RTO/ISO"). Market prices are  
20 electricity prices that electricity buyers (e.g., load serving entities) pay and sellers (e.g., electric  
21 generating units) receive per megawatt-hour of electricity traded in the IM.

22 Q. How are market prices determined by an RTO/ISO?

1           A.       EMW and EMM are in the Southwest Power Pool (“SPP”) IM’s footprint and  
2 use SPP day-ahead and real-time markets for the portion of their daily electricity buying and  
3 selling that they perform through SPP. SPP has two energy markets (i) day-ahead market and  
4 (ii) real-time market.

5           (i)       The purpose of the day-ahead market is to provide the market participants with  
6 a financial mechanism to secure prices and hedge against risks due to price  
7 fluctuations, one day before the operating or dispatch day. It also provides a  
8 means for resource commitment and short-term scheduling before the  
9 dispatching day. In the day-ahead market, electricity sellers and buyers submit  
10 their price offers and bids for every hour of the following day for different  
11 settlement locations (“nodes”)<sup>1</sup>. SPP uses these bids to construct supply and  
12 demand curves for the operating day for every settlement node. The intersection  
13 of the supply and demand curve is the nodal clearing price for every hour of the  
14 dispatch day. All offers below the clearing price and all bids above the clearing  
15 price will be committed and scheduled for the next day’s dispatch. In the next  
16 step, bids and offers of the cleared sellers and buyers along with the binding  
17 transmission constraints are used in a pricing software to determine locational  
18 marginal prices (“LMP”), which are determined in the day-ahead market for  
19 every node (“DA LMP”)<sup>2</sup>.

20           (ii)       Around 95% of transactions happen in the day-ahead market. However, due to  
21 unpredictable, instantaneous fluctuations in the real-time market such as load

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<sup>1</sup> [ISO New England- Locational Marginal Pricing \(iso-ne.com\)](http://iso-ne.com)

<sup>2</sup> FERC, Staff Report (Handbook of Energy Markets), PP. 97-98.

1                   fluctuations, around 5% of transactions are completed in real-time to meet the  
2                   load needs and other changes such as unplanned outages. Accordingly, the real-  
3                   time market prices are determined every five minutes for every node, which are  
4                   called real-time LMPs<sup>3</sup>.

5           Q.       What is the purpose and use of market prices in this case?

6           A.       Staff's estimated DA LMPs are used in production cost modelling to determine  
7           the economic dispatch of the generating units owned or operated by EMM and by EMW, and  
8           also to determine the cost of EMM and EMW to acquire or retain energy to serve the respective  
9           load of each utility.

10          Q.       Please explain Staff's method for determining market prices.

11          A.       Staff used the SPP's DA LMPs for the three-year period ending December 31,  
12          2021, and calculated hourly averages for every settlement node where Evergy buys or sells  
13          electricity through SPP's IM. Staff used day-ahead LMPs because approximately,  
14          on average, 95% of SPP IM's buy/sell transactions are settled in the day-ahead market while  
15          only about 5% of transactions are completed in the real-time market. While Staff has not used  
16          this method in previous Evergy rate cases, Staff has used this method in previous  
17          Empire District Electric rate cases, ER-2019-0374 and ER-2021-0312.

18          Q.       What alternative methods can be used for calculating market prices?

19          A.       Market prices can alternatively be estimated using statistical and econometric  
20          methods such as time-series analysis (e.g., the method of Seasonal Autoregressive Integrated  
21          Moving Averages and Exponential Smoothing) by using historical DA LMPs. Market prices  
22          can also be simulated using production cost models. Staff did not use alternative methods

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<sup>3</sup> SPP- State of Market report, 2020, P. 56.

1 because (i) Staff does not have access to such tools,<sup>4</sup> and (ii) the alternative methods have their  
2 own limitations.<sup>5</sup>

3 Q. How did Staff take the effect of Storm Uri's market prices into account?

4 A. Because the market prices were abnormally high during the winter storm Uri in  
5 February 2021, Staff did not include them for its DA LMP calculations for the test year. If  
6 included in the calculations February 2021 market prices would significantly skew the average  
7 DA LMPS for the month of February in the test year, which would not be representative of a  
8 typical February prices.

9 Since market prices during February 2021 were unprecedentedly inflated due to the  
10 winter storm Uri, they are considered outliers from the statistical analysis standpoint. One of  
11 the most widely-used methods of dealing with outliers is to remove them from the analysis.  
12 Alternatively, the outliers can be replaced with more representative numbers when available.  
13 In this case, because representative market prices for February 2021 are not available, Staff  
14 decided to use the method of removing outliers. Therefore, February 2021 market prices were  
15 excluded from the analysis. Instead, the average of February 2019 and February 2020 DA LMPs  
16 were used. This method is consistent with Staff's method in ER-2021-0312 and ER-2021-0240.

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<sup>4</sup> Staff has access to software used for production cost modeling; however, Staff does not have access to data for all generating units in the eastern interconnect. Also, Staff does not have access to econometric modeling tools such as SAS and SPSS.

<sup>5</sup> The limitations of statistical/econometric methods are subjectivity in determining model parameters and sensitivity to outliers. Also, in production cost models, the simulated market prices may not be necessarily calculated based on actual supply offers and demand bids submitted by all market participants in the day-ahead market. Instead computer models use estimated minimum energy cost (incremental cost of production, considering fuel costs, O&M costs, emissions costs, etc.), transmission loss, and load forecast along with physical transmission constraints to solve a minimum-cost optimization problem (security-constrained, economic-dispatch co-optimization) to estimate nodal market prices. Therefore, computer simulation is prone to several estimation errors that are inherent in its approximation algorithms. Also, all production cost models have several general assumptions and limitations in their production cost optimization algorithms as documented in their manuals.



Direct Testimony of  
Saeid R. Dindarloo, Ph.D., P.E.

1 Q. Does this conclude your direct testimony?

2 A. Yes.

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 SAEID R. DINDARLOO, PhD, PE**

STATE OF MISSOURI )  
) ss.  
COUNTY OF COLE )

**COMES NOW SAEID R. DINDARLOO, PhD, PE** and on his oath declares that he is of sound mind and lawful age; that he contributed to the foregoing *Direct Testimony of Saeid R. Dindarloo, PhD, PE*; and that the same is true and correct according to his best knowledge and belief.


Further the Affiant sayeth not.

  
SAEID R. DINDARLOO, PhD, 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 7<sup>th</sup> day of June 2022.

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

  
Notary Public

**Saeid R. Dindarloo, Ph.D., P.E.**

I am employed by the Missouri Public Service Commission as a Professional Engineer in the Engineering Analysis Department at the Industry Analysis Division. I mainly review and analyze electric and gas rate cases, and provide recommendations to the Commission as a subject-matter expert.

**Educational Background and Work Experience**

I obtained Bachelor of Science and Master of Science degrees, both in Mining Engineering, in 2006 and 2008, respectively. I also received a Ph.D. degree in Mining Engineering from Missouri University of Science and Technology in 2012. Prior to joining the Commission in 2020, I worked for 12 years, on several engineering projects, in different capacities, in both the public and private sectors. I was employed by two international mining consulting firms from 2008 to 2012; Missouri University of Science and Technology from 2012 to 2017; Missouri Department of Social Services from 2017 to 2018; Missouri Department of Natural Resources from 2018 to 2020; and Missouri Public Service Commission since 2020. In addition, I have published 25 related research and technical papers in several relevant peer-reviewed scientific journals such as the journal of Energy, International Journal of Coal Geology, Applied Energy journal, Coal Combustion & Gasification Products journal, and Quality & Reliability Engineering International journal. Below is a list of cases in which I have participated since 2020.

**Case Participation (Saied Dindarloo)**

<b>Case/Tracking No.</b>	<b>Utility Type</b>	<b>Type Of Case</b>	<b>Designation</b>
EA-2020-0371	Electric	Application for Certificate	Staff
EA-2022-0043	Electric	Application for Certificate	SME
EC-2022-0148	Electric	Complaint	SME
EO-2021-0308	Electric	Other	SME
EO-2021-0327	Electric	Other	SME
EO-2021-0330	Electric	Other	SME
EO-2021-0344	Electric	Other	Staff
EO-2021-0345	Electric	Other	Staff
EO-2021-0346	Electric	Other	Staff
EO-2021-0347	Electric	Other	Staff
EO-2021-0348	Electric	Other	Staff
EO-2021-0352	Electric	Other	SME
EO-2021-0380	Electric	Other	SME
EO-2021-0383	Electric	Other	SME
EO-2021-0404	Electric	Other	SME
EO-2021-0405	Electric	Other	SME
EO-2021-0431	Electric	Other	SME
EO-2021-0432	Electric	Other	SME
EO-2022-0001	Electric	Other	SME
EO-2022-0002	Electric	Other	SME
EO-2022-0006	Electric	Other	SME
EO-2022-0061	Electric	Other	Staff
EO-2022-0215	Electric	Other	SME
EO-2022-0300	Electric	Other	SME
EO-2022-0302	Electric	Other	Staff
ER-2021-0312	Electric	Rate Case	SME
ER-2022-0129	Electric	Rate Case	SME
EW-2021-0267	Electric	Working Group	Staff
GO-2022-0070	Gas	Other	Staff - FA-M
GR-2021-0108	Gas	Rate Case	SME
GT-2022-0063	Gas	Tariff - Formal	Staff - FA-M