

ATTACHMENT 9 and 3: RES RETAIL RATE IMPACT

2024 RES Retail Rate Impact (“RRI”) Filing

The Empire District Electric Company – Liberty Utilities Central (“Liberty-Empire”) filed its 2022 Missouri triennial Integrated Resource Plan (“2022 IRP”) on April 1, 2022 in File No. EO-2021-0331. Liberty-Empire filed its 2023 IRP Annual Update compliance filing (“2023 IRP Annual Update”) in March 2023 in File No. EO-2023-0294. As of the writing of this 2024 RES RRI report, Liberty-Empire also plans to submit its 2024 IRP Annual Update compliance filing (“2024 IRP Annual Update”) in March 2024, consistent with 4 CSR 4240. Liberty-Empire’s 2024 IRP Annual Update reviews the 2022 IRP preferred plan and the steps the Company has taken toward implementation since the filing of the 2022 IRP. As further described in the 2024 IRP Annual Update, Liberty-Empire has taken significant steps toward implementing its 2022 IRP preferred plan and expects a change to the plan with the 105 MW solar+storage project originally expected for 2027 to be substituted by a standalone solar project of similar size in 2026 or 2027. Furthermore, Liberty-Empire expects to deploy combustion turbines instead of the reciprocating engines originally planned for the Riverton site in 2025, as shown in the 2023 IRP Annual Update.

As part of the process to perform analysis for the plan changes established in the 2024 IRP Annual Update, Liberty-Empire refreshed its outlook for key parameters to capture changes in market dynamics since the filing of the 2022 IRP. These include load and capacity reserve margin (SPP market and Liberty-Empire territory), capacity accreditation, cost of new builds (including IRA tax credit provisions), natural gas prices, and emissions prices. These updates were also used to inform a revised outlook for SPP retirements, new builds, and energy market pricing. Liberty-Empire found that modestly lower natural gas pricing and a delayed start to base case carbon pricing combined with an increased rate of load growth resulted in largely similar long-term SPP market energy price levels as those used for the 2022 IRP. New build capital costs for renewables have escalated more than expected in the 2022 IRP Base Case, although this effect has been largely offset by the enhanced tax credit provisions of the Inflation Reduction Act. A similar upward trend is observed for capital costs for new build gas units. Further detail about these factors can be found in the 2024 IRP Annual Update. Liberty-Empire updated the PVRR results used for purposes of the RES RRI filing on the basis of these outlook revisions.

Liberty-Empire’s 2024 RES RRI analysis contained herein calculates the retail rate impact (“RRI”) on an incremental basis for each planning year based on procurement or development of renewable energy resources averaged over the next ten (10) years. The RES RRI is calculated by subtracting the total retail revenue requirement incorporating an incremental non-renewable generation and purchased power portfolio from the total retail revenue requirement including an incremental RES-compliant generation and purchased power portfolio.

Section 5(B) of the Rule 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. Consistent with the Rule, Liberty-Empire defined the non-renewable generation and purchased power portfolio (“Plan 1 – No RES”) as the utility’s existing generation and purchased power resource portfolio excluding all renewable resources except those owned or contracted prior to September 30, 2010,¹ plus additional non-renewable resources sufficient to meet the utility’s needs on a least-cost basis for the next ten years. To develop the Plan 1 – No RES

¹ Pursuant to Rule Section 5(A), because the Ozark Beach hydro facility, the Meridian Way Windfarm PPA and the Elk River Windfarm PPA were all owned or contracted prior to September 30, 2010, they were kept in the non-renewable generation and purchase power portfolio.

portfolio, Liberty-Empire removed the following renewable resources from Liberty-Empire’s existing portfolio:

Resource Name	Resource Type	ICAP MW by 2041
Neosho Ridge	Wind	301
North Fork Ridge	Wind	149
Kings Point	Wind	149
Prosperity Solar	Dist. Solar	2.5

To maintain a minimum capacity reserve margin of 15%² over the modeling horizon, a 90 MW natural gas reciprocating engine (“RICE”) was added in 2022, 30 MW RICE was added in 2023, 30 MW natural gas combustion turbine (“CT”) was added in 2025, 15 MW RICE was added in each of 2030, 2032, and 2034, 180 MW RICE was added in 2035, 15 MW RICE was added in 2037, and 240 MW of a CT frame was added in 2039.

Rule 5(B) 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 RES requirements 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. Because Liberty-Empire’s existing portfolio including all renewable resources already more than achieves RES requirements, Liberty-Empire added to the current existing portfolio a least-cost amount of non-renewable resources (“Plan 1”). To maintain a minimum capacity margin of 15% over the modeling horizon, Plan 1 adds 30 MW CT in 2025, 30 MW RICE was added in 2030, 15 MW RICE was added in 2033, 180 MW RICE in 2035, 15 MW RICE was added in 2037, and 240 MW CT frame. Relative to Plan 1 – No RES, Plan 1 also includes 600 MW wind in 2020-2021.

Rule Section 5(B)4 states that the assumptions for this filing should utilize the most recent electricity utility resource planning analysis. Liberty-Empire used power market prices, natural gas fuel prices, and emissions prices from its most recent electric utility resource planning analysis assumptions. Consistent with the 2022 IRP, a 20% probability weighting was given to the Low carbon emissions cost scenario and a 40% probability weighting was given to both the Base and High carbon emissions cost scenarios.

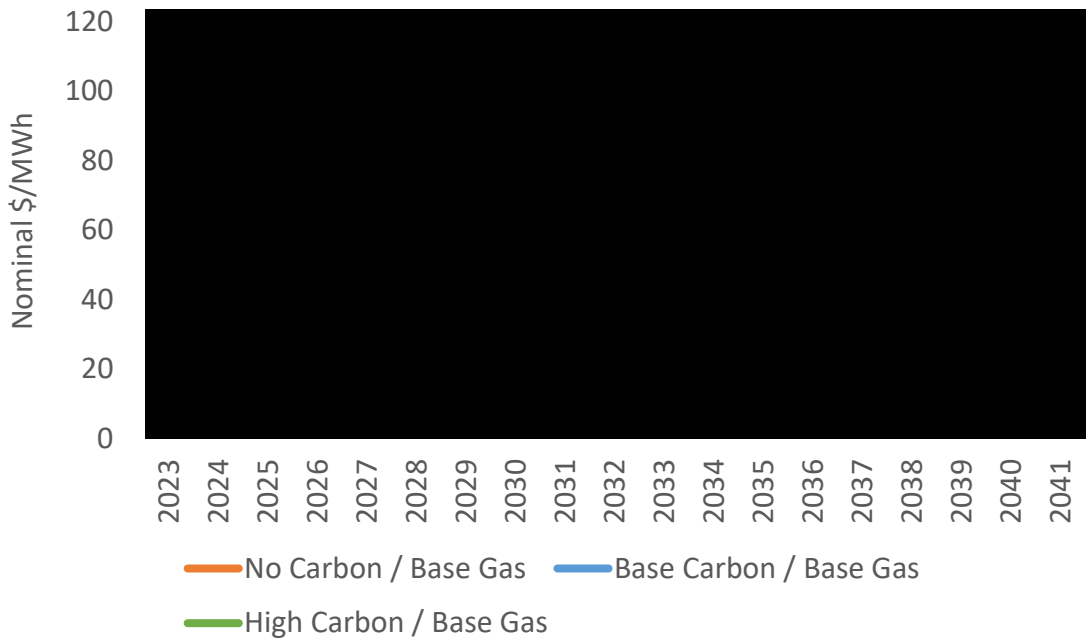
Table 1 includes the expected value of costs associated with carbon emissions used in this analysis. Exhibit 1 includes forecast power prices for South Hub with and without the impact of a carbon tax.

² The planning reserve margin has been revised to increase gradually from the current requirement of 15% up to 18% by 2030 to account for a potential increase in SPP requirements in light of market reliability risks driven by extreme weather events.

Table 1: Expected Value of Carbon Tax (Nom\$/Short Ton) *CONFIDENTIAL*

	Carbon Tax (\$Nom/Short Ton)			Expected Value
	No Carbon - 20%	Base Carbon - 40%	High Carbon – 40%	
2023	-	-	-	-
2024	-	-	-	-
2025	-	-	-	-
2026	-	-	-	-
2027	-	-	-	-
2028	-	-	-	-
2029	-	-	-	-
2030	-	-	-	-
2031	-	-	-	-
2032	-	-	-	-
2033	-	-	-	-
2034	-	-	-	-
2035	-	-	-	-
2036	-	-	-	-
2037	-	-	-	-
2038	-	-	-	-
2039	-	-	-	-
2040	-	-	-	-
2041	-	-	-	-

Exhibit 1: South Hub Annual Average Power Prices (Nom\$/MWh) *CONFIDENTIAL*



Results:

The following table shows the calculation for the average 10-year compliance spend over the 10-year period (2024-2033) as required by Rule 5(B). The RRI Budget is calculated as 1% of the Plan 1 revenue requirement. Actual Compliance Spend is calculated as the difference between the PVRRs of Plan 1 – No RES and Plan 1 in each year. As indicated in the table, the average Actual Compliance Spend for the 10-year period does not exceed the budgeted 1% RRI for the 10-year period. In fact, the negative Compliance Spend indicates that the revenue requirement of Plan 1 - No RES is greater than that of Plan 1. The primary driver of the relatively lower cost of Plan 1 is a material increase in capital cost for thermal generation used to supplement Plan 1 – No RES, while the cost of the Liberty-Empire’s existing wind assets used to achieve RES compliance in Plan 1 remains unchanged. Moreover, as the 10-year analysis window shifts forward by one year, the rapidly escalating price of carbon in the high carbon case in particular results in materially higher costs for the Plan 1 – No RES portfolio relative to Plan 1, due to the higher proportion of thermal gas generation.

*Exhibit 2: 2024-2033 Annual Revenue Requirements and RES Compliance Spend *CONFIDENTIAL**

<i>Dollars in millions</i>	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
RRI Budget (2024-2033)											
Actual Compliance Spend (2024-2033)											
Revenue Requirement (2024-2033)											
Budget (% of RR)											
Actual Compliance Spend (% of RR)											

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The following tables summarize the Retail Rate Impact calculation, including the annual carry-forward amount required by Rule 5(G).

*Exhibit 3: 2024-2033 RRI Calculation Period *CONFIDENTIAL**

2024-2033 RRI Calculation Period		2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	10-Year	Cumulative
	Baseline Revenue Requirement (\$MM)	[REDACTED]											
	Annual 1% (\$MM)	[REDACTED]											
		[REDACTED]											
		[REDACTED]											
	Actual Costs of Compliance	[REDACTED]											
	Annual Over (Under)	[REDACTED]											
	Plus Prior Carryover	[REDACTED]											
	Cumulative Carryover	[REDACTED]											

*Exhibit 4: 2025-2034 RRI Calculation Period *CONFIDENTIAL**

2025-2034 RRI Calculation Period		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	10-Year	Cumulative
	Baseline Revenue Requirement (\$MM)	[REDACTED]											
	Annual 1% (\$MM)	[REDACTED]											
		[REDACTED]											
		[REDACTED]											
	Actual Costs of Compliance	[REDACTED]											
	Annual Over (Under)	[REDACTED]											
	Plus Prior Carryover	[REDACTED]											
	Cumulative Carryover	[REDACTED]											

*Exhibit 5: 2026-2035 RRI Calculation Period *CONFIDENTIAL**

2026-2035 RRI Calculation Period		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	10-Year	Cumulative
	Baseline Revenue Requirement (\$MM)	[REDACTED]											
	Annual 1% (\$MM)	[REDACTED]											
		[REDACTED]											
		[REDACTED]											
	Actual Costs of Compliance	[REDACTED]											
	Annual Over (Under)	[REDACTED]											
	Plus Prior Carryover	[REDACTED]											
	Cumulative Carryover	[REDACTED]											

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*Exhibit 6: 2027-2036 RRI Calculation Period *CONFIDENTIAL**

2027-2036 RRI Calculation Period		2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	10-Year	Cumulative
	Baseline Revenue Requirement (\$MM)	[REDACTED]											
	Annual 1% (\$MM)	[REDACTED]											
		[REDACTED]											
	Actual Costs of Compliance	[REDACTED]											
	Annual Over (Under)	[REDACTED]											
	Plus Prior Carryover	[REDACTED]											
	Cumulative Carryover	[REDACTED]											

*Exhibit 7: 2028-2037 RRI Calculation Period *CONFIDENTIAL**

2028-2037 RRI Calculation Period		2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	10-Year	Cumulative
	Baseline Revenue Requirement (\$MM)	[REDACTED]											
	Annual 1% (\$MM)	[REDACTED]											
		[REDACTED]											
	Actual Costs of Compliance	[REDACTED]											
	Annual Over (Under)	[REDACTED]											
	Plus Prior Carryover	[REDACTED]											
	Cumulative Carryover	[REDACTED]											

*Exhibit 8: 2029-2038 RRI Calculation Period *CONFIDENTIAL**

2029-2038 RRI Calculation Period		2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	10-Year	Cumulative
	Baseline Revenue Requirement (\$MM)	[REDACTED]											
	Annual 1% (\$MM)	[REDACTED]											
		[REDACTED]											
	Actual Costs of Compliance	[REDACTED]											
	Annual Over (Under)	[REDACTED]											
	Plus Prior Carryover	[REDACTED]											
	Cumulative Carryover	[REDACTED]											

*Exhibit 9: 2030-2039 RRI Calculation Period *CONFIDENTIAL**

2030-2039 RRI Calculation Period		2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	10-Year	Cumulative
	Baseline Revenue Requirement (\$MM)	[REDACTED]											
	Annual 1% (\$MM)	[REDACTED]											
		[REDACTED]											
	Actual Costs of Compliance	[REDACTED]											
	Annual Over (Under)	[REDACTED]											
	Plus Prior Carryover	[REDACTED]											
	Cumulative Carryover	[REDACTED]											

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*Exhibit 10: 2031-2040 RRI Calculation Period *CONFIDENTIAL**

2031-2040 RRI Calculation Period		2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	10-Year	Cumulative
	Baseline Revenue Requirement (\$MM)	[REDACTED]											
	Annual 1% (\$MM)	[REDACTED]											
		[REDACTED]											
	Actual Costs of Compliance	[REDACTED]											
	Annual Over (Under)	[REDACTED]											
	Plus Prior Carryover	[REDACTED]											
	Cumulative Carryover	[REDACTED]											

*Exhibit 11: 2032-2041 RRI Calculation Period *CONFIDENTIAL**

2032-2041 RRI Calculation Period		2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	10-Year	Cumulative
	Baseline Revenue Requirement (\$MM)	[REDACTED]											
	Annual 1% (\$MM)	[REDACTED]											
		[REDACTED]											
	Actual Costs of Compliance	[REDACTED]											
	Annual Over (Under)	[REDACTED]											
	Plus Prior Carryover	[REDACTED]											
	Cumulative Carryover	[REDACTED]											

*Exhibit 12: 2033-2042 RRI Calculation Period *CONFIDENTIAL**

2033-2042 RRI Calculation Period		2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	10-Year	Cumulative
	Baseline Revenue Requirement (\$MM)	[REDACTED]											
	Annual 1% (\$MM)	[REDACTED]											
		[REDACTED]											
	Actual Costs of Compliance	[REDACTED]											
	Annual Over (Under)	[REDACTED]											
	Plus Prior Carryover	[REDACTED]											
	Cumulative Carryover	[REDACTED]											