BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of The Dayton Power and Light Company for Approval of its Electric Security Plan.	:	Case No. 12-426-EL-SSO
In the Matter of the Application of The Dayton Power and Light Company for Approval of Revised Tariffs.	:	Case No. 12-427-EL-ATA
In the Matter of the Application of The Dayton Power and Light Company for Approval of Certain Accounting Authority.	:	Case No. 12-428-EL-AAM
In the Matter of the Application of The Dayton Power and Light Company for the Waiver of Certain Commission Rules.	:	Case No. 12-429-EL-WVR
In the Matter of the Application of The Dayton Power and Light Company to Establish Tariff Riders.	:	Case No. 12-672-EL-RDR

PREFILED TESTIMONY OF RODNEY P. WINDLE

PLANNING AND MARKET ANALYSIS DIVISION
ENERGY AND ENVIRONMENT DEPARTMENT
PUBLIC UTILITIES COMMISSION OF OHIO

Staff Exhibit _____

March 11, 2013

1. Q. Please state your name and business address.

A. My name is Rodney P. Windle. I am employed by the Public Utilities Commission of Ohio as a Utility Specialist II in the Planning and Market Analysis Division of the Energy and Environment Department. My responsibilities include energy forecasting as well as energy market monitoring and analysis.

2. Q. What are your qualifications for this position?

A. I have worked in my current position since July of 2009 and have been following energy market related developments since that time. I have benefitted from training courses that are specific to the PJM markets. I have received valuable on the job training in energy markets, including competitive bid price prediction, while fulfilling my duties as Staff.

3. Q. Do you have other relevant education and experience that you wish to share?

A. Prior to 2009, I was employed at Ohio EPA as an Environmental Specialist II. I evaluated and provided guidance for air permitting. Sometimes those duties included evaluating air permits for energy projects. Those evaluations included emissions projections, technology determinations, and cost benefit analyses. I was employed by Ohio EPA for 7 years and worked in on air permits for various energy projects at different points during the entire term I was employed.

I hold a B.Sc. degree in Environmental Engineering from Shawnee State University.

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

A. The purpose of my testimony is to develop two sets of projections of competitively bid retail prices that would result from a Market Rate Option (MRO); one set of prices for the period proposed by the Dayton Power and Light Company (company) in its revised electric security plan (ESP) application, and another set of prices based on the ESP period recommended by staff. The MROs I have generated will be used by staff witness Turkenton as the MRO price points in her comparison of the Electric Service Plan to the MRO.

5. Q. Can you please describe your methodology for developing a MRO?

A. Yes. The methodology I used takes a bottom-up approach in that separate values are assigned to eight price components, which include wholesale prices for energy and capacity, and other components needed to account for converting wholesale prices into retail prices. The sum of the eight values represents a total price for competitive retail electric service. This approach bears many similarities to the construct that AEP used in Case No. 11-346-EL-SSO, *et al*., as modified by the adjustments made by Staff in that same case. The price components described below were used in the development of the MRO.

Simple Swap

The Simple Swap is a hedging contract mechanism by which a buyer and a seller can lock in a price for future delivery of electric energy to a specified location. Although the buyers can demand physical delivery of the electric energy, they rarely do so. The contracts are used primarily as financial hedges to achieve future price certainty.

The contract is for a standardized amount of electric energy (50 MW) for each on peak hour in a future month, and separately, for each off-peak hour in a future month. Thus, a party must purchase two monthly contracts for a particular month, one for the on peak hours and another for the off peak hours. By combining all the monthly prices in a future delivery period one can project electric energy prices.

Such contracts are traded every day on the InterContinental Exchange (ICE) electronic trading platform. Parties establish a membership on ICE by posting credit and by agreeing to the terms and conditions of the standardized contract. ICE, in turn, clears transactions by member parties. Trading members see bid and asked prices in real time, which are cleared by ICE when contracts are executed. ICE also daily publishes the prices at which contracts have been cleared that day. Staff receives a daily email from ICE that contains those cleared prices. These emails are the source of pricing data I used to value the Simple Swap.

Basis Adjustment

Each Simple Swap contract is specific to a location. The location used for this analysis is the AD Hub, which is a short name for the AEP – Dayton Hub. This is a collection of delivery points in Ohio, which are within or proximate to the Dayton Power and Light company. The AD Hub is a location for which transparent forward energy prices are published by ICE.

However, the final prices for actual deliveries of electric energy would be settled by PJM[1] at a different location from the AD Hub. PJM settles the price for actual deliveries to the DP&L at the DP&L Zone. Thus the prices DP&L would actually pay to procure electric energy would be the prices at

[1] PJM Interconnection, LLC (PJM) operates markets for the physical delivery of power at all points on the interstate transmission system within its footprint. PJM dispatches power plants and measures the actual production and consumption of electric energy at all the pricing points in its footprint, which includes the price points comprising the AD Hub and the DP&L Zone. Thus, PJM settles the prices of actual deliveries, which differ from location to location and from hour to hour, as opposed to the financial hedge contracts that are traded on, and cleared by ICE.

the DP&L Zone, which are different from the prices at the AD Hub. It is therefore necessary to account for the price differences between those two locations to determine the full price of delivered electric energy. Staff used historical differences in locational marginal prices[2] (LMPs) between the two price points in a correlation analysis to calculate the Basis Adjustment.

Load Following / Shaping Adjustment

Simple Swap contracts are for 50 MW blocks of power delivered each hour in the contract term. Actual demand for electric energy does not manifest in 50 MW blocks, rather it manifests in smaller increments and decrements each minute of an hour. In other words, demand rises and falls continuously, not in stepwise increments of 50 MW.

In order to supply the actual demand, a buyer must purchase extra electric energy in PJM's day-ahead and real time markets when actual demand exceeds the total number of 50 MW blocks purchased using the Simple Swap hedged contract. Likewise a buyer must sell off excess electric

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[2] Locational marginal prices refer to the prices to deliver the next incremental or marginal megawatt at a given pricing point on the PJM system. LMPs represent how wholesale electric energy is priced. Buyers pay the LMP for each megawatt consumed at a delivery point each hour. Thus, the difference between a historical series of LMPs at one price point and a historical set of LMPs at another price point are assumed to be indicative of future price differentials between those price points. Because Simple Swap contracts are location specific hedged prices, the differentials are assumed to apply to the difference between the Simple Swap price at one point and the actual LMP paid at another point, e.g., the AD Hub and the DP&L Zone.

energy when actual demand is less than the number of 50 MW blocks purchased using the Simple Swap hedged contract. This buying and selling deficit and excess energy is necessary for supply and demand to be in balance at each moment.

Generally speaking the hourly prices that will be applied to incremental and decremental energy will vary from the hedged Simple Swap prices. Higher prices occur at times when demand is heavy, and so higher prices are transacted for more volumes than lower prices when demand is relatively lighter. Thus, higher prices are weighted more heavily than lower prices.

The Load Following / Shaping Adjustment component accounts for both the differences in quantity between actual load and 50 MW blocks of the Simple Swap hedge, and the difference between load-weighted hourly prices for delivered energy and Simple Swap hedge prices.

Capacity

Capacity represents the fixed cost of generating facilities that are needed to produce electric energy. The market price of capacity is set by means of capacity auctions that are administered by PJM. The auction sets prices that vary annually, and the auction prices are set three years in advance of the year the price is actually in effect.

The PJM capacity auction prices are generally accepted as transparent, readily discoverable by any buyer on the PJM website, and are known three years in advance. DP&L's application called for at least 5 years of capacity data. Due to the lack of PJM RPM derived values for the 2016/2017 and 2017/2018 capacity planning years, Staff considered DP&L's values presented in their application. Based upon historical results, I do not have a logical basis to question the validity of DP&L's capacity values. Therefore for comparison purposes, I used DP&L's estimated capacity prices for the two aforementioned planning years.

Ancillary Services

Ancillary services are separately priced transmission services that are needed to perfect the delivery of electric energy. They include 1) scheduling, system control and dispatch; 2) reactive supply and voltage control from generation service; 3) regulation and frequency response service; 4) energy imbalance service; 5) operating reserve – synchronized reserve service; and 6) operating reserve – supplemental reserve service.[3],[4]

[3] 1 75 FERC ¶ 61,080 (1996).

[4] For a discussion of ancillary services see 2011 Quarterly State of the Market Report for PJM: January through March, Section 6, Ancillary Services. http://www.pjm.com/~/media/documents/reports/state-of-market/2011/2011q1-som-pjm-sec6.ashx

ARR Revenues

ARR stands for Auction Revenue Rights. Auction Revenue Rights are entitlements allocated annually to Firm Transmission Service Customers that entitle the holder to receive an allocation of the revenues (or charges) from the Annual FTR Auction.[5]

ARRs are specific and narrowly defined hedges against the price impacts of congestion (the price impacts of transmission constraints on LMPs) on the transmission system. Because the western portion of the PJM system where the DP&L exists is relatively free of congestion, revenues from the purchase, sale and execution of these rights result in net revenue to the DP&L.

Note that the ancillary services and ARR credits are combined into one component (market-based transmission charges) as described below.

[5] FTRs, or Financial Transmission Rights, are financial instruments awarded to bidders in the FTR Auctions that entitle the holder to a stream of revenues (or charges) based on the hourly Day Ahead congestion price differences across a specific transmission path. For a primer on ARRs and FTRs, see "PJM ARR and FTR Markets" at http://pjm.com/Search%20Results.aspx?q=ARR.

Losses

The losses component refers to physical losses of energy in the distribution system.

Risk Adjustment

The Risk Adjustment component is a premium that accounts for the value of various types of risks incurred by auction “bidders” including risks that non-hedged prices will increase beyond expectations, risk that added costs will be incurred because quantities of electricity demanded will be different than expected, risk that regulators will disallow costs or delay cost recovery without compensation for the delay, the risk that the companies will be required to share the costs of default by PJM market participants, and others.

Retail Administration

Auction bidders characterize this price component as the costs to administer and manage activities needed to participate in an auction and fulfill the contractual obligations in the event the supplier (bidder) was successful in the auction.

6. Q. What method did you use to predict a MRO price in this case?

A. Except for my calculation of Load Shaping & Following and Risk described below, I used the calculated the price using a compilation of the components described above in the same manner that Staff performed the MRO projection in Case No. 11-346-EL-SSO, *et al*. This approach is simply a summation of the eight components that are calculated according to the approaches described below.

7. Q. Did you use Staff's methodology in 11-346-EL-SSO for each and every one of the eight pricing components?

A. No. I used a slightly different approach than was used by Staff in the 11-346-EL-SSO case, for the AER credits, Load Shaping & Following, ancillary services, and ARR Credits and Risk components. In this case for Load Shaping, I started with a monthly average of historical hourly load curves covering the period January 1, 2010, through August 5, 2012.[6] For each averaged month I fitted a stepwise function of 50 MW blocks under the hourly curve such that one of the upper two corners of each of the 50 MW blocks just touched the load curve specific to DP&L's historical load. I then calculated the integral representing the area of the triangles formed by the conterminous 50 MW blocks and their intersect points with the load

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[6] The source of the historical data was Ventyx' Energy Velocity Suite.

curve. As I did so, I associated the average LMP with each hour's quantity. I took the average of the product of each hour times LMP for the hourly quantities under the triangles to arrive approximately at the costs required to shape load.

In order to recognize load following, I estimated the load weighted LMP for each day. I also estimated the historic average LMP with each day. I then calculated the difference in load weighted LMP and average LMP for each day. After that I averaged those products over all days to arrive at a total load following component.

I added those two components – the triangles representing load shaping, and the difference between load weighted and straight daily averages representing load following, to arrive at a total cost of load shaping and following. I multiplied the resulting factor by the simple swap price to arrive at a value for load shaping and following.

Staff back-calculated the Risk component value based upon comparing historic auction results of EDU SSO auctions with calculations using all the components in Staffs methodology except for risk. The difference was attributed to risk and made a factor of the simple swap. Staff can adjust the risk factor to calibrate the model. The magnitude of the risk component has changed little from the AEP supplied factors in 11-346-EL-SSO.

For ancillary service and ARR credits, I created a new component with the calculation described below. It is simple a combination of the two components for calculation simplicity.

Staff decided to handle the AER credit outside of the MRO comparison in order straight forward comparisons in the MRO/ESP Test. Ms. Turkenton is testifying to the MRO/ESP Test.

8. Q. Has the validity of this methodology been tested?

A. Yes. In PUCO Case No. 11-346-EL-SSO, *et al.*, Staff tested this methodology by back casting FirstEnergy and Duke SSO auction results. The tests demonstrated that the methodology was sound.

9. Q. What is the MRO price you are projecting for DPL's SSO case?

A. I am projecting prices for two time frames. The prices I have projected are in the following tables:

5 Year

Period	1/13-5/14	6/14-5/15	6-15-5/16	6/16-5/18	6/17-5/18
Auction Prediction	**$46.69**	**$56.33**	**$58.25**	**$62.91**	**$64.69**

3 Year

Period	6/13-5/14	6/14-5/15	6-15-5/16
Auction Prediction	**$47.67**	**$57.09**	**$59.30**

For the three and five year analyses, I relied on data readily available from Ventyx' Energy Velocity Suite and ICE to determine MRO prices. The data from Velocity Suite included historic demand in the DP&L load zone and historic LMP for both the DP&L load zone and the AD Hub. Due to the fact that PJM RPM auctions have currently only occurred for a procurement of capacity until May of 2016, I relied upon the capacity prices that DP&L filed in the application to this case for time frames beyond May of 2016. This is in no way an endorsement of the Company's capacity projections in the application. I used these projections because I cannot dispute the validity of the projections, and because no better information is available. However, using the Company's projections of capacity prices beyond May of 2016 allows me to focus only on variables where independent, transparent market data are available. A quantitative description of the competitive price projection is in attachment RPW-1.

10. Q. What capacity values did you use?

A. I used the capacity values I calculated in RPW-2. The capacity values are based upon the PJM RPM Base Residual Auctions for the PJM delivery periods of 6/1/2012 through 5/31/2016. DP&L capacity values were used for the periods of 6/1/2016 through 5/31/2018 for reasons describe in testimony above.

11. Q. What did you use for a distribution loss factor?

A. I estimated distribution losses by using DP&L's long term forecast report to derive the fraction of distribution losses from serving load for the period in question then multiplied by the forwards price for DP&L's service area.

12. Q. What did you use for market-based transmission charges?

A. I calculated this value by using the TCRR-B revenue projections in DP&L's application specifically with regard to ancillary services and ARR credits (the amount was 49% of the application TCRR-B) and divided by the SSO load per year in the same application. The 49% figure was determined by finding the ratio of the TCRR components in the TCRR-B that did not include congestion, and losses.

13. Q. What did you use for the basis adjustment?

A. I conducted a correlation analysis using Statistical Analysis System. The data included prices for DP&L load bases and the AD Hub. The data was obtained through Velocity Suite. A correlation analysis allows my to measure the historic difference between the AD Hub and the DP&L load buses. I used that historic difference as the basis adjustment.

14. Q. What values did you use for the Simple Swap?

A. I used the daily quotes for on peak and off peak products for the pertinent delivery periods, which were available from ICE on December 31, 2012 for the 5 year projections and February 20, 2013 for the three year.[7] I weighted the on peak and off peak strips by the number of on peak and off peak hours, just as staff did in PUCO Case No. 11-346-EL-SSO, *et al*. The reason for the selection of different dates is that the forwards are more representative of what the market will resolve to closest to the settle market price the closer bids are made to the delivery period. For the five year estimate that included periods for January 2013 to May 2018, December 31, 2013 was the last day available before the delivery period started. For the three year estimate that included periods for June 2013 to May 2016, I used the latest trade day before writing testimony which was February 20,

[7] InterContinental Exchange, email published prices for product numbers 1625 and 375.

2013. The closer to the delivery date of energy the less uncertainty there is in things like weather, rules, scheduled outages, etc. The fact that I used different trade dates for the simple swap prices explains why I got different results for the same periods.

15. Q. What did you use for the retail administration?

A. Based upon the AEP filing (11-346-EL-SSO, *et. al*.) a flat $5 amount was and has been used by Staff. Therefore, I used that figure in my estimation as well.

16. Q. Doe this conclude your testimony?

A. Yes, it does. However, I reserve the right to submit supplemental testimony as described herein, as new information subsequently becomes available or in response to positions taken by other parties.

PROOF OF SERVICE

I hereby certify that a true copy of the foregoing Prefiled Testimony of Tamara S. Turkenton, submitted on behalf of the Staff of the Public Utilities Commission of Ohio, was served via electronic mail, upon the parties listed below, this 11th day of March, 2013.

/s/ Thomas W. McNamee

Thomas W. McNamee
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Exhibit RPW-1

Competitive Bid for DP&L SSO

5-Year Competitive Bid Projection
$/MWh

	Period	1/2013-5/2014	6/2014-5/2015	6/2015-5/2016	6/2016-5/2017	6/2017-5/2018
1	Simple Swap (12/31/2012)	$32.01	$33.27	$34.47	$35.77	$36.84
2	Basis Adjustment	$0.42	$0.42	$0.42	$0.42	$0.42
3	Load Following/Shaping Adjustment	$1.36	$1.42	$1.47	$1.52	$1.57
4	Capacity	$1.97	$10.12	$10.63	$13.76	$14.19
5	Market-based transmission charges	$1.53	$1.53	$1.53	$1.53	$1.53
7	Losses	$1.26	$1.31	$1.35	$1.40	$1.53
8	Risk Adder	$3.14	$3.26	$3.38	$3.51	$3.61
9	Retail Administration	$5.00	$5.00	$5.00	$5.00	$5.00
	Staff MRO Price	**$46.69**	**$56.33**	**$58.25**	**$62.91**	**$64.69**

Competitive Bid for DP&L SSO

3-Year Competitive Bid Projection
$/MWh

	Period	6/2013-5/2014	6/2014-5/2015	6/2015-5/2016
1	Simple Swap (02/20/2013)	$32.61	$33.92	$35.36
2	Basis Adjustment	$0.42	$0.42	$0.42
3	Load Following/Shaping Adjustment	$1.39	$1.44	$1.51
4	Capacity	$2.24	$10.12	$10.63
5	Market-based transmission charges	$1.53	$1.53	$1.53
7	Losses	$1.28	$1.33	$1.39
8	Risk Adder	$3.20	$3.32	$3.47
9	Retail Administration	$5.00	$5.00	$5.00
	Staff MRO Price	**$47.67**	**$57.09**	**$59.30**

Exhibit RPW-2

Capacity Component Valuation for DPL MRO Test

Capacity Auction		
Planning Period	Auction Clearing Price ($/MW-day)	Load Factor
PJM RPM Base Residual Auction		0.527706562
June 2012 - May 2013	$16.74	
June 2013 - May 2014	$28.37	
June 2014 - May 2015	$128.17	
June 2015 - May 2016	$134.62	
June 2016 - May 2017 (DP&L value)	$174.25	
June 2017 - May 2018 (DP&L value)	$189.19	

Auction Period (PJM delivery year)	Value ($/MWh)
Jan 2013 - May 2014	**$1.97**
Jun 2014 - May 2014	**$2.24**
Jun 2014 - May 2015	**$10.12**
Jun 2015 - May 2016	**$10.63**
Jun 2016 - May 2017	**$13.76**
Jun 2017 - May 2018	**$14.94**

Load Factor Calculation

Source: 2012 DP&L Long Term Forecast Report

Year	**Territory**	**Form D1 Net Energy for Load***	**Form D3 Sum Internal Peak**	**Load Factor**
2013	Total Ohio	14,319,530	3,002	54.45%
2014	Total Ohio	14,237,900	3,023	53.77%
2015	Total Ohio	14,154,768	3,042	53.12%
2016	Total Ohio	14,086,799	3,063	52.36%
2017	Total Ohio	13,997,094	3,082	51.84%
2018	Total Ohio	13,920,332	3,102	51.09%
		* (includes Losses)		52.77%