Empire District
A Liberty Utilities Company

April 12, 2017

Missouri Public Service Commission

Re: 2017 Annual Renewable Energy Standard Compliance Plan: Non-proprietary Information

This version of the Annual Compliance Plan is a fully completed version. Portions of this report contain confidential information which has been removed.

EMPIRE DISTRICT ELECTRIC COMPANY

2017 ANNUAL RENEWABLE ENERGY STANDARD COMPLIANCE PLAN

Prepared in Compliance with 4 CSR 240-20.100

April 2017

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2017 ANNUAL RENEWABLE ENERGY STANDARD COMPLIANCE PLAN

INTRODUCTION

Pursuant to the Missouri Public Service Commission's (Commission) renewable energy standards rule, 4 CSR 240-20.100(8), The Empire District Electric Company (EDE or Empire), a Kansas corporation, is filing the Annual Renewable Energy Standard (RES) Compliance Plan. The rule became effective in September 2010, and pursuant to the rule EDE must file the RES Compliance Plan on or before April 15, 2017 for the current year and subsequent two calendar years.

EDE began to develop its wind renewable energy portfolio on December 10, 2004, when it entered into a 20-year contract with Elk River Windfarm, LLC (owned by Avangrid Renewables) to purchase all of the energy generated at the 150-megawatt (MW) Elk River Windfarm located in Butler County, Kansas.

On June 19, 2007, EDE enhanced its renewable energy portfolio when it entered into a 20-year purchased power agreement with Cloud County Wind Farm, LLC. EDP Renewables North America LLC is an indirect parent company of Cloud County Wind Farm, LLC. Pursuant to the terms of the agreement, EDE purchases all of the output from the 105 MW Phase 1 Meridian Way Wind Farm located in Cloud County, Kansas.

In addition, the Ozark Beach Hydroelectric Project, owned by EDE has produced renewable hydropower for many years. Through purchased power agreements or owned generation, EDE's wind and hydro renewable energy resources have provided adequate renewable energy to comply with the RES in the past and for the future.

The solar component of the RES requires compliance which can only be met with Solar Renewable Energy Credits (SRECs) or energy from solar generation resources. EDE will meet the solar RES compliance obligation through customer-generated SRECs. Effective May 16, 2015, Empire began offering rebates for Missouri customers for qualifying solar installations in

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accordance with the Missouri RES and Empire's Solar Rebate Rider approved by the Commission. This requirement will continue to be in place for future compliance obligations.

The following sections provide information required to indicate compliance with the rule:

SECTION (8) (B) 1 A: PLANNED RES COMPLIANCE

Non-solar Compliance

4 CSR 240-20 provides the procedure by which utilities must meet statutory obligations for renewable energy. Missouri law requires that by 2011, electric companies must either generate, purchase energy, or purchase renewable energy credits (RECs) equal to at least 2 percent of the electricity they sell to retail customers from renewable sources. That percentage increased to 5 percent in 2014 and increases to 10 percent by 2018 and 15 percent by 2021. The regulation also requires the utilization of a commission designated third-party registry for REC accounting, and the North American Renewable Registry (NARR) is utilized for tracking EDE retirements for Missouri compliance.

This year and in the subsequent two years, EDE plans to comply with the non-solar portion of the RES through contracts with Elk River Windfarm, LLC and/or generation from its Ozark Beach Hydroelectric facility. In fact, EDE currently could meet the 2021 requirement through its renewable energy purchase power agreements and owned generation if it chose not to sell any RECs generated from these facilities.

EDE owns the Ozark Beach Hydroelectric Project (Ozark Beach) which generates approximately 54,000 megawatt-hours (MWh) each year. Since the facility is located in Missouri, EDE is allowed to claim the amount of MWhs generated plus an additional twenty-five hundredths (0.25) credits, as authorized by subsection (3)(G) of this rule. Consequently, Ozark Beach generation counts as one and twenty-five hundredths (1.25) RECs for purposes of compliance with this rule as allowed by 4 CSR 240-20.100 (3) (G).

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The table below represents EDE's expected Missouri retail sales and the non-solar percentage requirements of Missouri retail electric sales that must be achieved by EDE either through the purchase of RECs or the production of energy, and the total expected potential of qualifying RECs that could be used for compliance. EDE expects to sell all or a portion of its remaining RECs after all current or future state and/or federal mandates have been met.

Table 1: Projected Non Solar Compliance

Time Period	RES Requirement Percent	Mo Retail Sales (MWh)	Non Solar Resources				Total Non-Solar Requirement	Total RES Requirement[3]
			Elk River[1]	Meridian Way[1]	Ozark Beach[1]	Total Potential[2]		
2017	5%	4,147,340	550,000	330,000	67,500	947,500	203,220	207,367
2018	10%	4,157,612	550,000	330,000	67,500	947,500	407,446	415,761
2019	10%	4,162,893	550,000	330,000	67,500	947,500	407,963	416,289

[1]Expected average operation; Ozark Beach number includes additional 0.25 credit

[2]Total expected eligible RECs not including potential 3rd party sales or other RES requirements.

[3] Both Non solar and Solar will make up the total RES requirement

Solar Compliance

EDE filed a tariff to establish solar rebate payment procedures and to revise its net metering tariffs to accommodate the payment of solar rebates which became effective on May 16, 2015. Under the terms of the tariff, EDE will buy SRECs from its electric customers who installed or are installing net metered solar facilities at their homes and/or businesses according to the solar rebate tariff and net metering requirements.

For 2017 compliance, EDE expects to obtain SRECs transferred from qualified customer-generator's operational solar electric systems as a condition of receiving the solar rebate. SRECs produced from these solar electric systems will be transferred to EDE for a period of 10 years. Generation from these customer-owned facilities would be eligible for application of the 1.25 factor as these facilities are located in Missouri.

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In the future, (2017-2019) Empire will use customer-generated SRECs or banked SRECs. EDE will also evaluate and monitor the feasibility and economics of constructing and operating utility scale solar generation.

Table 2: Projected Solar Compliance

Time Period	RES Requirement Solar %	MO Retail Sales (MWh)	Solar RES Requirement	Customer Generated Solar[1]
2017	0.1%	4,147,340	4,147	13,863
2018	0.2%	4,157,612	8,315	13,863
2019	0.2%	4,162,893	8,326	13,863

[1]Future Projections based on 2016 production. Customer-generated number includes additional 0.25 credit.

SECTION (8) (B) 1 B: LIST OF EXECUTED CONTRACTS

EDE's executed renewable energy contracts include a 20-year contract with Elk River Windfarm, LLC to purchase all of the energy generated at the 150 MW Elk River Windfarm located in Butler County, Kansas. In addition, EDE entered into a 20-year purchased power agreement with Cloud County Wind Farm. Pursuant to the terms of that agreement, EDE will purchase all of the output from the 105 MW Phase 1 Meridian Way Wind Farm located in Cloud County, Kansas. Empire anticipates generation of approximately 550,000 MWhs for Elk River and approximately 330,000 MWhs for Meridian Way.

The effective date of the Elk River agreement was December 10, 2004 and the effective date of the Meridian Way agreement was on June 19, 2007. Unless otherwise terminated in accordance with contract stipulations each of those agreements will remain in full force for a term ending at midnight local time on the 20th anniversary of each facility's respective completion date. ATTACHMENT 1 indicates the wind generation allocation for Missouri retail customers. Additional information on the wind energy purchases and sales can be found in ATTACHMENT 2.

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In 2016, Empire executed payment for 663 solar customer generated rebates. Empire expects to annually execute payment for customer generated rebates.

SECTION (8) (B) 1 C: PROJECTED TOTAL RETAIL SALES

The following table represents EDE's projected Missouri retail sales for each year of the Annual Compliance Plan period. These MWhs are the sales numbers that each non-solar and solar requirement is multiplied by in order to calculate EDE's RES requirements.

Table 3: EDE Projected Retail Sales and RES Requirements*

Year	Projected Retail Electric Sales (MWh)	Non-solar Requirement (MWh)	Solar Requirement (MWh)
2017	4,147,340	203,220	4,147
2018	4,157,612	407,446	8,315
2019	4,162,893	407,963	8,326

Source: 2017-2021 Revenue Model, FINAL

SECTION (8) (B) 1 D: COMPARISON TO PREFERRED RESOURCE PLAN

EDE will fully meet the RES compliance requirements for 2017, 2018, and 2019 with its current purchased power contracts, hydroelectric facility, and customer-generated solar energy. Therefore, there is no difference between the RES Compliance Plan and the most recent Integrated Resource Plan (IRP) filed with the Commission in April of 2016. EDE continues to include a section in the IRP which discusses the impact potential or proposed changes to Renewable Energy Standards would have on EDE. Regardless of the outcome of proposed changes, in the future, EDE will continue to retain a sufficient amount of RECs and SRECs to meet any current or future RES.

SECTION (8) (B) 1 E: RES COMPLIANCE PLAN COST

EDE currently meets the Missouri non-solar RES compliance requirements on a total percentage basis with hydro and wind resources for the plan period. Analysis of the IRP

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indicates the use of energy provided by EDE-owned hydro generation and long-term wind purchased power agreements is the least cost, most prudent methodology to achieve compliance with the RES.

To comply with the solar-specific compliance, the purchase of SRECs through an industry broker is currently the least expensive alternative. However, EDE expects to utilize SRECs transferred from qualified customer-generator's systems for the compliance obligation.

SECTION (8) (B) 1 F: RES RETAIL RATE IMPACT

The retail rate impact was calculated by comparing non-renewable generation portfolio to a RES-compliant portfolio with sufficient renewable resources to achieve the renewable standards. EDE has performed this rate impact calculation in accordance with Section (5) Retail Rate Impact. The calculations were completed consistent with EDE's understanding of Staff's interpretation of the RES rules. For each year of the 2017-2019 RES Compliance Plan period, the annual retail rate impact is limited to a maximum of 1% of the 10-year average non-RES compliant revenue requirement.

Costs associated with EDE's current or anticipated RES compliance are associated with (1) the registration of assets and RECs in the NARR, (2) costs associated with retirement of RECs, (3) the value of RECs from purchased power agreements that are used for compliance and (4) costs associated with solar rebates. Costs incurred for 2016 compliance totaled $50,900 for the registration, retirement and associated costs of REC management. The purchase price of the amount of wind energy necessary for 2016 compliance totaled *[redacted]* This amount reflects an asset that is currently included in Empire's portfolio through a purchased power agreement and does not reflect an additional cost as it was contracted for prior to the commencement of the RES. This resource will be used in the future for compliance, as needed. Empire's base rates reflect a representative level of renewable registry costs. The addition of wind resources will not be required for the period of 2017 to 2019 as current wind resources are adequate to meet compliance obligations.

Solar costs incurred for 2016 solar rebates paid totaled $8,034,812. EDE successfully received treatment to recover the solar costs in Missouri base rates.

The total compliance cost for 2016 was $8,085,712.The purchase price of the existing wind energy which was not added for compliance totaled [redacted] EDE will use the generation from our Ozark Beach hydro facility, energy from the windfarm purchased power agreements and solar energy from customer-generated facilities but we do not expect to exceed the rate cap. ATTACHMENT 3 further explains the retail rate impact calculations. The calculations in ATTACHMENT 3 are based on total company not Missouri jurisdictional.

It is important to note the rate cap calculation is *purely* a mathematical exercise and is not associated with current rates, current generation assets or even current finalized environmental rules. For example, the "base case" which the 1% rate cap is calculated upon does not reflect Empire's actual generation portfolio as all renewable generation is to be taken out. The "base case" also assumes a value for items such as carbon to which there is currently no finalized rule nor is there a liquid market that could be used as an estimate for carbon costs. The end result of this mathematical exercise over-inflates the costs for the "base case" and, in turn, shows a savings for the renewable case after a few years.

SECTION (8) (B) 1 G: COMPLIANCE WITH AIR, WATER, OR LAND USE REQUIREMENTS

Pursuant to Section 393.1030.4 RSMo, any renewable energy facility located in the state of Missouri shall not cause undue adverse air, water or land use impacts.

All generating facilities utilized by EDE to meet the requirements of the Missouri RES have, to EDE's knowledge, received all necessary environmental and operational permits and are in compliance with any necessary federal, state and/or local requirements related to air, water and land use. All generating facilities have received Certification as a Renewable Energy Generation Facility by the Missouri Department of Economic Development.

EMPIRE

2017-2019 RES PLAN

ATTACHMENT 1

WIND GENERATION ALLOCATION

☐ HIGHLY CONFIDENTIAL

☑ NON-PROPRIETARY

ATTACHMENT 1

WIND GENERATION ALLOCATION FOR MO RETAIL CUSTOMERS 2016

Facility	Generation (MWh)	Percentage*	Energy Supplied to Missouri Retail Customers (MWh)
Elk River Windfarm	507,686	83.561%	424,227.50
Meridian Way Windfarm	316,736	83.561%	264,667.77

* Allocation based on 12-month average CP Demand Factor

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EMPIRE

2017-2019 RES PLAN

ATTACHMENT 2

REC REPORT

REPORTS ARE CONSIDERED PROPRIETARY

☐ HIGHLY CONFIDENTIAL

☑ PROPRIETARY

Renewable Energy Certificate Position Report
Empire District Electric Company

Elk River 2016

HIGHLY CONFIDENTIAL	January 2016	February 2016	March 2016	April 2016	May 2016	June 2016	July 2016	August 2016	September 2016	October 2016	November 2016	December 2016	Total 2016
Expected REC's	51,300	28,275	58,800	61,200	45,800	42,700	33,700	38,400	35,300	52,800	53,200	55,200	556,675
**Actual REC's	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
MO Compliance for 2016 KS Vol Compliance	41,279	54,239	42,484	46,520	37,684	32,429	36,739	26,588	37,519	51,248	45,957	41,419	
Active			13,581										0
REC's Sold													
Counterparty													
[redacted] Quantity	0	0	[redacted]	0	0	0	0	0	0	0	0	0	[redacted]
Price ($/REC)	$ -	$ -	[redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	[redacted]
Gross Revenue	$ -	$ -	[redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	[redacted]
Commission $'s	$ -	$ -	[redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	[redacted]
Net Revenue ($)	$ -	$ -	[redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	[redacted]
[redacted] Quantity	0	0	[redacted]	0	0	0	0	0	0	0	0	0	[redacted]
Price ($/REC)	$ -	$ -	[redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	[redacted]
Gross Revenue	$ -	$ -	[redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	[redacted]
Commission $'s	$ -	$ -	[redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	[redacted]
Net Revenue ($)	$ -	$ -	[redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	[redacted]
Quantity	0	0	0	0	0	0	0	0	0	0	0	0	0
Price ($/REC)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Revenue	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commission $'s	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net Revenue ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Quantity	0	0	0	0	0	0	0	0	0	0	0	0	0
Price ($/REC)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Revenue	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commission $'s	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net Revenue ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Quantity	0	0	0	0	0	0	0	0	0	0	0	0	0
Price ($/REC)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Revenue	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commission $'s	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net Revenue ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
Cumulative Remaining RECs	0	0	13,581	60,101	97,785	130,214	166,953	193,541	231,060	282,308	328,265	369,684	369,684
Total Gross Revenue	$ -	$ -	[redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	[redacted]
Total Expense (Commission)	$ -	$ -	[redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	[redacted]
Total Net Revenue	$ -	$ -	[redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	[redacted]

**Actual REC's is Expected REC's until month expires

Renewable Energy Certificate Position Report
Empire District Electric Company

Meridian Way 2016

HIGHLY CONFIDENTIAL

	January 2016	February 2016	March 2016	April 2016	May 2016	June 2016	July 2016	August 2016	September 2016	October 2016	November 2016	December 2016	Total 2016
Expected REC's	24,000	28,275	31,900	32,700	29,400	25,700	18,500	22,400	26,800	30,000	28,100	31,900	329,675
**Actual REC's	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
REC's Sold	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Counterparty													
[redacted] (BH 2016)													
Quantity	0	0	[redacted]	0	0	0	0	0	0	0	0	0	[redacted]
Price ($/REC)	$ -	$ -	$ [redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.37
Gross Revenue	$ -	$ -	$ [redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]
Commission $'s	$ -	$ -	$ [redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]
Net Revenue ($)	$ -	$ -	$ [redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]
[redacted] (PH 2016)													
Quantity	0	0	0	0	0	0	0	0	0	[redacted]	0	0	[redacted]
Price ($/REC)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.28	$ -	$ -	$ 0.28
Gross Revenue	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]	$ -	$ -	$ [redacted]
Commission $'s	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 929.00	$ -	$ -	$ 929.00
Net Revenue ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]	$ -	$ -	$ [redacted]
[redacted] (BH July-Sept 2016)										[redacted]			[redacted]
Quantity										0.30			0.30
Price ($/REC)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]	$ -	$ -	$ [redacted]
Gross Revenue	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]	$ -	$ -	$ [redacted]
Commission $'s	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 385.69	$ -	$ -	$ 385.69
Net Revenue ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]	$ -	$ -	$ [redacted]
[redacted] (Oct-Dec 2016 - 25,000)												[redacted]	[redacted]
Quantity	0	0	0	0	0	0	0	0	0	0	0	[redacted]	[redacted]
Price ($/REC)	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.27	$ 0.27
Gross Revenue	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]	$ [redacted]
Commission $'s	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 168.75	$ 168.75
Net Revenue ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]	$ [redacted]
	0	0	0	0	0	0	0	0	0	0	0	0	0
Quantity	0	0	0	0	0	0	0	0	0	0	0	0	-
Price ($/REC)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Revenue	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commission $'s	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net Revenue ($)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	31,243	59,946	61,562	61,562
Cumulative Remaining RECs	0	0	0	0	0	0	0	0	0	[redacted]	[redacted]	[redacted]	[redacted]
Total Gross Revenue	$ -	$ -	$ [redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]	$ -	$ [redacted]	$ [redacted]
Total Expense (Commission)	$ -	$ -	$ [redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]	$ -	$ [redacted]	$ [redacted]
Total Net Revenue	$ -	$ -	$ [redacted]	$ -	$ -	$ -	$ -	$ -	$ -	$ [redacted]	$ -	$ [redacted]	$ [redacted]

**Actual REC's is Expected REC's until month expires

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EMPIRE

2017-2019 RES PLAN

ATTACHMENT 3

RETAIL RATE CALCULATIONS

RES Retail Rate Impact (Word)

Base RES Modeling_2017 Annual Update (Excel)

ALL INFORMATION IS CONSIDERED HIGHLY CONFIDENTIAL

☑ HIGHLY CONFIDENTIAL

☐ NON-PROPRIETARY

Empire District Electric 2016 RES Filing

Empire requested that ABB perform modeling for their Electric Utility Renewable Energy Standard (RES) Requirements. The modeling included calculating the retail rate impact per section 5 of Missouri 4 CSR 240-20.100 (the "Rule").

Assumptions:

Rule 5 (B) 1 states that the non-renewable gneration and purchase power portfolio shall be determined by adding, to the utility's existing generation and purchased power resource portfolio excluding all renewable resources, additional non-renewable resources sufficient to meet the utility's needs on a least-cost basis for the next ten (10) years. To achieve this portfolio, ABB removed the following renewables from the 2016 IRP resources; 1) Elk River and Meridian Way Wind – 36 MWs of Accredited Capacity, Ozark Beach Hydro – 16 MWs of Accredited Capacity, 2029 Future Wind – 15 MWs of Accredited Capacity and 2031 Future wind – 22.5 MWs of Accredited Capacity . In addition, the impact of the residential and commercial solar additions that were removed from the load forecast by Itron were added back. To account for the loss of capacity, the 2029 Combined Cycle was brought on in 2026 in order to maintain a minimum capacity margin of 12%.

Rule 5 (B) 2 states that the RES-compliant portfolio shall be determined by adding to the utility's existing generation and purchased power resource portfolio an amount of least cost renewable resources sufficient to achieve the portfolio requirements set forth in section (2) of this rule and an amount of least-cost non-renewable resources, the combination of which is sufficient to meet the utility's needs for the next ten (10) years. ABB is using the preferred plan (Plan 5) from Empire's latest IRP filing and is performing the calculations based on total company and not the Missouri jurisdiction Plan 5 included renewable resources that meet the RES requirements set forth in section (2). As required by rule 5 (C), rebates made during each calendar year were also included in the cost of generation from renewable energy resouces. 2016 budgeted solar capacity was updated with actual solar rebated operational capacity. The difference between actual and budget was added as a solar resource in order to offset the impact on the load forecast. 2016 budgeted solar rebates paid were also updated for actuals and updated for the 2017 solar rebate budget.

Rule 5 (B) 4 states that the assumptions regarding projected renewable energy resource additions will utilize the most recent electric utility resouce planning analysis. Weighting of the greenhouse gas emissions, gas prices and market prices were updated using ABB's 2016 Fall Midwest Power Reference Case. A 75% weighting was given to the no-carbon tax scenario and 25% to the carbon tax scenario. Table 1 includes the expected value of costs associated with greenhouse gas emissions used in this analysis. Weighted market prices were developed in ABB's 2016 Fall Reference Case database with modifications that included a weighted carbon tax. Figure 1 includes market prices for the SPP-KSMO market area with the impact of a carbon tax begining in 2022.

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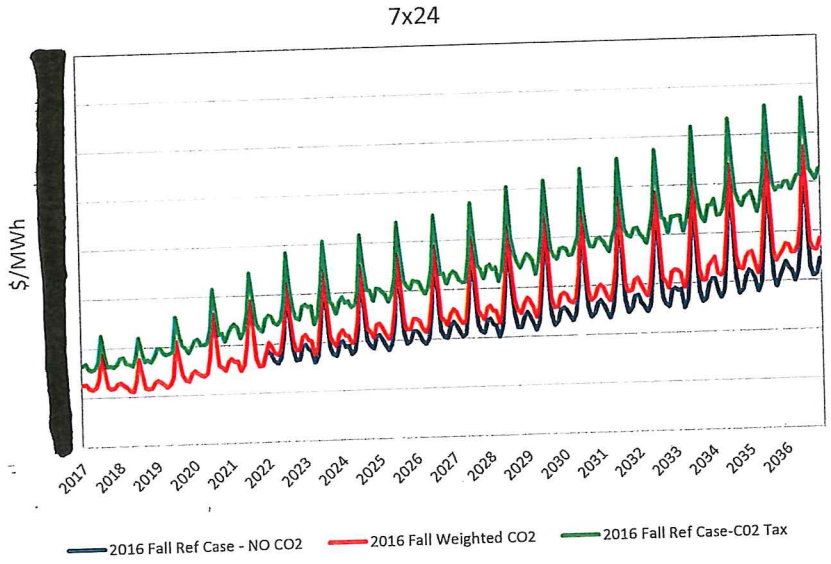
Table 1 Expected Value Carbon Tax

Year	75% No Carbon	25% Fall 2016 Ref Case	Expected Value
2022	-		
2023	-		
2024	-		
2025	-		
2026	-		
2027	-		
2028	-		
2029	-		
2030	-		
2031			
2032			
2033			
2034			
2035			
2036			

Figure 1 SPP-KSMO 7 x 24 Weighted Market Prices (Nominal $/MWh)



Results:

The following table shows the 1% calculation for the 10 year average over the succeeding 10-year period required by Rule 5 (B).

Table 2 Annual Revenue Requirements

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Total
Actual Spend - 2017-2026											
Budget - 2017-2026											
Revenue Requirements 2017-2026											1.0%
Budget % of Revenue Requirements	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	0.0%
Actual % of Revenue Requirements	2.1%	2.2%	1.7%	1.0%	0.5%	-0.3%	-0.5%	-0.9%	-1.4%	-4.2%	

HC

The following tables summarize the Retail Rate Impact calculation required by Rule 5 (G).

Table 3 2017-2026 RRI Calculation Period

2017-2026 RRI Calculation Period	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	
Baseline Revenue Req (MM$)											
Annual 1% (MM$)											
Actual Costs											
Annual Over/(Under)	6.111	6.941	4.241	-0.200	-3.576	-8.604	-10.229	-13.166	-17.108	-39.307	9.346
Plus Prior Carryover	2.344										
Cumulative carryover - over/(under)	8.455	15.396	19.637	19.438	15.862	7.258	-2.972	-16.138	-33.246	-72.553	

Table 4 2018-2027 RRI Calculation Period

2018-2027 RRI Calculation Period	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Cumulative
Baseline Revenue Req (MM$)											
Annual 1% (MM$)											
Actual Costs											
Annual Over/(Under)	6.941	4.241	-0.200	-3.576	-8.604	-10.229	-13.166	-17.108	-39.307	-39.631	
Plus Prior Carryover	8.455										
Cumulative carryover - over/(under)	15.396	19.637	19.438	15.862	7.258	-2.972	-16.138	-33.246	-72.553	-112.184	

Table 5 2019-2028 RRI Calculation Period

2019-2028 RRI Calculation Period	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Cumulative
Baseline Revenue Req (MM$)											
Annual 1% (MM$)											
Actual Costs											
Annual Over/(Under)	4.241	-0.200	-3.576	-8.604	-10.229	-13.166	-17.108	-39.307	-39.631	-38.367	
Plus Prior Carryover	15.396										
Cumulative carryover - over/(under)	19.637	19.438	15.862	7.258	-2.972	-16.138	-33.246	-72.553	-112.184	-150.551	

Table 6 2020-2029 RRI Calculation Period

2020-2029 RRI Calculation Period	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Cumulative
Baseline Revenue Req (MM$)											
Annual 1% (MM$)											
Actual Costs											
Annual Over/(Under)	-0.200	-3.576	-8.604	-10.229	-13.166	-17.108	-39.307	-39.631	-38.367	-29.098	
Plus Prior Carryover	19.637										
Cumulative carryover - over/(under)	19.438	15.862	7.258	-2.972	-16.138	-33.246	-72.553	-112.184	-150.551	-179.648	

Table 7 2021-2030 RRI Calculation Period

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2021-2030 RRI Calculation Period	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Cumulative
Baseline Revenue Req (MM$)											
Annual 1% (MM$)											
Actual Costs											
Annual Over/(Under)	-3.576	-8.604	-10.229	-13.166	-17.108	-39.307	-39.631	-38.367	-29.098	-31.993	
Plus Prior Carryover	19.438										
Cumulative carryover - over/(under)	15.862	7.258	-2.972	-16.138	-33.246	-72.553	-112.184	-150.551	-179.648	-211.642	

Table 8 2022-2031 RRI Calculation Period

2022-2031 RRI Calculation Period	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Cumulative
Baseline Revenue Req (MM$)											
Annual 1% (MM$)											
Actual Costs											
Annual Over/(Under)	-8.604	-10.229	-13.166	-17.108	-39.307	-39.631	-38.367	-29.098	-31.993	-51.504	
Plus Prior Carryover	15.862										
Cumulative carryover - over/(under)	7.258	-2.972	-16.138	-33.246	-72.553	-112.184	-150.551	-179.648	-211.642	-263.146	

Table 9 2023-2032 RRI Calculation Period

2023-2032 RRI Calculation Period	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Cumulative
Baseline Revenue Req (MM$)											
Annual 1% (MM$)											
Actual Costs											
Annual Over/(Under)	-10.229	-13.166	-17.108	-39.307	-39.631	-38.367	-29.098	-31.993	-51.504	-54.269	

Table 10 2024-2033 RRI Calculation Period

2024-2033 RRI Calculation Period	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Cumulative
Baseline Revenue Req (MM$)											
Annual 1% (MM$)											
Actual Costs											
Annual Over/(Under)	-13.166	-17.108	-39.307	-39.631	-38.367	-29.098	-31.993	-51.504	-54.269	-57.323	
Plus Prior Carryover	-2.972										
Cumulative carryover - over/(under)	-16.138	-33.246	-72.553	-112.184	-150.551	-179.648	-211.642	-263.146	-317.414	-374.738	

Table 11 2025-2034 RRI Calculation Period

2025-2034 RRI Calculation Period	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	Cumulative
Baseline Revenue Req (MM$)											
Annual 1% (MM$)											
Actual Costs											
Annual Over/(Under)	-17.108	-39.307	-39.631	-38.367	-29.098	-31.993	-51.504	-54.269	-57.323	-61.421	
Plus Prior Carryover	-16.138										
Cumulative carryover - over/(under)	-33.246	-72.553	-112.184	-150.551	-179.648	-211.642	-263.146	-317.414	-374.738	-436.159	

Table 12 2026-2035 RRI Calculation Period

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2026-2035 RRI Calculation Period	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035			Cumulative
Baseline Revenue Req (MM$)													
Annual 1% (MM$)													
Actual Costs													
Annual Over/(Under)	-39.307	-39.631	-38.367	-29.098	-31.993	-51.504	-54.269	-57.323	-61.421	-62.415			
Plus Prior Carryover	-33.246												
Cumulative carryover - over/(under)	-72.553	-112.184	-150.551	-179.648	-211.642	-263.146	-317.414	-374.738	-436.159	-498.574			

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Attachment 4

Base RES Modeling_2017 Annual Update (Excel)

Please see attached excel file: