Exhibit No.:	
Issues:	*Production Cost Model*
Witness:	*Shawn E. Lange*
Sponsoring Party:	*MO PSC Staff*
Type of Exhibit:	*Surrebuttal Testimony*
Case No.:	*ER-2016-0023*
Date Testimony Prepared:	*May 16, 2016*

MISSOURI PUBLIC SERVICE COMMISSION

OPERATIONAL ANALYSIS DEPARTMENT

ENGINEERING ANALYSIS UNIT

SURREBUTTAL TESTIMONY

OF

SHAWN E. LANGE

THE EMPIRE DISTRICT ELECTRIC COMPANY

CASE NO. ER-2016-0023

Jefferson City, Missouri
May 2016

SURREBUTTAL TESTIMONY

OF

SHAWN E. LANGE

THE EMPIRE DISTRICT ELECTRIC COMPANY

CASE NO. ER-2016-0023

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. Are you the same Shawn E. Lange that filed direct testimony in this proceeding?

A. Yes, I am.

Q. What is the purpose of your surrebuttal testimony?

A. My surrebuttal testimony is in response to The Empire District Electric Company ("Empire") witness Mr. Todd W. Tarter's rebuttal testimony; in particular to respond to Mr. Tarter's view of Staff's level of coal generation, State Line combined cycle heat rates, level of Stateline CT and Energy Center 1 through 4 generation, and Staff's modeling of Empire's generation fleet.

Coal Generation

Q. Does Staff's fuel model produce unreasonably high generation levels for coal resources?[1]

A. No. While Staff's modeled level of coal generation is higher than Empire's modeled level of coal generation, this difference is predominately driven by the difference in

[1] Tarter Rebuttal, page 5, lines 17-23.

Asbury 1 generation. The table below shows the generation from each coal plant in Staff's direct run and Empire's direct run.

Coal Unit	Staff MWH	Empire MWH
IATAN 1	578,592	572,300
IATAN 2	799,680	726,700
PLUM POINT	675,300	612,200
ASBURY 1	1,454,385	1,099,400

Q. Why is there a difference in generation at Asbury?

A. There are differences in model inputs between Staff's model and Empire's model. One difference is the capacity of Asbury 1. Based on Mr. Tarter's direct workpapers, Empire used a modeled maximum capacity of 186 MW. Staff used a modeled capacity of 195 MW.

Q. What was the source of Staff's use of the 195 MW capacity value for Asbury?

A. Staff relied on the reports Empire provided pursuant to CSR 240-3.190 that were reported after turbine upgrades were completed at Asbury 1 in February of 2015.

Q. Did the turbine work increase the capacity at Asbury 1?

A. Yes. In its reporting pursuant to CSR 240-3.190, Empire provided outage reporting indicating an increase to the reported maximum capacity of Asbury 1. Empire's outage information reports the amount of MWs the unit is down, which can be a partial outage (at some number less than the maximum capacity) or a full outage (at the maximum capacity). Therefore, when the unit is shut down for maintenance, the maximum capacity is the amount of MWs the unit is down. Based on these reports, the maximum capacity of the unit changed from 189 MW to 194 MW in the February 2015 time frame. In the February 2016 outage reporting, Empire indicated an increase in the Asbury 1 capacity to 198 MW.

Q. What work has Empire done at Asbury 1 in recent years?

A. Empire installed Air Quality Control System ("AQCS") upgrades on the Asbury 1 unit. Those upgrades were completed in February 2015. At the same time, Empire had some turbine work done that ultimately increased the capacity of Asbury. Asbury 1's capacity, with the turbine upgrades, after parasitic loads related to the installed AQCS equipment, increased by approximately 5 MW.

Q. Is the 195 MW Asbury 1 capacity Staff used as a model input a conservative amount?

A. Yes. Staff's use of 195 MW is a conservative and representative capacity value for Asbury 1 capacity, since Asbury 1 generated above 195 MW approximately 11.06% of the time period 12 months ending September 30, 2015. This level of generation is also consistent with a conservative reading of data provided by Empire pursuant to CSR 240-3.190. Staff reviewed data for the 12 months ending September 30, 2015, and found that during that time period, Asbury 1 generated above 186 MW 27.39% of the time.

Q. Is Mr. Tarter's reference at page 6 to the year 2015 as an example of historic levels of generation at Asbury 1 reasonably representative of a year of "normal" generation?

A. No. Staff inputs a normalized level of outages for each plant as an input to the fuel model. In late 2014 through late 2015, Asbury underwent an atypical level of outages that is not likely to be experienced on an ongoing basis.

Q. What outages occurred at Asbury 1 during this time period?

A. Asbury was down for extended outages in late 2014 for the AQCS tie in, and was down for a maintenance outage in September and October 2015. Asbury 1 was down from September 12, 2014, through November 5, 2014, and September 29, 2015, through

October 19, 2015. Once the tie in outage is complete, there usually is a testing and tuning phase. This is a phase where there are typically outages due to new equipment as well as testing procedures that are designed to test whether the equipment will perform as the contractor illustrated.

Q. Was Asbury 1 the only coal plant with extensive outages in the 2014 – 2015 time period?

A. No. Although the coal units are each on a maintenance cycle, in 2014 – 2015 many of those cycles aligned. In the 2014 – 2015 period, all of Empire's coal units experienced a higher than normal level of both planned and forced outages. In 2014, Plum Point had 2,770.82 hours of equivalent forced outage; that is more than the sum of the equivalent forced outage hours for 2012, 2013, and January through September 2015 combined. To put that into perspective, 2,770.82 equates to the total number of hours in the period of January 1, 2014, through April 26, 2014. In January through September 2015, Iatan 1 was down for 1,614.61 planned outage hours, which was nearly the amount of the planned outage hours of the previous three years combined (1,769.85 planned outage hours). In January through September 2015, Iatan 2 had the most forced outages it had ever had (1,469.35 equivalent forced outage hours). In 2014, Iatan 2 had the most planned outages it ever had (1,627.74 planned outage hours).

Combustion Turbines

Q. Do you agree with Mr. Tarter's assertion that the level of generation associated with Energy Center 1 through 4 and Stateline 1 is too low?[2]

[2] Tarter Rebuttal, page 6, line 1, through page 7, line 1.

A. No. While the generation is low compared to Mr. Tarter's model run, at the end of the day, the natural gas price tends to set the market price in peak hours. Those plants typically run in peak hours. So for ratemaking purposes, the fuel and purchase power cost assumes that Empire is generating at Energy Center 1-4 or Stateline 1 for minimal margin, or buying market power at pennies over the cost of Empire-owned generation; the difference will be minimal. For example, consider an hour when the market price of energy is $35.00 and the cost of generating at one of Empire's peaking units is $34.99. If that unit generates 100 MWh in that hour, Empire's generation at that unit would increase 100 MWh; however, Empire's fuel and purchase power cost would only decrease by $1.00, compared to the price of purchased power. Similarly, if the market price for that hour fell to $34.98, Empire's generation for that unit would decrease by 100 MWh, but the reduction to Empire's fuel and purchase power cost would only be $1.00. Please see Staff witness Ms. Erin Maloney for Staff's additional testimony on Market Prices.

Q. Are there other aspects to the calculation of fuel and purchased power costs that contribute to differences between Empire's fuel model and Staff's fuel model?

A. Yes. For example, Staff separately analyzes Empire's activities in the Southwest Power Pool ("SPP") ancillary services market outside of Staff's fuel model. These ancillary service revenues and expenses are included in Staff's calculation of Empire's revenue requirement, as described in Staff witness Ms. Amanda C. McMellen's testimony.

Stateline Heat Rate

Q. Is Mr. Tarter claiming that Staff modeled Stateline using an inaccurate heat rate curve?

A. No. Mr. Tarter's concern is that under Staff's model, Stateline operated at a more efficient average than it did in Mr. Tarter's model. Apparently, in Mr. Tarter's model, the unit turned off and on more frequently than under Staff's model; or it ran at a very high level, or at a very low level. By way of analogy, if a car is operated in stop and go traffic, it will use more gallons to the mile than a car that runs at highway speed. Similarly, if that car is driven at 120 mph, or at 10 mph, it will probably use more gallons to the mile than the same car traveling at a constant 65 mph. Mr. Tarter's criticism is that Staff's fuel run modeled the Stateline units operating at a constant and efficient rate.

Modeling

Q. Mr. Tarter states "it does not appear that Staff's model has been refined enough to produce reasonable results."3 Does Staff agree with that statement?

A. No. Staff is uncertain whether Mr. Tarter is stating the software Staff is using is not refined enough, or whether the representation of Empire's system within the software package is not refined to Mr. Tarter's preferred level. Therefore, I will address both points.

If Mr. Tarter is referring to the Plexos software, the Plexos software has been used by American Electric Power ("AEP"), Westar, and the Midcontinent Independent System Operator ("MISO"). MISO is currently using the Plexos software in their Clean Power Plan ("CPP") modeling.

If Mr. Tarter is referring to the representation of Empire's system within Plexos, the results of Staff's direct case, at the fuel adjustment clause base factor level, is $25.64. Empire filed a base factor of $26.88. Below is a table showing the last two accumulation periods' actual $/MWh cost for Empire.

[3] Tarter Rebuttal, page 5, lines 9-10.

Period Ending	$/MWh
2/28/2016	$ 24.82
8/31/2015	$ 26.36

The model used in Empire's direct filing included the new capacity and lower unit operational fuel costs associated with the Riverton 12 Combined Cycle project. With the addition of the more efficient heat recovery steam generator on Riverton 12, one would expect the base factor level should be lower, not higher, than the last two accumulation periods which did not include the Riverton 12 Combined Cycle project. Staff's value of $25.64, without the Riverton 12 Combined Cycle Project, is comparable to the simple average of the two accumulation period's $/MWh ($25.59), which is also without the Riverton 12 Combined Cycle Project.

Q. Does this conclude your surrebuttal testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the Matter of The Empire District Electric Company's Request for Authority to Implement a General Rate Increase for Electric Service	)))	Case No. ER-2016-0023

AFFIDAVIT OF SHAWN E. LANGE

STATE OF MISSOURI	)	
	)	ss.
COUNTY OF COLE	)	

COMES NOW SHAWN E. LANGE and on his oath declares that he is of sound mind and lawful age; that he contributed to the foregoing SURREBUTTAL TESTIMONY; 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

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 16th day of May, 2016.

D. SUZIE MANKIN
Notary Public - Notary Seal
State of Missouri
Commissioned for Cole County
My Commission Expires: December 12, 2016
Commission Number: 12412070

D. Suzie Mankin
Notary Public