

Meeting Agenda

Reliability Advisory Council (RAC)

Thursday, May 16, 2024
8:00 a.m. to 2:00 p.m. central

*MRO Corporate Offices, King Conference Center
St. Paul, MN & Webex*



**MIDWEST
RELIABILITY
ORGANIZATION**

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Saint Paul, MN 55102

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Public

VIDEO AND AUDIO RECORDING

Please note that Midwest Reliability Organization (MRO) may make a video and/or an audio recording of this organizational group meeting for the purposes of making this information available to board members, members, stakeholders, and the general public who are unable to attend the meeting in person.

By attending this meeting, I grant MRO:

1. Permission to video and/or audio record the meeting including me; and
2. The right to edit, use, and publish the video and/or audio recording.
3. I understand that neither I nor my employer has any right to be compensated in connection with the video and/or audio recording or the granting of this consent.

MRO ORGANIZATIONAL GROUP GUIDING PRINCIPLES

These MRO Organizational Group Guiding Principles complement charters. When the Principles are employed by members, they will support the overall purpose of the organizational groups.

Organizational Group Members should:

1. Regularly attend meetings of the group(s) on which the member serves.
2. Competently prepare for, and be an active participant in, the meetings for the group(s) on which the member serves.
3. Collaborate with other organizational group members in support of the mission, vision, and strategic initiatives of MRO.
4. Support the Highly Effective Reliability Organization (HERO™) principles.

MRO RELIABILITY ADVISORY COUNCIL MEETING AGENDA

Agenda Item	
1	Call to Order and Determination of Quorum <i>Gayle Nansel, Reliability Advisory Council Chair</i>
2	Standards of Conduct and Antitrust Guidelines <i>Bryan Clark, Director of Reliability Analysis, MRO</i>
3	Safety Briefing <i>Shawn Keller, Outreach Coordinator, MRO</i>
4	Chair's Remarks <i>Gayle Nansel, Reliability Advisory Council Chair</i>
5	Consent Agenda <i>Gayle Nansel, Reliability Advisory Council Chair</i>
6	MRO Board of Directors, OGOC and General Update <i>Bryan Clark, Director of Reliability Analysis, MRO</i>
7	Interregional Transfer Capability Study (ITCS) Update <i>John Moura, Director of Reliability Assessment and Performance Analysis, NERC</i> <i>Saad Malik, Manager of Transmission Assessments, NERC</i>
8	2024 Reliability Conference Debrief <i>Cris Zimmerman, Manager of Outreach and Stakeholder Engagement, MRO</i>
9	Reliability and Security Technical Committee (RSTC) Meeting Update <i>Jake Bernhagen, Manager of Reliability Performance, MRO</i>
10	MRO Representatives on NERC Subgroups – Written Reports <i>Jaimin Patel, SaskPower, NERC Electric Gas Working Group (EGWG) Rep</i> <i>Doug Bowman, Southwest Power Pool, NERC Inverter-Based Resource Performance Subcommittee (IRPS) Rep</i> <i>Wayne Guttormson, SaskPower, NERC System Planning Impacts from DER Working Group (SPIDERWG) Rep</i> <i>Lynn Schroeder, Sunflower Electric Power Corporation, NERC System Protection and Control Working Group (SPCWG) Rep</i> <i>Tom Whynot, Manitoba Hydro, NERC Energy Reliability Assessment Working Group (ERAWG) Rep</i>
Break – 9:30 a.m.	
11	2024 Work Plan Update <i>Gayle Nansel, Reliability Advisory Council Chair</i>
12	Planning Coordinator Update <i>Nandaka Jayasekara, Manitoba Hydro and RAC Member</i>
13	Reliability Coordinator Updates <i>John Harmon, MISO and RAC Member</i> <i>CJ Brown, Southwest Power Pool and RAC Member</i>

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Agenda Item	
14	2024 Regional Summer Assessment Overview <i>Salva Andiappan, Principal Reliability Assessment Engineer, MRO</i>
15	2025 Regional Risk Assessment <i>Mark Tiemeier, Principal Technical Advisor, MRO</i>
Lunch – 11:30 a.m.	
16	NERC Lessons Learned Review <i>John Grimm, Principal Systems Protection Engineer, MRO</i>
17	NERC Standards Review Forum (NSRF) Update <i>Gayle Nansel, Reliability Advisory Council Chair</i>
18	Protective Relay Subgroup (PRS) Update <i>Jake Bernhagen, Manager of Reliability Performance, MRO</i>
19	2024 Meeting Dates <i>Gayle Nansel, Reliability Advisory Council Chair</i>
20	RAC Member Roundtable <i>Reliability Advisory Council Members</i>
21	Other Business and Adjourn <i>Gayle Nansel, Reliability Advisory Council Chair</i>

Call to Order and Determination of Quorum

Determination of Quorum

Gayle Nansel, Reliability Advisory Council Chair

Name	Role	Company	Term
Gayle Nansel	Chair	Western Area Power Administration	12/31/25
Bryn Wilson	Vice Chair	Oklahoma Gas & Electric	12/31/26
Andy Witmeier	Member	MISO	12/31/24
Binod Shrestha	Member	Saskatchewan Power Corporation	12/31/25
CJ Brown	Member	Southwest Power Pool	12/31/24
Dallas Rowley	Member	Oklahoma Gas & Electric	12/31/25
Dick Pursley	Member	Great River Energy	12/31/25
Eric Barry	Member	Xcel Energy	12/31/26
Evan Wilcox	Member	American Electric Power	12/31/26
Jason Weiers	Member	Otter Tail Power Company	12/31/24
Jeremy Severson	Member	Basin Electric Power Cooperative	12/31/24
John Harmon	Member	MISO	12/31/26
Mark Eastwood	Member	City Utilities of Springfield, MO	12/31/26
Nandaka Jayasekara	Member	Manitoba Hydro	12/31/25
Natasha Brown	Member	Oklahoma Municipal Power Authority	12/31/24

Call to Order and Determination of Quorum

Robert's Rules of Order

Gayle Nansel, Reliability Advisory Council Chair

Parliamentary Procedures. Based on Robert's Rules of Order, Newly Revised, Tenth Edition

Establishing a Quorum. In order to make efficient use of time at MRO organizational group meetings, once a quorum is established, the meeting will continue, however, no votes will be taken unless a quorum is present at the time any vote is taken.

Motions. Unless noted otherwise, all procedures require a "second" to enable discussion.

When you want to...	Procedure	Debatable	Comments
Raise an issue for discussion	Move	Yes	The main action that begins a debate.
Revise a Motion currently under discussion	Amend	Yes	Takes precedence over discussion of main motion. Motions to amend an amendment are allowed, but not any further. The amendment must be germane to the main motion and cannot reverse the intent of the main motion.
Reconsider a Motion already resolved	Reconsider	Yes	Allowed only by member who voted on the prevailing side of the original motion. Second by anyone.
End debate	Call for the Question <i>or</i> End Debate	No	If the Chair senses that the committee is ready to vote, he may say "if there are no objections, we will now vote on the Motion." Otherwise, this motion is not debatable and subject to majority approval.
Record each member's vote on a Motion	Request a Roll Call Vote	No	Takes precedence over main motion. No debate allowed, but the members must approve by majority.
Postpone discussion until later in the meeting	Lay on the Table	Yes	Takes precedence over main motion. Used only to postpone discussion until later in the meeting.
Postpone discussion until a future date	Postpone until	Yes	Takes precedence over main motion. Debatable only regarding the date (and time) at which to bring the Motion back for further discussion.

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Remove the motion for any further consideration	Postpone indefinitely	Yes	Takes precedence over main motion. Debate can extend to the discussion of the main motion. If approved, it effectively “kills” the motion. Useful for disposing of a badly chosen motion that cannot be adopted or rejected without undesirable consequences.
Request a review of procedure	Point of order	No	Second not required. The Chair or secretary shall review the parliamentary procedure used during the discussion of the Motion.

Notes on Motions

Seconds. A Motion must have a second to ensure that at least two members wish to discuss the issue. The “seconder” is not required to be recorded in the minutes. Neither are motions that do not receive a second.

Announcement by the Chair. The chair should announce the Motion before debate begins. This ensures that the wording is understood by the membership. Once the Motion is announced and seconded, the Committee “owns” the motion, and must deal with it according to parliamentary procedure.

Voting

Voting Method	When Used	How Recorded in Minutes
Vote by Voice	The standard practice.	The minutes show Approved or Not Approved (or Failed).
Vote by Show of Hands (tally)	To record the number of votes on each side when an issue has engendered substantial debate or appears to be divisive. Also used when a Voice Vote is inconclusive. (The Chair should ask for a Vote by Show of Hands when requested by a member).	The minutes show both vote totals, and then Approved or Not Approved (or Failed).
Vote by Roll Call	To record each member’s vote. Each member is called upon by the Secretary, and the member indicates either. “Yes,” “No,” or “Present” if abstaining.	The minutes will include the list of members, how each voted or abstained, and the vote totals. Those members for which a “Yes,” “No,” or “Present” is not shown are considered absent for the vote.

Notes on Voting.

Abstentions. When a member abstains, he/she is not voting on the Motion, and his/her abstention is not counted in determining the results of the vote. The Chair should not ask for a tally of those who abstained.

Determining the results. A simple majority of the votes cast is required to approve an organizational group recommendations or decision.

“Unanimous Approval.” Can only be determined by a Roll Call vote because the other methods do not determine whether every member attending the meeting was actually present when the vote was taken, or whether there were abstentions.

Electronic Votes – For an e-mail vote to pass, the requirement is a simple majority of the votes cast during the time-period of the vote as established by the Committee Chair.

Majorities. Per Robert’s Rules, as well as MRO Policy and Procedure 3, a simple majority (one more than half) is required to pass motions.

Standards of Conduct and Antitrust Guidelines

Bryan Clark, Director of Reliability Analysis, MRO

Standards of Conduct Reminder:

Standards of Conduct prohibit MRO staff, committee, subcommittee, and task force members from sharing non-public transmission sensitive information with anyone who is either an affiliate merchant or could be a conduit of information to an affiliate merchant.

Antitrust Reminder:

Participants in Midwest Reliability Organization meeting activities must refrain from the following when acting in their capacity as participants in Midwest Reliability Organization activities (i.e., meetings, conference calls, and informal discussions):

- Discussions involving pricing information; and
- Discussions of a participant's marketing strategies; and
- Discussions regarding how customers and geographical areas are to be divided among competitors; and
- Discussions concerning the exclusion of competitors from markets; and
- Discussions concerning boycotting or group refusals to deal with competitors, vendors, or suppliers.

Safety Briefing

Shawn Keller, Outreach Coordinator, MRO

Action

Information

Report

Shawn Keller will lead this agenda item.

Chair's Remarks

Gayle Nansel, Reliability Advisory Council Chair

Action

Information

Report

Chair Nansel will give an oral report during the meeting.

Consent Agenda

Gayle Nansel, Reliability Advisory Council Chair

Action

Approve the consent agenda.

Report

Meeting Minutes

The consent agenda includes draft minutes from the open meeting held on February 22, 2024. The meeting minutes as written start on the next page.

Charter Recommendation

The consent agenda also includes the RAC and PRS Charters for recommendation to the OGOC for approval. The only change will be the approval date (August 21, 2024).



Draft Minutes of the Reliability Advisory Council Meeting

St. Paul, MN, and Webex

Thursday, February 22, 2024, 9:01 a.m. to 2:38 p.m. Central

*Notice for this meeting was electronically posted to the MRO [website](#) on January 25, 2024.
A final agenda, including advanced reading materials, was also posted on February 15, 2024.*

1. Call to Order and Determination of Quorum

The Reliability Advisory Council (RAC) Chair, Gayle Nansel called the meeting to order at 9:01 a.m. Nansel welcomed everyone, and introductions were made. Reliability Analysis Administrator, Rebecca Schneider, advised the chair that a quorum of the RAC was present. A complete list of attendees is included as [Exhibit A](#).

2. Standards of Conduct and Antitrust Guidelines

Pursuant to Policy and Procedure 4, Bryan Clark, MRO Director of Reliability Analysis, highlighted MRO's Standards of Conduct and Antitrust Guidelines.

3. Safety Briefing

MRO Outreach Coordinator, Shawn Keller, presented a safety video illustrating the steps to take if various emergency situations are encountered onsite at MRO.

4. Chair's Remarks

Chair Nansel highlighted the RAC's accomplishments from 2023. Nansel mentioned the joint review of the performance of the bulk power system during recent winter storms by FERC, NERC, and NERC's Regional Entities. The results of the review are expected to be delivered no later than June 2024. She also highlighted the objectives of the Interregional Transfer Capability Study (ITCS) and noted that the focus of the independent study is to achieve a strategic plan and create a repeatable process. Chair Nansel is currently a member of the ITCS Advisory Group.

5. New Members' Welcome Presentation

Reliability Analysis Administrator, Rebecca Schneider, provided an overview of the new members' welcome presentation. New RAC member, Mark Eastwood, City Utilities of Springfield, MO introduced himself to the group.

6. Consent Agenda

The RAC reviewed the consent agenda, which included draft minutes from the November 9, 2023, open and closed meetings. Also included were four nominee recommendations, which will be submitted to the Organizational Group Oversight Committee (OGOC) for approval at the first quarter meeting on March 6, 2024.

Upon a motion duly made and seconded, the RAC approved the consent agenda in its entirety.



7. MRO Board of Directors, OGOC and General Update

Clark provided a recap of the fourth quarter Organizational Group Oversight Committee (OGOC) strategy session on December 13, 2023. The focus areas of discussion from the draft 2024 Regional Risk Assessment (RRA) were Uncertain Energy Availability (extreme risk) and Generation Unavailability During Extreme Cold Weather (high risk). Clark noted the following suggestions made during the breakout sessions: highlight work product (e.g., white papers) from the NERC Energy Reliability Assessment Working Group (ERAWG), discussion around energy policy, quantify the work that the RAC has done around generation availability during extreme cold weather, and the need for more strategic outreach to challenge areas.

Clark provided feedback on the 2024 Draft Work Plan. The RAC added a new work plan item to support the ITCS. Additionally, minimal wording changes were made in the activities and notes sections to add clarity. Clark solicited a volunteer to attend the first quarter OGOC risk roundtable discussion on March 6, 2024. The topic is "Company Use of Artificial Intelligence Large Language Models, such as Chat GPT." Discussion ensued.

8. Interregional Transfer Capability Study (ITCS) Update

Clark provided an update of the ITCS project. There are three parts to the study: 1) Current transfer capability, 2) Recommendations of prudent additions to transfer capability, 3) Recommendations to meet and maintain transfer capability. The ITCS is in alignment with other industry initiatives to ensure energy availability. Clark shared a high-level project timeline and project structure organizational chart. Details were provided for each part of the ITCS project. Lastly, Clark summarized the completed milestones for the project. Discussion ensued.

9. Reliability and Security Technical Committee Meeting Update

MRO Manager of Reliability Performance, Jake Bernhagen, provided a recap of the NERC Reliability and Security Technical Committee (RSTC) meeting on December 6-7, 2023. Bernhagen noted an electric vehicle technical reference document written by the Load Modeling Working Group (LMWG). The report was designed to help planning coordinators and transmission planners understand the impact of electric vehicles on system performance and how to model them. NERC is planning a small inquiry on the cold weather event that occurred in January 2024 to generate lessons learned from the effort. The next meeting is scheduled for March 12-13, 2024, in San Diego. Discussion ensued.

10. MRO Representatives on NERC Subgroups

NERC Electric Gas Working Group (EGWG) – Jaimin Patel

Patel did not provide a written report. However, he was present on the call and provided an oral report. The group met on January 18, 2024, and discussed the EGWG scoping document. A subgroup has been formed to review and update the document. The Reliability Guidelines have been updated on NERC's website.

NERC Inverter Based Resource Performance Subcommittee (IRPS) – Doug Bowman

Mostafa Sedighzadeh and Naved Khan provided a written report (on behalf of Doug Bowman) located in the agenda packet.

NERC System Planning Impacts from DER Working Group (SPIDERWG) – Wayne Guttormson



Guttormson provided a written report located in the agenda packet.

NERC System Protection and Control Working Group (SPCWG) – Lynn Schroeder
Schroeder provided a written report located in the agenda packet.

NERC Energy Reliability Assessment Working Group (ERAWG) – Tom Whynot
Whynot provided a written report located in the agenda packet.

11. 2024 Work Plan Update

To accommodate scheduling conflicts, Chair Nansel moved the NERC Rep Assignments (Agenda Item 11b.) ahead on the agenda. These minutes reflect the order in which the reports were provided.

NERC Rep Assignments

RAC Vice Chair, Bryn Wilson led a discussion updating the NERC subgroup assignments for new RAC members and others who requested a change. MRO staff will reach out to the MRO sponsored NERC Representatives to share the guidance document and review the expectations and goals of the discussions. Discussion ensued. A table of the NERC Rep Assignments is included as [Exhibit B](#).

Action Item Review.

Clark recapped the seven items in the 2024 work plan. Chair Nansel reviewed the action items in the 2024 work plan and updates were made accordingly.

2024 Reliability Conference Update

RAC member, Dallas Rowley, provided an update on behalf of the conference planning subcommittee for the Annual Reliability Conference which is scheduled for May 15, 2024. The conference will be preceded by a networking reception on May 14. Potential topics and speakers have been identified and are awaiting confirmation. The subcommittee will continue to meet until the conference agenda has been finalized. Discussion ensued.

12. Reliability Coordinator Updates

Midcontinent Independent System Operator (MISO)

Andy Witmeier, RAC member, provided a winter operations update. MISO hit a new winter peak load of 106 gigawatts on January 17, 2024, an all-time wind peak of 25.7 gigawatts on January 12, 2024, and an all-time solar peak of 4.4 gigawatts on February 19, 2024. Overall, this winter season is noticeably warmer in the North and Central regions, compared to the 10-year normal. Winter Storm Heather brought below-normal temperatures and an all-time winter peak for the South region. Winter Storm Heather had limited impact on MISO due to high wind production and less gas generator outages compared to previous winter storms. MISO continues to focus on improvements around uncertainty in operations planning.

Saskatchewan Power Corporation (SPC)

Binod Shrestha, RAC member, provided winter highlights for 2023-2024. Loads are below forecasts due to the warmer than expected winter season. In mid-January, SaskPower experienced a cold snap and hit a peak load of ~3,900 megawatts. SaskPower was able to manage the loads and generation without issuing any Energy Emergency Alerts (EEAs).



Shrestha shared highlights from the summer reliability assessments for 2024. Load served is expected to be between 3,000 and 3,450 megawatts for the summer months (May to October). Planned generation outages are scheduled in May, June September, and October. Great Plains, a 377-megawatt combined cycle gas plant, is expected to be online this summer. SaskPower expects to have no gas or coal issues. But SPC is expecting a low hydro season which will impact their hydro operations all summer. There are no transmission lines scheduled for maintenance at the present time.

Southwest Power Pool (SPP)

CJ Brown, RAC member, provided an overview of operations during the winter storm event in January 2024. Brown reviewed the timeline of operational communications during the event and noted that system operator coordination worked well. The SPP region was significantly impacted by the winter storm, due to forced outages and derates. The Balancing Authority (BA) area experienced surface temperature anomalies of up to 40 degrees Fahrenheit below average on January 14, 2024. Average coal availability was the same as Winter Storm Elliott and natural gas availability improved slightly. By contrast, average wind availability was down slightly from Winter Storm Elliott levels. Brown reported that SPP imported 6,766 megawatts from various interconnections, which was the most ever.

SPP set new minimum load records for two full days (January 14-15, 2024) where load did not drop below 40 gigawatts. SPP also saw their sixth highest energy day served on January 15, 2024. The previous five highest days occurred in August 2023 (peak summer load week). Brown noted that this winter event was the lowest congested event compared to the two previous events (Uri and Elliott). Discussion ensued.

13. Planning Coordinator Updates

Saskatchewan Power Corporation (SPC)

Binod Shrestha, RAC member, provided an oral report. Near term generation projects include a new combined cycle gas facility, two new simple cycle gas units, and new wind and solar PV generation facilities. There are approximately 2,735 megawatts of internal generation projected to be added throughout the assessment period (2023-2033), this includes Tier 1, Tier 2, and Tier 3. There are approximately 212 megawatts projected for confirmed retirements, mainly end of life. Unconfirmed retirements include 1,200 megawatts of conventional coal and 150 megawatts of wind.

Near term transmission projects include expanded transmission service between SaskPower and Southwest Power Pool (SPP). Two 230 kV power lines are being added from Saskatchewan to North Dakota. There are also new 230 kV transmission reinforcements in the Regina, SE Saskatchewan area to facilitate the new transmission service. Additionally, SaskPower has a twenty megawatt-hour battery site under construction with plans for expansion. Discussion ensued.

Manitoba Hydro

Due to a scheduling conflict, this agenda item was tabled until the second quarter RAC meeting on May 16, 2024.

14. MRO Regional Risk Assessment (RRA)

MRO Principal Technical Advisor, Mark Tiemeier, provided an overview of the 2024 Regional Risk Assessment (RRA) and a timeline for the 2025 RRA. Tiemeier shared an infographic of the top eight risks, noting that for the first time MRO has identified an extreme risk: Uncertain Energy Availability.



There were fifteen total risks identified in the 2024 RRA. Tiemeier reviewed the 2025 timeline and noted a significant change in timing due to the fourth quarter OGOC Risk Summit. The risk ranking workshop is scheduled for September 17, 2024. Two volunteers from the RAC will be solicited to participate in the workshop and risk information sessions.

15. NERC Standards Review Forum Update

Chair Nansel provided an update on behalf of the NERC Standards Review Forum (NSRF). Nansel noted two items from the NSRF weekly call on February 21, 2024, that were distributed to the RAC via email for their consideration.

16. Protective Relay Subgroup Update

MRO Manager of Reliability Performance, Jake Bernhagen, provided an update on behalf of the Protective Relay Subgroup (PRS). Bernhagen is working with MRO Sr. Systems Protection Engineer, Sarah Wernette, so she can take over as the PRS liaison. Bernhagen is considering a joint meeting in 2024-2025 with a relay subgroup from another region in the ERO Enterprise.

17. 2024 Meeting Dates

Clark reviewed the 2024 meeting dates for the RAC, as well as the other councils and subgroups.

18. RAC Member Roundtable

Chair Nansel invited member participants to share other relevant industry observations. No roundtable topics were shared.

19. Other Business and Adjourn

Having no further business to discuss, the meeting was adjourned at 2:38 p.m.

Prepared by: Rebecca Schneider, Reliability Analysis Administrator.

Reviewed and submitted by: Bryan Clark, Director of Reliability Analysis



Exhibit A – Meeting Attendees

Reliability Advisory Council Members Present	
Name	Organization
Gayle Nansel, Chair	Western Area Power Administration
Bryn Wilson, Vice Chair	Oklahoma Gas & Electric
Andy Witmeier	MISO
Binod Shrestha	Saskatchewan Power Corporation
C. J. Brown	Southwest Power Pool
Dallas Rowley	Oklahoma Gas & Electric
Dick Pursley	Great River Energy
Jason Weiers	Otter Tail Power Company
Jeremy Severson	Basin Electric Power Cooperative
Mark Eastwood	City Utilities of Springfield, Missouri
Nandaka Jayasekara	Manitoba Hydro
MRO Staff Present	
Name	Title
Bryan Clark	Director of Reliability Analysis
Rebecca Schneider	Reliability Analysis Administrator
Shawn Keller	Outreach Coordinator
Jake Bernhagen	Manager of Reliability Performance
Mark Tiemeier	Principal Technical Advisor
Salva Andiappan	Principal Reliability Assessment Engineer
Cris Zimmerman	Manager of Outreach and Stakeholder Engagement
Steen Fjalstad	Director of Security
Eric Graftaas	Principal Power Systems Engineer
Sarah Wernette	Sr. Systems Protection Engineer



Lauren McClary	Meeting Administrator
Lisa Stellmaker	Executive Administrator
Kabir Dogubo	Senior RAM Engineer
Other Attendees	
Name	Organization
Jaimin Patel	Saskatchewan Power Corporation
Wayne Guttormson	Saskatchewan Power Corporation
Tom Whynot	Manitoba Hydro
Dane Rogers	Oklahoma Gas & Electric
Daryl Maxwell	Manitoba Hydro
Don Hargrove	Oklahoma Gas & Electric
Ellen Watkins	Sunflower Electric Power Corporation
Kelly Crist	Engie
Kevin Giles	Evergy
Larry Brusseau	Corn Belt Power Cooperative
Mary Agnes Nimis	FERC
Mostafa Sedighizadeh	Southwest Power Pool
Natasha Brown	Oklahoma Municipal Power Authority
Nate Morris	Liberty Utilities
Naved Khan	Southwest Power Pool
Paul Mehlhaff	Sunflower Electric Power Corporation
Ray Bergmeier	Sunflower Electric Power Corporation
Ricardo Rodriguez	City of Ames
Shawna Satterwhite	Oklahoma Gas & Electric
Thilini HathiyaIdeniye	Manitoba Hydro



Exhibit B – NERC Rep Assignments

NERC Subgroup	MRO Staff Liaison	MRO NERC Rep	MRO RAC Rep	MRO RAC Rep	MRO RAC Rep
NERC Electric Gas Working Group (EGWG)	Dianlong Wang	Jaimin Patel	CJ Brown	Eric Barry	Bryn Wilson
NERC Inverter-Based Resource Performance Subcommittee (IRPS)	Eric Graftaas	Doug Bowman	Binod Shrestha	Jeremy Severson	Dick Pursley
NERC System Planning Impacts from DER Working Group (SPIDERWG)	Salva Andiappan	Wayne Guttormson	Jason Weiers	Gayle Nansel	John Harmon
NERC System Protection and Control Working Group (SPCWG)	John Grimm	Lynn Schroeder	Evan Wilcox	Dallas Rowley	Nandaka Jaysekara
NERC Energy Reliability Assessment Working Group (ERAWG)	Dianlong Wang	Tom Whynot	Mark Eastwood	Natasha Brown	Andy Witmeier

MRO Board of Directors, OGOC and General Update
Bryan Clark, Director of Reliability Analysis, MRO

Action

Information

Report

Bryan Clark will lead this discussion during the meeting.



MIDWEST
RELIABILITY
ORGANIZATION

OGOC and BOD Update

Bryan Clark, P.E.
Director of Reliability Analysis
May 16, 2024

OGOC Q1 Meeting

- **Approvals**
 - New RAC Members
 - 2024 RAC Work Plan
- **Risk Roundtable**
 - Artificial Intelligence Tools

Future Meeting Dates

- **Q2 OGOC Meeting**
 - May 22, 2024
- **Q2 BOD Meeting**
 - May 23, 2024
- **Q3 OGOC Meeting**
 - August 21, 2024



Questions

Interregional Transfer Capability Study (ITCS) Update

John Moura, Director of Reliability Assessment and Performance Analysis, NERC

Saad Malik, Manager of Transmission Assessments, NERC

Action

Information

Report

NERC will provide an oral report during the meeting.

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Interregional Transfer Capability Study

MRO Reliability Advisory Council Meeting

Saad Malik, Manager Transmission Assessments

May 16, 2024

RELIABILITY | RESILIENCE | SECURITY





Part I: Calculate current transfer capability

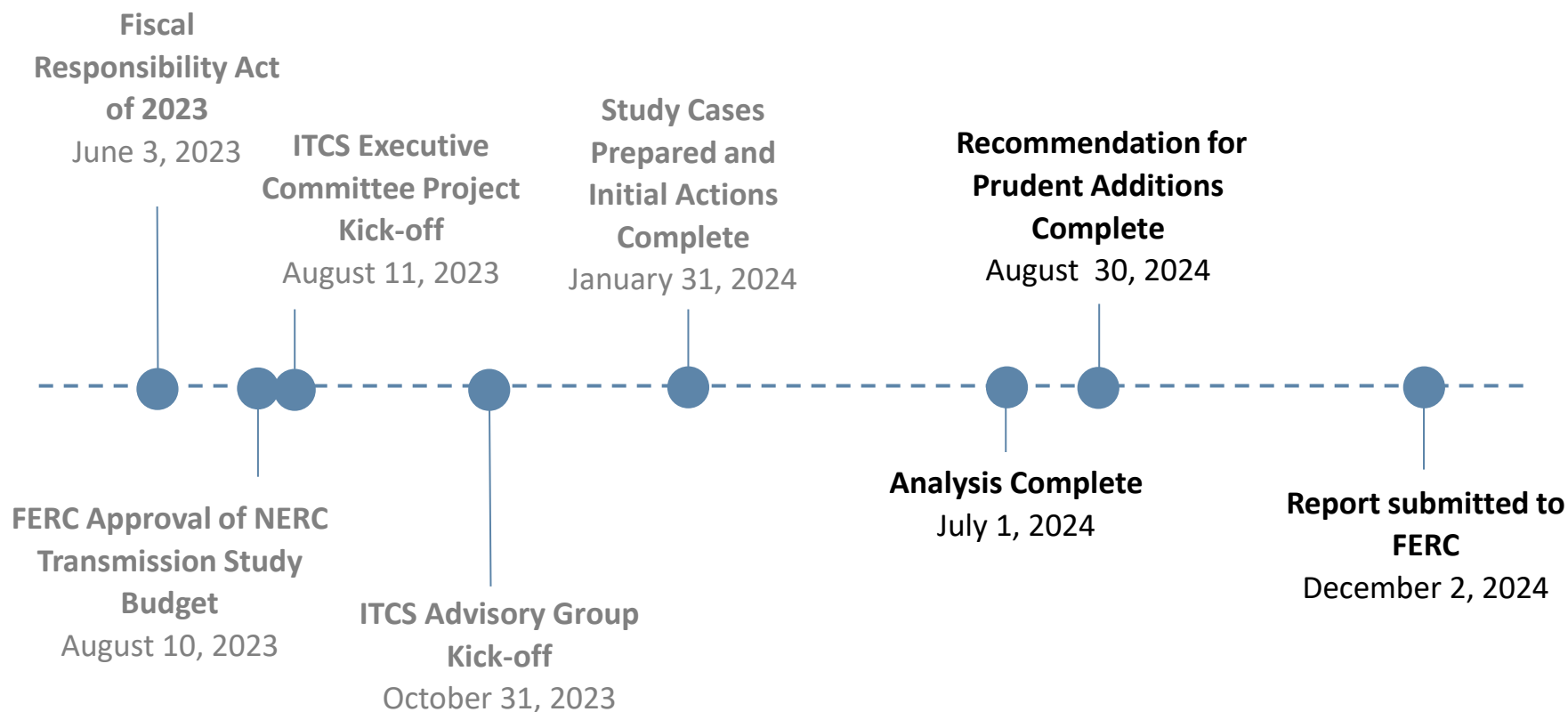


Part II: Recommend prudent additions to transfer capability



Part III: Recommend how to meet and maintain transfer capability

The following is a timeline of key activities:



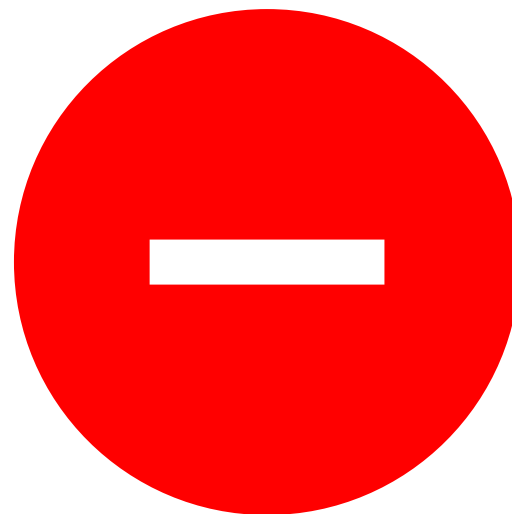
Planning Study

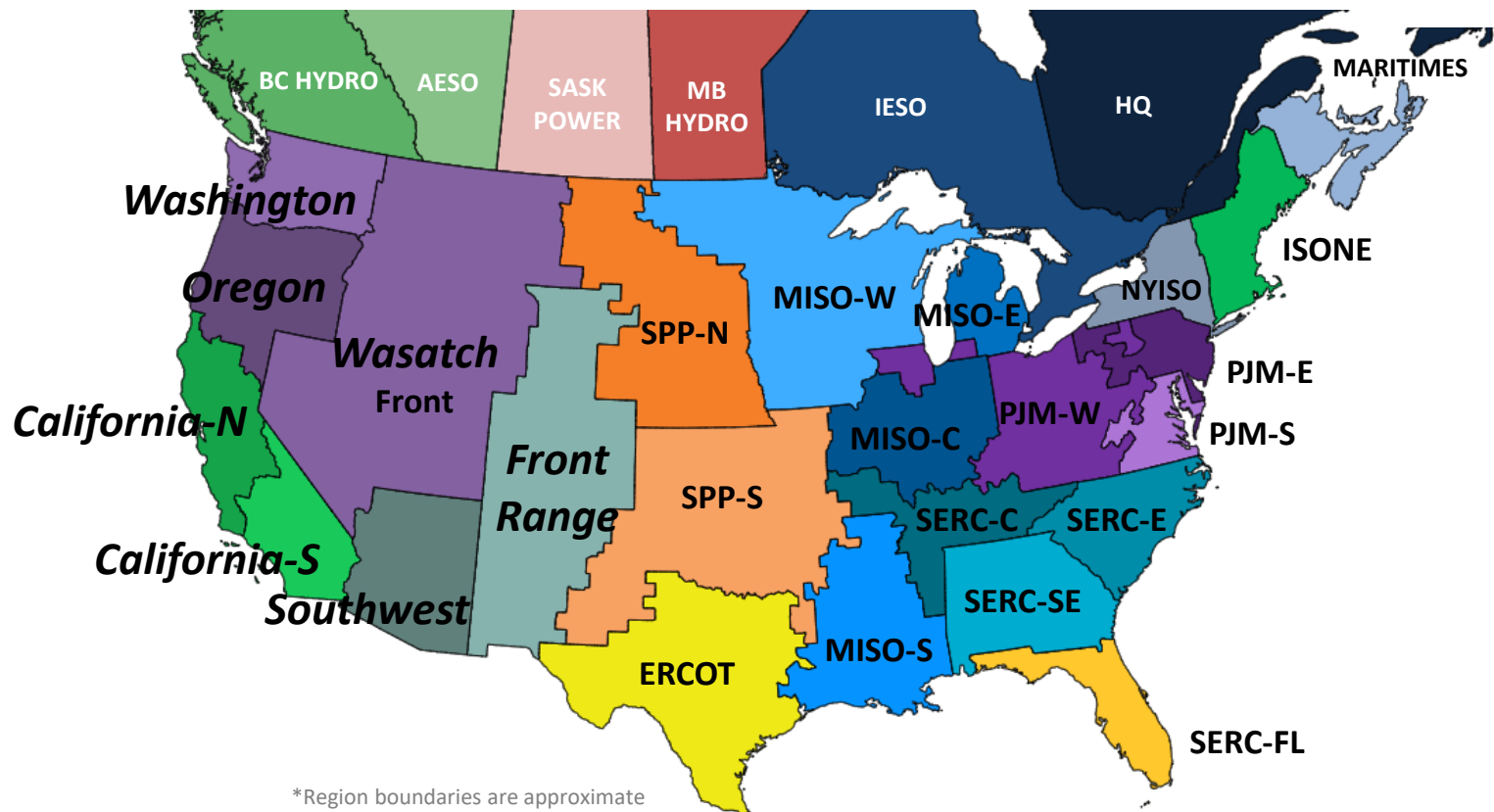
Replacement for Transmission
Expansion Analysis and Interregional
Planning Groups

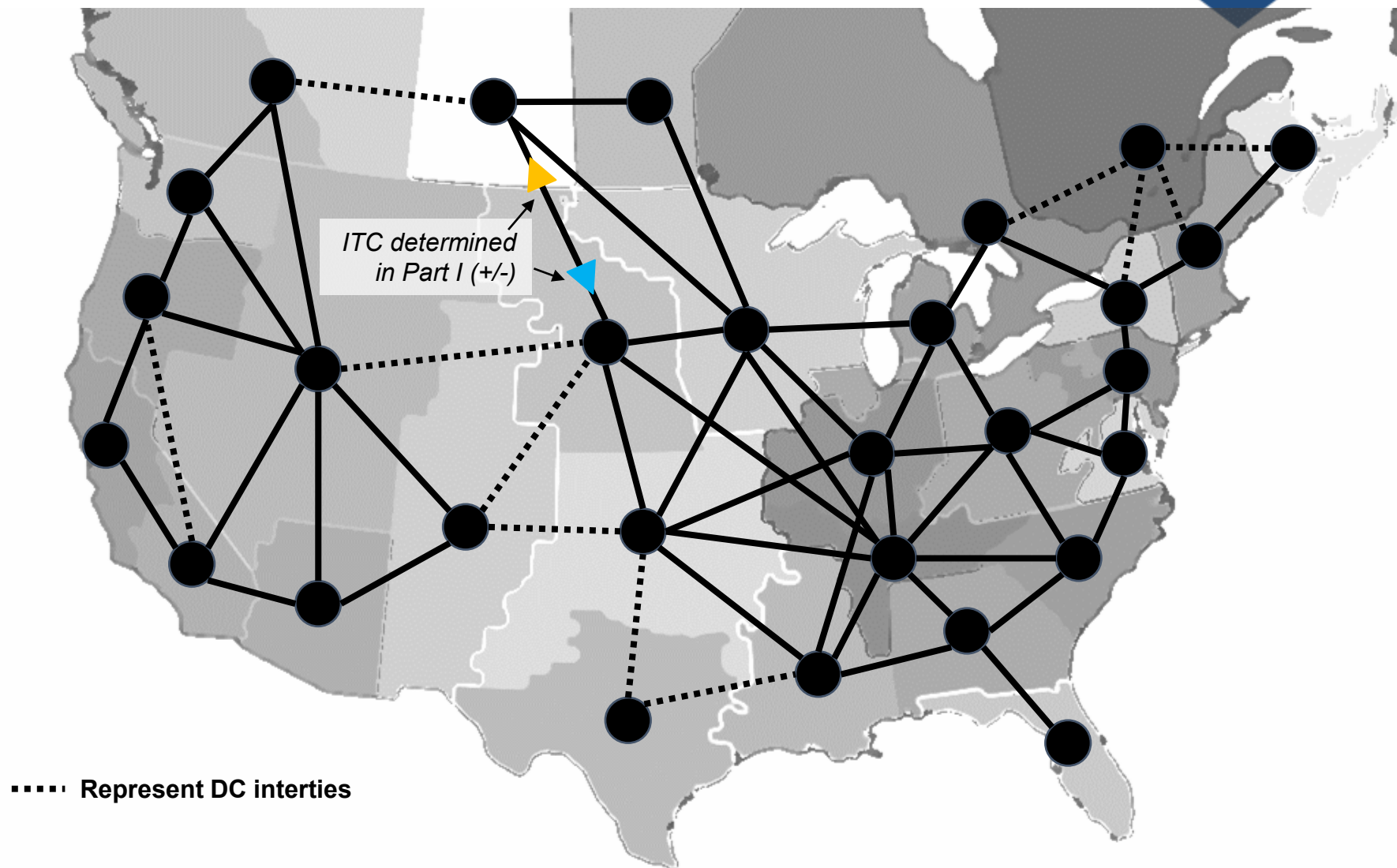
No recommendations for specific
projects (generation, transmission, etc.)

Focus on WHAT...not HOW

A complete solution







- **Transfer Directions**

- Non-simultaneous transfer analysis will be performed between the neighboring regions
- Transfers into or between Canadian provinces will be included as part of the Canadian Analysis to be published in early 2025
- Non-simultaneous transfer analysis will also be performed using the FERC Order 1000 Transmission Planning Regions

- **Modeling of Transfer Participation**

- Each transfer will be simulated until a valid thermal limit is reached
- A voltage screening will be performed for each transfer direction at the FCITC limit

Study Tool

- PowerGem TARA software will be used for steady state thermal and voltage analysis.

Base Cases

- Eastern Interconnection MMWG Cases 2024 Heavy Summer/Winter and 2033 Heavy Summer/Winter
- Western Interconnection 2024 Heavy Summer/Winter and 2033 Heavy Summer/Winter
- Transmission Owners (TO) and Transmission Providers (TP) review
- ERCOT cases not required

Contingencies

- P1-1: Loss of individual generators
- P1-2: Loss of a single transmission line, operating at 100 kV or above
- P1-3: Loss of a single transformer, with a low side voltage of 100 kV or above

- **Monitored Elements**

- All elements in source/sink
- All elements rated 230 kV and above (outside source/sink), 5 buses from source/sink boundaries
- All elements 345 kV and above (outside source/sink), 10 buses from source/sink boundaries

- **Contingencies**

- All contingencies within source/sink
- All contingencies 5 buses (outside source/sink) from source/sink boundaries

- First pass results being reviewed
- Second pass results expected mid-May
- Finalize transfer analysis results by end of May

Part 1: Transfer Analysis

Identify interregional
transfer capability

Part 2: Prudent Additions

A North American Weather
Event Dataset
(correlated and consistent load, wind,
solar, weather dependent outages)

B Energy Assessment
(Hourly energy margins by region
throughout reliability events)

C Prudent Transfer
Capability Additions
(Required transfer capability to mitigate
shortfalls and reliability events)

Transfer
Capability

	Current System	10-year Outlook
Summer Peak	Quantify existing transfer capability	
Winter Peak		
↓ ↓ ↓		
Cold Snap		
Heat Wave	Identify prudent additions to transfer capability to mitigate reliability events	
Renewable Drought		
Combined Risk		

Hourly Energy Margin Calculation

Hourly Energy Margin =

- + Available Wind & Solar**
- + Seasonal Hydro Capacity**
- + Available Thermal**
- Weather Dependent Outages**
- + Storage Net Gen**
- (Load + Reserves)**

Hourly capacity factors by Source/Sink based on meteorological conditions.

Monthly maximum hydro output for normal and drought conditions

Seasonal rated capacity for coal, gas, oil, and nuclear generators

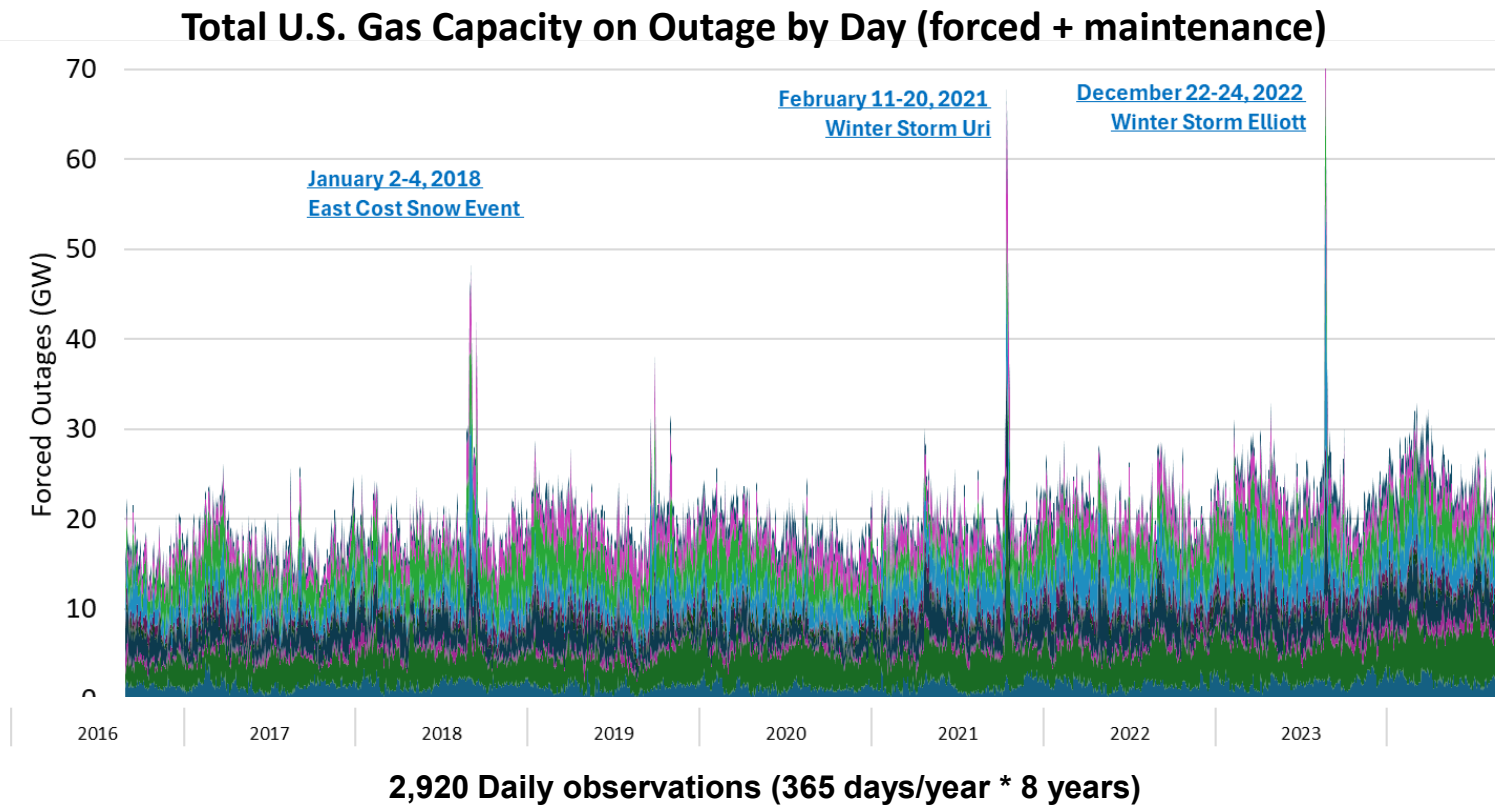
Forced outages based on daily temperature observations, plus normal planned maintenance

Storage charge and discharge schedules to arbitrage net load

Hourly load as a function of weather, plus reserves

- ✓ *Hourly*
- ✓ *Time-synchronized*
- ✓ *Locational*
- ✓ *Consistent*

NERC GADS Data, Aggregated **by day**, by fuel type, by Source/Sink



Synthetic (modeled)

Historic (actuals)



HOURLY LOAD

NREL Standard Scenarios hourly load by region, scaled to meet median LTRA peak and energy. Hourly 8760 by weather year

Actual EIA 930 Balancing Area hourly load, scaled to meet median LTRA peak and energy. BTM PV and unserved energy “added back”

HOURLY WIND & SOLAR

NREL WindToolkit and NSRDB datasets from ReEDS model. Hourly 8760 by weather year.

To be scaled down to align with historic actuals.

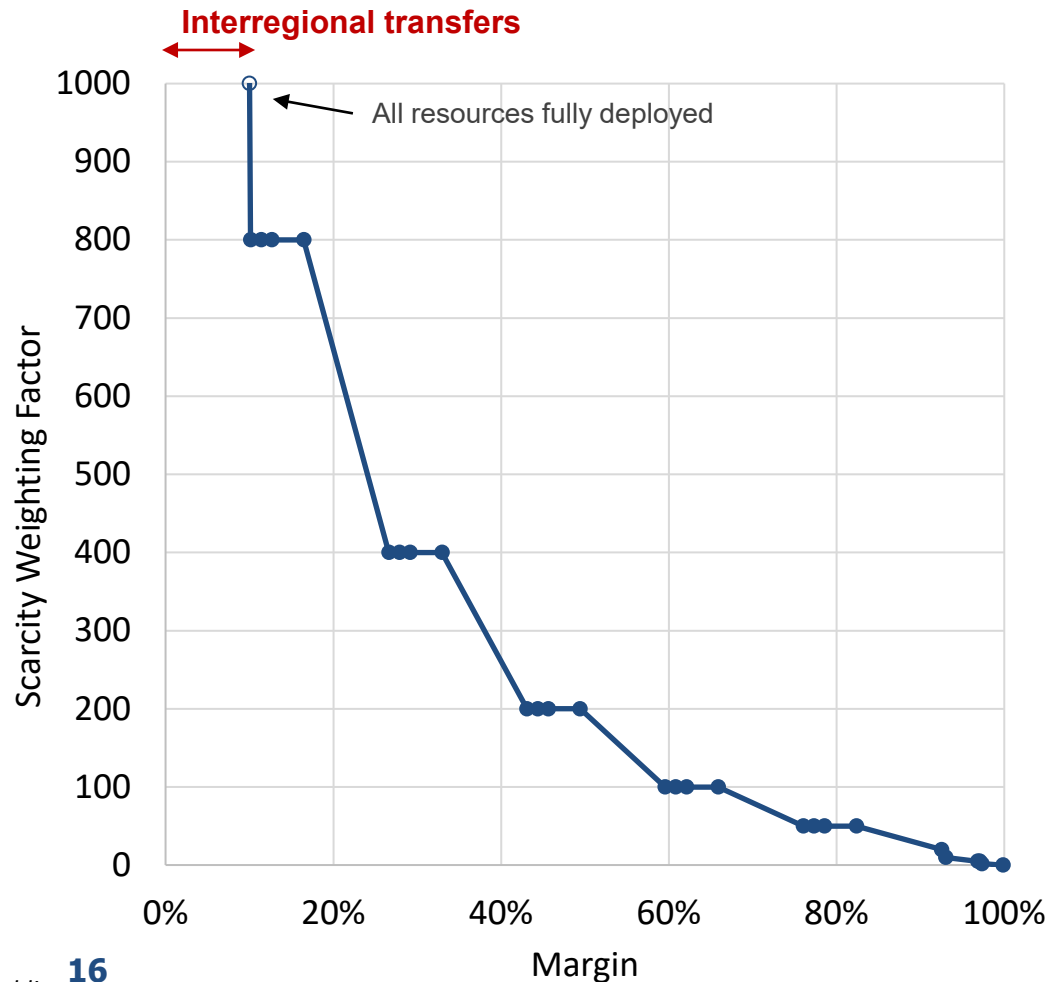
Actual EIA 930 Balancing Area generation by resource type, adjusted to capacity factor based on estimated reported installed capacity.

DAILY THERMAL OUTAGES

Forced outages bootstrapped from historic actuals (GADS data) using temperature observations in each region and average maintenance profile by region/resource type

NERC GADS outages (maintenance and forced) by day, by region, by resource type. Converted to available capacity as percent of installed capacity.

Objective: to perform a reliability “dispatch” for each region, rather than production cost modeling based on available resources relative to load



- Each region will serve its own load prior to importing or exporting, which helps isolate **reliability interchange** rather than economic interchange.
(this is done by setting a high hurdle rate on ties between regions)
- Operating costs are NOT assumed for resources
- An operating constraint will increase “Scarcity Weighting Factor” in the region as margin gets tighter (model dispatch will be based on relative surplus/scarcity, not resource costs)
- If a region cannot serve its own load, it will import from a neighbor that has relatively more surplus (lower scarcity weighting factor), subject to resource availability and tie-line capacity

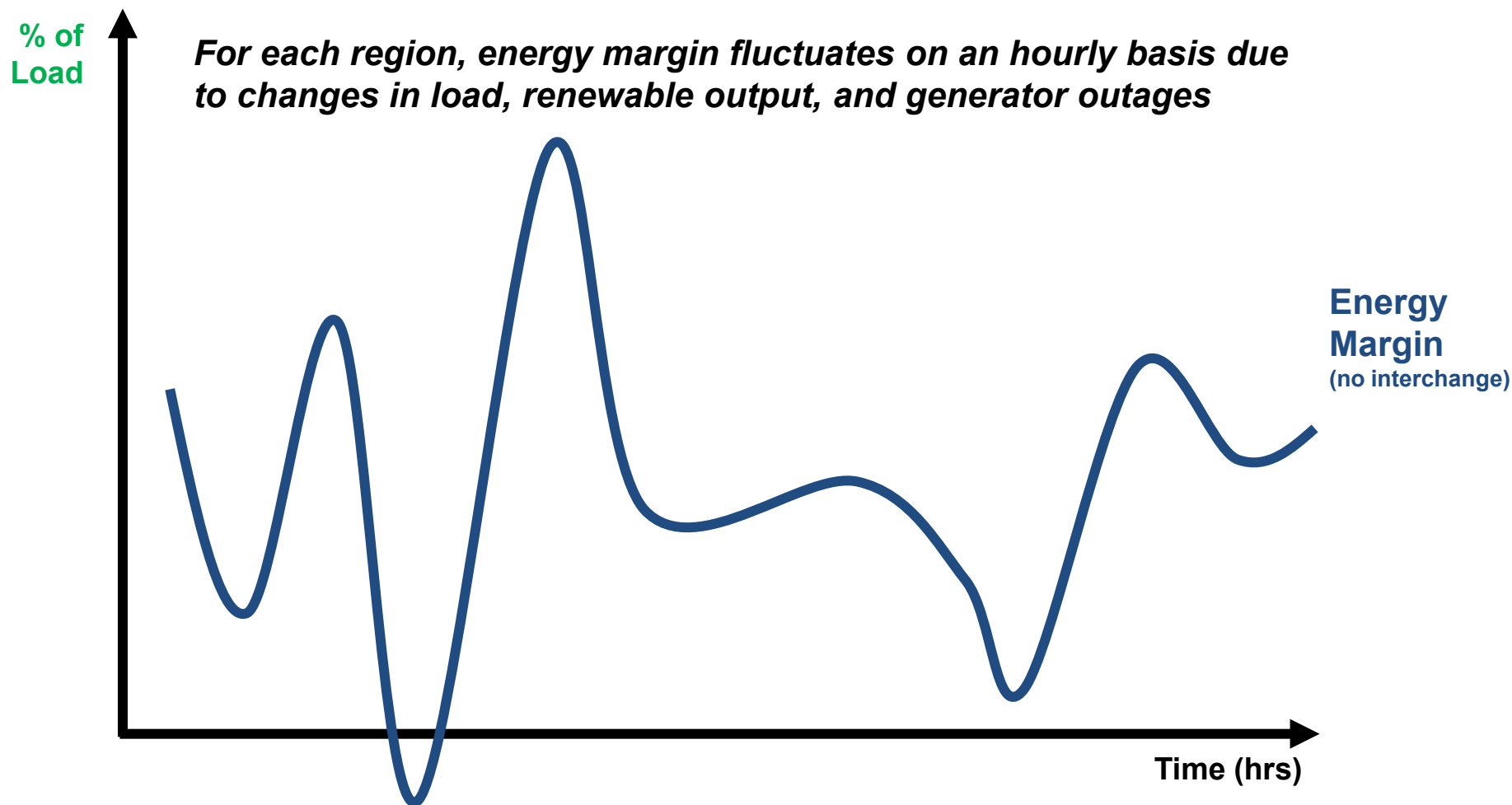
What this method DOES

- ✓ Prioritize regions for interregional transfer capability
- ✓ Tracks daily and hourly availability of all resource types
- ✓ Calculates relative surplus and deficit in each region, at the same time
- ✓ Performs a reliability-only dispatch of resources
- ✓ Allows regions to import from one region while exporting to another

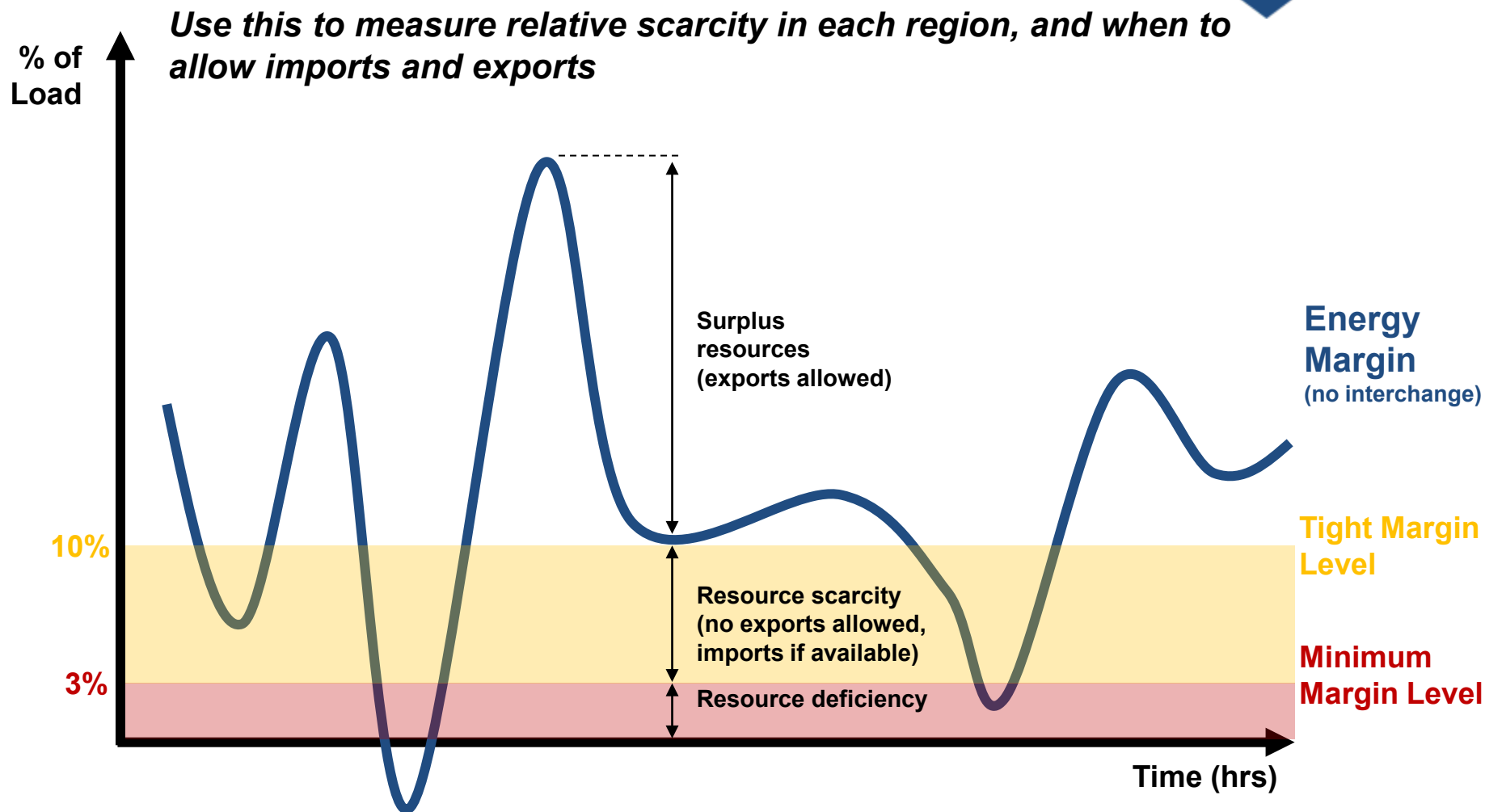
What this method DOES NOT

- ✗ Represent actual physical power flows across the network
- ✗ Track individual resource performance
- ✗ Calculate relative costs or prices between regions
- ✗ Perform an economic, least-cost (production cost) dispatch
- ✗ Only evaluate “neighbor” flows

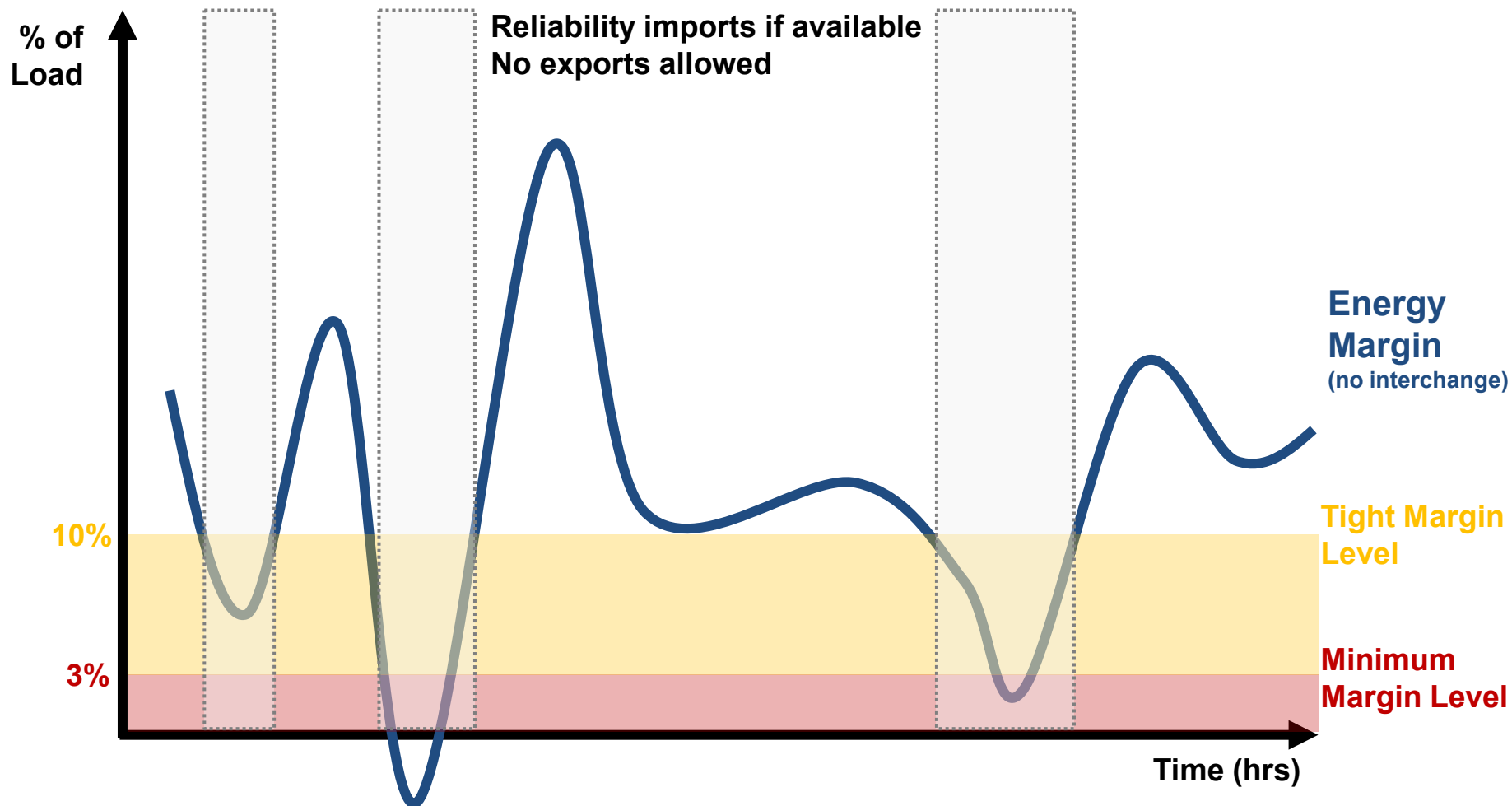
Energy margin illustrative example



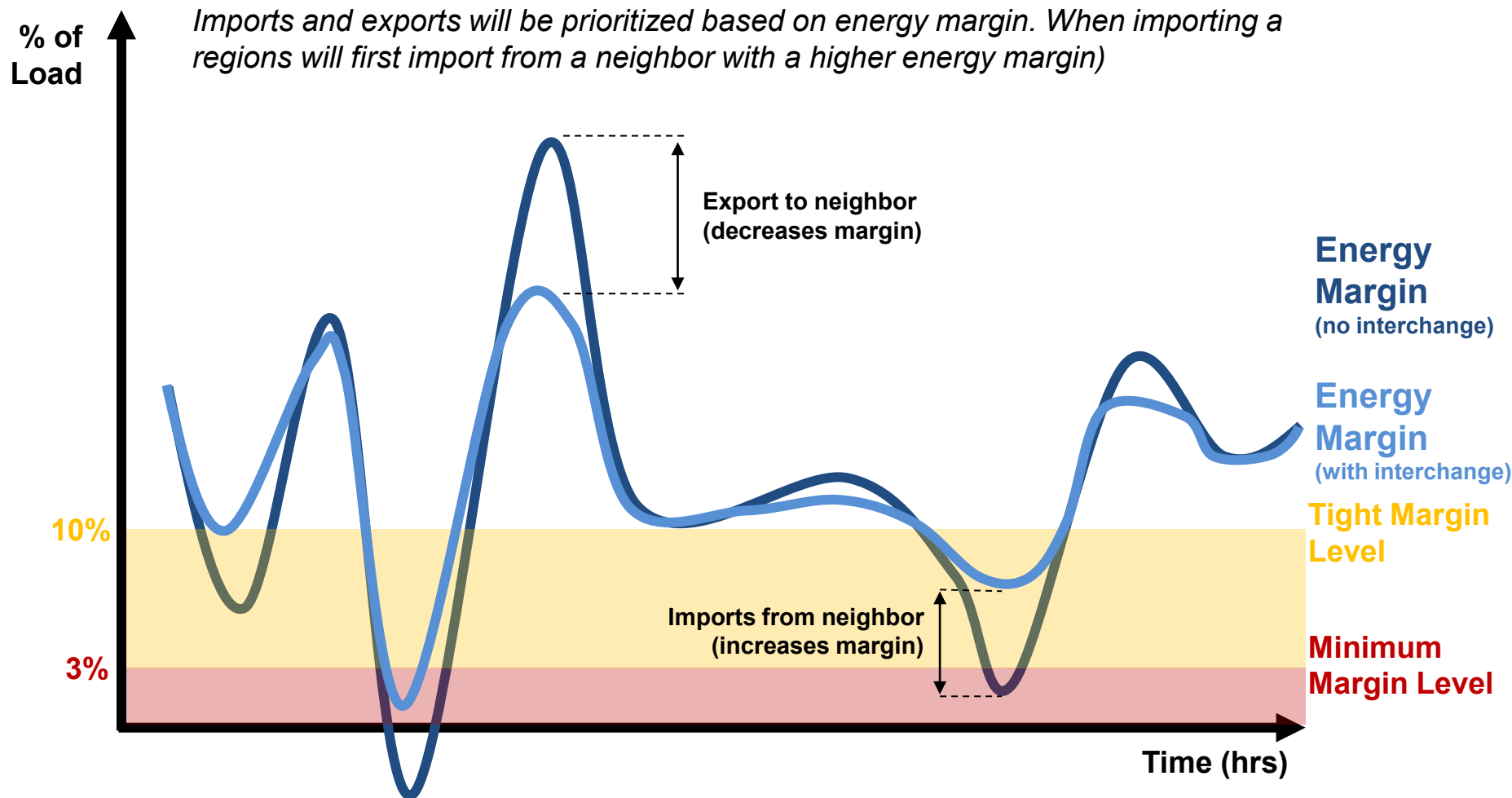
Energy margin illustrative example



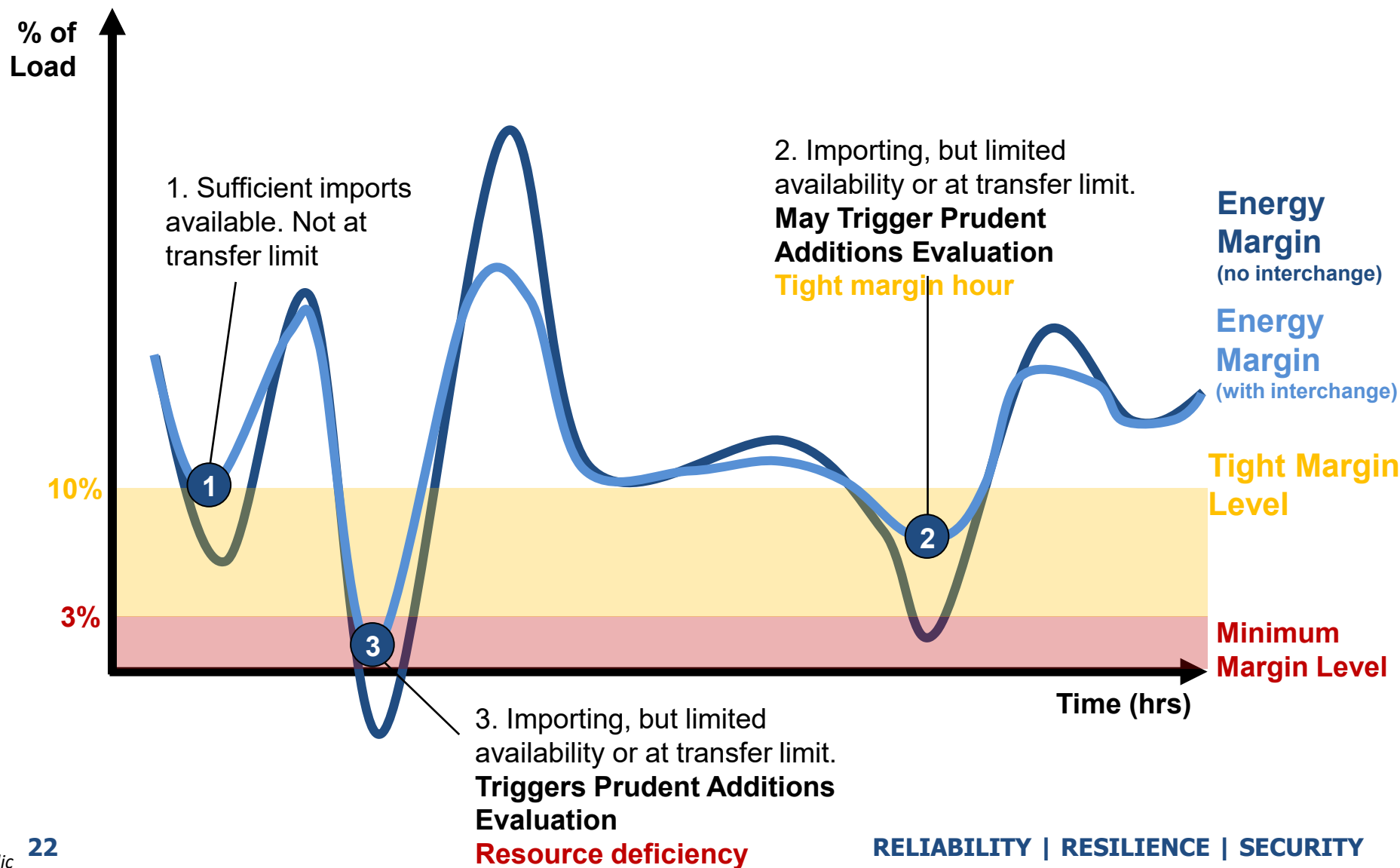
Energy margin illustrative example



Energy margin illustrative example



Energy margin illustrative example



Tight Margin Level: only being used to dictate when and where regions should import from. Sets the priority for interregional transfers.

Currently set to 10% (3% minimum + 7% energy)

Minimum Margin Level: holding back some capacity for ancillary services (that would be held even if there was unserved energy) and forecast uncertainty.

Currently set to 3%

Incremental Steps for Reliability Dispatch

1. Use own resources to serve load first. As region gets tighter, increase the relative scarcity factor.
2. When regions fall below **10% Tight Margin Level**, import from neighbors. Decision on which neighbor to import from is based on their respective energy margin.
3. If sufficient imports are unavailable (due to transfer capability or lack of resources available) go below **10% Tight Margin Level** but maintain a **3% Minimum Margin**.
4. If sufficient resources are unavailable and energy reserves are fully utilized, call out resource deficiency.

- **Energy margin:** can track the hourly energy margin over the course of the year, both in MW and % of load) [avg, min, etc.]
- **Interchange Hours:** number of hours in a year when a system requires imports to keep hourly energy margin $\geq 10\%$
tells us how often a region needs to import
- **Tight-Margin Hours:** number of hours in a year when minimum reserves are below tight levels
tells us how often a region's transfer capability is limited due to transfer capability – or- lack of resources
- **Hours Congested:** hours when an import interface is at its limit.
Tells us how often a region's transfer capability is insufficient due to the transfer limit.
- **Scarcity Hours:** number of hours with resource deficiency
Metrics can be reported as hours, energy (MWh), or max power (MW)

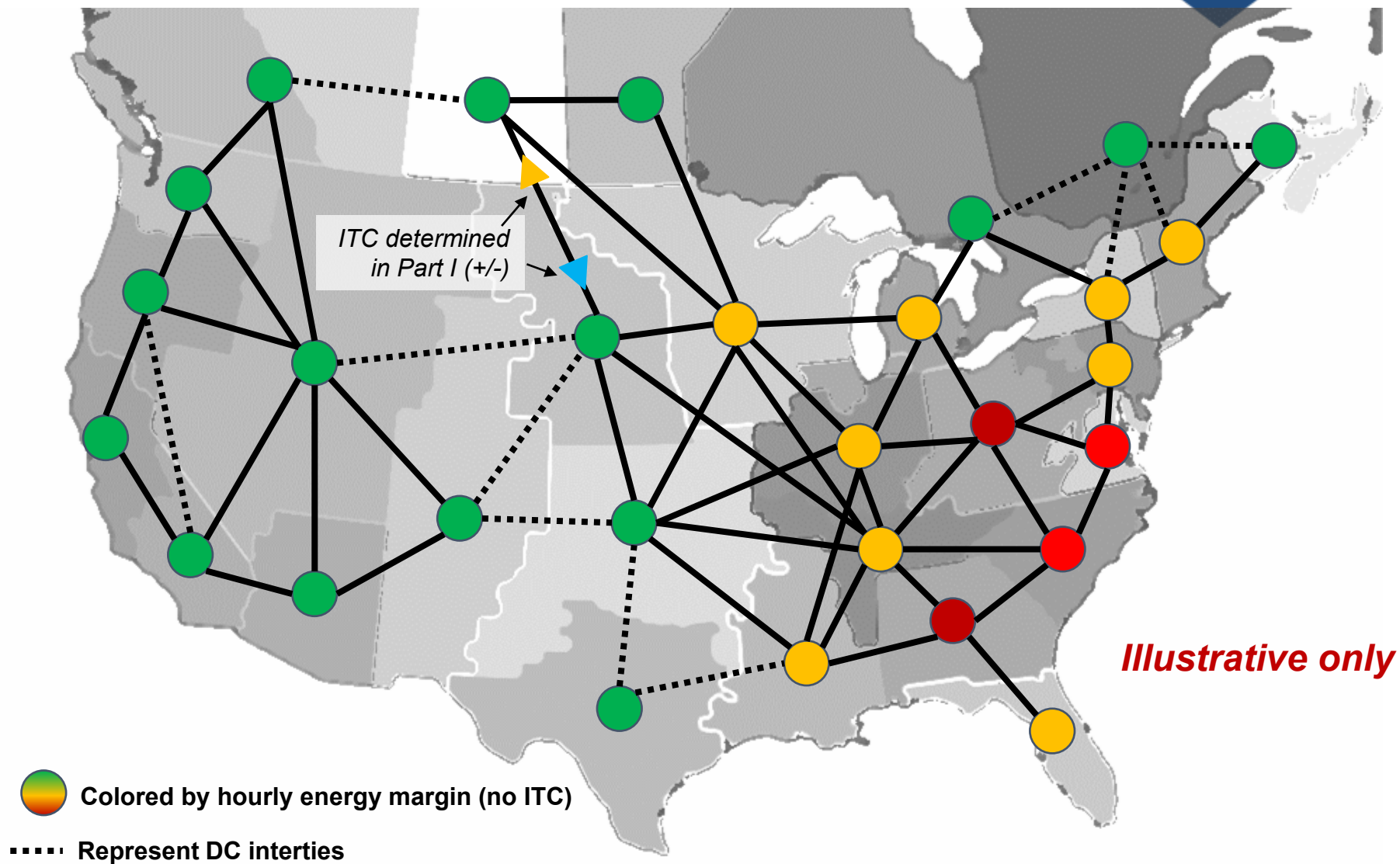
What is technically prudent addition to transfer capability?

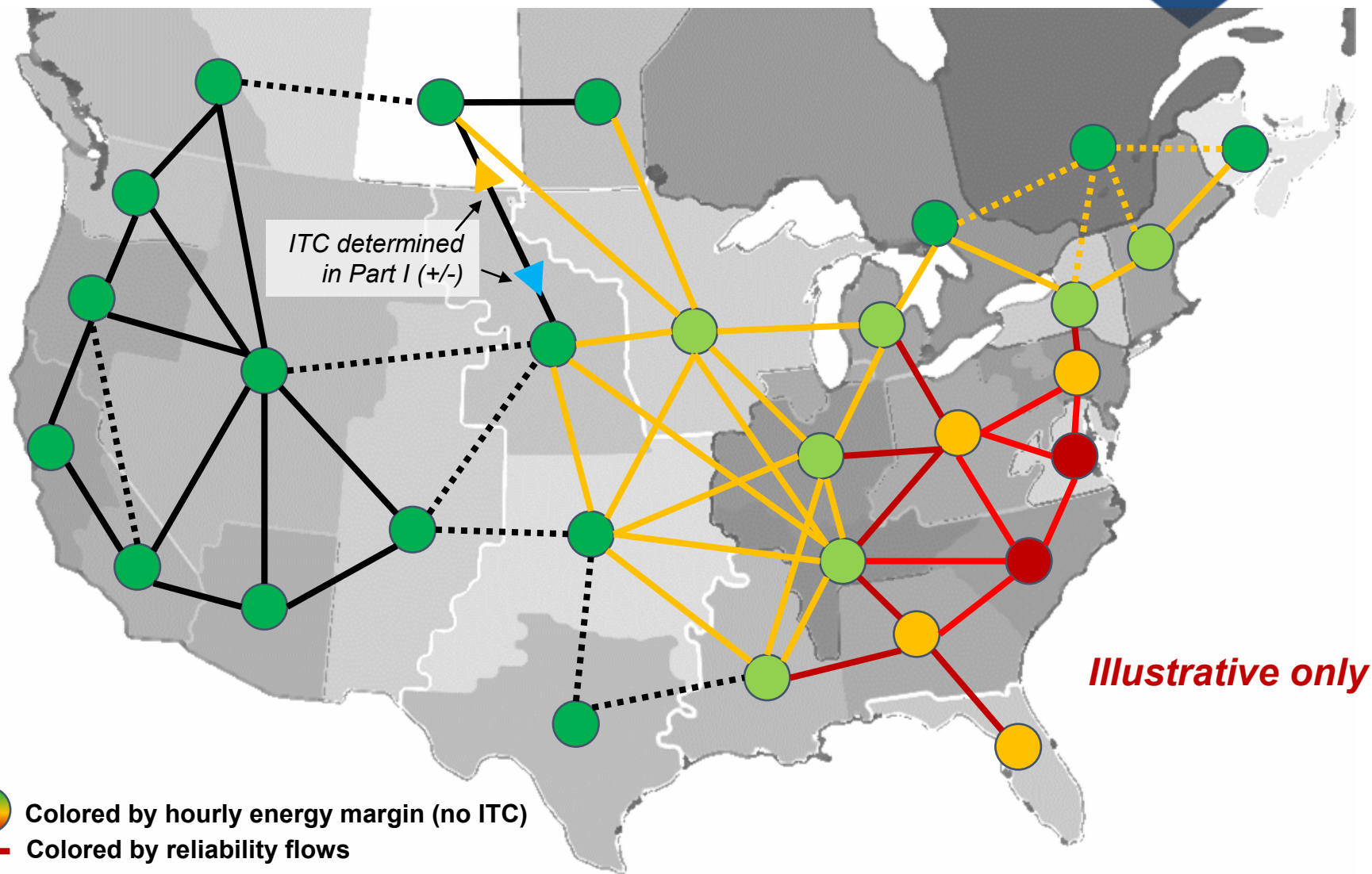
- *Strengthens reliability*
- *Serve load under extreme conditions*
- *Without creating other reliability problems*

FERC precedent provides that “prudence” means a determination of whether a reasonable entity would have made the same decision in good faith under the same circumstances, and at the relevant point in time.

In more recent proceedings, FERC has described prudent decisions:

- (1) enhance ability to restore service;*
- (2) achieve significant efficiencies;*
- (3) reduce higher costs or time delays;*
- (4) make efficient use of resources to ensure reliability of the transmission grid.*

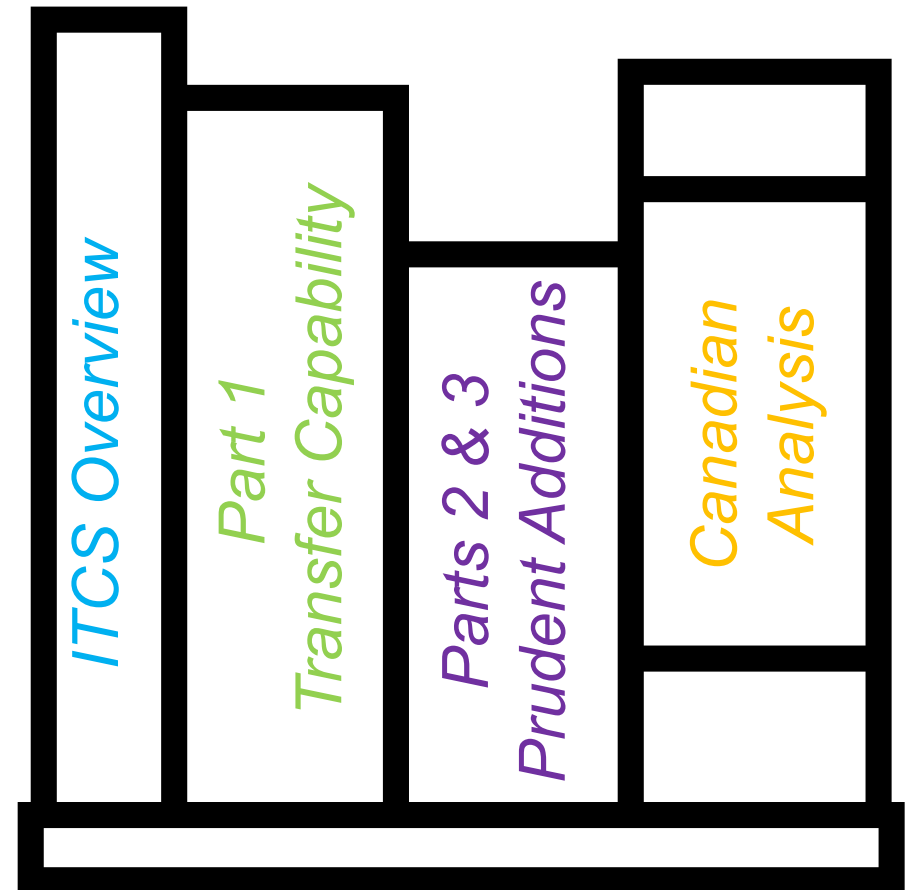
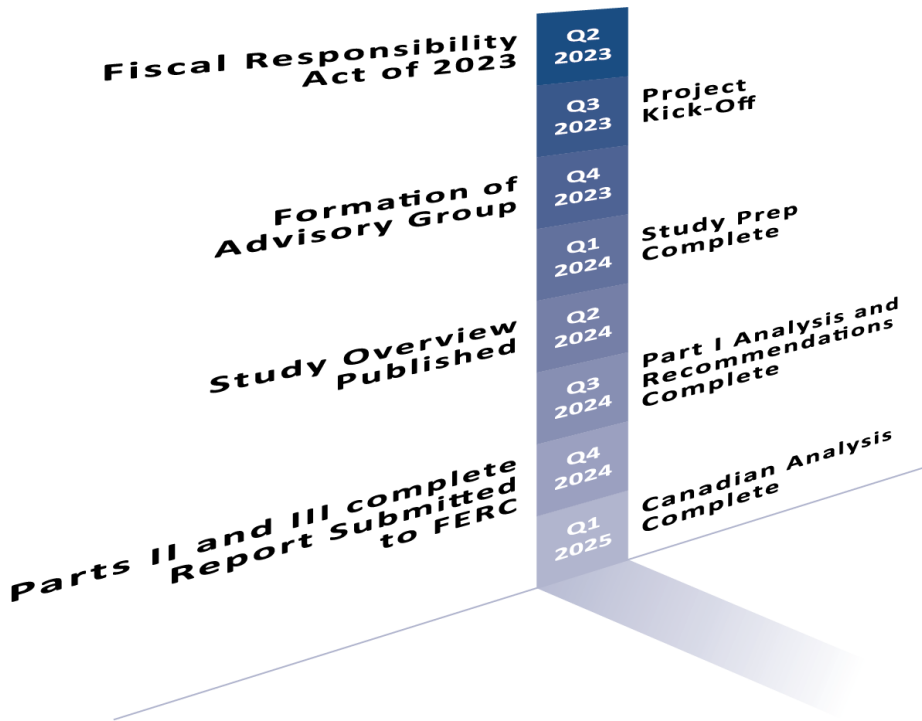




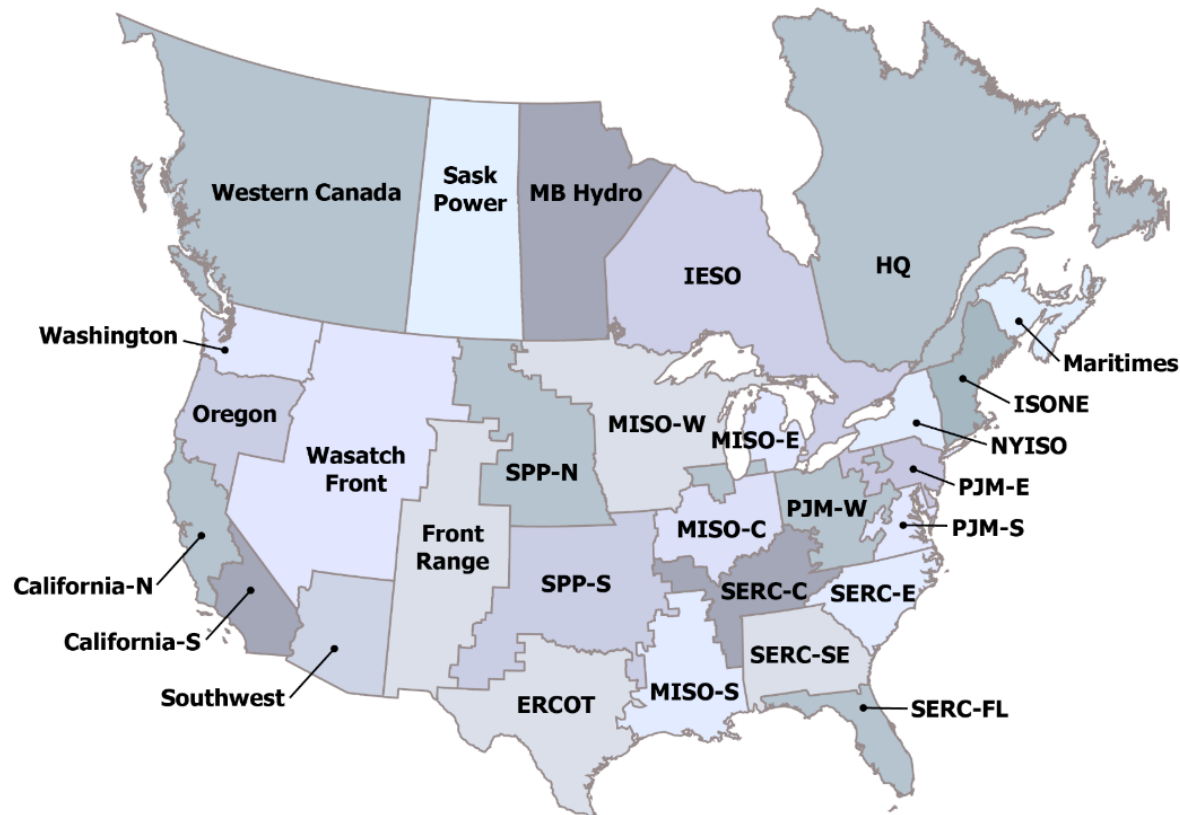
-  Colored by hourly energy margin (no ITC)
-  Colored by reliability flows
-  Represent DC interties

- Mandate calls for:
 - “Recommendations to meet and maintain total transfer capability together with such recommended prudent additions to total transfer capability...”
- Report will describe measures and general actions needed to achieve and sustain the identified transfer capability and any recommended enhancements.
 - **Capital & Infrastructure:**
 - Transmission upgrades and/or grid enhancing technologies
 - Generation additions and/or alternative commitment
 - **Markets & Regulatory:**
 - Market mechanism enhancements
 - Other reliability considerations (additional analysis etc.)
 - Regulatory/legislative requirements

ITCS Timeline and Report Strategy



More information can be found on the ITCS website at
<https://www.nerc.com/pa/RAPA/Pages/ITCS.aspx>



2024 Reliability Conference Debrief

Cris Zimmerman, Manager of Outreach and Stakeholder Engagement, MRO

Action

Information

Report

Cris Zimmerman will lead this discussion during the meeting.

Reliability and Security Technical Committee (RSTC) Meeting Update
Jake Bernhagen, Manager of Reliability Performance, MRO

Action

Information

Report

Jake Bernhagen will lead this discussion during the meeting.

MRO Representatives on NERC Subgroups – Written Reports

Jaimin Patel, SaskPower

Doug Bowman, Southwest Power Pool

Wayne Guttormson, SaskPower

Lynn Schroeder, Sunflower Electric Power Corporation

Tom Whynot, Manitoba Hydro

Action

Information

Report

- NERC Electric Gas Working Group (EGWG) – *Jaimin Patel*
- NERC Inverter-Based Resource Performance Subcommittee (IRPS) – *Doug Bowman*
- NERC System Planning Impacts from DER Working Group (SPIDERWG) – *Wayne Guttormson*
- NERC System Protection and Control Working Group (SPCWG) – *Lynn Schroeder*
- NERC Energy Reliability Assessment Working Group (ERAWG) – *Tom Whynot*

MRO Representatives on NERC Subgroups – Written Reports

NERC Electric Gas Working Group (EGWG)

Jaimin Patel, SaskPower

Action

Information

Report

Since the last RAC meeting, the EGWG had Webex meeting on April 17, 2024. The meeting agenda is posted on the [NERC website](#). In addition to the posted agenda, “Team Overview and Roster Review” was included and “Update on the Gas Infrastructure Study” item was replaced with “Strategies for Enhanced Gas-Electric Coordination”. The [meeting minutes](#) from January 18, 2024, were approved.

Areas of Focus

- **EGWG Scope Document**
 - The proposed updates/changes were discussed. The redline and clean versions of the document were shared with EGWG to provide feedback by April 30th.
- **Reliability Alliance White Paper**
 - Natural gas and power industries’ reliability alliance white paper was discussed.
 - Refer to [this link](#) for the white paper.
- **Strategies for Enhanced Gas-Electric Coordination**
 - A white paper was presented in the meeting.
 - Refer to [this link](#) for the white paper.
- **NERC’s State of Reliability Report – Summary of Winter Storm Elliott**
 - The draft summary of Winter Storm Elliott was discussed and shared with EGWG to provide comment by April 24th.

Accomplishments

- None identified for this report.

Challenges

- None identified for this report.

MRO Representatives on NERC Subgroups – Written Reports

NERC Inverter-Based Resource Performance Subcommittee (IRPS)

Naved Khan and Mostafa Sedighizadeh (on behalf of Doug Bowman), Southwest Power Pool

Action

Information

Report

NERC conducted IRPS conference call/Webex on April 18, 2024, which included following items and focus areas. Informational technical presentations were also made on industry facing IBR related issues.

Area of Focus

- DOE Interconnection Innovation exchange (i2x): A scope and road map was presented by DOE and ESIG staff providing information on the forum for the implementation of Reliability Standards for Transmission
 - Led by U.S. Department of Energy's (DOE) Solar Energy Technologies Office (SETO) and Wind Energy Technologies Office (WETO)
 - To serve as guide for stakeholders to implement solutions for BPS interconnection challenges within the next five years and beyond.
 - Participants would be key stakeholders and industry participants interested in challenges around new standards implementation. (OEMs, plant developers/owners, utilities, ISO, consultants)
 - Leveraging insights from early adopters/industry forum to share practical implementation ideas on IEEE 2800 and NERC work plan of FERC order 901.
- Update on IRPS Work Item #24 – Commissioning Best Practices White Paper: Work in progress within IRPS – aiming for completion and release before the end of this year.
 - IRPS is working on a white paper under work item IRPS #24 – providing technical basis and recommendations to be used by industry stakeholders to improve commissioning processes for IBR facilities.
- Other updates
 - Standard Authorization Request (SAR) Revisions to FAC-001-4 and FAC-002-4 (Planning)
 - (1) The Reliability and Security Technical Committee (RSTC) approved the posting of draft SAR for a 30-day industry comment period. Comment period was 03/18/24 – 04/17/24. A final version of the draft SAR will be submitted to NERC Standards Development, consistent with the Standards Development Process, to begin the process for developing, modifying, withdrawing or retired a Reliability Standard.
 - NERC's plan for FERC Order No. 901
 - (1) Early in the year, NERC created a work plan to address FERC Order No. 901 providing a timeline and strategy.

(2) FERC Order 901 was issued in October 2023 addressing a wide spectrum of IBR related performance issues and Reliability Standards.

(3) General summary

- Milestone 1: Submit Information Work Plan - January 2024
- Milestone 2: Complete active projects for registered IBRs to address IBR performance requirements and post event performance validation- November 2024 and create SARs and begin new projects for registered IBRs to supports Milestone 3
- Milestone 3: Complete active and new projects to address data sharing and model validation – November 2025, create SARs (as needed) and begin new projects to address planning and operational studies.
- Milestone 4: Complete active and new projects to address planning and operational studies for registered IBRs, Unregistered IBRs, and DERs – November 2026

(4) NERC's plan update on FERC Order No. 901:

- Milestone was achieved early in the year. Currently working on Milestone 2 and active standards projects associated with it - to be completed by November 2024.
- Information on Milestone 3 and 4 to be shared over the year. Implementation of all directives under 901 must be completed by 2030.

Accomplishments

- Completion of Milestone 1 to address FERC Order 901

Challenges

- SAR development for the revision of FAC -001 and FAC-002 and addressing limitation of legacy equipment/existing IBRs which cannot be modified.
- Prioritization of NERC projects with assigned directives for FERC Order 901– will require continual coordination between active standard projects.

MRO Representatives on NERC Subgroups – Written Reports
NERC System Planning Impacts from DER Working Group (SPIDERWG)
Wayne Guttormson, SaskPower

Action

Information

Report

The last SPIDERWG meeting was held on April 30th and May 1st. The meeting was a hybrid meeting and covered the following working group coordination and analysis sub-group activities.

- Agenda packages are posted on the SPIDERWG websites ([System Planning Impacts from DER Working Group \(SPIDERWG\) \(nerc.com\)](#) and [SPIDERWG Extranet](#)).
 - o Minutes to be posted.

Additional SPIDERWG or RSTC information posted at:

- SPIDERWG workplan posted at [Report \(nerc.com\)](#) and [SPIDERWG Extranet](#)).
- RTSC strategic plan posted at [Report \(nerc.com\)](#)
- RSTC workplan posted at <https://www.nerc.com/comm/RSTC/Documents/RSTC-Work-Plan.xlsx>
- RSTC Newsletter [April 2024 RSTC Newsletter \(nerc.com\)](#)

General Activities:

- Status updates, administrative materials, and outcomes from the last RSTC meeting.
- Workplan Review

Coordination Subgroup Activities:

- Standards Committee Engagement
 - o Engagement with ongoing Standards Projects from SPIDERWG submitted SARs:
 - Project 2022-02 for TPL-001 and MOD-032 revisions.
 - Currently a lower development priority project with NERC SC
 - Project 2023-05 for FAC-001 and FAC-002 revisions.
 - Currently a lower development priority project with NERC SC
 - Project 2023-08 for MOD-031 revisions.
 - Currently a lower development priority project with NERC SC
- White Paper Update: Variability, Uncertainty, and Data Collection for the BPS with DER Aggregators
 - o Presentation of progress.
 - o Finalized for submission to the RSTC
- Proposed SAR Revisions Update:
 - EOP-004
 - Work on-going.
 - Collaborating with NERC RS/RTOS
 - EOP-005
 - Work on-going.
 - Collaborating with NERC RTOS
 - PRC-006

- Work on-going.
 - Reviewing industry comments.
 - Collaborating with NERC SPCWG
- OPA/RTA Clarity Edits
 - Collaboration with NERC RTOS.
 - Draft for industry comment posted at [Reliability Guidelines, Security Guidelines, Technical Reference Documents, and White Papers \(nerc.com\)](#)
 - comments closed April 24th
- Presentations:
 - Presentation from EPRI related to ongoing work in the DER space.
 - Reflection of Distribution on Transmission Expansion
 - Technical presentation from ESIG on the effects of distributed generation on transmission infrastructure.
 - Updates to the Production Cost Model related to DER.
 - Technical presentation from WECC on updates to their models reflective of DER.

Analysis Subgroup Activities:

- Guideline Review Update:
 - BPS Planning under Increasing Penetrations of DER
 - Presentation of progress.
 - Draft for industry comment posted at [Reliability Guidelines, Security Guidelines, Technical Reference Documents, and White Papers \(nerc.com\)](#)
 - Comments due by June 6th.
 - Detection of Aggregate DER Response
 - Discussion of draft language.
 - DER Forecasting Practices and Relationship to DER Modeling for BPS Planning Studies
 - Finalizing for RSTC
- White Paper Review: Modeling of DER Aggregator and DERMS Functional Impacts
 - Presentation of progress.
- Review of proposed new guidelines:
 - Aggregate DER Conditions for Emergency Operations
- Presentations:
 - Forecasting – DER and Load
 - Presentation from ESIG on how to forecast DERs and other distribution equipment such as EVs and heat pumps.

Next meeting:

- Schedule for 2024: July 30th - 31st (virtual), and October 15th - 16th (hybrid).

Areas of Focus

Following workplan deliverables are being proposed for submission (to be finalized) for RSTC action at the June 2024 meeting.

- White Paper: Variability, Uncertainty, and Data Collection for the BPS with DER Aggregators – Request for **Approval**.

- Reliability Guideline: DER Forecasting Practices and Relationship to DER Modeling for BPS Planning Studies – Request for **Review**, and **Authorization to post** for 45-day comment period.

Accomplishments

- White Paper: Communication and Coordination Strategies for Transmission Entities and Distribution Entities regarding DERs – **Approved**
 - To be posted at [Reliability Guidelines, Security Guidelines, Technical Reference Documents, and White Papers \(nerc.com\)](#)
- SAR for OPA/RTA Clarity Edits – Posted for public comments.
- Reliability Guideline: BPS Planning Practices under Increasing Penetrations of DER – Posted for public comments.

Challenges

- Gaining industry consensus is becoming more difficult for NERC.

MRO Representatives on NERC Subgroups – Written Reports

NERC System Protection and Control Working Group (SPCWG)

Lynn Schroeder, Sunflower Electric Power Corporation

Action

Information

Report

Areas of Focus

1. Determination of Practical Transmission Relaying Loadability has been approved by the RSTC and pending final review by standards committee prior to posting. Originally published in December 2017 for PRC-023-4, this version has been updated for PRC-023-6 and has been placed into the current NERC format and template. Technical revisions include drafting team clarification recommendations to Appendix C related to out of step.
2. PRC024 IBR Whitepaper is in review by the RSTC. This paper discusses and provides an example of how an IBR plant, such as a wind farm, can show compliance considering the voltage that would be seen at each individual turbine control throughout the feeders of the plant. Transmission System Phase Back Up Protection is in review by the RSTC. In 2011, the System Protection and Control Subcommittee published a version of this document as a Reliability Guideline. After review, this document is a Technical Reference Document. This document has been revised to place it in the new format style and reviewed by the SPCWG and determined that it is still a valid and relevant reference for industry.
3. Technical Reference related to maintenance for ethernet based P&C is being developed to provide industry guidance for impacts of systems such as 61850 architectures on NERC Protection System definition and related standards. Writing assignments are in progress.
4. Whitepaper on footnote 13 of TPL001. Writing assignments are in progress. This is intended to be provided to the standard drafting team. Working on IG for footnote 13 SAR to expedite to industry as this drafting team is not a “high” priority. Further work planned for an expanded approach to footnote 13 by SPCWG to provide to the drafting team when they convene.
5. Misoperation Task Force. Discussed drafting a charter for creation under the NERC SPCWG to present to the RSTC for approval.

Accomplishments

- “Determination of Practical Transmission Relaying Loadability Settings” IG approved by the RSTC.
- “Transmission System Phase Back Up Protection” under review by the RSTC.
- “PRC024 IBR Whitepaper” under review by the RSTC.

Challenges

1. Increased IBR across the grid and their impacts to system protection, such as modeling and injection characteristics during fault conditions.

Future meeting schedule

Next scheduled meeting is on July 18 & 19 hosted by Hydro Quebec in Montreal.

MRO Representatives on NERC Subgroups – Written Reports

NERC Energy Reliability Assessment Working Group (ERAWG)

Tom Whynot, Manitoba Hydro

Action

Information

Report

Report on recent ERAWG developments from the meeting held on May 1, 2024.

The most recent edition of the White Paper Volume 2 will be posted for comment on May 7, 2024.

The drafting team for Volume 2 of the white paper is meeting twice a week. The deadline for submitting to the Reliability and Security Technical Committee (RSTC) is Friday, May 10. The technical reference document will be posted for feedback.

There is a noted paradox where there is a technical reference document explaining how to do an ERA (Energy Reliability Assessment), while the standards are yet to be completed. The intent is to finalize the standards stating the requirements surrounding the ERA's, and the technical reference document outlining the process at the same time to ensure the documents reconcile.

The second ballot is approaching for approval of the proposed operations standard BAL-007-1. The planning standard is in the works.

The BAL-007-1 standard is drafted to address the ERA's and is being discussed by the Executive Committee on Friday, May 3, 2024.

Since the ERATF (taskforce) transitioned into the ERAWG (working group), the ERAWG website is seeking team members to add content to the website and the NERC extranet site.

Timeline

An early draft of the White Paper Volume 2 is being posted May 10, 2024. The next ERAWG meeting is Wednesday, July 10, 2024.

2024 Work Plan Update
Gayle Nansel, Reliability Advisory Council Chair

Action

Discussion

Report

Chair Nansel will lead this discussion during the meeting.

Planning Coordinator Update
Nandaka Jayasekara, Manitoba Hydro, and RAC Member

Action

Information

Report

Nandaka Jayasekara will provide an oral report during the meeting.



MANITOBA HYDRO PLANNING COORDINATOR UPDATES

MRO Reliability Advisory Council (RAC)
May 16, 2024

Manitoba Hydro Overview

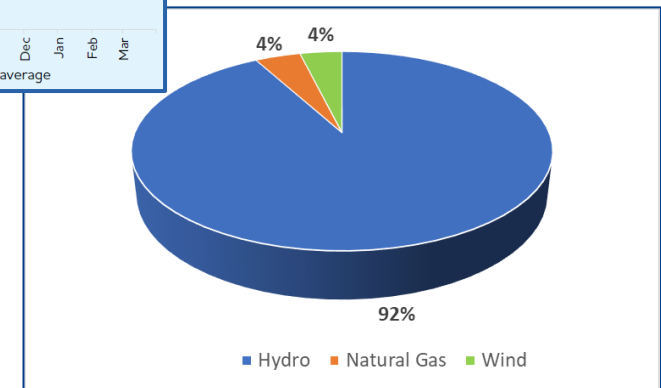
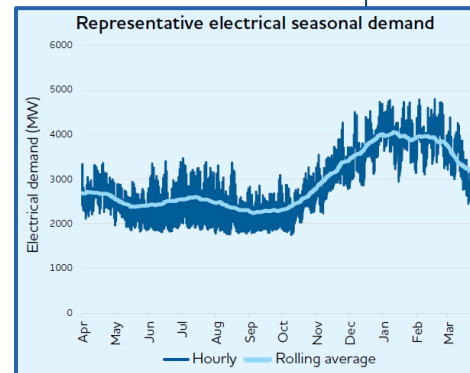
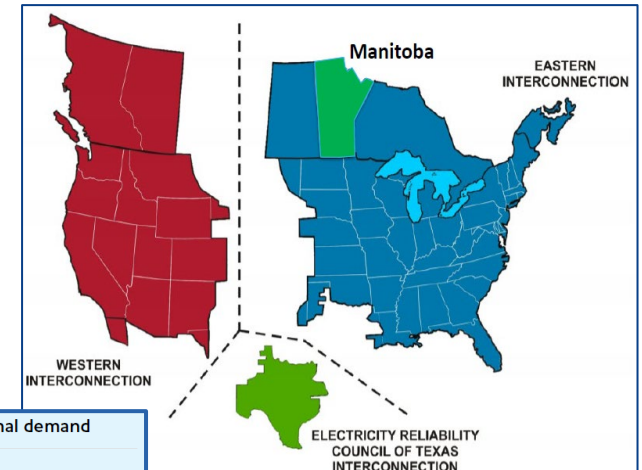
- ~616,000 electric customers
- Accredited Winter Capacity: ~6100 MW
- Predominantly hydroelectric system
- Winter peaking:
 - All-time peak 4910 MW on January 30, 2019
 - Temperature: -39.8 °C
- Average Net load growth is 1.2% over the next 10 years
- Planning Coordinator and Balancing Authority in Manitoba
- Coordinating member of MISO

Generation (Installed Nameplate Capacity):

Resource	Nameplate Capacity MW
Hydro (15)	6200
Natural Gas (1)	280
Wind (2)	260
Total (18)	6740

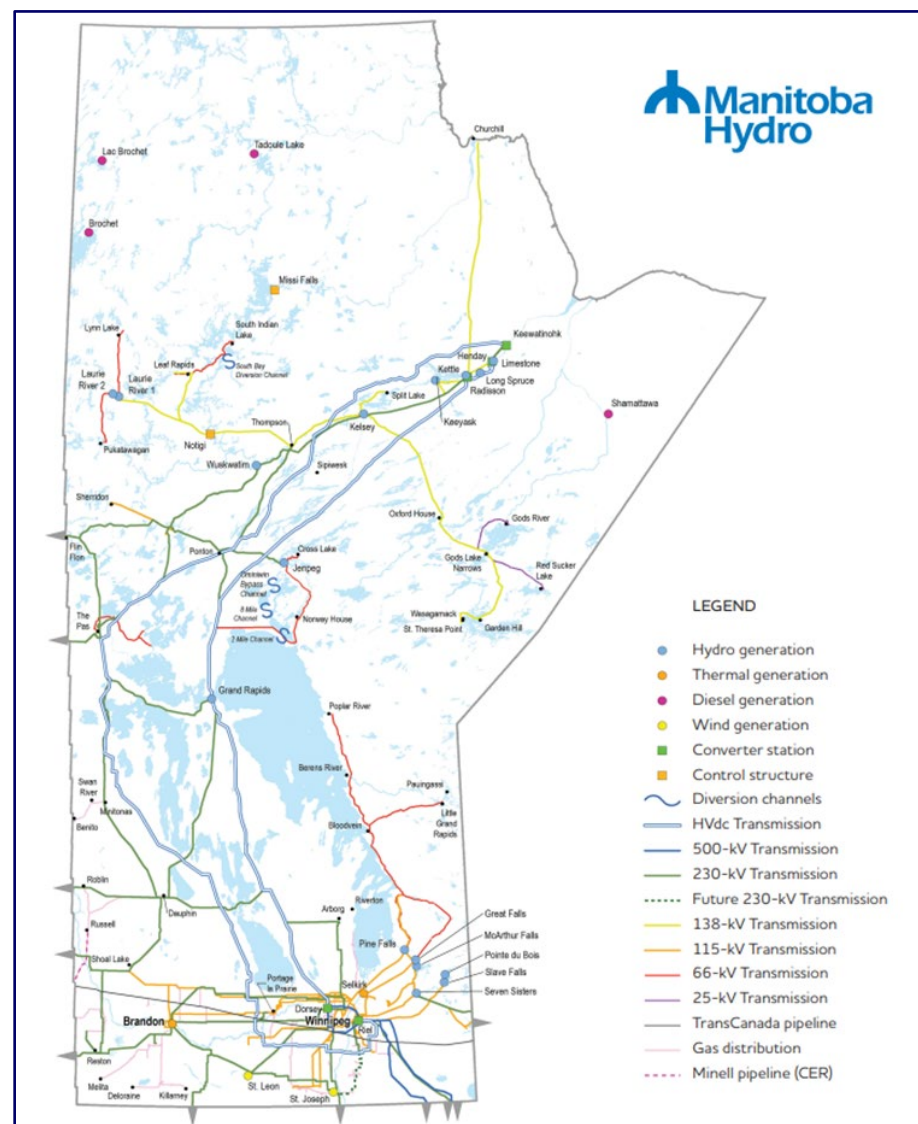
Distributed energy resources and behind-the-meter generation:

- 36.4 MW AC of solar PV distributed energy resources
- Modest solar growth anticipated over the next 5 years
- No impact on winter peak load



MANITOBA HYDRO'S TRANSMISSION SYSTEM LONG-TERM PLAN

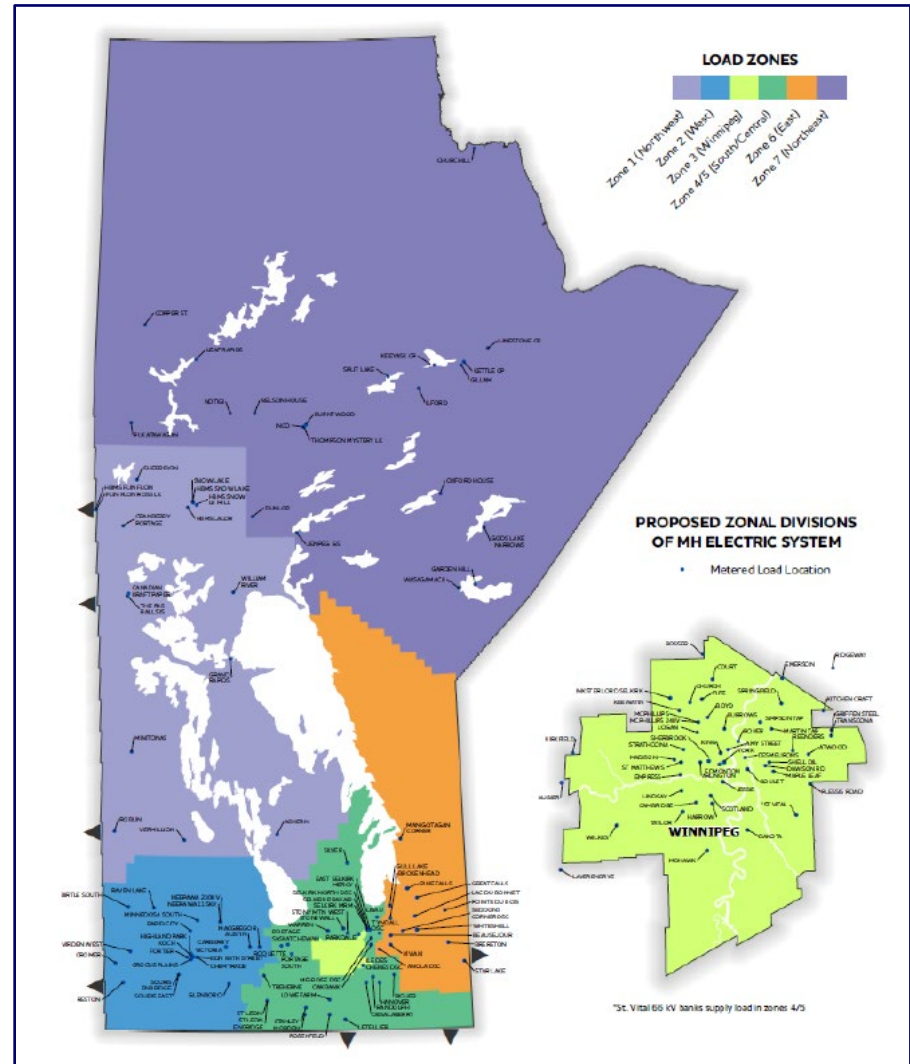
- 20-year horizon
- Most transmission projects are identified based on load forecast analysis, system performance assessments, and asset condition assessments.
- The drivers behind these projects are:
 1. Improve safety
 2. Serve local load growth
 3. Maintain or improve reliability
 4. Increase efficiency
 5. Address aging infrastructure
 6. Connect new customer load
 7. Connect new generation
 8. Provide transmission service



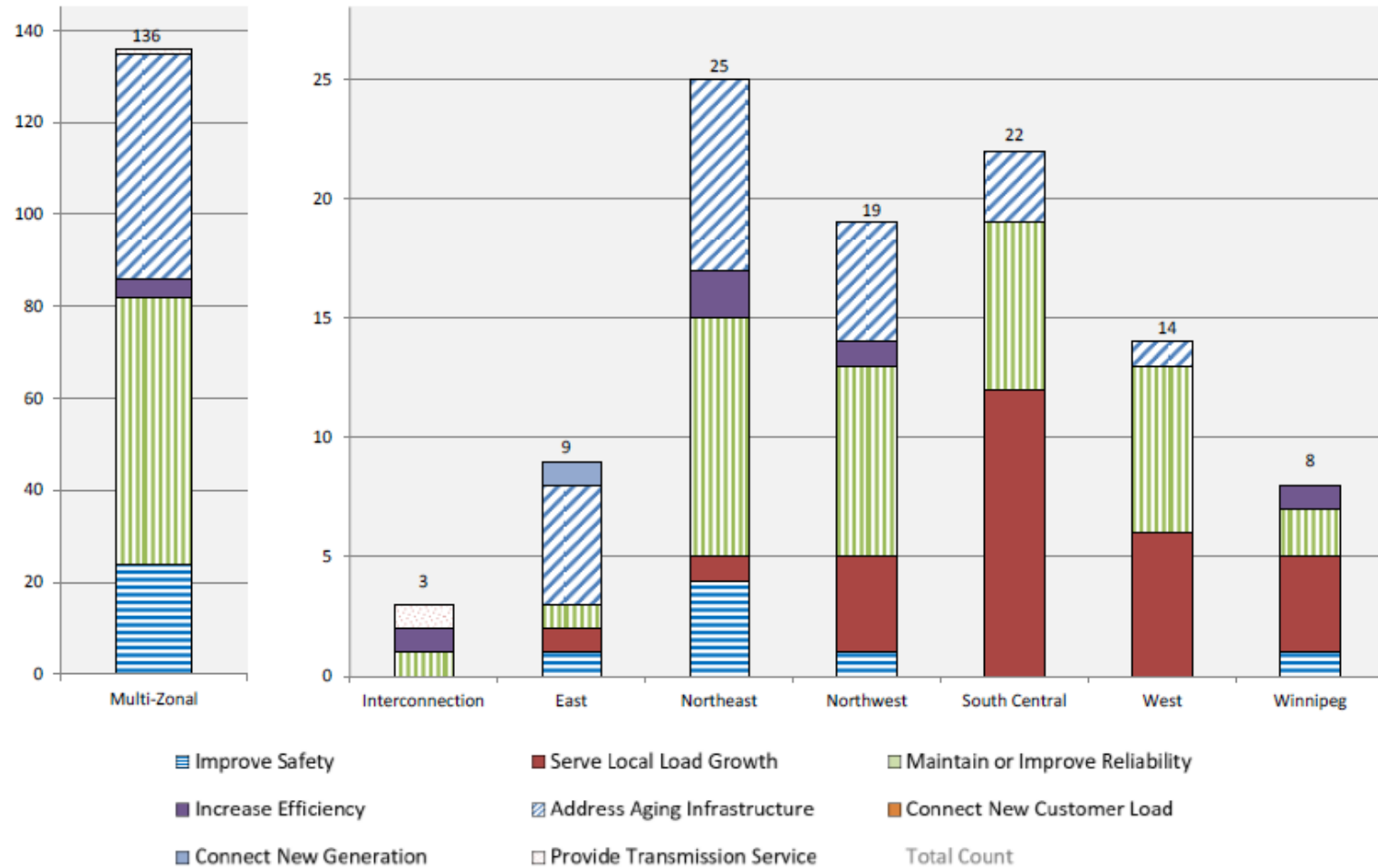
[Transmission_System_Long_Term_Plan_2023.pdf \(oati.com\)](https://oati.com/Transmission_System_Long_Term_Plan_2023.pdf)

Zonal Divisions of MH Electric System

- Two investment categories:
 - Capacity & Growth
 - Sustainment
- Zonal classification
 - East
 - Northeast
 - Northwest
 - South Central
 - West
 - Winnipeg
- Many projects will benefit customers in more than one region (multi-regional)
- Projects that involve a generation connection or are tied to transmission outside of Manitoba are classified as Interconnection.

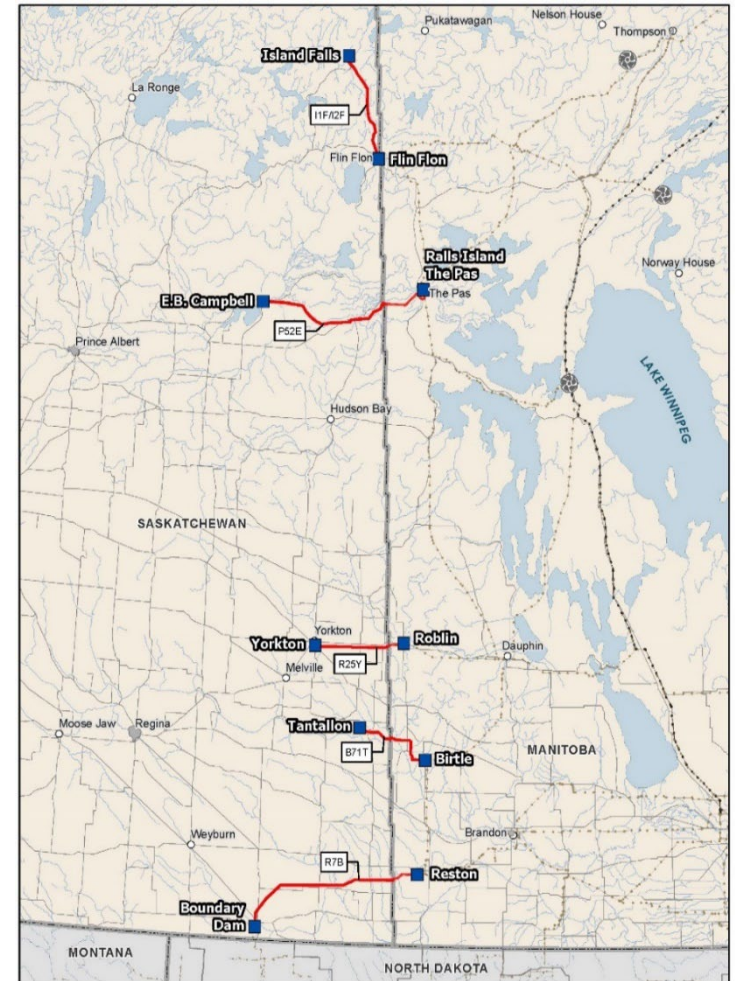


Count of Investment Drivers by Zone¹

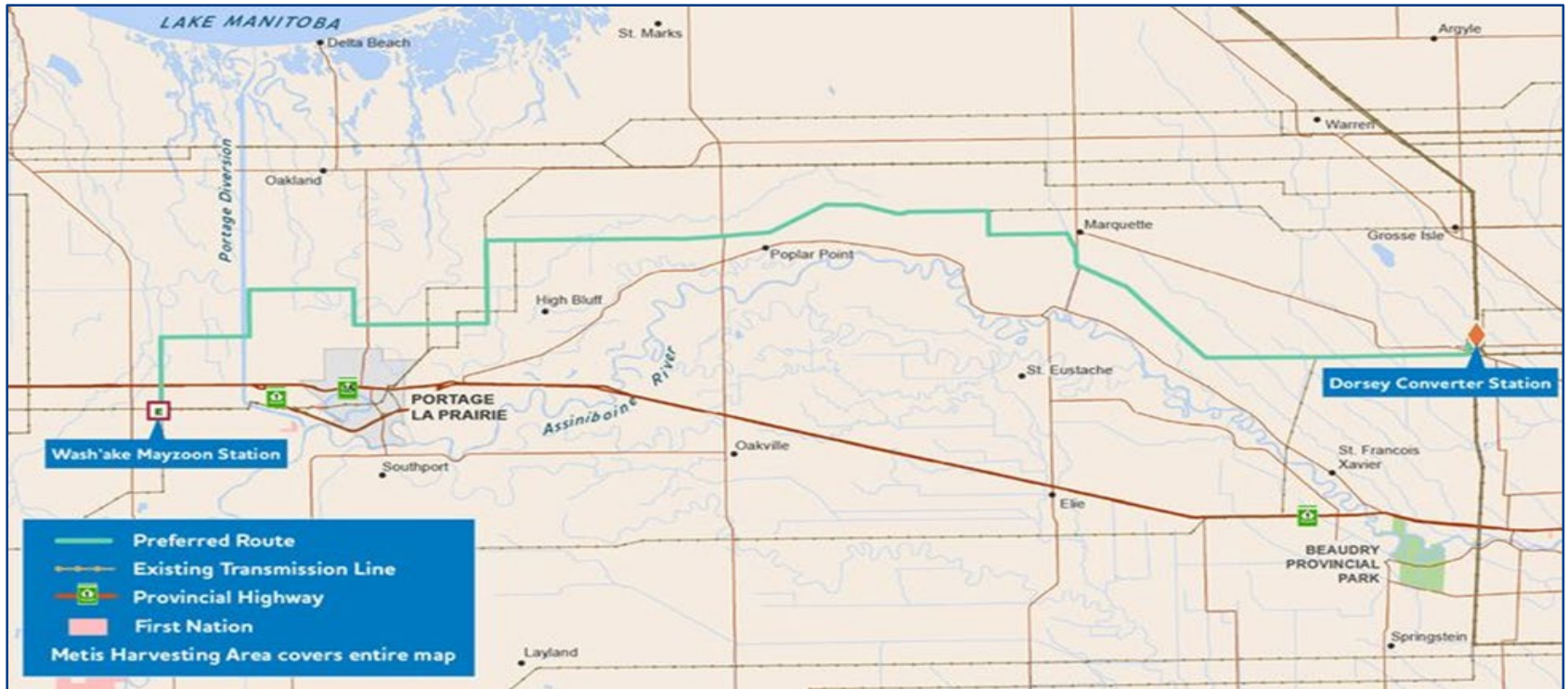


Interconnection Projects - Committed

- Birtle to Tantallon (B71T) placed in-service on March 29, 2021.
- Increased MH-SPC export capability from 150 MW to 290 MW (southern 230 kV ties).
- SPC is reducing GHG emissions and transitioning away from coal.
- MH is helping with the transition and are supplying 100 MW under a 20-year contract (2020-2040) and 215 MW under 30-year contract (2022-2052). 290 MW on southern ties and 25 MW on northern ties.
- Currently studying two new 50 MW long-term firm MH->SPC TSRs. Upgrades: Upgrade MR11, Raven Lake CT ratio, B69R CT ratio, C28R wave trap, Reston 15 MVar cap, Dauphin 3x15 MVar cap.



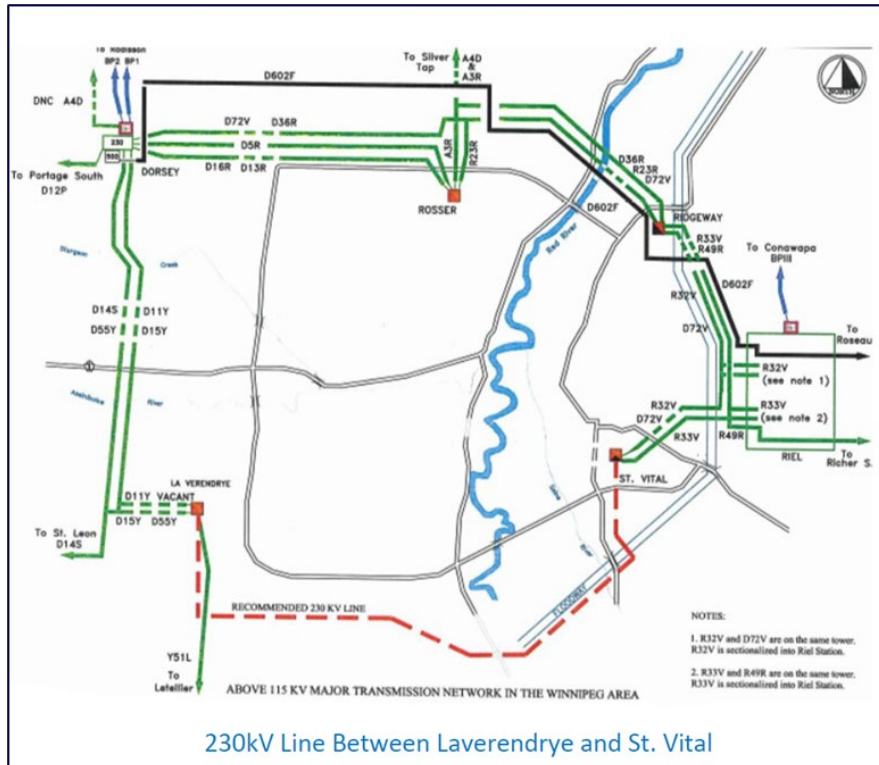
Western Region Projects – Committed



Portage Area Capacity Enhancement

- Scope: construct a new station west of Portage la Prairie and a 75 km 230 kV line from the new station to Dorsey Converter Station.
- Driver: serve local load growth.
- ISD: Station: March 2025, Line: February 2027.

Laverendrye – St. Vital 230 kV Transmission Line (Y36V) – Committed

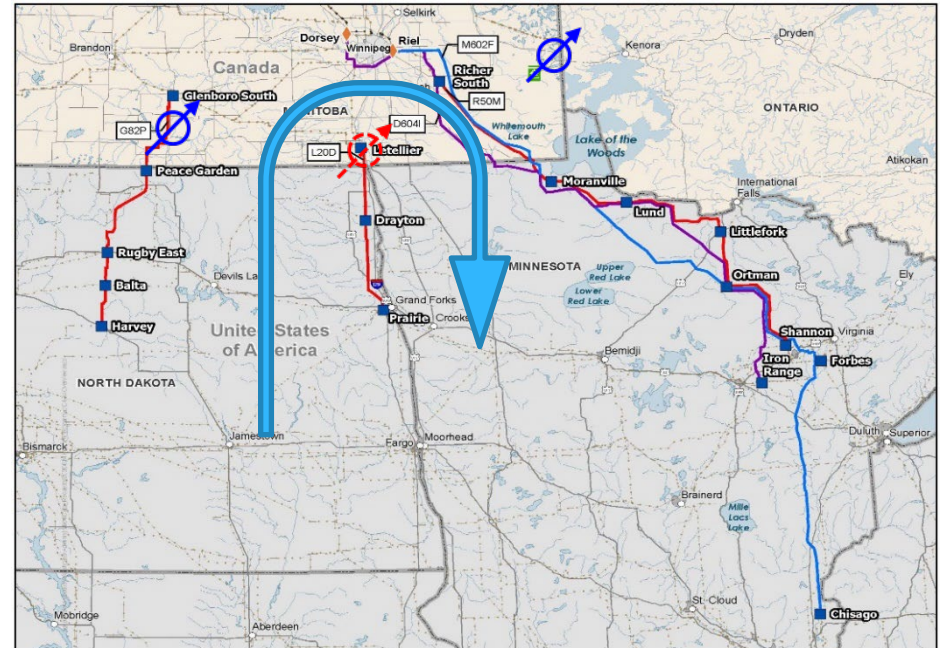


- **Scope:** construction of a new 230-kV 37-km transmission line between Laverendrye Station and St. Vital Station.
- Complete the 230 kV ring around the City of Winnipeg thus preventing any station isolation during equipment failure.
- Commissioned in December 2023.

Interconnection Projects

L20D PST (not Committed)

- Scope: installation of 2x300 MW phase-shifting transformer on the 230 kV interconnection line L20D (Letellier Station in Manitoba to Drayton Station in North Dakota) to mitigate possible excessive loop flow through Manitoba due to increasing wind generation in the United States.
- DPP 2021 Phase 2 studies started—L20D is impacted based on Phase 1 and a PST will therefore be recommended. MISO finalized base model on Jan 13, 2024.



Multi-Regional Projects – Not Committed

Bipole I/Bipole II Modernization New 230 kV Transmission Line to Heday

- Scope: upgrade to the Northern Collector System to increase the transfer capacity between Bipole I and Bipoles II/III
- Driver: address aging infrastructure, maintain or improve reliability
- Proposed ISD: March 2029.

Bipole I and Bipole II Modernization

- Scope: address the aging Bipole I and Bipole II infrastructure
- Driver: address aging infrastructure, maintain or improve reliability
- Proposed ISD: Bipole II converter station upgrades, 2030; Bipole I converter station upgrades, 2035.

Bipole I and Bipole II Transmission Line Modernization

- Scope: upgrades to the Bipole I/II 500 kV DC transmission lines, including associated electrode lines, and northern AC collector transmission lines
- Driver: address aging infrastructure, maintain or improve reliability
- Proposed ISD: estimated ISD for 500 kV work is March 2032.

Generation - Committed

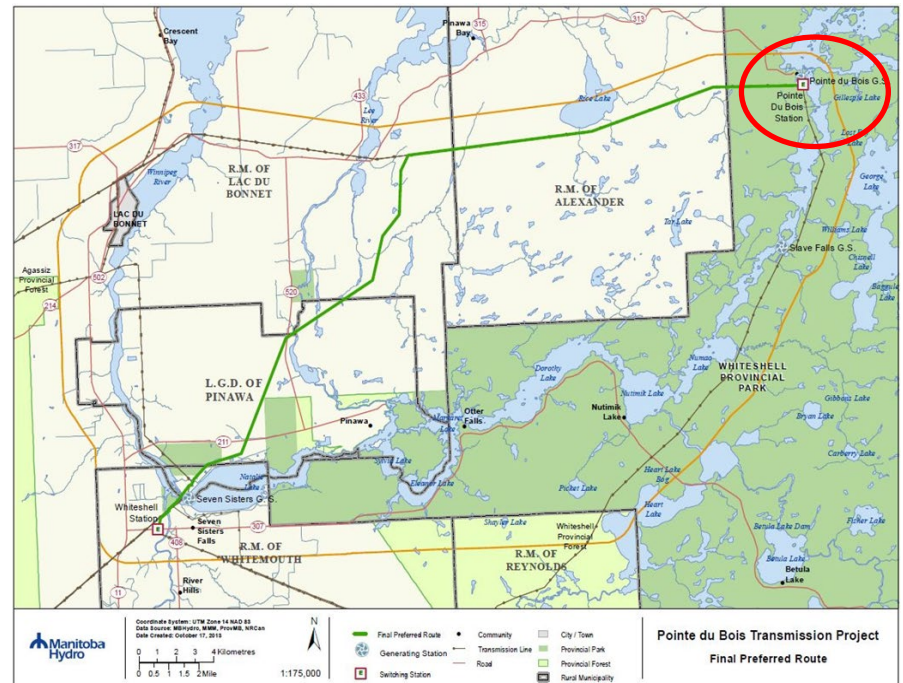
Keeyask (630 MW NRIS/65 MW ERIS):

- All 7 units are in-service.
- Keyask Final Update

<https://www.youtube.com/watch?v=K9BR4Ck40Z8>

Pointe du Bois Redevelopment:

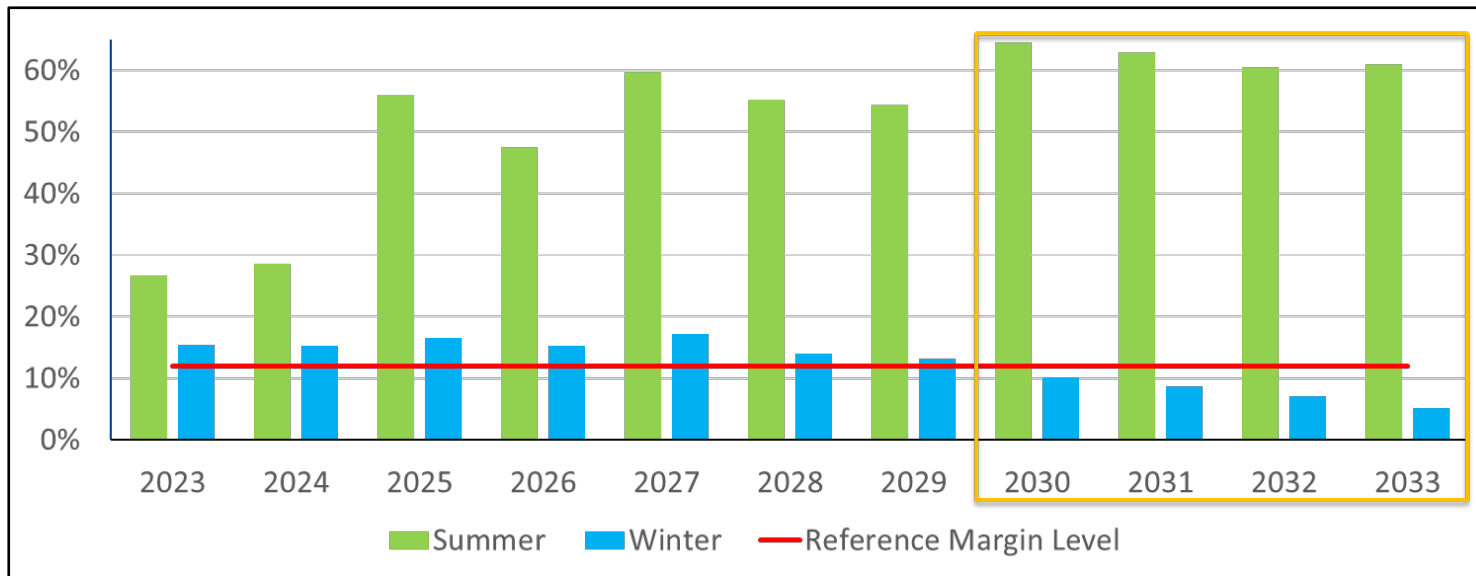
- Pointe du Bois increases from 35 MW to 106 MW (8 units will be replaced).
- Anticipated ISD 2027/28.
- Unconfirmed retirements: ~25 MW by 2029 (End of life: > 100 years of service).
- Construct new 42-km 115 kV line PW75.
- Retire 66 kV P lines (P3/P4).
- Upgrade Slave Falls RAS.



[Pointe du Bois Renewable Energy Project \(youtube.com\)](https://www.youtube.com/watch?v=K9BR4Ck40Z8)

Planning Reserve Margin

- 12% Reference Margin Level
 - Higher than 10% default for predominately hydroelectric systems
- Reference Margin Level based on both system historical adequacy performance analysis and reference to probabilistic resource adequacy studies using the index of loss of load expectation (LOLE) and loss of energy expectation (LOEE).
- Probabilistic Assessment also tracks annual loss of load hours (LOLH) and the expected unserved energy (EUE).
- 12% Reference Margin Level reviewed by the Manitoba Public Utilities Board.
- Anticipated Reserve Margin exceeds the 12% Reference Margin Level until Winter 2030-31 (based on 2023 LTRA).



Transmission Assessment Process

- Manitoba Hydro prepares transmission system reliability studies periodically as part of applicable and mandatory Manitoba and NERC Reliability Standards including but not limited to the following:
 - Transmission planning assessment every year
(MH-TPL-001-4 Transmission System Planning Performance Requirements)
 - Under frequency load shedding (UFLS) design assessment every five years
(PRC-006-5 Automatic Underfrequency Load Shedding)
 - Physical security risk assessment every three years
(CIP-014-2 Physical Security)
 - Review of Remedial Action Schemes (RAS) every five years
(PRC-012-2 Remedial Action Schemes)
 - Geomagnetic disturbance (GMD) vulnerability assessment every five years
(MH-TPL-007-2 Transmission System Planned Performance for Geomagnetic Disturbance Events)

MH-US TSRs in Study Mode

- Current long-term firm transfer capability (study values including reliability margin) Export: 3058 MW; Import: 1475 MW. See: [https://www.oasis.oati.com/woa/docs/MHEB/MHEBdocs/Transmission_Interface_Capability_Report\(05.19.2022\).pdf](https://www.oasis.oati.com/woa/docs/MHEB/MHEBdocs/Transmission_Interface_Capability_Report(05.19.2022).pdf)
- 2x100 MW TSRs in study mode to increase imports to 1675 and exports to 3258 MW (2022-2028).
 - Preliminary indications are that export increase may be partially available, import increase is more difficult. SIS is expected in fall 2024.
 - Any changes to export/import levels will require a modification to the Canadian Energy Regulator and Presidential permits.

MH Long-Term TSRs in Study Mode

Provider: MHEB	Status: Study	Increment: ALL	Source: ALL	POR: ALL	Time: Start	ALL
Customer: ALL	Assign Ref:	Class: FIRM	Sink: ALL	POD: ALL	Path:	

Status	Assign Ref	MW Req	Source	Sink	Service	Start Time	Stop Time	Queued Time ^	Last Updated	TP
STUDY	93103461	50	MHEB	SPC	YEARLY FIRM PTP	2022-05-31 23:00:00 CS	2027-05-31 23:00:00 CS	2021-01-29 13:42:52 CS	2021-01-29 13:51:01 CS	MHEB
STUDY	93119954	50	MHEB	SPC	YEARLY FIRM PTP	2022-05-31 23:00:00 CS	2027-05-31 23:00:00 CS	2021-02-01 09:51:14 CS	2021-02-01 09:55:37 CS	MHEB
STUDY	93133491	100	MHEB	NSP	YEARLY FIRM PTP	2022-08-31 23:00:00 CS	2028-05-31 23:00:00 CS	2021-02-03 09:55:56 CS	2021-02-03 09:57:02 CS	MHEB
STUDY	93133494	100	MHEB	MP	YEARLY FIRM PTP	2022-08-31 23:00:00 CS	2028-05-31 23:00:00 CS	2021-02-03 09:58:12 CS	2021-02-03 09:59:02 CS	MHEB
STUDY	93133556	100	NSP	MHEB	YEARLY FIRM PTP	2022-05-31 23:00:00 CS	2027-05-31 23:00:00 CS	2021-02-03 10:09:53 CS	2021-02-03 10:11:04 CS	MHEB
STUDY	93133561	100	NSP	MHEB	YEARLY FIRM PTP	2022-05-31 23:00:00 CS	2027-05-31 23:00:00 CS	2021-02-03 10:11:52 CS	2021-02-03 10:13:02 CS	MHEB
STUDY	99781524	7	MHEB	NSP	YEARLY FIRM PTP	2024-05-31 23:00:00 CS	2029-05-31 23:00:00 CS	2023-05-12 09:32:45 CS	2023-08-03 13:50:44 CS	MHEB
STUDY	102013252	92	MHEB	NSP	YEARLY FIRM PTP	2025-05-31 23:00:00 CS	2030-05-31 23:00:00 CS	2024-02-01 09:27:01 CS	2024-02-01 09:28:01 CS	MHEB

- MH-SPC 2x50 MW; MHEB-US 2x100 and US-MHEB 2x100 discussed
- The remainder are renewals (7 and 92 MW) of existing MH-US import/export services that are being processed.

Generator Queue Coordination



Generation Interconnection Study Queue 3/1/2024

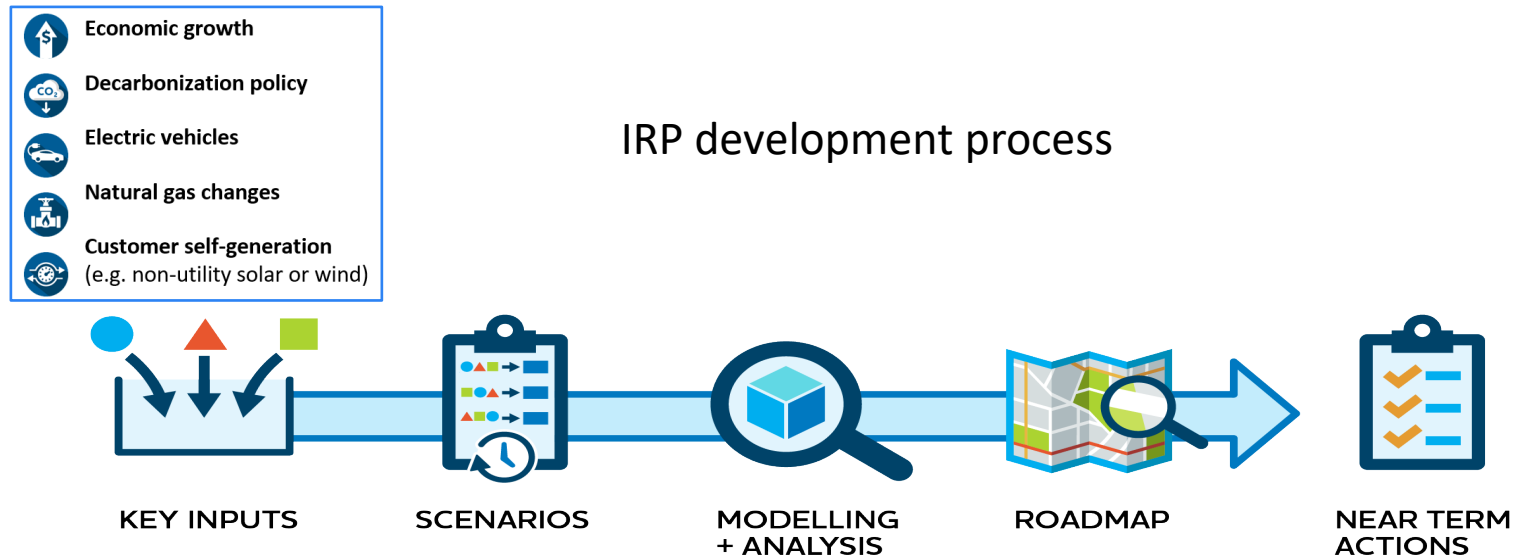
Queue Position	Date Received	Connection Point	Plant Size (Summer)	Plant Size (Winter)	Location.	Planned ISD	Facility Type	Service Type	IES Available	IFS Available	Generating Unit	IR Process Step
1	5/15/2009	Pine Falls	10 MW	10 MW	29-18-10EPM	9/2/2019	Hydro	NRIS	Yes	Yes	U1-U4	COD
2	5/25/2012	Keeyask	65/630 MW	65/630 MW	9-85-15-EPM	10/1/2020	Hydro	ERIS/NRIS	Yes	Yes	U1-U7	COD
3	4/21/2017	Slave Falls	Sub. Mod.	Sub. Mod.	50°22'24"N 95°56'88"W	7/1/2022	Hydro	None	Yes	Yes	U1-U8	COD
4	8/1/2018	Seven Sisters	Sub. Mod.	Sub. Mod.	50°7'13.44"N 96°1'4.08"W	6/1/2020	Hydro	None	Yes	Yes	U5-U6	COD
5	3/30/2020	Great Falls	0 MW	1.2 MW	50°34'5"N 96°10'37"W	12/31/2022	Hydro	ERIS/NRIS	Yes	Yes	U1-U6	IOA Draft
6	11/13/2020	Kettle	34 MW	34 MW	56°23'03"N; 94°38'06"W	2/1/2024	Hydro	ERIS/NRIS	Yes	Yes	U5-U12	IOA Executed
7	1/22/2021	Pointe du Bois	Sub. Mod.	Sub. Mod.	36-15-14E	9/30/2027	Hydro	ERIS/NRIS	Yes	Yes	TBD	COD
8	12/2/2022	Jenpeg	Sub. Mod.	Sub. Mod.	52°32'32.9"N 98°01'46.7"W	11/1/2027	Hydro	None	No	No	U2	IES Study
9	1/25/2024	St. Leon Substation	203 MW	203 MW	15-6-9-W1	12/1/2029	Wind	NRIS	No	No	TBD	Interconnection Request

Acronyms

IR	Interconnection Request
IES	Interconnection Evaluation Study
IFS	Interconnection Facilities Study
IOA	Interconnection and Operating Agreement
Sub Mod	Substantial Modification as defined in TSIR



2023 Integrated Resource Plan

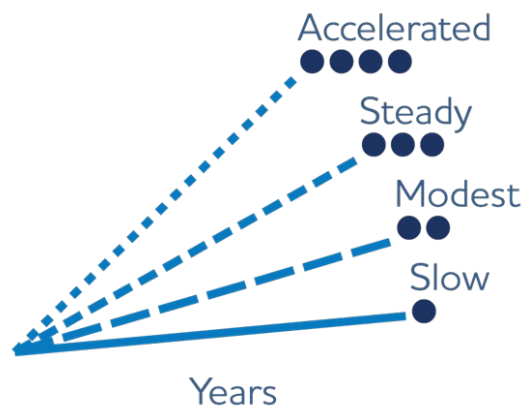


- Manitoba Hydro's first IRP was published in July 2023.
- The Integrated Resource plan includes natural gas and electricity resources and infrastructure including generation, transmission, distribution, and non-wires solutions.
- Four rounds of engagement provided valuable feedback into the plan's development.

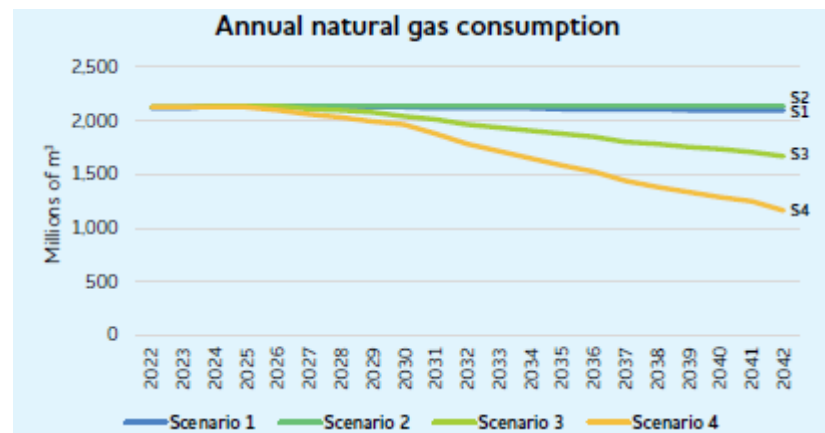
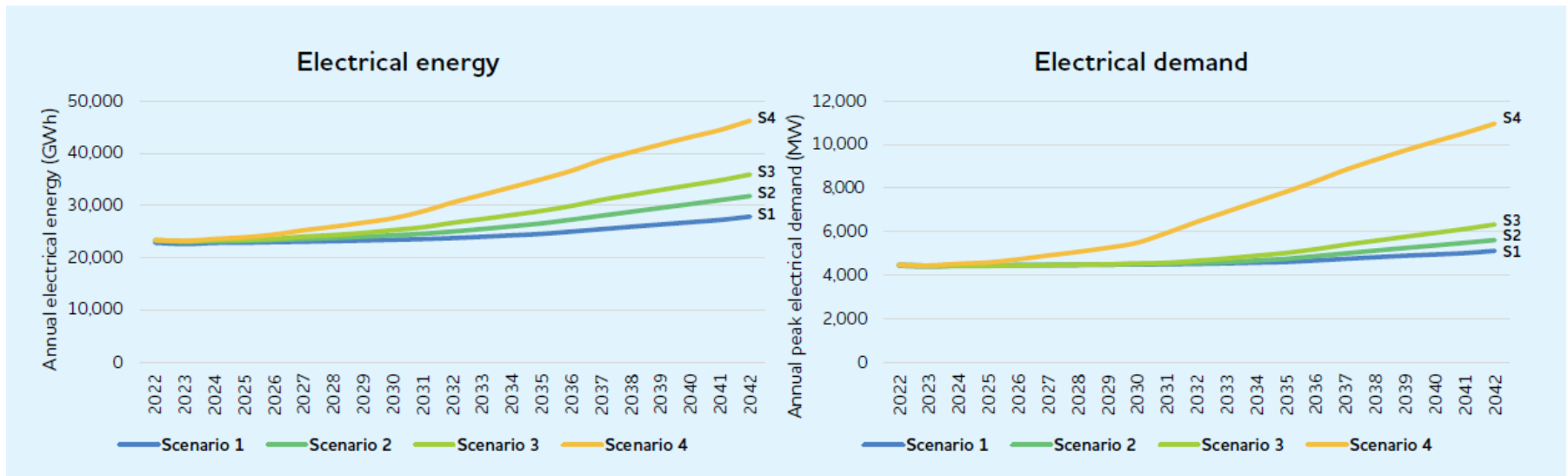
[Integrated Resource Plan \(hydro.mb.ca\)](https://hydro.mb.ca)

2023 IRP Scenarios and Key Inputs Pace of Change

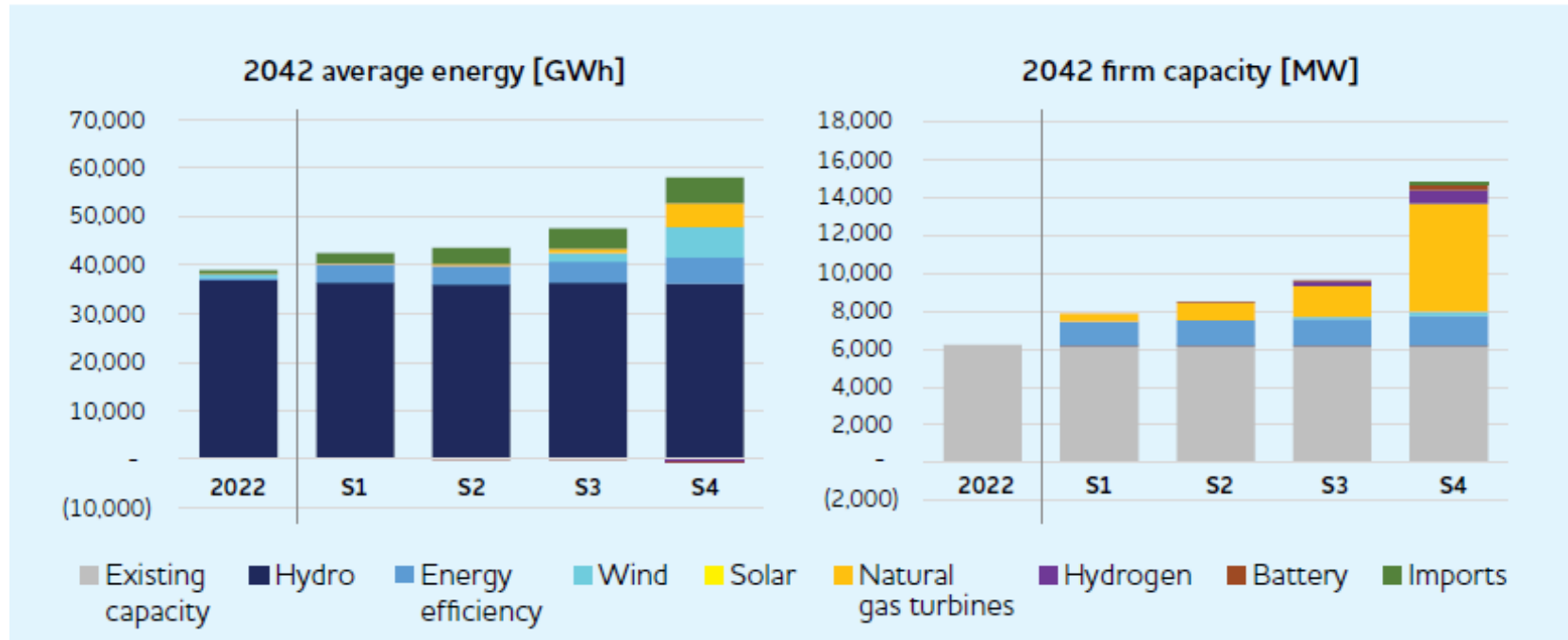
	1	2	3	4
	SCENARIO 1: Slow decarbonization & slow decentralization	SCENARIO 2: Modest decarbonization & modest decentralization	SCENARIO 3: Steady decarbonization & modest decentralization	SCENARIO 4: Accelerated decarbonization & steady decentralization
 Economic growth	●	● ●	● ●	● ● ●
 Decarbonization policy	●	● ●	● ● ●	● ● ● ●
 Electric vehicles	●	● ●	● ● ●	● ● ● ●
 Natural gas changes	●	● ●	● ● ●	● ● ● ●
 Customer self-generation	●	● ●	● ●	● ● ●
● represents amount of change				



Future Electric Energy and Peak Demand

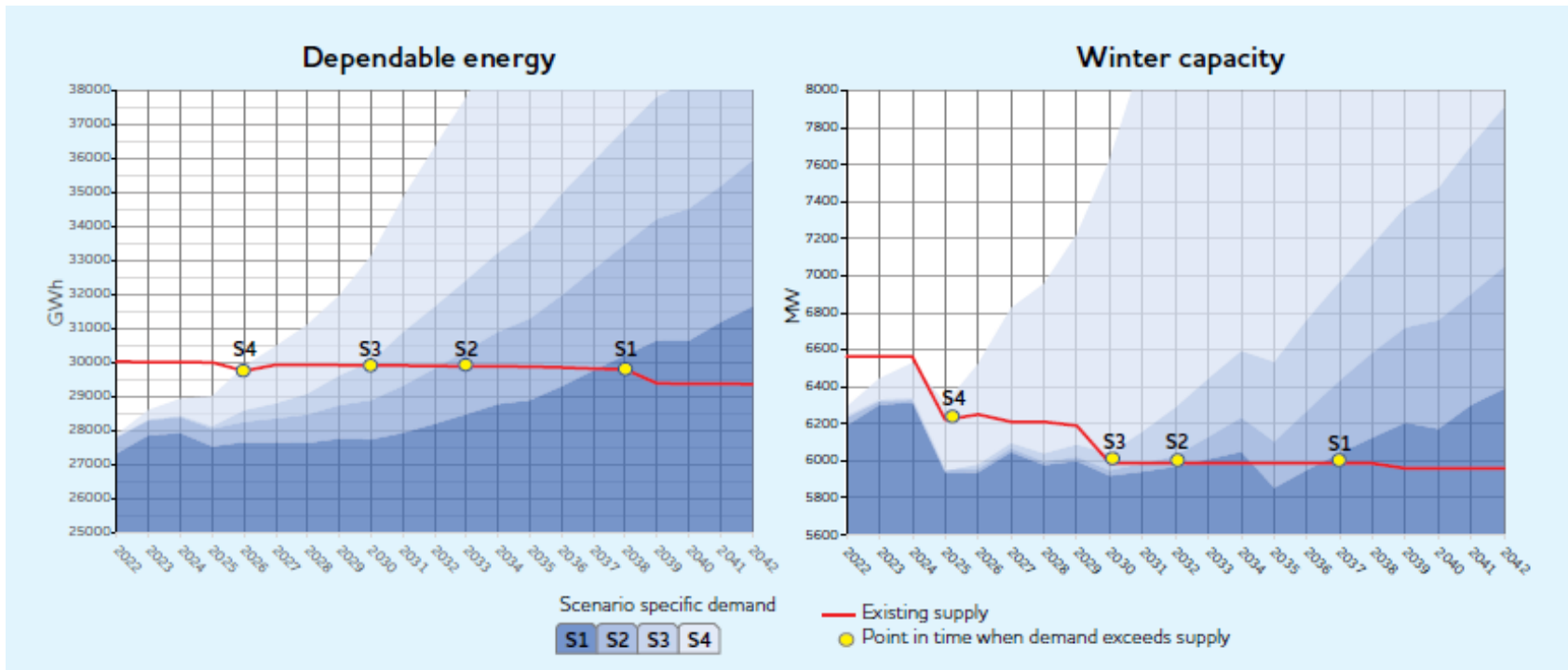


Future Electric Energy and Capacity Supply

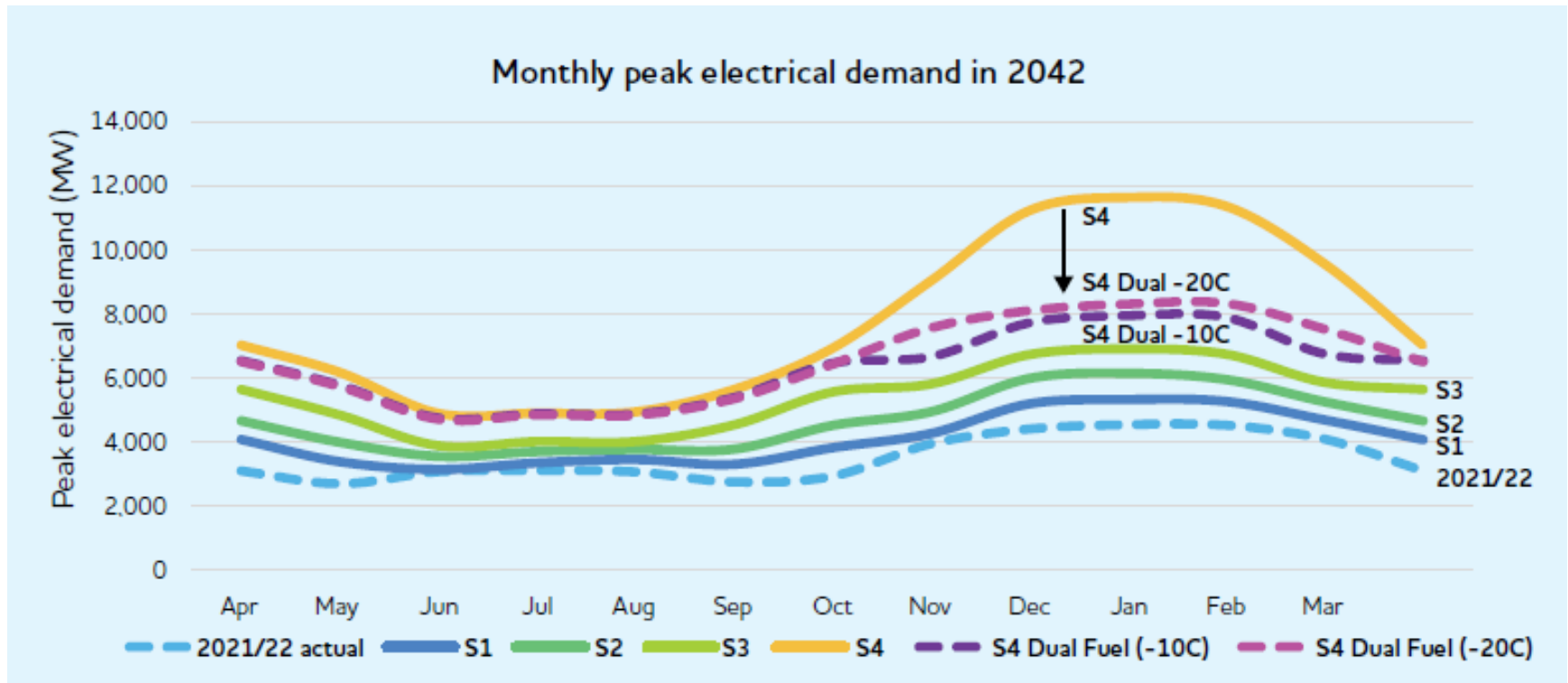


- Existing generation remains vital

The pace of change over the study period for dependable energy and winter capacity for each IRP scenario



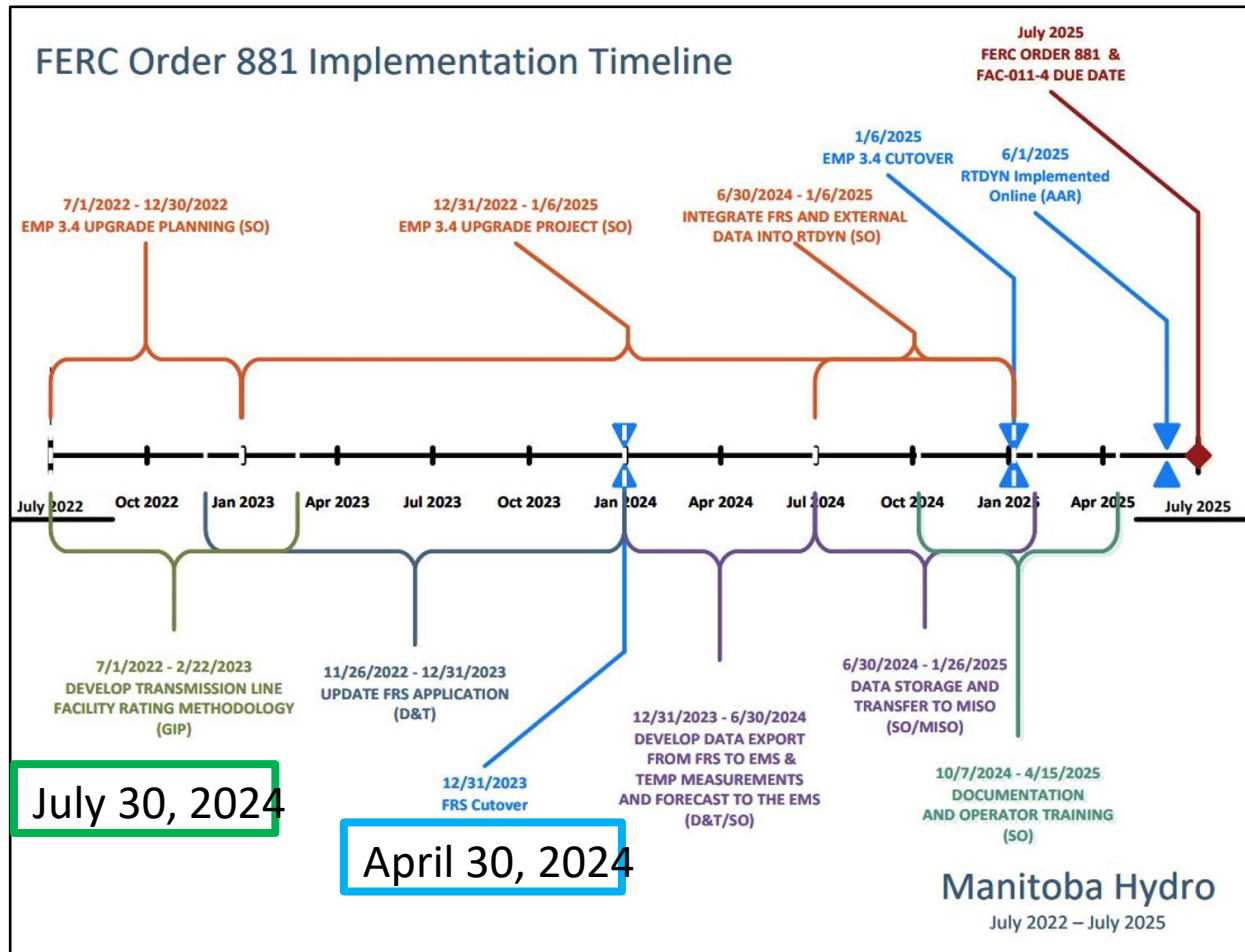
Managing Peak Electric Demand in 2042



2023 IRP Near-Term Actions

 Manage winter peak	 Prepare for rapid demand growth	 Develop options to reduce carbon in gas	 Enhance planning	 Prepare for deep decarbonization
1.1 Explore the potential for dual fuel space heating, including development of a pilot project. 1.2 Pursue high-value energy efficiency measures in collaboration with Efficiency Manitoba. 1.3 Develop demand response product options. 1.4 Develop rate design options.	2.1 Pursue cost-effective enhancements to existing hydropower plants. 2.2 Increase readiness for new resources including minimizing lead times to initiate, plan and construct. 2.3 Prepare detailed plans for high potential near-term new resources, such as wind and dispatchable capacity. 2.4 Establish a range of potential resource development plans that meet Manitoba's future capacity and energy needs. 2.5 Develop grid modernization and expansion strategies to enable future peak demand growth and enhance operations.	3.1 Develop renewable natural gas market participation structure. 3.2 Continue investigation of renewable natural gas market and supply potential. 3.3 Investigate hydrogen blending feasibility and market potential.	4.1 Continue building the energy planning community and evolve engagement with interested parties, including Indigenous and community leadership, as well as representation from a variety of customer segments. 4.2 Develop a framework to evaluate total energy-related costs to help Manitobans understand the implications of future energy choices. 4.3 Study the evolving role of energy markets and interconnections. 4.4 Advance detailed planning to reflect regional variations across Manitoba.	5.1 Determine impacts of integrating variable renewable resources like wind, including transmission requirements. 5.2 Identify and assess the potential of hydrogen supply, direct-use, storage and other infrastructure. 5.3 Explore the potential long-term role for technologies such as energy storage, carbon capture and storage, hydrogen fueled combustion turbines, biomass, and small modular reactors.

FERC Order 881 Implementation In Manitoba



- Manitoba Hydro is not subject to FERC jurisdiction. However, Manitoba Hydro decided to implement FERC Order 881 voluntarily.

- **Manitoba Hydro is working towards implementing AAR by July 2025.**
 - **Update Facility Rating Methodology (FRM) and Facility Rating System (FRS)**
 - Define four Seasons and associated ambient assumptions.
 - both overhead and underground conductor rating methodologies are established.
 - Incorporate day/night and the impact of solar radiation into AAR.
 - Night-time = day-time rating; low night wind offsets solar radiation gain.
 - Normal and Multiple emergency ratings.
 - Normal ratings complete; 15-minute and 30-minute emergency ratings for overhead transmission line conductors are being finalized.
 - Document methodology for FAC-008 compliance – July-August 2024.
 - **Implement AAR in the control center**
 - Divide the province into temperature zones and identify facilities in each zone - Complete
 - Transfer ratings from FRS to EMS.
 - Bring temperature measurements and forecasts into EMS.
 - Purchase, enhance and integrate RTDYN application into EMS.
 - Update operating instructions and operator training.
 - Transfer current and future ratings to MISO.



Thank You

Reliability Coordinator Updates
John Harmon, MISO, and RAC Member
CJ Brown, Southwest Power Pool, and RAC Member

Action

Information

Report

- Midcontinent Independent System Operator (MISO) – *John Harmon*
- Southwest Power Pool – *CJ Brown*



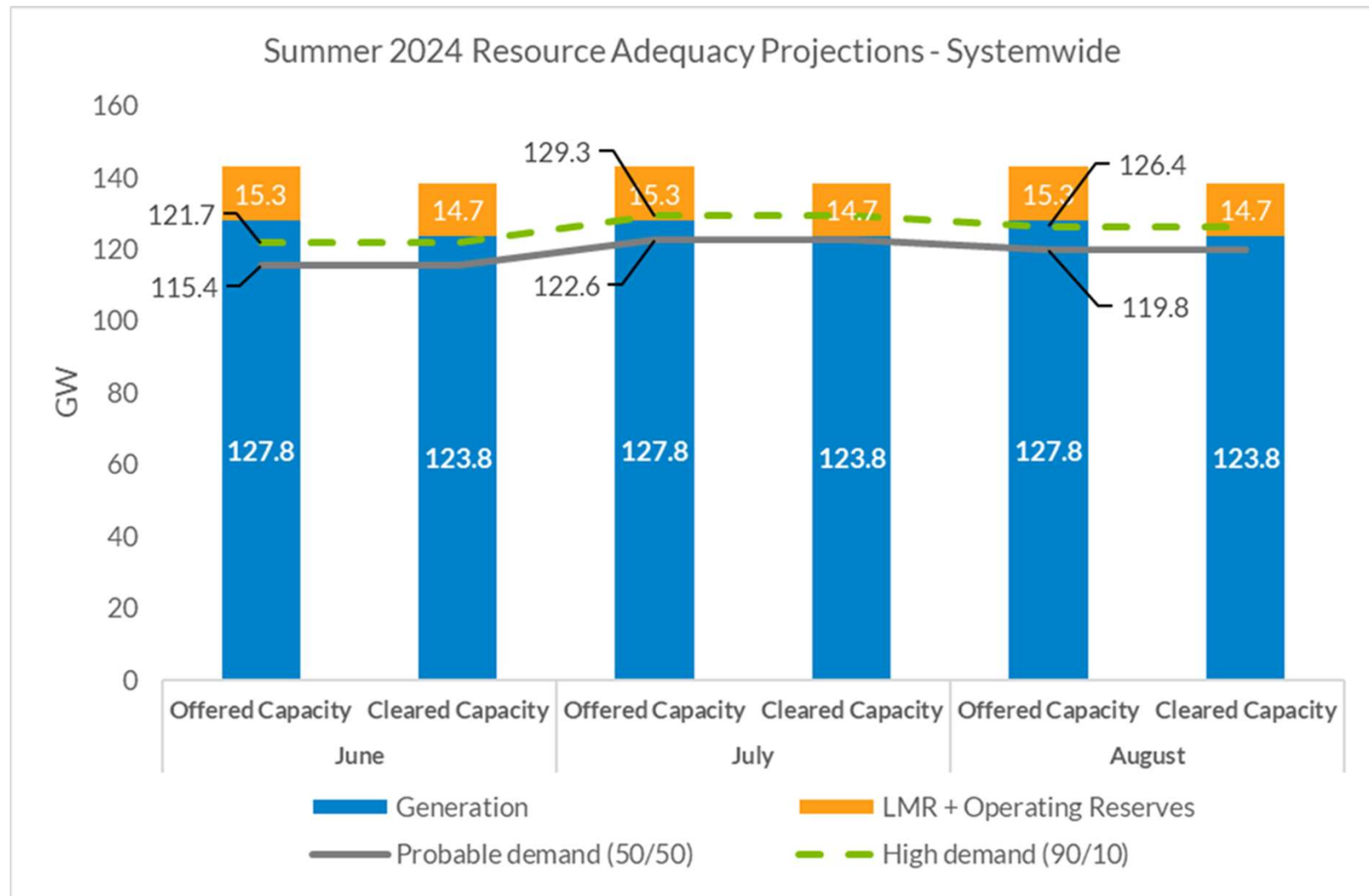
MISO Operations Update

May 2024

Overview

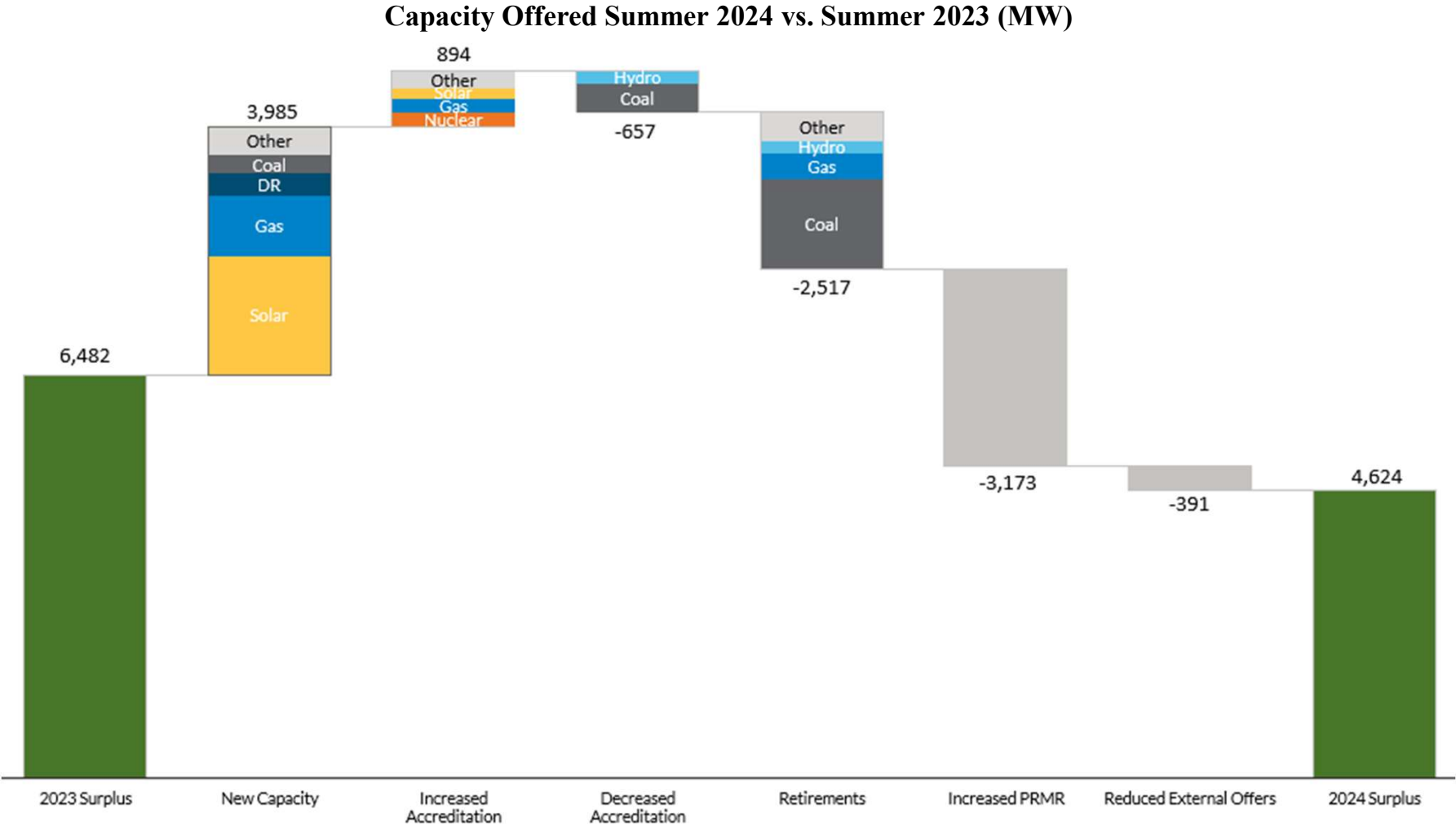
- FAC-011 Implementation
- Summer Readiness
 - NOAA forecasts hot summer
 - No issues identified in transfer analysis

MISO projects sufficient capacity under probable demand, but will rely on demand side resources to meet a high demand scenario



The MISO footprint showed approximately a 30% decrease in surplus and reflects continued portfolio change

Reduced surplus driven by retirements, increased PRMR and reduced external offers



DR: Demand Response

Capacity indicated is offered accredited value

2024 Regional Summer Assessment Overview
Salva Andiappan, Principal Reliability Assessment Engineer, MRO

Action

Information

Report

Salva Andiappan will lead this discussion during the meeting.



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OVERVIEW OF MRO 2024 REGIONAL SUMMER ASSESSMENT

Presented by: Salva Andiappan
RA Department

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RESULTS

Key Findings

- **MISO and SPC is at risk of implementing Energy Emergency Alerts (EEAs) for above-normal summer peak load with unplanned outages.**
- **Extreme summer peak conditions with historic high outage rates and low wind conditions could result in energy shortfalls across SPP.**
- **MH anticipate resources are sufficient to meet reserve margin requirements under normal and extreme demand for the 2024 summer season.**
- **Conventional generation Weighted Equivalent Forced Outage Rates (WEFOR) for 2023 were higher than the five-year moving average.**
- **Protection system misoperation continues to be the top event causes in the MRO region.**



2024 Summer Seasonal Forecast

Assessment Area	Anticipated Resources with Typical Outages	Extreme Peak Load	Reserve Margin Under Extreme Peak Load	Likelihood to issue EEAs
MH	3,512	3,333	5.4%	Low
MISO	126,162	125,817	0.3%	Medium
SPC	4,479	3,736	19.9%	Medium
SPP	65,058	57,537	13.1%	Low

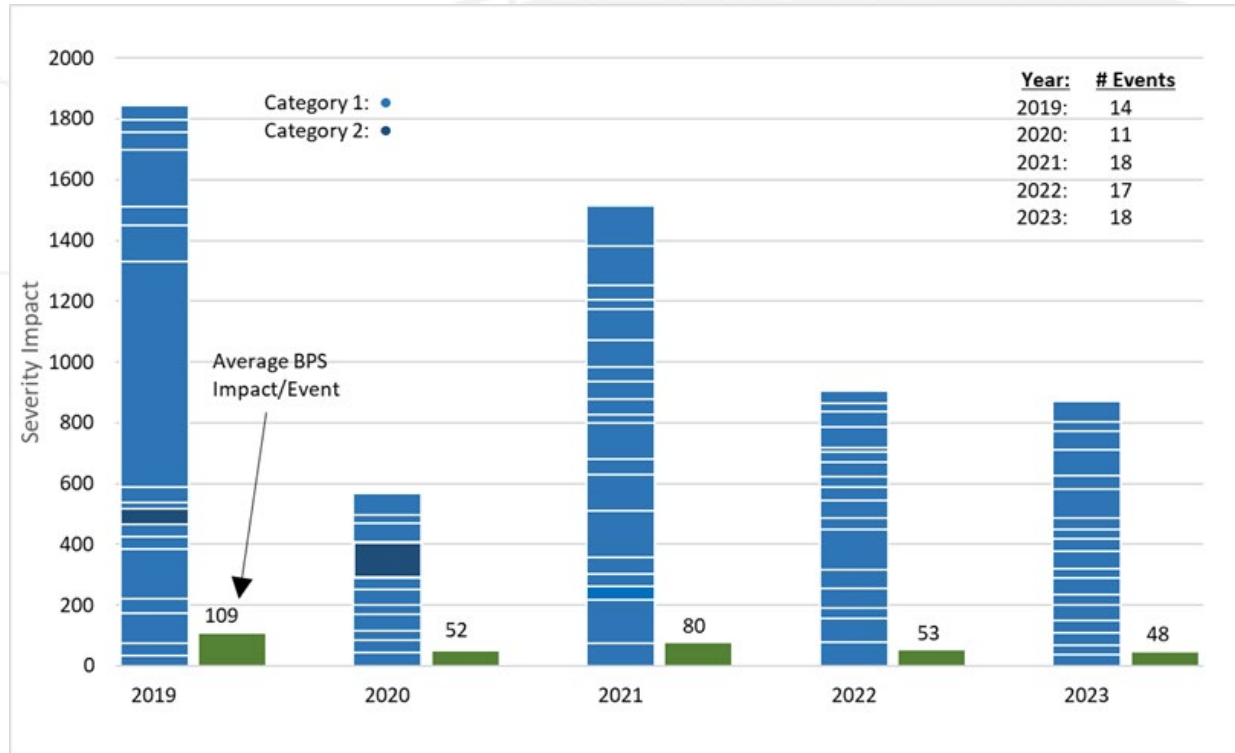
Reserve Margin Percentage with Typical Outages and Extreme Peak Load

Assessment Area	Anticipated Resources with Typical Outages	Extreme Resource Derates	Extreme Low Generation	Extreme Peak Load	Reserve Margin Under Extreme Resource Derates and Extreme Peak Load	Likelihood to issue EEAs
MH	3,512	10	3,502	3,333	5.1%	Low
MISO	126,162	8,228	117,934	125,817	-6.3%	High
SPC	4,479	359	4,120	3,736	10.3%	High
SPP	65,058	7,875	57,183	57,537	-1.0%	High

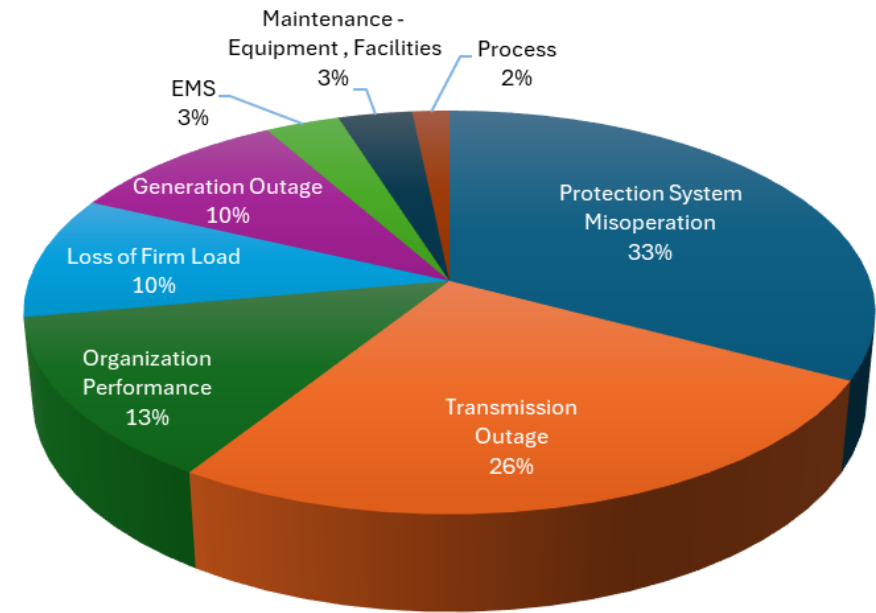
Reserve Margin Percentage with Extreme Resource Derates and Extreme Peak Load



BES Event Analysis



MRO Event Severity Index

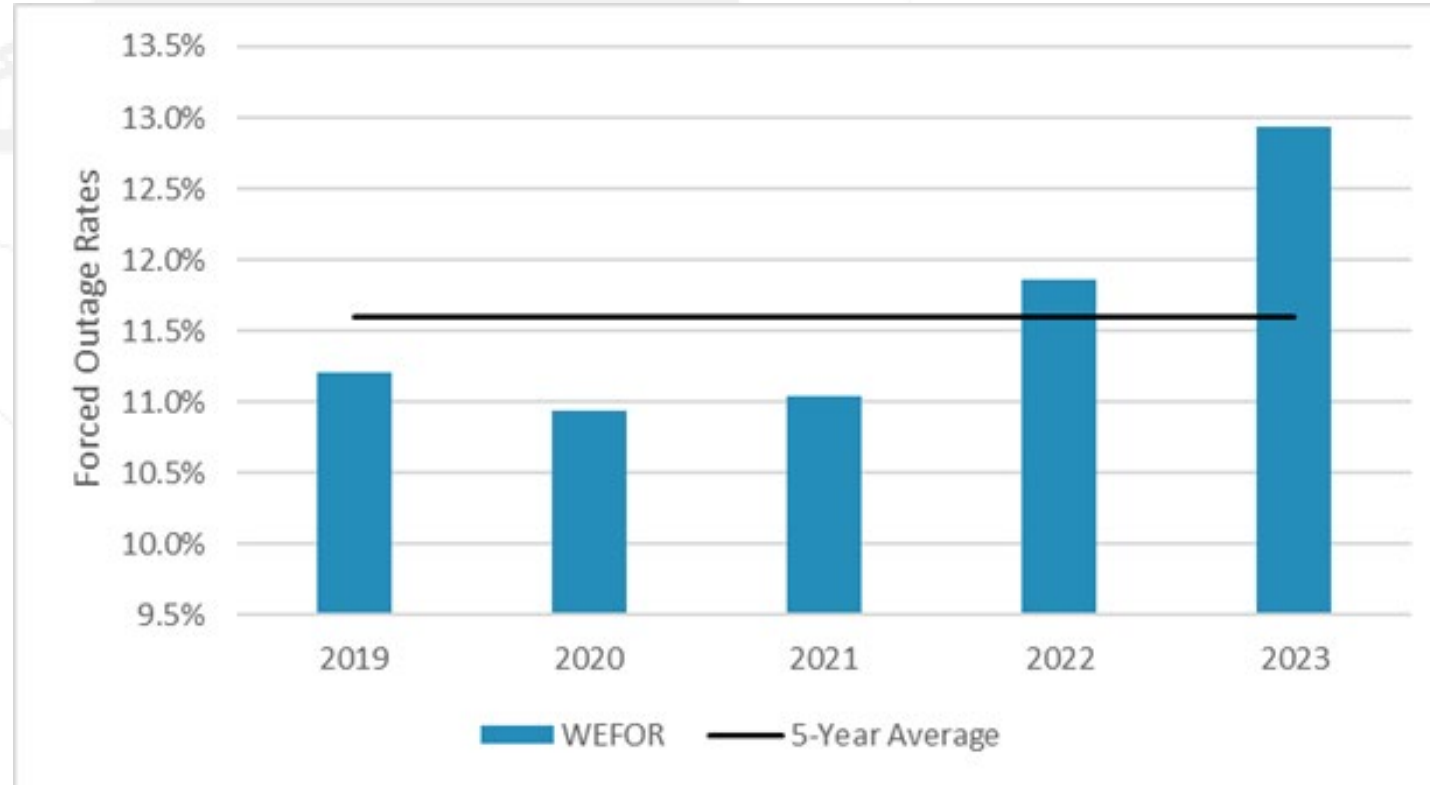


Top Event Causes 2019 - 2023

- Total 5 transmission events occurred in 2023 summer.

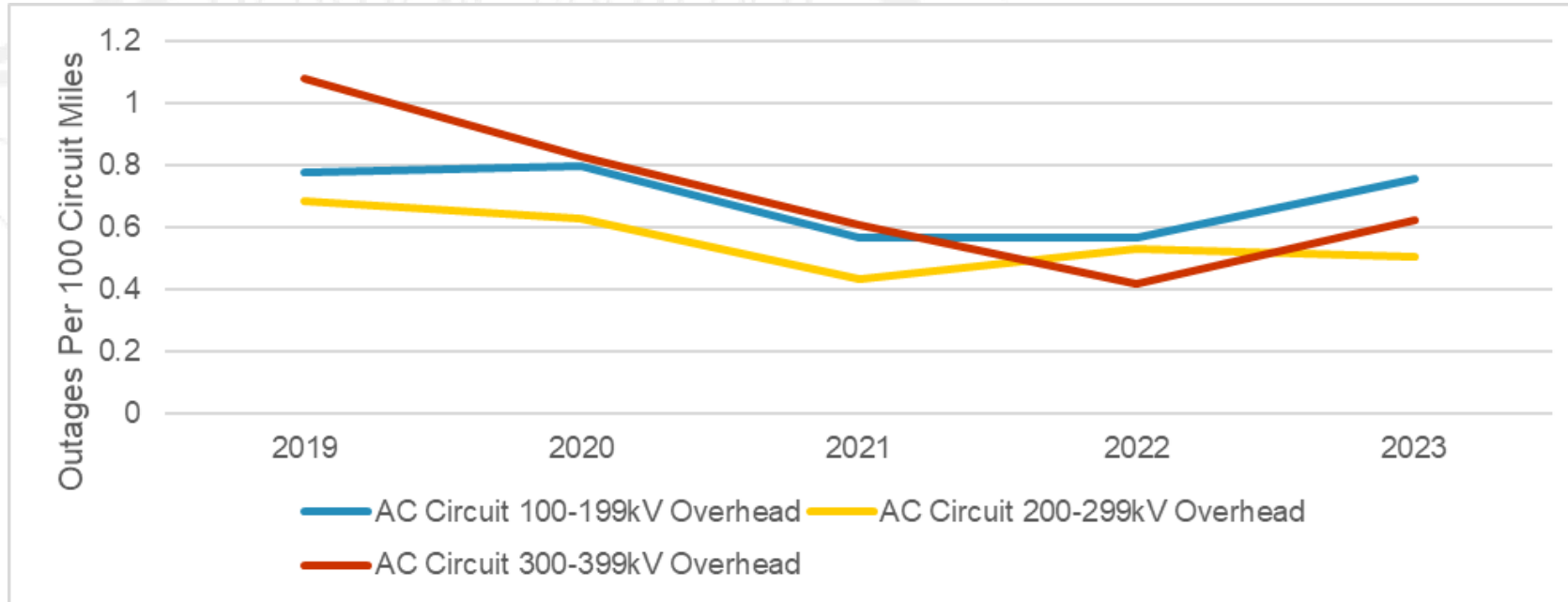


MRO 5-Year Generator MW-Weighted EFOR



- Long term trends continue to indicate increasing EFOR rates.

Annual Summer Total Outages Per 100 Circuit Miles



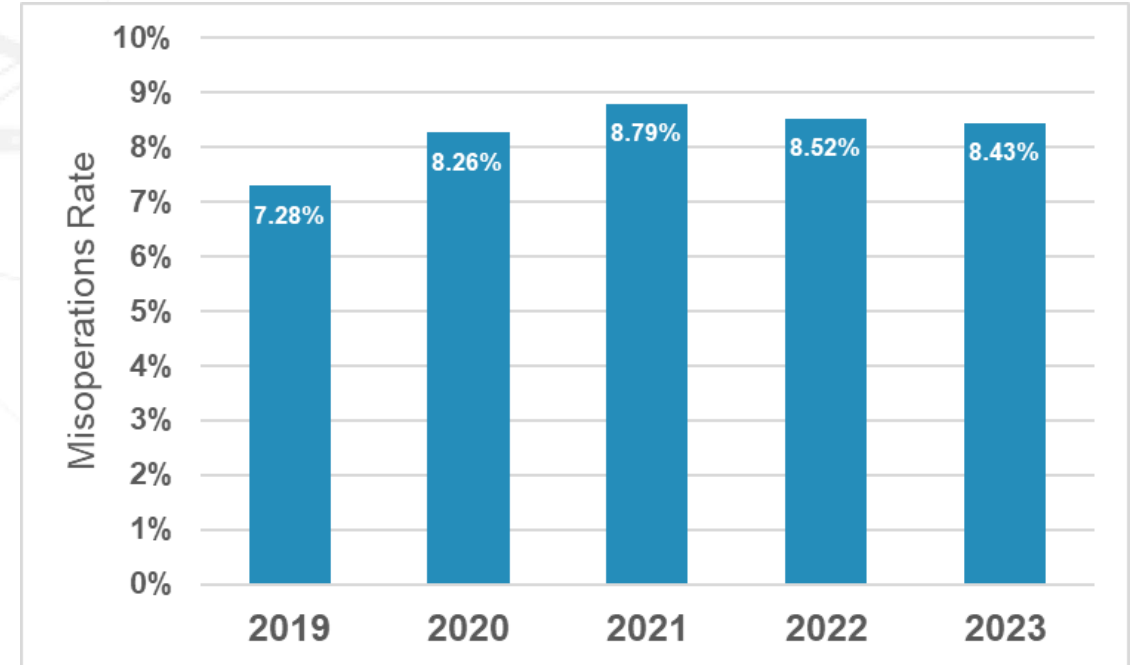
- Increase in outages for 2023 summer in the 100 -199kV and 300-399kV voltages due to storms went through the southern portion of MRO.



MRO Misoperation Rates by Year

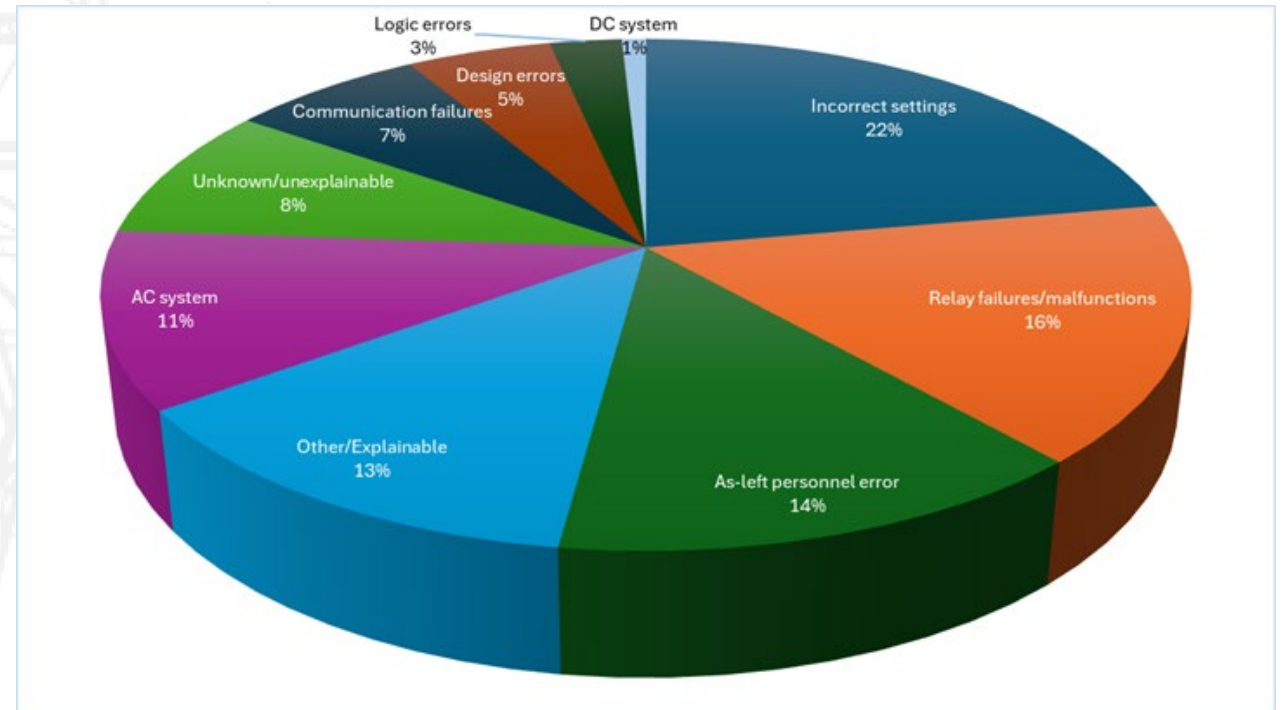
- Total protection system operations down 11.5%.
- Total misoperations down 12%.
- Resulted in slightly lower misoperation rate in 2023.

$$\text{Misop Rate} = \frac{\text{Number of Misoperations}}{\text{Number of Total Operations}} \times 100\%$$



Summer Misoperations by Cause

- Total 117 misoperations between June 1 thru September 30, 2023.
- 44 percent attributed to human errors (incorrect settings, as-left personnel errors, logic errors and design errors)



Questions



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2025 Regional Risk Assessment
Mark Tiemeier, Principal Technical Advisor, MRO

Action

Information

Report

Mark Tiemeier will lead this discussion during the meeting.



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MRO 2025 Regional Risk Assessment

Mark Tiemeier

Principal Technical Advisor

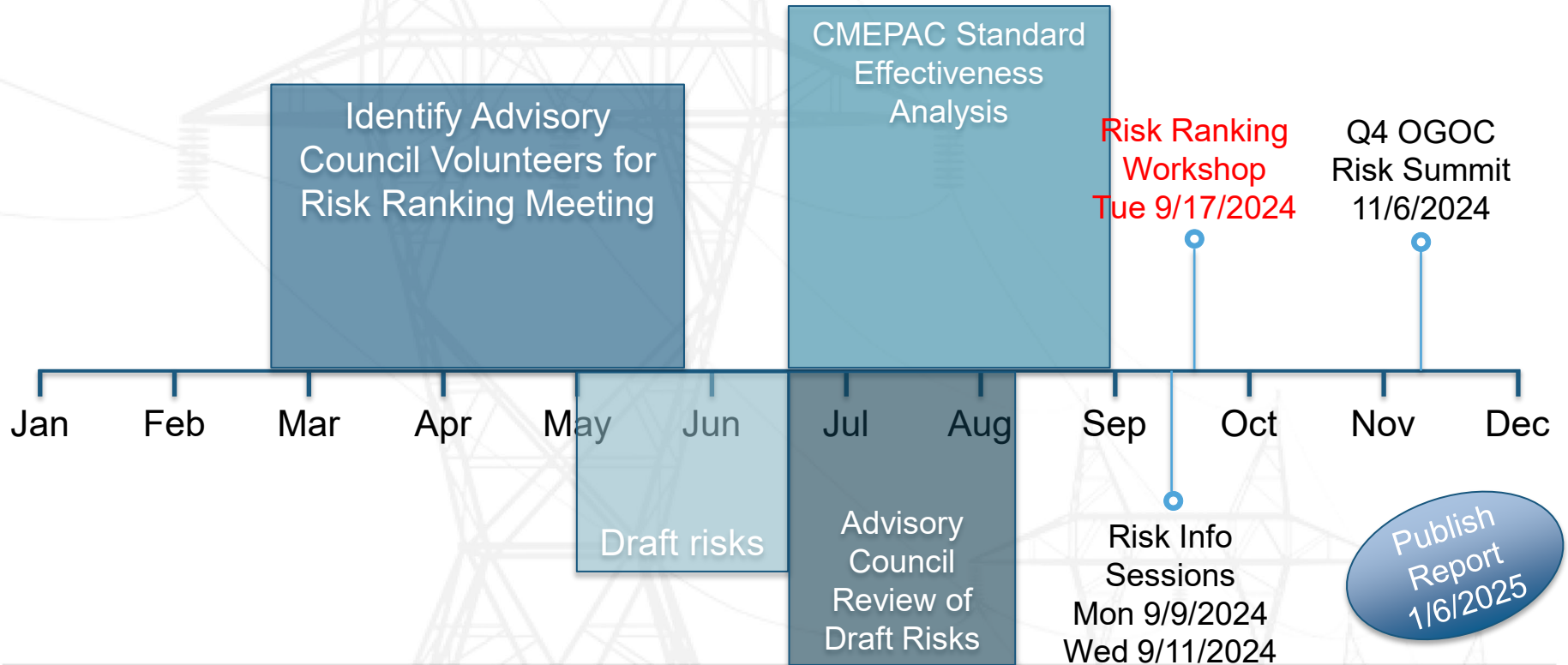
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2025 RRA Timeline



Regional Reliability Risks Discussion

Reliability Risks	
1	Generation Unavailability During Extreme Cold Weather High
2	Inadequate IBR and DER Modeling and Performance High
3	Increased Penetration of Internet-Connected Devices
4	Insufficient Physical Access Controls
5	Loss of Essential Reliability Services High
6	Malicious Insider Threat High
7	Material and Equipment Unavailability High
8	Misoperations Due to Human Errors
9	Phishing / Malware / Ransomware
10	Physical Attacks High
11	Supply Chain Compromise High
12	Tight Supply of Expert Labor
13	Uncertain Energy Availability Extreme
14	Use of Inaccurate Transmission Facility Ratings
15	Vulnerabilities of Unpatched Systems

- What trends are you seeing that drive these risks?
- Are there any risks missing from this list?
- Is there a risk listed that shouldn't be considered for the 2025 RRA?



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NERC Lessons Learned Review
John Grimm, Principal Systems Protection Engineer, MRO

Action

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Report

John Grimm will lead this discussion during the meeting.



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Recent Lessons Learned (NERC)

John Grimm

Principal Systems Protection Engineer

May 16, 2024

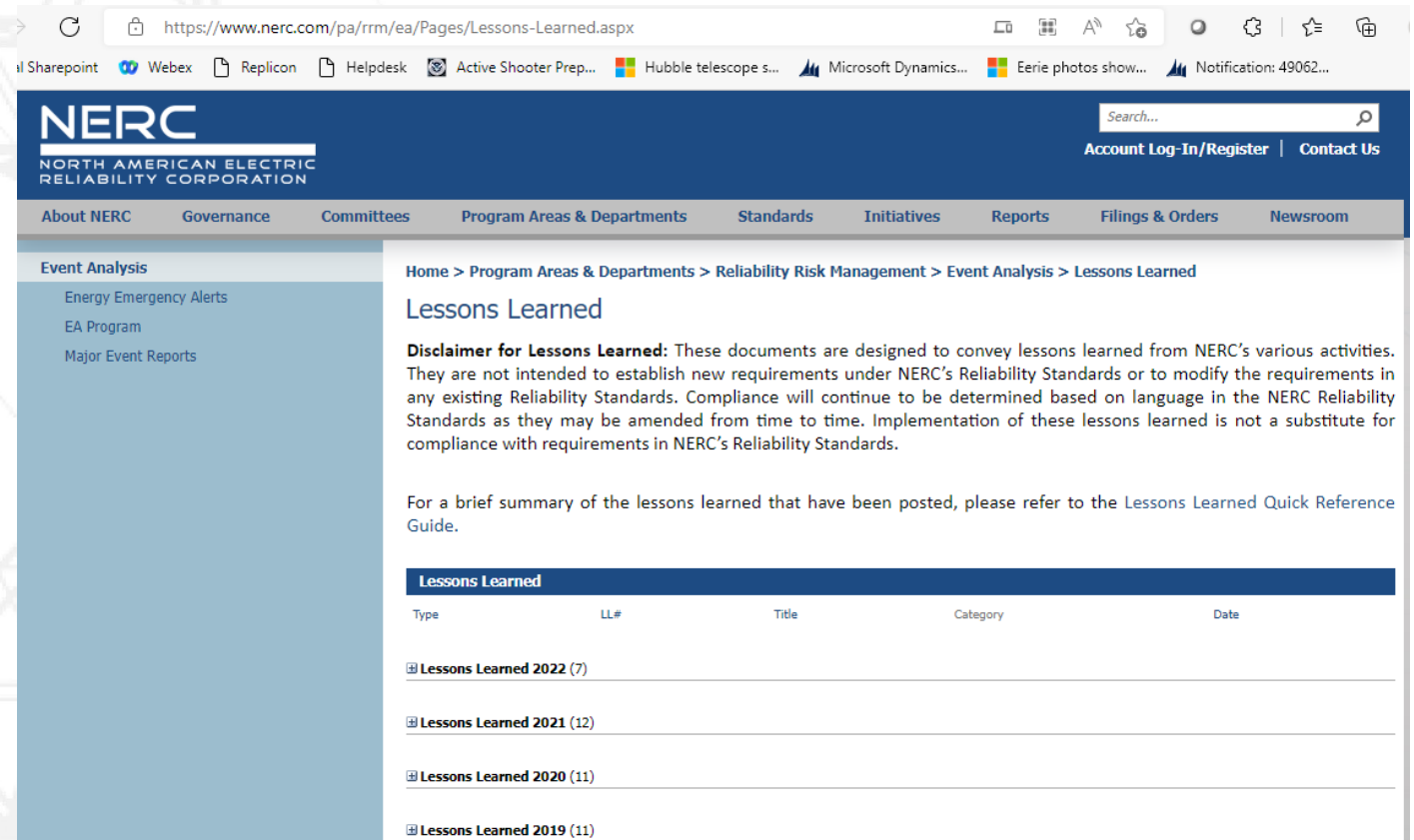
Where to Find Them

EA Program Page

[Event Analysis \(nerc.com\)](https://www.nerc.com/pa/rrm/ea/Pages/Lessons-Learned.aspx)

Or Directly

[Lessons Learned \(nerc.com\)](https://www.nerc.com/pa/rrm/ea/Pages/Lessons-Learned.aspx)



The screenshot shows the NERC (North American Electric Reliability Corporation) website. The browser address bar displays the URL: <https://www.nerc.com/pa/rrm/ea/Pages/Lessons-Learned.aspx>. The website header includes the NERC logo and navigation links: About NERC, Governance, Committees, Program Areas & Departments, Standards, Initiatives, Reports, Filings & Orders, and Newsroom. A search bar is located in the top right corner.

The main content area is titled "Lessons Learned" and includes a disclaimer: "Disclaimer for Lessons Learned: These documents are designed to convey lessons learned from NERC's various activities. They are not intended to establish new requirements under NERC's Reliability Standards or to modify the requirements in any existing Reliability Standards. Compliance will continue to be determined based on language in the NERC Reliability Standards as they may be amended from time to time. Implementation of these lessons learned is not a substitute for compliance with requirements in NERC's Reliability Standards."

Below the disclaimer, there is a section for "Lessons Learned" with a table listing lessons learned by year:

Type	LL#	Title	Category	Date
Lessons Learned 2022 (7)				
Lessons Learned 2021 (12)				
Lessons Learned 2020 (11)				
Lessons Learned 2019 (11)				

Recent Activity - Working On



Submitted Lessons Learned Summary

Limited Disclosure

- **WECC – Loss of Visibility from Lack of Contractor Oversight**

During scheduled work, DC power was lost to both telecommunication racks (A and B) at the BES substation interrupting all telecommunications equipment fed from both “A” and “B” racks which resulted in the loss of visibility to 135 Remote Terminal Units (RTUs).

- **WECC – Incorrect Implementation of IBR Primary Frequency Response Logic Caused Negative ACE for an ISO**

SCADA provider’s Primary Frequency Response (PFR) was incorrectly applied in response to grid frequency event, causing an ACE error and lowered frequency. Energy storage resources that do not have controller logic set in a manner that applies the PFR droop offset as “additive” to the dispatch setpoint may produce anomalous responses.

... 4 ...

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Recent Activity - Recently Posted

NERCNORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Category of Lessons Learned Published

Limited Disclosure

- **1 NERC Lessons Learned published to date in 2024**
 - 1- Relaying and Protection Systems

- **6 NERC Lessons Learned published to date in 2023**
 - 2 - Generation Facilities
 - 1- Transmission Facilities
 - 3 - Communications

2*Limited Disclosure*

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Recent Activity

Lessons Learned

LL#	Title	Summary
LL20240301	Protective Relay Solid-State Output Contact Voltage Leakage	An entity experienced unnecessary breaker failure initiation signals due to solid-state output contact voltage leaks which can operate downstream devices with optically coupled isolator (OCI) inputs or air gap inputs. A traditional corrective action was used that is now considered a less than optimal work-around by the vendor.
LL20231102	540 MW of Wind Turbine Generation Loss due to Unexpected and Insufficient Ride-through Performance	Insufficient ride-through performance for wind turbine generators continues to cause repeated events due to incorrect protection settings, insufficiently maintained uninterruptible power supply (UPS) systems, and the previous tripping causes remaining unidentified. This lesson learned discusses a recent wind farm event to serve as an example of the type of event occurring frequently across the bulk power system (BPS).
LL20231101	Loss of Communication to Transmission Substations	A TO experienced an unplanned interruption on its “Path A” (fiber optic) that impacted several communication circuits due to previously rerouted circuits during an ongoing planned outage on “Path B” (microwave). As a result, select relay communications were affected in addition to the monitoring and control to several remote substations. As a result of this break, both analog communications and digital SCADA communications were interrupted for 11 hours and 30 minutes.



Recent Activity – cont.

Lessons Learned		
LL#	Title	Summary
LL20230901	Abnormal Area Control Error due to a Model Translation Error	After a scheduled quarterly model update, the entity experienced an abnormal area control error (ACE) deviation from expected ranges. It was identified that the automatic generation control(AGC) application sent invalid setpoint instructions to the generation fleet due to a model translation error.
LL20230801	Loss of Monitoring due to a “Half Failed” High Availability Switch Pair	Due to an incomplete failover between firewalls, an entity experienced intermittent inter-control center communications protocol (ICCP) data failures and data quality issues in the energy management system (EMS) and plant information (PI) applications. As a result, the entity lost monitoring capability for more than 30 minutes until the system was switched to a Backup Control Center.
LL20230701	Weathering the Storm: System Hardening	The electric system requires additional system hardening in coastal areas to reduce the cost of impact from hurricanes. This is necessary because population growth and infrastructure concentration along the coast has greatly increased the cost of damage from extreme weather events in North America over the last 20 years. Some system hardening has already occurred in Florida and has reduced restoration times there.



Closing

- **The goal with publishing lessons learned is to provide industry with technical and understandable information that assists them with maintaining the reliability of the bulk power system.**
- **Entities should have technical/operations staff review all Lessons Learned and comment on the applicability to their systems and/or operations.**

NERC Standards Review Forum (NSRF) Update
Gayle Nansel, Reliability Advisory Council Chair

Action

Information

Report

Chair Nansel will lead this discussion during the meeting.

Protective Relay Subgroup (PRS) Update
Jake Bernhagen, Manager of Reliability Performance, MRO

Action

Information

Report

Jake Bernhagen will lead this discussion during the meeting.

2024 Meeting Dates
Gayle Nansel, Reliability Advisory Council Chair

Action

Information

Report

Chair Nansel will lead this agenda item.

	Q1 2024	Q2 2024	Q3 2024	Q4 2024
RAC	2/22	5/16	8/8	10/3
SAC	2/21	5/14	8/5	10/3
CMEPAC	2/20 Virtual	5/7	7/23	10/3
PRS	3/12	6/11	9/10	12/10
OGOC	3/6 Virtual	5/22	8/21	11/6
BOD	2/8 Virtual	5/23	8/22	11/7

***Joint council meeting
10/2/24 PM**

MRO CONFERENCE DATES 2024

Q1	RAM Conference: March 20, 2024, Virtual conference
Q2	Reliability Conference: May 14–15, 2024, Social networking event and conference (hybrid); St. Paul, MN
Q3	CMEP Conference: July 23–24, 2024, Social networking event and conference (hybrid); Kansas City, MO
Q4	Security Conference: October 1–2, 2024, Social networking event and conference (hybrid); St. Paul, MN

OTHER CONFERENCE DATES 2024

GridSecCon: October 22–25, 2024 (Co-hosted by NERC E-ISAC and MRO); Minneapolis Hyatt Regency, Minneapolis, MN

RAC Member Roundtable
Gayle Nansel, Reliability Advisory Council Chair

Action

Discussion

Report

Chair Nansel will lead this discussion during the meeting.

Other Business and Adjourn
Gayle Nansel, Reliability Advisory Council Chair

Action

Discussion

Report

Chair Nansel will lead this discussion during the meeting.