EVERGY METRO

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 Metro 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.

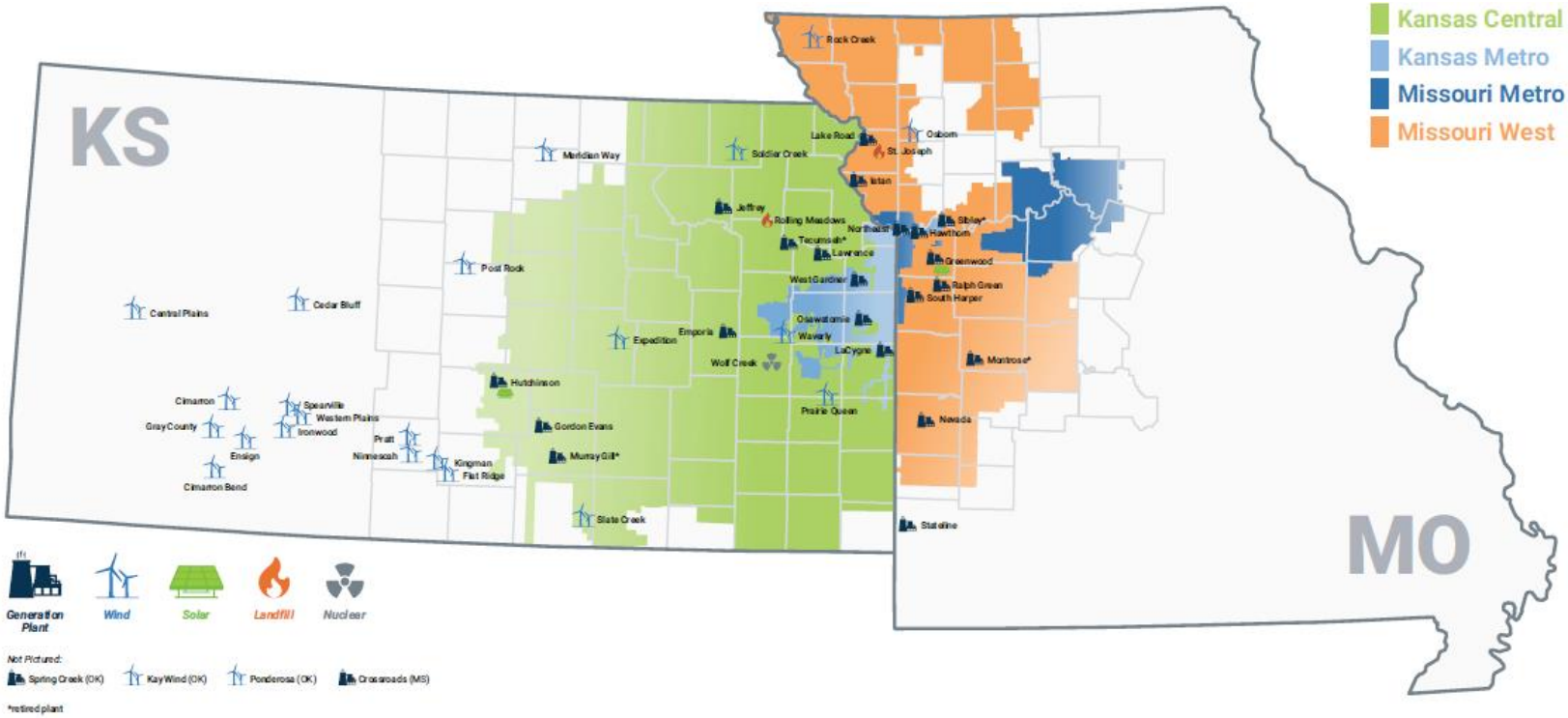
Several distinct tasks are included in the planning process:

- 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 METRO SYSTEM OVERVIEW

Evergy Metro is an integrated, mid-sized electric utility serving the region surrounding the Kansas City, Missouri metropolitan area including customers in Kansas and Missouri. A map of the Evergy service territory which includes Evergy Missouri and Kansas Metro is provided in Figure 1 below:

Figure 1: Evergy Service Territory



Evergy Metro 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.

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

Jurisdiction	Number of Retail Customers	Retail Sales (MWh)	Net Peak Demand (MW)
Evergy Missouri Metro	295,550	8,053,770	1,725
Evergy Kansas Metro	265,630	6,170,121	1,575
Evergy Metro	561,180	14,223,891	3,300

Evergy Metro owns and operates a diverse generating portfolio and Power Purchase Agreements (PPA) to meet customer energy requirements. In October 2019, Evergy executed a PPA for Ponderosa Wind, a 178 MW wind farm located in northwest Oklahoma. Evergy Metro is the offtaker of 100 MW of the energy output from Ponderosa Wind which reached commercial operation in December 2020. Table 2, Figure 2, and Figure 3 below reflect Evergy Metro's generation assets including PPAs.

Table 2: Capacity and Energy By Resource Type

Capacity By Fuel Type	Capacity (MW)	Capacity (%)	Energy (MWh)	Energy (%)
Coal	2,249	42%	9,232,744	48%
Nat. Gas	767	14%	327,681	2%
Nuclear	553	10%	4,973,855	26%
Oil	393	7%	6,375	0%
Wind	1,330	25%	4,540,861	23%
Hydro	60	1%	329,976	2%
Total	5,352	100%	19,411,492	100%

Figure 2: Capacity by Resource Type

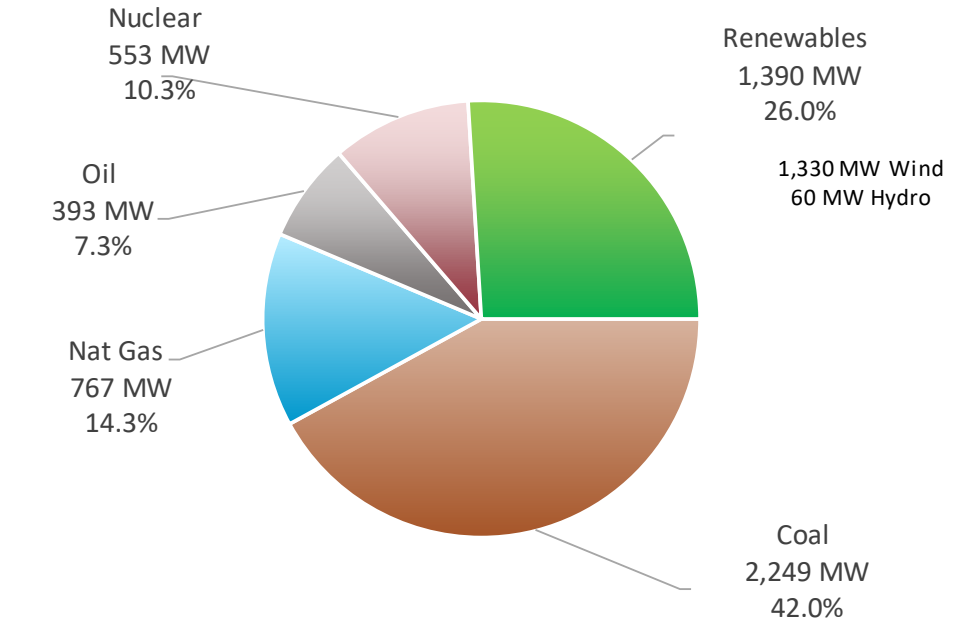


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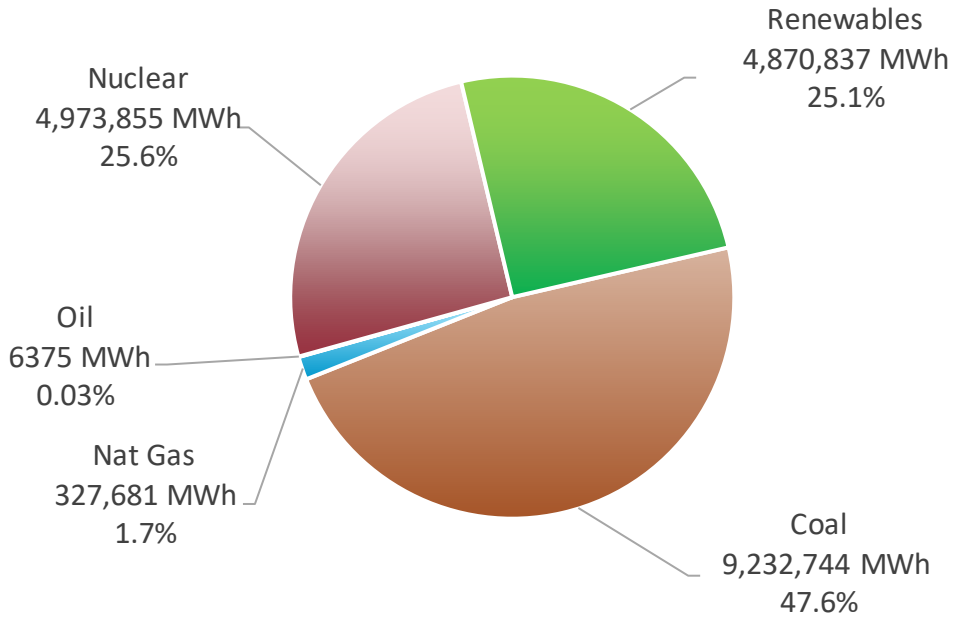
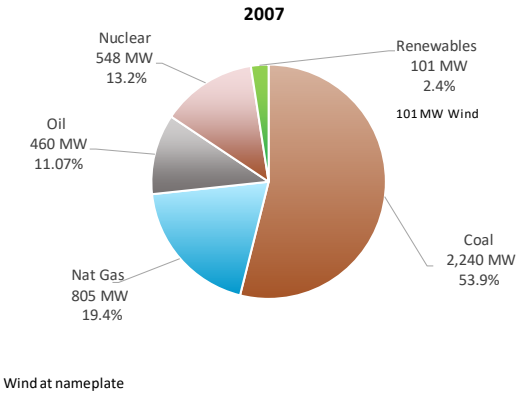
Figure 3: Energy by Resource Type



2.1 CONTINUED COMMITMENT TOWARDS RENEWABLES

More than a decade ago, Evergy Metro began increasing their generation portfolio makeup with renewable generation resources while retiring coal fired generators. In 2007, less than 3% of Evergy Metro's total capacity was sourced from renewable resources, whereas by 2021, 26% of total capacity is sourced from renewable resources. The following pie charts illustrates this shift from the Evergy Metro generating fleet consisting primarily of coal and gas generation to a diversified portfolio consisting of substantial renewable generation.



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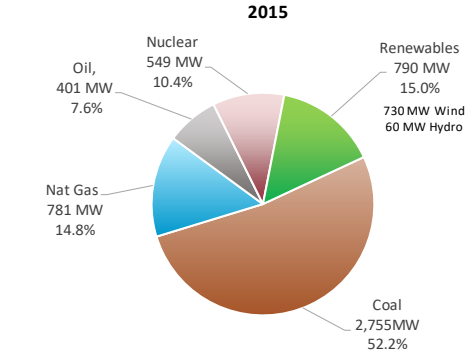

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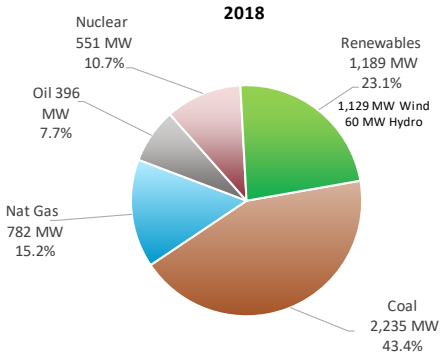

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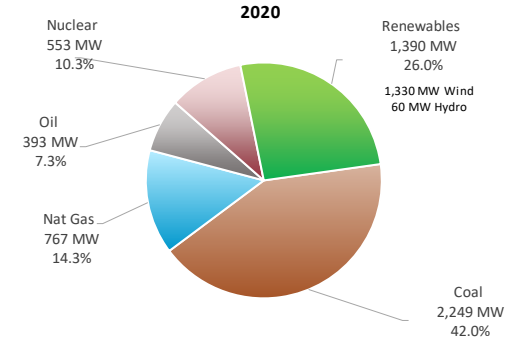

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SECTION 3: PREFERRED PLAN SELECTION

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, fifteen 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 Metro Preferred Plan

Year	CT's (MW)	Wind (MW)	Solar (MW)	DSM (MW)	Retire (MW)
2021	0			29	
2022	0			48	
2023	0			146	
2024	0		230	196	
2025	0	120		237	
2026	0	120		273	
2027	0			305	
2028	0		120	333	
2029	0		120	357	
2030	0		120	377	
2031	0		120	384	
2032	0		120	382	373
2033	0			380	
2034	0			379	
2035	0			377	
2036	0			376	
2037	0			376	
2038	0			378	
2039	0			379	821
2040	699			379	

The Preferred Plan includes the following renewable additions: 230 MW of solar generation in year 2024, and 120 MW of solar generation in each of the years 2028 – 2032. Additionally, 120 MW of wind generation in years 2025 and 2026. DSM resources are based upon a RAP- level which consists of a suite of eight residential and ten commercial programs five of which are demand response programs, three are demand side rates, and ten are energy efficiency programs.

The Preferred Plan, denoted as Alternative Resource Plan MCGCU in Volume 6, also includes retiring Evergy Metro's 373 MW share of LaCygne-1 in 2032 which coincides

with the book life retirement date for Evergy Central's share of the generating unit. However, the Preferred Plan has determined that it is economically beneficial to extend the book life retirement date of Evergy Metro's 331 MW share of LaCygne-2 from 2029 to 2039. Additionally, Evergy Metro's 490 MW share of Iatan-1 is expected to be retired 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.

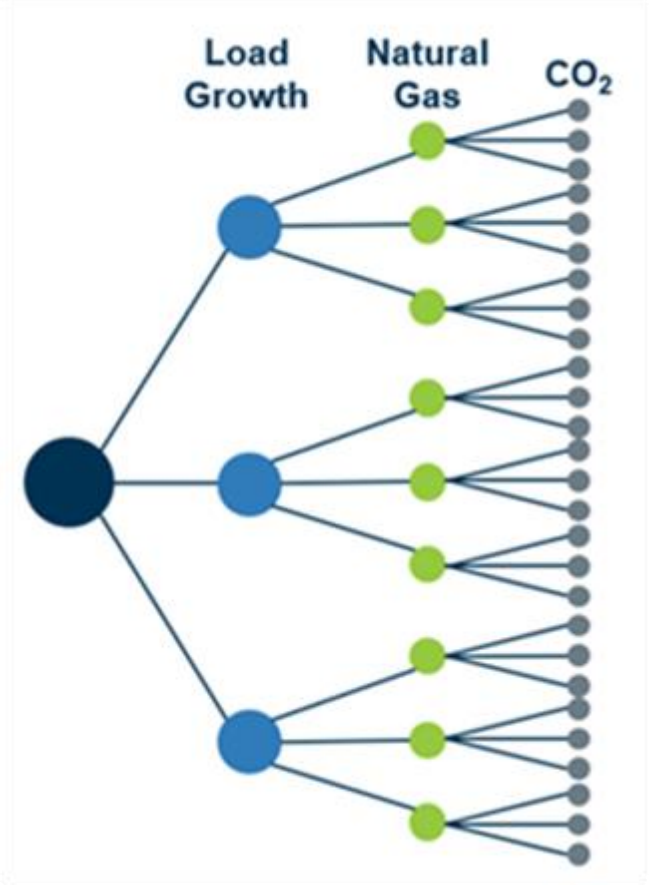
The Preferred Plan meets the fundamental planning objectives as required by Rule 22.010(2) to provide the public with energy services that are safe, reliable, and efficient, at just and reasonable rates, in compliance with all legal mandates, and in a manner that serves the public interest and is consistent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

SECTION 4: CRITICAL UNCERTAIN FACTORS

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

Evergy Metro 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_2 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

Year	Revenue Requirement ($MM)	Revenue Requirement Without DSM Performance Incentive ($MM)	Levelized Annual Rates ($/kW-hr)	Levelized Annual Rates Without DSM Performance Incentive ($/kW-hr)	Rate Increase	Rate Increase Without DSM Performance Incentive	Times Interest Earned	Debt to Capital
2021	1,771	1,771	0.11	0.11	0.00%	0.00%	4.29	53.59
2022	1,712	1,709	0.11	0.11	-3.39%	-3.51%	4.19	53.59
2023	1,694	1,691	0.11	0.11	-0.63%	-0.67%	4.30	49.12
2024	1,680	1,677	0.11	0.11	-0.60%	-0.62%	4.50	49.12
2025	1,698	1,694	0.11	0.11	1.28%	1.24%	4.51	49.12
2026	1,726	1,722	0.11	0.11	1.68%	1.70%	4.52	49.12
2027	1,715	1,712	0.11	0.11	-0.68%	-0.68%	4.30	49.13
2028	1,725	1,722	0.11	0.11	0.31%	0.30%	4.28	49.13
2029	1,722	1,719	0.11	0.11	-0.28%	-0.31%	4.23	49.13
2030	1,828	1,825	0.12	0.12	5.88%	5.93%	4.13	49.13
2031	1,819	1,815	0.12	0.12	-0.89%	-0.89%	4.08	49.13
2032	1,807	1,803	0.11	0.11	-1.30%	-1.30%	4.03	49.13
2033	1,835	1,832	0.12	0.12	1.03%	1.03%	3.85	49.13
2034	1,838	1,835	0.11	0.11	-0.62%	-0.63%	3.74	49.13
2035	1,812	1,808	0.11	0.11	-2.26%	-2.26%	3.77	42.27
2036	1,913	1,910	0.12	0.12	4.62%	4.63%	4.42	42.27
2037	1,948	1,945	0.12	0.12	1.09%	1.10%	4.28	42.27
2038	1,951	1,948	0.12	0.12	-0.71%	-0.71%	4.17	41.88
2039	2,048	2,044	0.12	0.12	4.05%	4.04%	4.02	41.88
2040	2,239	2,236	0.13	0.13	8.34%	8.39%	4.66	41.88

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	EM&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 Home Energy Report	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
RealTime 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. 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 Metro 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 Metro plans to look at conducting a price elasticity study during the implementation period.

Evergy Metro will continue to 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 Metro 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.