

**EVERGY MISSOURI WEST  
EXECUTIVE SUMMARY  
INTEGRATED RESOURCE PLAN  
4 CSR 240-22.010**

**APRIL 2021**



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## **SECTION 1: INTRODUCTION**

The fundamental objective of the resource planning process shall be to provide the public with energy services that are safe, reliable and efficient, at just and reasonable rates, in a manner that serves the public interest and is consistent with state energy and environmental policies. This objective requires that the utility shall:

- Consider demand-side resources, renewable energy, and supply-side resources on an equivalent basis
- Use minimization of the present worth of long-run utility costs as the primary selection criterion
- Identify and where possible, quantitatively analyze any other considerations which are critical to meeting the fundamental objective of the resource planning process

### **1.1 IRP REPORT STRUCTURE**

Nine (9) separate volumes comprise this IRP filing:

1. Volume 1: Executive Summary
2. Volume 2: Missouri Filing Requirements including an index of Rule compliance
3. Volume 3: Load Analysis and Load Forecasting
4. Volume 4: Supply-Side Resource Analysis
5. Volume 4.5: Transmission and Distribution Analysis
6. Volume 5: Demand-Side Resource Analysis
7. Volume 6: Integrated Resource Plan and Risk Analysis
8. Volume 7: Resource Acquisition Strategy Selection

## 9. Volume 8: Filing Schedule and Requirements

### 1.2 **IRP DEVELOPMENT**

In developing the IRP filing, Evergy Missouri West has endeavored to meet all requirements of Missouri's IRP rules covered under 4 CSR 240-22. Evergy Metro's IRP spans the 2021-2040 planning horizon. Data necessary to complete evaluations were derived from recognized industry sources, consultants, publications and other sources as appropriate. Data sources are noted in the text of the report or in the appendices of a volume.

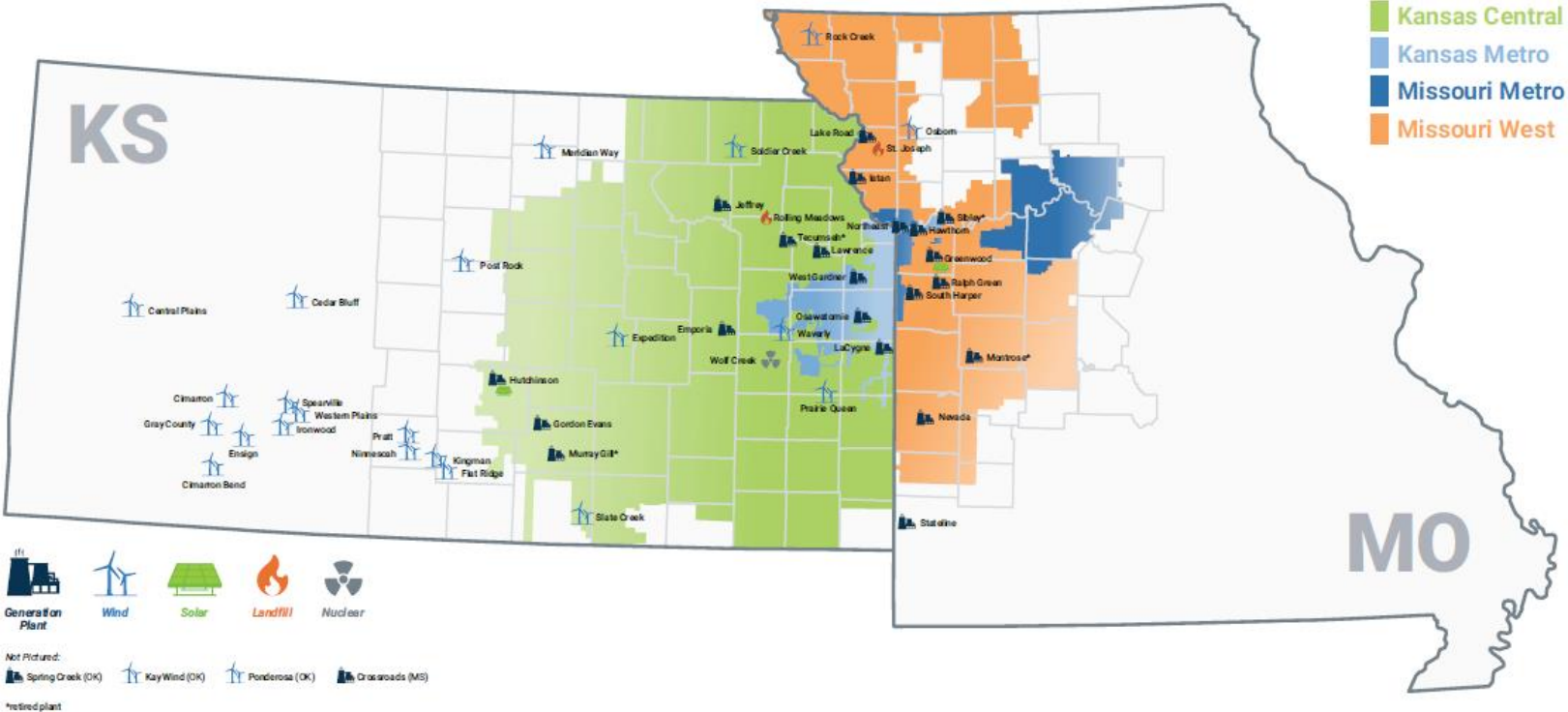
Several distinct tasks are included in the planning process:

- A detailed forecast of future demand and energy requirements
- An assessment of Supply-Side resource alternatives
- An assessment of Demand-Side resource alternatives
- An assessment of Transmission and Distribution alternatives
- Integrated Analysis evaluates the economics of various combinations of demand-side and supply-side alternatives that are developed as alternative resource plans over the planning timeline
- Risk Analysis provides a comparison of the range of economic results for the alternative resource plans due to identified critical uncertain factors
- The adoption and executive approval of a Resource Acquisition Strategy that includes a preferred resource plan, implementation plan, and contingency plans

## **SECTION 2: EVERGY MISSOURI WEST SYSTEM OVERVIEW**

Evergy Missouri West is an integrated, mid-sized electric utility serving portions of Northwest Missouri including St. Joseph and several counties south and east of the Kansas City, Missouri metropolitan area. Evergy Missouri West also provides regulated steam service to certain customers in the St. Joseph, Missouri area. A map of the Evergy service territory which includes Evergy Missouri West is provided in Figure 1 below:

Figure 1: Eevergy Service Territory





Evergy Missouri West is significantly impacted by seasonality with approximately one-third of its retail revenues recorded in the third quarter. Table 1 provides a snapshot of the number of customers served, retail sales, and peak demand based upon 2020 data.

**Table 1: 2020 Customers, Retail Sales, and Peak Demand**

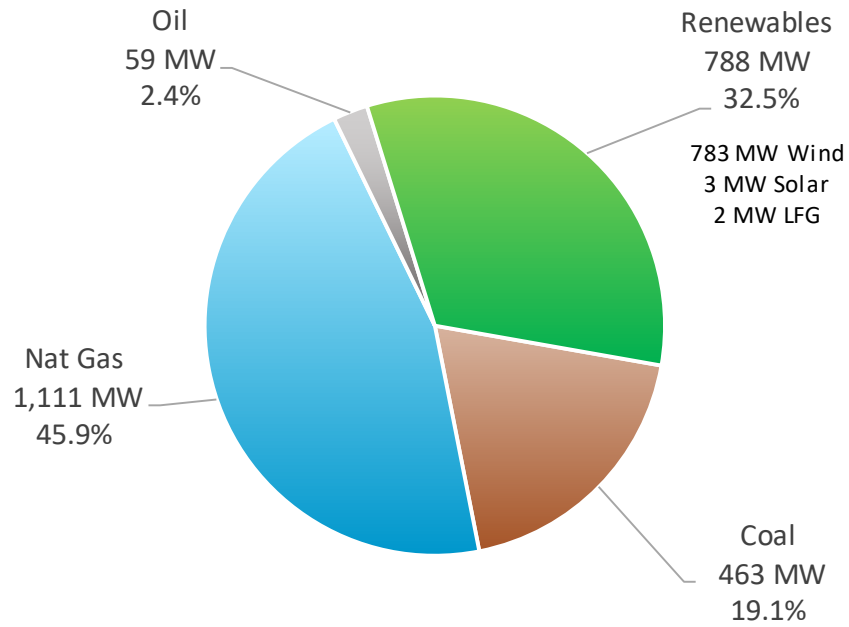
| Jurisdiction                | Number of Retail Customers | Retail Sales (MWh) | Net Peak Demand (MW) |
|-----------------------------|----------------------------|--------------------|----------------------|
| <b>Evergy Missouri West</b> | <b>331,947</b>             | <b>7,979,927</b>   | <b>1,838</b>         |

Evergy Missouri West owns and operates a diverse generating portfolio and Power Purchase Agreements (PPA) to meet customer energy requirements. In March 2020, Evergy executed a PPA for Cimarron Bend III wind, a 150 MW wind farm located in southwest Kansas. Evergy Missouri West is the offtaker of 130 MW of the energy output from Cimarron Bend III which reached commercial operation in December 2020. Table 2, Figure 2, and Figure 3 below reflect Evergy Missouri West’s generation assets including PPAs.

**Table 2: Capacity and Energy By Resource Type**

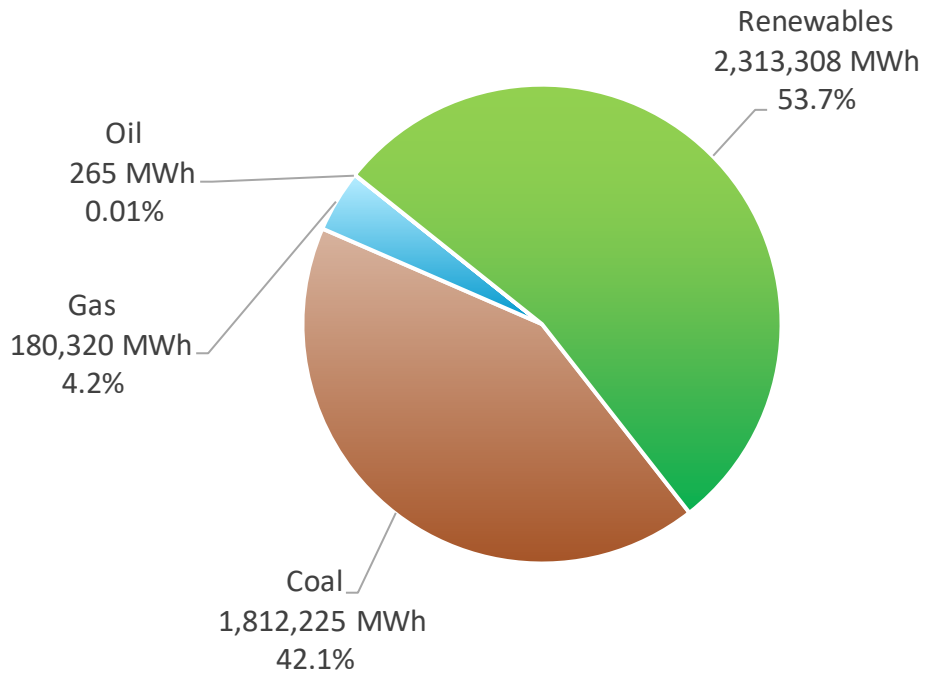
| Capacity By Fuel Type | Capacity (MW) | Capacity (%)  | Energy (MWh)     | Energy (%)  |
|-----------------------|---------------|---------------|------------------|-------------|
| Coal                  | 463           | 19.1%         | 1,812,225        | 42.08%      |
| Nat. Gas              | 1,111         | 46.0%         | 180,320          | 4.19%       |
| Oil                   | 59            | 2.4%          | 265              | 0.01%       |
| Wind                  | 783           | 32.3%         | 2,298,460        | 53.38%      |
| LFG                   | 2             | 0.1%          | 10,197           | 0.23%       |
| Solar                 | 3             | 0.1%          | 4,651            | 0.11%       |
| <b>Total</b>          | <b>2,420</b>  | <b>100.0%</b> | <b>4,306,118</b> | <b>100%</b> |

**Figure 2: Capacity by Resource Type**



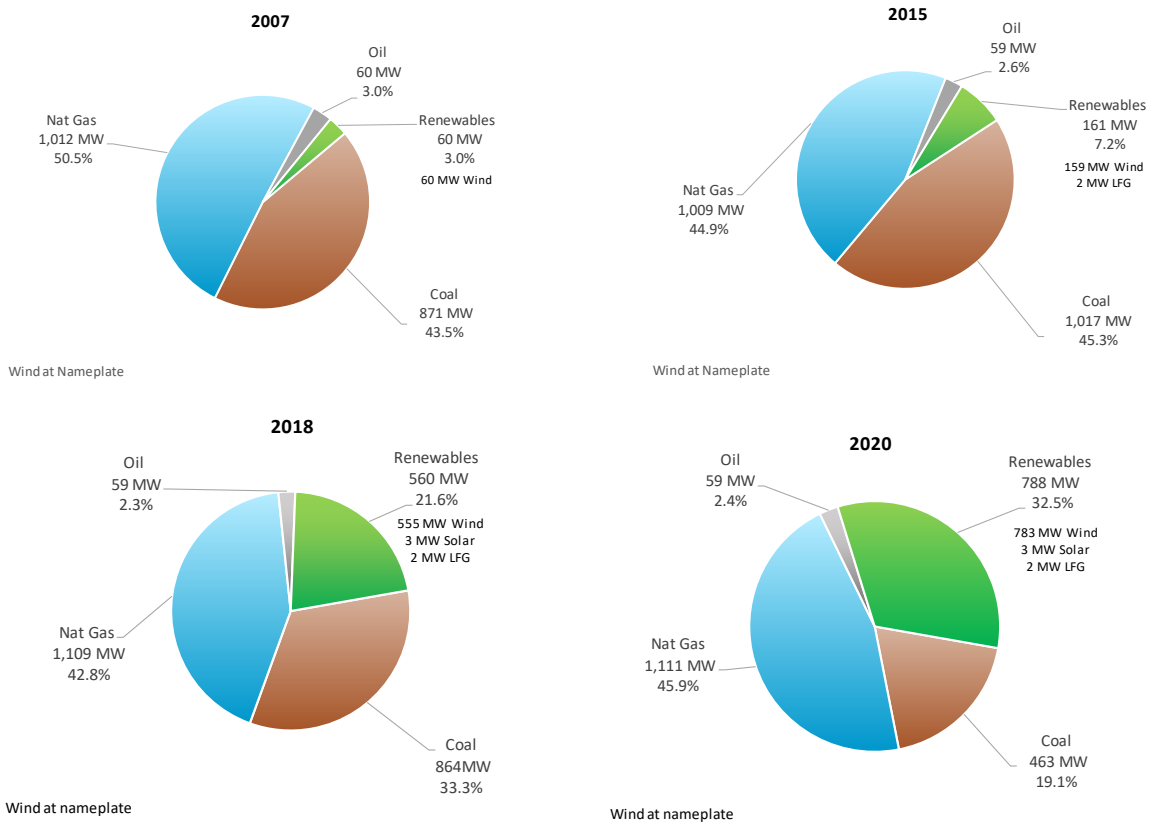
Wind at nameplate

**Figure 3: Energy by Resource Type**



## 2.1 CONTINUED COMMITMENT TOWARDS RENEWABLES

More than a decade ago, Evergy Missouri West began increasing their generation portfolio makeup with renewable generation resources while retiring coal generators. In 2007, less than 3% of Evergy Metro’s total capacity was sourced from renewable resources, whereas by 2021, 32.5% of total capacity is sourced from renewable resources. The following pie charts illustrates this shift from the Evergy Missouri West generating fleet consisting primarily of coal and gas generation to a diversified portfolio consisting of substantial renewable generation.



## SECTION 3: PREFERRED PLAN SELECTION

### 3.1 ALTERNATIVE RESOURCE PLANS AND SELECTION OF PREFERRED PLAN

*3. A summary of the preferred resource plan to meet expected energy service needs for the planning horizon, clearly showing the demand-side resources and supply-side resources (both renewable and non-renewable resources), including additions and retirements for each resource type;*

Alternative Resource Plans were developed using a combination of various supply-side resources, demand-side resources and resource addition timing.

In total, ten Alternative Resource Plans were developed for integrated resource analysis. Each plan is detailed in Volume 6 of the IRP submittal. The Preferred Plan for the 20-year planning period is shown in Table 3 below:

**Table 3: Evergy Missouri West Preferred Plan**

| Year | CT (MW) | Wind (MW) | Solar (MW) | DSM (MW) | Retire (MW) |
|------|---------|-----------|------------|----------|-------------|
| 2021 | 0       |           |            | 68       |             |
| 2022 | 0       |           |            | 89       |             |
| 2023 | 0       |           |            | 137      |             |
| 2024 | 0       |           | 120        | 166      | 97          |
| 2025 | 0       | 80        |            | 191      |             |
| 2026 | 0       | 80        |            | 215      |             |
| 2027 | 0       |           |            | 237      |             |
| 2028 | 0       |           | 80         | 257      |             |
| 2029 | 0       |           | 80         | 278      |             |
| 2030 | 0       |           | 80         | 296      | 58          |
| 2031 | 0       |           | 80         | 301      |             |
| 2032 | 0       |           | 80         | 299      |             |
| 2033 | 233     |           |            | 298      |             |
| 2034 | 0       |           |            | 300      |             |
| 2035 | 0       |           |            | 301      |             |
| 2036 | 0       |           |            | 303      |             |
| 2037 | 0       |           |            | 307      |             |
| 2038 | 0       |           |            | 310      |             |
| 2039 | 233     |           |            | 311      | 242         |
| 2040 | 233     |           |            | 310      |             |

The Preferred Plan includes the following renewable additions: 120 MW of solar generation in year 2024, and 80 MW of solar generation in each of the years 2028 – 2032. Additionally, 80 MW of wind generation in years 2025 and 2026. DSM resources are based upon a RAP level which consists of a suite of seven residential and ten commercial programs five of which are demand response programs, three demand response programs, and nine are energy efficiency programs.

The Preferred Plan, denoted as Alternative Resource Plan WDDBU in Volume 6, also includes retiring a 97 MW natural gas unit at Lake Road in 2024, Evergy Missouri West’s 58 MW share of Jeffrey-3 in 2030, 58 MW share of Jeffrey-1 and 2 in 2039,

and Evergy Missouri West's 126 MW share of Iatan-1 in 2039. Key drivers that contribute to these retirement decisions are continued low long-term gas price forecasts, low long-term peak load forecasts, the expectation of a carbon tax and significant renewable additions in the SPP region that have reduced the economic value of the units.

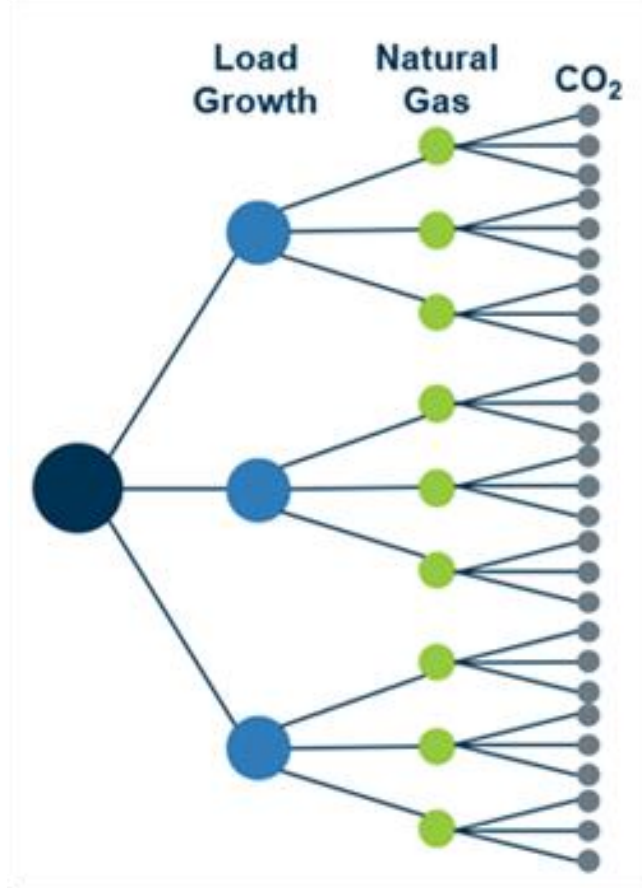
The Preferred Plan meets the fundamental planning objectives as required by Rule 22.010(2) to provide the public with energy services that are safe, reliable, and efficient, at just and reasonable rates, in compliance with all legal mandates, and in a manner that serves the public interest and is consistent with state energy and environmental policies.

## SECTION 4: CRITICAL UNCERTAIN FACTORS

### *4. Identification of critical uncertain factors affecting the preferred resource plan;*

Evergy Missouri West analyzed several uncertain factors individually to determine which were critical – meaning that a factor would impact Alternative Resource Plan ranking results. Three uncertain factors were determined to be critical uncertain factors - load growth, natural gas prices and CO<sub>2</sub> credit prices. Once identified, these three critical uncertain factors were utilized to construct scenarios as shown in Figure 4 below:

**Figure 4: Critical Uncertain Factor Scenarios**



## **SECTION 5: PERFORMANCE MEASURES**

***5. For existing legal mandates and approved cost recovery mechanisms, the following performance measures of the preferred resource plan for each year of the planning horizon:***

***A. Estimated annual revenue requirement;***

***B. Estimated level of average retail rates and percentage of change from the prior year; and***

***C. Estimated company financial ratios;***

Data for the Preferred Plan is provided in the table below. This information is also provided in the Company response to Rule 240-22.060(4)(C)1 in Volume 6.

It should be noted that the IRP analysis for determining estimated annual revenue requirement; estimated level of average retail rates and percentage of change from the prior year; and estimated company financial ratios assumes perfect ratemaking.

Of note, the analysis does not take into consideration other factors such as Company commitments and determinations from Commission Orders in other dockets that may impact the rate increase depicted each year in the table below.

As such, rate increase percentages reflected in the various years of analysis should not be interpreted as actual planned rate increase requests anticipated by the Company.



**Table 4: Preferred Plan Financial Performance**

| <b>Year</b> | <b>Revenue Requirement (\$MM)</b> | <b>Revenue Requirement Without DSM Performance Incentive (\$MM)</b> | <b>Levelized Annual Rates (\$/kW-hr)</b> | <b>Levelized Annual Rates Without DSM Performance Incentive (\$/kW-hr)</b> | <b>Rate Increase</b> | <b>Rate Increase Without DSM Performance Incentive</b> | <b>Times Interest Earned</b> |
|-------------|-----------------------------------|---|--|--|----------------------|--|------------------------------|
| 2021        | 800                               | 800   | 0.09                                     | 0.09   | 0.00%                | 0.00%  | 4.06                         |
| 2022        | 813                               | 810   | 0.09                                     | 0.09   | 1.19%                | 0.81%  | 4.34                         |
| 2023        | 825                               | 822   | 0.09                                     | 0.09   | 1.63%                | 1.59%  | 4.32                         |
| 2024        | 833                               | 830   | 0.09                                     | 0.09   | 1.13%                | 1.11%  | 4.45                         |
| 2025        | 847                               | 844   | 0.09                                     | 0.09   | 1.62%                | 1.66%  | 4.29                         |
| 2026        | 870                               | 867   | 0.10                                     | 0.10   | 2.64%                | 2.68%  | 4.26                         |
| 2027        | 874                               | 871   | 0.10                                     | 0.10   | 0.30%                | 0.32%  | 4.10                         |
| 2028        | 887                               | 884   | 0.10                                     | 0.10   | 1.07%                | 1.08%  | 4.17                         |
| 2029        | 898                               | 895   | 0.10                                     | 0.10   | 1.09%                | 1.06%  | 4.17                         |
| 2030        | 996                               | 993   | 0.11                                     | 0.11   | 10.51%               | 10.59%   | 4.18                         |
| 2031        | 994                               | 991   | 0.11                                     | 0.11   | -0.68%               | -0.68%   | 4.19                         |
| 2032        | 1,008                             | 1,005   | 0.11                                     | 0.11   | 0.63%                | 0.63%  | 4.15                         |
| 2033        | 1,035                             | 1,033   | 0.11                                     | 0.11   | 2.03%                | 2.04%  | 4.19                         |
| 2034        | 1,042                             | 1,039   | 0.11                                     | 0.11   | -0.31%               | -0.32%   | 3.92                         |
| 2035        | 1,067                             | 1,064   | 0.11                                     | 0.11   | 1.48%                | 1.50%  | 3.94                         |
| 2036        | 1,111                             | 1,108   | 0.12                                     | 0.12   | 3.10%                | 3.11%  | 3.96                         |
| 2037        | 1,140                             | 1,137   | 0.12                                     | 0.12   | 1.73%                | 1.73%  | 3.99                         |
| 2038        | 1,176                             | 1,173   | 0.12                                     | 0.12   | 2.26%                | 2.26%  | 3.99                         |
| 2039        | 1,284                             | 1,281   | 0.13                                     | 0.13   | 8.18%                | 8.17%  | 4.27                         |
| 2040        | 1,363                             | 1,360   | 0.14                                     | 0.14   | 5.03%                | 5.08%  | 4.31                         |

## **SECTION 6: COMPANY FINANCIAL RATIOS**

***6. If the estimated company financial ratios in subparagraph (2)(E)5.C. of this rule are below investment grade in any year of the planning horizon, a description of any changes in legal mandates and cost recovery mechanisms necessary for the utility to maintain an investment grade credit rating in each year of the planning horizon and the resulting performance measures of the preferred resource plan;***

The Company calculated performance measures for all studied alternative plans including the Preferred Plan. The expected values of alternative plan performance ratios do not materially change below current conditions. The expectation is that the investment rating of the Company is not at risk from the choice of any particular Alternative Resource Plan.

## **SECTION 7: RESOURCE ACQUISITION INITIATIVES**

*7. Actions and initiatives to implement the resource acquisition strategy prior to the next triennial compliance filing; and*

### **7.1 DEMAND-SIDE MANAGEMENT PLANNING**

The current schedules for ongoing and planned DSM programs are shown in Table 5 and Table 6 below.

**Table 5: DSM Program Schedule – Existing Programs**

| Program Name                    | Program Type      | Segment     | Program Implemented | Annual Report               | Program Duration | E M & V Completed and draft report available |
|---------------------------------|-------------------|-------------|---------------------|-----------------------------|------------------|--|
| Energy Saving Products          | Energy Efficiency | Residential | Jan., 2020          | 90-days following Plan Year | 3-Years          | 1-Yr following Plan Year                     |
| Online Home Energy Audit        | Educational       | Residential | Jan., 2020          | 90-days following Plan Year | 3-Years          | 1-Yr following Plan Year                     |
| Heating, Cooling & Home Comfort | Energy Efficiency | Residential | Jan., 2020          | 90-days following Plan Year | 3-Years          | 1-Yr following Plan Year                     |
| Income-Eligible Multi-Family    | Energy Efficiency | Residential | Jan., 2020          | 90-days following Plan Year | 6-Years          | 1-Yr following Plan Year                     |
| Home Energy Report              | Energy Efficiency | Residential | Jan., 2020          | 90-days following Plan Year | 3-Years          | 1-Yr following Plan Year                     |
| Residential Demand Response     | Demand Response   | Residential | Jan., 2020          | 90-days following Plan Year | 3-Years          | 1-Yr following Plan Year                     |
| Business Standard               | Energy Efficiency | C&I         | Jan., 2020          | 90-days following Plan Year | 3-Years          | 1-Yr following Plan Year                     |
| Business Custom                 | Energy Efficiency | C&I         | Jan., 2020          | 90-days following Plan Year | 3-Years          | 1-Yr following Plan Year                     |
| Business Process Efficiency     | Energy Efficiency | C&I         | Jan., 2020          | 90-days following Plan Year | 3-Years          | 1-Yr following Plan Year                     |
| Online Business Energy Audit    | Educational       | C&I         | Jan., 2020          | 90-days following Plan Year | 3-Years          | 1-Yr following Plan Year                     |
| Business Smart Thermostat       | Demand Response   | C&I         | Jan., 2020          | 90-days following Plan Year | 3-Years          | 1-Yr following Plan Year                     |
| Business Demand Response        | Demand Response   | C&I         | Jan., 2020          | 90-days following Plan Year | 3-Years          | 1-Yr following Plan Year                     |

**Table 6: DSM Program Schedule – Planned Programs**

| Program Name                 | Program Type          | Segment     | Projected Tariff Filing Date | Projected Approval Date | Projected Implementation Date | Annual Report               |
|------------------------------|-----------------------|-------------|------------------------------|-------------------------|-------------------------------|-----------------------------|
| Home Energy Report           | Energy Efficiency     | Residential | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Home Lighting Rebate         | Energy Efficiency     | Residential | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Income-Eligible Multi-Family | Energy Efficiency     | Residential | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Whole House Efficiency       | Energy Efficiency     | Residential | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Direct Load Control          | Demand Response       | Residential | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Smart Thermostat             | Demand Response       | Residential | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Time of Use                  | Demand Response Rates | Residential | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Block Bidding                | Energy Efficiency     | C & I       | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Business EER - Custom        | Energy Efficiency     | C & I       | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Business EER - Standard      | Energy Efficiency     | C & I       | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Small Business Lighting      | Energy Efficiency     | C & I       | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Strategic Energy Management  | Energy Efficiency     | C & I       | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Smart Thermostat             | Demand Response       | C & I       | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Thermal Storage              | Demand Response       | C & I       | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Business Demand Response     | Demand Response       | C & I       | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Direct Load Control          | Demand Response       | C & I       | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Time of Use                  | Demand Response Rates | C & I       | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |
| Real Time Pricing            | Demand Response Rates | C & I       | February, 2023               | July, 2022              | January, 2023                 | 90-days following Plan Year |

## **7.2 2024 SOLAR RESOURCE ADDITIONS**

The Preferred Plan includes acquiring approximately 350 MW of company-owned solar generation reaching commercial operation by December 31, 2024. The solar project would be allocated to both Evergy Metro and Evergy Missouri West, assigning 230 MW to Evergy Metro and 120 MW to Evergy Missouri West. If the solar project ultimately selected is larger or smaller than 350 MW, the allocations to the two utilities will be adjusted accordingly. It is expected that the project selected for 2024 commercial operation would be selected from the Request for Proposal (RFP) issued in February 2021 with updated pricing solicited from developers prior to contract execution.

## **SECTION 8: MAJOR RESEARCH PROJECTS**

***8. A description of the major research projects and programs the utility will continue or commence during the implementation period;***

### **8.1 ELECTRIC POWER RESEARCH INSTITUTE (EPRI)**

Evergy financially supports research conducted by the Electric Power Research Institute (EPRI). Evergy has access to the EPRI library of energy efficiency and demand response research and data that is available to program participants.

More information about the EPRI energy efficiency and demand response program research can be found on their website, [www.epri.com](http://www.epri.com). Additional specific EPRI energy efficiency and demand response programs recently and/or currently supported by the Company are summarized below.

#### **8.1.1 EPRI PROGRAM 18: ELECTRIC TRANSPORTATION**

Evergy continues its participation in this EPRI research program. This program develops research products that help electric transportation serve as a major electrification driver, with a focus on safe, affordable, reliable electricity with reduced environmental impacts, while at the same time providing increased choice for customers. This research spans the electric transportation domain from high-level strategic intelligence and fundamentals, through technical research and development, to low-level technical deployment. The result of this research effort has been a long-standing and influential program that provides unbiased and information-rich guidance to utility participants and others and has guided many key EV technologies and systems to commercial adoption.

EPRI research in electric transportation yields data and knowledge beneficial to members of the program. EPRI's products and services are delivered in a variety of ways and generally include the following:

- Facilitated collaboration between the utility industry and major automotive manufacturers, EV infrastructure equipment suppliers, infrastructure operators, and public agencies.
- Analysis of the impacts of EV charging to utility grid systems through laboratory testing and other means.
- Utility-specific analyses of EV market potential, EV-specific load shape and requirements, customer expectations, infrastructure requirements, and informational materials to support utility-internal EV-readiness programs.
- Testing and evaluation of EVs and EV charging equipment, including data collection and analysis of real-world EV operation in utility fleet and other applications.
- Major vehicle and infrastructure demonstration initiatives to collect and analyze real-world operating data on the latest vehicle and infrastructure technologies.
- Development of advanced charging technologies that enable smart integration of EVs into the grid.
- Expanding commercial and industrial electric non-road transport applications and markets through field demonstration, technology development, and assessment.
- Validation of the economic and environmental benefits of EVs to utilities, utility customers, and their communities.

### **8.1.2 EPRI PROGRAM 199: ELECTRIFICATION**

Evergy continues its participation in this EPRI research program. This program is focused on the application of novel, energy-efficient electric technologies as alternatives to fossil-fueled or non-energized processes that can boost customer productivity and also enhance utilities quality of service to their customers. Electricity offers inherent advantages of controllability, precision, versatility, efficiency, and



environmental benefits compared to fossil-fueled alternatives in many applications. A lack of familiarity and experience with emerging technologies, however, impedes many enterprises, particularly small- to medium-sized businesses and civil institutions, from pursuing electrification measures that can improve the productivity and efficiency of operations. Identifying and measuring the prime opportunities for electrification in a given service territory can be difficult. This research program aims to address this challenge by developing and refining analytical tools and a knowledge base of technologies, applications, and markets, and facilitating stakeholder networks to help utilities evaluate and pursue electrification opportunities.

## **8.2 LOAD FORECASTING**

Evergy Missouri West plans to conduct its next Residential Appliance Saturation Survey during the next implementation period. The last survey was completed in 2019. The results were used to calculate appliance saturations and these saturations were used to calibrate DOE forecasts of appliance saturations for use in Evergy's load forecasting models. Evergy also plans to match the responses with the customers' billing records and to conduct a conditional demand study to measure the unit energy consumption (UEC) for each major appliance.

Evergy Missouri West plans to look at conducting a price elasticity study during the implementation period.

Evergy Missouri West will continue develop and improve its framework of incorporating photovoltaic (PV) and electric vehicle (EV) impacts into the energy forecast to capture PV and EV energy impacts.

Evergy Missouri West plans to look at developing a new industrial model that will allow the utility to create an industrial intensity index which would be calibrated to the Evergy service areas C&I survey data.

### **8.3 DEMAND-SIDE MANAGEMENT INITIATIVES**

All demand side research projects including DSM Potential Study, EPRI Programs as well as MEEIA Cycle 3 research and pilot projects are described in detail in Vol. 5 Section 2.

### **8.4 ELECTRIFICATION**

On February 24, 2021 Evergy filed applications requesting the Commission approve transportation electrification pilot programs in both the Missouri Metro and Missouri West jurisdictions. These filings were subsequently consolidated into ET-2021-0151. The requested programs include rebates to offset the costs of installing electric vehicle (EV) and time-of-use rates for transit and commercial fleet customers. Subject to the regulatory approval process, Evergy expects these pilot programs to commence within the implementation period.