



# **REGIONAL ALLOCATION REVIEW TASK FORCE**

Approved on February 5, 2024

RCAR III Lessons Learned Report

# TABLE OF CONTENTS

- EXECUTIVE SUMMARY ..... 3
- SECTION 1: OVERVIEW OF LESSONS LEARNED PROCESS ..... 4
  - 1.1 BACKGROUND – THE RARTF REPORT AND RCAR I & II..... 4
  - 1.2 RCAR I APPROVED LESSONS LEARNED ..... 4
  - 1.3 RCAR II APPROVED LESSONS LEARNED ..... 7
- SECTION 2: RCAR III LESSONS LEARNED AND RECOMMENDATIONS ..... 10
  - 2.1 RECONFIRMATION AND EXTENSION OF RCAR I & II LESSONS LEARNED ITEMS..... 10
  - 2.2 RCAR III LESSONS LEARNED ITEMS ..... 10
- APPENDIX 1: OBSERVATIONS FROM RCAR III..... 13
- APPENDIX 2: HYBRID APPROACH FOR FUTURE RCAR STUDIES..... 16
- APPENDIX 3: RCAR 3.1 ANALYSIS AND RESULTS ..... 21

# EXECUTIVE SUMMARY

This Report contains the “lessons learned” from Southwest Power Pool’s (SPP) third iteration of the Regional Cost Allocation Review (RCAR III) that was performed in accordance with the Regional Allocation Review Task Force (RARTF) Report as prescribed in Attachment J, Section III.D of SPP’s Open Access Transmission Tariff (OATT).

The “lessons learned” contained in this Report were adopted unanimously by the RARTF on 12/01/2023<sup>1</sup> after having received and reviewed stakeholder comments and suggestions at the conclusion of the RCAR III assessment.

The concept of this Report was first raised in the 2012 RARTF Report and was further detailed in the RCAR I, RCAR II, and RCAR III Reports endorsed by SPP stakeholders in 2013, 2016, and 2022, respectively. The purpose of this Report is to evaluate “lessons learned” from the three completed RCAR studies and to make “suggested improvements” to the RCAR process. These recommendations are to be incorporated into future RCAR processes.

After reviewing and considering the comments and suggestions from SPP stakeholders, the RARTF has agreed to reconfirm and continue to utilize those recommendations made at the conclusion of RCAR I and II and to adopt six additional recommendations from RCAR III that are explained in more detail later in this Report. Those new recommendations are:

- RCAR III RECOMMENDATION NO. 1 – Continuation of the Hybrid Methodology
- RCAR III RECOMMENDATION NO. 2 – Develop process to gather updated generation ownership data
- RCAR III RECOMMENDATION NO. 3 – Remove Operating Reserves from RCAR Calculations
- RCAR III RECOMMENDATION NO. 4 – Develop schedule to review interim RCAR results sooner in the 6-year process
- RCAR III RECOMMENDATION NO. 5 – Review approach for some supplemental benefits

---

<sup>1</sup> RCAR III Lessons Learned report approved unanimously on consent agenda by MOPC on January 15, 2024 and approved unanimously by the RSC on February 5, 2024.

- RCAR III RECOMMENDATION NO. 6 – Approve RCAR 3.1 benefit-to-cost ratios to be used for the basis of future RCAR studies

# SECTION 1: OVERVIEW OF LESSONS LEARNED PROCESS

## 1.1 BACKGROUND – THE RARTF REPORT AND RCAR I & II

In January 2012, the RARTF issued its report (RARTF Report), which established the methodology upon which the RCAR analysis would be performed as required under Attachment J.III.D to the SPP OATT. The RARTF Report was approved by the MOPC, the RSC, and the SPP Board of Directors/Members Committee.<sup>2</sup>

Based upon the recommendations contained in the RARTF Report, RCAR I was conducted from 2012 to 2013. RCAR I was finalized by the RARTF on October 8, 2013. Subsequently, the MOPC<sup>3</sup> and RSC<sup>4</sup> voted to accept the RCAR I Report during the October 2013 SPP cycle of stakeholder meetings.<sup>5</sup>

In addition to the results analyzing the reasonableness of the Highway/Byway transmission cost allocation methodology, the RCAR I Report contained three additional recommendations on next steps. The third recommendation was that:

“the RARTF begin a process to evaluate “lessons learned” from SPP’s first RCAR Report and finalize “suggested improvements” to the RCAR process by the January 2014 stakeholder meeting cycle. This recommendation will allow any improvements to be incorporated into the RCAR II process and will be in accord with Section 7.1 of the RARTF Report. At 6.”

## 1.2 RCAR I APPROVED LESSONS LEARNED

At the conclusion of RCAR I in 2013 the RARTF provided an opportunity for stakeholders and SPP staff to submit comments and suggestions regarding the experiences in implementing the initial RCAR analysis. The following are the ten Lessons Learned recommendations approved by the

---

<sup>2</sup> The RCAR I Report was reviewed in the SPP Stakeholder process in October 2013 with the following outcomes; on October 8, 2013, the RARTF “approved the report as modified”; on October 16, 2013, the MOPC “approved as meeting the requirements of the tariff” and on October 28, 2013 the SPP RSC “accepted the report as presented”.

<sup>3</sup> See Agenda Item 17 at page 5 in the MOPC October 15-16, 2013 minutes posted on SPP’s website at: <https://spp.org/documents/21032/mopc%20meeting%20minutes%20&%20attachments%20october%2015-16.%202013.pdf>.

<sup>4</sup> See “RSC Minutes 10/28/13” at page 4; <https://spp.org/documents/21575/rsc102813.pdf>.

<sup>5</sup> The RCAR I Report is posted as the “RCAR Final Report 10/10/13” on the SPP website at: <https://spp.org/documents/37781/rcar%20report%20final%20clean.pdf>.

RARTF in 2013 which were to be used in large part for conducting the second Regional Cost Allocation Review (RCAR II):

RECOMMENDATION NO. 1:

That the principles and the detailed guidance provided to SPP staff in conducting RCAR I were a major success of the SPP stakeholder process with meaningful stakeholder input. Notwithstanding this success, improvements to the RCAR process can be made as SPP staff begins to analyze the Highway/Byway for RCAR II. As a result, the RARTF recommends that the January 2012 RARTF Report continue to be the basis upon which SPP staff conducts the RCAR II analysis with the exception of, or additions to, the recommendation contained in this Lessons Learned Report. The recommendations contained in this Lessons Learned Report should be incorporated and used by SPP staff when conducting the RCAR II assessment of the SPP Highway/Byway.

RECOMMENDATION NO. 2:

That the Economic Studies Working Group (ESWG) continues to review the benefits contained in the Metrics Task Force (MTF) Report that were approved through the SPP stakeholder process in 2012. This review should be established to provide SPP stakeholders the opportunity to offer wide-ranging improvements to the benefits contained in the MTF Report. Any changes or improvements to the benefits shall be presented to the ESWG, RARTF, MOPC, and RSC for recommendation to the BOD for approval by the July 2014 meeting cycle.

RECOMMENDATION NO. 3:

That the ESWG continues to review the benefits contained in the MTF Report that were approved through the SPP stakeholder process in 2012. This review should provide SPP stakeholders the opportunity to suggest which benefits should be included in future RCAR reports. Any changes or improvements to the benefits shall be presented to the ESWG, RARTF, MOPC, and RSC for recommendation to the BOD for approval by the July 2014 meeting cycle.

RECOMMENDATION NO. 4:

That SPP staff continue to work with the SPP Transmission Working Group (TWG) and ESWG to improve models used for RCAR II. This effort should provide SPP stakeholders the opportunity to offer or suggest improvements to models used in future RCAR reports. Any changes or improvements to the models should be vetted by the TWG and ESWG as appropriate. These changes or improvements should also be in alignment with the ten guiding principles contained in the RARTF Report.

#### RECOMMENDATION NO. 5:

That SPP staff utilize, to the maximum extent possible, models used in the Integrated Transmission Plan 10-year planning horizon assessment (ITP10) for RCAR II. Conducting the ITP10 and RCAR II processes in parallel should allow leveraging of models and promote consistency and efficiency in the model vetting process. This measure could reduce cost and help to eliminate redundancy of efforts between SPP staff and stakeholders.

#### RECOMMENDATION NO. 6:

That SPP staff evaluate remedies for zones below the threshold in the Notification to Construct (NTC)-only review for RCAR II.<sup>6</sup>

#### RECOMMENDATION NO. 7:

That SPP staff continue to work with SPP stakeholders to find ways to improve upon calculating Point to Point (PTP) revenue credits for RCAR II. This effort should provide SPP stakeholders the opportunity to suggest improvements to PTP revenue credits calculations for use in future RCAR reports that most closely align with SPP's OATT. Additionally, by updating how PTP revenue credits are projected with up-to-date information, SPP staff will be using "the most up[-]to[-] date and best available information," consistent with Principle 3 contained in the RARTF Report. Any changes or improvements to the PTP projection methodology should be vetted by the RARTF and RTWG as it was handled during the RCAR I Report in an open and transparent manner that will enable the participation of SPP stakeholders.<sup>7</sup>

#### RECOMMENDATION NO. 8:

That the RARTF and SPP stakeholder-approved 0.8 benefit to cost ratio threshold continue to be the basis to determine when it is warranted for members to request and for SPP staff to subsequently study possible remedies as stated in Section 4.1

---

<sup>6</sup> Based on RCAR I Recommendation No. 10 this recommendation should reflect that staff will evaluate remedies for zones below the threshold based on a review of the upgrades that have been approved for construction after June 10, 2010.

<sup>7</sup> Per Lessons Learned Recommendation No. 7, SPP Staff facilitated a stakeholder process to develop revisions of the SPP OATT for the purposes of clarifying and ensuring consistency in the treatment of Point-To-Point (PTP) revenue credits for calculating rates. This set of revisions allows PTP revenue credits to be more consistently applied to transmission owners' revenue requirements and helps in projecting a more reliable method in estimating future PTP revenues in the RCAR analysis. The Tariff revisions were ultimately approved by SPP's Board of Directors and the FERC. See, FERC Docket No. ER16-165.

of the RARTF Report. Additionally, the RARTF recommends that if RCAR II shows that a zone is above the 0.8 threshold, but below a 1.0 benefit to cost ratio, that this analysis should be used and considered as a part of SPP's transmission planning process in the future.<sup>8</sup>

#### RECOMMENDATION NO. 9:

That SPP staff continue to update and brief the RARTF throughout the RCAR II analysis and seek guidance from the RARTF when input from SPP stakeholders is necessary for SPP staff to complete RCAR II.

#### RECOMMENDATION NO. 10:

That SPP make a filing with the Federal Energy Regulatory Commission (FERC) to amend Attachment J, Section III.D.2 to read as follows:

For each review conducted in accordance with Section III.D.1, the Transmission Provider shall determine the cost allocation impacts of the Base Plan Upgrades **approved for construction** with ~~Notifications to Construct~~ issued after June 19, 2010 to each pricing Zone within the SPP Region.

All ten of these recommendations were ultimately approved by the RARTF, MOPC, and RSC<sup>9</sup> and provided to SPP staff to be used in the RCAR II analysis. Recommendation No. 10 was filed with and approved by FERC on December 22, 2014.<sup>10</sup>

## 1.3 RCAR II APPROVED LESSONS LEARNED

At the conclusion of RCAR II in 2016 the RARTF again provided an opportunity for stakeholders and SPP staff to submit comments and suggestions regarding the experiences in implementing the RCAR II analysis. The following are the four Lessons Learned recommendations approved by the RARTF in 2019 which were to be used in large part for conducting the third Regional Cost Allocation Review (RCAR III):

#### RCAR II RECOMMENDATION NO. 1–Use of the hybrid approach for RCAR III

---

<sup>8</sup> In FERC Docket No. EL-19-62, City Utilities of Springfield, Missouri vs. Southwest Power Pool, Inc., FERC denied the Complaint against SPP. The order denying the Complaint contained language that supports the process adopted in developing the original RARTF Report and the subsequent RCAR I and RCAR II Reports. Particularly regarding remedies.

<sup>9</sup>See RARTF approval of RCAR I Lessons Learned items at page 1 of March 31, 2014 minutes; <http://www.spp.org/documents/22238/rartf%20meeting%20minutes%2031%20march%202014%20draftgf.pdf>

<sup>10</sup> SPP Staff facilitated Lessons Learned Recommendation No. 10 through SPP's stakeholder process which was ultimately approved by the SPP Board of Directors and FERC. See, FERC Docket: ER15-307. This filing was approved by FERC on December 22, 2014.

At the conclusion of the RCAR II assessment the RARTF agreed that due to significant technical challenges that were encountered in both the RCAR I and RCAR II assessments,

SPP staff should investigate and propose to the RARTF some alternative methodologies for completing future RCAR assessments. During late 2016 and early 2017 staff developed a few proposals for RARTF consideration. Ultimately, the RARTF agreed to a staff proposal that was similar to the process used in developing the SPP Value of Transmission Report published in 2016. This process involves utilizing the daily market runs from the Integrated Marketplace and then removing the selected Highway/Byway transmission upgrades in a subsequent run to capture the value that the removed transmission provided to the SPP region. Other approved benefit metrics will need to be calculated outside of this process and will be included in the overall RCAR results.<sup>11</sup>

## RCAR II RECOMMENDATION NO. 2–Projects to be reviewed

Attachment J, Section III.D.2 of the OATT requires that:

For each review conducted in accordance with Section III.D.1, the Transmission Provider shall determine the cost allocation impacts of the Base Plan Upgrades approved for construction after June 19, 2010 to each pricing Zone within the SPP Region.

The RARTF recommends that SPP make a filing at the Federal Energy Regulatory Commission (FERC) to modify Attachment J, Section III.D.2 of the OATT to read as follows:

For each review conducted in accordance with Section III.D.1, the Transmission Provider shall determine the cost allocation impacts of ~~the~~ **certain** Base Plan Upgrades approved for construction after June 19, 2010 to each pricing Zone within the SPP Region **as approved in the methodology in Section III.D.4.**

This change is a reflection of the fact that as future RCARs are conducted a higher percentage of projects will actually be in-service whereas RCAR I and RCAR II had a very

---

<sup>11</sup> A more detailed explanation of the hybrid approach recommended and used in RCAR III can be seen Appendix 2.



small to approximately half the projects in-service.<sup>12</sup> The RARTF finds that a future RCAR may not need to study all approved upgrades (i.e., when only a small amount and/or percentage are in-service) if real data for Highway/Byway projects in-service may be a better

measure for future RCARs. This modification to SPP's OATT gives SPP stakeholders the option to review the results from the daily operational market runs and if those results provide adequate certainty that long-term equity is currently being achieved, the RARTF could provide a recommendation to the Markets and Operations Policy Committee (MOPC) and Regional State Committee (RSC) to forgo any further cost allocation analysis for projects not yet in-service at that time.

### RCAR II RECOMMENDATION NO. 3 – Develop schedule for stakeholder review

There were a number of recommendations and suggestions about the overall schedule and time of the RCAR II assessment schedule and time allotted for stakeholder review of assumptions, models, and results of the assessment. SPP staff should work to develop a schedule that allows for additional time for stakeholder review of these important milestones during the review and approval process.

### RCAR II RECOMMENDATION NO. 4 – Miscellaneous recommendations

There were several stakeholder suggestions related to the RCAR II assessment assumptions and process that should be addressed in future assessments. This 'catch-all' recommendation will address these multiple process concerns and be implemented in the next RCAR assessment.

- A. Standard rates and costs for wind energy and gas prices used in the RCAR assessment will be those same rates and costs used in the annual Integrated Transmission Planning (ITP) assessments.
- B. Conduct a rate impact analysis study at the conclusion of an RCAR assessment. This is the analysis originally conducted by the Rate Impact Task Force.
- C. Stakeholder suggestions and comments requested during and after an assessment will be done in Word format rather than Excel as in the past.

---

<sup>12</sup> As of the drafting of the RCAR II Report, 274 of 503 Highway/Byway-funded upgrades subject to the RCAR II review are in service, as compared to 48 of 298 projects in RCAR I. See RCAR II Report on page 27 at <https://spp.org/documents/46235/rcar%20%20report%20final.pdf>.

# SECTION 2: RCAR III LESSONS LEARNED AND RECOMMENDATIONS

## 2.1 RECONFIRMATION AND EXTENSION OF RCAR I & II LESSONS LEARNED ITEMS

The RARTF recommends continued utilization of the applicable lessons learned contained in the 2013 and 2019 RCAR I and II Lesson Learned Reports.

## 2.2 RCAR III LESSONS LEARNED ITEMS

Of the remaining stakeholder suggestions and comments from RCAR III the RARTF agrees that the following items should be addressed prior to the next RCAR assessment.

### RCAR III RECOMMENDATION NO. 1 – Continuation of the Hybrid Methodology

The RARTF recommends that staff use the approved RCAR hybrid methodology approved for use in RCAR III subject to the changes suggested included in this Report. Similar to RCAR III, this option gives the stakeholders the option to only use the operations based approach if approved.

As approved for RCAR III, this hybrid approach there will be an operations based approach that will be used for those upgrades that have been in-service for at least 2 years prior to the beginning of the RCAR analysis and a planning base approach for those projects that have been approved for construction but not yet in-service or have not been in-service for at least 2 years. If both operations and planning based approaches are used, the benefits will be added together to get a complete benefit projection. Actual projected costs will then be used as a divisor to calculate the benefit-to-cost ratio for each transmission pricing zone.

To calculate the operational benefits Staff will utilize daily production market runs measuring the production cost differences with and without the applicable Highway/Byway projects that have been in-service for at least two full years and have not been previously included in an RCAR analysis. Essentially this recommendation recommends that RCAR IV will be approached in the same manner as RCAR III, with the option of using just the operations approach or hybrid except for the improvements specifically addressed in other sections of this Report.

## RCAR III RECOMMENDATION NO. 2 – Develop process to gather updated generation ownership data

RCAR III did not evaluate whether remote resources were fully hedged under SPP congestion hedging process. The generation ownership mapping used in RCAR III was based on transmission planning assumptions not validated specifically for the RCAR study. RCAR III used ownership by pricing zone for the calculation of benefits in the operational results.

For RCAR IV, staff is reviewing multiple options to improve this process including; reviewing firm vs non-firm transmission rights to determine a deliverability factor of these resources and reviewing the benefit calculation methodology.

The RARTF recommends that staff continue to work with stakeholders and analyze options to best resolve how remote resources should be valued for RCAR IV.

## RCAR III RECOMMENDATION NO. 3 – Remove Operating Reserves from RCAR Calculations

In RCAR III, operating reserve products requirements were left in the operational reruns. Operating reserves are cleared to meet the requirement for the whole footprint. This means clearing the operating reserve product was not cleared evenly across the pricing zones and that what was cleared in the case with Highway/Byway upgrades, did not clear with the same resources in the case without Highway/Byway upgrades. This could cause a separation in cost and clearing between the two cases that is not attributed to Highway/Byway facilities.

In order to focus in on the benefit realized by Highway/Byway, the RARTF recommends not including a requirement for Operating Reserves products in RCAR IV<sup>13</sup>

## RCAR III RECOMMENDATION NO. 4 – Develop schedule to review interim RCAR results sooner in the 6-year process

Another concern raised by stakeholders was the amount of time given after the analysis was complete for review and identification of potential issues or concerns. Given that the RCAR cycle is a six-year cycle, the opportunity exists to provide initial results with time to allow stakeholders sufficient review and discussion on the data. The RARTF recommends that staff develop an interim schedule to review operational results on a more frequent basis during the six-year window. RCAR IV processing dates for the operational analysis will be

---

<sup>13</sup> . See explanation in Appendix 3 of this Report for additional details on the analysis conducted for RCAR 3.1 and impacts to the Operating Reserve products.

January 1, 2022 through December 31, 2027 for upgrades that went into service between January 1, 2020, and December 31, 2025. The RARTF recommends staff to develop interim results schedule that includes stakeholder review for RARTF approval.

#### RCAR III RECOMMENDATION NO. 5 – Review approach for some supplemental benefits

There were issues with two of the supplemental benefits calculated during the RCAR III study raised by stakeholders to evaluate. Specifically, the Mandated Reliability and Increased Wheeling Through and Out need to be reviewed. The RARTF recommends that SPP Staff bring recommendations to the RARTF on how to best calculate/allocate these benefits for RCAR IV.

#### RCAR III RECOMMENDATION NO. 6 – Approve RCAR 3.1 benefit-to-cost ratios to be used for the basis of future RCAR studies

SPP staff has continued to engage with interested stakeholders to better understand the concerns raised during and after the RCAR III analysis and find improvements. To the extent possible, staff has addressed those items that have been re-calculated as part of the post-case run analysis. In addition to the Operating Reserves, noted in RCAR III Recommendation #3 above, staff has included the impacts of Uneconomic Commitment Adjustment (UCA) to address the situations where a generating resource was committed but did not recover their costs through market revenues in the RCAR III study.<sup>14</sup>

To address the UCA issue and to better refinement of the RCAR III results SPP staff conducted what has been titled as the RCAR 3.1 analysis. The RCAR 3.1 analysis was important to develop a base for future RCAR studies. As designed, the RCAR hybrid methodology will use the operational benefit results from previous RCAR studies (RCAR III for RCAR IV) as the basis, where future results will be additive. As a reminder, this approach was designed to help alleviate the issues of models not solving due to the large number of Highway/Byway upgrades that get removed from the change case runs.

The RARTF recommends approval of the RCAR 3.1 benefit-to-cost ratios as a supplement to the RCAR III report and that RCAR 3.1 results be incorporated into future RCAR studies.

---

<sup>14</sup> A further explanation of the RCAR 3.1 process and results is included in Appendix 3 of this Report.

# APPENDIX 1: OBSERVATIONS FROM RCAR III

While performing the RCAR III analysis and upon completion, SPP staff had observations that were noteworthy to be included in the final RCAR III Report. These observations are listed below:

**Significant Amount of Transmission Upgrades Evaluated in RCAR III:** Due to the number of upgrades studied in RCAR III, the projects placed in service earlier could have impacted the same area or even the same transmission elements as later projects. The value provided by these later projects is then likely understated or even not captured in RCAR III. This is due to the system being reset as close as possible to the topology as it was before all of the Highway/Byway projects were added. This also resulted in some generation being disconnected if their only connection was to a Highway/Byway element. It is estimated that 21 generation resources were heavily impacted by the removal of the Highway/Byway elements resulting in these resources not being available for commitment in all or nearly all of the intervals that they existed in the model. These resources accounted for approximately 4,000 MWs of capacity in the market cases.

**Extreme prices and RCAR III Mitigation:** The amount of transmission removed for RCAR III often resulted in extremely high levels of congestion and this congestion heavily impacted prices in a very regional way. This resulted in the import and export costs or benefits being heavily impacted by real-life outages. To reduce the impact of imports and exports, their cost was capped to the marginal energy component (MEC). Likely, many of these outages would not have been taken in the same manner without the Highway/Byway projects impacting the analysis.<sup>15</sup>

**The Morgan Transformer Project:** After RCAR II, SPP staff worked with City Utilities of Springfield (CUS) and Associated Electric Cooperative, Inc. (AECI) to find possible seams projects that benefit CUS due to RCAR II showing CUS as below the .8 benefit to cost threshold. Based upon the 2017 ITP10 study, SPP identified a project on AECI's system known as the Morgan Transformer Project (MTP) that provided large benefits to CUS. With an agreement from AECI to build the MTP and the RSC voting to support regionally funding the MTP, SPP was successful in getting FERC to approve regionally funding the MTP. The MTP went into service on October 24, 2020, which was after the study window of RCAR III, and the benefits of this project are not included.

**February 2021 Winter Storm Uri:** Due to the stresses on the system and the extremely high prices of the February 2021 winter weather event known as Uri, the operations optimization engine had a very hard time solving at all and did not converge to good solutions for RCAR III cases during this time frame. For that reason, these days were excluded from the savings calculations. This exclusion significantly reduced the benefits of the Highway/Byway projects

---

<sup>15</sup> See RARTF February 25, 2022 minutes: <https://www.spp.org/Documents/66960/RARTF%20Materials%2020220422.zip>

studied because without the Highway/Byway projects in place during Winter Storm Uri it is certain that much larger amounts of load would have needed to be shed during this time period as transporting the power as was needed would not have been possible. In addition to the reliability benefits not captured, these projects provided significant economic benefits as well.

**Zone Interchange Calculation Methodology:** A large portion of the final APC savings are attributable to an interchange benefit to the Transmission Pricing Zones. This interchange calculation is conducted as later presented in Section 7.6.1. The Markets Working Group (MWG) discussed and recommended purchase at hourly load-weighted zonal LMP and sales at hourly generation-weighted zonal LMP to account for energy imbalances between the different Transmission Pricing Zones.<sup>16</sup>

**Remote Generation:** Generation resources that are not physically located in the transmission pricing Zone, but the output of the resource is owned by the Zone, are included in the zonal interchange calculation. Because of the remote nature of these resources their LMP is oftentimes vastly different than the local generation and load as the congestion and losses can be vastly different. There is no measure of deliverability of the power generated by these resources to their Transmission Pricing Zone, or any differential treatment of this remote power. For example; if a Zone is generating in excess of their load solely because of the inclusion of the remote generation, the remote generation's power is 'sold' at the Zone's hourly generation weighted LMP, even if the remote generation's LMP is very different. During the calculation of the sale of this power, the hourly load-weighted zonal LMP is not considered.

**Other/Miscellaneous:** There are several notable savings values or changes that we can make note of here. In 2018 the transmission Zone Oklahoma Gas and Electric had small total savings for the model year compared to the other years in the RCAR study. This was caused by the outage of two step-down transformers. Without the RCAR transmission upgrades, these outages produced very low and even negative prices in the Oklahoma Gas and Electric region. The interchange adjustment cost equations resulted in greatly reduced savings for this model year.

The other notable feature is the large drop in savings for regions Midwest Energy and Sunflower Electric from 2019 to 2020. In the change cases, the load-weighted LMP was very expensive until Q2 2020. In Q2 2020 a 300MW wind resource came online in Midwest Energy and Sunflower Electric regions which greatly reduces the Load Weighted LMP in these cases.

In the after cases Load Weighted LMP was always lower, because of the additional transmission available for importing into Midwest Energy and Sunflower Electric. Since the addition of the wind resource in 2020 causes Load Weighted LMP prices to converge between the before and

---

<sup>16</sup>On February 19, 2019 the MWG made a formal recommendation to the RARTF on hourly purchases/sales: <https://spp.org/documents/59578/mwg%20minutes%20&%20attachments%2020190219.pdf>

after cases the savings that Midwest Energy and Sunflower Electric realize related to transmission decreases.

# APPENDIX 2: HYBRID APPROACH FOR FUTURE RCAR STUDIES

## RCAR III METHODOLOGY

Since the conclusion of the RCAR II analysis in October 2016, the RARTF has been engaged in several meetings and conversations to develop an alternate approach for the completion of RCAR III that is required to be completed in 2022.<sup>17</sup> The creation of an alternate approach was discussed with the RARTF to address a number of concerns shared by the RARTF members, stakeholders, and SPP staff. First and foremost were the technical challenges that were experienced in RCAR II due to the number of upgrades that needed to be removed from the base case planning models used to create the change cases models and capture the Adjusted Production Cost (APC) benefits were so voluminous that models would not solve without manual interventions and created results that were skewed in these affected pricing zones. In addition, due to the large amounts of wind development in certain parts of the footprint when the Highway Byway transmission facilities approved and built to support these generation additions were removed the generation became “trapped” in the local areas and skewed the results.

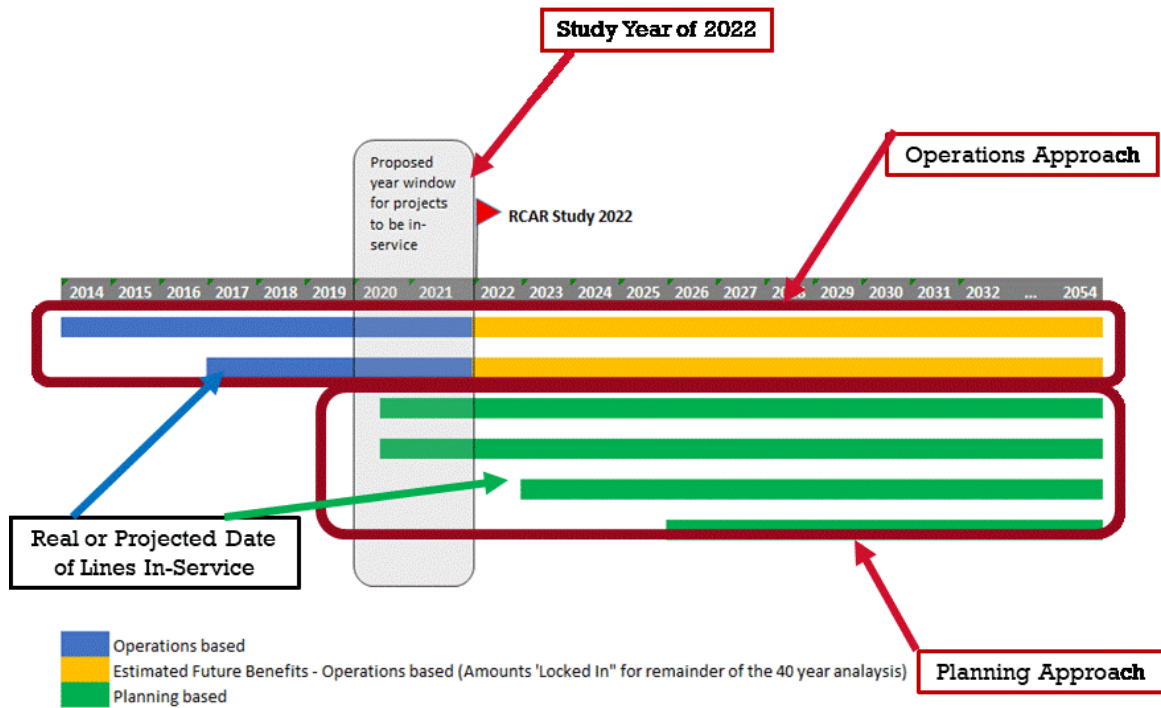
Ultimately, the RARTF has agreed to recommend that a hybrid approach (see Figure 1 below) be utilized in the calculation of benefits for RCAR III. Under this hybrid approach there will be an operations-based approach that will be used for those upgrades that have been in-service for at least 2 years prior to the beginning of the RCAR analysis and a planning base approach for those projects that have been approved for construction but not yet in-service or have not been in-service for at least 2 years. At the conclusion of these two processes the benefits will be added together to get a complete benefit projection. Actual reported costs will then be used as a divisor to calculate the benefit-to-cost ratio for each transmission pricing zone.

---

<sup>17</sup> SPP’s OATT originally called for an RCAR analysis to be conducted “at least every 3 years.” Based upon the recommendation of the RARTF, SPP stakeholders and FERC approved extending this 3 years to 6 years. See FERC Docket No. ER17-2229.



Figure 1 – Proposed Hybrid Approach for RCAR III



To further develop the hybrid approach the RARTF approved five policy recommendations on February 27, 2019<sup>18</sup> to help guide staff in their work. These policy decisions were:

1. From a historical case perspective, the RARTF approved a staff recommendation to complete a limited number of operations-based historical cases (~72-120 cases in total) over 1-2 years. This limited option was recommended and chosen because the processing of historical cases is time and resource-intensive. This motion passed 8-1.<sup>19</sup> For the going forward cases, beginning in January 2020 or as soon as possible, staff will begin processing the operational cases on a daily basis. The RARTF also recommends that staff automate this operational case processing. This motion passed unanimously.
2. The RARTF recommended that the results of the operational cases be used to calculate the benefits for the remainder of the 40-year assessment period. To complete this operations data will be used to interpolate the data points from the market case runs up to the RCAR study year and then will be extrapolated out to study year 20. This motion passed 8-0 with one abstention.<sup>20</sup>

<sup>18</sup> See February 27, 2019, RARTF Meeting minutes at <https://spp.org/documents/59666/rartf%20minutes%20&%20attachments%2020190227.pdf>

<sup>19</sup> Xcel Energy Services Inc./Southwestern Public Service Company (Xcel) voted against this motion, preferring to only have staff run historical cases on an as-needed basis.

<sup>20</sup> Xcel abstained on this vote.

3. The RARTF recommended that a transmission facility be in service for two years before being included in the operations based approach. Those facilities that have not been in service for the two years would then have their benefits measured as part of the planning based approach for this RCAR analysis. This motion passed 8-0 with one abstention.<sup>21</sup>
4. With this recommendation the RARTF looked at five specific benefit metrics that are not specifically included in the results of the operational cases and made a recommendation for each on how they should be calculated and included in the RCAR III analysis.
  - a. Avoided or Delayed Reliability Projects – Projects built for economic and policy reasons that displaced reliability projects that would have otherwise been built. Staff recommended that they utilize the data calculated from previous ITP reports for this metric. The RARTF agreed with this approach by an 8-1 vote.<sup>22</sup>
  - b. Capacity Savings Due to Reduced On-Peak Transmission - Reduction in losses due to transmission upgrades means less generation build-out required for capacity margin requirement. Staff recommended that they utilize the data calculated from previous ITP reports for this metric. The RARTF agreed with this approach unanimously.
  - c. Assumed Benefit of Mandated Reliability Projects - There is a benefit associated with having a reliable system and it is monetized as the total cost of reliability projects. Staff recommended using a technical approach to capture flow data from the operational cases, develop economic models, and allocate the benefits. The RARTF accepted this recommendation with an 8-1 vote.<sup>23</sup>
  - d. Benefits from Meeting Public Policy Goals - There is a monetary benefit associated with meeting public policy mandates and goals through transmission projects. Staff recommended that since we do not have any projects to date assigned to this category ITP calculated benefits should be used for RCAR III, if needed. The RARTF accepted this recommendation unanimously.
  - e. Increased Wheeling Through and Out - Increased ATC from transmission projects increases import and export opportunities for the SPP footprint. Staff recommended the use of historical settlements data to analyze additional service being sold relative to estimated ATC increases created by the increased transmission. The RARTF accepted this motion unanimously.
5. The RARTF reviewed the options for valuing the purchases and sales transactions in the operational cases. The RARTF had asked for the Market Working Group to review and make a recommendation on the best course of action. The MWG recommended using load-weighted zonal Locational Marginal Price (LMP) for Purchases and generation-weighted zonal LMP for Sales. The RARTF accepted the MWG recommendation unanimously.<sup>24</sup>

Beginning in January 2020, or as soon as possible, staff will begin capturing daily operational cases from the Integrated Marketplace cycles. These original cases will be stored and utilized as the

---

<sup>21</sup> Xcel voted against this motion.

<sup>22</sup> Xcel voted against this motion.

<sup>23</sup> See February 19, 2019, MWG Meeting Minutes on page 4 at <https://spp.org/documents/59578/mwg%20minutes%20&%20attachments%2020190219.pdf>

<sup>24</sup> Xcel abstained on this vote.

base cases for RCAR purposes. Those transmission facilities that were approved as Highway/Byway facilities and that have met the 2-year threshold for inclusion in the operation approach will then be removed and create a change case. That change case will be reprocessed through the market engine and those differences between the base case and change case will be captured. The difference between the cases will reflect the following benefits: Adjusted Production Cost, Reduction of Emission Rates and Values, Savings due to Lower Ancillary Service Needs and Production Costs, Mitigation of Transmission Outage Costs and Marginal Energy Losses. The other five approved and monetized metrics will be addressed as described in the RARTF policy recommendation #4 in the paragraph above. These benefits will be forecasted out over the full 40-year analysis period and then will be locked for the remainder of that analysis period.

The planning based approach is a status quo approach from RCAR I and RCAR II. It will continue to utilize planning models and forecasts to calculate the benefits metrics for those projects that have been approved for construction and are not yet in service for the 2-year threshold recommended by the RARTF. Unlike the operations based approach that will process daily for the future cases, the planning based approach will only be run when an RCAR study is required and will continue to utilize the latest annual ITP models and assumptions.

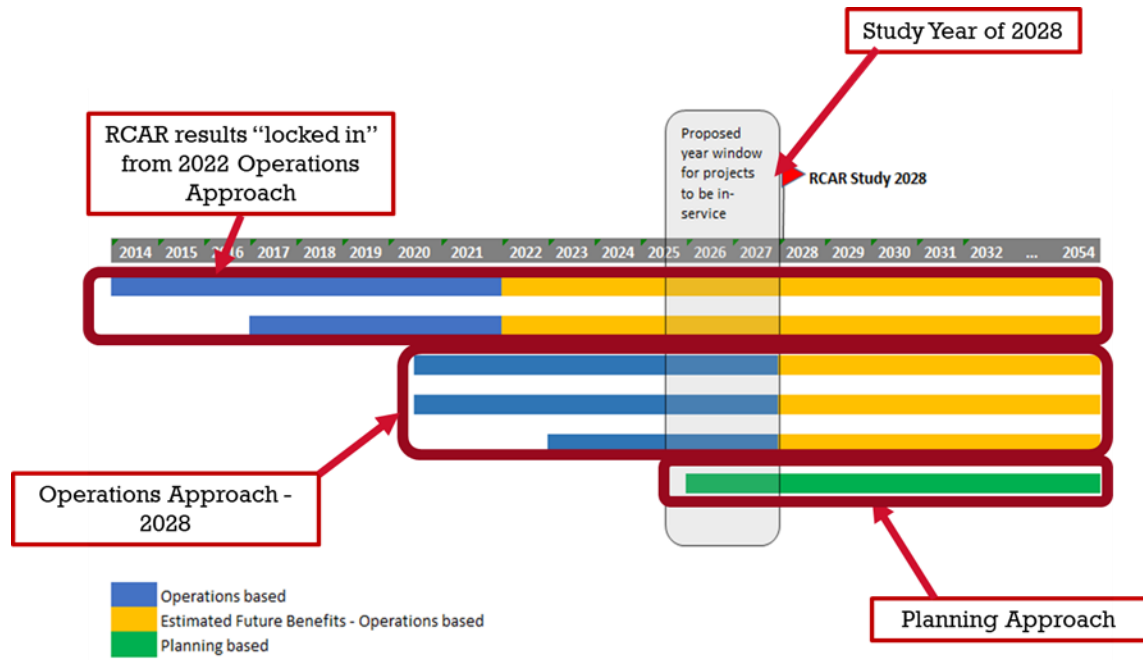
#### RCAR IV METHODOLOGY

The methodology to be used for RCAR IV will be the same as used in RCAR III analysis except for the following items that have been addressed previously in this Report:

1. RCAR IV processing dates for the operational analysis will be January 1, 2022 through December 31, 2027 for upgrades that went into service between January 1, 2020, and December 31, 2025.
2. Operating Reserves Products will be removed from the RCAR IV analysis
3. Benefit calculations and allocations for the Assumed Benefit of Mandated Reliability Projects and Increased Wheeling Through and Out will be reviewed by staff for efficiencies and technical feasibility

Figure 2 shows the proposed approach for RCAR IV.

Figure 2 – Proposed Approach for RCAR IV



# APPENDIX 3: RCAR 3.1 ANALYSIS AND RESULTS

The RCAR 3.1 concept was proposed by staff in an effort to address the concerns raised after the completion of the RCAR III study. RCAR III was the first time that an RCAR study was completed using the hybrid methodology and operational approach approved as part of the RCAR II Lessons Learned process in 2019 and explained in greater detail in Appendix 2 of this Report. The intent of the RCAR 3.1 analysis was to assess the stakeholder concerns and if possible, look at the impacts of those concerns through post-processing and re-state the RCAR III benefit-to-cost results, if approved by the RARTF, MOPC, and RSC. Since the RCAR III results will be used as the building blocks for future studies it is important that the results become more widely accepted by the stakeholders.

As part of the RCAR 3.1 analysis staff analyzed the following:

A. Uneconomic Commitments and Dispatch:

City Utilities of Springfield – “It appears that ‘excess’ generation is being committed which creates significant interchange resulting in unrealistic costs to the transmission zone. The ‘cost’ of this excess generation should be assigned to zone(s) which benefit from its operation, or at least employ a make-whole payment methodology to hold the zone harmless” and

Liberty – “Forecasting revenue below production costs in the Change Case as a significant driver of benefits when compared to the Base case is inconsistent with Market Operations and an unrealistic paradigm for market-based runs”

- i. Some resources were committed and dispatched to clear Operating Reserves. Revenues and costs of Operating Reserves were not considered as part of the original RCAR Operational savings methodology.
  1. An adjustment for Operating Reserves to account for the increases in resource revenues and the load ratio share of costs is recommended by SPP Staff (AS Adjustment).
- ii. Due to the large amounts of constraints with no feasible solution, more uneconomic commitments were possible.
  1. An Uneconomic Commitment Adjustment (UCA) is being recommended by SPP staff to account for the larger number of Uneconomic commitments in the RCAR 3 study.

B. Other concerns: These are included as part of the lessons learned for changes in model development, case runs, and calculation methodology as part of RCAR IV.

As a result of the RCAR 3.1 analysis, the benefit-to-cost ratios for the transmission pricing zones should be updated to the following:

Pricing Zone	RCAR 3.1 Present Value Benefits for 2018-2057 (\$ millions) (2022 \$)							2018-2057 ATRRs (\$ millions) (2022 \$)			Benefit/Cost Ratio
	2018-2057 Operational Results *	Avoided or Delayed Reliability Projects	Capacity Cost Savings due to Reduced On-Peak Transmission	Assumed Benefit of Mandated Reliability Projects	Benefits of Meeting Public Policy Goals	Increased Wheeling Through and Out Revenues	Total Benefits	Before MISO and PTP Offset	PtP and MISO Offset	After PtP and MISO Offset	
American Electric Power	\$2,556	\$21	\$6	\$757	\$0	not monetized	\$3,340	\$1,640	\$115	\$1,525	2.19
Empire District	\$398	\$2	\$1	\$86	\$0	not monetized	\$488	\$137	\$10	\$128	3.82
KCPL - Greater Missouri Operations	\$1,369	\$4	\$1	\$243	\$0	not monetized	\$1,617	\$202	\$14	\$188	8.62
Grand River Dam	\$546	\$2	\$0	\$66	\$0	not monetized	\$614	\$125	\$9	\$117	5.26
Kansas City Board of Public Utilities	\$567	\$0	\$0	\$26	\$0	not monetized	\$593	\$47	\$3	\$43	13.67
Kansas City Power and Light	\$2,651	\$8	\$10	\$343	\$0	not monetized	\$3,012	\$387	\$27	\$360	8.36
Lincoln Electric System	\$336	\$1	\$0	\$66	\$0	not monetized	\$403	\$84	\$6	\$78	5.18
Midwest Energy	\$825	\$1	\$0	\$75	\$0	not monetized	\$900	\$81	\$6	\$75	11.93
Nebraska Public Power District	\$2,248	\$6	\$3	\$325	\$0	not monetized	\$2,582	\$445	\$31	\$414	6.24
Oklahoma Gas & Electric	\$2,583	\$44	\$0	\$558	\$0	not monetized	\$3,184	\$842	\$59	\$783	4.07
Omaha Public Power District	\$1,049	\$5	\$1	\$182	\$0	not monetized	\$1,237	\$347	\$25	\$322	3.84
City Utilities of Springfield	\$174	\$1	\$0	\$70	\$0	not monetized	\$246	\$69	\$5	\$64	3.83
Sunflower Electric	\$986	\$13	\$30	\$276	\$0	not monetized	\$1,305	\$324	\$25	\$299	4.37
Xcel - Southwestern Public Service	\$11,087	\$2	\$19	\$601	\$0	not monetized	\$11,710	\$1,502	\$101	\$1,400	8.36
Basin - WAPA - Heartland Integrated System	\$1,810	\$9	\$0	\$430	\$0	not monetized	\$2,249	\$359	\$61	\$298	7.55
Westar Electric	\$5,670	\$10	\$8	\$555	\$0	not monetized	\$6,244	\$926	\$25	\$901	6.93
Western Farmers Electric	\$2,135	\$3	\$0	\$286	\$0	not monetized	\$2,425	\$307	\$41	\$266	9.11
<b>Total</b>	<b>\$36,990</b>	<b>\$132</b>	<b>\$81</b>	<b>\$4,945</b>	<b>\$0</b>	<b>not monetized</b>	<b>\$42,148</b>	<b>\$7,822</b>	<b>\$562</b>	<b>\$7,260</b>	<b>5.81</b>

\*Operational Results include Adjusted Production Cost, Reduction of Emission Rates and Values, Savings due to Lower Ancillary Service Needs and Production Costs, Mitigation of Transmission Outage Costs, and Marginal Energy Losses benefits that are approved for RCAR.

Below is a comparison of the RCAR III vs. RCAR 3.1 B/C ratios:

Pricing Zone	Original RCAR 3 B/C Ratio	RCAR 3.1 B/C Ratio
American Electric Power	1.94	2.19
Empire District	7.99	3.82
KCPL - Greater Missouri Operations	18.36	8.62
Grand River Dam	4.42	5.26
Kansas City Board of Public Utilities	18.86	13.67
Kansas City Power and Light	11.28	8.36
Lincoln Electric	3.56	5.18
Midwest Energy	9.13	11.93
Nebraska Public Power District	3.47	6.24
Oklahoma Gas & Electric	2.93	4.07
Omaha Public Power District	4.24	3.84
City Utilities of Springfield	14.87	3.83
Sunflower Electric	3.70	4.37
Xcel - Southwestern Public Service	6.89	8.36
Basin - WAPA - Heartland Integrated System	9.17	7.55
Westar Electric	7.12	6.93
Western Farmers Electric	7.71	9.11
Total	5.76	5.81