2017 SPP Post-Season Analysis Report

June 29, 2018
SPP Resource Adequacy Team

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION	COMMENTS
5/30/2018	SPP Staff	Final	

CONTENTS

1. EXECUTIVE SUMMARY

As part of Southwest Power Pool's (SPP) Resource Adequacy process, a post-season analysis was conducted on the 2017 summer season comparing each Load Responsible Entity's (LRE) actual summer season peak demand to the forecasted summer season peak demand submitted in the 2017 Resource Adequacy Workbooks (RAW). This analysis will evaluate each LRE's planning forecast consistency and can be used to develop improvements to the resource adequacy process.

RESULTS

The results of the analysis show:

- thirty-four (34) LREs between -5% and +5% deviation from their actual peak demands which accounts for 91% of the SPP Balancing Authority (BA) Area load;
- fourteen (14) LREs in ranges -6% to -10% and +6% to 10% deviation from their actual peak demands which accounts for 8.2% of the SPP BA Area load; and
- three (3) LREs outside of -10% and +10% deviation from their actual peak demands which accounts for less than 1% of the SPP BA Area load.

The majority of the deviations were due to inconsistencies in reporting of behind-the-meter generation, the variety of load forecasting methodologies from entity to entity, and the consideration of Firm Power allocation agreements in the actual meter data submission process and the RAW submission process.

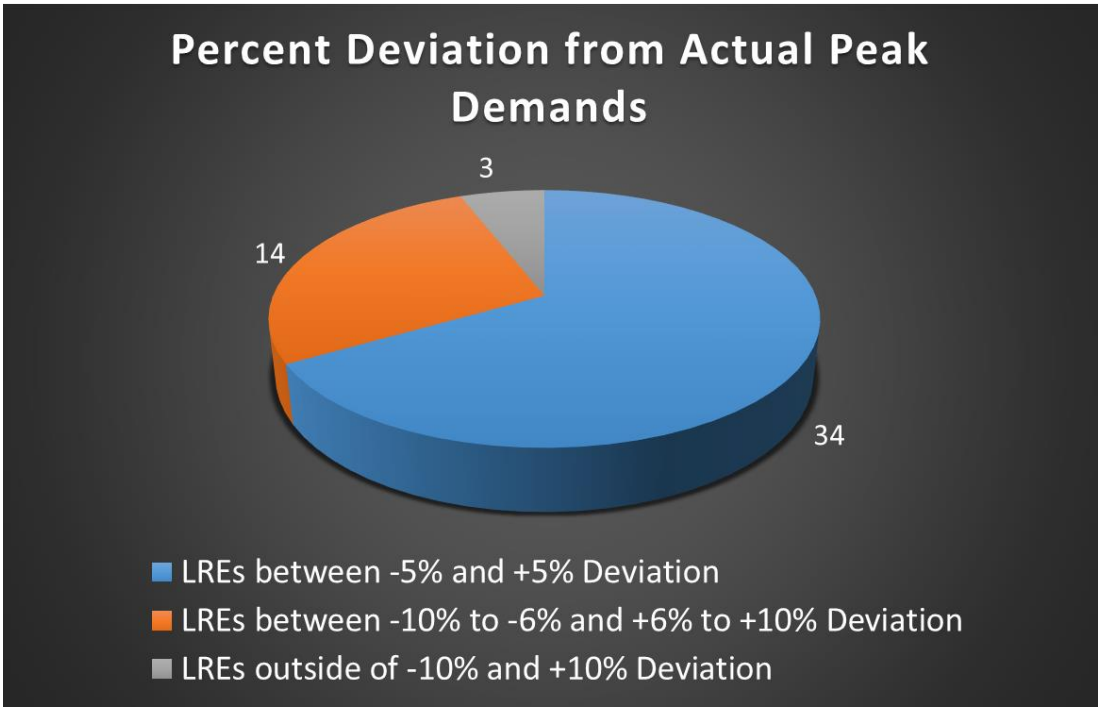

Figure 1: Number of LREs by percent deviation categories

CONSIDERATIONS FOR FUTURE ANALYSIS

The following factors may be considered for the 2018 post-season analysis:

- Compare 2017 post-season analysis results to the 2018 results to incorporate trending aspects for each LRE
- Consideration of normalizing extreme or mild weather years
- Incorporate the consideration of behind-the-meter generation, other distributed generation, and Firm Power allocation agreements and better understand how each LRE considers them in the submitted metered values and RAW submissions

ACKNOWLEDGEMENTS

The stakeholder review process was an integral part in this analysis and the participation and oversight of the SAWG was much appreciated by SPP staff.

2. INTRODUCTION

As part of SPP's Resource Adequacy process, a post-season analysis will be conducted on the prior summer season to compare each Load Responsible Entity's (LRE) actual summer season peak demand to the LRE's forecasted peak demand. This analysis will evaluate each LRE's planning forecast consistency and can be used to develop improvements to the resource adequacy process. Annually, SPP will present the results to the Supply Adequacy Working Group (SAWG) for review who may refer cases of potential discrepancies to the Markets and Operations Policy Committee (MOPC) for further investigation and action, if necessary.

The 2017 Resource Adequacy Workbook (RAW) submissions were compared to the actual peak demand for each LRE. The actual values are obtained through the SPP Settlements meter submission process. The analysis gives insight to stakeholders when making policy decisions related to resource adequacy, especially when considering load forecasting methodologies and how behind-the-meter resources should be treated in the resources adequacy process.

3. DATA DESCRIPTION

LRE OVERVIEW

The SPP Balancing Authority (BA) Area includes all or parts of Arkansas, Iowa, Kansas, Louisiana, Minnesota, Missouri, Montana, New Mexico, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas. Fifty-one (51) LREs submitted RAWs for the 2017 submission year. The LREs included the following:

American Electric Power
Arkansas Electric Cooperative Corporation
Basin Electric Power Cooperative
Carthage Water & Electric Plant
City of Chanute
City of Fremont
City of Grand Island Nebraska Utilities
City of Hastings Nebraska Utilities
City of Malden Board of Public Works
City of Neligh
City of Piggott Municipal Light & Water
City of Poplar Bluff Municipal Utilities
City of West Plains Board of Public Works
City Utilities of Springfield
Empire District Electric Company
Falls City Utilities
Golden Spread Electric Cooperative
Grand River Dam Authority
Greater Missouri Operations Company (KCP&L)
Harlan Municipal Utilities
Heartland Consumers Power District
Independence Power & Light
Kansas City Board of Public Utilities
Kansas City Power & Light
Kansas Municipal Energy Agency – EMP1
Kansas Municipal Energy Agency – EMP2
Kansas Municipal Energy Agency – EMP3
Kansas Municipal Energy Agency – Eudora
Kansas Power Pool
Kennett Board of Public Works
Lincoln Electric System
MidAmerican Energy Company
Midwest Energy

Missouri Joint Municipal Electric Utility Commission
Missouri River Energy Services
Municipal Energy Agency of Nebraska
Nebraska City Utilities
Nebraska Public Power District
Northwestern Energy
NSP Energy Marketing
Oklahoma Gas & Electric Company
Oklahoma Municipal Power Authority
Omaha Public Power District
Paragould Light and Water Commission
People's Electric Cooperative
South Sioux City Nebraska
Southwestern Public Service Company
Sunflower Electric Power Corporation
Westar Energy
Western Area Power Administration
Western Farmers Energy Services

RESOURCE ADEQUACY WORKBOOK SUBMISSIONS

Each LRE's forecasted Summer Season Peak Demand[1] from the 2017 RAW submissions was used in the comparison analysis. The available distributed energy generation and behind-the-meter generation in the RAW submissions was considered when comparing actual demand to forecasted demand.

ACTUAL METERED VALUES

Submitted hourly-metered values from SPP Settlements department were derived from the Meter Report Card process[2]. There were ninety-six (96) meter locations with hourly metered values which were mapped to each LRE. Only the summer season hours (June 1 to September 30) of 2017 were obtained for the analysis.

[1] Forecasted Peak Demand and other values submitted in each LRE's RAW submission can be found in the June 2017 Resource Adequacy Report:
https://www.spp.org/Documents/52237/June%202017%20Resource%20Adequacy%20Report.pdf
[2] Information on metered values can be found here:
https://www.spp.org/Documents/35357/Meter%20Presentation%202016%20V4.pdf

4. POST-SEASON ANALYSIS RESULTS

Each LRE's forecasted Summer Season Peak Demand was compared to the actual metered peak value using the percent deviation formula below.

$$Percent\ Deviation\ (\%) = \frac{(Forecasted\ Peak\ Demand - Actual\ Peak\ Demand)}{Actual\ Peak\ Demand} * 100\%$$

The results were divided into three tiers: tier 1 contains comparisons values between -5% and +5%, tier 2 for values in ranges -6% to -10% and +6% to 10%, and tier 3 for values outside of -10% and +10% deviation from actual peak demand values. Tier 1 values are shown in Table 1 and each line represents one LRE. Tier 1 is comprised of thirty-four (34) LREs, 47,988 MW of forecasted peak demand, and 46,908 MW of actual peak demand.

Table 1: LREs between -5% and +5% percent deviation from actual peak demand

ACTUAL PEAK DEMAND (MW)	FORECASTED PEAK DEMAND (MW)	PERCENT DEVIATION
12.0	11.5	-4%
348.7	335.0	-4%
96.4	93.2	-3%
12.6	12.4	-2%
763.0	749.0	-2%
96.5	94.8	-2%
2,804.5	2,767.6	-1%
748.7	737.7	-1%
3,475.1	3,439.8	-1%
83.1	82.4	-1%
2,449.3	2,431.4	-1%
168.0	166.8	-1%
52.9	52.6	-1%
494.0	492.0	0%
37.3	37.3	0%
110.0	109.9	0%
173.5	174.4	0%

104.3	104.9	1%
1,907.5	1,925.7	1%
211.9	215.2	2%
63.0	64.0	2%
755.0	769.0	2%
5,201.8	5,306.6	2%
40.0	40.8	2%
2,874.4	2,943.4	2%
4,501.3	4,621.7	3%
945.1	972.9	3%
41.2	42.5	3%
32.0	33.2	4%
5,720.1	5,941.6	4%
1,075.0	1,124.0	5%
1,295.8	1,357.5	5%
8,751.6	9,200.6	5%
1,461.7	1,536.7	5%

Tier 2 values are shown in Table 2. Tier 2 contains fourteen (14) LREs, 4,274 MW of forecasted peak demand, and 4,021 MW of actual peak demand.

Table 2: LREs with percent deviation values in ranges -6% to -10% and +6% to 10% from actual peak demand

ACTUAL PEAK DEMAND (MW)	FORECASTED PEAK DEMAND (MW)	PERCENT DEVIATION
40.0	36.5	-9%
10.0	9.2	-8%
97.0	89.4	-8%
4.7	4.4	-7%
1.2	1.1	-6%
14.7	13.8	-6%
918.2	970.0	6%

369.3	390.9	6%
157.5	167.1	6%
521.9	557.3	7%
806.7	863.6	7%
77.0	82.6	7%
721.9	781.7	8%
281.0	306.9	9%

Tier 3 values are shown in Table 3. Tier 3 contains three (3) LREs, 403 MW of forecasted peak demand, and 395 MW of actual peak demand.

Table 3: LREs outside of -10% and +10% percent deviation from actual peak demand values

ACTUAL PEAK DEMAND (MW)	FORECASTED PEAK DEMAND (MW)	PERCENT DEVIATION
285.6	231.8	-19%
101.9	157.6	55%
7.2	13.4	87%

SPP Staff reached out to the entities in tier 2 and tier 3 in order to gain understanding and confirm any discrepancies. Two entities' percent deviations were due to the consideration of Western Area Power Administration (WAPA) allocation service agreements, which are Federal Service Exemption (FSE) loads. The LRE with 7.2 MW of actual peak demand submits their entire amount of forecasted demand (13.4 MW) in the RAW and accounts for their WAPA service agreement in their Net Peak Demand. (Net Peak Demand allows for the reduction of Firm Power purchases from other entities.) The amount of the Firm Power purchased for this LRE exceeds the difference of the actual and forecasted demands (13.4 - 7.2 = 6.2 MW) which is considered in WAPA's actual metered values.

The LRE with 231.8 MW of forecast peak demand considers their entire company's load amount, including their WAPA allocation service agreements, as their peak hour in which they forecast their demand. However, the company's load is registered as two separate meter locations which are under two separate LREs (themselves and WAPA). The actual peak demand of 285.6 is the peak value for the one meter location registered under the LRE. If the two meter locations are combined into one analysis and the coincident peak hour is considered instead of the peak hour from the individual meter location, the value would be 223.5 MW instead of 285.6 MW for that meter location. This would reduce the percent deviation from -19% to 3.7% ([231.8 - 223.5] / 223.5 * 100% = 3.7%).

The LRE with an actual peak demand of 101.9 MW has three metered meter locations associated with their peak demand because their loads are located in three separate Legacy Balancing Authority

(LBA) areas. The forecast of 157.6 MW is derived by aggregating the non-coincident values for each location instead of utilizing the coincident peak hour for the three locations. The actual peak demand value on a coincident basis is 132.7 MW by aggregating the non-coincident values for each location. This would reduce the percent deviation from 55% to 19% ([157.6 – 132.7] / 132.7 * 100% = 19%). However, the use of behind-the-meter generation or the allocation of Firm Power agreements are other factors to consider when comparing the actual to projected demand values.

The majority of the entities in tier 2 SPP Staff contacted referred to 2017 as being a mild to moderate weather year for the summer season and experienced actual peak demands lower than previous years.

5. CONCLUSIONS AND CONSIDERATIONS

CONCLUSIONS

The post-season analysis results for the 2017 summer peak season shows:

- A variety of load forecasting methodologies are used in the SPP BA footprint when considering each entity's historical peak demand values
- Inconsistency in the reported actual metered values when compared to the values reported in the RAW submissions
- Inconsistency for accounting behind-the-meter generation and Firm Power agreements in both the actual metered values and the RAW submissions from entity to entity

CONSIDERATIONS

Considerations for the 2018 post-season analysis:

- Compare 2017 post-season analysis results to the 2018 results to incorporate trending aspects for each LRE
- Consideration of normalizing extreme or mild weather years based on the footprint's performance as a whole
- Incorporate the consideration of behind-the-meter generation, other distributed generation, and Firm Power allocation agreements and better understand how each LRE considers them in the submitted metered values and RAW submissions

APPENDIX A: LIST OF ACRONYMS

BA	Balancing Authority
FSE	Federal Service Exemption
LBA	Legacy Balancing Authority
LRE	Load Responsible Entity
MOPC	SPP Market and Operations Policy Committee
MW	Megawatt
RAW	Resource Adequacy Workbook
SAWG	Supply Adequacy Working Group
SPP	Southwest Power Pool
WAPA	Western Area Power Administration