NP

VOLUME 7

RESOURCE ACQUISITION STRATEGY SELECTION

THE EMPIRE DISTRICT ELECTRIC COMPANY D/B/A LIBERTY ("LIBERTY-EMPIRE")

20 CSR 4240-22.070

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RESOURCE ACQUISITION STRATEGY SELECTION

Commission Rule 20 CSR 4240-22.070, Resource Acquisition Strategy Selection, provides in part as follows:

PURPOSE: This rule requires the utility to select a preferred resource plan, develop an implementation plan, and officially adopt a resource acquisition strategy. The rule also requires the utility to prepare contingency plans and evaluate the demand-side resources that are included in the resource acquisition strategy.

SECTION 1 PREFERRED RESOURCE PLAN

(1) The utility shall select a preferred resource plan from among the alternative resource plans that have been analyzed pursuant to the requirements of 4 CSR 240-22.060. The utility shall describe and document the process used to select the preferred resource plan, including the relative weights given to the various performance measures and the rationale used by utility decision-makers to judge the appropriate tradeoffs between competing planning objectives and between expected performance and risk. The utility shall provide the names, titles, and roles of the utility decision-makers in the preferred resource plan selection process. The preferred resource plan shall satisfy at least the following conditions:

1.1 Preferred Plan Selection Criteria

(A) In the judgment of utility decision-makers, strike an appropriate balance between the various planning objectives specified in 4 CSR 240-22.010(2);

Consistent with 20 CSR 4240-22.010(2), Liberty-Empire's 2025 Integrated Resource Plan ("IRP") analysis was intended to select a resource strategy that provides energy services that are safe, reliable, and efficient at just and reasonable rates, consistent with state energy and environmental policies, in compliance with all legal mandates, and in a manner that serves the public interest. Further, consistent with 20 CSR 4240-22.010(2)(C), the selected resource strategy was based on the minimization of the present value of long-run utility costs as well as the mitigation of risks associated with critical uncertain factors ("CUF"), legal compliance, and rate increases. Finally, Liberty-Empire also considered the Preferred Plan's capability to significantly reduce carbon emissions over the long term. While Liberty-Empire used the minimization of the present worth of long-run utility costs as the primary selection criterion for the Preferred Plan, it also considered these additional objectives as priorities and used them as guidelines for

developing and evaluating the alternative resource plans. To compare criteria, Liberty-Empire used a scorecard approach, as discussed in Section 1.2.

1.2 Preferred Plan Selection Process

Liberty-Empire developed and evaluated 12 alternative resource plans to meet the objectives described in 20 CSR 4240-22.010(2). The development of the 12 alternative resource plans is described in more detail in Volume 6.

To capture the process and rationale behind Liberty-Empire's decision-making in evaluating tradeoffs and balancing the minimization of expected utility costs with other resource planning considerations and metrics, the company utilized an IRP scorecard in its 2025 Integrated Resource Plan. The scorecard is a means of reporting key metrics for different alternative resource plans to facilitate the evaluation of relative portfolio performance and key tradeoffs. Liberty-Empire's scorecard did not produce a ranking of portfolios. Still, it served as a tool to help facilitate structured tradeoff discussions and support the internal decision-making and approval process.

Liberty-Empire identified five major planning objectives and nine performance metrics as summarized in Figure 7-1. The objectives included Customer Affordability, Risk Mitigation, Reliability, Environmental Sustainability, and Compliance and Safety. By populating the 2025 IRP Scorecard metrics for all alternative resource plans, Liberty-Empire could evaluate the plans holistically and recommend a preferred resource plan based on transparent selection criteria.

Figure 7-1 – 2025 IRP Scorecard Metrics

Objective	Metric	Metric Description
Customer Affordability	Short-Term NPV Revenue Requirement	NPV of short-term (5-year) total annual costs paid by ratepayers under the Base Case scenario
	Long-Term NPV Revenue Requirement	NPV of long-term (20-year) total annual costs paid by ratepayers under the Base Case scenario
Risk Mitigation	Scenario Range	Expected value of 20-year PVRRs when evaluated against all CUF probabilities
	Cost Risk	Range (delta) between higher-cost (P95) and median (P50) PVRR outcomes when calculated against CUFs
Reliability	Planning Reserves	Summer and Winter % Reserve Margin, CUFs Average
	Operational Flexibility	Dispatchable Capacity (Summer/Winter UCAP MW) included in portfolio by 2045
Environmental Sustainability	Carbon Emissions	Million short tons CO2 emissions in 2045 (scope 1/2 only)
Compliance and Safety	Environmental and Legal Compliance	Adherence to legal mandates and energy policies
	Safety	Adherence to safety standards

To determine the 2025 IRP Preferred Plan, Liberty-Empire analyzed the costs and tradeoffs associated with each alternative resource plan (shown in Table 7-1). As discussed in Volume 6, all alternative plans include the retirement of Energy Center 1 and 2 in 2035 and Riverton 10 and 11 in 2026.

Table 7-1 – Description of Alternative Resource Plans

Plan	Plan Description
1	Gas + RAP DSM
2	Gas + MAP DSM
3	Gas/Renewable Mix + RAP DSM
4	Gas/Renewable Mix + RAP DSM (Frame CT)
5	Gas/Renewable Mix + RAP DSM (5x Aero)
6	Gas/Renewable Mix + MAP DSM
7	Renewable + RAP DSM
8	Renewable + MAP DSM
9	Net Zero 2050 – Renewable + Advanced Storage + RAP DSM
10	Net Zero 2050 – Nuclear SMR + RAP DSM
11	Net Zero 2050 – Hydrogen + RAP DSM
12	EPA GHG Rule – Advanced Tech + RAP DSM
Notes: All plans are provided utility and distributed scale resource options Plans 1-12 include the retirement of Riverton 10 and 11 in 2026 and Energy Center 1 and 2 in 2035 Plans 9-11 include the retirement or retrofit of Riverton CC in 2045 and State Line CC in 2050 Plan 12 includes the retirement of Iatan 1 and 2	

Minimization of the present worth of long-run utility costs, as measured by the present value of revenue requirements ("PVRR"), was the primary selection criterion for the Preferred Plan, with all remaining planning objectives given consideration. In the judgment of utility decision-makers, the Preferred Plan represented an appropriate balance between the various planning objectives specified in 20 CSR 4240-22.010(2).

Liberty-Empire's populated 2025 IRP Scorecard is shown in Figure 7-2. The scorecard represents the criteria that utility decision-makers weighed most heavily in determining Liberty-Empire's Preferred Plan.[1] For each metric in the populated scorecard, values in darker shades of green illustrate a "stronger" performance of the plan (i.e., more favorable), and values in darker shades of red illustrate a "weaker" performance (i.e., less favorable).

[1] By design, all alternative resource plans adhere to legal mandates, energy policies, and safety standards, hence, the Compliance and Safety objectives are not shown in Figure 7-2.

Figure 7-2 – Populated 2025 IRP Scorecard

Objective	Metric	Metric Description	Portfolio											
			1	2	3	4	5	6	7	8	9	10	11	12
Customer Affordability	Short-Term NPV Revenue Requirement	Total short-term (5-year) annual costs paid by ratepayers on a net present value basis under Base Case scenario	$2,765	$2,768	$2,765	$2,767	$2,792	$2,766	$2,852	$2,848	$2,850	$2,797	$2,850	$2,765
	Long-Term NPV Revenue Requirement	Total long-term (20-year) annual costs paid by ratepayers on a net present value basis under Base Case scenario	$8,698	$8,676	$8,694	$8,574	$8,820	$8,689	$9,179	$9,373	$9,623	$9,712	$9,388	$8,815
Risk Mitigation	Resilience to Critical Uncertain Factors	Expected value of 20-year PVRRs when evaluated against all critical uncertain factor probabilities	$8,666	$8,649	$8,696	$8,541	$8,812	$8,693	$9,373	$9,572	$9,890	$10,203	$9,590	$8,859
		Range (delta) between higher-cost (P95) and median (P50) PVRR outcomes when calculated against the CUF probabilities	$528	$523	$666	$657	$659	$672	$1,387	$1,452	$1,551	$2,300	$1,391	$822
Maintaining Reliability	Planning Reserves	% Reserve Margin, CUFs Average (Summer | Winter)	27.2% 25.9%	27.0% 25.6%	28.6% 25.7%	31.6% 28.9%	32.0% 29.4%	28.3% 25.4%	56.2% 32.2%	55.5% 31.9%	56.6% 33.5%	49.8% 34.3%	56.2% 32.2%	31.5% 26.2%
	Operational Flexibility	Dispatchable capacity (Summer UCAP MW) included in portfolio in 2044	1,351	1,347	1,328	1,330	1,334	1,324	847	847	847	1,147	847	1,313
Environmental Sustainability	Carbon Reduction	Million short tons CO_2 emissions in 2044 (scope 1/2 only)	1,761	1,735	1,761	1,752	1,783	1,735	1,559	1,559	1,559	1,559	1,559	1,801

1.3 Preferred Plan Selection

Minimizing PVRR was the primary criterion for selecting the Preferred Plan. Figure 7-3 displays the PVRR of all 12 plans under Base Case planning assumptions before introducing uncertainty for specific market factors for the twenty-year planning period of the IRP. The thirty-year PVRRs of all the alternative resource plans are shown in Figure 7-4.

Figure 7-3 – 20-Year PVRR for All Plans (2025-2044) ($ millions)

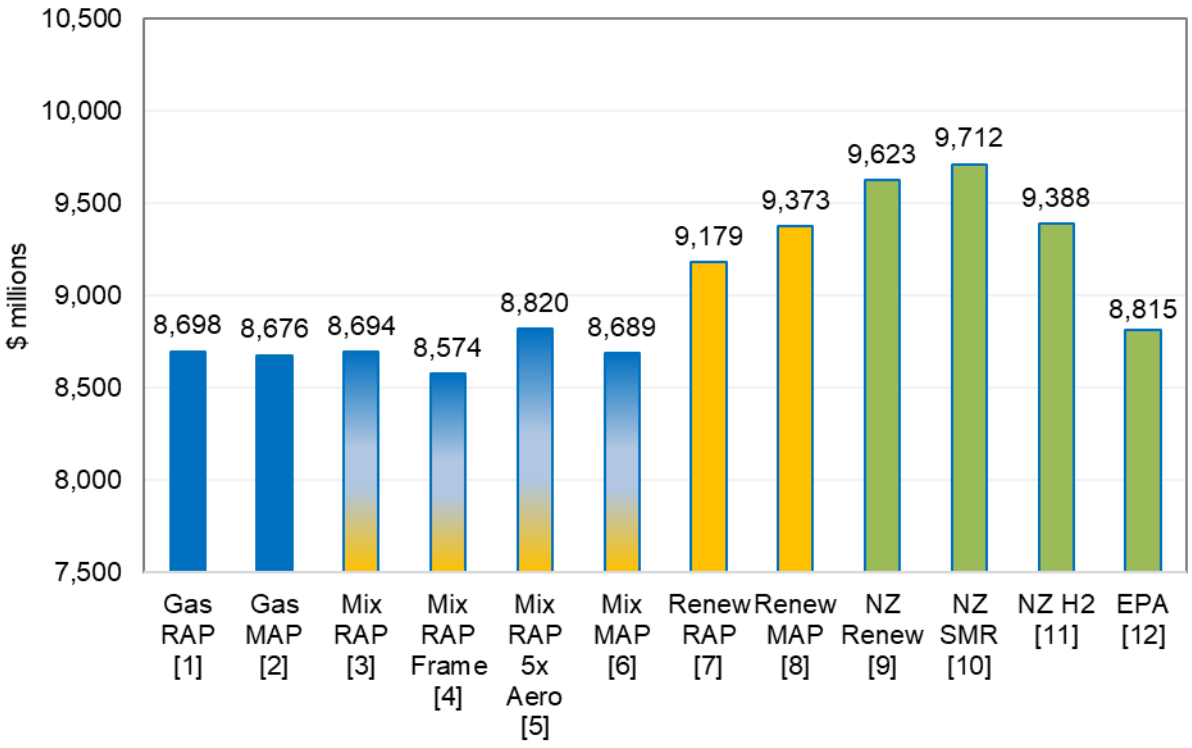
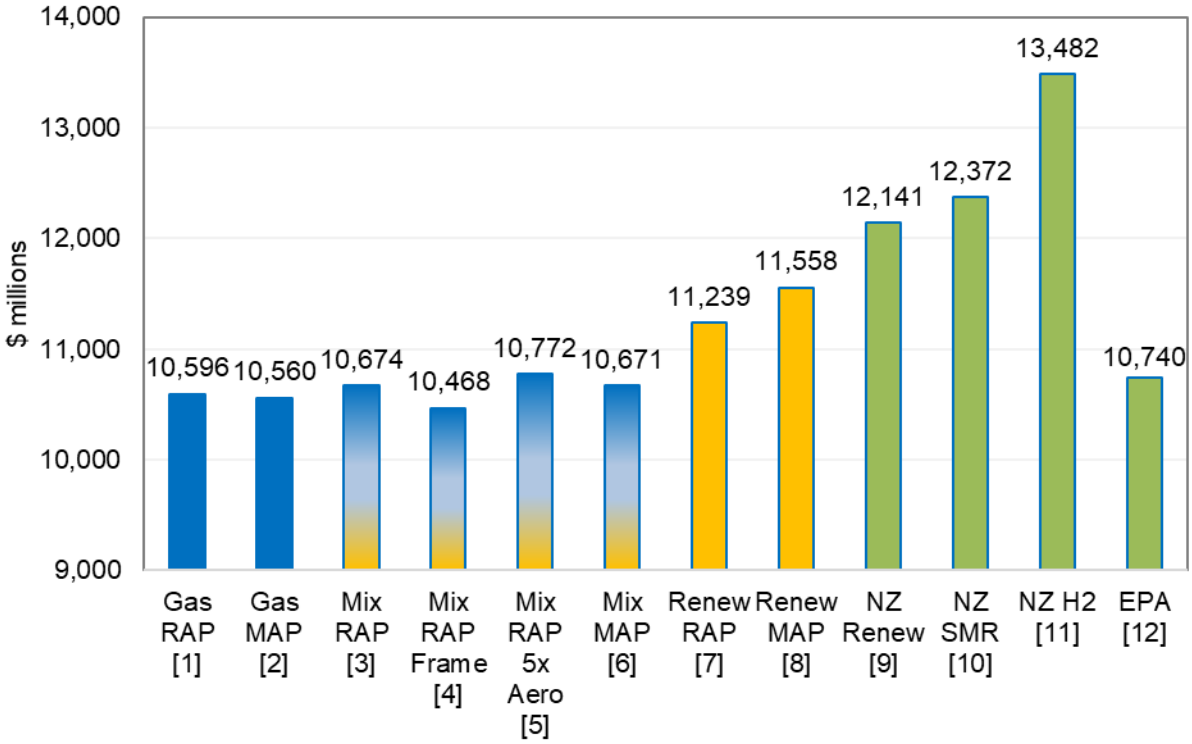


Figure 7-4 – 30-Year PVRR for All Plans (2025-2054) ($ millions)



As shown in Figure 7-3, on a 20-year PVRR basis, Plan 4 is the lowest-cost alternative plan among all plans. However, PVRRs are close across Plans 1 through 6 due to the addition of similar technology types in those portfolios through 2044. Given only minor differences in near-term portfolio changes within similar portfolio technology concept themes (i.e., within Plans 1-2 – natural gas options only, within Plans 3-6 – natural gas and renewables mix), the PVRRs within these themes were found to be similar to each other. Plans 7 and 8, representing renewable options only, result in a higher cost profile than Plans 1-6, indicating that gas resources are a cost-efficient option. Plans 9 through 11, representing "Net Zero by 2050" Plans that retire Liberty-Empire's two existing natural gas combined cycle ("CC") units by 2050, are generally the highest cost plans during the 20-year study period. Plan 12, representing EPA Greenhouse Gas ("GHG") rules compliance, has a PVRR similar to that of the gas only and mix resource Plans 1 through 6.

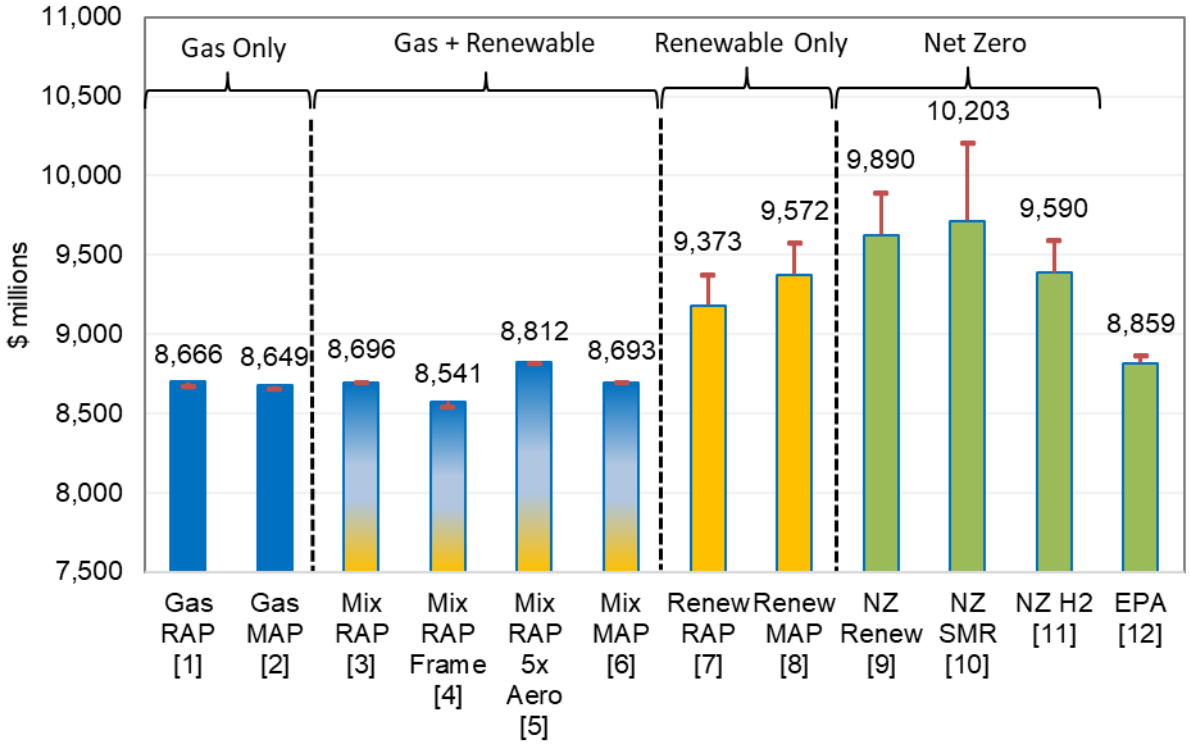
Of all alternative plans, Plan 4 was the lowest cost. Plan 12 (EPA GHG Rule with Advanced Tech + RAP DSM) is cost competitive with Plans 1 through 6 on both a 20-

year and 30-year PVRR basis, providing a viable alternative. The early retirement of coal assets under the EPA GHG rule does not take place until 2031[2], and Plan 12 is similar to Plan 4 in technology buildout with an emphasis on gas turbine resources during the first six years of the IRP study period. Therefore, Plan 4 maintains flexibility and optionality to comply with Plan 12's EPA GHG rule, assuming the necessary steps are taken in the near future.

Through the risk analysis, Liberty-Empire also determined the expected value or weighted average of PVRRs across the 81 endpoints, with subjective probabilities assigned to each endpoint by the utility decision-makers. The risk analysis is described further in Volume 6. From a risk mitigation perspective, Liberty-Empire found that Plan 4 performed best on an expected value basis for both 20-year and 30-year PVRRs, though several plans that assume age-based or baseline retirements have similar risk profiles, including Plans 1-3 and Plan 6. Overall, Plan 4 remained the lowest cost and preserves flexibility to pivot to the resource acquisition strategy under Plan 12 in the near- to mid-term. The expected value PVRRs for all plans are shown in Figure 7-5, with the red "whisker" lines representing risk values incremental to the Base Case PVRRs.

[2] Liberty-Empire is a minority owner of Iatan and Plum Point coal units, hence early retirement of these assets would not purely be a Company decision. In this respect, Plan 12 is a contingency and could not be implemented at the Company's choosing. Moreover, Liberty-Empire modeled an interpretation of the proposed EPA GHG rule. If the EPA were to pass a final GHG rule, that rule could be different than what was modeled.

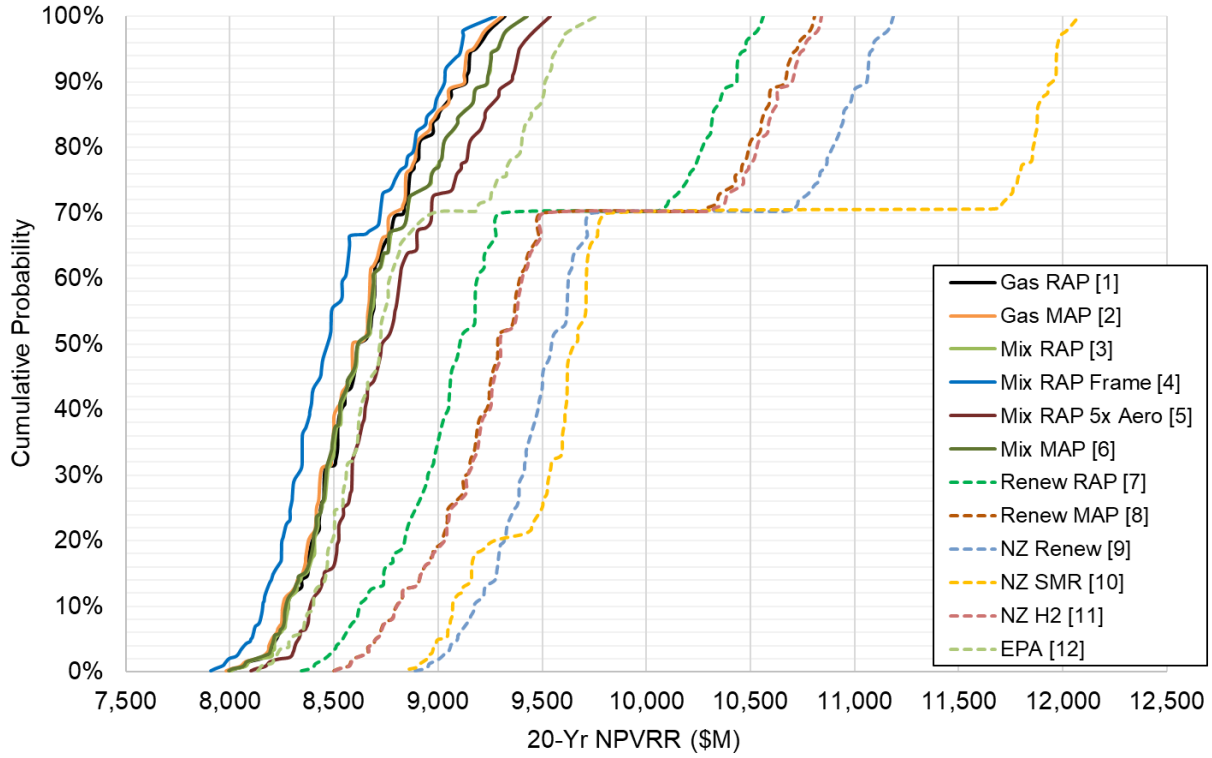
Figure 7-5 – PVRR with Risk Value for All Plans (2025-2044) – ($ millions)



Compared to alternative plans that included only new renewable resources (i.e., Plans 7 and 8), the alternative plans that included thermal resources (i.e., Plans 1 and 2 and, to a more limited extent, Plans 3 through 6) significantly lowered the range between higher-cost PVRR outcomes (defined as the 95th percentile of PVRRs when evaluated across the 81 endpoints) and the median PVRR outcome (defined as the 50th percentile of PVRRs when evaluated across the 81 endpoints). This metric indicated that portfolios that included more thermal capacity were better able to "tighten" or narrow the risk band in potential PVRR outcomes. Although the CUF analysis includes uncertainty in natural gas prices and environmental costs, which also increases thermal resource cost risk, the new thermal capacity added in the alternative plans consists of natural gas-fired peaking technologies, which are expected to operate at relatively low capacity factors and primarily in hours with high power prices. This difference is also driven by higher uncertainty in capital costs for renewable and storage resources compared to natural gas-fired resources.

An illustration of the tighter "band" of outcomes in Plans 1-6 relative to Plans 7-11 can be seen in the cumulative probability distribution graphic or "risk profile" in Figure 7-6. The risk profile plots the PVRR for all plans for each of the 81 endpoints. While all plans that included thermal resources (Plans 1-6) show fairly similar risk profiles, Plans 1 and 2 performed the best on this metric. Although Plan 4 did not perform the best on this metric, the utility decision-makers determined that the difference in performance between the natural gas-only plans and Plan 4 were not material enough to overwhelm Plan 4's advantage in PVRR, which was the primary selection criterion for Preferred Plan selection. Similarly, although Portfolio 4 does not perform best on the dispatchable capacity metric, the difference did not overwhelm Plan 4's advantage in PVRR.

Figure 7-6 – Risk Profiles of All Plans ($ millions)



Liberty-Empire found that plans that added new carbon-free resources performed better than plans that added new natural gas-fired resources on the Environmental Sustainability metric, measured by the amount of scope 1 and 2 CO_2 emissions from the

generation portfolio in 2044. Plans 1 through 6, which added new thermal resources before 2044, performed the weakest on this metric. Plan 12, which retired both of Liberty-Empire's existing coal-fired units before 2044, performed best on this metric.[3]

Finally, Liberty-Empire determined that Plan 4 benefits from having more optionality in technology type since it allows for the selection of new utility-scale and distributed renewable resources in addition to new gas-fired resources, while other similar plans, such as Plan 7, allow only for the selection of renewable resources. As in all alternative plans, Plan 4 includes distributed resources in addition to utility-scale resources. Liberty-Empire believes there is value in investing in some level of distributed resources from an energy security and reliability perspective: distributed resources can help improve local reliability, prevent blackouts and outages, avoid distribution system investment, and improve energy security in the event of large-scale disruptions at the transmission level. They may also provide further benefits, such as compliance with FERC Order 2222 implementation.

After carefully considering alternative plan performance across the Preferred Plan selection criteria described in Section 1.1, Liberty-Empire ultimately selected Plan 4 as the Preferred Plan.

1.4 Preferred Plan Description

Liberty-Empire's decision-makers selected Plan 4 as the Preferred Plan. Plan 4 includes the near-term retirement of Riverton 10 and 11 replaced directly at the site by dual-fuel ** [redacted] ** industrial gas turbines and the retirement of Energy Center 1 and 2 in 2035. Plan 4 also includes the low-, mid-, and high-cost bundles of realistically achievable potential ("RAP") demand-side management ("DSM") and a mix of utility-scale and distributed natural gas resources and utility-scale solar resources added over the study period.

[3] See footnote 2.

1.4.1 Supply-Side Resources in the Preferred Plan

The Preferred Plan includes the following assumed resource retirements and PPA expirations of the existing resources:

- Expiration of the Elk River Wind PPA in 2025;
- Expiration of the 78 MW Missouri Joint Municipal Utility Commission ("MJMEUC") Capacity Sale PPA in 2025;
- Retirement of Riverton 10 and 11 in 2026;
- Expiration of the 25 MW MJMEUC Capacity Sale PPA in 2027[4];
- Expiration of the Meridian Way Wind PPA in 2028;
- Retirement of Energy Center 1 and 2 in 2035;
- Retirement of Iatan 1 in 2039;
- Expiration of the Plum Point PPA in 2040

All other existing Liberty-Empire generating units were assumed to continue operations throughout the planning horizon, and Liberty-Empire did not plan to extend any PPAs for IRP analysis purposes, although that option is available.

The Preferred Plan will satisfy future capacity needs with a broad mix of utility-scale solar, distributed standalone storage, and natural gas resources at both the utility and distributed scale. The plan adds 240 MW of natural gas frame combustion turbine by 2029[5] utilizing SPP's Expedited Resource Adequacy Study ("ERAS") provision.[6] This process would allow for utilities to select any generation resource for a special one-time study conducted outside the regular generator interconnection ("GI") study queue. Requests accepted into the study will have priority over all GI requests without signed

[4] 25 MW MJMEUC Capacity Sale PPA that begins in 2025 is an amended and restated contract to the original MJMEUC capacity sale that began in 2020.
[5] The expedited addition of the frame combustion turbine in 2029 allows Liberty-Empire to ensure compliance with SPP's latest guidance for a winter reserve margin requirement beginning at 36% in 2026 and increasing to 44% in 2029
[6].May be commissioned by 2029 with provision of the Expedited Resource Addition Study (ERAS) recently endorsed by SPP, which creates a one-time study process to expedite the interconnection of new generation projects to meet resource adequacy needs.

agreements. The plan adds a second 240 MW of natural gas frame combustion turbine in 2036. By 2044, the plan also includes 300 MW of utility-scale solar, 28 MW of distributed-scale natural gas reciprocating internal combustion engine ("RICE"), and 1 MW of distributed 4-hour lithium-ion battery storage. The plan also adds the low-, mid, and high-cost bundles of RAP DSM. As in all alternative plans, the Preferred Plan assumes dual-fuel combustion turbine units replace Riverton 10 and 11 retirements in 2026, and 175 MW of previously-established firm solar capacity is added in 2028. The Preferred Plan additions are further illustrated in Table 7-2. The capacity values (presented in MW) represent the summer operating capacity.

Table 7-2 – Preferred Plan Supply Side Resource Retirements and Additions

Year	Supply-Side Retirements and PPA Expirations	Supply-Side Additions
2025	Elk River Contract Expires (150 MW)	
2026	Riverton 10-11 Retires (27 MW)	
2027		RAP DSM (Low-, Mid-, and High-Cost Bundles)
2028	Meridian Way Contract Expires (105 MW)	
2029		Gas Frame CT (240 MW)
2030		
2031		
2032		
2033		
2034		
2035	Energy Center 1 and 2 Expires (160 MW)	Utility-Scale Solar (150 MW)
2036		Gas Frame CT (240 MW)
2037		
2038		
2039	Iatan 1 Retires (84 MW)	
2040	Plum Point PPA Expires (50 MW)	
2041		Utility-Scale Solar (150 MW); Dist. RICE (2 MW)
2042		Dist. RICE (8 MW)
2043		Dist. RICE (8 MW); Dist. Storage (1 MW)
2044		Dist. RICE (10 MW)

Note – In addition to the resources above, the plan includes near-term firm additions established as a part of previous planning (27 MW gas CT at Riverton site in 2026, 175 MW solar in 2028)

1.4.2 Advanced Transmission and Distribution Technologies in the Preferred Plan

(B) Invest in advanced transmission and distribution technologies unless, in the judgment of the utility decision-makers, investing in those technologies to upgrade transmission and/or distribution networks is not in the public interest;

The advanced transmission and distribution planning elements are discussed in Volume 4.5. Liberty-Empire makes every effort to incorporate advanced technologies in presently budgeted or recently substantially completed projects. As demonstrated by its recent investments in Advanced Metering Infrastructure ("AMI"), Advanced Distribution Management Systems ("ADMS"), and distribution automation, Liberty-Empire is taking significant action to incorporate advanced technologies into its distribution and transmission network and is modernizing its grid better to set the stage for future advanced grid technologies. However, implementing advanced grid technologies did not influence the current selection of the near-term resource acquisition strategy.

Organization-wide, Liberty is working to establish a platform of capabilities involving AMI, ADMS, and other capabilities that are important for the safe, compliant, and cost-effective operation of the distribution grid. For example, the Company has a comprehensive corporate-wide initiative called the Customer First program. Customer First includes AMI and an initiative called Network & Design Operations. This will implement a uniform Geospatial Information System ("GIS") technology across Liberty for consistency of asset data management and analytics to support many other business and operational objectives, including the implementation of ADMS that will improve the integration and utilization of smart devices, sensors, automation, and operational optimization across its grid infrastructure. Over time, Liberty-Empire will continue to better understand the extent of implementation of these programs, determining Liberty-Empire's specific requirements about load and customer needs.

1.4.3 Demand-Side Programs in the Preferred Plan

(C) Utilize demand-side resources to the maximum amount that comply with legal mandates and, in the judgment of the utility decision-makers, are consistent with the public interest and achieve state energy policies; and

Liberty-Empire analyzed demand-side and supply-side resources on an equivalent basis as options for meeting load requirements. Applied Energy Group ("AEG") developed the demand-side resource inputs. AEG developed load shapes for each DSM program to be included as resource options for the portfolio modeling. The DSM programs were split into various bundles by cost for IRP analysis purposes, representing low, mid, and high-cost ranges. At least the low-cost bundle of RAP or maximum achievable potential ("MAP") DSM was found to be cost-effective in all plans. The demand-side resource analysis is discussed in Volume 5.

1.4.4 Resources in the Preferred Plan

Tables 7-3 and 7-4 present the forecasted capacity balance for the Preferred Plan and provide more details about the timing of the resources planned to meet Liberty-Empire's load while complying with current legal mandates. Table 7-3 shows the capacity balance for the summer season, utilizing summer peaks and unit ratings. Table 7-4 shows the capacity balance for the winter season, utilizing winter peaks and winter unit ratings.

Table 7-3 – Plan 4 Preferred Plan – Summer Peak

****Confidential in its Entirety****

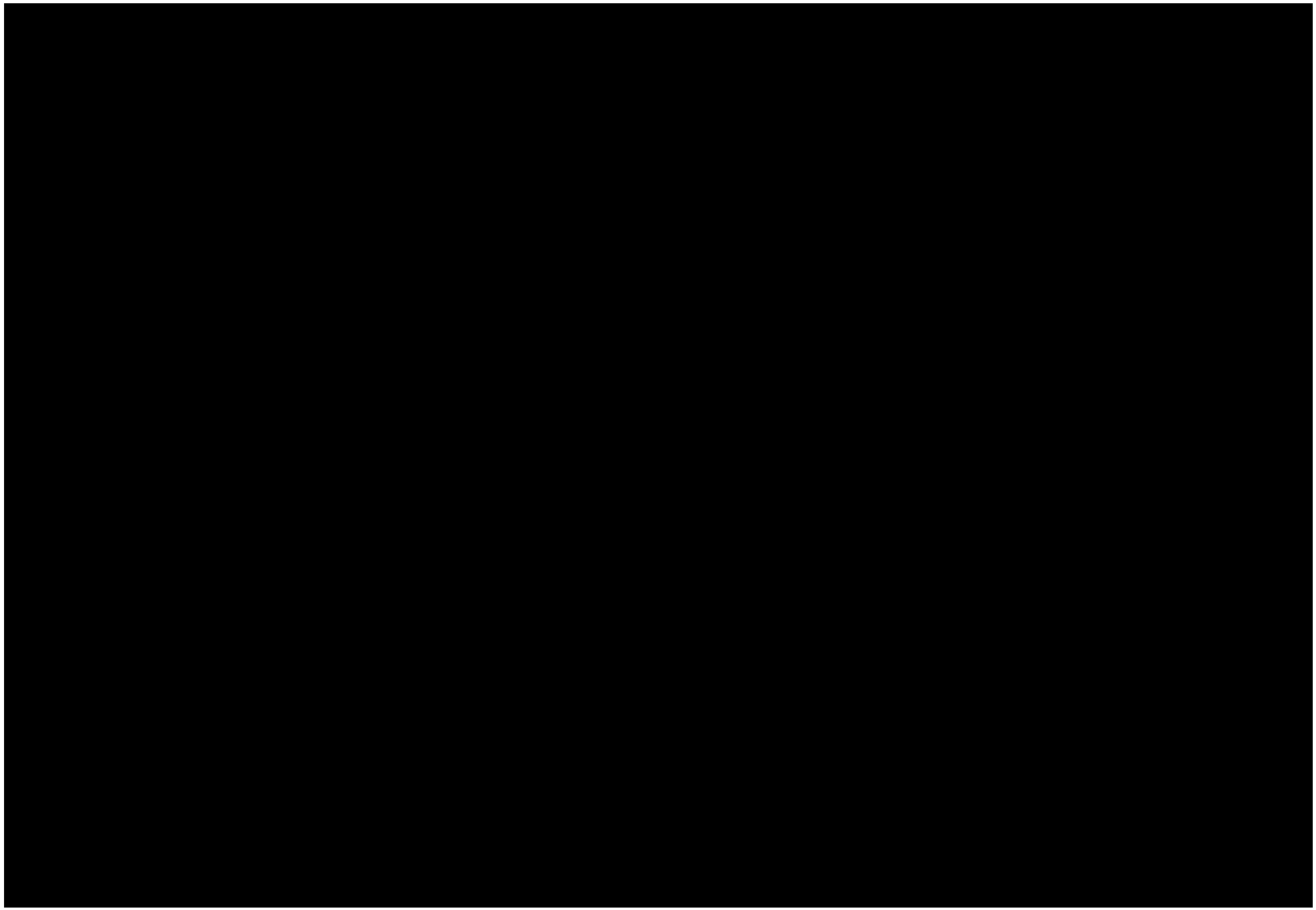
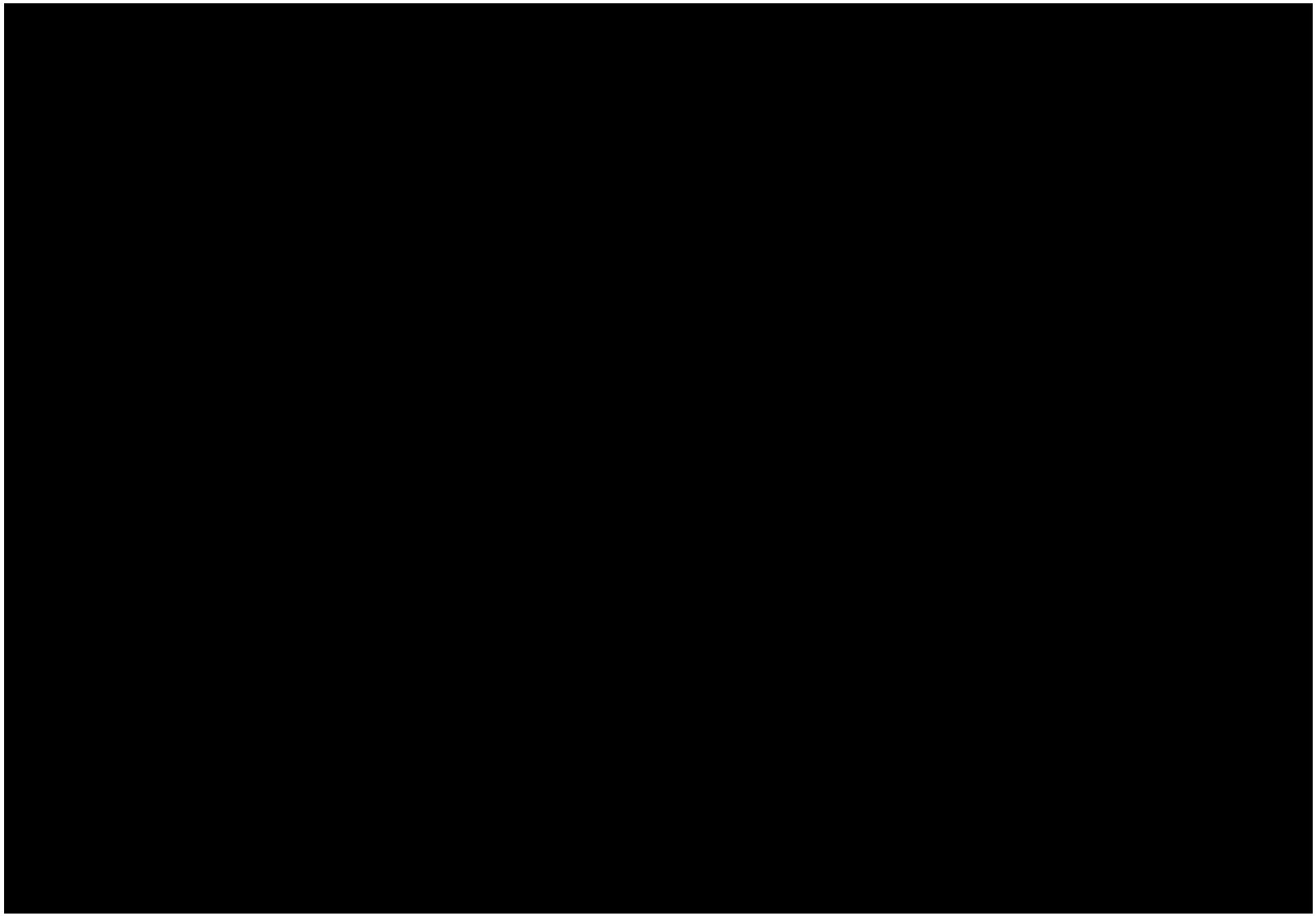


Table 7-4 – Plan 4 Preferred Plan – Winter Peak

****Confidential in its Entirety****



1.4.5 Extreme Weather Capability

(D) In the judgment of the utility decision-makers, the Preferred Plan, in conjunction with the deployment of emergency demand response measures and access to short-term and emergency power supplies, has sufficient resources to serve load forecasted under extreme weather conditions pursuant to 4CSR 240-22.030(8)(B) for the implementation period. If the utility cannot affirm the sufficiency of resources, it shall consider an alternative resource plan or modifications to its preferred resource plan that can meet extreme weather conditions.

Liberty-Empire examined the adequacy of the Preferred Plan to serve the load forecasted under extreme weather conditions pursuant to 20 CSR 4240-22.030(8)(B). As a member of the Southwest Power Pool ("SPP") balancing authority and energy market, Liberty-Empire's ability to serve load in extreme weather scenarios relies primarily on the utility meeting the SPP required reserve margin. Liberty-Empire also ensured that all portfolios meet SPP's latest guidance for a winter reserve margin requirement of 36% in 2026, increasing to 44% in 2029.

All Liberty-Empire resource plans also include the replacement of the existing Riverton units 10 and 11 with significantly more reliable dual-fuel ** [redacted] ** industrial gas turbines, as well as the life extension of Energy Center units 1 and 2 until 2035 to maintain and improve the ability to provide reliable services during potential emergency events. Energy Center 1 and 2 provided significant value to customers during recent winter storms, including helping stabilize the system during the events of Storm Uri due to their ability to operate on fuel oil and natural gas. Liberty-Empire believes maintaining Energy Center 1 and 2 through 2035 will significantly help hedge market risks at a relatively low investment cost. In addition, the continued operation of Energy Center 1 and 2 may provide other foreseeable benefits to address new proposed SPP resource adequacy constructs which will place a priority on reliable capacity, including the potential for increasing reserve margins and decremented capacity for existing thermal resources.

1.5 Utility Decision Makers

The list of utility decision-makers for the 2025 IRP included Liberty-Empire executives and directors. Other managers, analysts, and specialists were also involved in developing this IRP. The names, titles, and roles of the Liberty-Empire IRP team, including the utility decision-makers are provided in Table 7-5. An Executive team review process also supported this local team.

Table 7-5 – Liberty-Empire 2025 IRP Team (Central Region)

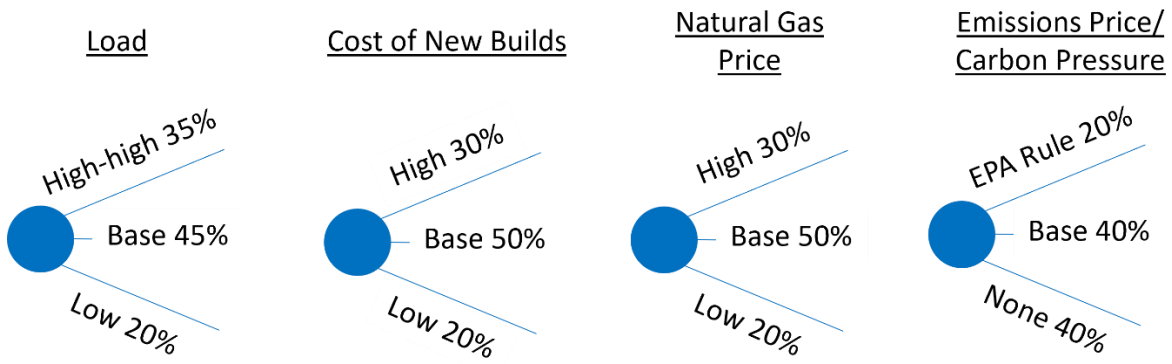
Name	Title	Primary IRP Function
Tim Wilson	President, Central Region – Electric	Executive Staff - Utility Decision Maker
Nate Morris	Vice President, Transmission Planning and Operations	Executive Staff, Transmission & Distribution, SPP RTO – Utility Decision Maker
Jennifer Shewmake	Vice President, Finance and Administration – Central Region	Executive Staff – Utility Decision Maker
Aaron Doll	Senior Director, Energy Strategy	Director in charge of IRP, SPP Market – Utility Decision Maker
Drew Landoll	Senior Director, Engineering and Project Management	Strategic Projects, Environmental, Renewable Energy – Utility Decision Maker
Charlotte Emery	Senior Director, Rates & Regulatory Affairs	Regulatory, Rates – Utility Decision Maker
Brian Berkstresser	Senior Director, Generation Operations – Central Region	Existing Supply-Side Fleet
Diana Carter	Director, Legal Services	Legal
Shaen Rooney	Director, Strategic Projects	Supply-Side, Environmental, Renewable Energy
Kim Dragoo	Director, Key Accounts and Energy Programs	Demand-Side
Todd Tarter	Senior Manager, Strategic Planning	IRP Project Manager
Josh Tupper	Manager, Energy Market Operations	Energy Supply, Energy Trading, Fuel Procurement, SPP Next Day Market
Christopher Green	Manager, Energy Market Operations	Congestion Hedging Management, Transmission
David Busse	Lead, Planning and Fuel	Supply-Side, Commodity Pricing, Load Forecasting, Resource Adequacy
Terra Higgins	Analyst II, Planning	Load Forecasting Liaison, Resource Adequacy, Technical Writing

(2) The utility shall specify the ranges or combinations of outcomes for the critical uncertain factors that define the limits within which the preferred resource plan is judged to be appropriate and explain how these limits were determined. The utility shall also describe and document its assessment of whether, and under what circumstances, other uncertain factors associated with the preferred resource plan could materially affect the performance of the preferred resource plan relative to alternative resource plans.

2.1 Critical Uncertain Factors

A CUF is any uncertain factor that is likely to affect the outcome of the resource planning decision materially. As discussed in Volume 6, Liberty-Empire identified the following critical uncertain factors: load growth, carbon prices, natural gas fuel prices, and a grouping of factors related to the cost of new builds.[7] These critical uncertain factors and their ranges form the nodes and the branches of the uncertainty tree in Figure 7-7. Volume 6 documents the rationale underlying the subjective probabilities of each scenario the utility decision-makers assign.

Figure 7-7 – Critical Uncertain Factors Tree



[7] As discussed in Volume 6, the cost of new builds CUF itself includes high, base, and low scenarios of component factors, including capital costs, interconnection costs, interest rates, and tax credit provisions (if relevant).

2.2 Ranges of Critical Uncertain Factors

Planning for future resources in the electric utility industry involves considering and evaluating many uncertainties. For this IRP, Liberty-Empire developed 12 alternative plans. As discussed in Volume 6, these plans were developed to examine a variety of long-term options for Liberty-Empire's portfolio, including future preferred technology type, levels of distributed versus utility-scale resources, levels of DSM, and retirement dates of existing Liberty-Empire units.

Plan 4, selected as the Preferred Plan, includes a long-term future resource buildout dominated by utility-scale and distributed natural gas resources and utility-scale solar resources. An analysis of the range of probable outcomes for the Preferred Plan under the critical uncertain factors was performed to evaluate its performance relative to the other alternative plans under a wide range of external market conditions. The 20-year PVRRs for all alternative plans under each of the 81 endpoints were calculated to determine which portfolio was the lowest cost under each scenario.

Of the baseline plans (Plans 1-8), Liberty-Empire found that the Gas-Renewable Mix portfolios (Plans 3-6) performed the best across most combinations of natural gas price, emissions cost, and load conditions. The gas-only portfolios (Plans 1-2) performed best under certain scenarios with high cost of new build trajectories. Under the high cost of new build scenarios, Plans 7-8 were higher cost due to higher assumed solar and storage capital costs, less favorable future federal tax credit policy, higher interconnection costs, and higher interest rates. However, the high cost of new builds endpoint represents a "worst case scenario" for all component variables, and Liberty-Empire believes it is unlikely that all of the factors within the high cost of new build critical uncertain factor would happen simultaneously for a sustained period of time.

No combination of natural gas price, emissions price, and load growth was found to change the positioning of the Gas Only or Gas-Renewable Mix portfolios as the best-performing plans. In other words, Liberty-Empire found that a Preferred Plan strategy that includes at least some natural gas generation is expected to perform better than any

alternative strategies regardless of how natural gas prices, emissions prices, and load growth are reasonably expected to evolve.

When further evaluating the performance of the Gas-Renewable Mix plans (Plans 3-6) under the critical uncertain factor scenarios, Liberty-Empire determined that Plan 4 (Mixed Gas/Renew Mix + RAP DSM + Frame CT) had a lower cost across all scenarios. This is primarily due to relatively lower capital and fixed operating costs of the gas frame units. As with all other alternative plans, Liberty-Empire believes that Plan 4 has additional benefits by including distributed energy resources. Liberty-Empire believes there is value in investing in some level of distributed resources from an energy security and reliability perspective: distributed resources can help improve local reliability, prevent blackouts and outages, avoid distribution system investment, and improve energy security in the event of large-scale disruptions at the transmission level. They may provide further benefits such as compliance with FERC Order 2222 implementation.

SECTION 3 BETTER INFORMATION

(3) The utility shall describe and document its quantification of the expected value of better information concerning at least the critical uncertain factors that affect the performance of the preferred resource plan, as measured by the present value of utility revenue requirements. The utility shall provide a tabulation of the key quantitative results of that analysis and a discussion of how those findings will be incorporated in ongoing research activities.

3.1 Expected Value of Better Information

To determine the maximum possible value that Liberty-Empire should be willing to pay for better information about future market conditions, Liberty-Empire assumed it was possible to obtain perfect information about the future trajectory of the critical uncertain factors; that is, Liberty-Empire could determine with certainty which state of the world will occur. The expected value of perfect information ("EVPI") represents the delta between the expected value of the best decisions under every scenario with perfect information regarding market uncertainties and the expected value of the best decision without perfect information regarding market uncertainties.[8] Liberty-Empire developed two measures of EVPI: (1) the EVPI assuming perfect information regarding *all four* critical uncertain factors, representing the value that Liberty-Empire would pay to have perfect information regarding all critical uncertainties; and (2) the *conditional* EVPIs assuming perfect information regarding each of the four critical uncertain factors individually, given that the remaining three factors were at their "Base" values.

The first measure illustrates the maximum amount Liberty-Empire should be willing to pay to have better information about all four critical uncertain factors together and only assumes prior knowledge about the critical uncertain factors other than the subjective probability distributions. To determine the EVPI assuming perfect information regarding all four critical uncertain factors, Liberty-Empire first determined the alternative plan with the lowest cost under each of the 81 scenarios, then weighted the PVRR of each portfolio by the subjective probability of the given scenario. The sum of the probability-weighted PVRRs results is the expected value of the best decisions made with perfect information regarding all market uncertainties. By calculating the delta between this value and the

[8] The EVPI represents the delta between the scenario-specific probability-weighted average of the values of the best decisions under given scenarios.

expected value of the Preferred Plan (Plan 4) across the 81 scenarios, Liberty-Empire determined the EVPI. EVPI represents the theoretical maximum amount of money Liberty-Empire should be willing to spend to obtain perfect information about the future state of the world. The results of the EVPI analysis are summarized in Table 7-6 for 20-year and 30-year PVRR results.

Table 7-6 – Summary of the Expected Values of Perfect Information ("EVPI")

Expected Value of Perfect Information	20-Year PVRR ($M)	30-Year PVRR ($M)
Expected Value Plan 4:	8,541	10,557
Expected Value with Perfect Information:	8,540	10,475
Expected Value of Perfect Information:	**1.00**	**82.80**

The second measure described above, i.e., the *conditional* EVPI for a single critical uncertain factor, is the maximum amount Liberty-Empire should be willing to pay for better information about that critical uncertain factor, assuming that the other three critical uncertain factors are at their "Base" values. To individually obtain the conditional EVPI for each of the four critical uncertain variables, it was assumed that all other variables were known to be at the Base Case value. For example, to test the value of perfect information for load growth, Liberty-Empire kept natural gas prices, CO_2 prices, and the cost of new builds at their Base Case values, while load growth was varied between base, high, and low. Under this example, the EVPI represents the EVPI assuming perfect information regarding load growth, conditional on the fact that the remaining three factors were at their "Base" values.

Table 7-7 – EVPI Load – 20-Year PVRR

Load			
Load	**Base**	**High**	**Low**
Natural Gas	Base	Base	Base
CO2	Base	Base	Base
Cost of New Builds	Base	Base	Base
Endpoint:	1	19	10
Subjective Probability:	4.5%	3.5%	2.0%
Gas RAP	8,698	8,866	8,609
Gas MAP	8,676	8,847	8,588
Mix RAP	8,694	8,862	8,605
Mix RAP Frame	8,574	8,729	8,486
Mix RAP 5x Aero	8,820	8,974	8,732
Mix MAP	8,689	8,862	8,601
Renew RAP	9,179	9,303	9,091
Renew MAP	9,373	9,502	9,285
NZ Renew	9,623	9,741	9,535
NZ SMR	9,712	9,821	9,619
NZ H2	9,388	9,511	9,300
EPA	8,815	8,977	8,726
Lowest Cost Plan:	Mix RAP Frame	Mix RAP Frame	Mix RAP Frame
Lowest Cost Plan ($M):	8,574	8,729	8,486
Expected Value Plan 4 ($M):	8,610		
Expected Value Using Perfect Information ($M):	8,610		
Expected Value of Perfect Information ($M):	-		

Table 7-8 – EVPI Load – 30-Year PVRR

Load			
Load	**Base**	**High**	**Low**
Natural Gas	Base	Base	Base
CO2	Base	Base	Base
Cost of New Builds	Base	Base	Base
Endpoint:	1	19	10
Subjective Probability:	4.5%	3.5%	2.0%
Gas RAP	10,596	11,029	10,458
Gas MAP	10,560	10,996	10,422
Mix RAP	10,674	11,102	10,536
Mix RAP Frame	10,468	10,881	10,329
Mix RAP 5x Aero	10,772	11,185	10,634
Mix MAP	10,671	11,104	10,533
Renew RAP	11,239	11,619	11,102
Renew MAP	11,558	11,950	11,419
NZ Renew	12,141	12,513	11,991
NZ SMR	12,372	12,739	12,217
NZ H2	13,482	13,819	13,344
EPA	10,740	11,159	10,602
Lowest Cost Plan:	Mix RAP Frame	Mix RAP Frame	Mix RAP Frame
Lowest Cost Plan ($M):	10,468	10,881	10,329
Expected Value Plan 4 ($M):	10,585		
Expected Value Using Perfect Information ($M):	10,585		
Expected Value of Perfect Information ($M):	-		

Table 7-9 – EVPI Natural Gas Prices – 20-Year PVRR

Natural Gas			
Load	Base	Base	Base
Natural Gas	**Base**	**High**	**Low**
CO2	Base	Base	Base
Cost of New Builds	Base	Base	Base
Endpoint:	1	3	2
Subjective Probability:	5%	3%	2%
Gas RAP	8,698	8,791	8,517
Gas MAP	8,676	8,765	8,501
Mix RAP	8,694	8,771	8,533
Mix RAP Frame	8,574	8,539	8,433
Mix RAP 5x Aero	8,820	8,902	8,651
Mix MAP	8,689	8,765	8,528
Renew RAP	9,179	9,277	9,056
Renew MAP	9,373	9,482	9,235
NZ Renew	9,623	9,717	9,500
NZ SMR	9,712	9,732	9,672
NZ H2	9,388	9,495	9,250
EPA	8,815	8,765	8,705
Lowest Cost Plan:	Mix RAP Frame	Mix RAP Frame	Mix RAP Frame
Lowest Cost Plan ($M):	8,574	8,539	8,433
Expected Value Plan 4 ($M):	8,535		
Expected Value Using Perfect Information ($M):	8,535		
Expected Value of Perfect Information ($M):	-		

Table 7-10 – EVPI Natural Gas Prices – 30-Year PVRR

Natural Gas			
Load	Base	Base	Base
Natural Gas	**Base**	**High**	**Low**
CO2	Base	Base	Base
Cost of New Builds	Base	Base	Base
Endpoint:	1	3	2
Subjective Probability:	5%	3%	2%
Gas RAP	10,596	10,651	10,383
Gas MAP	10,560	10,608	10,354
Mix RAP	10,674	10,629	10,528
Mix RAP Frame	10,468	10,264	10,351
Mix RAP 5x Aero	10,772	10,734	10,616
Mix MAP	10,671	10,624	10,526
Renew RAP	11,239	11,327	11,104
Renew MAP	11,558	11,670	11,401
NZ Renew	12,141	12,138	12,054
NZ SMR	12,372	12,258	12,387
NZ H2	13,482	13,485	13,362
EPA	10,740	10,502	10,664
Lowest Cost Plan:	Mix RAP Frame	Mix RAP Frame	Mix RAP Frame
Lowest Cost Plan ($M):	10,468	10,264	10,351
Expected Value Plan 4 ($M):	10,383		
Expected Value Using Perfect Information ($M):	10,383		
Expected Value of Perfect Information ($M):	-		

Table 7-11 – EVPI Environmental Costs – 20-Year PVRR

CO2			
Load	Base	Base	Base
Natural Gas	Base	Base	Base
CO2	**Base**	**High**	**Low**
Cost of New Builds	Base	Base	Base
Endpoint:	1	7	4
Subjective Probability:	5%	2%	5%
Gas RAP	8,698	8,398	8,458
Gas MAP	8,676	8,380	8,440
Mix RAP	8,694	8,405	8,470
Mix RAP Frame	8,574	8,307	8,347
Mix RAP 5x Aero	8,820	8,525	8,589
Mix MAP	8,689	8,401	8,464
Renew RAP	9,179	8,925	9,024
Renew MAP	9,373	9,117	9,196
NZ Renew	9,623	9,364	9,466
NZ SMR	9,712	9,501	9,622
NZ H2	9,388	9,133	9,212
EPA	8,815	8,566	8,621
Lowest Cost Plan:	Mix RAP Frame	Mix RAP Frame	Mix RAP Frame
Lowest Cost Plan ($M):	8,574	8,307	8,347
Expected Value Plan 4 ($M):	8,430		
Expected Value Using Perfect Information ($M):	8,430		
Expected Value of Perfect Information ($M):	-		

Table 7-12 – EVPI Environmental Costs – 30-Year PVRR

CO2			
Load	Base	Base	Base
Natural Gas	Base	Base	Base
CO2	**Base**	**High**	**Low**
Cost of New Builds	Base	Base	Base
Endpoint:	1	7	4
Subjective Probability:	5%	2%	5%
Gas RAP	10,596	10,252	10,294
Gas MAP	10,560	10,220	10,265
Mix RAP	10,674	10,364	10,421
Mix RAP Frame	10,468	10,188	10,213
Mix RAP 5x Aero	10,772	10,454	10,511
Mix MAP	10,671	10,362	10,417
Renew RAP	11,239	10,960	11,062
Renew MAP	11,558	11,281	11,341
NZ Renew	12,141	11,882	11,984
NZ SMR	12,372	12,178	12,300
NZ H2	13,482	13,218	13,318
EPA	10,740	10,483	10,525
Lowest Cost Plan:	Mix RAP Frame	Mix RAP Frame	Mix RAP Frame
Lowest Cost Plan ($M):	10,468	10,188	10,213
Expected Value Plan 4 ($M):	10,310		
Expected Value Using Perfect Information ($M):	10,310		
Expected Value of Perfect Information ($M):	-		

Table 7-13 – EVPI Cost of New Builds – 20-Year PVRR

Cost of New Builds			
Load	Base	Base	Base
Natural Gas	Base	Base	Base
CO2	Base	Base	Base
Cost of New Builds	**Base**	**High**	**Low**
Endpoint:	1	28	55
Subjective Probability:	5%	3%	2%
as RAP	8,698	9,155	8,525
as MAP	8,676	9,140	8,500
ix RAP	8,694	9,254	8,501
ix RAP Frame	8,574	9,121	8,381
ix RAP 5x Aero	8,820	9,386	8,613
ix MAP	8,689	9,256	8,491
Renew RAP	9,179	10,437	8,740
Renew MAP	9,373	10,678	8,915
Z Renew	9,623	11,067	9,295
Z SMR	9,712	11,967	9,162
Z H2	9,388	10,716	8,919
PA	8,815	9,601	8,555
Lowest Cost Plan:	Mix RAP Frame	Mix RAP Frame	Mix RAP Frame
Lowest Cost Plan ($M):	8,574	9,121	8,381
Expected Value Plan 4 ($M):	8,700		
Expected Value Using Perfect Information ($M):	8,700		
Expected Value of Perfect Information ($M):	-		

Table 7-14 – EVPI Cost of New Builds – 30-Year PVRR

Cost of New Builds			
Load	Base	Base	Base
Natural Gas	Base	Base	Base
CO2	Base	Base	Base
Cost of New Builds	**Base**	**High**	**Low**
Endpoint:	1	28	55
Subjective Probability:	5%	3%	2%
Gas RAP	10,596	11,205	10,361
Gas MAP	10,560	11,180	10,320
Mix RAP	10,674	11,729	10,314
Mix RAP Frame	10,468	11,493	10,115
Mix RAP 5x Aero	10,772	11,812	10,406
Mix MAP	10,671	11,743	10,300
Renew RAP	11,239	12,865	10,651
Renew MAP	11,558	13,249	10,946
NZ Renew	12,141	14,542	11,534
NZ SMR	12,372	15,787	11,356
NZ H2	13,482	15,223	12,844
EPA	10,740	12,029	10,315
Lowest Cost Plan:	Mix RAP Frame	Gas MAP	Mix RAP Frame
Lowest Cost Plan ($M):	10,468	11,180	10,115
Expected Value Plan 4 ($M):	10,705		
Expected Value Using Perfect Information ($M):	10,611		
Expected Value of Perfect Information ($M):	94.0		

Based on the results, Liberty-Empire determined that better information about the cost of new builds would be most valuable for further analysis of resource strategy. While Liberty-Empire will always have imperfect information regarding these variables, it will continue to monitor trends in new builds, interconnection costs, and federal tax policy, particularly those associated with solar and storage resources, when implementing the Preferred Plan.

3.2 Contingency Resource Plans

(4) The utility shall describe and document its contingency resource plans in preparation for the possibility that the preferred resource plan should cease to be appropriate, whether due to the limits identified pursuant to 4 CSR 240-22.070(2) being exceeded or for any other reason.

(A) The utility shall identify as contingency resource plans those alternative resource plans that become preferred if the critical uncertain factors exceed the limits developed pursuant to section (2).

The 12 alternative resource plans are described in detail in Volume 6. For reference, Table 7-15 provides a summary of each.

Table 7-15 – Alternative Resource Plans

Plan	Plan Description	Replacement Tech.	Key Retirements*	DSM Bundle
1	Gas Only – Utility-Scale + Distributed	Natural Gas		RAP
2	Gas Only – Utility-Scale + Distributed	Natural Gas		MAP
3	Gas/Renew Mix – Utility-Scale + Distributed	Natural Gas + Renew.		RAP
4	Gas/Renew Mix – Utility-Scale + Distributed + Frame CT (2029)	Natural Gas + Renew.		RAP
5	Gas/Renew Mix – Utility-Scale + Distributed + 5x Aero (2029)	Natural Gas + Renew.		RAP
6	Gas/Renew Mix – Utility-Scale + Distributed	Natural Gas + Renew.		MAP
7	Renewable – Utility-Scale + Distributed	Renewable		RAP
8	Renewable – Utility-Scale + Distributed	Renewable		MAP
9	Net Zero 2050 – Renewable + Storage	Renewable	Riverton CC 2045 Stateline CC 2050	RAP
10	Net Zero 2050 – Nuclear SMR	Nuclear + Renewable	Riverton CC 2045 Stateline CC 2050	RAP
11	Net Zero 2050 – Hydrogen	Hydrogen + Renewable	Riverton CC 2045 Stateline CC 2050	RAP
12	EPA GHG Rule – Advanced Tech	Advanced Tech. + Renew.	Iatan 1 2031 Iatan 2 2031 Plum Point 2031	RAP

DSM = “Demand-Side Management”
RAP = “Realistic Achievable Potential”
MAP = “Maximum Achievable Potential”
Renewable options include storage. Advanced storage options are allowed only in the net zero portfolios.

*Key Retirements are incremental to retirements and PPA expirations that are common across all plans:
Expiration of the Elk River Wind PPA in 2025
Expiration of the 78 MW MJMEUC Capacity Sale PPA in 2025
Retirement of Riverton 10 and 11 in 2026
Expiration of the 25 MW MJMEUC Capacity Sale PPA in 2027
Expiration of the Meridian Way Wind PPA in 2028
Retirement of Energy Center 1 and 2 by 2035
Retirement of Iatan 1 in 2039
Expiration of the Plum Point PPA in 2040

Liberty-Empire considers Plans 1, 3, 5, and 12 contingency plans to the Preferred Plan. Plan 1 represents a contingency plan if solar and storage resources were difficult to develop or site.[9] Plans 3 and 5 do not differ significantly from Plan 4 in buildout through the 20-year IRP study period, although provide an alternate aero-derivative gas combustion turbine technology option for the 2029 addition if a frame combustion turbine were difficult to source. Plan 12 is cost competitive with Plan 4 on both a 20-year and 30-year PVRR basis, providing a viable alternative if the requirement for EPA GHG rule compliance should arise. The early retirement of coal assets under the EPA GHG rule does not take place until 2031[10], and Plan 12 is similar to Plan 4 in technology buildout with an emphasis on gas turbine resources during the first six years of the IRP study period. Therefore, Plan 4 maintains flexibility and optionality to comply with the EPA GHG rule, assuming the necessary steps are taken in the near future.

Given Liberty-Empire’s existing generation fleet and market position, the Company can develop contingency plans if the critical uncertain factors change enough to compel a different course of action. For example, should solar and storage resources be found difficult to develop or site, Liberty-Empire could adjust its planning to a course similar to

[9] Liberty-Empire is considering a contingency plan without the assumed 175 MW firm solar addition in 2028. This plan would add a modest amount of incremental gas in the 2030’s to offset lower solar capacity.
[10] See footnote 2.

Plan 1. Should a frame combustion turbine machine become difficult to source, Liberty-Empire could adjust its planning to a course similar to Plan 3 or 5. Should compliance with the EPA GHG regulations be required, Liberty-Empire could adjust its planning to a course similar to Plan 12. In addition, Liberty-Empire will continue to monitor all uncertain factors, file annual updates, and file triennial IRPs to update its plan regularly.

> *(B) The utility shall develop a process to pick among alternative resource plans, or to revise the alternative resource plans as necessary, to help ensure reliable and low cost service should the preferred resource plan no longer be appropriate for any reason. The utility may also use this process to confirm the viability of contingency resource plans identified pursuant to subsection (4)(A).*

Liberty-Empire is continually monitoring factors that could impact the Preferred Plan. This may involve additional analyses. Liberty-Empire updates its Missouri stakeholder group periodically through the filing of triennial IRPs and annual updates required under rule 20 CSR 4240-22.080. Liberty-Empire's modeling and the effects of these factors on Liberty-Empire's plans are researched, reanalyzed, documented, and presented to the Commission every year. Additionally, if Liberty-Empire's Preferred Plan changed significantly, Liberty-Empire would notify the Commission as required by 20 CSR 4240-22.080(12). Because of its ongoing planning requirements, Liberty-Empire is always focused on regulatory and industry developments, and both the Commission and stakeholders are continually apprised of how these developments may affect Liberty-Empire's performance and plans.

> *(C) Each contingency resource plan shall satisfy the fundamental objective in 4 CSR 240-22.010(2) and the specific requirements pursuant to 4 CSR 240-22.070(1).*

All alternative resource plans minimally comply with legal mandates. The contingency plans satisfy the fundamental objectives in 20 CSR 4240-22.010(2).

SECTION 4 LOAD BUILDING PROGRAMS

(5) Analysis of Load-Building Programs. If the utility intends to continue existing load-building programs or implement new ones, it shall analyze these programs in the context of one (1) or more of the alternative resource plans developed pursuant to 4 CSR 240-22.060(3) of this rule, including the preferred resource plan selected pursuant to 4 CSR 240-22.070(1). This analysis shall use the same modeling procedure and assumptions described in 4 CSR 240-22.060(4). The utility shall describe and document-

(A) Its analysis of load building programs, including the following elements:

1. Estimation of the impact of load-building programs on the electric utility's summer and winter peak demands and energy usage;

2. A comparison of annual average rates in each year of the planning horizon for the resource plan(s) with and without the load-building program;

3. A comparison of the probable environmental costs of the resource plan(s) in each year of the planning horizon with and without the proposed load-building program;

4. A calculation of the performance measures and risk by year; and

5. An assessment of any other aspects of the proposed load-building programs that affect the public interest; and

(B) All current and proposed load-building programs, a discussion of why these programs are judged to be in the public interest, and, for all resource plans that include these programs, plots of the following over the planning horizon:

1. Annual average rates with and without the load-building programs; and

2. Annual utility costs and probable environmental costs with and without the load-building programs.

Liberty-Empire does not have any load-building programs in place at this time and does not contemplate adding load-building programs during the 20-year planning horizon.

SECTION 5 IMPLEMENTATION PLAN

(6) The utility shall develop an implementation plan that specifies the major tasks, schedules, and milestones necessary to implement the preferred resource plan over the implementation period. The utility shall describe and document its implementation plan, which shall contain-

5.1 Implementation Plan

The implementation plan contains the descriptions and schedules for the major tasks necessary to implement the Preferred Plan over the implementation period, i.e., the time between the triennial compliance filings. The next triennial IRP filing is scheduled for 2028. Therefore, the implementation period is the period 2025-2028.

5.1.1 Planned Research Activities for Load Forecasting

(A) A schedule and description of ongoing and planned research activities to update and improve the quality of data used in load analysis and forecasting

Liberty-Empire conducted a Residential and Non-Residential market research study as part of an agreement in its last triennial IRP. This study involved primary data collection surveys with Liberty-Empire customers in Missouri to give planners insight into the equipment and appliances that customers use in their homes and businesses. Liberty-Empire utilized this data to produce its class-level load forecast for this IRP.

5.1.2 Demand-Side Implementation Plan

(B) A schedule and description of ongoing and planned demand-side programs and demand-side rates, evaluations, and research activities to improve the quality of demand-side resources;

For purposes of the 2025 IRP, demand-side programs were bundled based on their performance and cost characteristics and then evaluated on an equivalent basis with supply-side options. Based on this analysis, Liberty-Empire selected the low-, mid-, and high-cost bundles of RAP DSM for inclusion in the Preferred Plan. The selected bundle is shown on both a peak and energy basis in Figure 7-8 and Figure 7-9, respectively.

Figure 7-8 – Low-, Mid-, and High-Cost RAP DSM Peak Savings

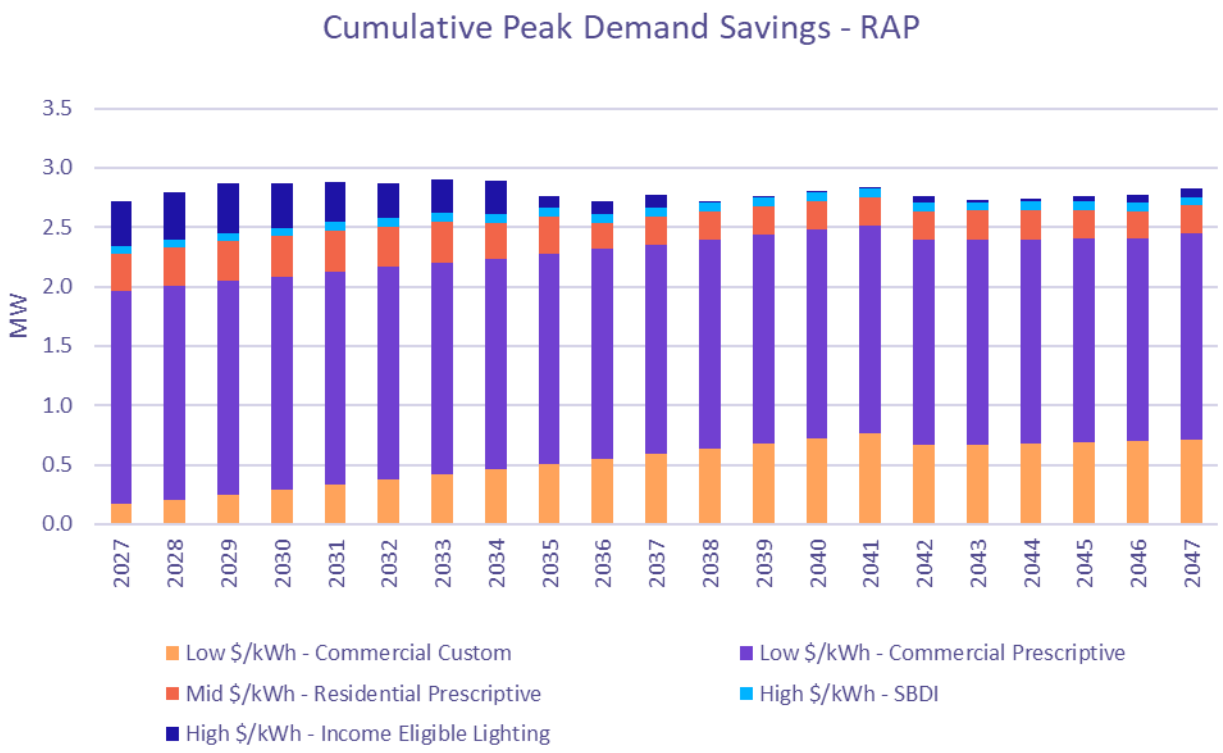
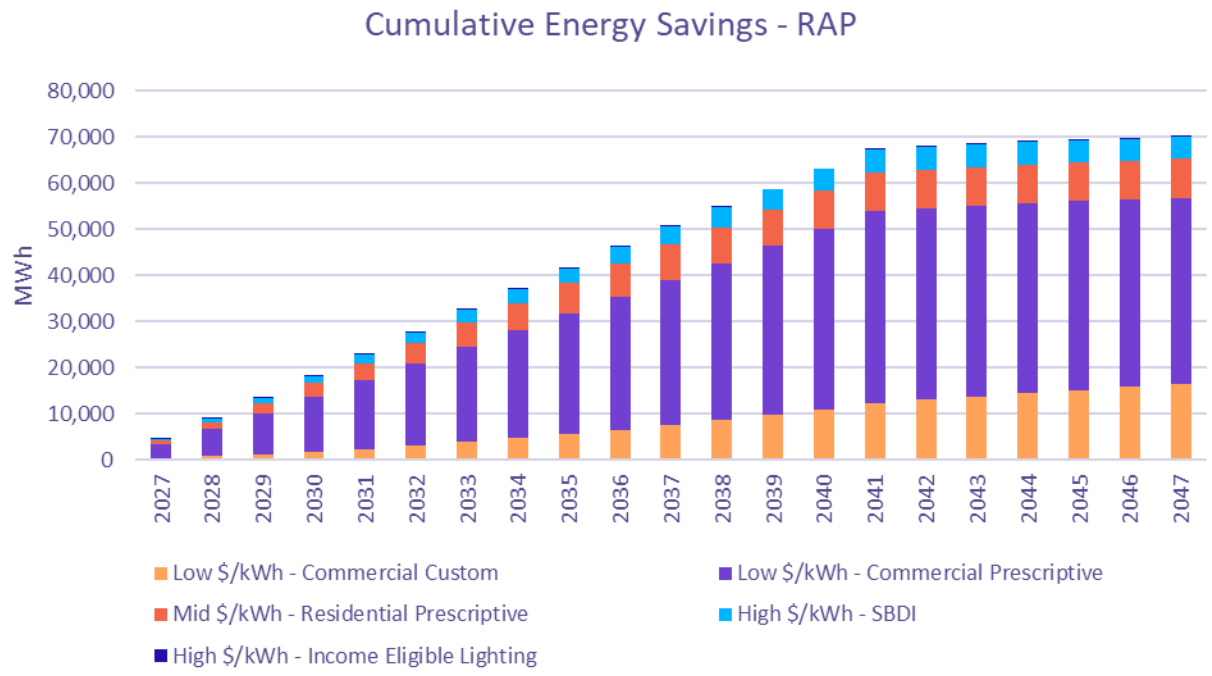


Figure 7-9 – Low-, Mid-, and High-Cost RAP DSM Energy Savings



The low-cost bundle of RAP DSM includes programs with a five-year average $/kWh saved between $0.20/kWh and $0.40/kWh; the mid-cost bundle includes programs with a five-year average $/kWh saved between $0.40/kWh and $0.55/kWh; the high-cost bundle includes programs with a five-year average $/kWh saved above $0.55/kWh. The bundles include commercial custom, commercial prescriptive, residential prescriptive, SBDI, and income eligible lighting.

Liberty-Empire filed an application to implement robust and mutually beneficial energy efficiency offerings under the framework prescribed by the Missouri Energy Efficiency Investment Act ("MEEIA") in September 2021 in Commission File No. EO-2022-0078. The Commission approved the application on December 15, 2021, and the tariffs for these programs were approved through December 31, 2022. This 2022 MEEIA portfolio (MEEIA Cycle 1) continued and expanded on popular programs from previous energy efficiency offerings and introduced four new customer programs. MEEIA Cycle 1 was intended to run for one year through December 31, 2022, but the State of Missouri Public Commission approved an extension of Liberty-Empire's MEEIA Cycle 1 through December 31, 2024. On December 13, 2024, Liberty-Empire reached an agreement with multiple parties to extend their MEEIA Cycle 1 a third time, through March 31, 2025, while Liberty-Empire works on a MEEIA Cycle 2 application or settlement (Missouri PSC Docket EO-2022-0078). This agreement extends the terms of Liberty-Empires' current MEEIA tariffs without change to the tariff language and without additional budget. The agreement also contemplates Liberty-Empire submitting their MEEIA Cycle 2 filing with a proposal for a two-year cycle for energy efficiency programs and a three-year cycle for demand response programs. According to the agreement, Liberty-Empire's MEEIA Cycle 2 would commence on April 1, 2025. As part of the implementation plan from this IRP, the Company plans to prioritize the implementation of low-, mid-, and high-cost energy efficiency programs for MEEIA Cycle 2 and beyond, as appropriate.

5.1.3 Supply-Side Implementation Plan

(C) A schedule and description of all supply-side resource research, engineering, retirement, acquisition, and construction activities, including research to meet expected environmental regulations;

(D) Identification of critical paths and major milestones for implementation of each demand-side resource and each supply-side resource, including decision points for committing to major expenditures;

Liberty-Empire's Preferred Plan includes the retirement of Riverton 10 and 11 and the addition of 27 MW of new industrial gas turbine capacity in 2026. As discussed in Volume 6 and in Liberty-Empire's 2022 IRP, Riverton 10 and 11 were selected for near-term retirement and replacement due to the facility's age. Liberty-Empire has obtained a construction permit from the Kansas Department of Health and Environment's Bureau of Air and has filed a Generating Facility Replacement Interconnection Request with SPP. **[redacted].**

Liberty-Empire is also evaluating a new utility-scale solar resource that was discussed in the last triennial IRP and subsequent IRP annual updates. The details of this project are still undetermined at this time, as this potential project is currently in the evaluation stage. A proxy for this resource was included in the preferred plan of this IRP (175 MW installed capacity due to be operational in 2028). However, given the changing dynamics surrounding the SPP's resource adequacy construct, evolving market dynamics, and the timing of this filing, it is not certain that this project will proceed, and an update will be provided during the next IRP Annual Update as needed.

5.2 Gas Turbine Resource Additions

Liberty-Empire expects to add 27 MW of new industrial gas turbines to the Riverton site to replace the aging Riverton units 10 and 11. The Preferred Plan also includes addition of a new 240 MW frame gas combustion turbine added in 2029. In preparation for acquiring 240 MW gas combustion turbine Liberty-Empire will perform feasibility and environmental studies, begin permitting as required, and issue a request for proposal ("RFP").

5.3 Preferred Plan Considerations Beyond the Short-Term Implementation Period

While the short-term implementation period is defined as the period 2025 to 2028, Liberty-Empire identified one Preferred Plan consideration beyond this period: a plan to site resources at existing interconnection sites, co-located with existing plants to take advantage of surplus interconnection capabilities.

Co-located Resources at Existing Sites

Liberty-Empire's portfolio includes several renewable plants with existing generator interconnection rights into SPP. Given the low capacity accreditation (relative to interconnection size), the interconnection rights at these sites are not utilized to their full capability. By co-locating complementary renewable resources at these existing sites and taking advantage of "surplus" interconnection capabilities, Liberty-Empire could avoid paying additional generator interconnection costs and waiting in the SPP Generator Interconnection ("GI") Queue process to interconnect greenfield facilities.

Liberty-Empire identified Kings Point as a strong candidate site for co-locating thermal resources. Kings Point Wind Farm is located near the Energy Center gas generation site, giving it access to gas infrastructure and making it well-suited for co-location of gas generation to make use of spare interconnection. Co-location of new gas units at Kings Point will also allow for a shorter development timeline, with commissioning for the first available year moved up to 2029 relative to 2031 for greenfield sites. Preliminary and internal studies within the Company have also supported the prudence of taking advantage of these capabilities. In addition to surplus interconnection capabilities at Kings

Point, Liberty-Empire also identified the Neosho Ridge and North Fork wind sites as candidates to host solar resources. Further information on this topic is found in Section 4.3.1 of Volume 4.

Although the Preferred Plan does not call for specific co-location applications given the planned resource characteristics, the co-location opportunities above provide optionality for any specific development considerations that may arise.

5.4 Competitive Procurement Policies

(E) A description of adequate competitive procurement policies to be used in the acquisition and development of supply-side resources;

Before issuing requests for proposals, Liberty-Empire pre-screens potential bidders' qualifications and experiences to confirm that those allowed to propose on projects can complete the work safely and adequately. Liberty-Empire utilizes the competitive bidding process and performs rigorous evaluations of the proposals submitted to secure the best-evaluated goods and services for implementing the development of its supply-side resources. As of December 2017, Liberty-Empire adopted the "Responsible Contractor Policy for Large Construction and Maintenance Projects." This policy will be followed by solicitation and procurement of new generations and all large projects.

5.5 Monitoring Critical Uncertain Factors

(F) A process for monitoring the critical uncertain factors on a continuous basis and reporting significant changes in a timely fashion to those managers or officers who have the authority to direct the implementation of contingency resource plans when the specified limits for uncertain factors are exceeded; and

5.5.1 Monitoring Environmental Costs

Liberty-Empire personnel monitor environmental regulations and requirements to determine what actions need to be undertaken to ensure compliance and to determine the costs associated with that compliance. Liberty-Empire is currently tracking issues related to ozone; sulfur dioxide ("SO_2"); nitrogen dioxide ("NO_2"); the Clean Air Interstate Rule ("CAIR") and/or the Cross-State Air Pollution Rule ("CSAPR"); the Clean Water Act ("CWA"); particulate matter; the Coal Combustion Residuals ("CCR") rule relating to ash;

mercury and hazardous air pollutants ("Hg/HAPS"); carbon dioxide ("CO_2"); the Resource Conservation and Recovery Act ("RCRA"); the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"); the Emergency Planning and Community Right to Know Act ("EPCRA"); the Toxic Substances Control Act ("TSCA"); and the Endangered Species Act ("ESA"). The information gathered is shared through discussions with senior management.

The Strategic Projects department monitors environmental issues. The Strategic Projects department works with various other departments and management to monitor environmental costs and issues at Liberty-Empire's generation facilities. Energy Supply Services provides management with the Annual NO_x Allocation Projection, the SO_2 Allowance Management Policy ("SAMP"), the Greenhouse Gas Projections and Emissions Inventory, and a quarterly Environmental Key Issues Summary. Personnel from the Environmental staff are in regular contact with local, state, and federal environmental agencies and attend various environmental events. Liberty-Empire is an active member of the EEI, the Regulatory Environmental Group for Missouri ("REGFORM"), the Missouri Electric Utilities Environmental Committee ("MEUEC"), and various other state committees and organizations.

5.5.2 Monitoring Market and Fuel Prices

Operational personnel regularly monitor power prices and fuel prices. Both operational personnel and senior management are kept up to date on the processes and procedures being implemented in SPP that directly impact the availability and pricing of power. SPP market prices are monitored on an ongoing basis. The Energy Supply Services department produces a monthly Market Report that reports, among other things, the average Day-Ahead market price for each of the Company's load and resource nodes. Additionally, this group also closely monitors the price of natural gas. As documented in Volume 4, Liberty-Empire implemented a natural gas risk management policy that has the objective of minimizing the impact of natural gas price volatility. The risk management policy includes monitoring of natural gas prices and has internal senior management oversight.

Liberty-Empire purchases fuel and power continuously. Each month, fuel and energy accountants prepare reports for management, such as the Summary of Fuel and Purchased Power Report, the Electric Fuel Report, and the Power Report. The Summary of Fuel and Purchased Power Report compares generation, fuel costs, market revenue, and purchase costs, actual to budget on a monthly, year-to-date, and twelve-months-ended basis. The Electric Fuel Report contains detailed fuel usage and cost information by generating unit, plant, and system monthly, year-to-date, and twelve-months-ended basis. The Power Report is a detailed list of monthly power purchases and sales. Explanations for variances from the budget are also reported to management in the monthly and quarterly Fuel Variance Report prepared by the Energy Supply Services department. Liberty-Empire's Electric Gas Position Report is supplied to management every month. It reports detailed natural gas prices and natural gas hedged volume information. This report summarizes the natural gas position, trading details, market details, and other information. It tracks both hedged and spot market natural gas activity. The market detail section lists the prices of natural gas futures and basis adjustment estimates for the next several years.

5.5.3 Monitoring Load Growth

Liberty-Empire's load forecast is revised annually, and close attention is paid to peak demand levels during the summer and winter months. Senior management schedules reviews of the load forecast. Liberty-Empire prepares variance reports related to the demand, energy, and sales forecasts and the actual results each month.

Each month, a Customer Report is prepared by the Energy Support Services department and distributed to management. The Customer Report shows the number of customers and the change in customer growth in the Commercial Operation Area. In addition, a Weather Report is prepared by the Rates and Regulatory Affairs department and distributed to management. Since the weather is a key factor for the monthly peak, NSI, sales, and revenue, the Weather Report shows how the current month's heating and cooling degree days compared to history and National Oceanic and Atmospheric Administration ("NOAA") 30-year normals. When the load forecasts are developed, input is provided from several areas of Liberty-Empire, including management, industrial and

commercial services, and commercial operations, which together track prospects for new load.

5.5.4 Monitoring Construction/Transmission/Interest Rates

Liberty-Empire monitors the capital costs associated with generation and transmission projects in various ways. A project development team is formed for each major generation project, with direct line reporting to a member of senior management. Finance personnel monitor the markets to track interest rates, frequently contact the rating agencies, and are kept well-informed of planned budgets for new projects. These efforts are coordinated with members of senior management.

Liberty-Empire monitors the state of current estimates of construction costs for supply-side resources via industry periodicals such as Platt's and the EIA Annual Energy Outlook. In the past, Liberty-Empire has contracted with engineering firms for construction cost estimates as needed. Liberty-Empire has recent experience with several new-generation construction projects with various technologies, including combined-cycle, simple-cycle combustion turbines, aeroderivative combustion turbines, community solar, and wind turbines. These types of construction projects are monitored by Project Managers. Reports are provided to management periodically. Additionally, Liberty-Empire actively participates in SPP RTO's transmission planning studies. SPP conducts several studies directly associated with transmission planning: the Balanced Portfolio Study, the Priority Projects Study, Aggregate Facilities Studies, the SPP Transmission Expansion Plan ("STEP"), and Integrated Transmission Plans. A copy of these studies is provided in the appendices to Volume 4.5 – Transmission Distribution Analysis in response to rule 22.045(6). In addition to the aforementioned and attached studies, Liberty-Empire, through its representation in various SPP working groups, participates in any applicable high-priority and special case studies as deemed necessary by the respective overseeing working groups.

5.6 Monitoring Preferred Resource Plan

(G) A process for monitoring the progress made implementing the preferred resource plan in accordance with the schedules and milestones set out in the implementation plan and for

reporting significant deviations in a timely fashion to those managers or officers who have the authority to initiate corrective actions to ensure the resources are implemented as scheduled.

Liberty-Empire's 2025 IRP implementation period is 2025-2028. During this period, the near-term resource acquisition strategy involves the retirement of Riverton 10 and 11, replacement by approximately 27 MW of industrial gas turbines, and pursuit of low-, mid, and high-cost RAP DSM programs. Development of the 240 MW frame combustion turbine is also expected to commence during this period.

The Preferred Plan (Plan 4) contains the 175 MW solar development being targeted to commission in 2028, however, resource adequacy changes late in the IRP development may have an impact on this resource. The Company is still evaluating this resource but given the changing dynamics surrounding the SPP's resource adequacy construct, evolving market dynamics, and the timing of this filing, it is not certain that this project will proceed. An update will be provided during the next IRP Annual Update as needed. Additionally, the Company has a contingency plan in place from this IRP in case the solar project does not materialize.

Liberty-Empire reports updates and progress to the Company's decision-makers through regular meetings monitoring progress, issues, and deviations to ensure that plant retirements are completed on schedule, on budget, and in accordance with safety protocols.

Liberty is monitoring participation, savings, and program spending for DSM initiatives under its MEEIA portfolio. This information is being collected internally through Liberty systems and externally through Liberty's implementation partners. Every quarter, this information will be aggregated and shared with the DSM Advisory Group ("DSMAG"), which consists of Staff, DE, OPC, National Housing Trust ("NHT"), and Renew Missouri. The DSMAG will also review the revenue recovered through the Demand-Side Investment Mechanism ("DSIM"), marketing efforts, research, and future program development. These meetings will serve as the forum to review and discuss any adjustments to the MEEIA portfolio needed to meet the portfolio goals.

Liberty-Empire also hosts an annual meeting at its headquarters in Joplin featuring local Community Action Agencies and the DSMAG, during which it discusses “Strengths, Weaknesses, Opportunities, and Threats to Empire’s low-income population.” These discussions have led to numerous improvements in Liberty-Empire’s low-income weatherization and energy efficiency programs. Liberty-Empire committed to hosting no fewer than five of these annual meetings in the Stipulation and Agreement in Commission Case No. EM-2016-0213. The Company committed in its most recent rate case to continue hosting these meetings in future years even though the commitment from EM-2016-0213 has been fulfilled.

SECTION 6 RESOURCE ACQUISITION STRATEGY

(7) The utility shall develop, describe and document, officially adopt, and implement a resource acquisition strategy. This means that the utility's resource acquisition strategy shall be formally approved by an officer of the utility who has been duly delegated the authority to commit the utility to the course of action described in the resource acquisition strategy. The officially adopted resource acquisition strategy shall consist of the following components:

Liberty-Empire's resource acquisition strategy has been formally approved. The company's letter of transmittal, which includes a signed commitment to the Preferred Plan and the resource acquisition strategy, is attached to this volume as Appendix 7A.

6.1 Preferred Resource Plan

(A) A preferred resource plan selected pursuant to the requirements of section (1) of this rule;

The Preferred Plan was described and documented in Section 1 above in response to rule 22.070 (1).

6.2 Implementation Plan

(B) An implementation plan developed pursuant to the requirements of section (6) of this rule; and

Section 5 above describes and documents the Preferred Plan's implementation plan in response to rule 22.070 (6).

Major areas of focus in the Implementation Plan are as follows:

- Make use of the recently completed Residential and Non-Residential Market Study to help develop primary data-driven demand-side programs for the next MEEIA Cycle ("MEEIA Cycle 2");
- Finalize the construction of the 27 MW of industrial gas turbines to directly re-place the retirements of Riverton units 10 and 11 in 2026;
- Perform feasibility and environmental studies, begin permitting as required, and issue a request for proposal ("RFP") in preparation for acquiring the 240 MW frame combustion gas turbine to begin operation for 2029;

- Continue to evaluate a new utility-scale solar resource for potential operation as early as 2028;[11]
- Prioritize the implementation of low-, mid-, and high-cost energy efficiency programs from MEEIA Cycle 2 and beyond, as appropriate;
- Monitor federal tax credit policy, cost trends for renewable resources, and co-location opportunities at Liberty-Empire's existing generation resource sites to plan for anticipated additions.

6.3 Contingency Resource Plans

(C) A set of contingency resource plans developed pursuant to the requirements of section (4) of this rule and identification of the point at which the critical uncertain factors would trigger the utility to move to each contingency resource plan as the preferred resource plan.

The contingency resource plans were described and their applicability was discussed in Section 3 above in response to rule 22.070 (4).

[11] Liberty-Empire is considering a contingency plan without the assumed 175 MW firm solar addition in 2028. This plan would add a modest amount of incremental gas in the 2030's to offset lower solar capacity.

SECTION 7 EVALUATION OF DEMAND-SIDE PROGRAMS AND DEMAND-SIDE RATES

(8) Evaluation of Demand-Side Programs and Demand–Side Rates. The utility shall describe and document its evaluation plans for all demand-side programs and demand-side rates that are included in the preferred resource plan selected pursuant to 4 CSR 240-22.070(1). Evaluation plans required by this section are for planning purposes and are separate and distinct from the evaluation, measurement, and verification reports required by 4 CSR 240-3.163(7) and 4 CSR 240-20.093(7); nonetheless, the evaluation plan should, in addition to the requirements of this section, include the proposed evaluation schedule and the proposed approach to achieving the evaluation goals pursuant to 4 CSR 240-3.163(7) and 4 CSR 240-20.093(7). The evaluation plans for each program and rate shall be developed before the program or rate is implemented and shall be filed when the utility files for approval of demand-side programs or demand-side program plans with the tariff application for the program or rate as described in 4 CSR 240-20.094(3). The purpose of these evaluations shall be to develop the information necessary to evaluate the cost-effectiveness and improve the design of existing and future demand-side programs and demand-side rates, to improve the forecasts of customer energy consumption and responsiveness to demand-side programs and demand-side rates, and to gather data on the implementation costs and load impacts of demand-side programs and demand-side rates for use in future cost-effectiveness screening and integrated resource analysis.

(A) Process Evaluation. Each demand-side program and demand-side rate that is part of the utility's preferred resource plan shall be subjected to an ongoing evaluation process which addresses at least the following questions about program design.

1. What are the primary market imperfections that are common to the target market segment?

2. Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?

3. Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?

4. Are the communication channels and delivery mechanisms appropriate for the target market segment?

5. What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?

(B) Impact Evaluation. The utility shall develop methods of estimating the actual load impacts of each demand-side program and demand-side rate included in the utility's preferred resource plan

to a reasonable degree of accuracy.

1. Impact evaluation methods. At a minimum, comparisons of one (1) or both of the following types shall be used to measure program and rate impacts in a manner that is based on sound statistical principles:

A. Comparisons of pre-adoption and post-adoption loads of program or demand-side rate participants, corrected for the effects of weather and other intertemporal differences; and

B. Comparisons between program and demand-side rate participants' loads and those of an appropriate control group over the same time period.

2. The utility shall develop load-impact measurement protocols that are designed to make the most cost-effective use of the following types of measurements, either individually or in combination:

A. Monthly billing data, hourly load data, load research data, end-use load metered data, building and B. equipment simulation models, and survey responses; or

Audit and survey data on appliance and equipment type, size and efficiency levels, household or business characteristics, or energy-related building characteristics.

(C) The utility shall develop protocols to collect data regarding demand-side program and demand-side rate market potential, participation rates, utility costs, participant costs, and total costs.

Evaluation, measurement, and verification (“EM&V”) is designed to support the need for public accountability, oversight, cost-effective bundle improvements, and documentation of the effects of customer-funded efficiency bundles. Liberty-Empire will engage an EM&V contractor to conduct process and impact evaluations of the energy efficiency bundles.

EM&V is recommended on a three-year rotating schedule. A process and impact evaluation should be conducted on each bundle once during the three-year cycle. The EM&V budget is presented annually but may be spent at any point during the bundle cycle. The process and impact evaluations need to be conducted at different times. Process evaluations are typically conducted earlier in the bundle cycle to address any issues immediately, ensuring optimal bundle performance. Impact evaluations are typically conducted later in the bundling cycle when bundle results are accessible and apparent. The exact schedule will be determined with the evaluation contractor.

Process evaluations ensure that a bundle is operating as intended and provide information that can enable improvements in both the bundle design and implementation. They assess customer understanding, attitudes about, and satisfaction with the bundle and other educational activities. The EM&V contractor assesses the effectiveness of the marketing and outreach, trade ally involvement, and whether implementation milestones are met adequately and on schedule. These evaluations use sales and promotion data maintained by the tracking system and customer survey data.

A good process evaluation:

- Assists bundle implementers and managers in structuring bundles to achieve cost-effective savings while maintaining high levels of customer satisfaction.
- Determines awareness levels to refine marketing strategies and reduce barriers to participation.
- Provides recommendations for changing the bundle's structure, management, administration, design, delivery, operations, or targets.
- Determines if specific best practices should be incorporated.

Impact evaluations estimate gross and net demand, energy savings, and the cost-effectiveness of installed systems. They are used to verify and measure installations, identify key energy assumptions, and provide the research necessary to calculate defensible and accurate savings attributable to the bundle. The selected EM&V contractor develops an evaluation plan that ensures the appropriate savings measurement in compliance with industry protocols. The impact evaluation also includes an evaluation of net-to-gross components.

The Company will engage an EM&V contractor to the appropriate extent. The actual determination may be made in other filings.

THE EMPIRE DISTRICT ELECTRIC COMPANY d/b/a LIBERTY (LIBERTY-EMPIRE)

2025 INTEGRATED RESOURCE PLAN

COMMITMENT TO THE

APPROVED PREFERRED RESOURCE PLAN

FILE NO. EO-2024-0280

In accordance with Missouri Public Service Commission Rule 20 CSR 4240-22, The Empire District Electric Company d/b/a Liberty (Liberty-Empire) developed, described and documented, and now officially adopts for implementation, the preferred resource plan and resource acquisition strategy contained in this filing.

As required, the adopted resource acquisition strategy consists of a preferred resource plan; an implementation plan; and a set of contingency resource plans. I hereby further commit to provide the notice called for by Commission Rule 20 CSR 4240-22, if Liberty-Empire should, between triennial compliance filings, decide to take actions materially inconsistent with the preferred resource plan.

Tim Wilson

President, Central Region-Electric

3-13-25

Dated