# Evergy Metro

# Volume 7

# Resource Acquisition Strategy

# Selection

## Integrated Resource Plan

## 20 CSR 4240-22.070

## April 2024

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# Volume 7: Resource Acquisition Strategy Selection

## Highlights

- By 2030, Evergy Metro's Preferred Plan adds 450MW of solar and 300MW of wind resource additions.
- In the second half of 2024, Evergy expects to apply for a CCN for large-scale solar project(s) identified in its 2023 RFP. To meet the 2027 in-service timeline detailed in the Preferred Plan, Evergy needs to receive regulatory approval by mid-2025 and the project developer needs to complete construction, testing, and commissioning by November 2026.

# Section 1: Preferred Resource Plan[1]

The Alternative Resource Plans (ARP) developed and analyzed under the requirements of 20 CSR 4240-22.060 were designed to meet the objectives of 20 CSR 4240-22.010(2). A balanced mix of demand- and supply-side resources have been key components of the company's resource planning efforts for over a decade and are a key part of its preferred plan going forward.

## 1.1 Investment in Advanced Transmission and Distribution Technologies[2]

These planning elements are discussed in Volume 4.5 and in special contemporary issues in Volume 8.

## 1.2 Utilizing Demand Side Resources[3]

As indicated in section 1(A) above, demand-side resources are a key component of alternative resource plan development. Per 4 CSR 240-22.010(2)(A), demand-side resources, renewable energy, and supply-side resources are to be analyzed on an equivalent basis, subject to compliance with all legal mandates. Regarding demand-side resources, MEEIA provides the legal mandate structure that helps to translate the potential studies and other DSM tools into portfolios that are included in the alternative resource plans to be evaluated.

These planning elements are discussed in Volume 5.

## 1.3 Preferred Plan[4]

The Preferred Plan CAAB has been selected for Evergy Metro and is shown in Table 1 below:

[1] 20 CSR 4240-22.070 (1); 20 CSR 4240-22.070 (1)(A); 20 CSR 4240-22.070 (7)(A)
[2] 20 CSR 4240-22.070 (1)(B)
[3] 20 CSR 4240-22.070 (1)(C)
[4] 20 CSR 4240-22.070 (1)(D)

**Table 1: Evergy Metro Preferred Plan**

| Year | Wind (MW) | Solar (MW) | Battery (MW) | Thermal (MW) | Capacity Only (Summer MW) | DSM (Summer MW) | Retirements (MW) |
|---|---|---|---|---|---|---|---|
| **2024** | 0 | 0 | 0 | 0 | 0 | 65 | 0 |
| **2025** | 0 | 0 | 0 | 0 | 0 | 130 | 0 |
| **2026** | 0 | 0 | 0 | 0 | 126 | 181 | 0 |
| **2027** | 0 | 300 | 0 | 0 | 34 | 231 | 0 |
| **2028** | 0 | 150 | 0 | 0 | 26 | 272 | 0 |
| **2029** | 150 | 0 | 0 | 0 | 0 | 294 | 0 |
| **2030** | 150 | 0 | 0 | 0 | 0 | 326 | 0 |
| **2031** | 150 | 0 | 0 | 0 | 0 | 355 | 0 |
| **2032** | 0 | 0 | 0 | 415 | 0 | 375 | 0 |
| **2033** | 150 | 0 | 0 | 0 | 0 | 395 | 375 |
| **2034** | 150 | 0 | 0 | 0 | 0 | 417 | 0 |
| **2035** | 150 | 0 | 0 | 0 | 0 | 435 | 0 |
| **2036** | 0 | 0 | 0 | 325 | 10 | 451 | 0 |
| **2037** | 0 | 0 | 0 | 0 | 0 | 464 | 0 |
| **2038** | 0 | 0 | 0 | 325 | 0 | 476 | 0 |
| **2039** | 0 | 0 | 0 | 325 | 0 | 491 | 0 |
| **2040** | 0 | 150 | 0 | 0 | 34 | 508 | 832 |
| **2041** | 0 | 0 | 0 | 325 | 47 | 524 | 0 |
| **2042** | 150 | 0 | 0 | 0 | 0 | 539 | 0 |
| **2043** | 0 | 0 | 0 | 0 | 0 | 552 | 0 |

The Preferred Plan for 2024 accelerates resource additions compared to the 2023 Preferred Plan. The largest driver is a higher level of forecasted load growth as a result of economic development. The increase in forecasted capacity needs, due to expected increases in summer reserve margin requirements and the introduction of binding winter capacity requirements, also prompt earlier capacity resource build.

The Preferred Plan includes the following renewable additions: 300 MW and 150 MW of solar generation in years 2027 and 2028, respectively, and 150 MW of solar in 2040. Additionally, 150 MW of wind generation in years 2029-2031, 2033-2035, and 2042. Consistent with the 2023 Preferred Plan, DSM resources are based upon a RAP+ level which consists of a suite of nine residential and seven commercial programs three of which are demand response programs, four are demand side rates, and nine are energy efficiency programs.

The Preferred Plan, denoted as Alternative Resource Plan CAAB in Volume 6, also includes retiring Evergy Metro's 375 MW share of LaCygne-1 in 2032, Evergy Metro's 334 MW share of LaCygne-2 in 2039, and Evergy Metro's 492 MW share of Iatan-1 in 2039.

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. The selected Preferred Plan is the lowest-cost alternative resource plan on an expected value basis. It is also the lowest-cost plan in the mid- and high-$CO_2$ restriction scenarios and is the lowest-cost plan in the low-$CO_2$ restriction scenario other than plans which were optimized specifically for the Low Carbon / Low Gas scenario (CFAE and CAAE). It is the lowest-cost or second-lowest cost plan in all gas price and construction cost scenarios. (By-Scenario rankings included in Section 4 in Volume 6).

The Preferred Plan was reviewed and approved by David Campbell, President and Chief Executive Officer and Jason Humphrey, Vice President – Development.

The Forecast of Capacity Balance worksheet associated with the Evergy Metro Preferred Plan is included in Appendix 6A. The Capacity Balance shows that reserve obligations are met each year.[5]

The Preferred Plan was tested under extreme weather conditions as defined by Rule 240-22.030(8)(B). The results of this analysis are included in response to a Special Contemporary Issue in Volume 8. In addition, the Preferred Plan and each of the Evergy Metro plans modeled indicated no unserved energy in production cost modeling analysis and comply with all current and proposed SPP Resource Adequacy Requirements which are designed to maintain loss-of-load expectation (i.e., the expectation of unserved

[5] Appendix 6A Metro Plans Capacity Balance CONFIDENTIAL

energy) of less than one day in ten years, with a probabilistic consideration of extreme weather included in this SPP analysis.

## Section 2: Ranges of Critical Uncertain Factors[6]

The ranges of critical uncertain factors are calculated by finding the degree to which the critical uncertain factor needs to change in order for the Preferred Plan to no longer be preferred. The values of the NPVRR for the Preferred Resource Plan and the lowest cost plan under extreme conditions are compared and by using linear interpolation a crossover point value is found and expressed as a percent of the range of the critical uncertain factor. These percentages are superimposed on the high, mid and low forecasts for each critical uncertain factor to develop the resulting ranges.

All ARPs are ranked based upon the expected value of results from the twenty-seven scenario/endpoint decision tree represented in Figure 1 of Volume 6 Evergy Metro Integrated Resource Plan and Risk Analysis. These results are presented in Table 2 below:

[6] 20 CSR 4240-22.070 (2)

**Table 2: Expected Value Alternative Resource Plan Rankings**

| Rank | Plan | NPVRR | Difference |
|---|---|---|---|
| **1** | CAAB | 23,144 | 0 |
| **2** | AAAB | 23,190 | 47 |
| **3** | CCAB | 23,217 | 73 |
| **4** | GAAB | 23,271 | 128 |
| **5** | CAAC | 23,274 | 130 |
| **6** | CBAB | 23,307 | 163 |
| **7** | DAAB | 23,337 | 193 |
| **8** | BAAB | 23,370 | 226 |
| **9** | EAAB | 23,394 | 250 |
| **10** | FAAB | 23,516 | 372 |
| **11** | CAAD | 23,574 | 430 |
| **12** | HAAB | 23,685 | 542 |
| **13** | CDAB | 23,881 | 738 |
| **14** | CAAE | 24,936 | 1,792 |
| **15** | CEAB | 25,029 | 1,885 |
| **16** | EAAJ | 25,079 | 1,935 |
| **17** | CFAE | 25,130 | 1,986 |
| **18** | CAAI | 26,316 | 3,172 |
| **19** | BEAI | 30,424 | 7,280 |

The ARPs are also ranked by their sub-sets of results, representing a known state of $CO_2$ restrictions. Nine endpoints assume High $CO_2$ restrictions, nine assume Mid $CO_2$ restrictions, and nine assume no future $CO_2$ restrictions (Low).

**Table 3: Alternative Resource Plan Ranking Based upon $CO_2$ Assumptions**

| | High $CO_2$ | | | Mid $CO_2$ | | | Low $CO_2$ | | |
|---|---|---|---|---|---|---|---|---|---|
| Rank | Plan | NPVRR | Difference | Plan | NPVRR | Difference | Plan | NPVRR | Difference |
| 1 | CAAB | 23,864 | 0 | CAAB | 23,111 | 0 | CFAE | 21,980 | 0 |
| 2 | CCAB | 23,918 | 54 | AAAB | 23,122 | 11 | CAAE | 22,485 | 505 |
| 3 | CAAD | 23,948 | 84 | CCAB | 23,186 | 75 | CAAB | 22,790 | 810 |
| 4 | GAAB | 24,025 | 161 | CBAB | 23,210 | 99 | AAAB | 22,811 | 831 |
| 5 | AAAB | 24,097 | 233 | CAAC | 23,230 | 119 | DAAB | 22,854 | 874 |
| 6 | CAAC | 24,117 | 253 | GAAB | 23,243 | 132 | CBAB | 22,869 | 889 |
| 7 | BAAB | 24,135 | 271 | DAAB | 23,259 | 148 | CCAB | 22,870 | 889 |
| 8 | EAAB | 24,144 | 280 | BAAB | 23,318 | 207 | CAAC | 22,874 | 894 |
| 9 | FAAB | 24,283 | 420 | EAAB | 23,363 | 252 | GAAB | 22,887 | 907 |
| 10 | CBAB | 24,422 | 558 | FAAB | 23,488 | 377 | EAAB | 23,018 | 1,038 |
| 11 | DAAB | 24,453 | 589 | CAAD | 23,532 | 421 | BAAB | 23,036 | 1,055 |
| 12 | HAAB | 24,585 | 721 | HAAB | 23,665 | 554 | FAAB | 23,122 | 1,142 |
| 13 | CDAB | 24,721 | 857 | CDAB | 23,797 | 686 | EAAJ | 23,129 | 1,148 |
| 14 | EAAJ | 25,598 | 1,734 | CEAB | 24,916 | 1,805 | HAAB | 23,195 | 1,215 |
| 15 | CEAB | 25,850 | 1,986 | CAAE | 25,249 | 2,138 | CAAD | 23,450 | 1,470 |
| 16 | CAAI | 26,717 | 2,854 | CFAE | 25,508 | 2,397 | CDAB | 23,580 | 1,600 |
| 17 | CAAE | 27,769 | 3,905 | EAAJ | 25,761 | 2,650 | CEAB | 24,807 | 2,827 |
| 18 | CFAE | 28,867 | 5,003 | CAAI | 26,259 | 3,148 | CAAI | 26,211 | 4,230 |
| 19 | BEAI | 30,935 | 7,071 | BEAI | 30,336 | 7,225 | BEAI | 30,328 | 8,348 |

The lowest cost plan based on NPVRR by scenario/endpoint is shown in Table 4 below.

**Table 4: Lowest NPVRR Alternative Resource Plan By Endpoint**

| Endpoint | Weighting | NG | $CO_2$ | ConCost | ARP |
|---|---|---|---|---|---|
| **1** | 0.56% | High | High | High | CAAB |
| **2** | 2.25% | High | Mid | High | CAAB |
| **3** | 0.94% | High | Low | High | CFAE |
| **4** | 1.88% | Mid | High | High | CAAB |
| **5** | 7.50% | Mid | Mid | High | CAAB |
| **6** | 3.13% | Mid | Low | High | CFAE |
| **7** | 1.31% | Low | High | High | CAAB |
| **8** | 5.25% | Low | Mid | High | CAAB |
| **9** | 2.19% | Low | Low | High | CFAE |
| **10** | 1.13% | High | High | Mid | CAAD |
| **11** | 4.50% | High | Mid | Mid | AAAB |
| **12** | 1.88% | High | Low | Mid | CFAE |
| **13** | 3.75% | Mid | High | Mid | CAAD |
| **14** | 15.00% | Mid | Mid | Mid | CAAB |
| **15** | 6.25% | Mid | Low | Mid | CFAE |
| **16** | 2.63% | Low | High | Mid | CAAD |
| **17** | 10.50% | Low | Mid | Mid | CAAB |
| **18** | 4.38% | Low | Low | Mid | CFAE |
| **19** | 0.56% | High | High | Low | CAAD |
| **20** | 2.25% | High | Mid | Low | CAAD |
| **21** | 0.94% | High | Low | Low | CFAE |
| **22** | 1.88% | Mid | High | Low | CAAB |
| **23** | 7.50% | Mid | Mid | Low | AAAB |
| **24** | 3.13% | Mid | Low | Low | CFAE |
| **25** | 1.31% | Low | High | Low | CAAB |
| **26** | 5.25% | Low | Mid | Low | AAAB |
| **27** | 2.19% | Low | Low | Low | CFAE |

In the rankings above, the lowest NPVRR ARPs are CAAB, AAAB, CAAD and CFAE. CFAE has no retirements and optimal builds for the low $CO_2$, low natural gas future, it ranks highest in all low $CO_2$ endpoints. In contrast, CAAD, which is optimized for the high $CO_2$, high natural gas future is the highest ranked plan in four high $CO_2$ endpoints and a mid $CO_2$, high natural gas endpoint. The Preferred Plan CAAB is the highest ranked in 10 endpoints with varying scenarios, except for low $CO_2$. Plan AAAB with the RAP-level DSM is ranked highest in three mid $CO_2$ endpoints. The following tables represent the sensitivities for the uncertain factors by scenario/endpoint.

## Table 5: Uncertain Factors Sensitivities – High Construction Costs Vs. Natural Gas and $CO_2$

| | $CO_2$ | High | | Mid | | Low | | $CO_2$ | High | | Mid | | Low | | $CO_2$ | High | | Mid | | Low | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Nat Gas | Plan | NPVR | Plan | NPVR | Plan | NPVR | Nat Gas | Plan | NPVR | Plan | NPVR | Plan | NPVR | Nat Gas | Plan | NPVR | Plan | NPVR | Plan | NPVR |
| 1 | | CAAB | 25,041 | CAAB | 24,158 | CFAE | 22,292 | | CAAB | 24,191 | CAAB | 23,727 | CFAE | 22,184 | | CAAB | 23,885 | CAAB | 23,551 | CFAE | 22,129 |
| 2 | | CCAB | 25,047 | AAAB | 24,193 | CAAE | 23,089 | | CCAB | 24,207 | CCAB | 23,795 | CAAE | 22,789 | | CCAB | 23,907 | CCAB | 23,603 | CAAE | 22,634 |
| 3 | | GAAB | 25,176 | CCAB | 24,271 | CAAB | 23,557 | | GAAB | 24,330 | AAAB | 23,818 | CAAB | 23,416 | | GAAB | 24,022 | CAAC | 23,637 | EAAJ | 23,270 |
| 4 | | AAAB | 25,304 | CAAC | 24,280 | CAAC | 23,617 | | CAAC | 24,431 | CAAC | 23,822 | EAAJ | 23,441 | | CAAC | 24,109 | AAAB | 23,649 | CAAB | 23,336 |
| 5 | | FAAB | 25,308 | CBAB | 24,345 | DAAB | 23,620 | | EAAB | 24,493 | DAAB | 23,871 | CAAC | 23,476 | | EAAB | 24,186 | DAAB | 23,676 | CCAB | 23,393 |
| 6 | | EAAB | 25,336 | BAAB | 24,345 | AAAB | 23,631 | | FAAB | 24,501 | CBAB | 23,879 | DAAB | 23,477 | | FAAB | 24,209 | CBAB | 23,679 | CAAC | 23,397 |
| 7 | | BAAB | 25,337 | DAAB | 24,355 | CCAB | 23,671 | | BAAB | 24,517 | GAAB | 23,900 | CCAB | 23,489 | | BAAB | 24,227 | GAAB | 23,714 | DAAB | 23,398 |
| 8 | | CAAC | 25,344 | GAAB | 24,368 | GAAB | 23,708 | | AAAB | 24,597 | BAAB | 23,948 | AAAB | 23,512 | | AAAB | 24,344 | BAAB | 23,767 | AAAB | 23,438 |
| 9 | | CAAD | 25,373 | EAAB | 24,536 | CBAB | 23,746 | | DAAB | 24,865 | EAAB | 24,067 | CBAB | 23,542 | | DAAB | 24,561 | EAAB | 23,872 | CBAB | 23,443 |
| 10 | High | CBAB | 25,694 | CAAD | 24,599 | EAAJ | 23,782 | Mid | CAAD | 24,876 | FAAB | 24,165 | GAAB | 23,557 | Low | CBAB | 24,613 | FAAB | 23,964 | GAAB | 23,471 |
| 11 | | DAAB | 25,766 | FAAB | 24,670 | BAAB | 23,794 | | CBAB | 24,892 | HAAB | 24,395 | BAAB | 23,668 | | HAAB | 24,708 | HAAB | 24,224 | BAAB | 23,596 |
| 12 | | HAAB | 25,945 | HAAB | 24,901 | EAAB | 23,866 | | HAAB | 25,032 | CAAD | 24,480 | EAAB | 23,732 | | CAAD | 24,715 | CDAB | 24,316 | EAAB | 23,652 |
| 13 | | CDAB | 26,087 | CDAB | 25,028 | FAAB | 23,944 | | CDAB | 25,210 | CDAB | 24,513 | FAAB | 23,812 | | EAAJ | 24,811 | CAAD | 24,424 | FAAB | 23,734 |
| 14 | | EAAJ | 26,856 | CAAE | 26,214 | HAAB | 24,086 | | EAAJ | 25,344 | CAAE | 25,484 | HAAB | 23,949 | | CDAB | 24,905 | CEAB | 25,268 | HAAB | 23,867 |
| 15 | | CEAB | 27,479 | CFAE | 26,408 | CAAD | 24,428 | | CEAB | 26,239 | CEAB | 25,569 | CDAB | 24,305 | | CEAB | 25,840 | CAAE | 25,343 | CDAB | 24,155 |
| 16 | | CAAI | 28,711 | CEAB | 26,688 | CDAB | 24,654 | | CAAE | 27,904 | CFAE | 25,637 | CAAD | 24,402 | | CAAE | 27,554 | CFAE | 25,510 | CAAD | 24,375 |
| 17 | | CAAE | 29,015 | EAAJ | 26,748 | CEAB | 26,642 | | CAAI | 28,438 | EAAJ | 25,977 | CEAB | 25,498 | | CAAI | 28,383 | EAAJ | 25,898 | CEAB | 25,080 |
| 18 | | CFAE | 30,043 | CAAI | 27,944 | CAAI | 27,837 | | CFAE | 29,021 | CAAI | 27,994 | CAAI | 27,950 | | CFAE | 28,715 | CAAI | 28,037 | CAAI | 28,006 |
| 19 | | BEAI | 33,725 | BEAI | 32,930 | BEAI | 32,914 | | BEAI | 33,588 | BEAI | 33,004 | BEAI | 32,998 | | BEAI | 33,613 | BEAI | 33,075 | BEAI | 33,069 |

## Table 6: Uncertain Factors Sensitivities – Low Construction Costs Vs. Natural Gas and $CO_2$

| | $CO_2$ | High | | Mid | | Low | | $CO_2$ | High | | Mid | | Low | | $CO_2$ | High | | Mid | | Low | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Nat Gas | Plan | NPVR | Plan | NPVR | Plan | NPVR | Nat Gas | Plan | NPVR | Plan | NPVR | Plan | NPVR | Nat Gas | Plan | NPVR | Plan | NPVR | Plan | NPVR |
| 1 | | CAAD | 23,520 | CAAD | 22,746 | CFAE | 21,895 | | CAAB | 23,022 | AAAB | 22,479 | CFAE | 21,787 | | CAAB | 22,716 | AAAB | 22,310 | CFAE | 21,732 |
| 2 | | CAAB | 23,872 | AAAB | 22,854 | AAAB | 22,293 | | CAAD | 23,023 | CAAB | 22,558 | AAAB | 22,174 | | CCAB | 22,772 | CAAB | 22,382 | CAAE | 22,078 |
| 3 | | CCAB | 23,912 | CAAB | 22,989 | CAAB | 22,388 | | CCAB | 23,072 | CBAB | 22,588 | CAAE | 22,233 | | GAAB | 22,783 | CBAB | 22,388 | AAAB | 22,100 |
| 4 | | GAAB | 23,936 | CBAB | 23,054 | DAAB | 22,453 | | GAAB | 23,090 | CAAD | 22,627 | CAAB | 22,247 | | CAAD | 22,862 | CCAB | 22,468 | CBAB | 22,152 |
| 5 | | AAAB | 23,965 | GAAB | 23,129 | CBAB | 22,455 | | EAAB | 23,187 | CCAB | 22,659 | CBAB | 22,251 | | EAAB | 22,880 | GAAB | 22,475 | CAAB | 22,167 |
| 6 | | EAAB | 24,029 | CCAB | 23,136 | GAAB | 22,469 | | AAAB | 23,259 | GAAB | 22,661 | DAAB | 22,310 | | CAAC | 23,002 | DAAB | 22,509 | DAAB | 22,231 |
| 7 | | FAAB | 24,103 | BAAB | 23,151 | CAAC | 22,510 | | FAAB | 23,296 | DAAB | 22,704 | GAAB | 22,318 | | FAAB | 23,005 | CAAC | 22,530 | GAAB | 22,232 |
| 8 | | BAAB | 24,142 | CAAC | 23,173 | CAAE | 22,532 | | BAAB | 23,323 | CAAC | 22,715 | CCAB | 22,354 | | AAAB | 23,006 | EAAB | 22,566 | CCAB | 22,258 |
| 9 | | CAAC | 24,237 | DAAB | 23,188 | CCAB | 22,535 | | CAAC | 23,324 | BAAB | 22,754 | CAAC | 22,369 | | BAAB | 23,033 | CAAD | 22,571 | CAAC | 22,290 |
| 10 | High | CBAB | 24,403 | EAAB | 23,230 | EAAB | 22,559 | Mid | CBAB | 23,601 | EAAB | 22,760 | EAAB | 22,425 | Low | CBAB | 23,322 | BAAB | 22,573 | EAAB | 22,345 |
| 11 | | HAAB | 24,567 | FAAB | 23,466 | CAAD | 22,575 | | HAAB | 23,654 | FAAB | 22,961 | BAAB | 22,474 | | HAAB | 23,330 | FAAB | 22,759 | BAAB | 22,402 |
| 12 | | DAAB | 24,599 | HAAB | 23,523 | BAAB | 22,600 | | DAAB | 23,698 | HAAB | 23,017 | CAAD | 22,549 | | DAAB | 23,394 | HAAB | 22,846 | HAAB | 22,489 |
| 13 | | CDAB | 24,732 | CDAB | 23,673 | HAAB | 22,709 | | CDAB | 23,855 | CDAB | 23,158 | HAAB | 22,572 | | CDAB | 23,551 | CDAB | 22,962 | CAAD | 22,522 |
| 14 | | CAAI | 25,641 | CAAI | 24,873 | FAAB | 22,740 | | EAAJ | 24,954 | CEAB | 24,303 | FAAB | 22,608 | | EAAJ | 24,421 | CEAB | 24,003 | FAAB | 22,529 |
| 15 | | CEAB | 26,214 | CEAB | 25,423 | CDAB | 23,300 | | CEAB | 24,973 | CAAI | 24,923 | CDAB | 22,951 | | CEAB | 24,574 | CAAE | 24,786 | CDAB | 22,800 |
| 16 | | EAAJ | 26,466 | CAAE | 25,657 | EAAJ | 23,392 | | CAAI | 25,367 | CAAE | 24,927 | EAAJ | 23,051 | | CAAI | 25,313 | CAAI | 24,967 | EAAJ | 22,880 |
| 17 | | CAAE | 28,458 | CFAE | 26,011 | CAAI | 24,767 | | CAAE | 27,347 | CFAE | 25,240 | CEAB | 24,232 | | CAAE | 26,997 | CFAE | 25,114 | CEAB | 23,814 |
| 18 | | BEAI | 29,202 | EAAJ | 26,358 | CEAB | 25,376 | | CFAE | 28,624 | EAAJ | 25,587 | CAAI | 24,880 | | CFAE | 28,318 | EAAJ | 25,508 | CAAI | 24,935 |
| 19 | | CFAE | 29,647 | BEAI | 28,407 | BEAI | 28,391 | | BEAI | 29,064 | BEAI | 28,481 | BEAI | 28,474 | | BEAI | 29,090 | BEAI | 28,552 | BEAI | 28,546 |

## Table 7: Uncertain Factors Sensitivities – High Natural Gas Vs. Construction Costs and $CO_2$

| | $CO_2$ | High | | Mid | | Low | | $CO_2$ | High | | Mid | | Low | | $CO_2$ | High | | Mid | | Low | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Con Costs | Plan | NPVR | Plan | NPVR | Plan | NPVR | Con Costs | Plan | NPVR | Plan | NPVR | Plan | NPVR | Con Costs | Plan | NPVR | Plan | NPVR | Plan | NPVR |
| 1 | | CAAB | 25,041 | CAAB | 24,158 | CFAE | 22,292 | | CAAD | 24,406 | AAAB | 23,476 | CFAE | 22,089 | | CAAD | 23,520 | CAAD | 22,746 | CFAE | 21,895 |
| 2 | | CCAB | 25,047 | AAAB | 24,193 | CAAE | 23,089 | | CAAB | 24,930 | CAAB | 23,504 | CAAE | 22,777 | | CAAB | 23,872 | AAAB | 22,854 | AAAB | 22,293 |
| 3 | | GAAB | 25,176 | CCAB | 24,271 | CAAB | 23,557 | | AAAB | 24,937 | CCAB | 23,613 | CAAB | 22,903 | | CCAB | 23,912 | CAAB | 22,989 | CAAB | 22,388 |
| 4 | | AAAB | 25,304 | CAAC | 24,280 | CAAC | 23,617 | | CCAB | 24,994 | CAAD | 23,632 | AAAB | 22,914 | | GAAB | 23,936 | CBAB | 23,054 | DAAB | 22,453 |
| 5 | | FAAB | 25,308 | CBAB | 24,345 | DAAB | 23,620 | | BAAB | 25,125 | CAAC | 23,641 | DAAB | 22,971 | | AAAB | 23,965 | GAAB | 23,129 | CBAB | 22,455 |
| 6 | | EAAB | 25,336 | BAAB | 24,345 | AAAB | 23,631 | | GAAB | 25,147 | CBAB | 23,652 | CAAC | 22,979 | | EAAB | 24,029 | CCAB | 23,136 | GAAB | 22,469 |
| 7 | | BAAB | 25,337 | DAAB | 24,355 | CCAB | 23,671 | | CAAC | 25,221 | GAAB | 23,663 | GAAB | 23,003 | | FAAB | 24,103 | BAAB | 23,151 | CAAC | 22,510 |
| 8 | | CAAC | 25,344 | GAAB | 24,368 | GAAB | 23,708 | | EAAB | 25,253 | BAAB | 23,690 | CCAB | 23,012 | | BAAB | 24,142 | CAAC | 23,173 | CAAE | 22,532 |
| 9 | | CAAD | 25,373 | EAAB | 24,536 | CBAB | 23,746 | | CBAB | 25,354 | DAAB | 23,705 | CBAB | 23,053 | | CAAC | 24,237 | DAAB | 23,188 | CCAB | 22,535 |
| 10 | High | CBAB | 25,694 | CAAD | 24,599 | EAAJ | 23,782 | Mid | FAAB | 25,437 | EAAB | 23,778 | EAAB | 23,107 | Low | CBAB | 24,403 | EAAB | 23,230 | EAAB | 22,559 |
| 11 | | DAAB | 25,766 | FAAB | 24,670 | BAAB | 23,794 | | DAAB | 25,466 | FAAB | 23,908 | BAAB | 23,138 | | HAAB | 24,567 | FAAB | 23,466 | CAAD | 22,575 |
| 12 | | HAAB | 25,945 | HAAB | 24,901 | EAAB | 23,866 | | HAAB | 25,692 | HAAB | 24,098 | FAAB | 23,182 | | DAAB | 24,599 | HAAB | 23,523 | BAAB | 22,600 |
| 13 | | CDAB | 26,087 | CDAB | 25,028 | FAAB | 23,944 | | CDAB | 25,737 | CDAB | 24,256 | HAAB | 23,283 | | CDAB | 24,732 | CDAB | 23,673 | HAAB | 22,709 |
| 14 | | EAAJ | 26,856 | CAAE | 26,214 | HAAB | 24,086 | | CAAI | 26,762 | CEAB | 25,889 | EAAJ | 23,369 | | CAAI | 25,641 | CAAI | 24,873 | FAAB | 22,740 |
| 15 | | CEAB | 27,479 | CFAE | 26,408 | CAAD | 24,428 | | CEAB | 27,240 | CAAE | 25,903 | CAAD | 23,461 | | CEAB | 26,214 | CEAB | 25,423 | CDAB | 23,300 |
| 16 | | CAAI | 28,711 | CEAB | 26,688 | CDAB | 24,654 | | EAAJ | 27,479 | CAAI | 25,995 | CDAB | 23,882 | | EAAJ | 26,466 | CAAE | 25,657 | EAAJ | 23,392 |
| 17 | | CAAE | 29,015 | EAAJ | 26,748 | CEAB | 26,642 | | CAAE | 28,935 | CFAE | 26,206 | CEAB | 25,843 | | CAAE | 28,458 | CFAE | 26,011 | CAAI | 24,767 |
| 18 | | CFAE | 30,043 | CAAI | 27,944 | CAAI | 27,837 | | CFAE | 29,841 | EAAJ | 26,335 | CAAI | 25,888 | | BEAI | 29,202 | EAAJ | 26,358 | CEAB | 25,376 |
| 19 | | BEAI | 33,725 | BEAI | 32,930 | BEAI | 32,914 | | BEAI | 30,623 | BEAI | 29,827 | BEAI | 29,812 | | CFAE | 29,647 | BEAI | 28,407 | BEAI | 28,391 |

## Table 8: Uncertain Factors Sensitivities – Low Natural Gas Vs. Construction Costs and $CO_2$

| | $CO_2$ | High | | Mid | | Low | | $CO_2$ | High | | Mid | | Low | | $CO_2$ | High | | Mid | | Low | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Con Costs | Plan | NPVR | Plan | NPVR | Plan | NPVR | Con Costs | Plan | NPVR | Plan | NPVR | Plan | NPVR | Con Costs | Plan | NPVR | Plan | NPVR | Plan | NPVR |
| 1 | | CAAB | 23,885 | CAAB | 23,551 | CFAE | 22,129 | | CAAD | 23,748 | CAAB | 22,897 | CFAE | 21,926 | | CAAB | 22,716 | AAAB | 22,310 | CFAE | 21,732 |
| 2 | | CCAB | 23,907 | CCAB | 23,603 | CAAE | 22,634 | | CAAB | 23,774 | AAAB | 22,932 | CAAE | 22,323 | | CCAB | 22,772 | CAAB | 22,382 | CAAE | 22,078 |
| 3 | | GAAB | 24,022 | CAAC | 23,637 | EAAJ | 23,270 | | CCAB | 23,854 | CCAB | 22,944 | CAAB | 22,682 | | GAAB | 22,783 | CBAB | 22,388 | AAAB | 22,100 |
| 4 | | CAAC | 24,109 | AAAB | 23,649 | CAAB | 23,336 | | AAAB | 23,978 | CBAB | 22,986 | AAAB | 22,721 | | CAAD | 22,862 | CCAB | 22,468 | CBAB | 22,152 |
| 5 | | EAAB | 24,186 | DAAB | 23,676 | CCAB | 23,393 | | CAAC | 23,986 | CAAC | 22,999 | CCAB | 22,734 | | EAAB | 22,880 | GAAB | 22,475 | CAAB | 22,167 |
| 6 | | FAAB | 24,209 | CBAB | 23,679 | CAAC | 23,397 | | GAAB | 23,993 | GAAB | 23,010 | DAAB | 22,748 | | CAAC | 23,002 | DAAB | 22,509 | DAAB | 22,231 |
| 7 | | BAAB | 24,227 | GAAB | 23,714 | DAAB | 23,398 | | BAAB | 24,016 | DAAB | 23,026 | CBAB | 22,750 | | FAAB | 23,005 | CAAC | 22,530 | GAAB | 22,232 |
| 8 | | AAAB | 24,344 | BAAB | 23,767 | AAAB | 23,438 | | EAAB | 24,103 | BAAB | 23,112 | CAAC | 22,759 | | AAAB | 23,006 | EAAB | 22,566 | CCAB | 22,258 |
| 9 | | DAAB | 24,561 | EAAB | 23,872 | CBAB | 23,443 | | DAAB | 24,262 | EAAB | 23,113 | GAAB | 22,766 | | BAAB | 23,033 | CAAD | 22,571 | CAAC | 22,290 |
| 10 | High | CBAB | 24,613 | FAAB | 23,964 | GAAB | 23,471 | Mid | CBAB | 24,273 | FAAB | 23,201 | EAAJ | 22,858 | Low | CBAB | 23,322 | BAAB | 22,573 | EAAB | 22,345 |
| 11 | | HAAB | 24,708 | HAAB | 24,224 | BAAB | 23,596 | | FAAB | 24,339 | HAAB | 23,421 | EAAB | 22,893 | | HAAB | 23,330 | FAAB | 22,759 | BAAB | 22,402 |
| 12 | | CAAD | 24,715 | CDAB | 24,316 | EAAB | 23,652 | | HAAB | 24,455 | CAAD | 23,457 | BAAB | 22,941 | | DAAB | 23,394 | HAAB | 22,846 | HAAB | 22,489 |
| 13 | | EAAJ | 24,811 | CAAD | 24,424 | FAAB | 23,734 | | CDAB | 24,555 | CDAB | 23,544 | FAAB | 22,971 | | CDAB | 23,551 | CDAB | 22,962 | CAAD | 22,522 |
| 14 | | CDAB | 24,905 | CEAB | 25,268 | HAAB | 23,867 | | EAAJ | 25,434 | CEAB | 24,469 | HAAB | 23,063 | | EAAJ | 24,421 | CEAB | 24,003 | FAAB | 22,529 |
| 15 | | CEAB | 25,840 | CAAE | 25,343 | CDAB | 24,155 | | CEAB | 25,601 | CAAE | 25,031 | CDAB | 23,383 | | CEAB | 24,574 | CAAE | 24,786 | CDAB | 22,800 |
| 16 | | CAAE | 27,554 | CFAE | 25,510 | CAAD | 24,375 | | CAAI | 26,434 | CFAE | 25,308 | CAAD | 23,408 | | CAAI | 25,313 | CAAI | 24,967 | EAAJ | 22,880 |
| 17 | | CAAI | 28,383 | EAAJ | 25,898 | CEAB | 25,080 | | CAAE | 27,474 | EAAJ | 25,486 | CEAB | 24,281 | | CAAE | 26,997 | CFAE | 25,114 | CEAB | 23,814 |
| 18 | | CFAE | 28,715 | CAAI | 28,037 | CAAI | 28,006 | | CFAE | 28,512 | CAAI | 26,088 | CAAI | 26,056 | | CFAE | 28,318 | EAAJ | 25,508 | CAAI | 24,935 |
| 19 | | BEAI | 33,613 | BEAI | 33,075 | BEAI | 33,069 | | BEAI | 30,511 | BEAI | 29,972 | BEAI | 29,967 | | BEAI | 29,090 | BEAI | 28,552 | BEAI | 28,546 |

## Table 9: Uncertain Factors Sensitivities – High $CO_2$ Vs. Construction Costs and Natural Gas

| | NG Price | High | | Mid | | Low | | NG Price | High | | Mid | | Low | | NG Price | High | | Mid | | Low | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Con Costs | Plan | NPVR R | Plan | NPVR R | Plan | NPVR R | Con Costs | Plan | NPVR R | Plan | NPVR R | Plan | NPVR R | Con Costs | Plan | NPVR R | Plan | NPVR R | Plan | NPVR R |
| 1 | | CAAB | 25,041 | CAAB | 24,191 | CAAB | 23,885 | | CAAD | 24,406 | CAAD | 23,909 | CAAD | 23,748 | | CAAD | 23,520 | CAAB | 23,022 | CAAB | 22,716 |
| 2 | | CCAB | 25,047 | CCAB | 24,207 | CCAB | 23,907 | | CAAB | 24,930 | CAAB | 24,080 | CAAB | 23,774 | | CAAB | 23,872 | CAAD | 23,023 | CCAB | 22,772 |
| 3 | | GAAB | 25,176 | GAAB | 24,330 | GAAB | 24,022 | | AAAB | 24,937 | CCAB | 24,154 | CCAB | 23,854 | | CCAB | 23,912 | CCAB | 23,072 | GAAB | 22,783 |
| 4 | | AAAB | 25,304 | CAAC | 24,431 | CAAC | 24,109 | | CCAB | 24,994 | AAAB | 24,231 | AAAB | 23,978 | | GAAB | 23,936 | GAAB | 23,090 | CAAD | 22,862 |
| 5 | | FAAB | 25,308 | EAAB | 24,493 | EAAB | 24,186 | | BAAB | 25,125 | GAAB | 24,300 | CAAC | 23,986 | | AAAB | 23,965 | EAAB | 23,187 | EAAB | 22,880 |
| 6 | | EAAB | 25,336 | FAAB | 24,501 | FAAB | 24,209 | | GAAB | 25,147 | BAAB | 24,306 | GAAB | 23,993 | | EAAB | 24,029 | AAAB | 23,259 | CAAC | 23,002 |
| 7 | | BAAB | 25,337 | BAAB | 24,517 | BAAB | 24,227 | | CAAC | 25,221 | CAAC | 24,308 | BAAB | 24,016 | | FAAB | 24,103 | FAAB | 23,296 | FAAB | 23,005 |
| 8 | | CAAC | 25,344 | AAAB | 24,597 | AAAB | 24,344 | | EAAB | 25,253 | EAAB | 24,410 | EAAB | 24,103 | | BAAB | 24,142 | BAAB | 23,323 | AAAB | 23,006 |
| 9 | | CAAD | 25,373 | DAAB | 24,865 | DAAB | 24,561 | | CBAB | 25,354 | CBAB | 24,553 | DAAB | 24,262 | | CAAC | 24,237 | CAAC | 23,324 | BAAB | 23,033 |
| 10 | High | CBAB | 25,694 | CAAD | 24,876 | CBAB | 24,613 | Mid | FAAB | 25,437 | DAAB | 24,566 | CBAB | 24,273 | Low | CBAB | 24,403 | CBAB | 23,601 | CBAB | 23,322 |
| 11 | | DAAB | 25,766 | CBAB | 24,892 | HAAB | 24,708 | | DAAB | 25,466 | FAAB | 24,630 | FAAB | 24,339 | | HAAB | 24,567 | HAAB | 23,654 | HAAB | 23,330 |
| 12 | | HAAB | 25,945 | HAAB | 25,032 | CAAD | 24,715 | | HAAB | 25,692 | HAAB | 24,779 | HAAB | 24,455 | | DAAB | 24,599 | DAAB | 23,698 | DAAB | 23,394 |
| 13 | | CDAB | 26,087 | CDAB | 25,210 | EAAJ | 24,811 | | CDAB | 25,737 | CDAB | 24,860 | CDAB | 24,555 | | CDAB | 24,732 | CDAB | 23,855 | CDAB | 23,551 |
| 14 | | EAAJ | 26,856 | EAAJ | 25,344 | CDAB | 24,905 | | CAAI | 26,762 | EAAJ | 25,966 | EAAJ | 25,434 | | CAAI | 25,641 | EAAJ | 24,954 | EAAJ | 24,421 |
| 15 | | CEAB | 27,479 | CEAB | 26,239 | CEAB | 25,840 | | CEAB | 27,240 | CEAB | 26,000 | CEAB | 25,601 | | CEAB | 26,214 | CEAB | 24,973 | CEAB | 24,574 |
| 16 | | CAAI | 28,711 | CAAE | 27,904 | CAAE | 27,554 | | EAAJ | 27,479 | CAAI | 26,489 | CAAI | 26,434 | | EAAJ | 26,466 | CAAI | 25,367 | CAAI | 25,313 |
| 17 | | CAAE | 29,015 | CAAI | 28,438 | CAAI | 28,383 | | CAAE | 28,935 | CAAE | 27,824 | CAAE | 27,474 | | CAAE | 28,458 | CAAE | 27,347 | CAAE | 26,997 |
| 18 | | CFAE | 30,043 | CFAE | 29,021 | CFAE | 28,715 | | CFAE | 29,841 | CFAE | 28,818 | CFAE | 28,512 | | BEAI | 29,202 | CFAE | 28,624 | CFAE | 28,318 |
| 19 | | BEAI | 33,725 | BEAI | 33,588 | BEAI | 33,613 | | BEAI | 30,623 | BEAI | 30,485 | BEAI | 30,511 | | CFAE | 29,647 | BEAI | 29,064 | BEAI | 29,090 |

## Table 10: Uncertain Factors Sensitivities – Low $CO_2$ Vs. Construction Costs and Natural Gas

| | NG Price | High | | Mid | | Low | | NG Price | High | | Mid | | Low | | NG Price | High | | Mid | | Low | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Con Costs | Plan | NPVRR | Plan | NPVRR | Plan | NPVRR | Con Costs | Plan | NPVRR | Plan | NPVRR | Plan | NPVRR | Con Costs | Plan | NPVRR | Plan | NPVRR | Plan | NPVRR |
| 1 | | CFAE | 22,292 | CFAE | 22,184 | CFAE | 22,129 | | CFAE | 22,089 | CFAE | 21,981 | CFAE | 21,926 | | CFAE | 21,895 | CFAE | 21,787 | CFAE | 21,732 |
| 2 | | CAAE | 23,089 | CAAE | 22,789 | CAAE | 22,634 | | CAAE | 22,777 | CAAE | 22,478 | CAAE | 22,323 | | AAAB | 22,293 | AAAB | 22,174 | CAAE | 22,078 |
| 3 | | CAAB | 23,557 | CAAB | 23,416 | EAAJ | 23,270 | | CAAB | 22,903 | CAAB | 22,762 | CAAB | 22,682 | | CAAB | 22,388 | CAAE | 22,233 | AAAB | 22,100 |
| 4 | | CAAC | 23,617 | EAAJ | 23,441 | CAAB | 23,336 | | AAAB | 22,914 | AAAB | 22,795 | AAAB | 22,721 | | DAAB | 22,453 | CAAB | 22,247 | CBAB | 22,152 |
| 5 | | DAAB | 23,620 | CAAC | 23,476 | CCAB | 23,393 | | DAAB | 22,971 | DAAB | 22,827 | CCAB | 22,734 | | CBAB | 22,455 | CBAB | 22,251 | CAAB | 22,167 |
| 6 | | AAAB | 23,631 | DAAB | 23,477 | CAAC | 23,397 | | CAAC | 22,979 | CCAB | 22,830 | DAAB | 22,748 | | GAAB | 22,469 | DAAB | 22,310 | DAAB | 22,231 |
| 7 | | CCAB | 23,671 | CCAB | 23,489 | DAAB | 23,398 | | GAAB | 23,003 | CAAC | 22,838 | CBAB | 22,750 | | CAAC | 22,510 | GAAB | 22,318 | GAAB | 22,232 |
| 8 | | GAAB | 23,708 | AAAB | 23,512 | AAAB | 23,438 | | CCAB | 23,012 | CBAB | 22,849 | CAAC | 22,759 | | CAAE | 22,532 | CCAB | 22,354 | CCAB | 22,258 |
| 9 | | CBAB | 23,746 | CBAB | 23,542 | CBAB | 23,443 | | CBAB | 23,053 | GAAB | 22,852 | GAAB | 22,766 | | CCAB | 22,535 | CAAC | 22,369 | CAAC | 22,290 |
| 10 | High | EAAJ | 23,782 | GAAB | 23,557 | GAAB | 23,471 | Mid | EAAB | 23,107 | EAAB | 22,973 | EAAJ | 22,858 | Low | EAAB | 22,559 | EAAB | 22,425 | EAAB | 22,345 |
| 11 | | BAAB | 23,794 | BAAB | 23,668 | BAAB | 23,596 | | BAAB | 23,138 | BAAB | 23,013 | EAAB | 22,893 | | CAAD | 22,575 | BAAB | 22,474 | BAAB | 22,402 |
| 12 | | EAAB | 23,866 | EAAB | 23,732 | EAAB | 23,652 | | FAAB | 23,182 | EAAJ | 23,029 | BAAB | 22,941 | | BAAB | 22,600 | CAAD | 22,549 | HAAB | 22,489 |
| 13 | | FAAB | 23,944 | FAAB | 23,812 | FAAB | 23,734 | | HAAB | 23,283 | FAAB | 23,050 | FAAB | 22,971 | | HAAB | 22,709 | HAAB | 22,572 | CAAD | 22,522 |
| 14 | | HAAB | 24,086 | HAAB | 23,949 | HAAB | 23,867 | | EAAJ | 23,369 | HAAB | 23,146 | HAAB | 23,063 | | FAAB | 22,740 | FAAB | 22,608 | FAAB | 22,529 |
| 15 | | CAAD | 24,428 | CDAB | 24,305 | CDAB | 24,155 | | CAAD | 23,461 | CAAD | 23,435 | CDAB | 23,383 | | CDAB | 23,300 | CDAB | 22,951 | CDAB | 22,800 |
| 16 | | CDAB | 24,654 | CAAD | 24,402 | CAAD | 24,375 | | CDAB | 23,882 | CDAB | 23,533 | CAAD | 23,408 | | EAAJ | 23,392 | EAAJ | 23,051 | EAAJ | 22,880 |
| 17 | | CEAB | 26,642 | CEAB | 25,498 | CEAB | 25,080 | | CEAB | 25,843 | CEAB | 24,699 | CEAB | 24,281 | | CAAI | 24,767 | CEAB | 24,232 | CEAB | 23,814 |
| 18 | | CAAI | 27,837 | CAAI | 27,950 | CAAI | 28,006 | | CAAI | 25,888 | CAAI | 26,001 | CAAI | 26,056 | | CEAB | 25,376 | CAAI | 24,880 | CAAI | 24,935 |
| 19 | | BEAI | 32,914 | BEAI | 32,998 | BEAI | 33,069 | | BEAI | 29,812 | BEAI | 29,895 | BEAI | 29,967 | | BEAI | 28,391 | BEAI | 28,474 | BEAI | 28,546 |

### 2.1 $CO_2$ Restriction Uncertainty Ranges

Under all nine Low $CO_2$ scenarios, plan CFAE becomes lower cost than the Preferred Plan. Using the NPVRR results shown in the Table below, linear interpolation was used to determine the change in $CO_2$ restrictions necessary for CFAE NPVRR to become lower than the Preferred Plan CAAB NPVRR. As $CO_2$ restrictions decrease from the Mid scenario towards the Low scenario, CFAE becomes the lowest cost plan. From these results, $CO_2$ restrictions need to move 75% of the distance towards the Low $CO_2$ cost scenario for CFAE to become the lower cost plan.

**Table 11: CAAB vs. CFAE (Mid Natural Gas, Mid Construction Costs)**

| | $CO_2$ | |
|---|---|---|
| ARP | Mid | Low |
| CAAB | 23,073 | 22,762 |
| CFAE | 25,434 | 21,981 |
| % from Mid | | 75% |

Under some High $CO_2$ scenarios, plan CAAD becomes lower cost than the Preferred Plan. Using the NPVRR results shown in the Table below, linear interpolation was used to determine the change in $CO_2$ restrictions necessary for CAAD NPVRR to become lower than the Preferred Plan CAAB NPVRR. As $CO_2$ costs increase from the Mid scenario towards the High scenario, CAAD becomes the lower cost plan. From these results, $CO_2$ costs need to move 72% of the distance towards the High $CO_2$ cost scenario for CAAD to become the lower cost plan.

**Table 12: CAAB vs. CAAD (Mid Natural Gas, Mid Construction Costs)**

| | $CO_2$ | |
|---|---|---|
| ARP | Mid | High |
| CAAB | 23,073 | 24,080 |
| CAAD | 23,513 | 23,909 |
| % from Mid | | 72% |

## 2.2 Construction Cost Uncertainty Range

Under two Low Construction Cost scenarios, plan AAAB becomes lower cost than the Preferred Plan. Using the NPVRR results shown in the Table below, linear interpolation was used to determine the change in construction costs necessary for AAAB NPVRR to become lower than the Preferred Plan CAAB NPVRR. As construction costs prices decrease from the Mid scenario towards the Low scenario, AAAB becomes the lower cost plan. From these results, construction costs need to move 26% of the distance towards the Low scenario for AAAB to become the lower cost plan.

**Table 13: AAAB vs. CAAB (Mid Natural Gas, Mid $CO_2$ Restriction)**

| | Construction Cost | |
|---|---|---|
| ARP | Mid | Low |
| CAAB | 23,073 | 22,558 |
| AAAB | 23,101 | 22,479 |
| % from Mid | | 26% |

### 2.3 Natural Gas Forecast Uncertainty Range

Given that the natural gas price forecast did not materially change plan rankings, the limits within which the Preferred Plan remains appropriate was not evaluated.

## Section 3: Outcomes of Critical Uncertain Factors[7]

The Company calculated the value of better information for the critical uncertain factors identified in the preliminary sensitivity test that affect the performance of the Preferred Plan. For each uncertainty, the Preferred Plan NPVRR for the specific uncertainty scenarios (or endpoints) was compared to the better plan under each extreme uncertainty condition. Bayes' Theorem was applied to the endpoint probabilities to develop conditional probabilities for the calculation scenarios. The difference between the expected value of the Preferred Plan and the expected value of the plan with better information results is the expected value of better information.

These values represent the maximum amount the company should be willing to spend to study each of these uncertainties. It must be noted that should a Preferred Plan out-perform all alternatives across the range of a critical risk, the calculation for better information will yield a value of zero.

For Evergy Metro, Low $CO_2$ restrictions would cause plan CFAE to become a lower cost plan than the Preferred Plan across all nine of the Low $CO_2$ scenarios modeled. Table 14

[7] 20 CSR 4240-22.070 (3)

below represents the value of better information when evaluating these two plans having that knowledge.

**Table 14: Better Information – Low $CO_2$ Costs**

| Endpoint | NG | $CO_2$ | ConCost | Preferred | Weighting | Cond. Weight | NPVRR ($MM) | Expected Value ($MM) |
|---|---|---|---|---|---|---|---|---|
| **3** | High | Low | High | CAAB | 0.94% | 3.75% | 23,557 | |
| **6** | Mid | Low | High | CAAB | 3.13% | 12.50% | 23,416 | |
| **9** | Low | Low | High | CAAB | 2.19% | 8.75% | 23,336 | |
| **12** | High | Low | Mid | CAAB | 1.88% | 7.50% | 22,903 | |
| **15** | Mid | Low | Mid | CAAB | 6.25% | 25.00% | 22,762 | 22,790 |
| **18** | Low | Low | Mid | CAAB | 4.38% | 17.50% | 22,682 | |
| **21** | High | Low | Low | CAAB | 0.94% | 3.75% | 22,388 | |
| **24** | Mid | Low | Low | CAAB | 3.13% | 12.50% | 22,247 | |
| **27** | Low | Low | Low | CAAB | 2.19% | 8.75% | 22,167 | |
| **Endpoint** | **NG** | **$CO_2$** | **ConCost** | **Better** | **Weighting** | **Cond. Weight** | **NPVRR ($MM)** | **Expected Value ($MM)** |
| **3** | High | Low | High | CFAE | 0.94% | 3.75% | 22,292 | |
| **6** | Mid | Low | High | CFAE | 3.13% | 12.50% | 22,184 | |
| **9** | Low | Low | High | CFAE | 2.19% | 8.75% | 22,129 | |
| **12** | High | Low | Mid | CFAE | 1.88% | 7.50% | 22,089 | |
| **15** | Mid | Low | Mid | CFAE | 6.25% | 25.00% | 21,981 | 21,980 |
| **18** | Low | Low | Mid | CFAE | 4.38% | 17.50% | 21,926 | |
| **21** | High | Low | Low | CFAE | 0.94% | 3.75% | 21,895 | |
| **24** | Mid | Low | Low | CFAE | 3.13% | 12.50% | 21,787 | |
| **27** | Low | Low | Low | CFAE | 2.19% | 8.75% | 21,732 | |
| Expected Value of Better Information **($MM)** | | | | | | | | 810 |

For Evergy Metro, Low Construction Costs would cause plan AAAB to become a lower cost plan than the Preferred Plan across some of the Low Construction cost scenarios modeled. The information below represents the value of better information when evaluating these two plans having that knowledge.

**Table 15: Better Information – Low Construction Costs**

| Endpoint | NG | $CO_2$ | ConCost | Preferred | Weighting | Cond. Weight | NPVRR ($MM) | Expected Value ($MM) |
|---|---|---|---|---|---|---|---|---|
| **19** | High | High | Low | CAAB | 0.56% | 2.25% | 23,872 | |
| **20** | High | Mid | Low | CAAB | 2.25% | 9.00% | 22,989 | |
| **21** | High | Low | Low | CAAB | 0.94% | 3.75% | 22,388 | |
| **22** | Mid | High | Low | CAAB | 1.88% | 7.50% | 23,022 | |
| **23** | Mid | Mid | Low | CAAB | 7.50% | 30.00% | 22,558 | 22,553 |
| **24** | Mid | Low | Low | CAAB | 3.13% | 12.50% | 22,247 | |
| **25** | Low | High | Low | CAAB | 1.31% | 5.25% | 22,716 | |
| **26** | Low | Mid | Low | CAAB | 5.25% | 21.00% | 22,382 | |
| **27** | Low | Low | Low | CAAB | 2.19% | 8.75% | 22,167 | |
| **Endpoint** | **NG** | **$CO_2$** | **ConCost** | **Better** | **Weighting** | **Cond. Weight** | **NPVRR ($MM)** | **Expected Value ($MM)** |
| **19** | High | High | Low | AAAB | 0.56% | 2.25% | 23,965 | |
| **20** | High | Mid | Low | AAAB | 2.25% | 9.00% | 22,854 | |
| **21** | High | Low | Low | AAAB | 0.94% | 3.75% | 22,293 | |
| **22** | Mid | High | Low | AAAB | 1.88% | 7.50% | 23,259 | |
| **23** | Mid | Mid | Low | AAAB | 7.50% | 30.00% | 22,479 | 22,519 |
| **24** | Mid | Low | Low | AAAB | 3.13% | 12.50% | 22,174 | |
| **25** | Low | High | Low | AAAB | 1.31% | 5.25% | 23,006 | |
| **26** | Low | Mid | Low | AAAB | 5.25% | 21.00% | 22,310 | |
| **27** | Low | Low | Low | AAAB | 2.19% | 8.75% | 22,100 | |
| Expected Value of Better Information **($MM)** | | | | | | | | 35 |

## Section 4: Contingency Resource Plans[8]

Evergy Metro developed a number of ARPs to address specific planning contingencies. As shown in the critical uncertain factor analysis above, future emissions restrictions have a relatively significant effect on the economics of resource plans. The plan CAAD was developed as the optimal plan with High $CO_2$ restrictions and High Natural Gas prices, and it was also identified as the optimal plan for potential future GHG rule compliance. The plans CFAE and CAAE were developed for Low (No) $CO_2$ restrictions and Low Natural Gas prices.

[8] 20 CSR 4240-22.070 (4); 20 CSR 4240-22.070 (4)(A); 20 CSR 4240-22.070 (7)(C)

Contingency plans were also developed for execution risk of near-term solar (CAAC), and for high load growth (CAAF) and low load growth (CAAG). These plans were also developed through capacity expansion to determine the optimal resource additions given the contingencies assessed.[9] All ARPs are described in more detail in Volume 6.

The contingency plans meet the considerations of Rule 240.22.010(2) as they are Alternative Resource Plans developed and conformed in the response to Rule 4240-22.060(3) in Volume 6 of this filing.

As for concurrence with Rule 240.070(1), the plans conform by meeting Rule 240.010(2). The plans utilize DSM that conforms to legal mandates and each of the Evergy Metro plans modeled indicated no unserved energy in production cost modeling analysis. The plans comply with all current and proposed SPP Resource Adequacy Requirements which are designed to maintain loss-of-load expectation (i.e., the expectation of unserved energy) of less than one day in ten years, with a probabilistic consideration of extreme weather included in this analysis. Additional analysis of extreme weather is provided in response to a Special Contemporary Issue in Volume 8.[10]

## Section 5: Load–Building Programs[11]

Evergy Missouri Metro does not currently have or plan to propose any load-building programs.

[9] 20 CSR 4240-22.70(4)(B)
[10] 20 CSR 4240-22.070(4)(C)
[11] 20 CSR 4240-22.070 (5); 20 CSR 4240-22.070 (5)(A); 20 CSR 4240-22.070 (5)(A)(1); 20 CSR 4240-22.070 (5)(A)(2); 20 CSR 4240-22.070 (5)(A)(3); 20 CSR 4240-22.070 (5)(A)(4); 20 CSR 4240-22.070 (5)(A)(5); 20 CSR 4240-22.070 (5)(B); 20 CSR 4240-22.070 (5)(B)(1); 20 CSR 4240-22.070 (5)(B)(2)

# Section 6: Implementation Plan[12]

## 6.1 Load Analysis - Schedule and Description[13]

Evergy 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 also plans to look at developing a new TOU residential load shape.

## 6.2 Demand-Side Programs – Schedule and Description[14]

The current schedules for ongoing and planned DSM programs studied in the 2023 Evergy DSM Market Potential Study are shown in Table 16 and Table 17 below:

[12] 20 CSR 4240-22.070 (6); 20 CSR 4240-22.070 (7)(B)
[13] 20 CSR 4240-22.070 (6)(A)
[14] 20 CSR 4240-22.070 (6)(B)

## Table 16: 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 | 5-Years | 1-Yr following Plan Year |
| Heating, Cooling & Home Comfort | Energy Efficiency | Residential | Jan., 2020 | 90-days following Plan Year | 5-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 |
| Income-Eligible Single Family | Energy Efficiency | Residential | Jan., 2023 | 90-days following Plan Year | 2-Years | 1-Yr following Plan Year |
| Urban Heat Island | Energy Efficiency | Residential & C&I | Jan., 2024 | 90-days following Plan Year | 1-Year | 1-Yr following Plan Year |
| Research & Pilots | Energy Efficiency & Demand Response | Residential & C&I | Jan., 2020 | 90-days following Plan Year | 5-Years | 1-Yr following Plan Year |
| PAYS | Energy Efficiency | Residential | Sep., 2021 | 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 | 5-Years | 1-Yr following Plan Year |
| Business Standard | Energy Efficiency | C&I | Jan., 2020 | 90-days following Plan Year | 5-Years | 1-Yr following Plan Year |
| Business Custom | Energy Efficiency | C&I | Jan., 2020 | 90-days following Plan Year | 5-Years | 1-Yr following Plan Year |
| Business Demand Response | Demand Response | C&I | Jan., 2020 | 90-days following Plan Year | 5-Years | 1-Yr following Plan Year |

## Table 17: DSM Program Schedule – Planned Programs

| Program Name | Program Type | Segment | Projected Tariff Filing Date | Projected Approval Date | Projected Implementation Date | Annual Report |
|---|---|---|---|---|---|---|
| Energy Savings Products | Energy Efficiency | Residential | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| Heating, Cooling & Weatherization | Energy Efficiency | Residential | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| IEMF | Energy Efficiency | Residential | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| IESF | Energy Efficiency | Residential | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| Research & Pilot | Energy Efficiency & Demand Response | Residential & C&I | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| New Construction | Energy Efficiency | Residential | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| Connected Thermostats DLC | Demand Response | Residential | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| Time-of-Use (TOU) Rate | Demand Response Rate | Residential | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| Electric Vehicle (EV) TOU Rate | Demand Response Rate | Residential | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| Business Standard | Energy Efficiency | C&I | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| Business Custom | Energy Efficiency | C&I | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| Business Energy Education | Energy Efficiency | C&I | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| Firm Curtailment/Tariff | Demand Response | C&I | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| Connected Thermostats DLC | Demand Response | C&I | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| Critical Peak Pricing (CPP) Rate | Demand Response Rate | C&I | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |
| Time-Related Pricing (TRP) Rate | Demand Response Rate | C&I | Q2,2024 | July, 2024 | January, 2025 | 90-days following Plan Year |

Additional detail regarding the implementation plan for the DSM Preferred Plan can be found in Volume 5. It includes the descriptions of the programs, the implementation

strategy, a discussion of risk management, the incentive levels used for planning purposes, energy and peak demand savings goals, and budget estimates.

## 6.3 Supply-Side – Schedules and Descriptions[15]

The preferred plan for the next three years for Evergy Metro includes the RAP Plus demand-side management portfolio with additions of 300 MW of solar in 2027 and 150 MW of solar in 2028.

### *6.3.1 Solar Additions*

The Preferred Plan includes acquiring approximately 300 MW of company-owned solar generation, with all projects reaching commercial operation by December 31, 2026. The approximately 300 MW project(s) would be allocated to Evergy Metro. It is anticipated that one or more projects brought out of the 2023 All-Source RFP will be pursued for a CCN later this year. A draft schedule of major milestones expected to be undertaken for the construction of a large-scale solar project(s) is provided in Table 18 below.

**Table 18: Solar Project Milestone Schedule**

| Milestone Description | Expected Completion |
|---|---|
| Site Control Complete | July 2023 |
| Major Commercial Agreements Complete | First half of 2024 |
| Environmental and Land Permitting Complete | First half of 2025 |
| Regulatory Approvals | First half of 2025 |
| Detailed Design and Engineering | End of 2025 |
| Equipment Acquisition and Delivery | January 2026 |
| Construction Complete | October 2026 |
| Testing and Commissioning | November 2026 |
| Commercial Operation | End of 2026 |

There are also environmental retrofit projects continuing, expected to be continued, or initiated during the three-year implementation period. Table 19 below provides estimated dates for major projects currently expected.

[15] 20 CSR 4240-22.070 (6)(C)

**Table 19: Environmental Retrofit Project Schedule**

| Retrofit Project Description | Expected Timeline |
|---|---|
| Iatan 1 – Landfill Phase 2B Cover | 2024 |
| Iatan 1 – Landfill Phase 3 Cover | 2027- 2028 |
| Iatan 1 – Ash Pond Closure | Complete |
| Iatan 1 – 316(b) Intake Modifications | 2024 – 2026 |
| Iatan 2 – Landfill Phase 2B Cover | 2024 |
| Iatan 2 – Landfill Phase 3 Cover | 2027 – 2028 |
| Hawthorn 9 – 316(b) Intake Study and Modification | 2028 |
| LaCygne 1 – CCR Upper Impoundment Closures | 2024 – 2028 |
| LaCygne 1 – CCR Landfill Construction | 2024 – 2027 |
| LaCygne 1 – CCR Landfill Cover | 2024 – 2028 |
| LaCygne 1 – CCR Lower Impoundment Closures | 2027 - 2028 |
| LaCygne 2 – CCR Upper Impoundment Closures | 2024 – 2028 |
| LaCygne 2 – CCR Landfill Construction | 2024 – 2027 |
| LaCygne 2 – CCR Landfill Cover | 2024 – 2028 |
| LaCygne 2 – CCR Lower Impoundment Closures | 2027 - 2028 |

## 6.4 Critical Paths and Milestones[16]

Demand-side critical paths and milestones are provided in Section 6.2 above. Supply-side critical paths and milestones, including resource expenditures for the environmental projects listed in Table 19, are provided in Section 6.3 above.

## 6.5 Competitive Procurement Policies[17]

In August 2022 Evergy issued an RFP for capacity and energy. The RFP document is attached as Appendix 7A. Evergy utilized the North American Energy Markets Association

[16] 20 CSR 4240-22.070 (6)(D)
[17] 20 CSR 4240-22.070 (6)(E)

(NAEMA) for distribution of the RFP, with the collection and analysis of respondent submittals being performed by Evergy.

As referred to previously, Evergy also issued an RFP in February 2023. The RFP document is attached as Appendix 7B. Evergy retained 1898 & Co. to oversee distribution of the RFP and to collect and analyze respondent submittals.

## 6.6 Monitoring Critical Uncertain Factors[18]

Each critical uncertain factor is reviewed on an individual basis due to the varied nature of the information sources used in its review. This IRP analysis will be updated on an annual basis reflecting any changes to these critical uncertain factors. Results will be distributed to the Operations Leadership Team.

### *6.6.1 Critical Uncertain Factor: $CO_2$*

The passage of the Inflation Reduction Act and the EPA publishing several more stringent draft rules for fossil plants have demonstrated it is more likely that carbon reductions will be realized through a mix of renewable incentives (e.g., Production Tax Credits), carbon emission caps, and other stringent emission restrictions on fossil plants which drive the need for new retrofits. As a result of these changes, Evergy moved away from exclusively using a carbon tax (which was used in historical IRPs, including the 2022 Annual Update) to utilize carbon restriction scenarios instead, which are aligned with carbon restriction scenarios developed through the SPP economic model development process. As a result of this change, a higher level of carbon restrictions actually drives down average SPP energy market prices (as renewables are built out aggressively based on incentives and the need for carbon-free energy) and drives up fixed costs as fossil plants must be retrofitted or replaced with other non-emitting resources. As opposed to a carbon tax, which is a variable cost that impacts a resource's market offer cost, these fixed costs are not recoverable in the SPP energy market and thus do not drive-up energy prices. It is possible that ultimately a $CO_2$ tax may become the more likely scenario again, thus

[18] 20 CSR 4240-22.070 (6)(F)

Evergy continues to monitor policy developments to determine whether an adjustment is necessary, but for this IRP, an "incentives plus restrictions" approach is more representative of Evergy's expectations for the future. In parallel with Evergy's ongoing monitoring of environmental policy, SPP and its members will also continue to make changes to modeling assumptions related to carbon restrictions in future Integrated Transmission Planning processes and Evergy will be actively engaged in these discussions.

### *6.6.2 Critical Uncertain Factor: Load*

Load forecasts are updated on an annual basis as part of the company's annual budgeting and IRP process. In addition, updated forecasts for economics, end-use efficiency and saturations, electrification and distributed energy resources are incorporated into these load forecasts whenever they become available.

### *6.6.3 Critical Uncertain Factor: Natural Gas*

Natural Gas forecasts are updated weekly with executive updates provided monthly.

### *6.6.4 Critical Uncertain Factor: Construction Costs*

Expectations for future construction and interconnection are reviewed at least annually based on the latest publicly available cost information as well as up-to-date information from Evergy's ongoing construction efforts related to the implementation of its Preferred Resource Plans. Construction and interconnection costs related to specific projects are also monitored on an ongoing basis throughout project development.

## 6.7 Maintaining Flexibility – Other Sources of Uncertainty

The primary goals in selecting a Preferred Plan are to evaluate whether near-term actions are robust across various future market scenarios and to maintain as much flexibility as possible to adjust to changing market conditions in the medium- and long-term horizon. The planning environment has continued to evolve and become more dynamic – creating an increased value for maintaining flexibility. Some of the additional sources of uncertainty related to Evergy Metro's resource plans (beyond the critical uncertain factors already

described) are described below, as well as a discussion of how this uncertainty has been and will be factored into planning processes and resource planning decision-making.

### *6.7.1 Commodity Prices*

As expected, the dramatic increase in natural gas prices seen in late 2021 and 2022 has subsided and natural gas prices have now returned to levels seen in 2020 and prior. The experience of those elevated prices, however, demonstrated the value of considering a wide range of potential price scenarios in resource planning analysis given the large amount of uncertainty inherent in forecasting commodity prices. To that end, Evergy utilizes a range of natural gas price forecasts, created based on both publicly available and proprietary third-party forecasts. The Preferred Plan has been tested across this range of potential commodity price futures, as described in the Integrated Risk Analysis section.

### *6.7.2 Renewable Resource Construction Costs*

Driven by tight supply chains, increasing incentives for "onshoring" of manufacturing, and increased demand driven by the Inflation Reduction Act, there has been an increase in the construction cost for new renewable generation. Evergy has incorporated this increase into the cost assumptions utilized for this IRP based on the results of its early 2023 All-Source Request for Proposal (RFP). Based on these near-term prices for renewable projects, a third-party cost curve is then used to forecast future cost reductions and to create a long-term forecast for renewable resource costs. These increased costs, combined with the delayed availability of solar projects based on the RFP, have, based on capacity expansion modeling results explained in the Integrated Risk Analysis section, resulted in less renewable additions during the first few years of the Preferred Plan. Consistent with Evergy's methodology of treating construction costs as a critical uncertain factor for all resources, renewables projects were studied with a plus and minus twenty-five percent range around the mid-level estimates. This allows Evergy to study plan costs based on a range of renewables construction cost environments.

### *6.7.3 SPP Interconnection Queue*

The SPP Interconnection Queue continues to be backlogged, although SPP is making significant progress in addressing this issue and redesigning its processes to mitigate the risk of future backlogs. In addition, there is continued uncertainty around upgrade costs which will be assigned to specific projects once they complete the interconnection study process, which can create cost uncertainty depending on the maturity of individual projects. Evergy believes that the ratable approach to renewables included in this Preferred Plan allow it to better manage this risk and make adjustments as needed but will continue to monitor SPP's efforts to mitigate the existing backlog and determine cost allocation methods which will effectively share costs between renewable interconnection customers and the rest of the Pool, as appropriate. Evergy is closely monitoring SPP's development of the Consolidated Planning Process, the Capacity Resource Interconnection Service product, and the Joint Targeted Interconnection Queue, which all should serve to provide improved schedule and upgrade cost certainty for future resource additions. In addition, Evergy Metro has explicitly factored interconnection cost uncertainty into the 2024 IRP through the construction / interconnection cost uncertain factor.

### *6.7.4 Distributed Energy Resources (DERs)*

While Evergy has not yet seen significant penetration of distributed energy resources to the point that it impacts our long-term plan, the continued expansion of electrification, DER aggregation driven by FERC Order 2222, and other policy changes which could influence DER adoption will all continue to be monitored and factored into Evergy's long-term plans as needed. This uncertainty is implicitly considered in the range of load forecasts assessed through contingency plans in this IRP because behind-the-meter generation and electrification can either reduce or increase the Company's need for resources, respectively.

### *6.7.5 Electrification*

Across Evergy's system, the potential for broad electrification (e.g., vehicles, space / water heating) will continue to be an uncertainty in the development of load forecasts and

long-term plans. Evergy incorporates forecasts for electric vehicle adoption into its load forecasts used in IRP planning and these forecasts are updated regularly. Evergy also performed a broader electrification potential study for the 2021 Triennial IRP which was included as the "high" case in this 2024 IRP as well. Going forward, Evergy will continue to monitor actual electrification activity in its service territory and update load forecasts for IRP filings. This monitoring and forecasting activity will also be informed by the availability of programs and technology which can mitigate the impact of electrification on peak demand (and thus Evergy's capacity requirements).

### *6.7.6 Economic Development*

Evergy continues to see robust economic development activity with large new customer loads evaluating locating in the service territory. Given the magnitude of potential new loads, they represent an uncertainty which is monitored continuously and incorporated into Evergy's load forecasts as they come to fruition. In the 2024 IRP, Evergy has incorporated announced economic development projects – specifically focused on large projects greater than 100 MW – into its load forecasts for planning purposes for each of its utilities. Specific to Metro, the load associated with the announced Google data center has been incorporated into the low, mid, and high load forecasts. The current Metro pipeline for potential economic development which could be online by 2026 or 2027 is significantly larger than this single project, but planning to serve the full economic development pipeline could result in procuring / building capacity for a level of load which may not ultimately materialize. As a result, the full pipeline of potential new customers is not included in the load forecast. However, it is critical to ensure sufficient capacity is being built for customers who have announced their intent to locate in Evergy's service territory and who are farther along in the project development process. In parallel, the "high" load forecast incorporated as a contingency plan in this IRP provides a sensitivity on how additional load growth and/or additional changes in resource adequacy requirements could change Metro's resource plan if they materialized.

### *6.7.7 Reliability and Resource Adequacy*

As discussed, and agreed with parties following the 2021 IRP, Evergy has incorporated more detailed reliability risk analysis into this IRP in response to a Special Contemporary Issue. Beyond this specific analysis, there also continues to be significant uncertainty regarding SPP's resource adequacy requirements and, ultimately, how reliability risk should be evaluated and incorporated into planning processes – not just for Evergy or for SPP, but for the entire electric utility industry. Following Winter Storm Uri in 2021, SPP, other Regional Transmission Organizations (RTOs), NERC, and FERC have all initiated efforts to promote changes in resource adequacy processes and requirements so they can be better tailored to a low-carbon resource mix given an increasing dependence of customers on electricity as the economy continues to electrify. It is still uncertain what the ultimate impact of these efforts will be in terms of new Standards and Requirements, but some of the potential impacts are described below. Given the significant amount of uncertainty in these areas and the potential for significant impacts to Evergy's resource planning, Evergy is participating actively in both SPP and NERC activities related to these topics. Many of these items, and how they are incorporated into this IRP, are described in detail Volume 4, Section 1.5. They are also summarized at a high-level below.

**Multi-Season Adequacy**

Across the US, RTOs are modifying their resource adequacy constructs to change how they evaluate adequacy in, at the very least, the summer and winter seasons and, in many cases, all four seasons. Evergy has historically focused on planning for the summer season given our status as a summer-peaking utility. However, as SPP's requirements change, Evergy's planning processes also need to change. SPP has proposed two-season (winter and summer) performance-based accreditation (discussed below) and is also in the process of developing a planning reserve margin specific to the winter season (in addition to the summer reserve margin). SPP is currently expecting to implement an interim winter resource adequacy requirement for the 2025/2026 winter season (based on applying the summer reserve margin to winter load), with the implementation of a standalone winter requirement in the following winter. It is still uncertain how this requirement will be implemented, thus Evergy continues to participate actively in SPP

policy development. However, as described in Volume 4 and below, Evergy has incorporated the current expected impact of winter resource adequacy requirements in modeling for this 2024 Triennial.

**Resource Accreditation**

In 2023, FERC rejected SPP's proposal to implement the Effective Load Carrying Capability (ELCC) methodology for renewable accreditation, which would reduce the capacity credit given to renewable resources. ELCC remains the industry standard for renewable accreditation and FERC's stated rationale for rejecting the proposal was based largely on the discrepancy between accreditation approaches for renewable and thermal generators. In response to this feedback, SPP has filed a new request with FERC to implement ELCC and Performance-Based Accreditation for thermal generators at the same time in 2026. This parallel implementation creates significant uncertainty around capacity accreditation which will be received beginning in 2026 given these two methodologies are more "black box" and they create variability in the credit a resource will receive from season to season and year to year. To factor in this risk and uncertainty, capacity expansion modeling in the 2024 IRP allowed a lower level of market capacity purchases for each jurisdiction beginning in 2026. This reflects the expectation that excess capacity available in SPP will decline and other Load-Responsible Entities (LRE) will be less willing to sell their excess in order to manage their own resource adequacy risk. In addition, the expected impact of these accreditation methodologies was incorporated into the integrated analysis performed in the 2024 IRP as described in Volume 4.

**Fuel Supply Requirements**

Given challenges with natural gas supply during Winter Storm Uri and similar extreme winter events, many RTOs and NERC are evaluating how the firmness of fuel supply should be considered in determining a resource's contribution to meeting Adequacy requirements. Changes in this area could potentially materialize in the form of on-site fuel or firm transport requirements for individual generators or minimum reliability attributes at the overall RTO level in terms of on-site fuel availability. SPP continues to evaluate this

requirement in the context of other Resource Adequacy Requirement changes (particularly for the winter). The current expectation is that fuel security will be assessed through resource accreditation (described above) as opposed to a standalone requirement. As a result, no specific requirement is currently included in IRP modeling.

**Reserve Margin**

Soon after the 2022 Annual Update was filed, SPP increased the Planning Reserve Margin (i.e., the amount of accredited capacity that an LRE must maintain in excess of its load) from 12% to 15% beginning with the summer 2023 season. SPP has also indicated that they expect future increases to the Reserve Margin as the resource mix continues to become more intermittent and we see more extreme weather. At this time, it is uncertain when the next increase will be implemented, but it's possible it could be as soon as 2025 or 2026 summer. Based on SPP's preliminary evaluations of potential winter Resource Adequacy Requirements, it is also likely that the winter Reserve Margin will be much higher than the summer Reserve Margin. SPP has also indicated that the expected reserve margins will continue increasing in the future (beyond the 2025/2026 increase). As a result, Evergy has incorporated a slowly increasing reserve margin for both winter and summer in its integrated analysis for the 2024 IRP as described in Volume 4.

**Energy Adequacy (As Opposed to Capacity Adequacy)**

A relatively new concept in this space is the distinction being made between "energy adequacy" and the more traditional view of "resource adequacy" or "capacity adequacy", with the more traditional view being focused on maintaining sufficient capacity to meet peak hour requirements, plus a level of reserves to mitigate risk (with risk being driven by load uncertainty and resource performance, generally). A key focus of NERC over the last couple of years has been on exploring additional / modified Reliability Standards which expand that traditional focus to a broader view of "Energy Adequacy" which takes into account all hours – not just peaks – and incorporates a greater range of uncertainties given the quickly-changing resource mix (both supply- and demand-side resources). NERC has established Standard Drafting Teams to develop new Reliability Standards which will require the performance of Energy Assessments. It is uncertain how these

potential Standards will ultimately impact SPP analysis and requirements, but Evergy continues to monitor them closely. Given the loss of load expectation modeling which SPP performs to establish reserve margin requirements already assesses reliability risks in all hours (8,760 hours) and not just peaks, it is most likely that SPP will begin supplementing loss of load expectation metrics with expected unserved energy (EUE) metrics. The addition of EUE allows the duration and magnitude of loss-of-load events to be assessed in addition to just the frequency (which is assessed through LOLE). An example of the use of EUE is included in the reliability analysis in Volume 8.

The items described above are considered in ongoing updates to Evergy's IRP on either an annual or triennial basis (depending on the pace of change).

## 6.8 Monitoring Preferred Resource Plan[19]

### *6.8.1 DSM Initiatives*

Evergy Metro has processes in place to monitor its Demand-Side Management programs and track and report their performance compared to the planned implementation schedule.

### *6.8.2 Solar Initiative*

The implementation activities related to supply-side resource additions are described in Section 6.3. These activities are monitored on an ongoing basis by the Development team with specifically assigned Project Managers for each project to monitor schedule and budget. Any deviations and corresponding mitigations are first reported to / reviewed by the Vice President of Development and then the Chief Financial Officer and other Officers as needed.

[19] 20 CSR 4240-22.070 (6)(G)

# Section 7: Resource Acquisition Strategy[20]

## 7.1 Resource Acquisition Strategy Approval

The following statement is the formal approval by officers of Evergy Metro committing Evergy Metro to the course of action described in the resource acquisition strategy.

**Figure 1: Corporate Approval and Statement of Commitment for Resource Acquisition Strategy**

**Evergy Metro, Inc.**

**Integrated Resource Plan – 2024 Triennial Filing**

**Corporate Approval and Statement of Commitment for Resource Acquisition Strategy**

In accordance with Missouri Public Service Commission Rules found in 20 CSR 4240-22, Evergy Metro now officially adopts for implementation and the resource acquisition strategy contained in this Triennial filing.[1] Additionally, the preferred resource plan is consistent with Evergy Missouri Metro's business plan.[2]

With the objective of providing the public with energy services that are safe, reliable, and efficient at just and reasonable rates, Evergy Metro is committed to the full implementation of the Resource Acquisition Strategy contained herein.

DocuSigned by:
Jason Humphrey
0D22279D46074DA...
Jason Humphrey
Vice President Development

DocuSigned by:
David Campbell
27885EE5230D4DE...
David Campbell
President and Chief Executive Officer

[1] 20 CSR 4240-22.080 (1)(A)
[2] 20 CSR 4240-22.080 (1)(B)

[20] 20 CSR 4240-22.070 (7)

# Section 8: Evaluation of Demand-side Programs and Demand-Side Rates[21]

Evergy Missouri Metro will engage an EM&V contractor(s) to conduct process and impact evaluations of the DSM programs and demand-side rates that are approved by the Commission. The EM&V Contractor will meet with Evergy program staff to discuss evaluation objectives, establish a schedule of deliverables and set up a communications protocol. The EM&V Contractor will develop a high-level timeline of evaluation activities and reporting.

## 8.1 EM&V Process Evaluation

The scope of work will require that the Vendor conduct a process evaluation pursuant to requirements of 20 CSR 4240-22.070 (8) (A) and require the Vendor to provide answers to questions 1 through 5 of this rule sections in the EM&V final report ("Report").

## 8.2 EM&V Impact Evaluation

The scope of work will require that the Vendor conduct the impact evaluation pursuant to requirements of 20 CSR 4240-22.070 (8) (B) and require the Vendor to provide answers to questions 1 and 2 of this rule section in the Report.

## 8.3 EM&V Data Collection

The scope of work will require that the Vendor collect EM&V participation rate data, utility cost data, participant cost data and total cost data pursuant to requirements of 20 CSR 4240-22.070 (8) (C).

[21] 20 CSR 4240-22.070 (8); 20 CSR 4240-22.070 (8)(A); 20 CSR 4240-22.070 (8)(A)(1); 20 CSR 4240-22.070 (8)(A)(2); 20 CSR 4240-22.070 (8)(A)(3); 20 CSR 4240-22.070 (8)(A)(4); 20 CSR 4240-22.070 (8)(A)(5); 20 CSR 4240-22.070 (8)(B); 20 CSR 4240-22.070 (8)(B)(1); 20 CSR 4240-22.070 (8)(B)(1)(A); 20 CSR 4240-22.070 (8)(B)(1)(B); 20 CSR 4240-22.070 (8)(B)(2); 20 CSR 4240-22.070 (8)(B)(2)(A); 20 CSR 4240-22.070 (8)(B)(2)(B); 20 CSR 4240-22.070 (8)(C)

### 8.4 EM&V Reporting Requirements

The scope of work will also require that the Vendor perform, and report EM&V of each commission-approved demand-side program in accordance with 20 CSR 4240-3.163 (7). Evergy Missouri Metro will provide the Missouri Public Service Commission ("Commission") Staff and other stakeholders with an opportunity to review and comment on the EM&V scope of work.

An EM&V for all demand-side programs and demand-side rates that are included in Evergy Missouri Metro's Preferred Plan will begin after the completion of each program year.

The EM&V scope of work will require the vendor to evaluate and prepare an annual program performance report. Preliminary EM&V reports will be available 90 days following the program year. Commission Staff and stakeholders will be provided with an opportunity to review, and comment on the preliminary report. The final EM&V report will be available 180 days following the completion of each program year.

### 8.5 EM&V Schedule and Budget

The EM&V budget shall not exceed five percent (5%) of the total budget for all approved demand-side program costs. A tentative EM&V schedule is shown in Table 20 below. This schedule will be updated if/as needed for each program year under MEEIA 3.

**Table 20: Evaluation Schedule[i]**

| Estimated EM&V Schedule - MEEIA 3 | |
|---|---|
| 1st Annual EM&V Begins | Day 1 of PY 1 |
| 1st Annual Draft Report | 90 days after the end of PY 1 |
| 1st Annual Program Report | 180 days after the end of PY 1 |
| 2nd Annual EM&V Begins | Day 1 of PY 2 |
| 2nd Annual Draft Report | 90 days after the end of PY 2 |
| 2nd Annual Program Report | 180 days after the end of PY 2 |
| 3rd Annual EM&V Begins | Day 1 of PY 3 |
| 3rd Annual Draft Report | 90 days after the end of PY 3 |
| 3rd Annual Program Report | 180 days after the end of PY 3 |
| 4th Annual EM&V Begins | Day 1 of PY 4 |
| 4th Annual Draft Report | 120 days after the end of PY 4 |
| 4th Annual Program Report | 210 days after the end of PY 4 |
| 5th Annual EM&V Begins | Day 1 of PY 5 |
| 5th Annual Draft Report | 90 days after the end of PY 5 |
| 5th Annual Program Report | 180 days after the end of PY 5 |

[i] Dates are estimated based on a December 2019 Commission approval of MEEIA 3 programs, and the approval of updated EM&V Plans in February 2021.