SOUTHWEST POWER POOL
ECONOMIC STUDIES WORKING GROUP MEETING

June 2-3, 2021
Net Conference

SUMMARY OF MOTIONS AND ACTION ITEMS

General:

- Approved April ESWG meeting **minutes**.

20-Year Assessment:

- Approved the Renewable Policy Review methodologies as presented for use in the 2022 20-Year Assessment.
- Approved that GOFs from the 2022 ITP be included in the 20YA; however, a formal decision will be delayed on **20YA GOFs** until the Constraint Assessment milestone.

Email:

- Approved the **2022 ITP Resource Plan Phase II**, as posted to GlobalScape on 5/21/2021

SOUTHWEST POWER POOL
ECONOMIC STUDIES WORKING GROUP MEETING
June 2-3, 2021
Net Conference

MINUTES

AGENDA ITEM 1 – ADMINISTRATIVE ITEMS

Economic Studies Working Group (ESWG) Chair Alan Myers called the meeting to order at 8:00 a.m. The following members were in attendance or represented by proxy:

Al Tamimi, SUNC
Alan Myers, ITC
Anita Sharma, AEP
Bennie Weeks, Xcel
Calvin Daniels, WFEC
Derek Brown, Evergy
Gayle Nansel, WAPA
Jeremy Severson, BEPC
Jody Holland, SCMCN
Kurt Stradley, LES
Kyle McKinney, GSEC
Michael Watt, OMPA
Randy Collier, CUS
Steve Gaw, APA
Steve Hohman, OPPD
Tim Owens, NPPD
Zac Hager, OGE

Proxies:
Joe Dan Wilson for Kyle McKinney on day 2
Kurt Stradley for Tim Owens on day 2 at 10am

(Attachment 1 – Attendance) (Attachment 2 – Proxy)

Joshua Norton confirmed there was a quorum and provided the antitrust statement. Alan Myers reviewed the agenda for any changes. (Attachment 3 – Agenda)

> **Tim Owens made a motion, seconded by Kurt Stradley to approve the agenda. The motion was approved unanimously.**

AGENDA ITEM 2 – CONSENT AGENDA

The consent agenda included the following items:

Meeting Minutes – March 31-April 1, 2021 (Attachment 4 – April ESWG Minutes 2021-03-31)

The consent agenda was approved.

AGENDA ITEM 3 – REVIEW OF PAST ACTION ITEMS

Joshua Norton reviewed past action items. The newly added action item 211 was included in the list. (Attachment 5 – Past Action Items)

AGENDA ITEM 4A – 2021 ITP: SCHEDULE

Dara Solomon reviewed the 2021 ITP schedule and lessons learned for the Market Economic Model (MEM) and MEM benchmarking. (Attachment 6 – 2021 ITP Schedule)

AGENDA ITEM 4B – 2021 ITP: ITP MITIGATION STATUS UPDATE

Nick Parker reviewed the status of the 2021 ITP mitigation plan and displayed the transmission planning resource allocations until June 2023 showing the allocation of workload for transmission planning. Nick presented some ideas to help with the workload grouped by impact to calendar year. This item will be back in front of the group in the next meeting. (Attachment 7 – Transmission Planning Initiatives)

AGENDA ITEM 4C – 2021 ITP: NEEDS OVERVIEW

Josh Pilgrim gave an update on the needs assessment and displayed where the voltage and thermal needs were located. He also gave an overview of the economic needs and their correlation to the target areas. (Attachment 8 – Needs Assessment Update)

AGENDA ITEM 4D – 2021 ITP: TARGET AREA PORTFOLIO DEVELOPMENT STRAWMAN

This item was not covered. (Attachment 9 – Target Areas Update)

AGENDA ITEM 5AI – 20 YA: SCOPE EXECUTION ITEMS LIST

Sherri Maxey presented updates to the 20YA execution items list. (Attachment 10 – 2022 20-Year Scope and Study Execution Action Items)

AGENDA ITEM 5AII – 20 YA: F3/F4 SCOPE IMPLEMENTATION

Antonio Barber reviewed the resource planning methodologies for ELCC, Renewable accreditation and assignment of renewable and conventional resources. Ahmed Al Azzawi reviewed the methodology for implementing F3 resource planning with respect to emissions reduction targets. (Attachment 11 – 2022 20YA Resource Plan Phase 2)

AGENDA ITEM 5AIII – 20 YA: RENEWABLE POLICY REVIEW

Krishada Watson presented options and recommendations for handling renewable policy for the 20YA. She presented staff's recommendation to use year 10 values for 20YA except for states with requirements beyond year 10 (New Mexico has 80% requirement). She also pointed out that final F3 and F4 load values will not be available until the MEM is complete and presented staff's recommendation to calculate proxy F3/F4 peak values using F1/F2 peaks, load review monthly peak values, and space heating profiles. (Kansas and Texas only states with capacity RPS) The peak of space heating profile will be added to estimated winter peak. For summer-peaking demand groups the proxy winter peak will be used in Renewable Policy Review if proxy winter peak is greater than summer peak. For winter-peaking demand groups the Proxy winter peak will be used. (Attachment 12 – 2022 20-Year Renewable Policy Review Recommendation)

Steve Gaw made the motion, seconded by Kurt Stradley, to approve the Renewable Policy Review methodologies as presented for use in the 2022 20-Year Assessment. The motion was approved unanimously.

AGENDA ITEM 6A – 2022 ITP: SCHEDUULE INCLUDING 20YA

Dara Solomon reviewed the 2022 ITP and 20YA schedules. (Attachment 13 – 2022 ITP and 20-Year Assessment Schedule)

AGENDA ITEM 6B – 2022 ITP: MEM KICKOFF

Charlton Hill displayed the MEM build flowchart and detailed the updates needed to the MEM when starting with the 2021 ITP Year 2 MEM model. He reviewed 2022 ITP Scope items impacting the MEM and additional updates that are part of the milestone work plan. (Attachment 14 – 2022 ITP MEM Build Kickoff)

AGENDA ITEM 6C – 2022 ITP: SITING PLAN

Joshua Norton reminded the group that the site repository review window was closes on June 4. (Attachment 15 – Siting Plan)

AGENDA ITEM 6D – 2022 ITP: GOFS KICKOFF INCLUDING 20YA

Greg Lampley reviewed the Generator Outlet Facility (GOF) milestone deliverables, process overview, and schedule. He presented a staff recommendation that GOFs from the 2022 ITP be included in the 20YA; however, a formal decision will be delayed on 20YA GOFs until the Constraint Assessment milestone. (Attachment 16 – 2022 ITP and 20YA Generator Outlet Facilities)

> **Kurt Stradley made the motion, seconded by Tim Owens, to approve staff's recommendation that GOFs from the 2022 ITP be included in the 20YA; however, a formal decision will be delayed on 20YA GOFs until the Constraint Assessment milestone. The motion was approved unanimously.**

AGENDA ITEM 7 – ACTION ITEM 199: BATTERY SITING SURVEY

Joshua Norton reviewed the background for the battery survey and presented charts for questions one through six. He covered charts that summarized the battery requests in the GI queue by Point of Interconnection (POI). This item will be brought back to the group for approval. (Attachment 17 – ESWG ITP Battery Survey Results)

AGENDA ITEM 15 – CLOSING ITEMS

There were no action items taken.

EMAIL ITEMS

2022 ITP RESOURCE PLAN PHASE II

A motion was solicited to approve the 2022 ITP Resource Plan Phase II.

> **Anita Sharma made the motion, seconded by Tim Owens, to approve the 2022 ITP Resource Plan Phase II, as posted to GlobalScape on 5/21/2021. Voting closed on June 3 and the motion was approved unanimously.**

Respectfully Submitted,

Joshua Norton

Secretary

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Charlton Hill	chill@spp.org	Webex
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Zac Hager	hagerzc@oge.com	Webex

Proxy	Member	Note
Joe Dan Wilson	Kyle McKinney	Day 2
Kurt Stradley	Tim Owens	Day 2, 10a.m.

Hey guys, Joe Dan Wilson will be my proxy for the meeting on June 3rd.

Kyle McKinney

Josh & Alan,

On Thursday, June 3, 2021, starting at about 10:00 am [], Kurt Stradley will have my proxy.

Thanks,

Tim

SOUTHWEST POWER POOL, INC.
ECONOMIC STUDIES WORKING GROUP MEETING
June 2-3, 2021
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AGENDA

Wednesday, 8:00a.m – 12:00p.m.
Thursday, 8:00a.m – 12:00p.m.

1. Administrative Items ..... Alan Myers (15 min)
   - A. Call to Order, Introductions ..... Alan Myers
   - B. Receipt of Proxies ..... Joshua Norton
   - C. Review of Agenda[1] ..... Alan Myers
   - D. Antitrust Reminder ..... Joshua Norton
2. Consent Agenda[1]
   - A. April ESWG minutes
3. Review of Past Action Items[1] ..... Joshua Norton (10 min)
4. 2021 ITP
   - A. Schedule[1] ..... Dara Solomon (30 min)
   - B. ITP Mitigation Status Update[1] ..... Nick Parker (30 min)
   - C. Needs Overview[1] ..... Josh Pilgrim (30 min)
   - D. Target Area Portfolio Development Strawman[1] ..... Chris Jamieson (60 min)
5. 20-Year Assessment
   - A. Scope Execution Items
     - i) Scope Execution Items List[1] ..... Sherri Maxey (10 min)

[1] Background Material Included

ii) F3/F4 Scope Implementation[1] .....Ahmed Al Azzawi (10 min)

iii) Renewable Policy Review (Approval)[1].....Krishada Watson (20 min)

6. 2022 ITP

A. Schedule including 20-Year Assessment[1].....Dara Solomon (15 min)

B. MEM Kickoff[1] .....Charlton Hill (15 min)

C. Siting Plan[1].....Joshua Norton (15 min)

D. GOFs Kickoff including 20YA (Approval)[1] .....Greg Lampley (30 min)

7. Action Item 199: Battery Siting Survey[1] .....Joshua Norton (45 min)

8. Closing Items..... All (10 min)

A. Summary of Action Items

B. Upcoming Meeting Agenda Items

C. Future Meetings

i) June 30-July 1, 2021: Net Conference

ii) August 4-5, 2021: Net Conference

iii) September 1-2, 2021: TBD

SOUTHWEST POWER POOL
ECONOMIC STUDIES WORKING GROUP MEETING

March 31-April 1, 2021
Net Conference

SUMMARY OF MOTIONS AND ACTION ITEMS

- Approved consent agenda
    - March 3-4 minutes
- Approved **2021 ITP Market Economic Model**
- Approved **considerations for inclusion and exclusion of economic needs** in the 2021 ITP Assessment
- Approved recommendations to:
    - Waive the requirements in the ITP manual to build and assess the **Market Powerflow Models** during the 2021 ITP Reliability Needs Assessment
    - Waive the **economic and policy requirements** from the **2023 ITP**
    - Modify the **2021 ITP Scope to allow schedule adjustments** within the 2021 ITP
- Approved the **20-Year Assessment values and methodologies** for implementation of:
    - Peak demand growth rates
    - Electrification due to space heating and electric vehicles
    - Demand response
    - Distributed generation
- Approved the recommendations listed in the **Total Base Planning Model Reduction** Recommendation paper for implementation starting with the 2022 MDAG / 2023 ITP model developments
- Approved the **2022 ITP Load and Generation Review** through an email vote

SOUTHWEST POWER POOL
ECONOMIC STUDIES WORKING GROUP MEETING
March 31-April 1, 2021
Net Conference

MINUTES

AGENDA ITEM 1 – ADMINISTRATIVE ITEMS

Economic Studies Working Group (ESWG) Chair Alan Myers called the meeting to order at 8:00 a.m. The following members were in attendance or represented by proxy:

Alan Myers, ITC
Anita Sharma, AEP
Bennie Weeks, Xcel
Calvin Daniels, WFEC
Derek Brown, Evergy
Gayle Nansel, WAPA
Jeremy Severson, BEPC
Jody Holland, SCMCN
Kurt Stradley, LES
Kyle McKinney, GSEC
Michael Watt, OMPA
Randy Collier, CUS
Steve Gaw, APA
Steve Hohman, OPPD
Tim Owens, NPPD
Zac Hager, OGE

Proxies:
John Boshears for Randy Collier
Mike Sawn for Steve Hohman
Mike Wise for Kyle McKinney

(Attachment 1 – Attendance) (Attachment 2 – Proxy)

Joshua Norton confirmed there was a quorum and provided the antitrust statement. Alan Myers reviewed the agenda for any changes. It was noted that agenda item 4 would need to be covered at the beginning of the second day of meeting. (Attachment 3 – Agenda)

Steve Gaw made a motion, seconded by Kurt Stradley to approve the agenda. The motion was approved unanimously.

AGENDA ITEM 2 – CONSENT AGENDA

The consent agenda included the following items:

Meeting Minutes – March 3-4, 2021 (Attachment 4 – March 3-4 2021 ESWG Minutes)

The consent agenda was approved unanimously.

AGENDA ITEM 3 – REVIEW OF PAST ACTION ITEMS

Joshua Norton reviewed past action items. (Attachment 5 – Past Action Items)

AGENDA ITEM 4 – GETS STUDY RESULTS

Jay Caspary and Bruce Tsuchida presented details of the Grid-Enhancing Technologies case study performed on the Southwest Power Pool. (Attachment 6 – Unlocking the Queue)

AGENDA ITEM 5A – 2021 ITP: SCHEDULE

Dara Solomon reviewed the 2021 ITP schedule and presented lessons learned for scope development and generation and load review. (Attachment 7 – 2021 ITP Schedule)

AGENDA ITEM 5B – 2021 ITP: ITP MANUAL WAIVERS FOR MITIGATION PLAN

Chris Davis recapped the mitigation plan as approved by the TWG and ESWG in March and recommended approval for each item that needed ITP Manual waivers or scope changes. (Attachment 8 – Mitigation Waiver Requests presentation) (Attachment 9 – 2021 ITP Scope Updated for Mitigation)

Recommendation #1:

Calvin Daniels made the motion, seconded by Anita Sharma, to waive the requirements in the ITP manual to build and assess the Market Powerflow Models during the 2021 ITP Reliability Needs Assessment. The motion was approved unanimously.

Recommendation #2:

Jeremy Severson made the motion, seconded by Calvin Daniels, to waive the economic and policy requirements from the 2023 ITP. The motion was approved with two votes against (Steve Gaw and Anita Sharma) and two abstentions: Alan Myers and Bennie Weeks.

Rationale:

The Advanced Power Alliance voted against the motions that would result in failing to conduct the ITP 2023 study, other than a NERC reliability assessment. We continue to believe that this is a poor strategic move and does not appear to be allowed in the tariff. APA's position includes but is not limited to the following:

1. The last motion in the ESWG meeting of March 31, 2021 does not contemplate a tariff waiver request to FERC

a. The tariff language specifically states that assessments of policy, reliability, and economic needs will be done in the ITP. APA believes that the performance of the ITP must be done in compliance with the tariff requirements. While there is tariff language referencing that the assessments of the required elements will be done pursuant to the ITP manual, this is a recognition that the details of the analysis will be done pursuant to the manual. It does not signal that the ITP manual can somehow override the tariff. This language represents the standard approach used in the SPP tariff to defer to business practices and in this case the ITP Manual, in order to avoid putting substantial details in the tariff document itself. It now appears that SPP considers this approach to allow secondary documents under the tariff to override requirements in the tariff. Such an interpretation will bring into question any future deference of authority in secondary documents. Section III.2) c of Attachment O of the tariff states:

"The Transmission Provider shall develop the Integrated Transmission Planning Assessment study scope with input from the stakeholders, in accordance with the parameters in the Integrated Transmission Planning

Manual. The study scope and the Integrated Transmission Planning Manual shall specify the methodology, criteria, assumptions, and data to be used, including how transmission needs will be identified, and how the input requirements described in Section III.3 of this Attachment O will be incorporated. The study scope shall include an explanation of which Public Policy Requirements will be evaluated for potential solutions in the Integrated Transmission Planning Assessment. The final Integrated Transmission Planning Assessment study scope shall be posted on the SPP website."

The tariff calls the provisions of subsection 3 requirements rather than options that can be changed in the Manual. Subsection 3 again lists the provisions as requirements: "Policy, Reliability, and Economic Input Requirements to the Integrated Transmission Planning Assessment". Subsection 3 (j) list one of the requirements as: "Congestion within SPP and between the SPP Region and other regions and balancing areas;". This is a reference to the economic planning required under the ITP. Subsection 3(k) lists on of the policy assessments that must be considered: "Renewable energy standards;". Public Policy is again listed in Subsection 3(o): "Public Policy Requirements identified through the annual survey of stakeholders and additional Public Policy Requirements as determined by the Transmission Provider and stakeholders;".

The assessment of the items listed in subsection 3 on economic, reliability, and public policy are not options that can be waived without FERC action. In fact, there are additional references to the assessment of Public Policy needs in several other provisions outside of this subsection. If SPP's interpretation of the tariff is correct, taken to its logical conclusion it means that there is no requirement in the tariff to ever perform an economic or public policy assessment. This raises serious concerns about the planning requirements under previous FERC Orders. We believe that a

change to the assessment of needs listed on the tariff requires action at FERC.

2. The failure to conduct an economic, policy, and flow-based reliability assessment will have significant negative consequences including but not limited to:

a. Failure to assess and address the economic needs in SPP will mean higher costs for congestion to the detriment of consumers;

b. The Base Reliability model dispatch does not reflect the dispatch of the SPP system and thus the operational reliability problems that are observed in the market and operations may not be exposed and remedied market as they would have in the other planning mechanisms not being performed;

c. The SPP may compromise opportunities and needs as a result of significant policy changes in Washington D.C. The Biden administration's proposal for substantial infrastructure investment of the grid, coupled with other contemplated policy changes that will speed up the dramatic change underway in the generation portfolio will increase the need for transmission planning activity. Taking away the ITP 2023 will put SPP behind the curve in addressing these changes.

d. The loss of the 2023 ITP will harm the goal of addressing the GI queue backlog. Projects found to be cost beneficial can help alleviate transmission constraints and solve issues that cannot be addressed in the GI process or produce multiple restudies due to drop outs from the high cost of the upgrades. Not examining the economic and policy needs of the SPP region will mean that some needed GI projects are not built that would have significant benefit to SPP consumers. Without this study the costs of such network upgrades that would also facilitate Generation Interconnection and make the GI projects commercially unviable.

e. There is a possible problem that could result from not doing the ITP 2023 economic and policy evaluation related to the SCRIPT. If the SCRIPT results in a new approach to planning, such as the consolidated process across GI,

Transmission Service, and Transmission Planning it may cause a request for additional delays in planning and cancellations beyond the ITP 2023. This occurred in the last ITP reform. If this is a risk, it should be disclosed and factored in to this proposal.

-Steve Gaw

Recommendation #3:

Jeremy Severson made the motion, seconded by Tim Owens, to modify the 2021 ITP Scope to allow schedule adjustments within the 2021 ITP. The motion was approved unanimously.

AGENDA ITEM 5C – 2021 ITP: MARKET ECONOMIC MODEL BUILD

Charlton Hill reviewed the Market Economic Model (MEM) build and adjustments that were made to reduce emergency generation in the Upper Missouri Zone (UMZ). (Attachment 10 – Market Economic Model presentation)

Anita Sharma made the motion, seconded by Calvin Daniels, to approve the final 2021 ITP MEM as posted on 3/22. The motion was approved unanimously.

AGENDA ITEM 5D – 2021 ITP: CONSTRAINT ASSESSMENT UPDATE

Ahmed Alazzawi discussed the changes to the constraints list since the initial posting and provided a timeline for the constraint assessment. (Attachment 11 – Constraint Assessment presentation)

AGENDA ITEM 5E – 2021 ITP: TARGET AREA ANALYSIS

This item was not covered in the meeting.

AGENDA ITEM 5F – 2021 ITP: ECONOMIC AND POLICY NEEDS ASSESSMENT

Maurisa Hughes gave overviews of the policy needs and economic needs assessment processes and presented details and a recommendation on economic needs considerations for the 2021 ITP. (Attachment 12 – Economic and Policy Needs Assessment)

Calvin Daniels made the motion, seconded by Tim Owens, to approve the considerations for inclusion and exclusion of economic needs. The motion was approved with one abstention: Jeremy Severson.

Rationale:
BEPC is abstaining from this vote as we don't agree that SPP will not include any documentation as to why a potential need would be included or excluded from the needs assessment. We are comfortable that SPP is designing an approach to limit the needs as stated in this motion. However, we would like to review the consideration of the needs in via documentation at the culmination of the ITP study. The reason would be to see if we agree that SPP's exclusion of various needs and whether their assumption should be changed in future ITP studies.
-Jeremy Severson

Staff was asked to provide detail on the engineering judgement considerations and the following was sent after the meeting:

Due to the mitigation status of the 2021 ITP, the scope of the Economic Needs Assessment will be reduced per SPP staff's recommendation and approval by both the ESWG and TWG. It is SPP's intention to include economic needs that

- *Fall within the 2021 ITP target areas,*
- *Overlap with the SPP-MISO Joint Targeted Interconnection Queue (JTIQ) study needs,*
- *Overlap with reliability or operational needs,*
- *Are terminally limited and are not related to bulk transfer issues, or*
- *Have high congestion scores (detailed below).*

SPP will generally include constraints that have a congestion score of greater than $200K/MW, as opposed to the typical starting value of $50k/MW, as economic needs. Initially, SPP considered a lower threshold of $100k/MW, but due to the high quantity of constraints in the $100k/MW to $200k/MW congestion score range, SPP decided to increase the threshold to $200K/MW.

SPP will also use engineering judgement to modify the list of economic needs. This engineering judgement includes determining the quantitative value (APC benefit) of relieving constraints through relaxation runs. If this value low for a particular constraint, the constraint will be considered for exclusion from the needs list. Engineering judgement may also be used in cases where congestion on a constraint is consistent with the congestion seen in previous studies; if previous studies have not yielded economic projects for a given need with similar congestion, it's reasonable to assume that could also be the case for the current study and probably should not be a focus this cycle. Constraints may also be excluded from the needs list if more analysis is needed to understand the growth of congestion; these needs may be more sufficiently studied in the 2022 ITP and/or 2022 20-Year Assessment, allowing for a longer term look at the fluctuations in congestion.

Throughout the analysis, SPP will evaluate constraints by working to delineate their validity as an economic need and the drivers of the congestion for study years 2, 5 and 10.

These considerations were presented to and approved by the ESWG on March 31, 2021.

AGENDA ITEM 6A – 2022 ITP: SCHEDULE INCLUDING 20-YEAR ASSESSMENT

Dara Solomon reviewed the 2022 ITP and 2022 20-Year Assessment schedules for ongoing and upcoming milestones. (Attachment 13 – 2022 ITP and 20YA Schedules)

AGENDA ITEM 6B – 2022 ITP: RENEWABLE POLICY REVIEW & RESOURCE PLAN PHASE 1

Krishada Watson presented the renewable policy review results and recommended approval. (Attachment 14 – Renewable Policy Review and RP1 presentation)

> **Jeremy Severson made the motion, seconded by Kurt Stradley, to approve the renewable policy review results. After several members mentioned issues with access to GlobalScape and requesting some more time to review the motion was withdrawn.**

AGENDA ITEM 6C – 2022 ITP: RESOURCE PLAN PHASE 2

Antonio Barber provided an overview, discussed preliminary results, and previewed next steps for the milestone. (Attachment 15 – Resource Plan Phase 2 presentation)

AGENDA ITEM 7AI – 20-YEAR ASSESSMENT SCOPE EXECUTION ITEMS: LOAD REVIEW METHDOLOGY

Brooke Keene reviewed scope items for load review methodology and addressed implementation for peak demand growth rates, electrification due to space heating and electric vehicles, energy efficiency, demand response, and distributed generation. Serhat Guney of the SPP MMU raised questions about the energy efficiency methodology. Staff pulled energy efficiency from the recommendation to address in a later meeting. (Attachment 16 – 20YA Load Review Methodology presentation)

Tim Owens made the motion, seconded by Kurt Stradley, to approve the values and methodologies for implementation of peak demand growth rates, electrification due to space heating and electric vehicles, demand response, and distributed generation as presented. The motion was approved unanimously.

AGENDA ITEM 8 – MODEL REDUCTION

Sunny Raheem (SPP) presented the background and an overview of the model reduction recommendation. He addressed how the recommendation would align seasonal models, optimize the annual model development schedule and long term model builds. (Attachment 17 – Total Base Planning Model Reduction presentation) (Attachment 18 – Total Base Planning Model Reduction Recommendations)

Steve Gaw made the motion, seconded by Zac Hager, to approve the recommendations listed in the Total Base Planning Model Reduction Recommendation paper for implementation starting with the 2022 MDAG / 2023 ITP model developments. The motion was approved unanimously.

AGENDA ITEM 9 – CLOSING ITEMS

There were no action items taken.

EMAIL ITEMS

2022 ITP ECONOMIC GENERATION AND LOAD REVIEWS

A motion was solicited to approve the 2022 ITP Economic Generation and Load Reviews for use in the 2022 ITP and 2022 20-Year Assessments. Tim Owens expressed concern over the 20-Year load values, to which Brooke Keene responded that staff would be comfortable only having the 2022 ITP Economic Generation and Load Reviews approved without the 20-Year values.

> **Tim Owens made the motion, seconded by Jeremy Severson, to approve the 2022 ITP Load and Generation Review, as posted to GlobalScape on 3/17/2021, for use in the 2022 ITP market models. Voting closed on March 19 and the motion was approved with one abstention: Steve Gaw.**
>
> **Rationale**
> **I am unable to access the information from my computer (it is an ongoing problem that I have yet to resolve that may pertain to the SPP firewall) so I am going to have to abstain from the vote unless I figure out a workaround).**
> **-Steve Gaw**

Respectfully Submitted,

Joshua Norton

Secretary

SOUTHWEST POWER POOL, INC.
ECONOMIC STUDIES WORKING GROUP

Pending Action Items Status Report
June 2-3, 2021

	ACTION ITEM	DATE ORIGINATED	STATUS	COMMENTS
190	Utilize the results from RCAR III to determine the ratio of APC benefit to Transmission Outages benefit to be applied in the ITP assessments.	10/12/17	On Hold	Working with SPP operations on additional APC benefit with outages included. Mar: Ops is planning to perform after RCAR III and Value of Transmission study.
199	How we inform our Siting Plan: Research the appropriateness of relying on the GI Queue for Siting of renewables and battery storage and looking into other available information	04/01/19	In Progress	Goal: to complete and implement for the 2021 ITP Assessment Continue discussing the battery storage piece May: Battery Survey in progress **June:** Discuss Survey results
201	Review the interchange methodology	07/01/19	In Progress	Goal: To complete for the 2021 ITP Assessment Mar: 2021 portion considered complete. Outstanding long-term items: • Transactions between simulated and non-simulated regions • Benchmarking of pseudo-ties
210	Create list of 20YA items to review	01/07/21	In Progress	**June:** Continue review of list and discussion of items
211	Revisit the SPP Other bucket and how we use those for resources in Resource Plan	05/19/21	In Progress	

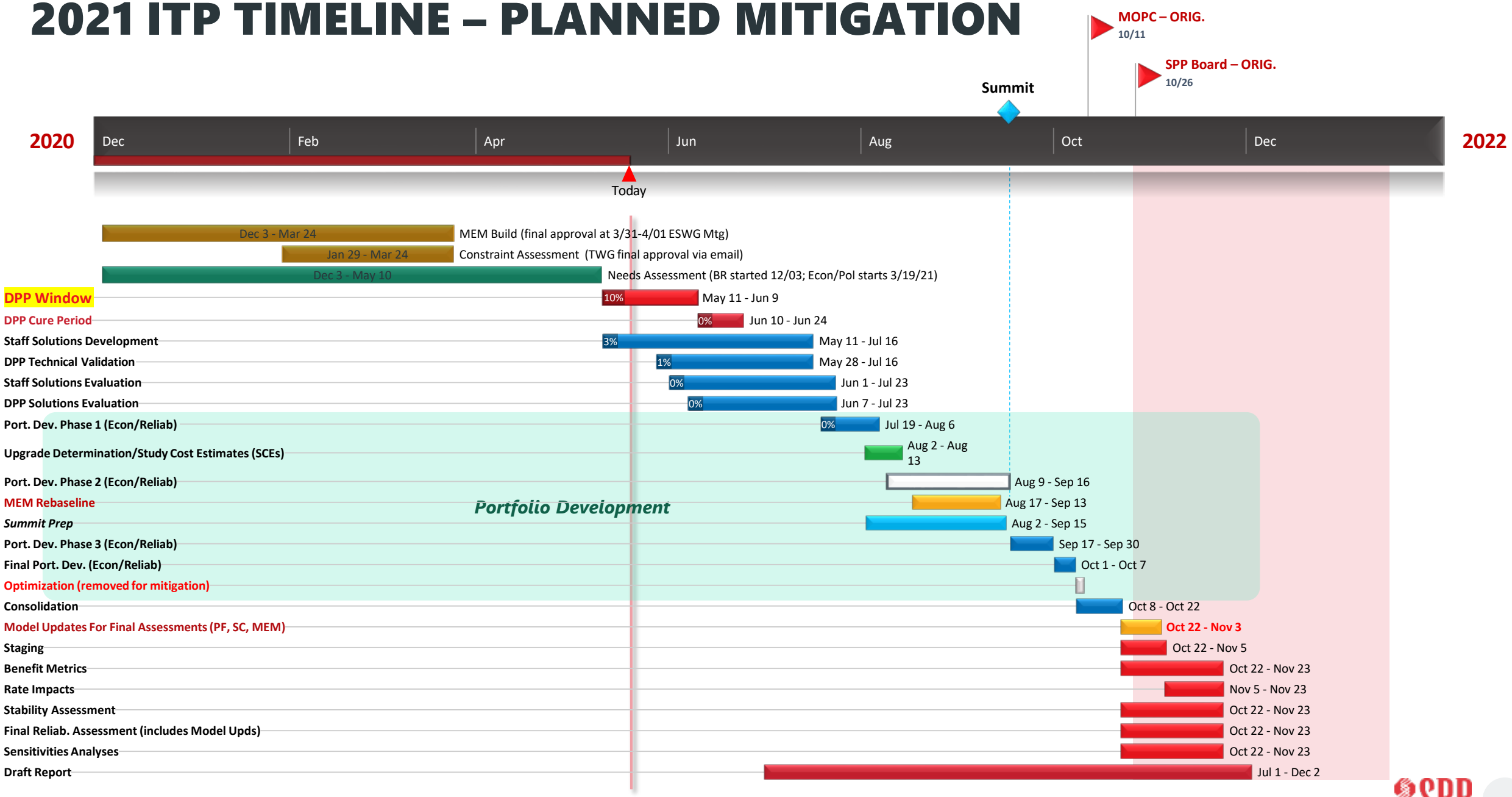
ACTION ITEM	DATE ORIGINATED	STATUS	COMMENTS
Phase II Accreditation and APC calculations			

2021 ITP SCHEDULE

DARA SOLOMON

JUNE 2021

2021 ITP TIMELINE – PLANNED MITIGATION



MARKET ECONOMIC MODEL BUILD (COMPLETE)

- Start: 12/01/2019
- End: 3/31/2021 (Members Final Approval)
- Member Review Time:
  - *Pass 1 (Year 2): 8/06/2020 – 8/14/2020 (6 days)*
  - *Pass 1 (Year 2) Updated: 8/24/2020 – 8/28/2020 (5 days)*
  - *Pass 1 (Year 2) Updated for Final Approval: 8/31/2020 – 9/04/2020 (5 days)*
  - *Pass 1 (Year 2) ESWG Final Approval: 9/04/2020*
  - *Pass 2 (Years 2/5/10): 1/13/2021 – 1/19/2021 (5 days)*
  - *Pass 2 (Years 2/5/10) Updated: 1/28/2021 – 2/4/2021 (5 days)*
  - *Final Market Economic Model: Posted for Final Approval: 3/23/2021 – 3/30/2021 (5 days)*
  - *Final Market Economic Model ESWG Final Approval: 3/31/2021*
- Staff Leader: Charlton Hill (chill@spp.org)
- Working Group Approval: ESWG

MARKET ECONOMIC MODELS (MEM)

Description

- Each MEM simulation is an hourly security-constrained unit commitment and economic dispatch utilizing a DC representation of the transmission system
- The assumptions for each of the economic models are detailed in the ITP Manual, Section 2.2 as well as in the study scope

Lessons Learned and Improvements

- Staff was able to incorporate summer light load and winter PST parameters - this is an improvement added from the 2020 ITP
- Verify correct format for bus percentages and ensure all ownership percentages equal 100%; quality check added to process documentation
- Post appropriate files/folders and supporting documentation for consistency across postings
- The team will make decisions regarding Economic Maximum Capacity before model build begins
- Staff has been identifying various quality checks of input data and workflow improvements prior to inclusion into the MEM
- Used the Benchmarking Tool to validate/QA the Y5 and Y10 scenarios – worked well this cycle

MARKET ECONOMIC BENCHMARKING (COMPLETE)

- Start: 7/01/2020
- End: 11/23/2020 (Members' Final Approval)
- Member Review Time:
  - *Pass 1: 10/07/2020 – 10/13/2020 (5 days)*
  - *Pass 2: Post for ESWG Final Review: 11/16/2020 – 11/23/2020 (5 days)*
  - *Pass 2: ESWG Request for Approval : 11/23/2020*

- Staff Leader: Charlton Hill (chill@spp.org)
- Working Group Approval: ESWG

MEM BENCHMARKING

Description

- Section 3.2 of ITP Manual: The year 2 economic model will be utilized to validate modeling parameters to determine if operation is reflective of the SPP system
- Data validation may include: capacity factor by unit type, maintenance outages, operating and spinning reserves, average energy costs, system LMPs (zonal, average, max, etc.), interchange, APC comparison, and renewable generation profiles
- Data may be compared to the most recent SPP operational data and previous study models

Lessons Learned and Improvements

- Staff will have a better understanding of the nuances between the operational outages and planning outages and further caveat and/or make improvements to outage methodology
- The Monthly Energy and Peak graph and table will be included in MEM benchmarking and MEM results postings.

NEEDS ASSESSMENT (COMPLETE)

- Start: 11/18/2020
- End: 5/10/2021

- Staff Leaders:
  - BR Needs: Joshua Pilgrim (jpilgrim@spp.org)
  - Econ/Policy Needs: Maurisa Hughes (mhughes@spp.org)
  - Short-Circuit Needs: Nathan Bean (nbean@spp.org)
  - Operational Needs: Will Tootle (wtootle@spp.org)

DPP WINDOW

- Start: 5/11/2021 12:00 a.m.
- End: 6/9/2021 11:59 p.m.

- Member Review Time:
  - Transmission-planning response window (30 calendar days)

- Staff Leader: Tammy Bright (tbright@spp.org)

STAFF SOLUTIONS DEVELOPMENT

- Start: 5/11/2021
- End: 7/12/2021

- Staff Leader: Krishada Watson (kwatson@spp.org)

DPP TECHNICAL VALIDATION

- Start: 5/28/2021
- End: 7/16/2021

- Staff Leader: Jake Morris (jmorris@spp.org)

SOLUTIONS EVALUATION

- Start: 6/1/2021
- End: 7/23/2021

- Staff Leaders:
  - Reliability: Jacob Pannell (jpannell@spp.org)
  - Economic/Policy: Spencer Magby (smagby@spp.org)
  - Short Circuit: Nathan Bean (nbean@spp.org)

RELIABILITY PORTFOLIO DEVELOPMENT

- Start: 7/19/2021
- End: 10/7/2021

- Staff Leader: Maurisa Hughes (mhughes@spp.org)

ECONOMIC PORTFOLIO DEVELOPMENT (PROJECT GROUPING)

- Start: 7/19/2021
- End: 10/7/2021

- Staff Leader: Ahmed M. Al Azzawi (AAlAzzawi@spp.org)

PLANNING SUMMIT

- September 2021 – Date TBD

- Staff Leader: Tammy Bright (tbright@spp.org)

PORTFOLIO CONSOLIDATION

- Start: 10/8/2021
- End: 10/29/2021

- Member Review Time:
  - *TBD*

- Staff Leader: Jacob Pannell (jpannell@spp.org)

PROJECT STAGING

- Start: 10/22/2021
- End: 11/5/2021

- Staff Leader: Jake Morris (jmorris@spp.org)

BENEFIT METRICS CALCULATION

- Start: 10/22/2021
- End: 11/23/2021

- Staff Leader: Krishada Watson (kwatson@spp.org)

STABILITY ANALYSIS

- Start: 10/22/2021
- End: 11/23/2021

- Staff Leader: Maurisa Hughes (mhughes@spp.org)

SENSITIVITY ANALYSIS

- Start: 10/22/2021
- End: 11/23/2021

- Staff Leader: Greg Lampley (glampley@spp.org)

FINAL RELIABILITY ASSESSMENT

- Start: 10/22/2021
- End: 11/23/2021

- Staff Leader: Ahmed M. Al Azzawi (AAlAzzawi@spp.org)

RATE IMPACTS/ATRR

- Start: 11/5/2021
- End: 11/23/2021

- Staff Leader: Krishada Watson (kwatson@spp.org)

FINAL REPORT

- Start: 10/1/2021
- End: 12/2/2021
  - Final ESWG/TWG Approval TBD
- Staff Leader: Tammy Bright (tbright@spp.org)

TWG/ESWG FINAL APPROVALS

- Start: 12/2021
- End: 12/2021

- Staff Leaders:
  - TWG – Adam Bell (abell@spp.org)
  - ESWG – Joshua Norton (jnorton@spp.org)

MOPC AND SPP BOARD APPROVALS

- MOPC: TBD
- SPP Board: TBD

CONTACT INFO

Dara Solomon, SPP Staff
dsolomon@spp.org

TRANSMISSION PLANNING MITIGATION IDEAS

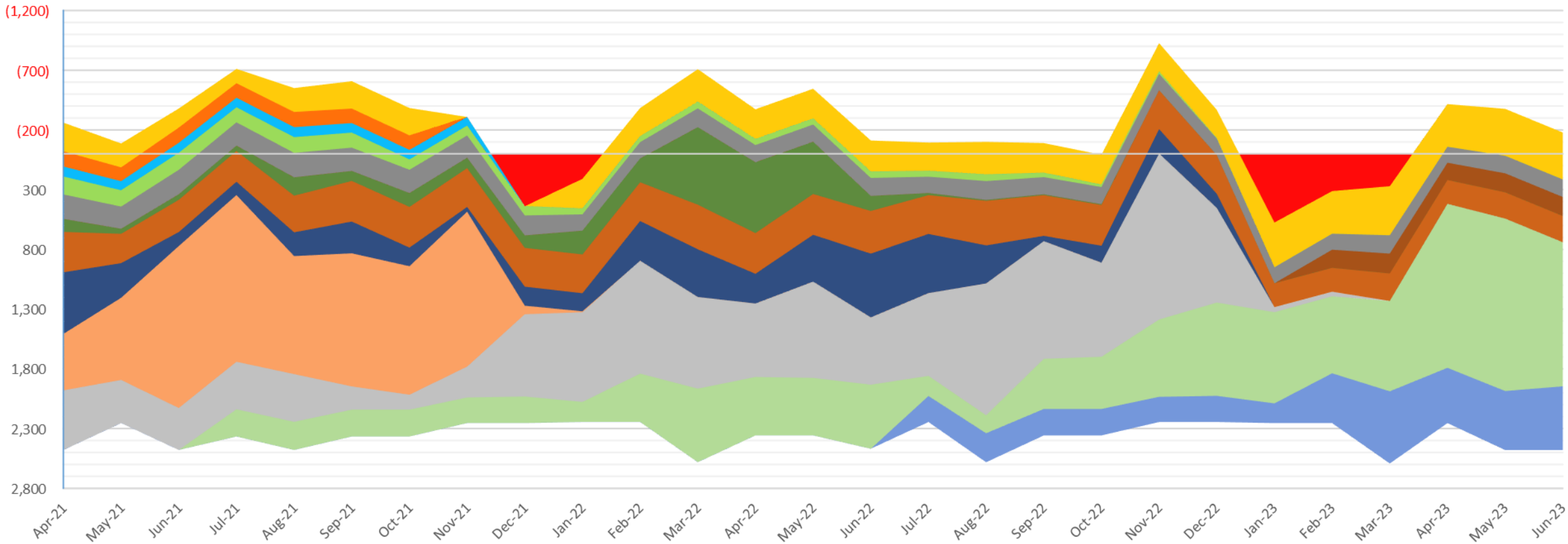
NICK PARKER

JUNE 2021 ESWG/TWG MEETINGS

CURRENT STATUS

- 2021 ITP mitigation plan was approved with the exception of a reliability-only 2023 ITP
  - Very tight to finish the 2021 ITP in December
- SPP board of directors approved the use of additional consulting budget if needed to keep the status quo through July
- 2022 Calendar year is over allocated by up to XX hours in certain months

Transmission Planning Resource Allocations - UPDATED



- AVAILABILITY
- Value of Transmission study
- SPP Strategic Initiatives Roadmap
- PROMOD Upgrade
- Other Base Work (working groups, cross-training, Risk-based planning, base automation work)
- 2021 ITP Assessment
- 2023 ITP Assessment
- SCRIPT Ideation thru Implementation phases
- SPP-MISO JTIQ Study (TP Team portion only)
- All other work (non-base)
- RCAR III
- 20-Year Assessment
- 2022 ITP Assessment
- 2024 ITP Assessment

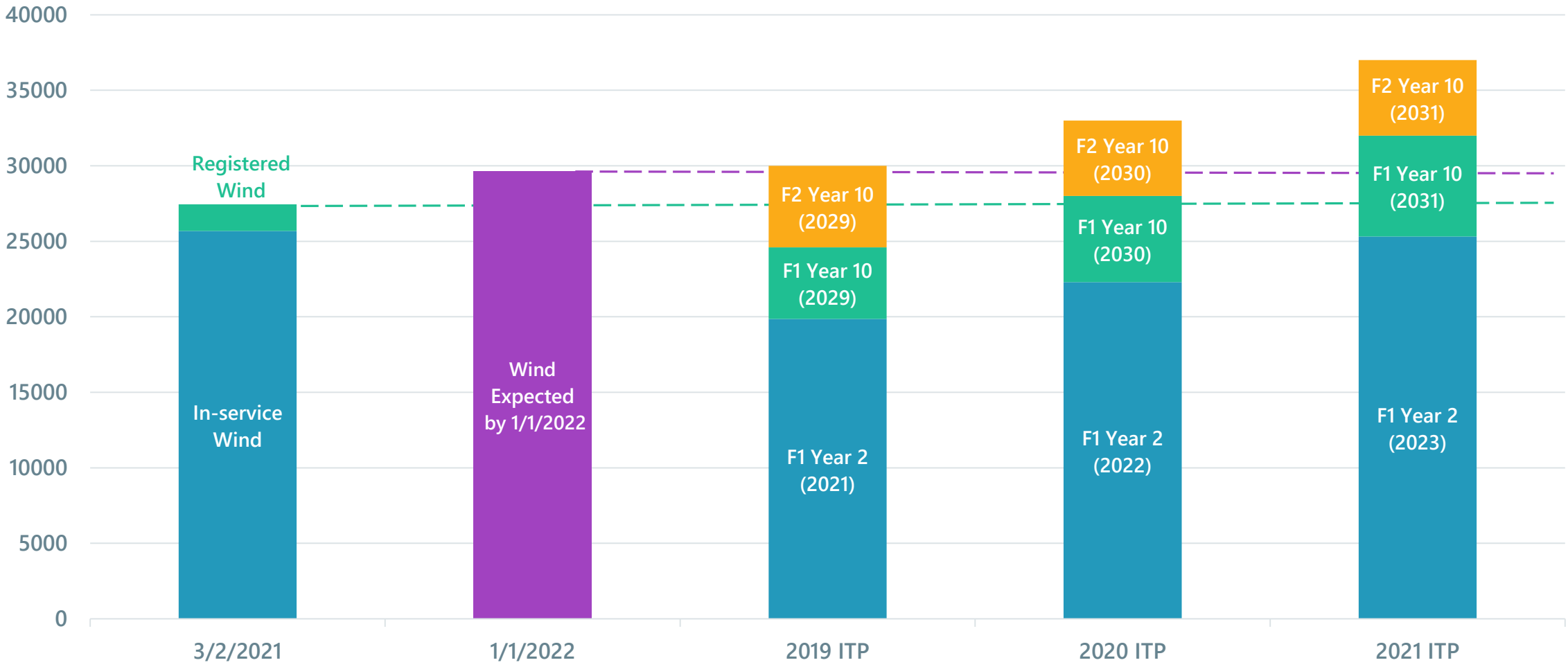
STAFF IDEAS – REUSE SCOPE

- Reuse 2022 ITP scope for 2023 ITP (wash, rinse, repeat)
  - Keep same assumptions but with updated wind, solar, and storage capacity values
  - Allows scope to be developed with less staff hours
  - Allows more staff to focus on 2021 ITP

STAFF IDEAS – REMOVE FUTURE 1

- Remove Future 1 from the 2021 ITP
  - Current registered wind capacity = 27.7 GW
  - 2021 ITP Future 1 Year 5 = 29 GW
  - 2021 ITP Future 1 Year 10 = 32 GW
  - Saves hours and schedule time in several areas
    - Removes Future 1 from portfolio development (starts in June)
    - Consolidation of Futures 1 and 2 are no longer needed
    - Sensitivity Analysis
    - Benefit metrics
    - Report

WIND GROWTH VS PLANNING ASSUMPTIONS



STAFF IDEAS – REMOVE SENSITIVITY ANALYSIS AND BENEFIT METRICS

- Remove 2021 ITP sensitivity analysis and benefit metrics
  - Staff thinks we should not remove both Future 1 and the sensitivity analysis and benefit metrics
  - These milestones are informational only
  - Would keep final reliability assessment and adjusted production cost (APC) metric
  - Would save about two weeks of schedule time

STAFF IDEAS – RCAR III

- Operations only RCAR III
  - Scope development would be reduced (2021 savings)
  - No resource or siting plans – 170 hrs. saved
  - No model development or constraint assessment – 800 hrs. saved
  - Would still perform benefit metrics
  - Provides a reduction in over-allocated hours
  - Total estimated savings is about 1500 hrs.

STAFF IDEAS – USE 2021 MITIGATION FOR 2022

- Apply similar mitigation practices to the 2022 ITP as used for the 2021 ITP
  - Carve out MPM violations from 2022 ITP process
  - Reduce number of economic needs to post
  - Revisions to study cost estimate request process
  - Re-use 2022 ITP MEM as base for 2023 ITP
- Could save approximately two months of schedule time
- Would allow time to spread out or shift milestones to times with fewer resource constraints

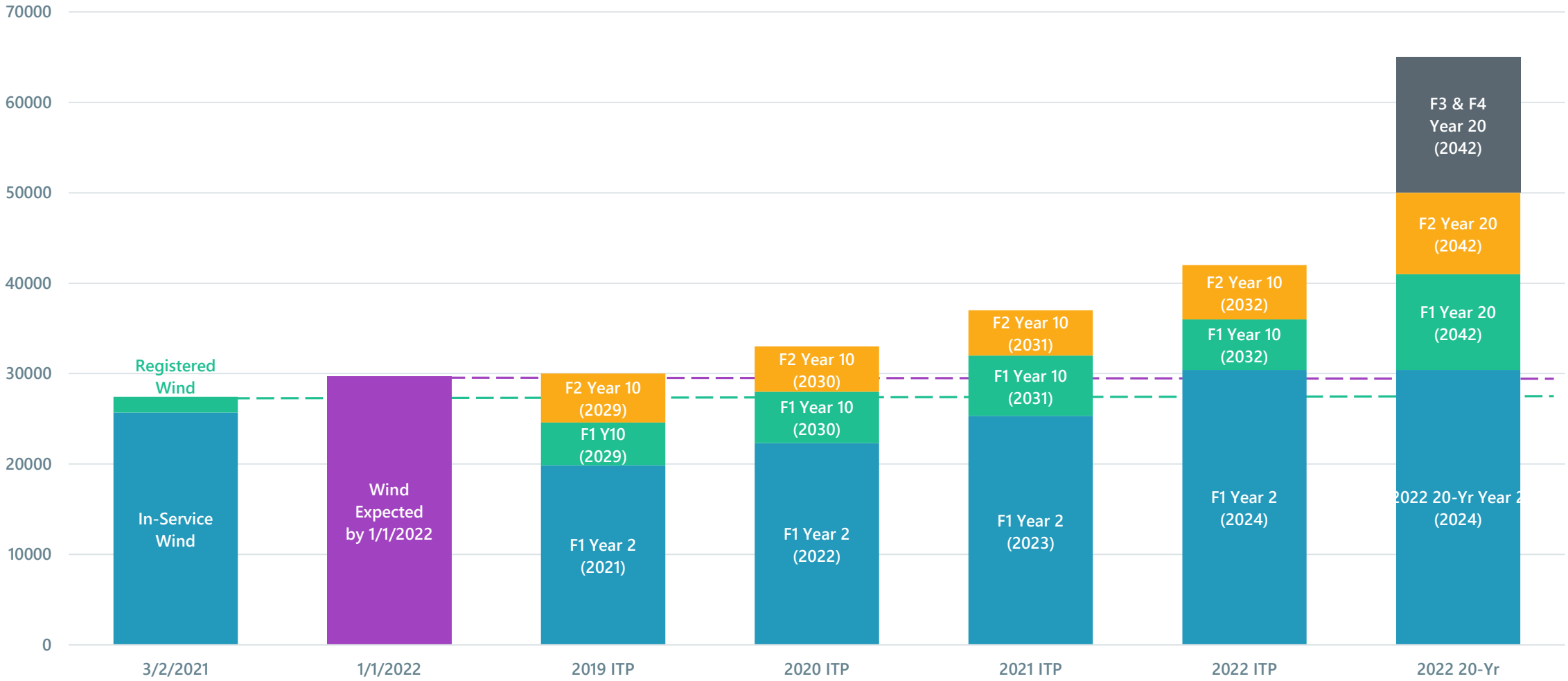
STAFF IDEAS – EXTEND FINAL DATES

- Extend 2022 ITP due dates
  - Could be extended to December 2022, January 2023, or April 2023, depending on need
- Extend 20-Year Assessment due dates
  - Dependent on 2022 ITP due date
  - Stagger report due date to be after the 2022 ITP due date

STAFF IDEAS – OTHER

- Remove Future 1 from the 2022 ITP and/or the 20-Year Assessment
  - Similar savings as previously noted
  - Time savings are realized the earlier a decision is made
    - January 2022 MOPC would be a key decision date for most savings
- Only use staff solutions for the 20-Year Assessment
  - Fewer evaluations
- Implement a cloud-based PROMOD environment
  - Will save time by running solutions in a shorter time period

WIND GROWTH VS PLANNING ASSUMPTIONS



SPP Southwest Power Pool

2021 ITP

2021 ITP NEEDS ASSESSMENT

JOSHUA PILGRIM

2021 **ITP**

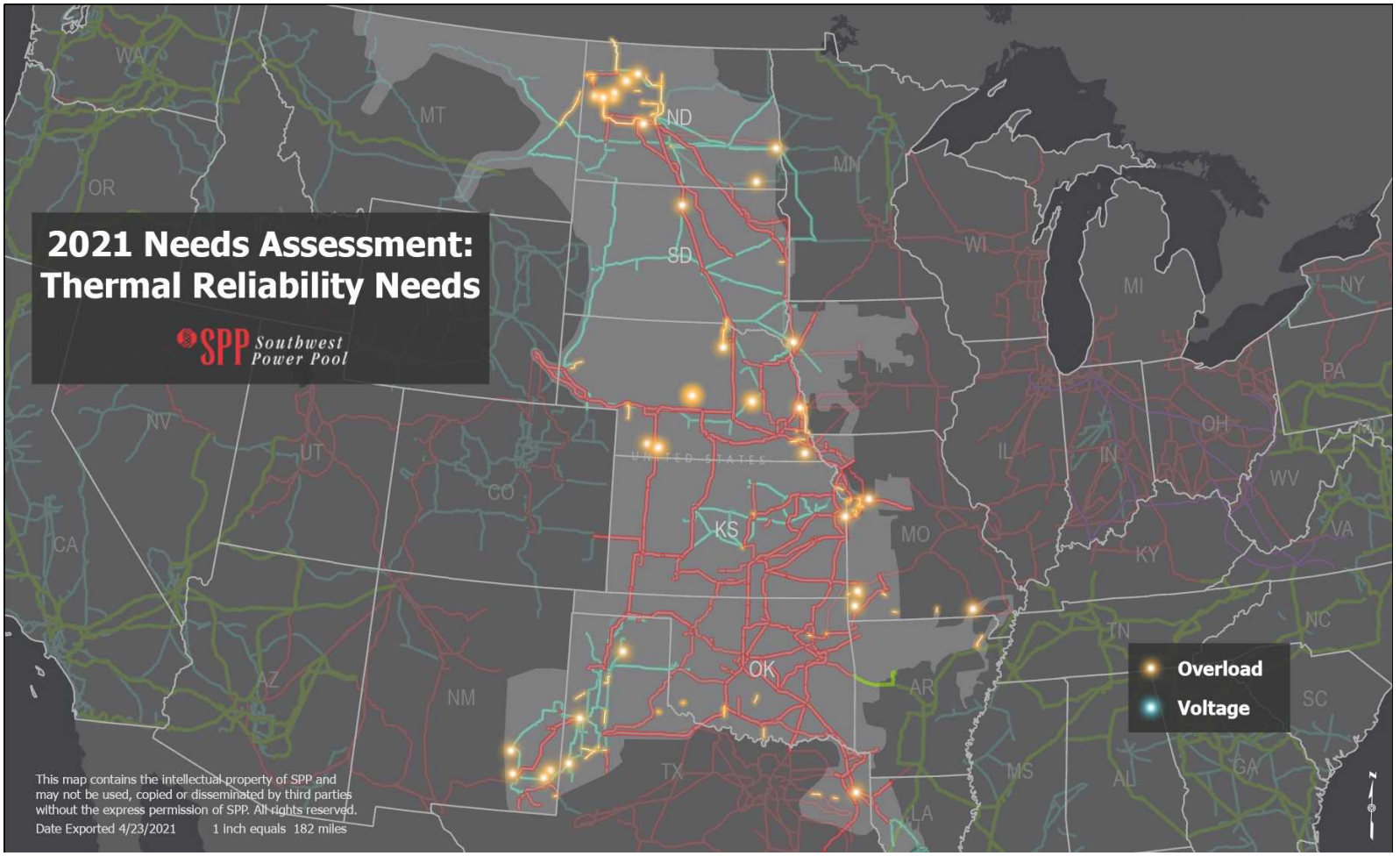
OVERALL NEEDS

DIFFERENCES IN THIS YEAR'S STUDY

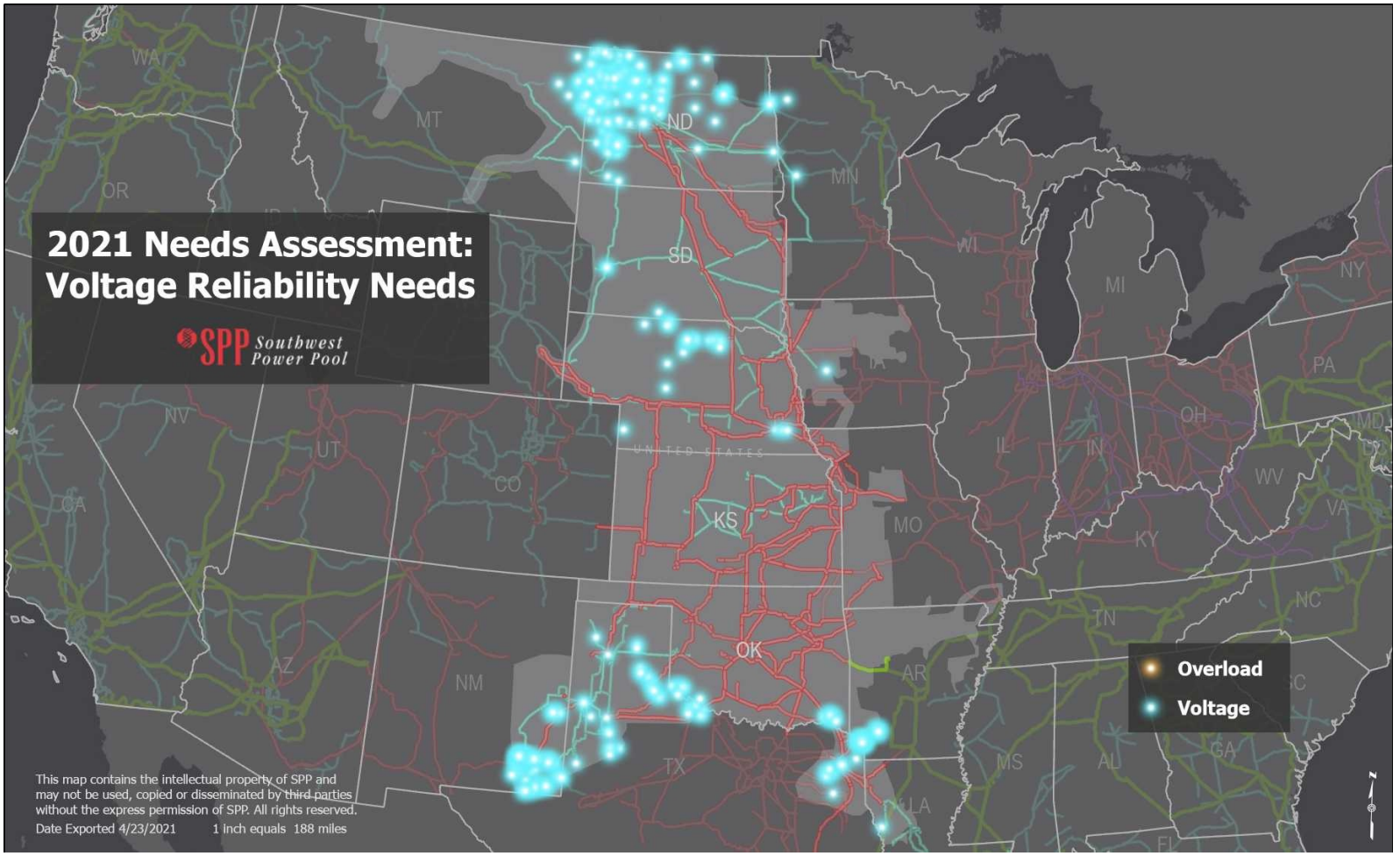
- Member-submitted P3 needs
- Voltage support required in WAPA year 10 winter models to solve the model under base case conditions
- Significant issues in Bakken and SPS including potential voltage collapse needs
- Including terminal vs conductor limitation information in the needs assessment
- Removal of MPMs from posted needs
- Additional sensitivity models being used (2022 BR, 31S_2)
- Interface definitions being considered
- Large number of informational needs being considered

RELIABILITY NEEDS

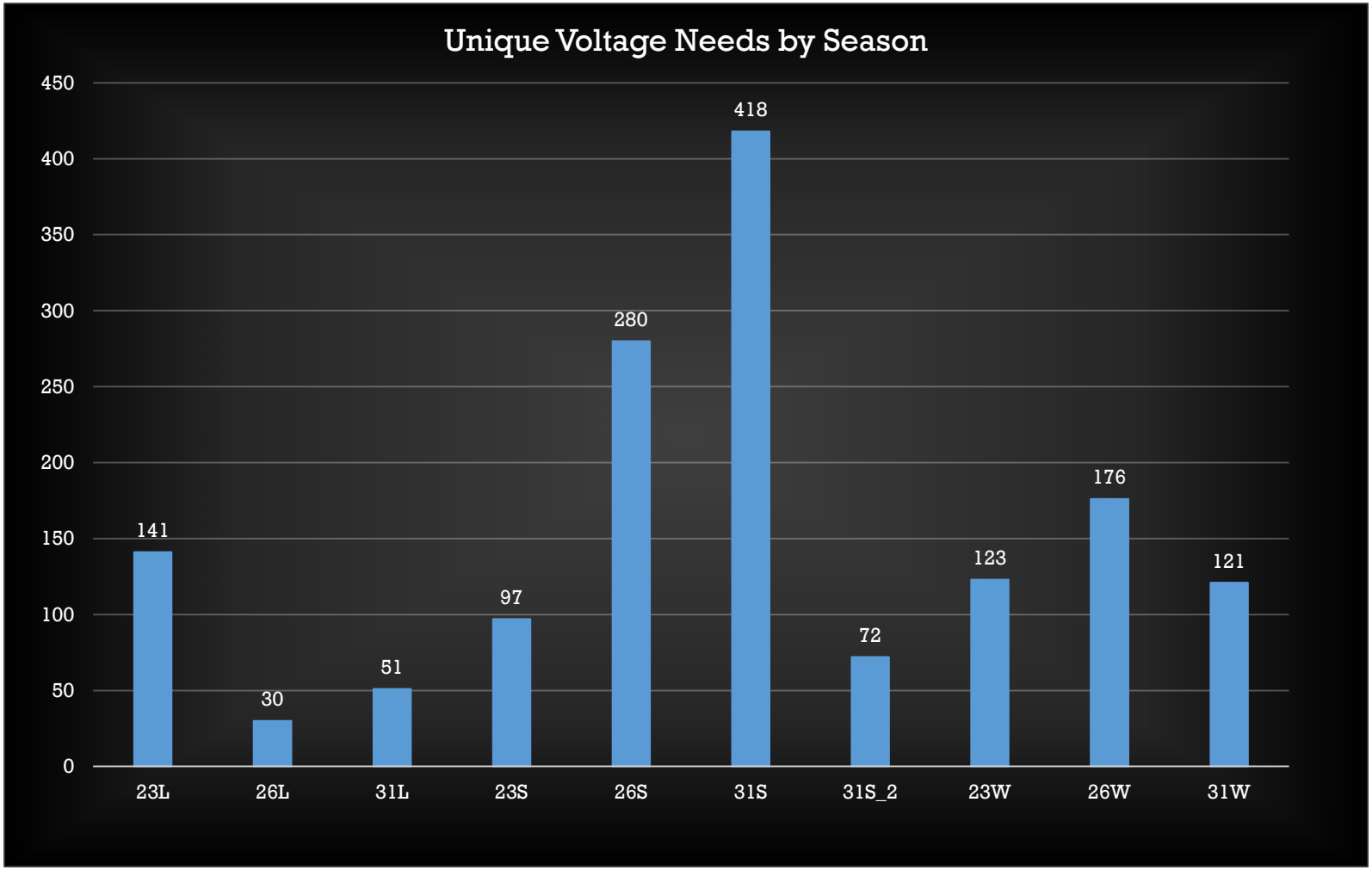
THERMAL NEEDS



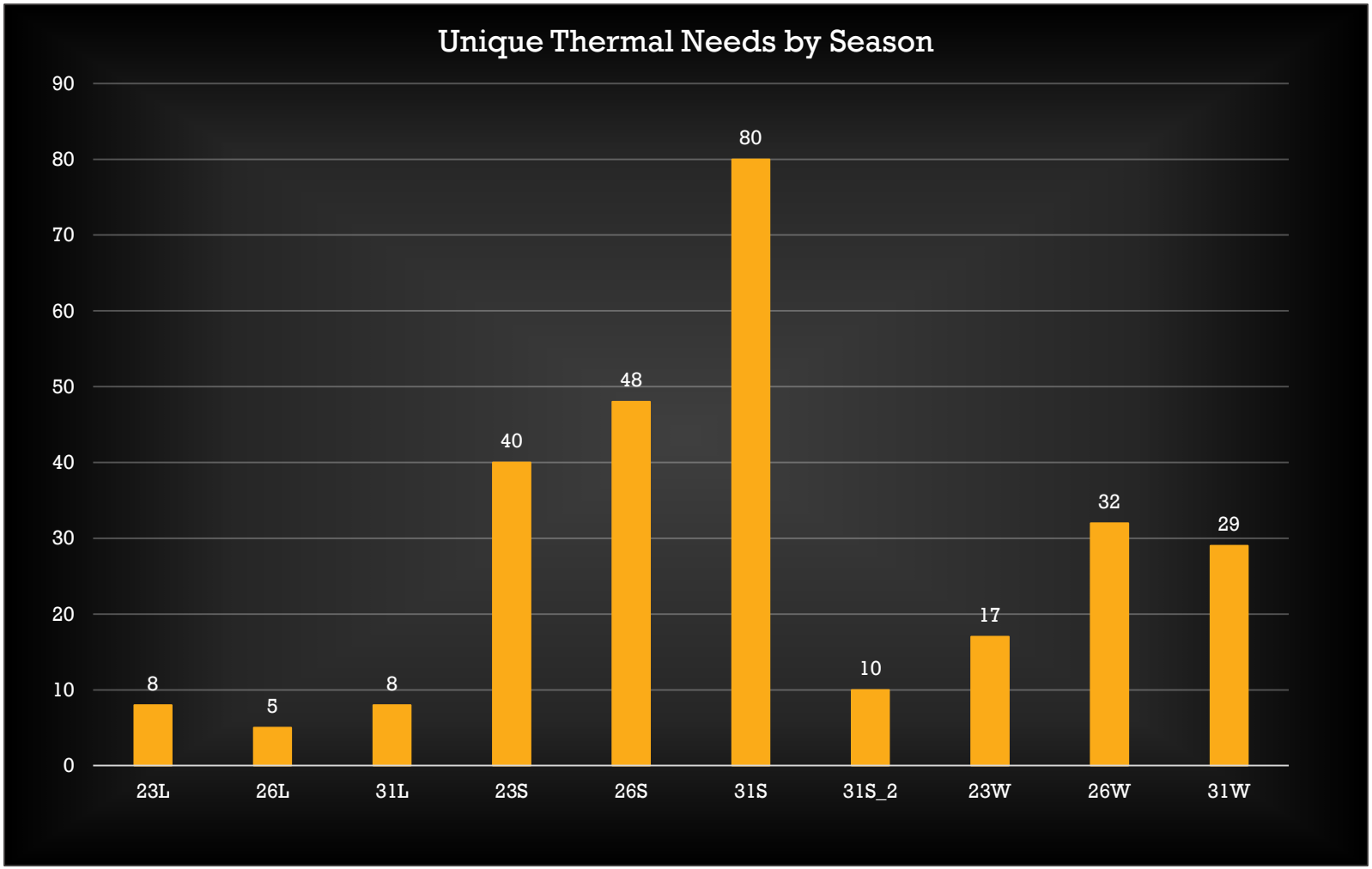
VOLTAGE NEEDS



RELIABILITY NEEDS



RELIABILITY NEEDS



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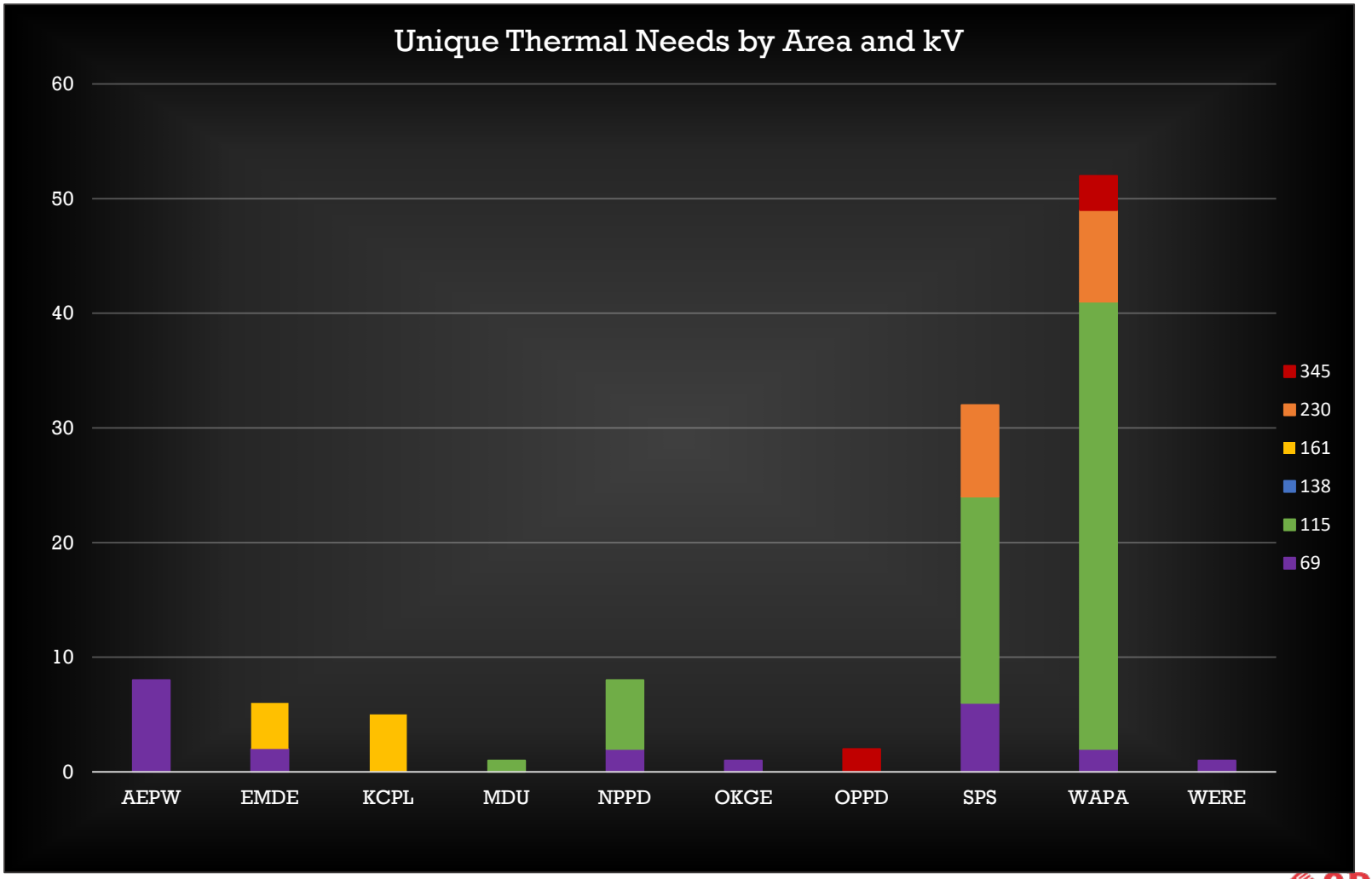

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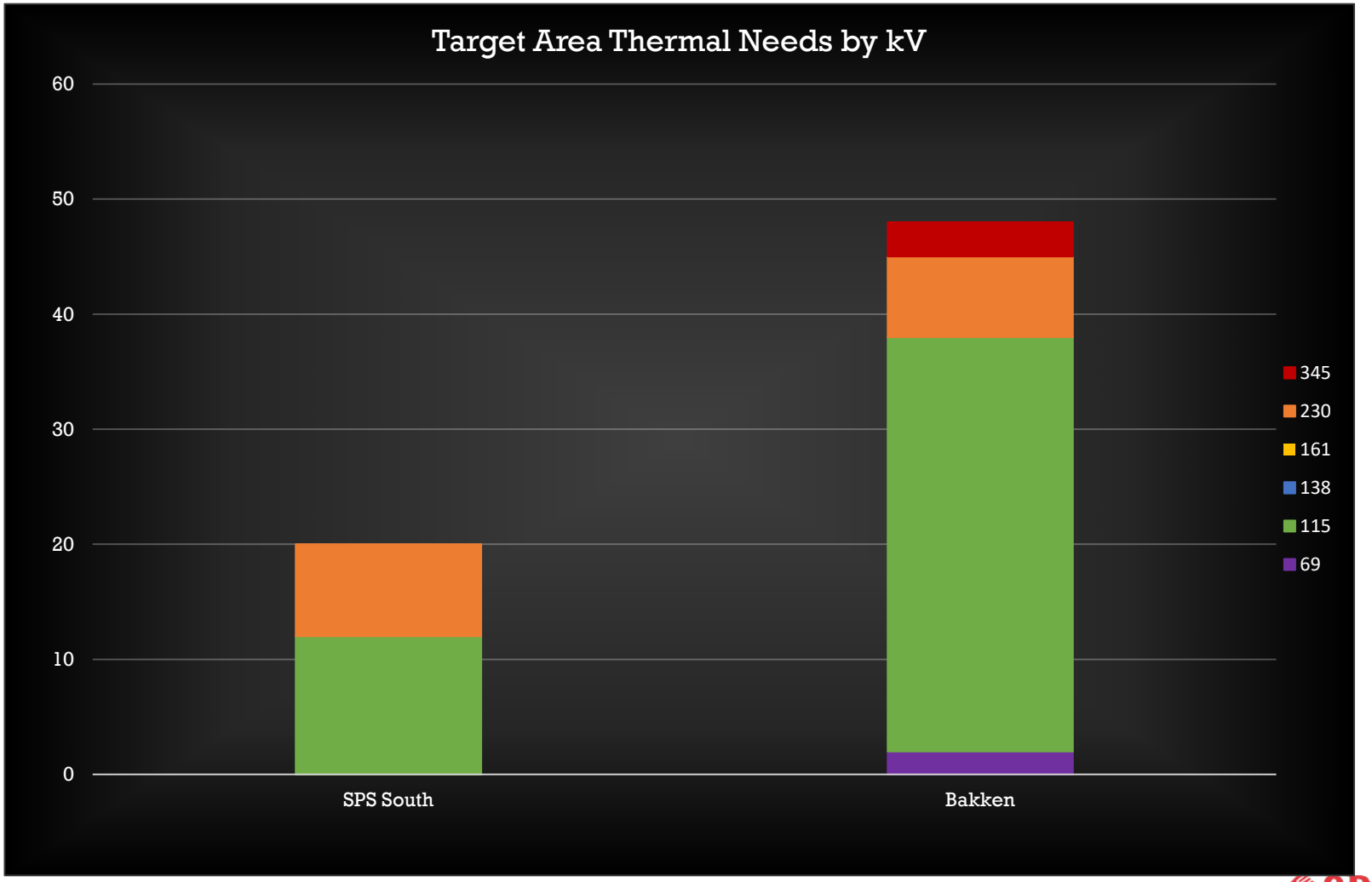
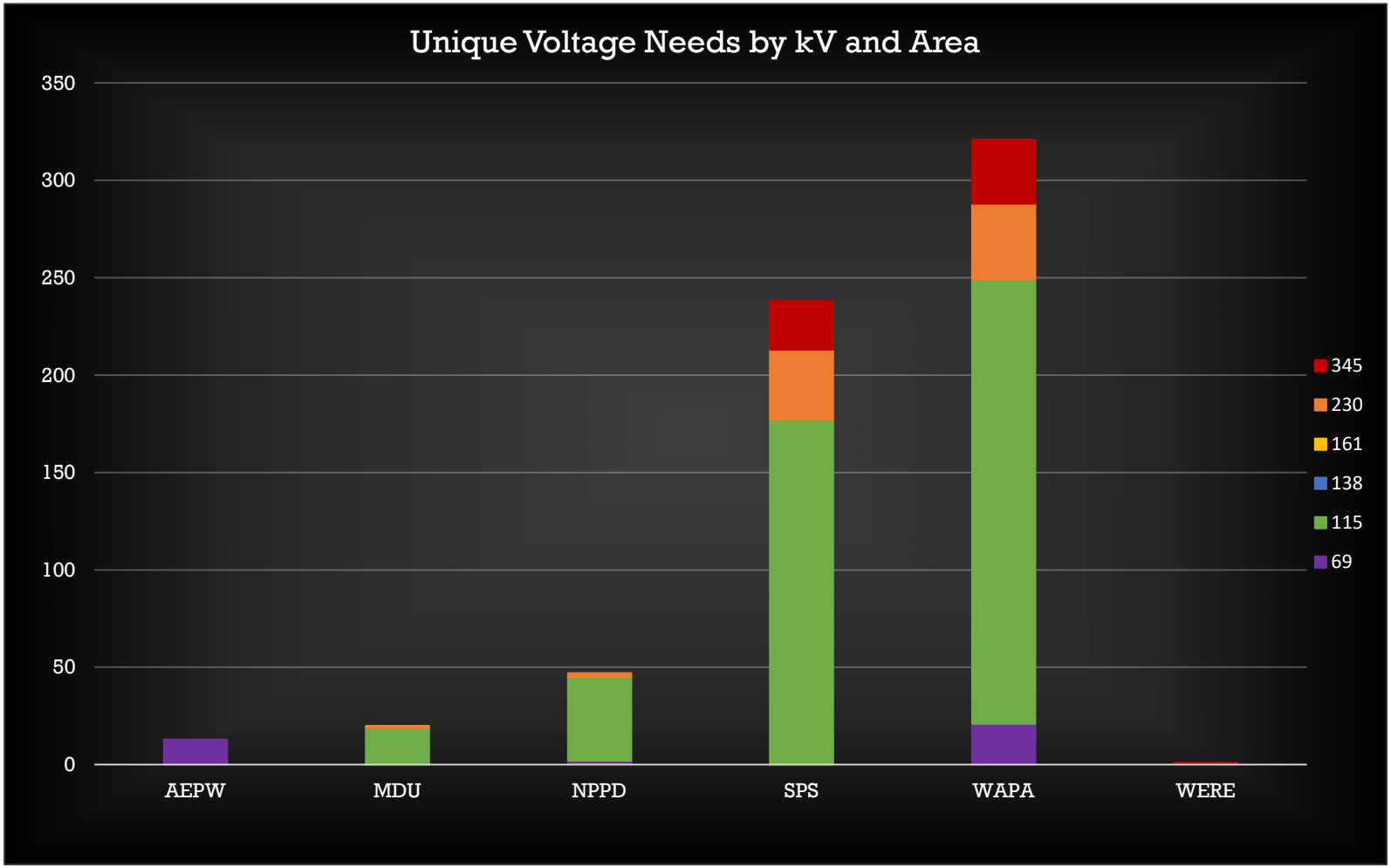
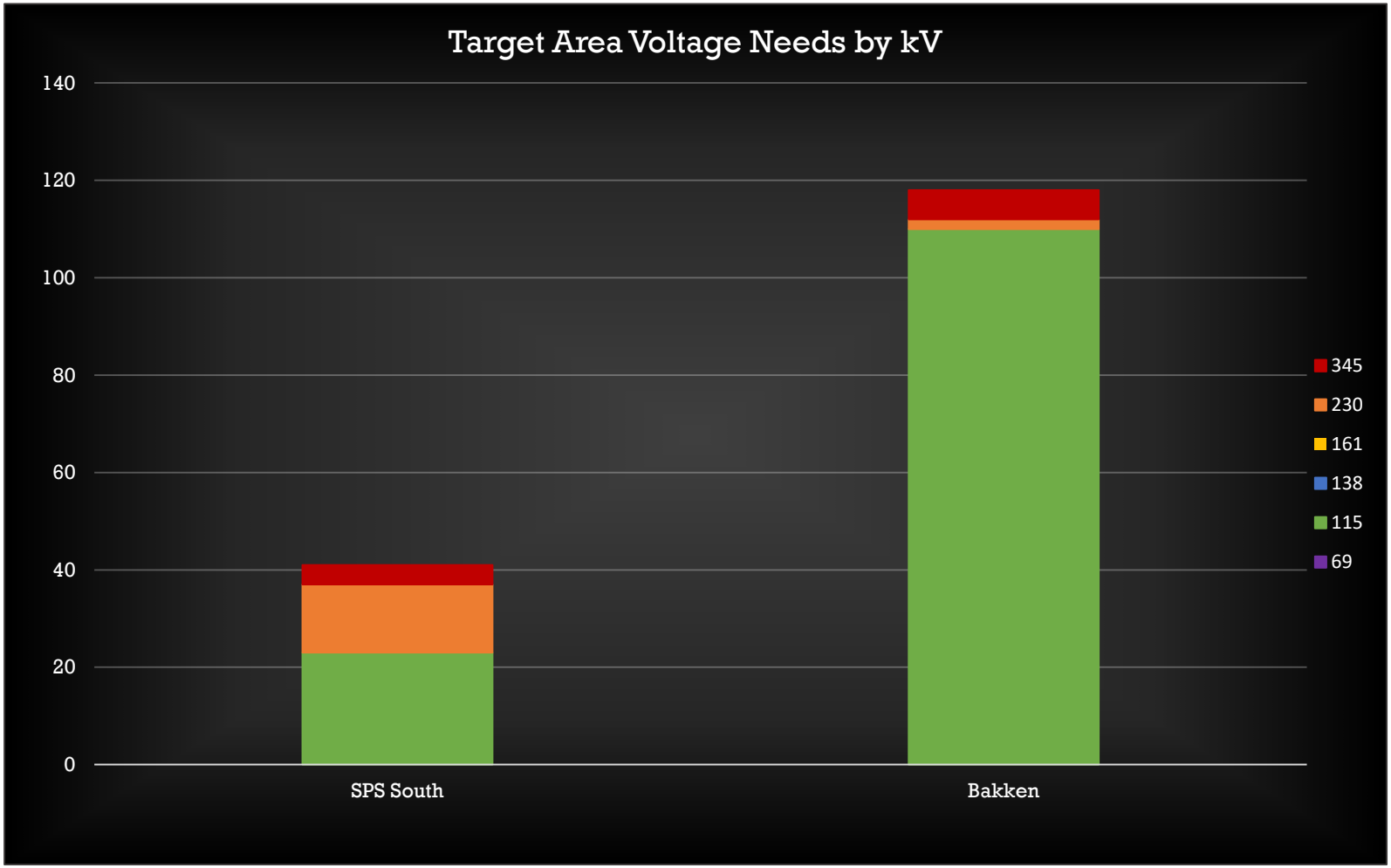


RELIABILITY NEEDS



RELIABILITY NEEDS



RELIABILITY NEEDS

- Outside of Bakken, needs are primarily driven by de-rates and model topology changes
- Inside Bakken, most thermal and voltage issues are driven by the low voltages present during base case conditions

ECONOMIC NEEDS

ECONOMIC NEEDS

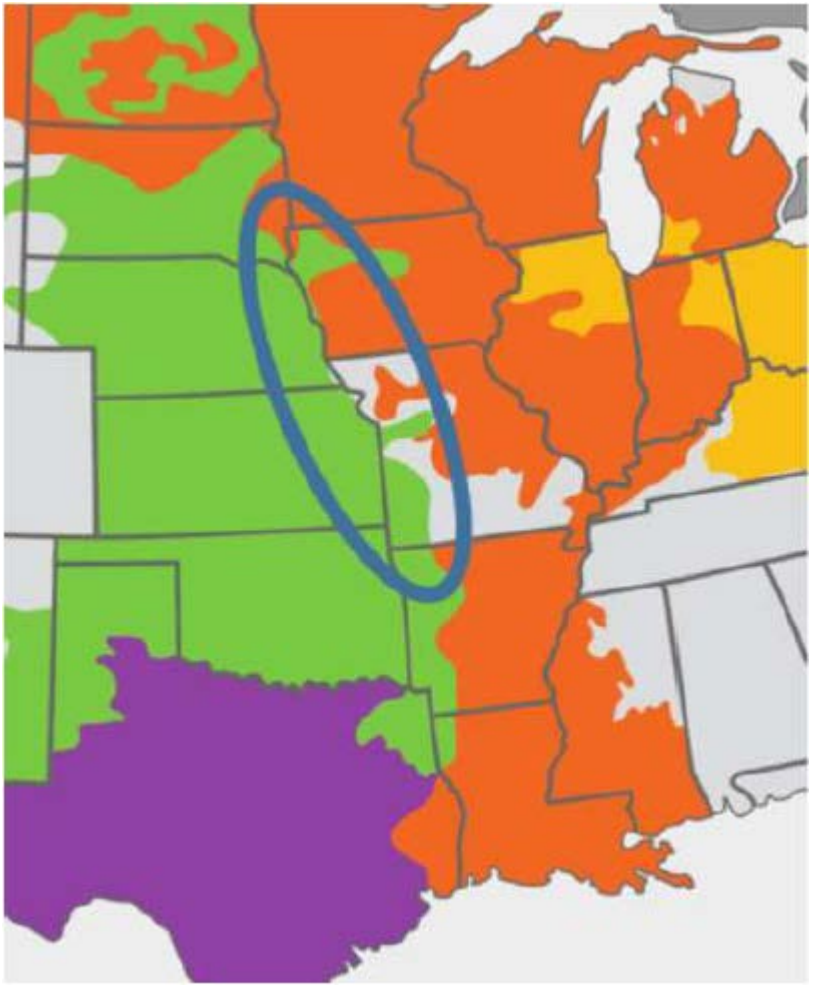
- Currently, 36 unique monitored elements are being slated for inclusion in the economic analysis
- The most congested element is the Lamar Transformer FLO MORGAN-7JASPER-1 345kV
- Butler – Altoona still present
- Several overlaps between reliability and economic needs
- Overlap between economic and operational needs

JTIQ ECONOMIC NEEDS

Constraint Name	Region	Priority	Max Congestion Score
B:3006512LAMR 3007945LAMAR 1 FLO 508:7MORGAN-7JASPER-1-345kV	SW MO	JTIQ Secondary	1,569,085
B:532987BUTLER 4 533001ALTOONA4 1 FLO 1186:G17-009-TAP-NEOSHO 7-1-345kV	SE KS	JTIQ Secondary	981,838
B:615649GRE-CHUBLAK3615650GRE-CHUBLAK71 FLO 2054:HELENA 3-SCOTTCO3-1-345kV	SW MN	JTIQ Secondary	677,031
B:3001135SRIVER 3003395EMERSN 1 FLO 725:7ZACHARY-7MAYWOOD-1-345kV	NE MO	JTIQ Secondary	570,132
B:631060TRK RIV5 681519STONEMAN 1 FLO 940:HCKRYCK3-HLV 345-1-345kV	NE IA	JTIQ Secondary	467,986
B:616002GRE-JOHNJCT7652555MORRIS 7 1 FLO 2185:BRKNGCO3-ASTORIA 3-1-345kV	SW MN	JTIQ Secondary	466,185
B:616002GRE-JOHNJCT7652555MORRIS 7 1 FLO 2203:HANKSON4-WAHPETN4-1-230kV	SW MN	JTIQ Secondary	381,856
B:3003492SRIVER 3015662BROSS4 1 FLO 274:5SPALDNG-5HANW-1-161kV	NE MO	JTIQ Secondary	361,230
B:505528AKINS W5 505550SALISAW5 1 FLO 206:MUSKOGE7-FTSMITH7-1-345kV	NE OK	JTIQ	292,469
B:547468AUR124 5 547473RDS295 5 1 FLO 702:BEAVER 5-EUREKA 5-1-161kV	SW MO	JTIQ	286,733
B:509817T.NO.--4 509839CDC-ET 4 1 FLO 736:GRDA1 7-GREC TAP7-1-345kV	NE OK	JTIQ	163,460
B:3001015MORGAN 505498STOCKTN5 1 FLO 508:7MORGAN-7JASPER-1-345kV	SW MO	JTIQ	160,033

JTIQ SCOPE

- Identify more comprehensive, cost effective and efficient upgrades than would otherwise be identified in the current interconnection queue process where upgrades are identified in the time sequence by one or the other RTO
- Identify solutions that meet the needs of interconnection customers and provide benefits to load in both SPP and MISO near the seam
- Identify opportunities to improve coordination between processes and affected parties both in this instance and on an ongoing basis



ECON NEEDS IN BAKKEN TARGET AREA

- 20 of the 45 unique Economic Needs were related to the Bakken target area
  - Most congested: Watford-Charlie Creek 230kV for the loss of Charlie Creek-Patentgate 345kV
    - B1 Sensitivity Congestion Score: $528,990/MW
    - B3 Sensitivity Congestion Score: $440,523/MW
- 17 related constraints were identified in the Bakken Target Area Scope

ECON NEEDS IN SPS SOUTH TARGET AREA

- 3 of the 45 unique Economic Needs were related to the SPS South target area
  - Most congested: SPSNMTIES Flowgate for base case
    - B1 Sensitivity Congestion Score: $ 346,699/MW
    - B3 Sensitivity Congestion Score: $ 487,772/MW
- 22 related constraints were identified in the SPS South Target Area Scope
  - SPPSPSTIES Flowgate has a congestion score of $21,454/MW
  - Per the SPS South Target Area Scope, as solutions for the SPS South target area are develop, the SPPSPSTIES interface should also be considered as it is an impactful voltage stability interface.
  - This interface restricts the flow into the Southwestern Public Service territory from the rest of the SPP footprint to 1345 MW year-round. The interface is comprised of five 345 kV lines, one 230 kV line, and three 115kV lines.

SPP Southwest Power Pool

2021 ITP

2021 ITP TARGET AREA PORTFOLIO DEVELOPMENT STRAWMAN

SPP STAFF

JUNE 2021 ESWG/TWG

Helping our members work together to keep the lights on... today and in the future.

SouthwestPowerPool SPPorg southwest-power-pool

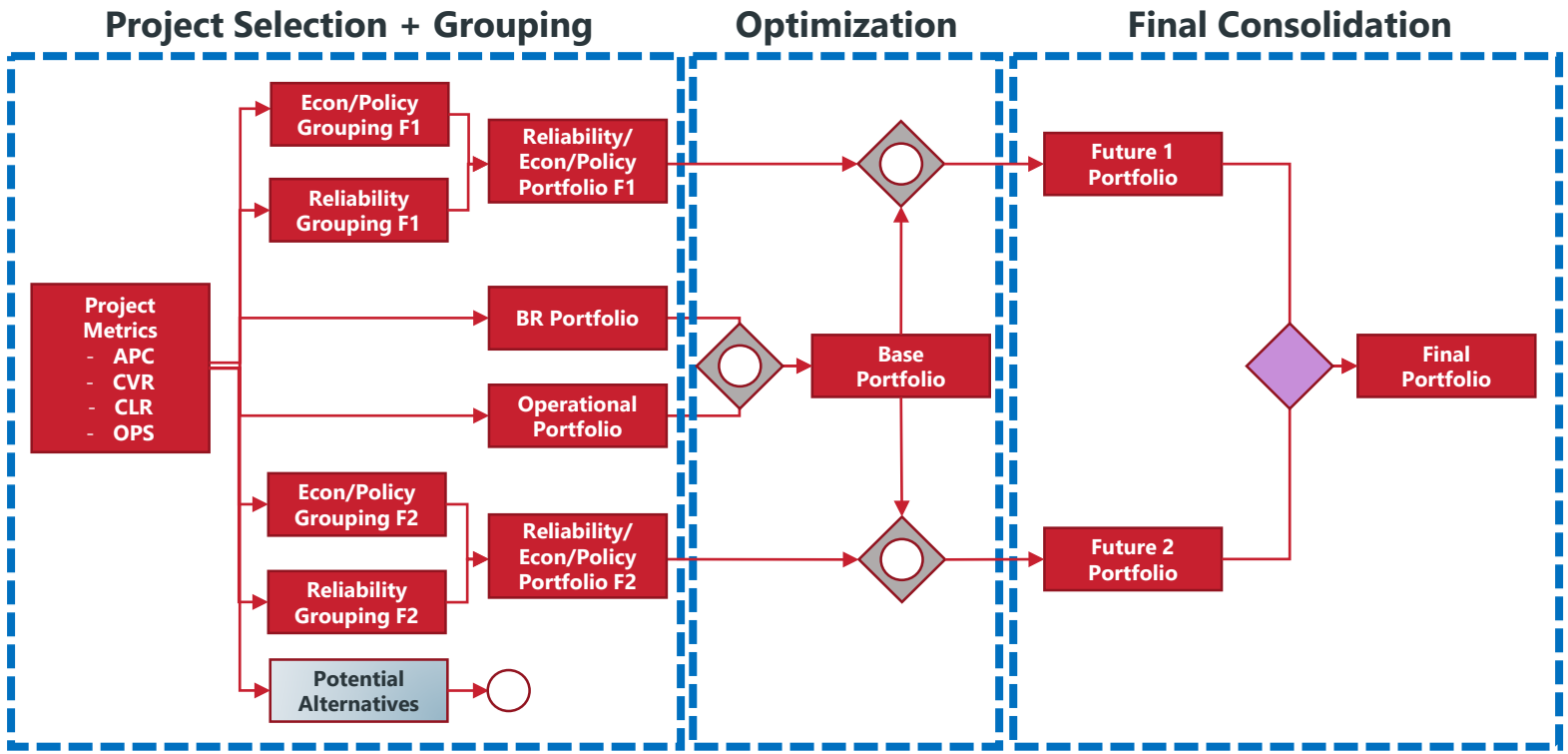
OVERVIEW

- Review Target Area Portfolio Development Strawman

2021 **ITP**

TARGET AREA PORTFOLIO DEVELOPMENT STRAWMAN

PORTFOLIO DEVELOPMENT OVERVIEW

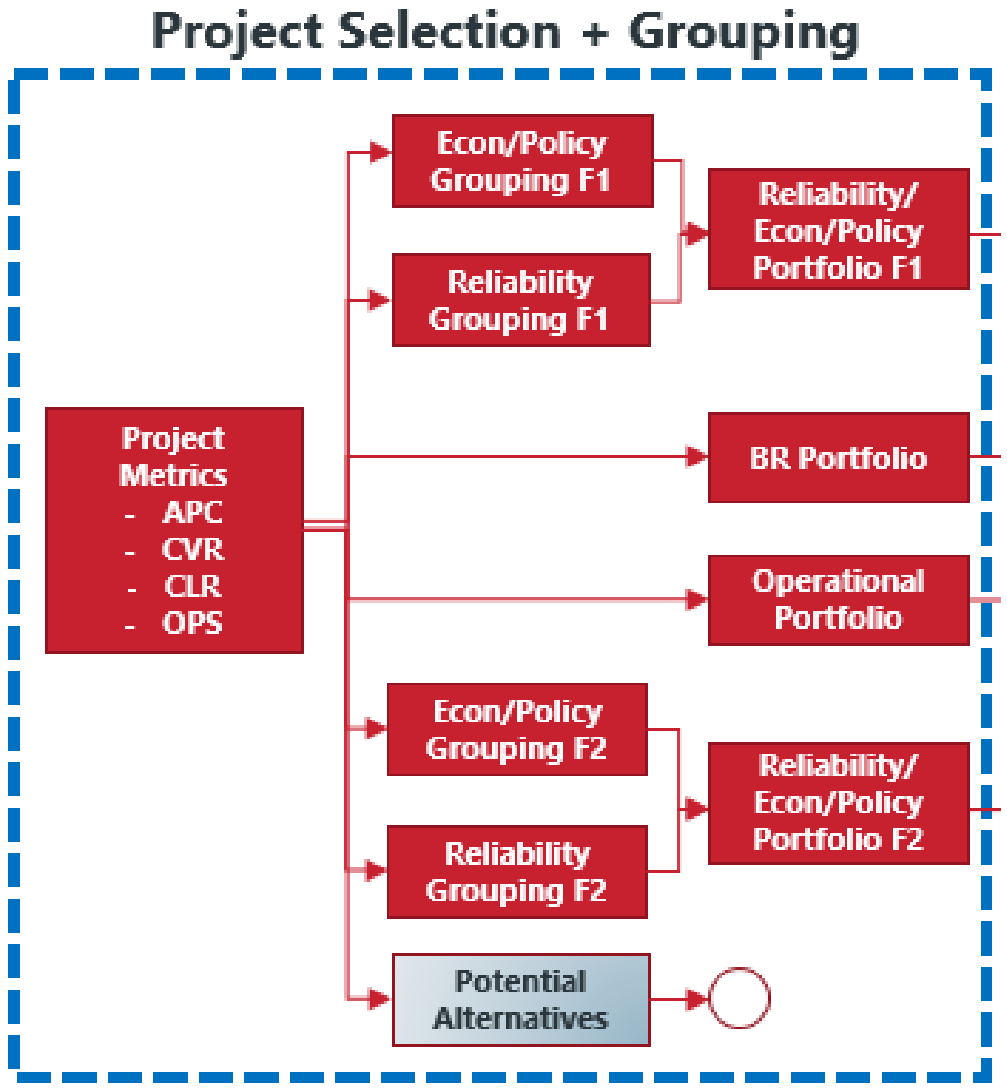


Optimization with consideration of potential alternatives

Individual project review including assessment of unmet needs

ECONOMIC GROUPING

- Develop Highest Net and Multivariable Portfolio Using Economic Sensitivity Model
- More Priority/Effort given to SPS South for identifying alternatives to support Base Reliability Portfolio
- Less Priority/Effort given to Bakken to support Base Reliability Portfolio and to inform construction approval recommendations
- Introduce consolidation process for SPS South to select groupings with 50/50 weighting for Economic models
- Introduce additional Risk-based Planning, PV, and QV analysis to consolidation step to select portfolio **(optional)**



INTRODUCE CONSOLIDATION PROCESS FOR SPS SOUTH TO SELECT GROUPINGS WITH 50/50 WEIGHTING

- Applies to competing project scenario and project selected in one economic model scenario
- Risked Based Planning, PV, and QV Analysis Scoring Contribution (optional)
- Engineering judgement recommendation to support or oppose outcome (optional)

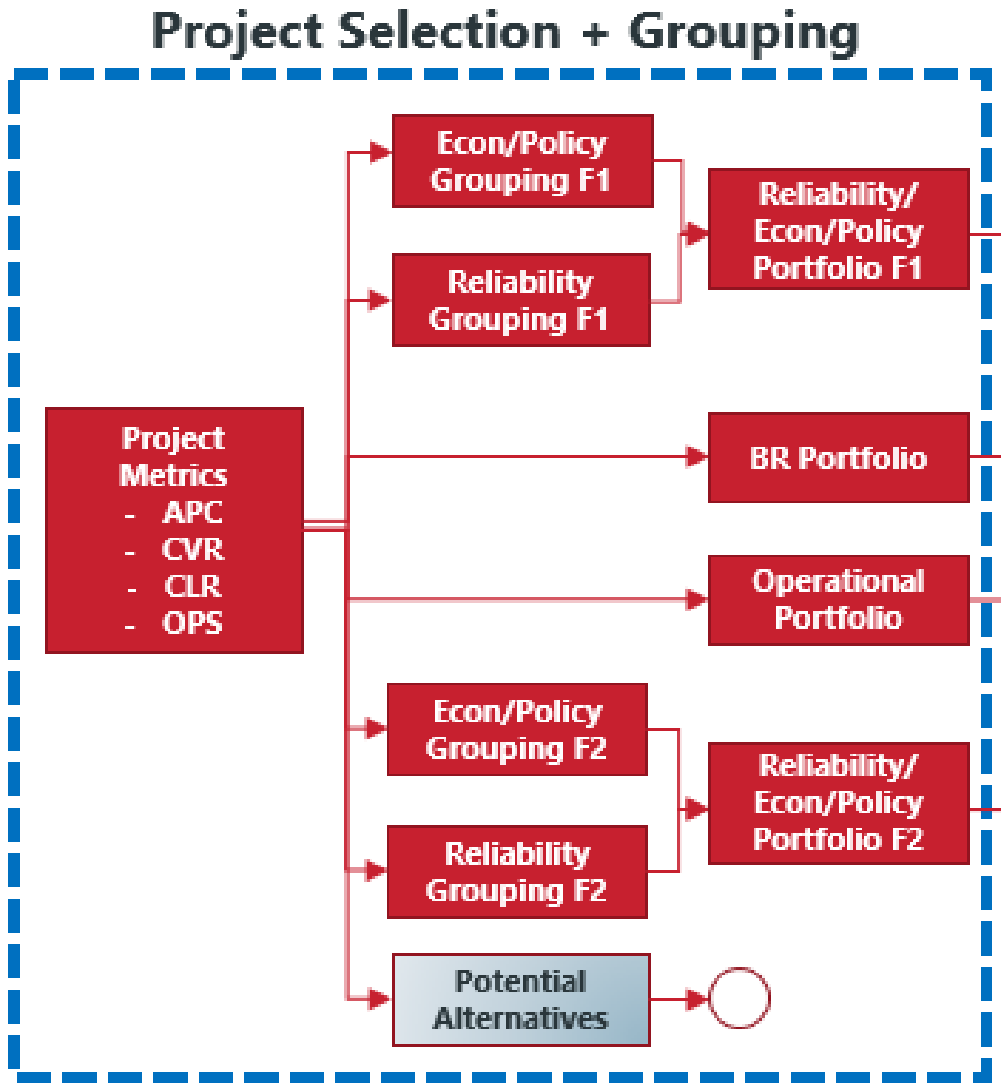
No.	Considerations	Possible Points	Threshold
1	40-yr (1-year) APC B/C in Base Scenario	50	1.0 (0.9)
	40-yr (1-year) APC B/C in Sensitivity Scenario		0.8 (0.7)
	40-yr (1-year) APC Net Benefit in Base Scenario ($M)		N/A
	40-yr (1-year) APC Net Benefit in Sensitivity Scenario ($M)		N/A
2	Congestion Relieved in Base Scenario (by need(s), all years)	10	N/A
	Congestion Relieved in Sensitivity Scenario (by need(s), all years)	10	N/A
3	Operational Congestion Costs or Reconfiguration ($M/yr or hrs/yr)	10	>0
4	New EHV	7.5	Y/N
5	Mitigate Non-Thermal Issues	7.5	Y/N
6	Long Term Viability (Eg 2013 ITP20) or ARR	5	Y/N
7	Risked Based Planning, PV, and QV Analysis (optional)	?	?
Total Points Possible (70 point Threshold in Scenario 3)		**100**	

INTRODUCE ADDITIONAL RISK-BASED PLANNING, PV, AND QV ANALYSIS TO CONSOLIDATION PROCESS TO SELECT GROUPINGS (OPTIONAL)

- Award points to project alternative with highest change in risk based index per project cost
  - For example,
    - Calculate change in Unexpected Unserved Energy (UUE) per project alternative
    - Calculate Incremental Reliability Index (IRI) = reliability improvement per million dollar = Change in UUE divided by project cost
- Award points to project alternative with highest PV and QV increase per project cost

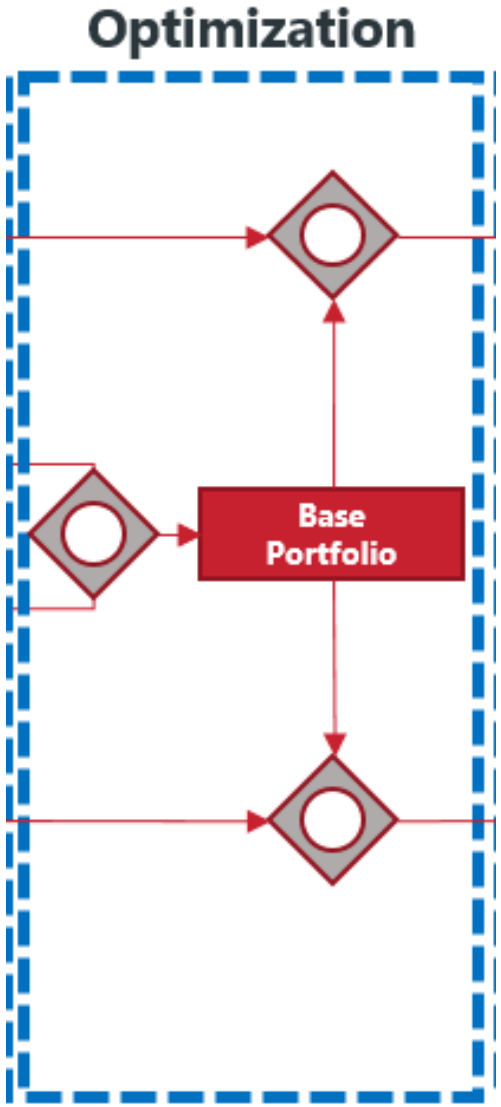
RELIABILITY GROUPING

- Develop Base Reliability alternatives for SPS South using both Base Reliability and SPSNMTIES Base transfer sensitivity model sets
- Develop and Analyze Base Reliability alternatives for Bakken Low Load Sensitivity Model AND Introduce step to select portion of Base Reliability alternatives for construction approval
- Introduce additional Risk-based Planning, PV, and QV analysis to select alternative **(optional)**



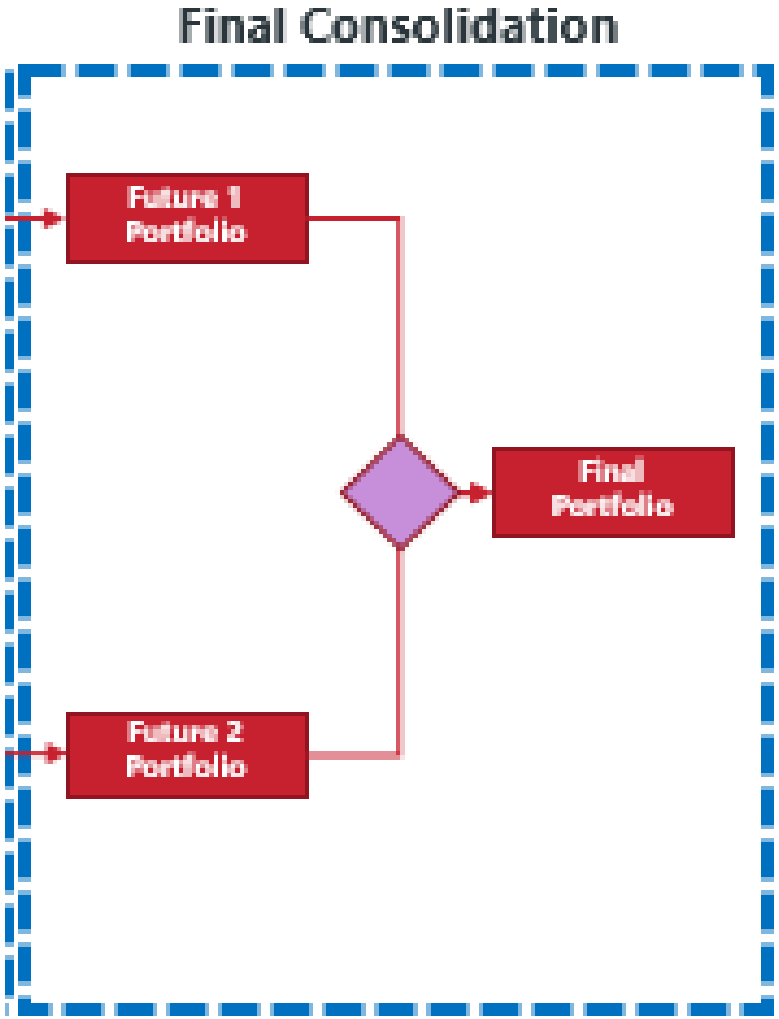
OPTIMIZATION (PORTFOLIO SYNERGY)

- Optimization addresses overlap between Economic and Reliability portfolio to select best alternative meeting same set of needs
- Introduce additional Risk-based Planning, PV, and QV analysis to optimization step to select best target area alternative for future 1 and 2 consolidation **(optional)**



CONSOLIDATION

- Consolidation involves Individual project review including assessment of unmet needs
- Introduce economic model sensitivity for SPS South into consolidation using equal weighting with F1 and F2 Economic models
- Introduce additional Risk-based Planning, PV, and QV analysis to consolodation **(optional)**



INTRODUCE ECONOMIC MODEL SENSITIVITY FOR SPS SOUTH INTO CONSOLIDATION USING EQUAL WEIGHTING WITH F1 AND F2 ECONOMIC MODELS

- Applies to competing project scenario and project selected in one economic model scenario
- Review consolidation formulas to add sensitivity model results with equal weighting with F1 and F2 Economic Models
- Risked Based Planning, PV, and QV Analysis Scoring Contribution (optional)
- Engineering judgement recommendation to support or oppose outcome (optional)

No.	Considerations	Possible Points	Threshold
1	40-yr (1-year) APC B/C in Selected Future and Sensitivity	50	1.0 (0.9)
	40-yr (1-year) APC B/C in Opposite Future and Sensitivity		0.8 (0.7)
	40-yr (1-year) APC Net Benefit in Selected Future and Sensitivity ($M)		N/A
	40-yr (1-year) APC Net Benefit in Opposite Future and Sensitivity ($M)		N/A
2	Congestion Relieved in Selected Future and Sensitivity (by need(s), all years)	10	N/A
	Congestion Relieved in Opposite Future and Sensitivity (by need(s), all years)	10	N/A
3	Operational Congestion Costs or Reconfiguration ($M/yr or hrs/yr)	10	>0
4	New EHV	7.5	Y/N
5	Mitigate Non-Thermal Issues	7.5	Y/N
6	Long Term Viability (Eg 2013 ITP20) or ARR	5	Y/N
7	Risked Based Planning, PV, and QV Analysis (optional)	?	?
Total Points Possible (70 point Threshold in Scenario 3)		**100**	

NEXT STEPS

NEXT STEPS

- Continue to identify details and schedule of target area portfolio development
- Anticipate and prepare for additional portfolio development policy and technical challenges

2021 **ITP**

APPENDIX

2021 **ITP**

TARGET AREA SUMMARY

BAKKEN TARGET AREA

- Background
  - 2016 ITP Near-Term Kummer Ridge - Roundup 345 kV circuit 1 approval and subsequent withdrawal
  - 2019 and 2020 ITP persistent economic operational issue (informational)
  - MOPC action item to assess increased load growth and cold weather-driven scenarios and contingencies
  - EPRI Risk-based planning assessment area of focus
  - Base reliability (BR) thermal and voltage collapse conditions and Market Economic Model (MEM) congestion

Challenge	Opportunity
2021 BR Year 10 Winter model includes 2 proxy static var compensators (SVCs)	Provide instructions for Detailed Project Proposals (DPPs) to include commands to inactivate SVCs
Bakken Load forecast higher than expected in 2021 ITP BR model	Introduce BR and Economic Low Load Sensitivity Model and Needs into portfolio development and project recommendation process

SPS SOUTH TARGET AREA

- Background
  - High Priority Incremental Load Study load and transmission additions, 2017 ITP10 Additional Analysis for Potter to Tolk 345 kV line recommendation, Attachment AQ load and transmission additions
  - 2020 ITP reliability and economic assessment conclusion to use 2021 ITP to address uncertainties in eastern New Mexico
  - BR thermal and voltage collapse conditions and MEM congestion
  - BR SPS New Mexico Ties (SPSNMTIES) Interface violations and MEM congestion as proxy for marginal voltage stability limit

Challenge	Opportunity
2021 BR Year 10 Summer model includes 1 proxy SVC	Provide 2021 BR Year 10 Summer model and SPS Needs without SVC
SPSNMTIES Interface BR violations and MEM congestion	Introduce Base Reliability SPSNMTIES Base and Incremental Transfer Analysis Sensitivity Models and Needs to proxy PV analysis into portfolio development and project recommendation process
MEM assumes significant EHV GOF in the area with load serving and economic energy delivery qualities to support the 2021 ITP Resource Plan Combined Cycle Plant	Introduce MEM Low Retirement Sensitivity Model and Needs without GOF and Combined Cycle Plant into portfolio development and project recommendation process

2021 **ITP**

TARGET AREA INFORMATIONAL NEEDS AND ADDITIONAL ANALYSIS (OPTIONAL)

TARGET AREA INFORMATIONAL NEEDS AND ADDITIONAL ANALYSIS (OPTIONAL)

- Bakken and SPS South
  - Higher order planning events that allow for non-consequential load loss (NCLL)
  - Evaluate how well top solutions reduce severity and NCLL for risk-based planning initiative
- Bakken
  - Cold weather-driven scenarios and contingencies
  - Evaluate how well top solutions reduce severity and NCLL for risk-based planning initiative
- SPS South
  - Perform PV and QV analysis on top solutions using BR base and incremental transfer sensitivity models

20-YEAR ASSESSMENT – SCOPE AND STUDY EXECUTION ACTION ITEMS

SHERRI MAXEY

JUNE 2021

OVERVIEW

- Staff's Approach
- Action Items identified – Updates from May ESWG presentation shown in red

STAFF'S APPROACH

- Purpose: Identify 20-Year Assessment scope and study execution items to be addressed with stakeholders
- Action: Take chronological approach by ITP study milestone
- Goal: Bring back 1-2 months prior to start of milestone work for stakeholder discussion and decision

ACTION ITEMS

ID	Description	Milestone(s)	Status Update
1	Load growth distribution and approach to non-conforming load (partial overlap with item 2)	Powerflow Models / Load Review	*Completed*
2	Implementing future drivers in generation and load review, and market economic model (MEM) Supply side items: • Emissions target and gas retirements (F3/F4), modeling and monitoring • Electric storage additions - transmission, energy or capacity asset, or all of the above? ✓ Distributed resource forecasts and modeling • Fuel forecasts extrapolation and adjustments Demand side items: ✓ Load shape changes (will complete in MEM) ✓ General electrification (*eg.*, 20YR - F3/F4) ✓ Electric vehicle growth and distribution ✓ Demand response ✓ Energy efficiency	Generation and Load Review / Resource Plan (RP2) / MEM	*In progress - partially complete* • Implementing Futures 3 and 4 drivers - *June 2021 ESWG* *Completed:* ✓ Load shape changes *(2042 peak load values will be determined during MEM build)* ✓ General electrification ✓ Electric vehicle growth and distribution ✓ Demand response ✓ Energy Efficiency
3	Renewable policy extrapolation	Renewable Policy Review	*June 2021 ESWG*

ACTION ITEMS - CONTINUED

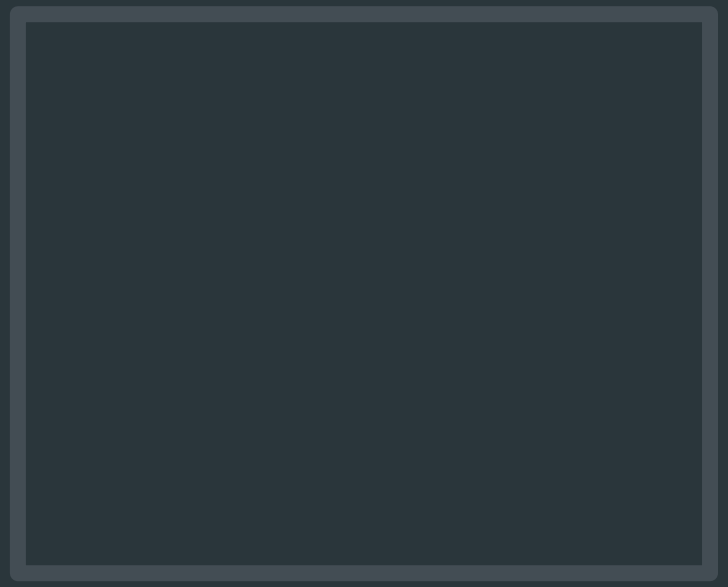
ID	Description	Milestone(s)	Status Update
4	Renewable pricing and PTC assumptions/expirations for new and existing units	Gen Review / RP2 / Siting	*In progress*
5	Aging wind fleet (repowering assumptions)	Gen Review	*In progress*
6	Possible use of resource planning software in 20-Year Assessment; or should we adjust the traditional resource additions?	RP2	*In progress – pending methodology decision for emissions target*
7	Resource Plan strategy for renewables: • Renewable and storage ownership, and accreditation assignment; CT-to-CC ratio; and ELCC implementation • Renewable accreditation	RP2	*In progress*
8	Identification of additional batteries beyond F1 and F2 scoped amounts (requires Scope change); including hybrid issues	RP2	*In progress*
9	External region resource plan and siting approaches	RP2	*In progress*

ACTION ITEMS - CONTINUED

ID	Description	Milestone(s)	Status Update
10	Review 12% cap on renewables for reserve margin requirements	RP2	*In progress*
11	Determine resource addition strategy	Siting / Generator Outlet Facilities (GOFs) / Constraint Assessment	*In progress*
12	EPRI transmission capacity hosting tool/SPP initiative for siting	Siting / GOFs / Constraint Assessment	*In progress*
13	MTEP Futures compatibility (2022 ITP & 20YA)	External (Load & Gen Review / RP2 / Siting)	*In progress*
14	Hybrid Solar/Renewable and Battery Modeling and GI Surplus Capacity	Siting / MEM	*In progress*
15	Generator outlet facilities (GOFs) decision on inclusion in 20-Year Assessment	GOFs	*June 2021 ESWG & TWG*
16	Constraint Assessment on each future; come up with EHV portfolio; monitor everything 100 kV and above? Bring methodology back for review.	Constraint Assessment	

ACTION ITEMS - CONTINUED

ID	Description	Milestone(s)	Status Update
17	20-Year objective function for developing portfolios by future • Approaches to non-SPP APC savings benefits (*eg.*, SPP-Other, SPP economy export APC savings benefits to non-SPP regions) • Approach to seams issues and solutions	Portfolio Development	
18	HV and EHV needs versus HV and EHV solution tradeoffs	Portfolio Development	
19	Identification of sensitivities	Sensitivity Analysis	



CONTACT SLIDE

Communications

Please feel free to contact us at communication@spp.org if you need help with the PPT, need modifications or would like to add a slide to the template.

20-YEAR ASSESSMENT – RESOURCE PLAN – PHASE 2

ANTONIO BARBER / AHMED ALAZZAWI

JUNE 2021

OVERVIEW

- ELCC Overview
- Renewable Accreditation Cap
- Assignment of Renewable Accreditation
- Assignment of Conventional Resources
- F3/F4 Implementation

ELCC OVERVIEW

- Effective Load Carrying Capability (ELCC) is defined as the amount of incremental load a resource, such as wind or solar, can dependably and reliably serve during peak hours
- To effectively measure ELCC of a resource, the reliability effects attributed to the studied resource need to be isolated from the rest of the system

RENEWABLE ACCREDITATION CAP

- Staff is recommending current methodology for allocating renewable accreditation
- Allocation of renewable accreditation will be capped at approximate ELCC values for wind, solar and battery storage*
  - Staff recommends removing the 12% cap
    - Assumption is that most projected renewable resources will have firm service
    - Leaving option open to use 12% cap for existing non-firm renewable resource capacity in excess
    - Approximate ELCC will be reviewed for reasonableness given combined solar, wind and battery projections

* As of 2023, SPP will be migrating to ELCC in place of current SPP Planning Criteria, section 7.1

ASSIGNMENT OF RENEWABLE ACCREDITATION

- Staff recommends utilizing the 2022 ITP Scope methodology for assignment and allocation of renewable accreditation to avoid adding complexities
  - Assignment of wind and batteries adds complexity to siting work for marginal adjusted production cost (APC) saving calculation improvements
    - Staff intends to recommend that F1 and F2 portfolio objective be to maximize APC savings of both SPP-Main and SPP-Other combined to meet existing and future planning process objectives
    - Perceived drawback of this aggregate approach is a slight overstatement APC benefit
  - Existing and new wind accreditation and allocation by zone will be reviewed for reasonableness

	SOLAR	WIND	BATTERY STORAGE
ASSIGNED	Yes	No	No
ALLOCATED	Load-Ratio Share	Based on Zonal Reserve Margin	Load-Ratio Share

ASSIGNMENT OF CONVENTIONAL RESOURCES

- Staff recommends utilizing the current methodology for assigning conventional resource additions
- Staff will continue the exceptions request process for specifying resource addition prototypes for combined cycle (CC) or combustion turbines (CTs)
- Existing and new unit annual operations will be reviewed for reasonableness

FUTURE 3 IMPLEMENTATION

F3 IMPLEMENTATION

- Objective: Inform resource plan changes for Futures 3 and 4 to obtain insight on the scope practicality
  - Approximately implement 20-year F3 scope assumptions in the 2021 ITP F2 Y10 approved model to review battery operation, solar and wind operation, gas operation, and emissions
  - Provide a review of renewable economic curtailments without transmission constraints (copper plate) and renewable curtailment and emission with transmission constraints
  - Implement MMU's F3 prototype analysis, to assess reasonability and to see what adjustment might need to be made
- Benefits: Battery operation improvements. The scope allows to make adjustments to batteries and gas retirements
  - Determine whether or not we need to add more wind, solar, or batteries beyond scoped amounts
  - Determine if we need additional gas retirements to meet emission targets
  - Determine what would happen to wind curtailments in 20-Year
- Next Steps: Determine a battery to retirement ratio if needed after data analysis
  - Scale area demand and energy on a pro-rata basis to approximately meet load projections
  - Scale model wind and solar on a pro-rata basis to meet scoped amounts
  - Scale model batteries on a pro-rata basis to meet scoped amounts
  - Review with no interchange to outside SPP system and no equivalent adjustments
  - Implement scoped retirements (all coal and oil retired)
    - Gas retirements based on age result in ~23GW of remaining gas capacity per MMU analysis discussed during scope development
    - Retire all resource plan CCs and CTs

20-YEAR ASSESSMENT - PROTOTYPES TABLE

- Objective: Inform resource plan changes for Futures 3 and 4 to meet emissions

	Wind (GW)	Solar (GW)	Storage (GW)	Gas (GW)	Demand (GW)	Reserve Margin	Emissions Reduction Target
F1	41	19	20% of projected solar (3.80 GW)	TBD	64.48	TBD	N/A
F2	50	27	35% of projected solar (9.45 GW)	TBD	64.48	TBD	N/A
F3 – MMU	65	48	30.50	23.00	61.00	12% capacity margin (7.32 GW)	TBD
F3 – MMU's Implementation - slight variations	65	48	30.50	21.16	65.29	12% capacity margin (7.83 GW)	TBD
F4	65	48	TBD	TBD	TBD	TBD	TBD

SPP Southwest Power Pool

20-YEAR ASSESSMENT

RENEWABLE POLICY REVIEW

KRISHADA WATSON

JUNE 2-3, 2021

RENEWABLE POLICY EXTRAPOLATION

- Issue: State-specific renewable mandates and goals are not defined for year 20
- Options
  - Option 1: Use year 10 values for 20YA except for states with requirements beyond year 10
    - New Mexico has 80% requirement
  - Option 2: Use year 10 values for 20YA across the board
  - Option 3: Extrapolate year 20 from year 10 values

<u>Recommendation: Option 1</u>

RENEWABLE POLICY EXTRAPOLATION

- Issue: For capacity RPS, final peak load values for F3/F4 will not be available until the market economic model is complete
- Options
  - Option 1: Calculate proxy F3/F4 peak values using F1/F2 peaks, load review monthly peak values, and space heating profiles
    - Kansas and Texas only states with capacity RPS
    - Add peak of space heating profile to estimated winter peak
    - For summer-peaking demand groups: If proxy winter peak is greater than summer peak, proxy winter peak used in RPR
    - For winter-peaking demand groups: Proxy winter peak used in RPR
  - Option 2: Use F1/F2 peak values for F3/F4 20YA RPR calculations

<u>Recommendation: Option 1</u>

RECOMMENDATION

- SPP recommends the ESWG approve the Renewable Policy Review methodologies as presented for use in the 2022 20-Year Assessment

NEXT STEPS

- Using the approved methodology, RPR & RP1 will be posted for review

KRISHADA WATSON

Planning Specialist I, Transmission Planning

Please feel free to contact me at

Email: kwatson@spp.org

SPP Southwest Power Pool

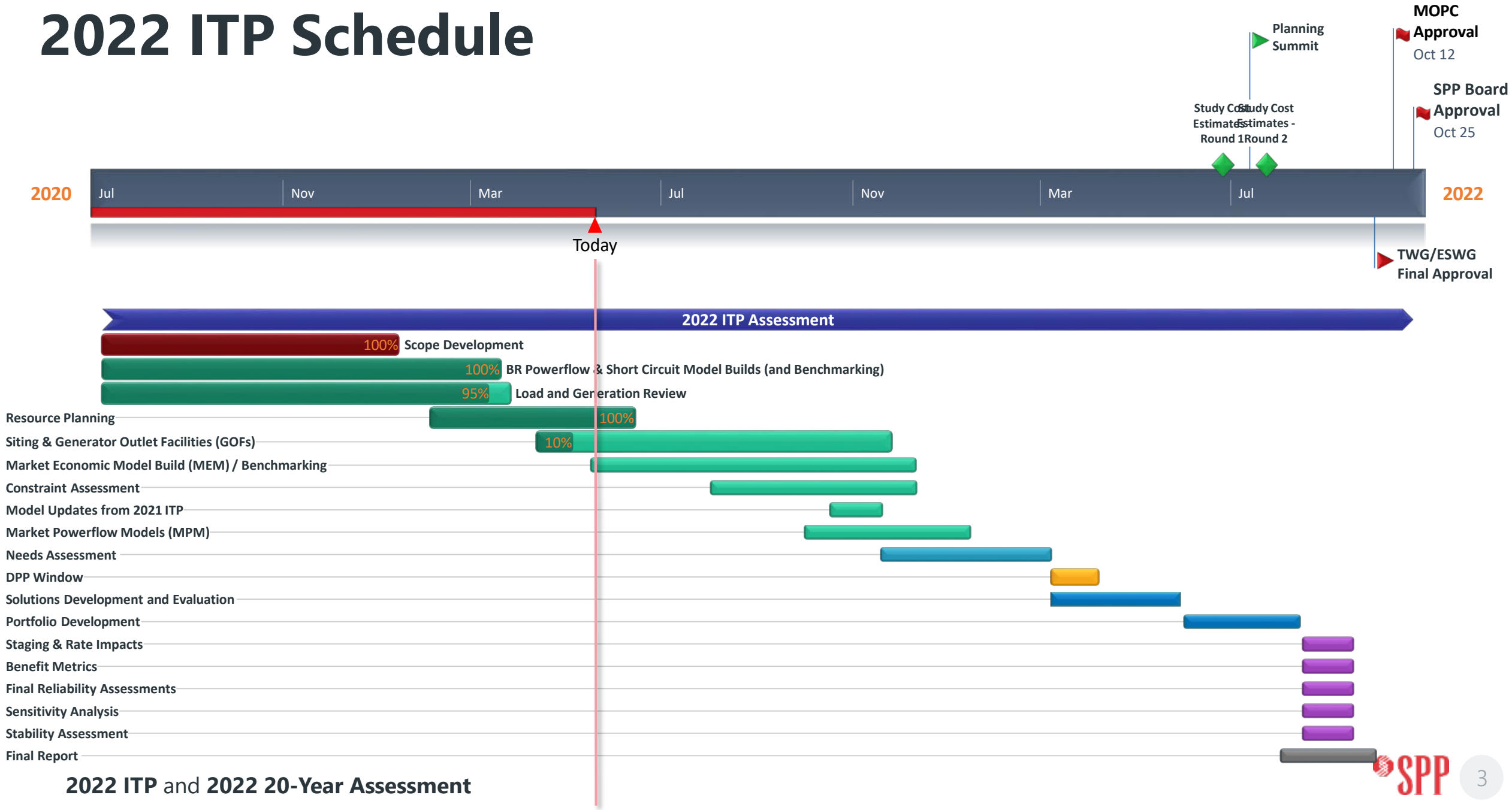
2022 ITP AND 20-YEAR ASSESSMENT SCHEDULES

DARA SOLOMON

JUNE 2021

2022 ITP

2022 ITP Schedule



2022 ITP and **2022 20-Year Assessment**

BASE RELIABILITY POWERFLOW & SHORT CIRCUIT MODELS

- Start: 7/06/2019
- Initial Final Approval: 3/12/2021 (BR Powerflow) & 3/19/2021 (Short-Circuit)
- BR Powerflow & SC - Final Approval: TBD

- Member Review Time:
  - *Pass 0 – Trial 1 (Posting: 7/17/2020): 7/20/2020 – 7/24/2020 (5 days)*
  - *Pass 0 – Trial 2 (Posting: 8/07/2020): 8/10/2020 – 8/28/2020 (15 days)*
  - *Pass 1 – Trial 1 (Posting: 9/25/2020): 9/28/2020 – 10/16/2020 (15 days)*
  - *Pass 1- Trial 1 (Short Circuit) (Posting: 9/29/2020): 9/30/2020 – 10/16/2020 (13 days)*
  - *Pass 1 – Trial 2 (Posting: 11/13/2020): 11/16/2020 – 12/11/2020 (20 days)*
  - Final Submission Deadline: 12/11/2020*
  - *Pass 2 (Posting: 1/15/2021): 1/18/2021 – 2/05/2021 (15 days)*
  - Final Submission Deadline: 2/05/2021**
  - *Final Initial ITP (Posting: 2/05/2021): 2/08/2021 – 2/19/2021 (10 days)*
  - *Final Initial BR Powerflow & Short-Circuit TWG Approval (Posting: 3/05/2021): 3/08/2021 – 3/12/2021 (5 days)*
  - *Final BR Powerflow TWG Approval: 3/31*
  - *Final Initial Final Short-Circuit TWG Approval: 5/5/2021*

- Staff Leader: David Duhart (dduhart@spp.org)
- Working Group Approval: TWG

*** Data Submitters** – Final Submission of Generator Additions, Retirements, Pmin & Pmax, Loads, and Interchange Corrections through MOD & EDST

**** Data Submitters** – Final Submission of Generation Dispatch, Docucheck Corrections, MOD-033 Feedback & Topology data updates through MOD & EDST

RENEWABLE POLICY REVIEW (COMPLETE)

- Start: 2/01/2021
- End: 4/21/2021 (Members' Final Approval)

- Staff Leader: Krishada Watson (kwatson@spp.org)
- Working Group Approval: ESWG

RESOURCE PLAN – PHASE 2

- Start: 2/06/2021
- End: 5/21/2021 (Members' Final Approval)

- Staff Leader: Antonio Barber (abarber@spp.org)
- Working Group Approval: ESWG

SITING PLAN & GENERATOR OUTLET FACILITIES (GOFS)

- Start: 4/12/2021
- End: 9/7/2021 (Members' Final Approval)

- Staff Leader: Josh Norton (jnorton@spp.org)
- Staff Leader: Greg Lampley (glampley@spp.org)

- Working Group Approval: ESWG

MARKET ECONOMIC MODEL BUILD

- Start: 5/17/2021
- End: 12/10/2021 (Members' Initial Final Approval)

- Staff Leader: Charlton Hill (chill@spp.org)
- Working Group Approval: ESWG

MARKET ECONOMIC BENCHMARKING

- Start: 8/6/2021
- End: 10/15/2021 (Members' Final Approval)

- Staff Leader: Charlton Hill (chill@spp.org)
- Working Group Approval: ESWG

CONSTRAINT ASSESSMENT

- Start: 08/02/2021
- End: 12/10/2021 (Member's Final Approval)

- Staff Leader: Jake Morris (jmorris@spp.org)
- Working Group Approval: TWG

MARKET POWERFLOW MODELS (MPM)

- Start: 11/15/2021
- End: 1/14/2022 (Member's Final Approval)

- Staff Leader: Michael Odom (modom@spp.org)
- Working Group Approval: TWG

NEEDS ASSESSMENT

- Start: 11/18/2021
- End: 3/08/2022

- Staff Leaders:
  - BR and MP Needs: Maurisa Hughes (mhughes@spp.org)
  - Econ/Policy Needs: Greg Lampley (glampley@spp.org)
  - Short-Circuit Needs: Nathan Bean (nbean@spp.org)
  - Operational Needs: Will Tootle (wtootle@spp.org)

DETAILED PROJECT PROPOSAL (DPP) WINDOW

- Start: 3/09/2022 12:00 a.m.
- End: 4/07/2022 11:59 p.m.
- Member Review Time:
  - Transmission-planning response window (30 calendar days)
- Staff Leader: Tammy Bright (tbright@spp.org)

SOLUTIONS DEVELOPMENT & TECHNICAL VALIDATION

- Start: 3/09/2022
- End: 5/10/2022

- Staff Leader: Antonio Barber (abarber@spp.org)

SOLUTIONS EVALUATION

- Start: 3/23/2022
- End: 6/03/2022

- Staff Leaders:
  - Reliability: Jake Morris (jmorris@spp.org)
  - Economic/Policy: Greg Lampley (glampley@spp.org)
  - Operational: Will Tootle (wtootle@spp.org)
  - Short Circuit: Nathan Bean (nbean@spp.org)

RELIABILITY PORTFOLIO DEVELOPMENT

- Start: 5/27/2022
- End: 8/01/2022

- Staff Leader: Neeya Toleman (ntoleman@spp.org)

ECONOMIC PORTFOLIO DEVELOPMENT (PROJECT GROUPING)

- Start: 5/27/2022
- End: 8/01/2022

- Staff Leader: Joshua Pilgrim (jpilgrim@spp.org)

STUDY COST ESTIMATES – ROUND 1

- TBD

- Staff Leader: John O'Dell (jodell@spp.org)

PLANNING SUMMIT

- TBD

- Staff Leader: Tammy Bright (tbright@spp.org)

STUDY COST ESTIMATES – ROUND 2

- TBD

- Staff Leader: John O'Dell (jodell@spp.org)

OPTIMIZATION

- Start: 8/02/2022
- End: 8/08/2022

- Staff Leaders: Krishada Watson (kwatson@spp.org)

PORTFOLIO CONSOLIDATION

- Start: 8/09/2022
- End: 8/22/2022

- Staff Leaders: Jake Morris (jmorris@spp.org)

PROJECT STAGING

- Start: 8/23/2022
- End: 9/02/2022

- Staff Leader: Greg Lampley (glampley@spp.org)

BENEFIT METRICS CALCULATION

- Start: 8/23/2022
- End: 9/21/2022

- Staff Leader: Jake Morris (jmorris@spp.org)

STABILITY ANALYSIS

- Start: 8/23/2022
- End: 9/21/2022

- Staff Leader: Neeya Toleman (ntoleman@spp.org)

SENSITIVITY ANALYSIS

- Start: 8/23/2022
- End: 9/21/2022

- Staff Leader: Jacob Pannell (jpannell@spp.org)

FINAL RELIABILITY ASSESSMENT

- Start: 8/23/2022
- End: 9/21/2022

- Staff Leader: Joshua Pilgrim (jpilgrim@spp.org)

RATE IMPACTS/ATRR

- Start: 9/02/2022
- End: 9/16/2022

- Staff Leader: Jake Morris (jmorris@spp.org)

FINAL REPORT

- Start: 5/01/2022
- End: 10/01/2022
- Member Review:
  - Final ESWG/TWG Approval in Sept. 2022

- Staff Leader: Tammy Bright (tbright@spp.org)

TWG/ESWG FINAL APPROVALS

- Start: 9/21/2022
- End: 10/01/2022

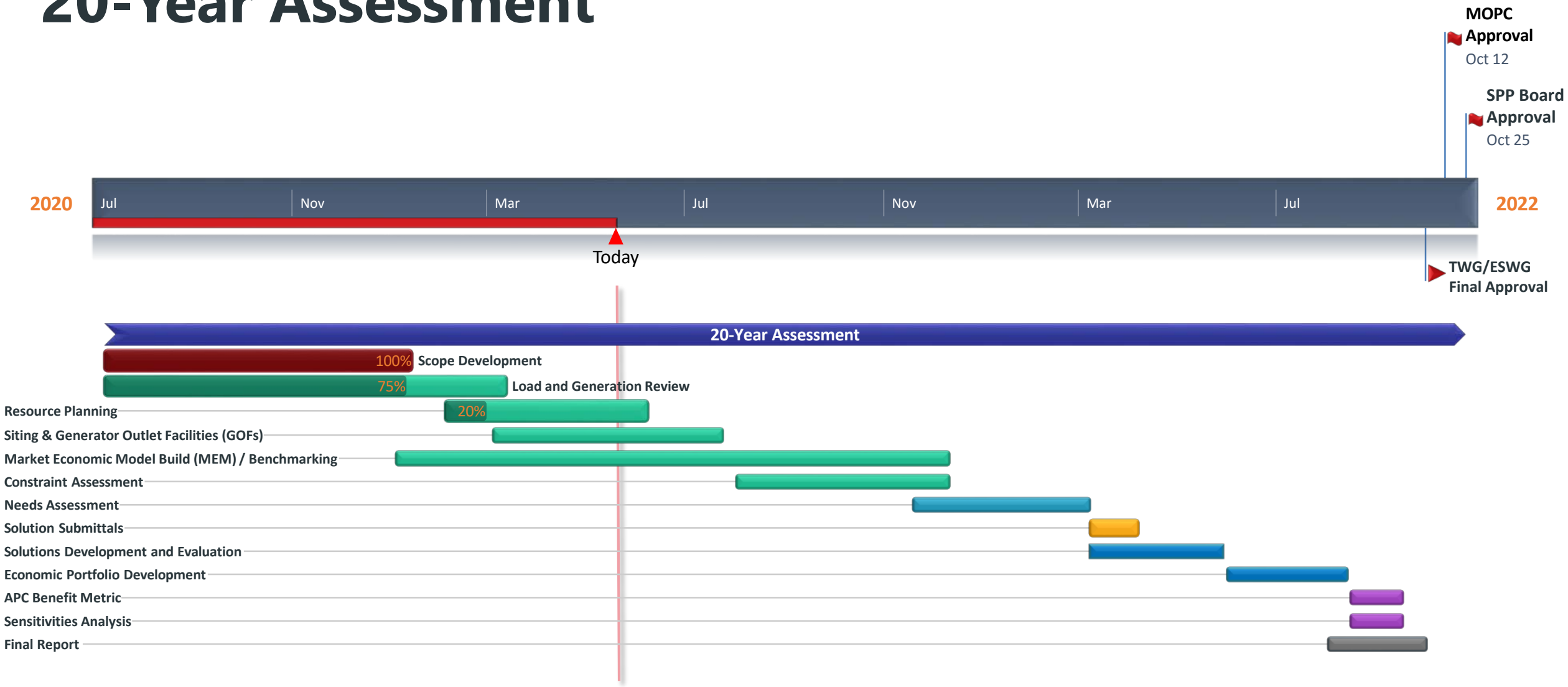
- Staff Leaders:
  - TWG – Adam Bell (abell@spp.org)
  - ESWG – Joshua Norton (jnorton@spp.org)

MOPC AND SPP BOARD

- MOPC: 10/12-13/2022
- SPP Board: 10/25/2022

20-YEAR ASSESSMENT

20-Year Assessment



LOAD REVIEW (COMPLETE)

- Start: 2/26/2021
- End: 7/2/2021
- Internal Load Review
  - **Final ESWG Approval: 5/5/2021**

- External Load Review
  - Completion Date: 7/2/2021
  - ** Not an ESWG approval item

- Staff Leader: Brooke Keene (bkeene@spp.org)
- Working Group Approval: ESWG

GENERATION REVIEW- (COMPLETE)

- Start: 2/26/2021
- End: 7/2/2021
- Internal Generation Review
  - **Final ESWG Approval: 5/6/2021**

- External Load Review
  - Completion Date: 7/2/2021
  - ** Not an ESWG approval item

- Staff Leader: Brooke Keene (bkeene@spp.org)
- Working Group Approval: ESWG

RENEWABLE POLICY REVIEW

- Start: 4/28/2021
- End: 6/10/2021 (Members' Final Approval)

- Staff Leader: Krishada Watson (kwatson@spp.org)
- Working Group Approval: ESWG

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RESOURCE PLAN – PHASE 1

- Start: 4/28/2021
- End: 6/16/2021 (Members' Final Approval)

- Staff Leader: Krishada Watson (kwatson@spp.org)
- Working Group Approval: ESWG

7

RESOURCE PLAN – PHASE 2

- Start: 4/29/2021
- End: 6/23/2021 (Members' Final Approval)

- Staff Leader: Antonio Barber (abarber@spp.org)
- Working Group Approval: ESWG

CONTACT INFO

Dara Solomon, SPP Staff

dsolomon@spp.org

SPP Southwest Power Pool

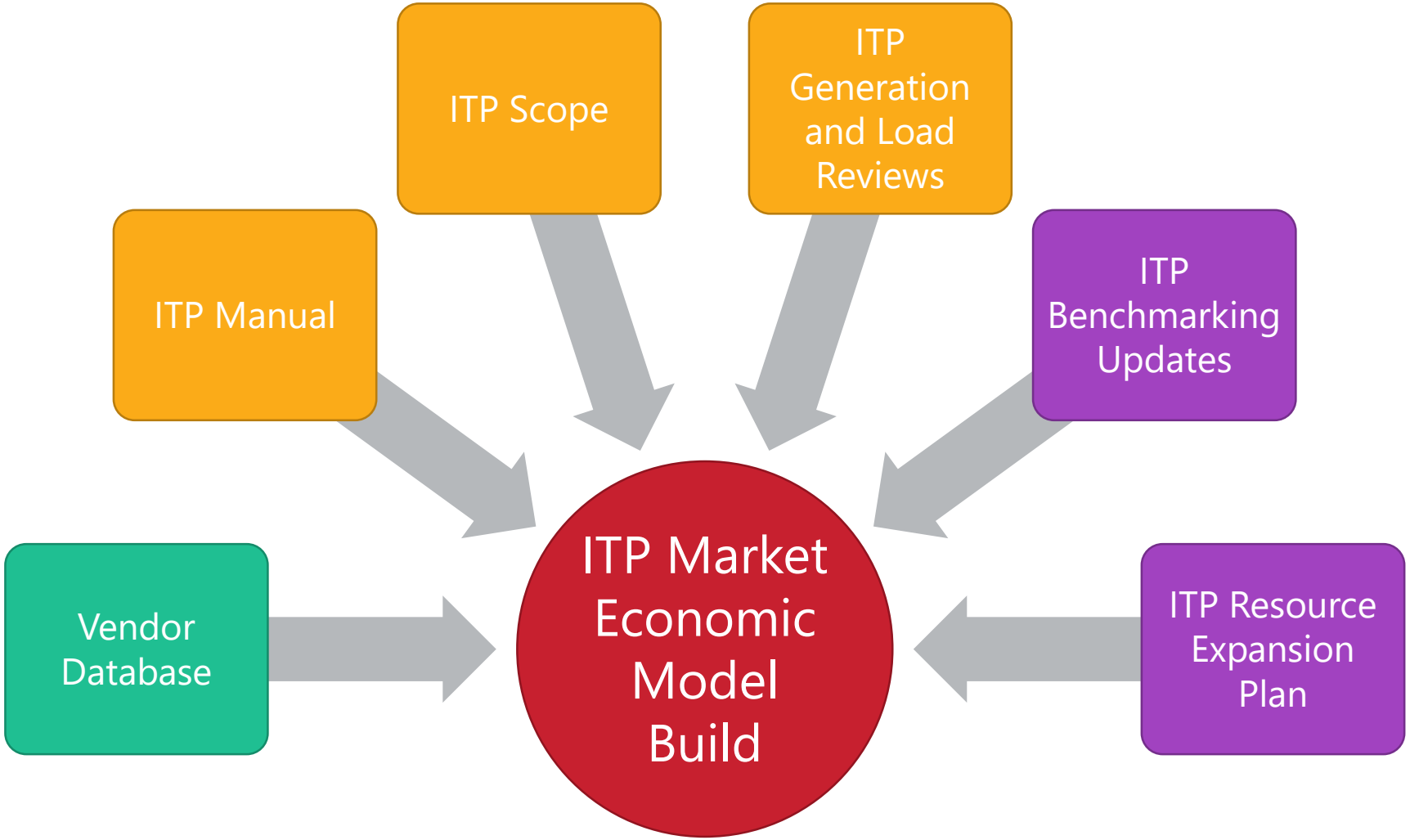
2022 **ITP**

MARKET ECONOMIC MODEL BUILD UPDATE

CHARLTON HILL

JUNE 2-3, 2021

MEM BUILD FLOWCHART



2022 ITP MEM REFRESH

- Start with 2021 ITP Year 2 MEM
- Update
  - Internal/External Gen Reviews
  - Internal/External Load Reviews
  - MEM Input Powerflow
    - Winter Ratings
  - Fuel Forecasts
    - ABB and Wood Mackenzie
  - Emissions Prices
    - ABB F19 Base Dataset
  - Hurdle Rates and Interchange
  - Nuclear Maintenance

2022 ITP SCOPE ITEMS

- Resource Plan
  - Increases to Renewable Resource Expansion Plan
- Must-Run Unit Designations
  - Landfill Gas (IC Renewable)
- Hurdle Rates and Interchange
  - SPP and ESWG will review the data set
  - Document approved adjustments in the ITP Assessment report

ADDITIONAL UPDATES

- SaskPower
- Investigating PROMOD engine to use for 2022 ITP
  - PROMOD 11.2 (current) vs. PROMOD 11.4.1 (preferred)
- Implement process improvements
- Next Steps
  - Continue to build Year 2 MEM
  - Post fuel forecast for review
  - Benchmarking

SPP Southwest Power Pool

2022 ITP

SITING PLAN

JOSHUA NORTON

Helping our members work together to keep the lights on... today and in the future.

SouthwestPowerPool SPPorg southwest-power-pool

SITE REPOSITORY REVIEW WINDOW

- Feedback due **June 4th**

2022 **ITP**

APPENDIX

HIGH-LEVEL SCHEDULE

May

- Stakeholder review of repository and baseline sites

June

- Preliminary Renewable Siting Plan review and exceptions window
- Distributed Solar Plan review and feedback
- Renewable siting plan + exceptions (ESWG review and approval)

June-July

- Battery siting plan + exceptions (ESWG review and approval)
- Conventional siting plan + exceptions (ESWG review and approval)
- External siting plan (ESWG review and approval)

DISTRIBUTED SOLAR

- Top 10% load buses per demand group
- Scoped amounts added on pro rata basis
- Include stakeholder feedback from previous ITP cycles
- Stakeholder review window in May

EXCEPTIONS TO INITIAL SITING PLANS

- SPP to post preliminary look at siting plans
  - Stakeholders to confirm sites of interest selected for siting
  - Stakeholders to present sites not selected for siting as exceptions
  - Initial siting plan list will not ensure inclusion
  - Any capacity approved as an exception by ESWG removed from lowest ranked sites
- Stakeholder materials on requested exceptions must include:
  - Generation interconnection status
  - PPA, firm service, or utility ownership information
  - Status of necessary regulatory filings and/or approvals
  - Procurement of financing
  - PTC safe harbor eligibility
  - Additional supporting information (public announcements, etc.)
- Template to be sent with exception solicitation

REFERENCE DOCUMENTS

- Resource Siting Whitepaper
- Resource Siting Manual

2022 ITP & 20-YEAR ASSESSMENT GENERATOR OUTLET FACILITIES

GREG LAMPLEY

JUNE 1, 2021

OVERVIEW

- Milestone deliverable
- Process overview as detailed in the ITP Manual
- GOF development notes
- High-level schedule
- 20-Year assessment (20YA) generator outlet facilities (GOFs) recommendation

MILESTONE DELIVERABLE

- Develop the proper set of upgrades to facilitate the integration of the siting plan into the 2022 ITP models
  - Ensure sited units do not cause issues on the system that would have been mitigated by Notifications to Construct (NTCs) had they gone through the GI process
  - Ensure minimal impact to existing congestion patterns
  - Avoid masking current issues on the system

HIGH-LEVEL PROCESS AS DETAILED IN THE ITP MANUAL, SECTION 2.2.2.3

- Review the First Contingency Incremental Transfer Capability (FCITC) analysis completed during the siting process
- Transmission distribution factors (TDFs) will be calculated for each transmission facility with each generation resource at its full nameplate value under system intact and contingency conditions
- Overloaded lines with a TDF above the threshold used in the GI process will be used as an indicator that a GOF may be necessary
  - In the instance that multiple units are sited with electrically similar interconnection points, the TDFs will be calculated with each resource dispatched at maximum capacity simultaneously to ensure the final GOF is sized appropriately

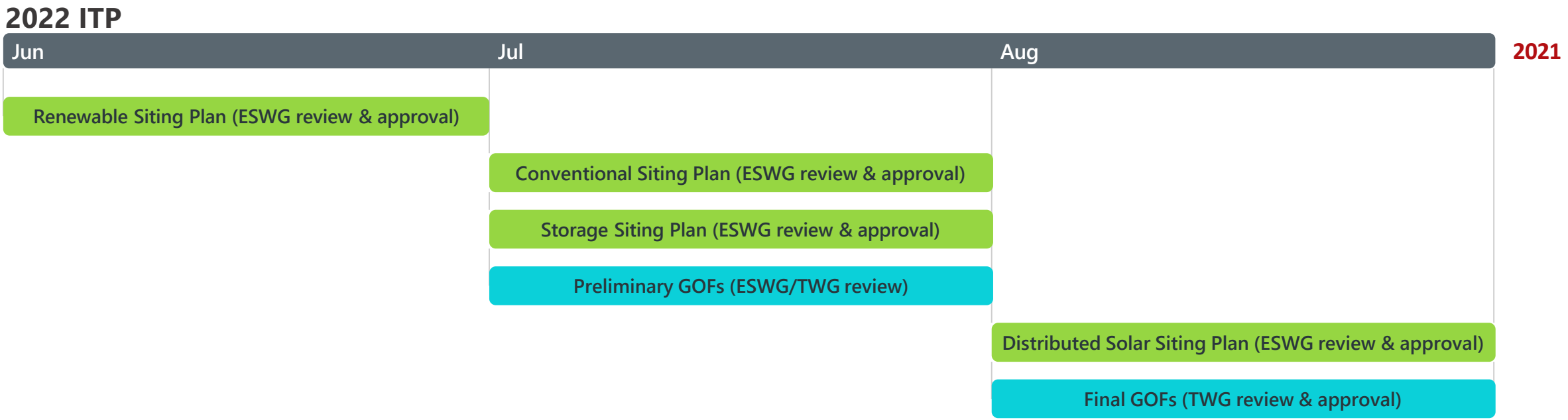
HIGH LEVEL PROCESS AS DETAILED IN THE ITP MANUAL, SECTION 2.2.2.3 - CONT.

- When TDFs on overloaded transmission facilities meet or exceed the minimum threshold, GOFs will not be guaranteed for inclusion in the ITP models
  - SPP will use engineering judgment, such as the consideration of a unit's expected dispatch and the impact a GOF may have on potential economic and/or reliability needs, to recommend GOF inclusion
- All GOFs recommended for inclusion in the models will be reviewed and approved by the TWG

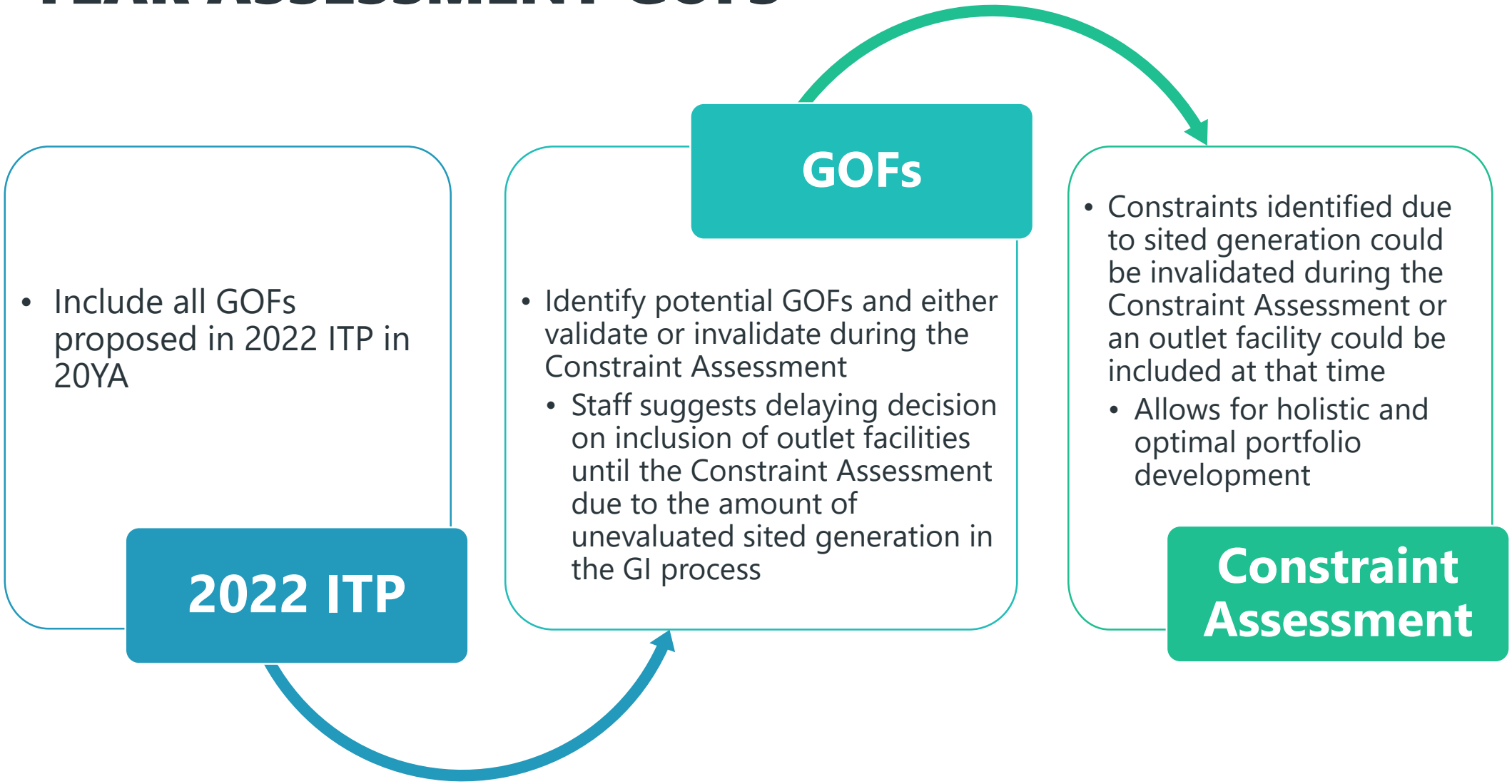
GOF DEVELOPMENT NOTES

- The GOF process is intended to proxy the evaluation of a resource in the GI process to develop necessary upgrades
- Intent is to work closely with incumbent TO during development of potential upgrades
  - Keep stakeholders involved in the process
  - Use stakeholder feedback to ensure upgrades are modeled realistically
- Verify a potential GOF's effectiveness with a verification run, as needed

SCHEDULE


2022 ITP
Jun
Jul
Aug
2021
Renewable Siting Plan (ESWG review & approval)
Conventional Siting Plan (ESWG review & approval)
Storage Siting Plan (ESWG review & approval)
Preliminary GOFs (ESWG/TWG review)
Distributed Solar Siting Plan (ESWG review & approval)
Final GOFs (TWG review & approval)

20-YEAR ASSESSMENT GOFS*



*Note: No NTCs will be issued from the 20YA

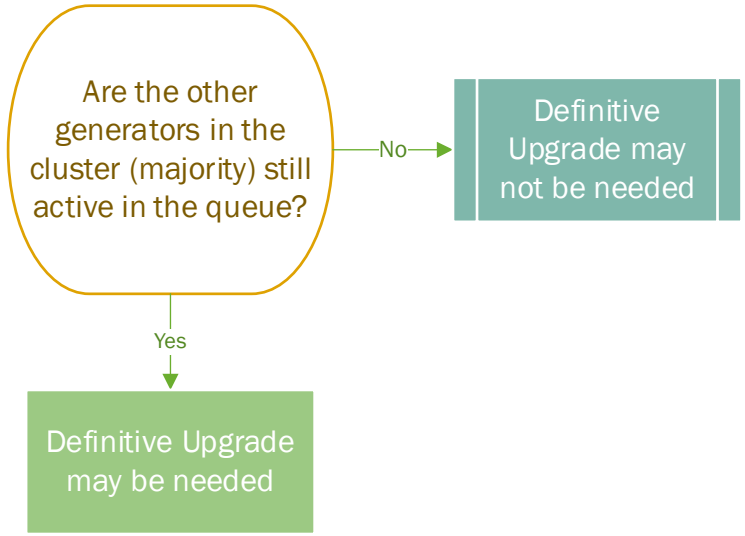
RECOMMENDATION

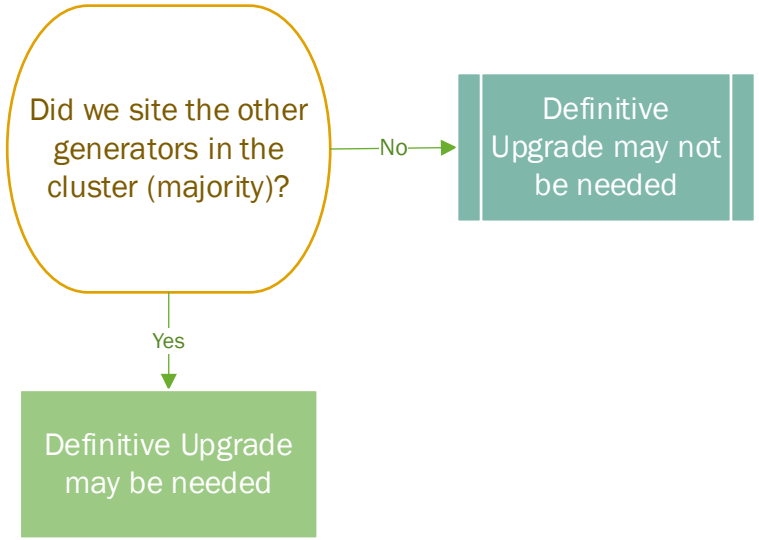
- Staff recommends GOFs from the 2022 ITP be included in the 20YA; however, a formal decision will be delayed on 20YA GOFs until the Constraint Assessment milestone

APPENDIX

DECISION POINTS FOR INCLUDING DEFINITIVE UPGRADE

- First, find the most recently studies GI report for the group in which the generator sited falls.



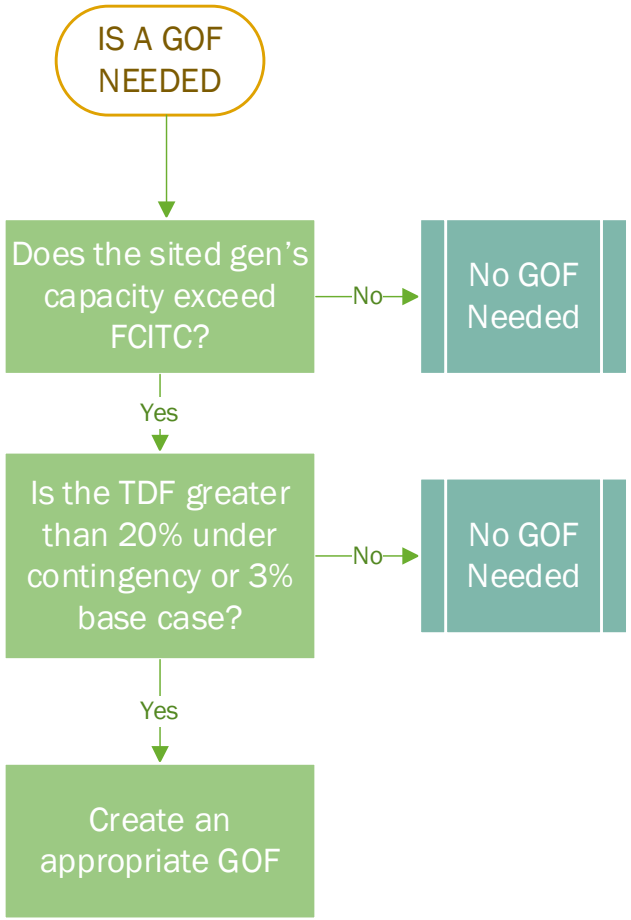


EXAMPLE

Keystone - Red Willow 345kV CKT 1			**$175,000,000**
Build Keystone - Red Willow 345kV CKT 1			
	GEN-2016-034		$20,200,894
	GEN-2016-074		$16,221,864
	GEN-2016-096		$8,669,539
	GEN-2016-106		$57,961,033
	GEN-2016-110		$32,800,050
	GEN-2016-147		$8,167,736
	GEN-2016-159		$18,830,286
	GEN-2016-165		$12,148,598
	Total Allocated Costs	**$175,000,000**	

- If we site 2016-034 that has the definitive upgrade, but over half have withdrawn from the queue, or we didn't site any of the others in the siting plan, we likely wouldn't need to include the definitive upgrade.

DECISION POINTS FOR FCITC/TDF CHECK

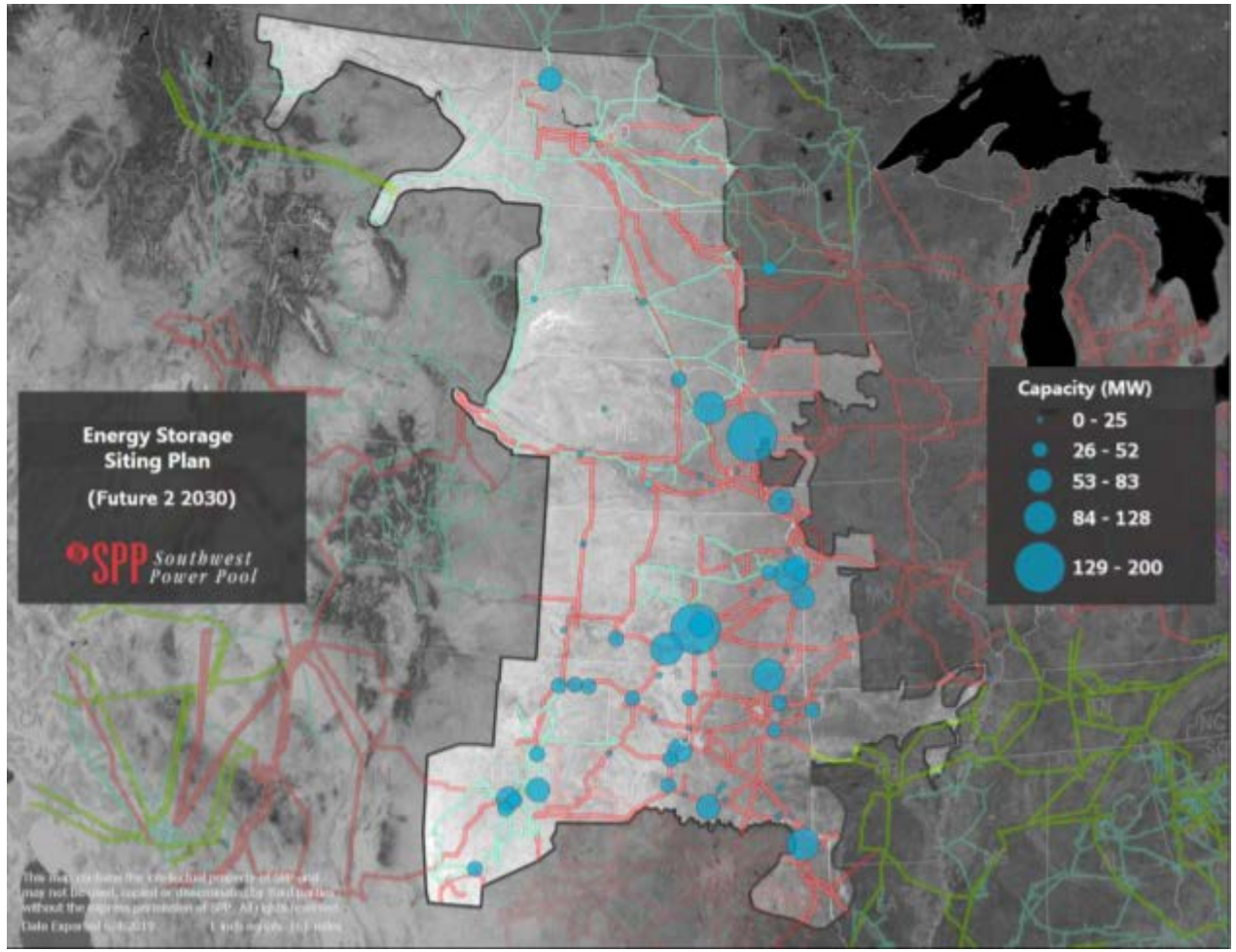


ESWG ITP BATTERY SURVEY RESULTS

FOR ACTION ITEM 199

ITP PROCESS

- The ITP includes projections of amounts and locations of resources, including batteries
- Reliability and economic analysis performed to determine transmission plan



2020 ITP Report

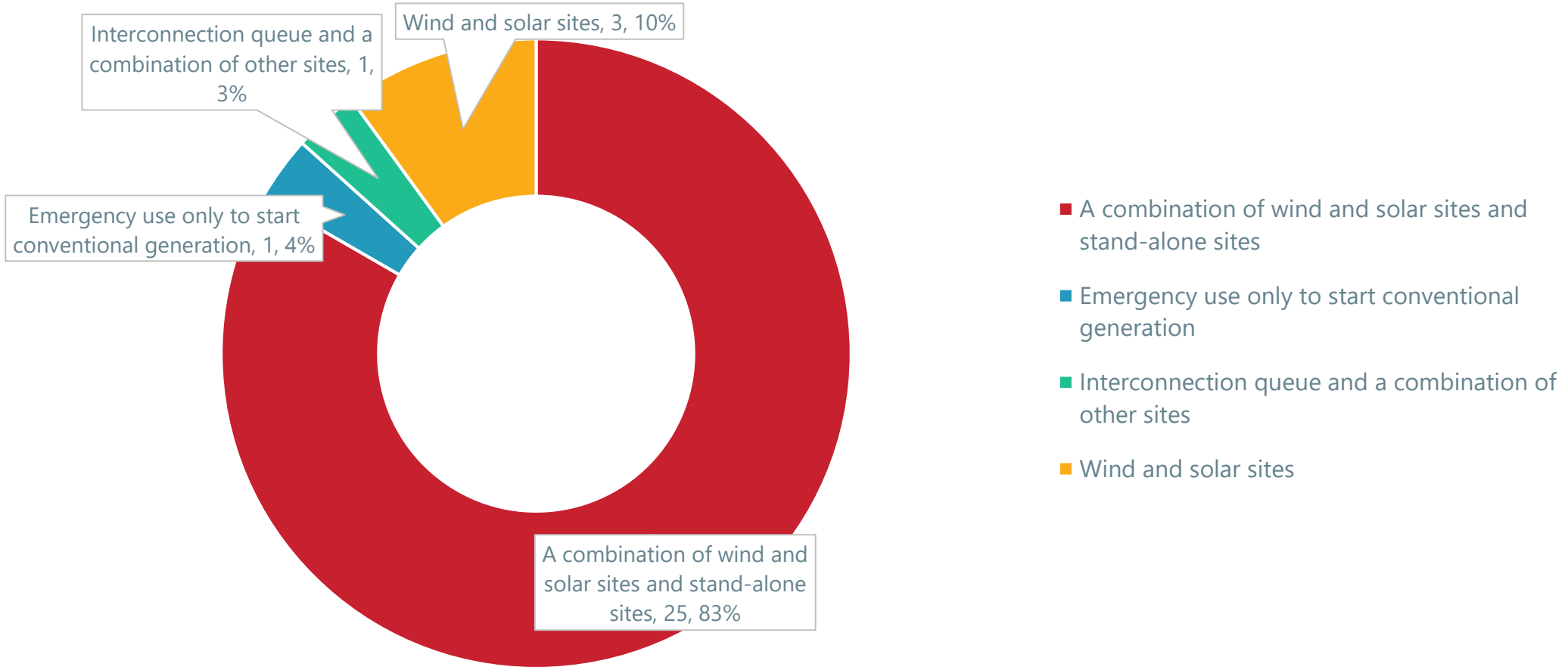
CURRENT HIGH-LEVEL PROCESS FOR PROJECTING BATTERY LOCATIONS

- 67% Solar and 33% Wind Association
- Site Priority (Solar & Wind):
  - Selected solar & wind sites with Battery GI Queue request
    - Capped at 2/3 of the total MW sited based on GI Queue
  - Rest of selected solar and wind sites by rank
    - Remaining MW sited
- All battery sites limited by request and renewable site capacity

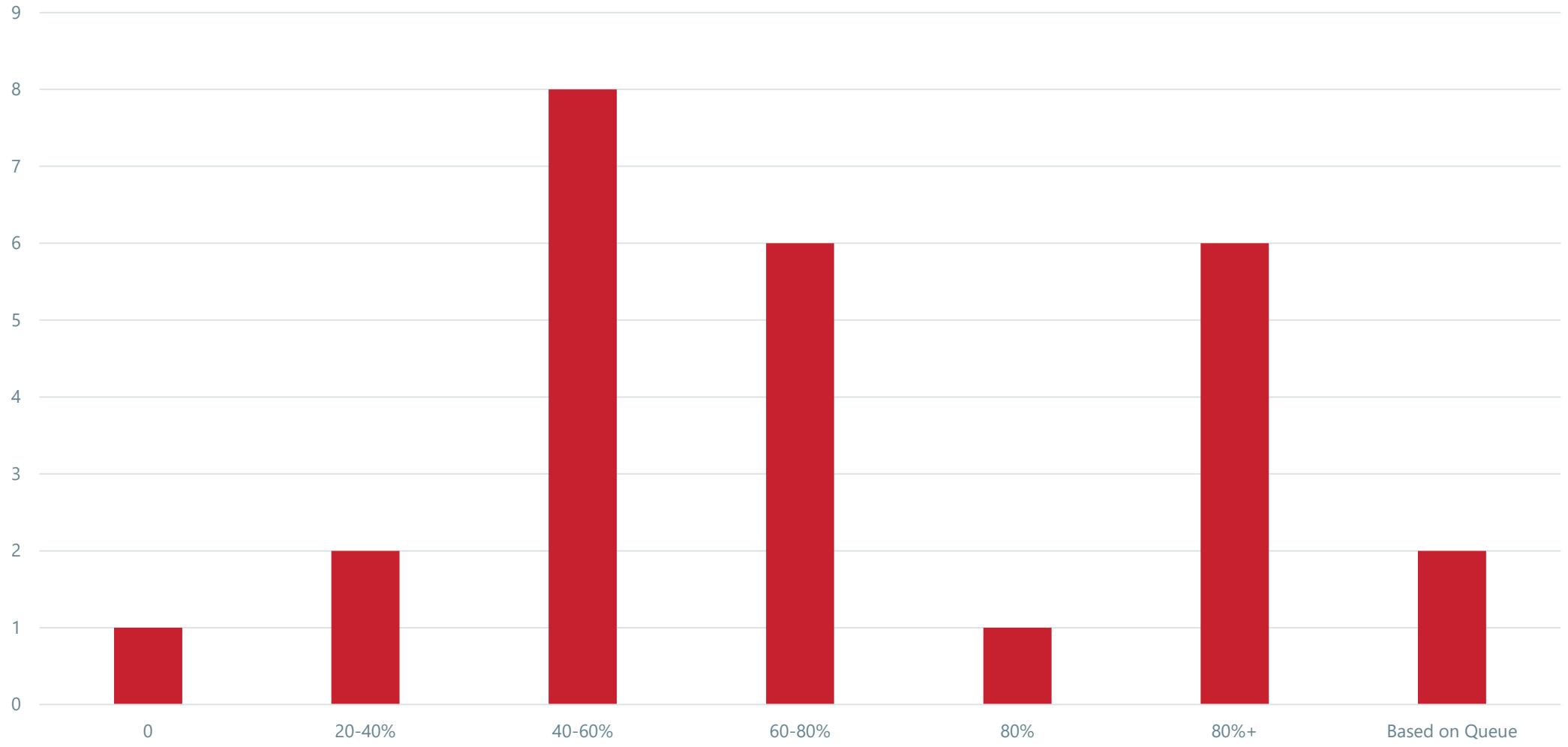
REVIEW PROCESS AND SURVEY

- ESWG Action Item 199 to review current process for projecting locations of batteries
- A survey was sent to the ESWG and GIUF exploders
  - 30 responses were received

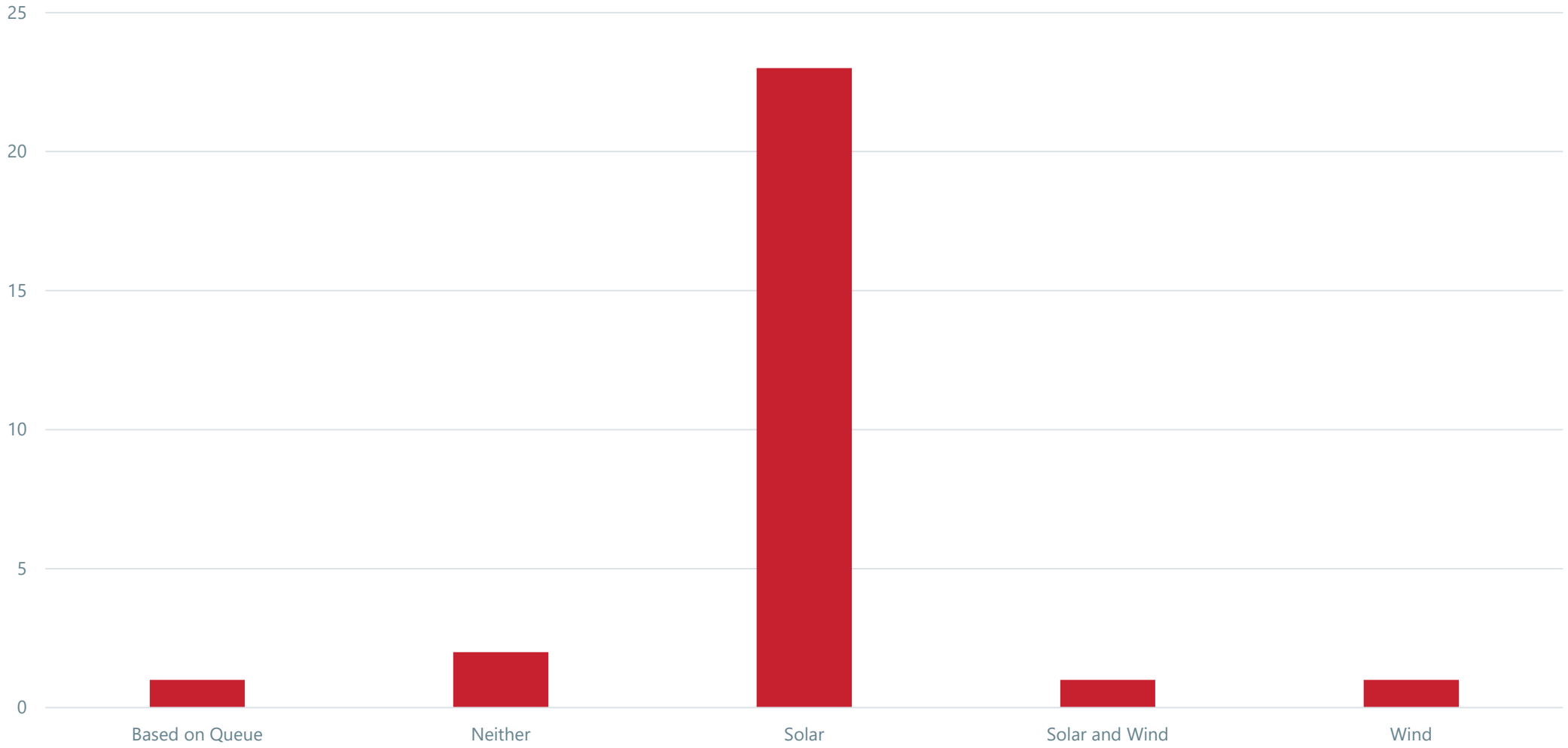
1. SHOULD THE SITING OF NEW STORAGE BE BASED UPON:



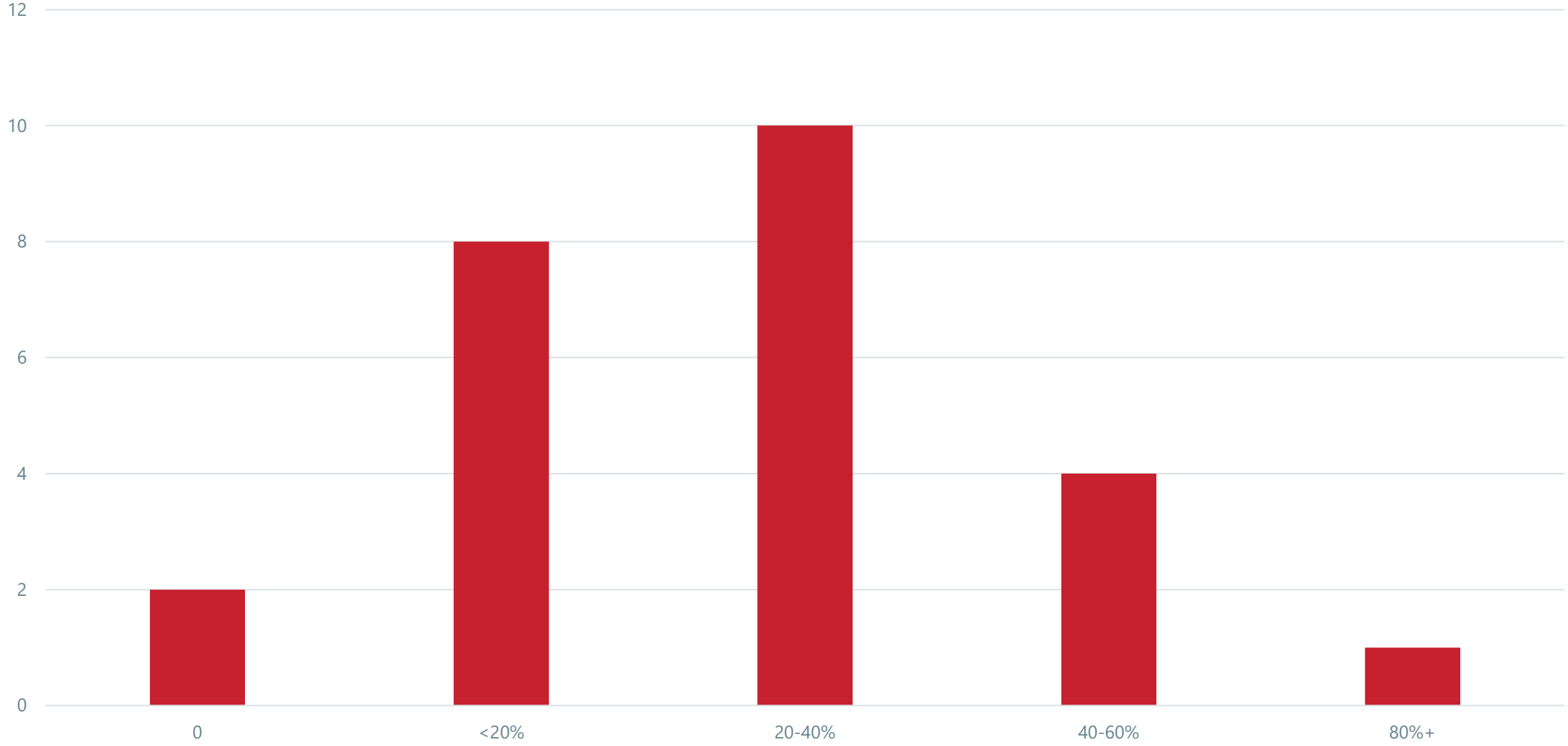
2. WHAT PERCENTAGE OF NEW STORAGE SITES SHOULD BE HYBRID (PAIRED WITH WIND OR SOLAR) ASSUMING THE REST ARE STAND-ALONE STORAGE SITES?



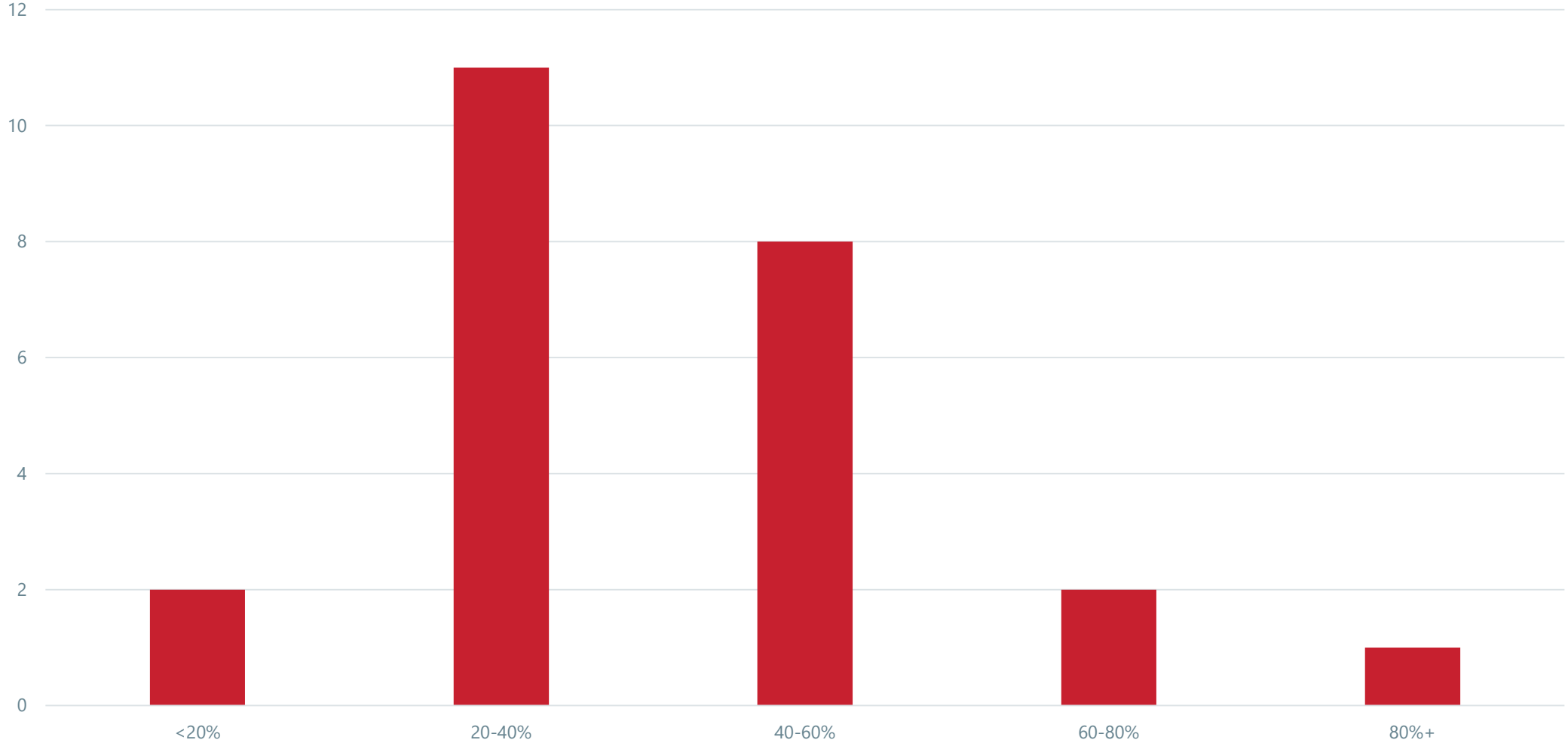
3. SHOULD HYBRID STORAGE BE PAIRED MORE SO WITH WIND OR SOLAR IN THE PLANNING MODELS?



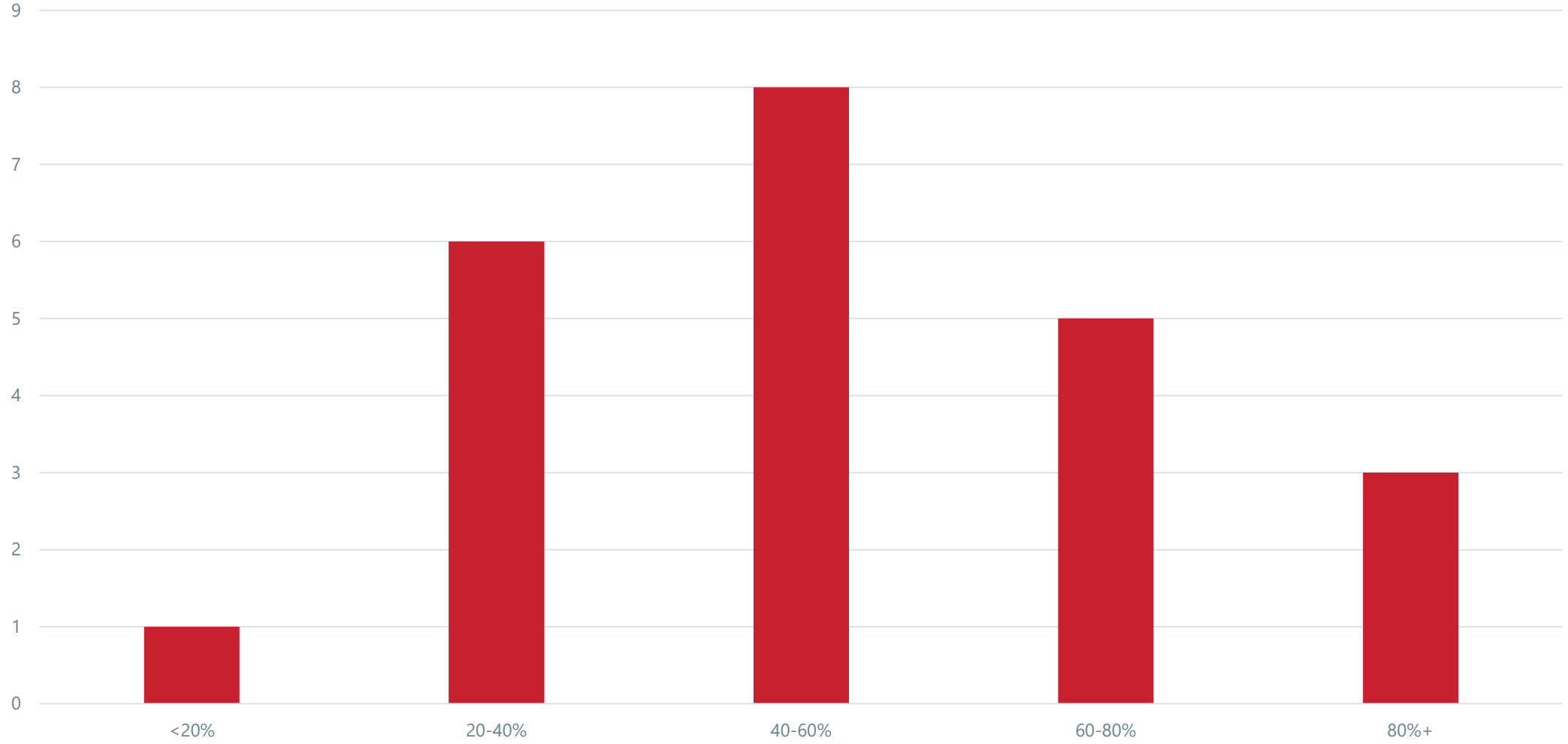
4. IN RELATION TO QUESTION 3 WHAT PERCENTAGE OF NEW RENEWABLE CAPACITY (WIND AND/OR SOLAR) SHOULD BE EXPECTED FOR NEW STORAGE CAPACITY IN THE PLANNING HORIZON? 2027



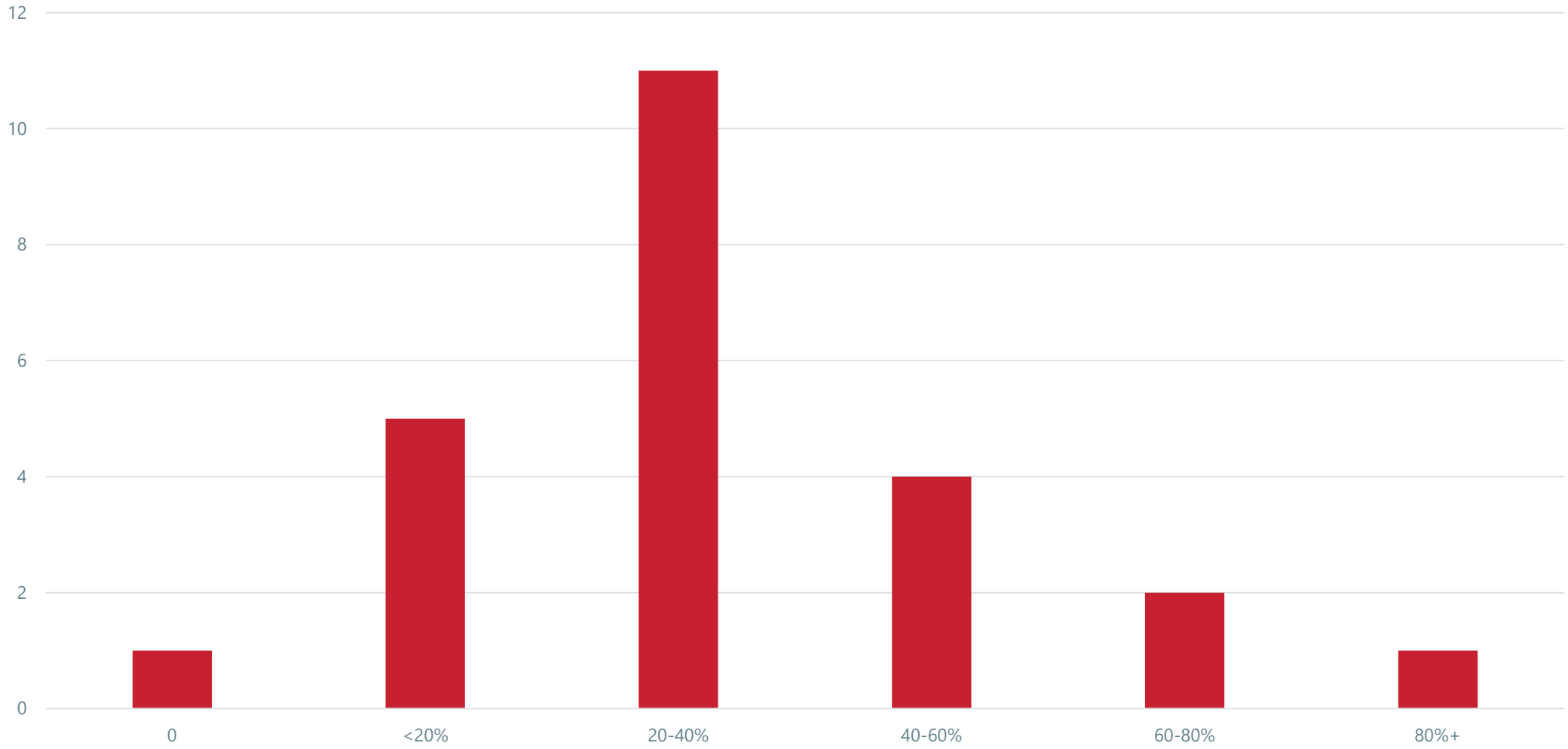
4. IN RELATION TO QUESTION 3 WHAT PERCENTAGE OF NEW RENEWABLE CAPACITY (WIND AND/OR SOLAR) SHOULD BE EXPECTED FOR NEW STORAGE CAPACITY IN THE PLANNING HORIZON? 2032



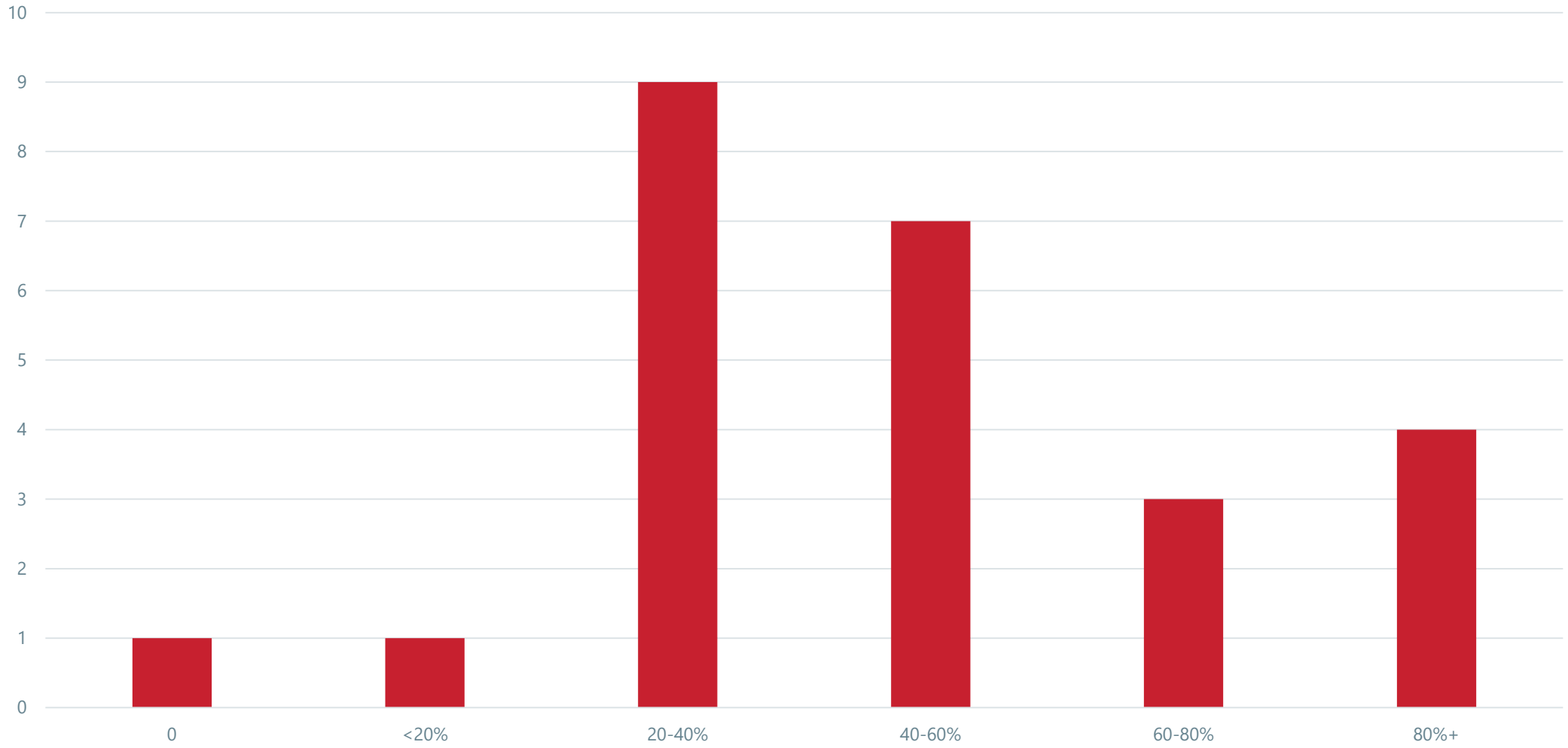
4. IN RELATION TO QUESTION 3 WHAT PERCENTAGE OF NEW RENEWABLE CAPACITY (WIND AND/OR SOLAR) SHOULD BE EXPECTED FOR NEW STORAGE CAPACITY IN THE PLANNING HORIZON? 2042



5. HOW MUCH BATTERY CAPACITY SHOULD BE INSTALLED AS A PERCENTAGE OF WIND CAPACITY AT HYBRID LOCATIONS?



6. HOW MUCH BATTERY CAPACITY SHOULD BE INSTALLED AS A PERCENTAGE OF SOLAR CAPACITY AT HYBRID LOCATIONS?



7. WHAT FACTORS WILL BE CONSIDERED IN SIZING STORAGE INTERCONNECTIONS FOR CAPACITY AND ENERGY?

High-power ratings may ultimately be used primarily on a de-rated basis (e.g., 50% nameplate for 2x duration), which provides optionality for higher power injections. Asset managers should be consulted as to their intended use for contributing to resource adequacy, which affects capacity accreditation.	space, connection at Substation, load, and level of need for storage
1. Whether the storage system is AC-cou 2. The injection limit on the transmissior 3. Reactive power from the IBRs (Inverte Considering the GI Queue Backlog we d be greater than the wind resource's ERIS service. Solar facilities might see an advantage to having more firm transmission service for their hybrid configuration.	Capacity need Geographical region. For example, the hybridized mix of solar with storage in SPP On the flip side, the economics and ferent than in SPP South which affect esource installations.
GOF	If sizing storage for capacity, it seems it should be part of a hybrid interconnection.
Transmission availability, cost of building transmission in a particular footprint, wind/solar capacity in local area for charging, areas where storage will counter low wind LMP pricing.	Interconnection costs and delivery costs
Price and location	Storage only is same as any other resource (i.e., minimizing need for network upgrades or GOF). For hybrid, storage should not exceed the renewable resource size. Note that for hybrid, the interconnected capacity is the size of the renewable resource only. For hybrid resource, assume the storage is only to "firm up" the renewable resource capacity and thus will not exceed the capacity of the associated renewable resource.
Market revenue streams and rules on storage participation, as well as resource adequacy. Transmission limitations will also be a consideration.	DC or AC coupled
Energy (MWh) duration sizing is based on ability to be accredited for 100% capacity value. Capacity (MW) duration sizing is based on limiting to a size that doesn't trigger prohibitive network upgrades.	If siting storage with renewables, need to consider the combined output of both.
	Cost of the storage facility versus the potential for energy arbitrage revenue at that particular location. For hybrid installations, you would also consider the economics of shifting the generation profile and increasing the accredited

These slides will be updated to better summarize responses prior to the meeting.

8. SHOULD THE BATTERY SITES BE DERIVED FROM THE GI QUEUE? IF NOT, WHAT OTHER SITES SHOULD BE CONSIDERED AND HOW SHOULD THEY BE RANKED IN THE PLANNING PROCESS?

Could be.	YES
50% yes 50% no	Yes, GI queue for now. When battery costs come down more speculative siting would be appropriate.
GI queue is fine, but it somewhat reflects a snapshot in arrears. For future speculative siting, dedicated grid-scale E transmission close to load centers, not a	
Utilities should be able to designate locations for expedited approval	No response.
Yes, at least partially. Otherwise, consider locations where the economics make sense.	No, the long wait-time on the GI Queue might delay viable future battery projects
Yes and tie to permit/commercial status of projects to help rank them.	Trends for placement of storage should be learned from the Queue placements and those lessons applied when more storage is needed for the models. Changes in tax credits may also effect where battery storage is installed in the future. If a utility could, for example, receives an investment tax credit for battery storage at an existing renewable facility, they may want to invest in that project.
Pulling from GI queue is fine for large standalone battery projects. For small standalone battery projects, consider the possibility that if a utility is deploying the battery, it might locate the battery at an existing substation and size it to match the expected peak load of the substation, thus making the battery look like BTMG in a planning model.	Start with the queue but you might consider NITSA too to see if there is an existing facility that may have space.
for planning, probably have to look to the GI queue	? Yes partially but also consider state IRPs and other information such as #7 above. SPP GI queue is much too slow to fully guide the implementation of storage resources that are critical to the buildout necessary to drive our nations economy.
Initially, yes, rely primarily on the GI queue.	No, they should be geographically dispersed, any FCA price fluctuation
Yes	Yes, information should come from the GI Queue.
GI's should not be assumed to be increased for storage. Rather storage should be	

These slides will be updated to better summarize responses prior to the meeting.

9. HOW IS SURPLUS INTERCONNECTION BEING CONSIDERED FOR STORAGE INTERCONNECTION?

Designed with enough transportation capacity.	
N/A	
For our existing generation resources, surplus interconnection is not being considered for storage interconnection. considering surplus interconnection for that the majority of sites correlated with satisfactory economics relative to the BE	
Storage is only beneficial when paired with renewables or in a transmissions congestion location.	
If there is surplus interconnection opportunities, consider hybrid interconnections.	
N/A	
In a hybrid model, consider the storage as using surplus interconnection so that the capacity from the project (storage+renewable) is more firm than what it would be if it was a renewable resource only.	
should be maxed out with storage	
No response	
If a wind/solar facility has headroom under the existing generator interconnection agreement, sizing new storage up to this amount brings value if it allows you to avoid the risk of future generator interconnection upgrades.	
GI's should not be assumed to be increased for storage. Rather storage should be considered as augmenting the capacity value of the hybrid resource and current GI or future GI for maximum amount of wind or solar should be considered sufficient	
MISO has developed surplus interconnection service rules. MISO has also	

These slides will be updated to better summarize responses prior to the meeting.

10. FOR STAND-ALONE BATTERY SITES, WHAT ARE THE MAIN DRIVERS FOR SITE SELECTION?

Close to the load	
new installations of solar farms	
Given that cost is still the primary driver, stand-alone BESS is only being considered by load customers who have cannot be ignored that the current inter by even faster and broader adoption of load behind the meter instead of aggreg	
Transmission benefits	
Economics seem to be the primary driver. Congestion management or something similar.	
Land costs/interconnection costs and whether there will be any charging restrictions.	
Same as for any other resource - minimizing network upgrades.	
IX & proximity to load	
No response	
Just like with any generator, a robust transmission interconnection to minimize upgrades related to both the generator interconnection and aggregate study processes. In addition, a broad LMP profile that allows for enhanced revenue from energy arbitrage.	
GI's should not be assumed to be increased for storage. Rather storage should be considered as augmenting the capacity value of the hybrid resource and current GI or future GI for maximum amount of wind or solar should be considered sufficient	
On the transmission system: Availability of spare interconnection capacity; length	

These slides will be updated to better summarize responses prior to the meeting.

PLEASE PROVIDE MORE DETAIL TO ANY OF THE SURVEY QUESTIONS

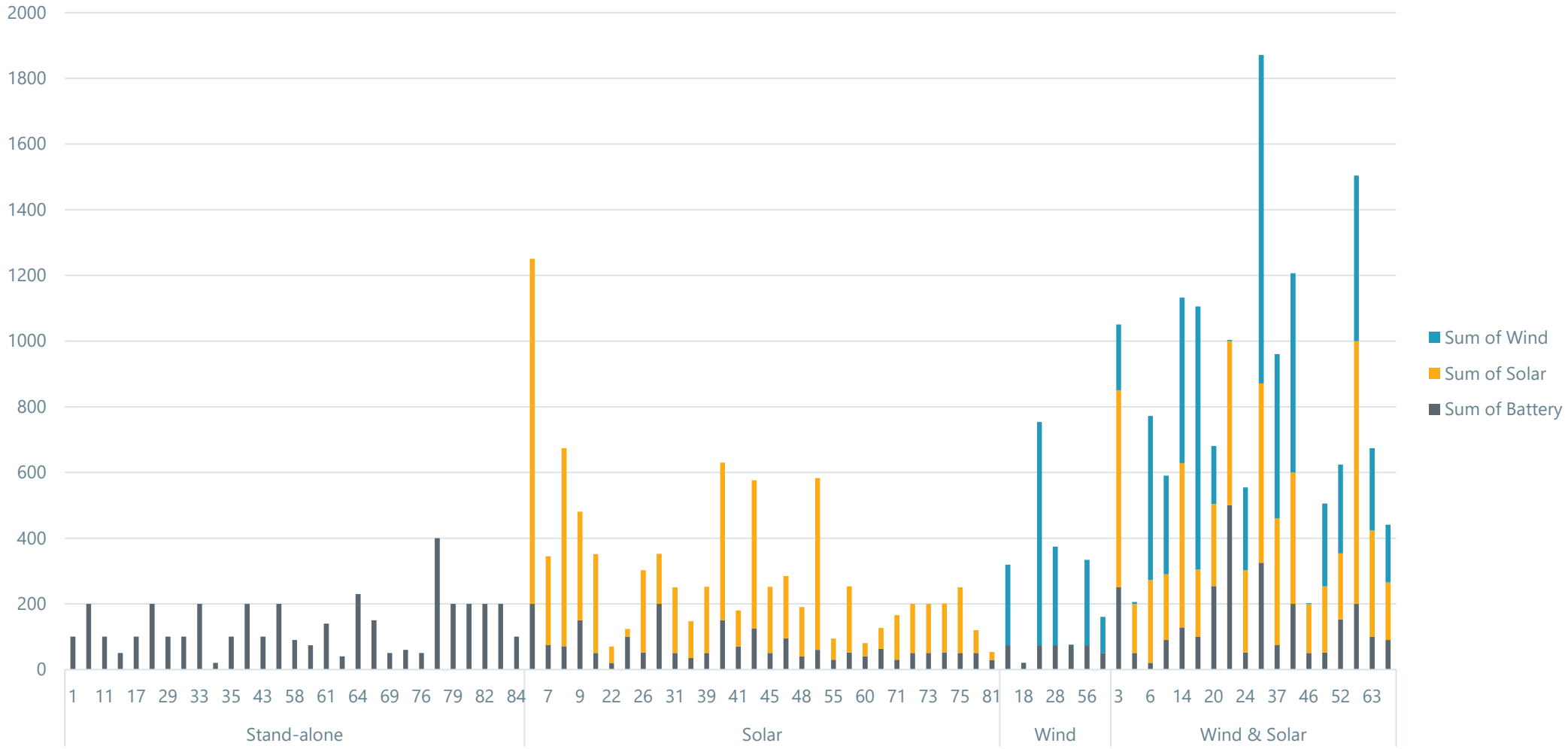
Clearly, siting stand-alone and hybrid BESS is an important consideration for ITP, but we cannot ignore that the buzz today is reminiscent of the fuel cell buzz of the late 00's. The aspect of batteries that we should not forget is that utility-scale may not materialize as the primary means of adoption. Instead, we may want to consider on-peak load modification or an additional factor of load uncertainty which reflects customer adoption of sma… fixed installations, EHVs, integrated load…	Please review UL 9540, UL 9540A, NFPA 855, UL 1741, UL 1973, UL 1642, AS 4777, IEC 62109-1, IEC 62619, VDE 4105, VDE 0126, and UK G59 standards that might provide some good insights. EPRI has some active energy storage research that might provide more insights: https://www.epri.com/search?k=Energy%20Storage …hile designing a plan for batteries in the
I don't have a formal stance on ESRs, ex… economically.	…tion is important to LSEs and may drive
Until battery technology improves and the markets develop products that properly value the advantages of energy storage resources, I think storage-only projects are only likely to be used by utilities and only as a cost-effective alternative to looping in radial loads where the utility wants to improve its service reliability to that load.	I was unsure whether ESWG member were supposed to respond and whether I received this latest admin email b/c I changed my email address in the SPP system...I don't recall receiving the survey email to my Gridliance email address. Here are my thoughts. I apologize if I wasn't supposed to respond. Thanks!
At this point we have not completed the necessary studies to identify the optimal amount of future storage additions on our system, nor how much should be collocated with solar & wind.	1. queue, primarily co-located with solar 2. Based on queue since queue amounts get pretty close to targets 3. Solar because of the ITC 4-year 5. based on GI queue 4-year 10. based on GI queue 4-year 20. based on GI queue for first ten years. Spread more evenly between wind/solar after ITC expires in years 10-20 5. GI queue 6. GI queue
Why do various organizations think it is a good idea to place battery sites around various parts of the trransmission system? The answer needs to be just more than these devices act like generators and load.	
NextEra appreciates the opportunity to provide input and are open to questions on any of the above responses.	We request that our answers be kept confidential or at a minimum that our company name be kept confidential.
Trends in battery storage are expected to change over time as battery cost decline, emerging technologies achieve commercialization, and with extension of government incentives. Any projections today should be reviewed again in 2023-2025.	1. Most sites should be hybrid with the potential for a few stand-alone 4. Percentage should vary by future 5. Use queue proportions as guide 6. Use queue proportions as guide
Projections on the use of storage should be reviewed every 1-2 years as it is a	The ITP should study 4 hour duration batteries in the models.

These slides will be updated to better summarize responses prior to the meeting.

GI QUEUE BATTERY DATA

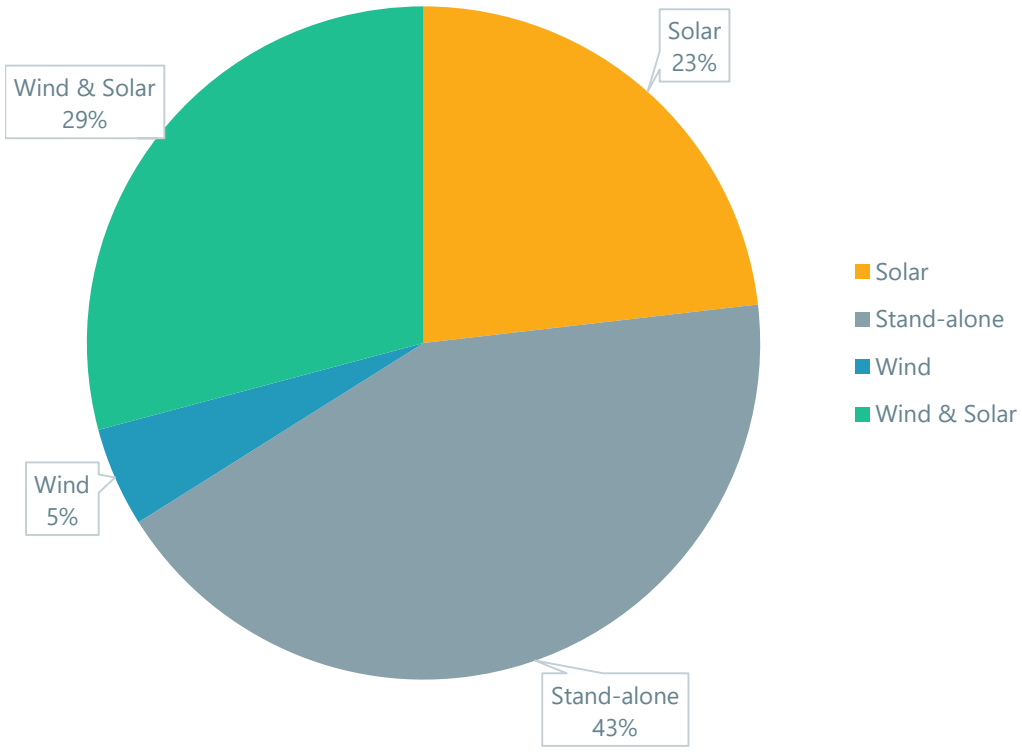
- Some survey responses mentioned using the GI queue data to determine some of the values for questions
- The following data is from the 2022 ITP site repository data and GI queue

EACH BATTERY SITE CAPACITY AT POI

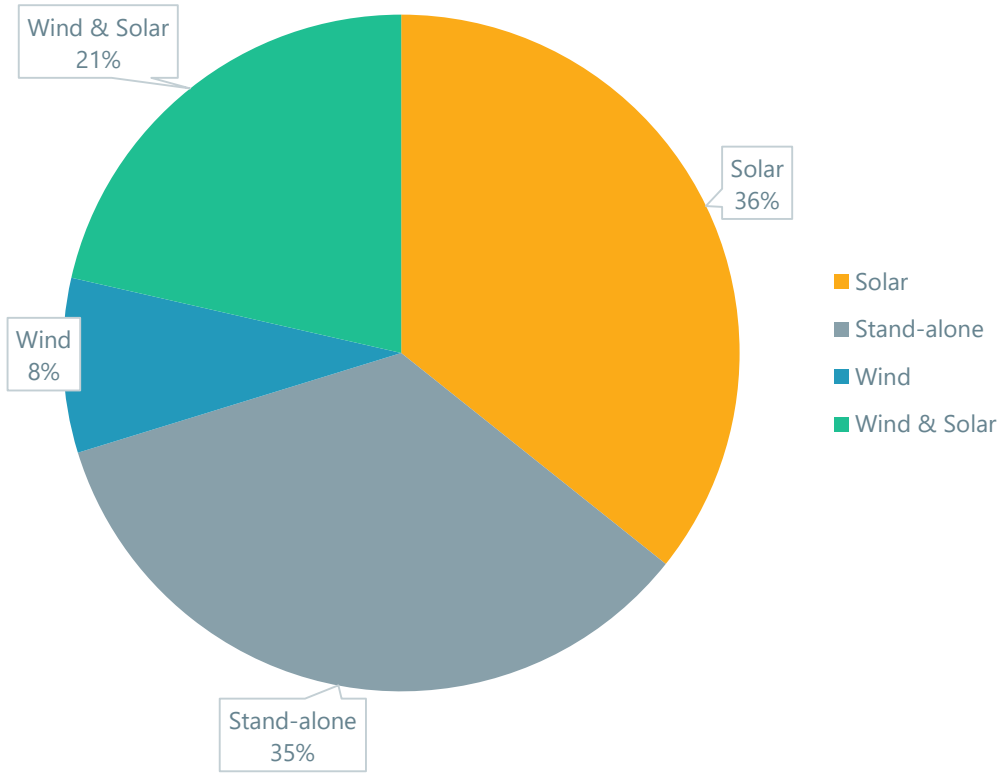


SUMMARY OF QUEUE BATTERY REQUESTS

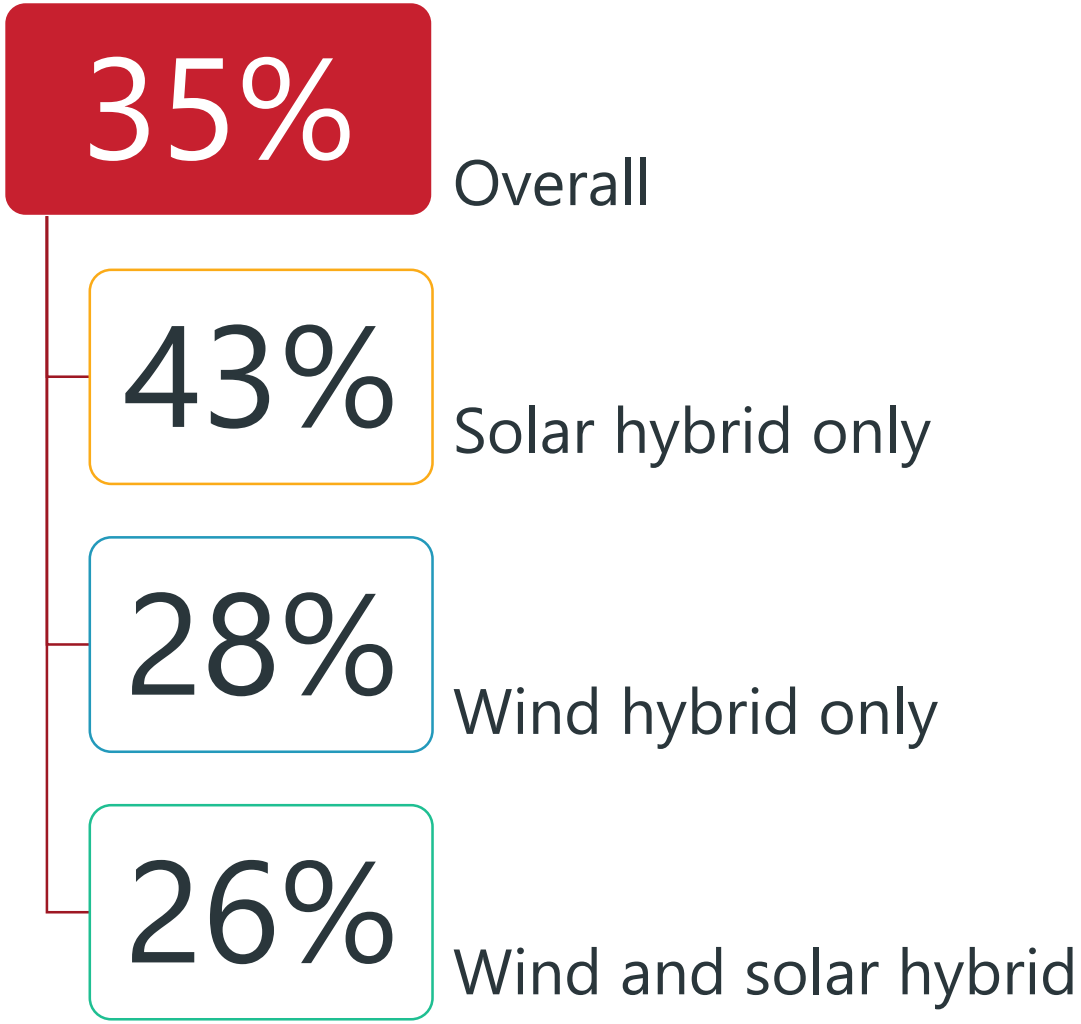
Capacity (MW)



Count



AVERAGE % OF BATTERY TO RENEWABLE AT POI



RECOMMENDATIONS

- TBD

JOSHUA NORTON

Please feel free to contact me at jnorton@spp.org if you have any questions related to the ESWG ITP Battery Survey

For further reading:

ITP Resource Siting Manual