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ATTACHMENT 9 and 3: RES RETAIL RATE IMPACT

The Empire District Electric Company 2019 RES Filing

The Empire District Electric Company (“Empire”) requested that Charles River Associates (“CRA”) 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 generation 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, CRA removed the following renewables from the 2019d IRP resources; 1) Elk River and Meridian Way Wind – 31 total MWs of Accredited Capacity; Ozark Beach Hydro – 16 total MWs of Accredited Capacity; 2020 Wind – 91 total MW of Accredited capacity; Community Solar – 0.5 total MW of Accredited Capacity; 50 MW of 2023 utility-scale solar and 50 MW of 2034 utility-scale solar – 50 total MW of Accredited Capacity; 50 MW of 2027 utility-scale solar + storage – 30 total MW of Accredited Capacity; and 19.5 MW of 2022 distributed solar + storage, 19.5 MW of 2028 distributed solar + storage, 13.5 MW of 2032 distributed solar + storage and 13.5 MW of 2036 distributed solar + storage – 44 total MW of Accredited Capacity. To account for the loss of capacity, a 49 MW gas aeroderivative was added in 2020, 148 MW gas aeroderivative was added in 2027, and a 49 MW gas aeroderivative was added in 2034 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. CRA is using the Preferred Plan (Plan 4) from Empire’s latest 2019 IRP filing. Plan 4 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 resources.

Rule 5 (B) 4 states that the assumptions regarding projected renewable energy resource additions will utilize the most recent electric utility resource planning analysis. Energy market prices were developed using ABB’s 2018 Fall Midwest Power Reference Case. A 50% weighting was given to the no-carbon tax scenario and 50% to the carbon tax scenario.

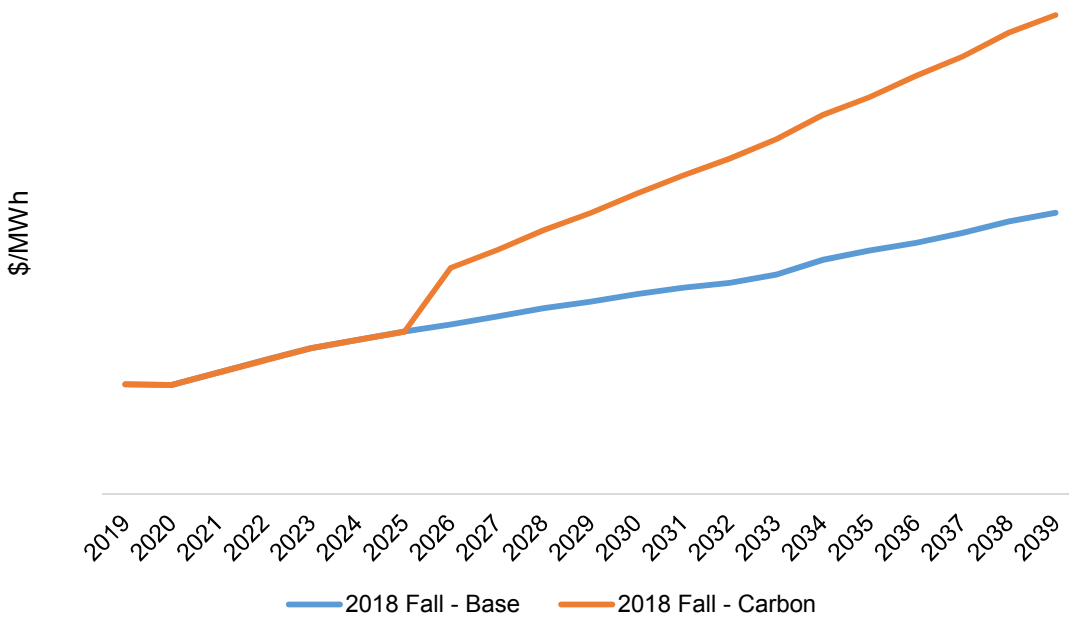
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Table 1 includes the expected value of costs associated with greenhouse gas emissions used in this analysis. Figure 1 includes market prices for the SPP-KSMO market area with the impact of a carbon tax beginning in 2026.

Table 1 Expected Value Carbon Tax

Carbon Tax - \$Nominal/Short Ton			
	No Carbon - 50%	Carbon - 50%	Expected Value
2019	0		
2020	0		
2021	0		
2022	0		
2023	0		
2024	0		
2025	0		
2026	0		
2027	0		
2028	0		
2029	0		
2030	0		
2031	0		
2032	0		
2033	0		
2034	0		
2035	0		
2036	0		
2037	0		
2038	0		
2039	0		

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

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total
Actual Spend - 2019-2028											
Budget - 2019-2028											
Revenue Requirements 2019-2028											
Budget % of Revenue Requirements											
Actual % of Revenue Requirements											

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

Table 3 2019-2028 RRI Calculation Period

2019-2028 RRI Calculation Period												
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028		
Baseline Revenue Requirement (\$MM)												
Annual 1% (\$MM)												
Actual Costs												
Annual Over/(Under)												
Prior Carryover												
Cumulative Carryover												

Table 4 2020-2029 RRI Calculation Period

2020-2029 RRI Calculation Period												
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029		Cumulative
Baseline Revenue Requirement (\$MM)												
Annual 1% (\$MM)												
Actual Costs												
Annual Over/(Under)												
Prior Carryover												
Cumulative Carryover												

Table 5 2021-2030 RRI Calculation Period

2021-2030 RRI Calculation Period												
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030		Cumulative
Baseline Revenue Requirement (\$MM)												
Annual 1% (\$MM)												
Actual Costs												
Annual Over/(Under)												
Prior Carryover												
Cumulative Carryover												

Table 6 2022-2031 RRI Calculation Period

2022-2031 RRI Calculation Period													
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031			Cumulative
Baseline Revenue Requirement (\$MM)													
Annual 1% (\$MM)													
Actual Costs													
Annual Over/(Under)													
Prior Carryover													
Cumulative Carryover													

Table 7 2023-2032 RRI Calculation Period

2023-2032 RRI Calculation Period													
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032			Cumulative
Baseline Revenue Requirement (\$MM)													
Annual 1% (\$MM)													
Actual Costs													
Annual Over/(Under)													
Prior Carryover													
Cumulative Carryover													

Table 8 2024-2033 RRI Calculation Period

2024-2033 RRI Calculation Period													
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033			Cumulative
Baseline Revenue Requirement (\$MM)													
Annual 1% (\$MM)													
Actual Costs													
Annual Over/(Under)													
Prior Carryover													
Cumulative Carryover													

Table 9 2025-2034 RRI Calculation Period

2025-2034 RRI Calculation Period													
	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034			Cumulative
Baseline Revenue Requirement (\$MM)													
Annual 1% (\$MM)													
Actual Costs													
Annual Over/(Under)													
Prior Carryover													
Cumulative Carryover													

Table 10 2026-2035 RRI Calculation Period

2026-2035 RRI Calculation Period													
	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035			Cumulative
Baseline Revenue Requirement (\$MM)													
Annual 1% (\$MM)													
Actual Costs													
Annual Over/(Under)													
Prior Carryover													
Cumulative Carryover													

Table 11 2027-2036 RRI Calculation Period

2027-2036 RRI Calculation Period													
	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036			Cumulative
Baseline Revenue Requirement (\$MM)													
Annual 1% (\$MM)													
Actual Costs													
Annual Over/(Under)													
Prior Carryover													
Cumulative Carryover													

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 2019-2021 RES Compliance Plan
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2027-2036 RRI Calculation Period												
	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036		Cumulative
Baseline Revenue Requirement (\$MM)												
Annual 1% (\$MM)												
Actual Costs												
Annual Over/(Under)												
Prior Carryover												
Cumulative Carryover												

Table 12 2028-2037 RRI Calculation Period

2028-2037 RRI Calculation Period												
	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037		Cumulative
Baseline Revenue Requirement (\$MM)												
Annual 1% (\$MM)												
Actual Costs												
Annual Over/(Under)												
Prior Carryover												
Cumulative Carryover												

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