MIDWEST RELIABILITY ORGANIZATION

Meeting Agenda

Reliability Advisory Council (RAC)

March 01, 2023
9:00 am to 3:00 pm central

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

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. **Make every attempt to attend all meetings in person or via webinar.**

2. **Be responsive to requests, action items, and deadlines.**

3. **Be active and involved in all organizational group meetings by reviewing all pre-meeting materials and being focused and engaged during the meeting.**

4. **Be self-motivating, focusing on outcomes during meetings and implementing work plans to benefit MRO and MRO's registered entities.**

5. **Ensure that the organizational group supports MRO strategic initiatives in current and planned tasks.**

6. **Be supportive of Highly Effective Reliability Organization (HEROTM) principles.**

7. **Be supportive of proactive initiatives that improve effectiveness and efficiency for MRO and MRO's registered entities.**

MRO RELIABILITY ADVISORY COUNCIL Q1 MEETING AGENDA

Agenda Item

1 Call to Order and Determination of Quorum
Dick Pursley, Reliability Advisory Council Chair
a. Determination of Quorum
b. Robert's Rules of Order

2 Standards of Conduct and Antitrust Guidelines
Bryan Clark, Director of Reliability Analysis, MRO

3 Chair's Remarks
Dick Pursley, Reliability Advisory Council Chair

4 New Members' Welcome Presentation
Bryan Clark, Director of Reliability Analysis, MRO

5 Consent Agenda
Dick Pursley, Reliability Advisory Council, Chair
a. Approve November 16, 2022 meeting minutes

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

7 RSTC Meeting Update
John Stephens, Reliability Advisory Council and RSTC Member

8 MRO Representatives on NERC Subgroups – Written Reports
Bryan Clark, Director, Reliability Assessment and Performance Analysis, MRO
a. NERC Electric Gas Working Group (EGWG) – *Jaimin Patel*
b. NERC Inverter Based Resource Performance Subcommittee (IRPS) – *David Brauch*
c. NERC System Planning Impacts from DER Working Group (SPIDERWG) – *Wayne Guttormson*
d. NERC System Protection and Control Working Group (SPCWG) – *Lynn Schroeder*
e. NERC Energy Reliability Assessment Task Force (ERATF) – *Tom Whynot*

Break – 10:00 a.m.

9 2023 Work Plan Update
Dick Pursley, Reliability Advisory Council Chair
a. Review Action Items
b. NERC Rep Guidance Document
Bryan Clark, Director of Reliability Analysis, MRO
c. 2023 Reliability Conference Update
Bryn Wilson, Reliability Advisory Council Member

10 Reliability Coordinator Updates
a. MISO – *Andy Witmeier, RAC Member*
b. SPC – *Binod Shrestha, RAC Member*
c. SPP – *Scott Aclin, Balancing Authority Manager, SPP*

11 Planning Coordinator Updates
a. SaskPower – *Binod Shrestha, RAC Member*
b. Manitoba Hydro – *Nandaka Jayasekara, RAC Member*

Lunch 12:00 p.m.

12 MRO Regional Risk Assessment (RRA)

Mark Tiemeier, Principal Technical Advisor, MRO

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

14 Protective Relay Subgroup (PRS) Update
Jake Bernhagen, Senior Systems Protection Engineer, MRO

15 2023 Meeting Dates
Dick Pursley, Reliability Advisory Council Chair

16 RAC Member Roundtable
Dick Pursley, Reliability Advisory Council Chair

17 Other Business and Adjourn
Dick Pursley, Reliability Advisory Council Chair

AGENDA

Call to Order and Determination of Quorum

a. Determination of Quorum

Dick Pursley, Relibility Advisory Council Chair

Name	Role	Company	Term
Andy Witmeier	Member	MISO	12/31/24
Binod Shrestha	Member	Saskatchewan Power Corporation	12/31/25
Bryn Wilson	Member	Oklahoma Gas & Electric	12/31/23
CJ Brown	Member	Southwest Power Pool	12/31/24
Dallas Rowley	Member	Oklahoma Gas & Electric	12/31/25
Derek Brown	Member	Evergy	12/31/23
Dick Pursley	**Chair**	Great River Energy	12/31/25
Durgesh Manjure	Member	MISO	12/31/23
Dwayne Stradford	Member	American Electric Power	12/31/24
Gayle Nansel	**Vice Chair**	Western Area Power Administration	12/31/25
Jason Weiers	Member	Otter Tail Power Company	12/31/24
Jeremy Severson	Member	Basin Electric Power Cooperative	12/31/24
John Stephens	Member	City Utilities of Springfield Missouri	12/31/23
Nandaka Jayasekara	Member	Manitoba Hydro	12/31/25
Ron Gunderson	Member	Nebraska Public Power District	12/31/23

AGENDA

Call to Order and Determination of Quorum

b. Robert's Rules of Order

Dick Pursley, 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 *or* 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.

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
	When the Chair senses that the Committee is substantially in agreement, and the Motion needed little or no debate. No actual vote is taken.	The minutes show "by unanimous consent."
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

AGENDA

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 participants 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.

AGENDA

Chair's Remarks
Dick Pursley, Reliability Advisory Council Chair

Action
Information

Report
Chair Pursley will lead this discussion during the meeting.

AGENDA

New Members' Welcome Presentation

Bryan Clark, Director of Reliability Analysis, MRO

Action

Information

Report

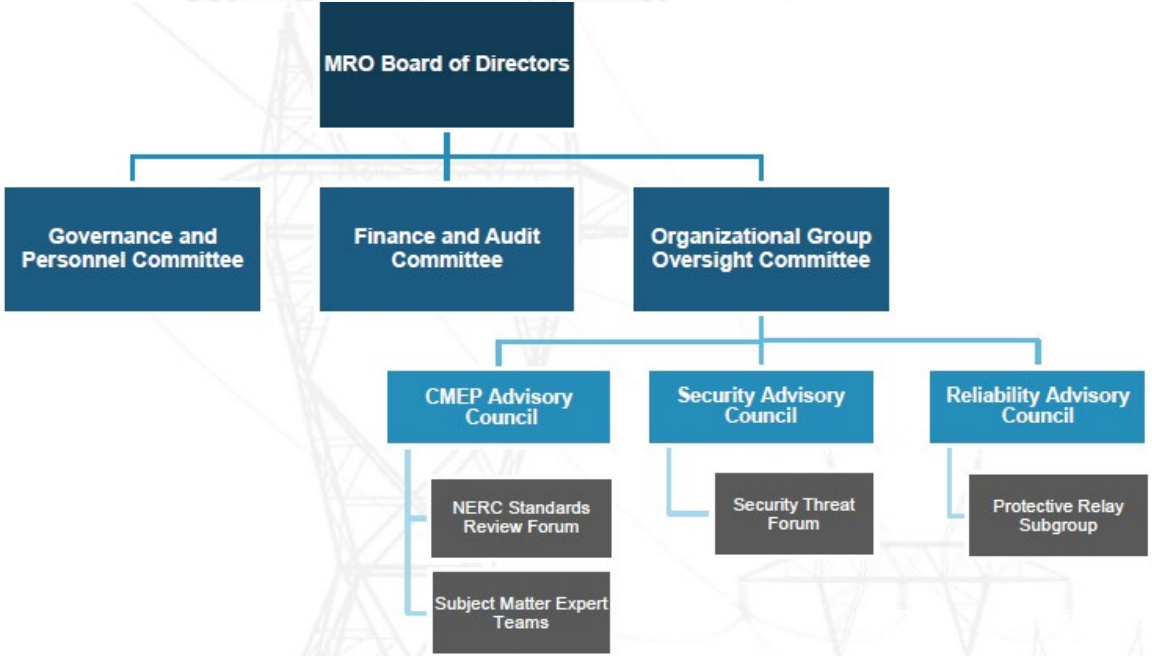
Bryan Clark will lead this discussion during the meeting.

MIDWEST RELIABILITY ORGANIZATION

Midwest Reliability Organization

New Member Welcome Presentation

Advisory Council Structure



Organizational Group Oversight Committee (OGOC)

- **The OGOC:**
  - Establishes and oversees MRO organizational groups and policies applicable to organizational groups
  - Ensures organizational groups are effective and efficient and do not duplicate the work of others
  - Designates individuals to represent MRO on NERC organizational groups
  - The Organizational Group Oversight Committee Charter is posted on MRO's public website

OGOC Roster

Member	Term End	Company
JoAnn Thompson, Chair	12/31/23	Otter Tail Power Company
Daryl Maxwell, Vice Chair	12/31/23	Manitoba Hydro
Iqbal Dhami	12/31/24	Saskatchewan Power Corporation
Kerri Glitch	12/31/24	MISO
Charles Marshall	12/31/23	ITC Holdings
Maurice Moss	12/31/23	Kansas City Board of Public Utilities
Darcy Neigum	12/31/23	Montana-Dakota Utilities
Ben Porath	12/31/24	Dairyland Power Cooperative
Eric Schmitt	12/31/24	Independent Director
Dehn Stevens	12/31/23	MidAmerican Energy Company
Jeanne Tisinger	12/31/24	Independent Director

Guiding Principles for Council Members

- **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. Make every attempt to attend all meetings in person or via webinar.
2. Be responsive to requests, action items, and deadlines.
3. Be active and involved in all organizational group meetings by reviewing all pre-meeting materials and being focused and engaged during the meeting.
4. Be self-motivating, focusing on outcomes during meetings and implementing work plans to benefit MRO and MRO's registered entities.
5. Ensure that the organizational group supports MRO strategic initiatives in current and planned tasks.
6. Be supportive of Highly Effective Reliability Organization (HERO™) principles.
7. Be supportive of proactive initiatives that improve effectiveness and efficiency for MRO and MRO's registered entities.

Types of Diversity

Inherent Diversity

- Race
- Ethnicity
- Age
- National origin
- Sexual orientation
- Cultural identity
- Assigned sex
- Gender identity

Acquired Diversity

- Expertise (e.g., engineering, operations, security)
- Experience (e.g., executive, technical)
- Geography (e.g., US, Canada, north, south)
- Company (e.g., no more than two members from the same company per group)

The Value of Diverse Teams

- **More focused on facts**
  - More likely to constantly reexamine facts and remain objective
  - Can lead to improved and more accurate group thinking
- **Facts are processed more carefully**
  - Considering the perspective of an outsider can result in improved decision-making and results
- **More innovative**
  - Diversity boosts intellectual potential
  - Conformity discourages innovative thinking

SOURCE: https://hbr.org/2016/11/why-diverse-teams-are-smarter

MRO Reliability Advisory Council

The MRO Reliability Advisory Council is a MRO Organizational Group that provides advice and counsel to MRO's Board of Directors (board), the board's Organizational Group Oversight Committee, staff, members and registered entities on topics such as transmission adequacy and availability, resource adequacy, integration of renewables, essential reliability services, event analysis, system protection, and reliability assessments. The MRO Reliability Advisory Council increases outreach and awareness in these key areas.

https://www.mro.net/organizational-groups/reliability-advisory-council/

RAC Council Membership

- **MRO's Council consists of 15 members:**
  - Pursuant to Policy and Procedure 3 - Establishment, Responsibilities, and Procedures of Organizational Groups and MRO Sponsored Representative on NERC Organizational Groups, membership on councils is based on experience and expertise.
  - No more than two members of the MRO (Council) may be an employee of a single entity or affiliated entities.
  - At least three sectors will be represented on the MRO (Council). To the extent practicable, membership will reflect geographic diversity and balanced sector representation.
  - Individuals with expertise and experience in the areas of transmission planning, resource planning, power systems engineering, system operations, as well as control and protection systems serve on the MRO RAC.

MRO RAC Roster

Member	Term End	Company
Andy Witmeier	12/31/24	MISO
Binod Shrestha	12/31/25	Saskatchewan Power Corporation
Bryn Wilson	12/31/23	Oklahoma Gas & Electric
CJ Brown	12/31/24	Southwest Power Pool
Dallas Rowley	12/31/25	Oklahoma Gas & Electric
Derek Brown	12/31/23	Evergy
Dick Pursley, Chair	12/31/25	Great River Energy
Durgesh Manjure	12/31/23	MISO
Dwayne Stradford	12/31/24	American Electric Power
Gayle Nansel, Vice Chair	12/31/25	Western Area Power Administration
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John Stephens	12/31/23	City Utilities of Springfield Missouri
Nandaka Jayasekara	12/31/25	Manitoba Hydro
Ron Gunderson	12/31/23	Nebraska Public Power District

RAC Key Responsibilities

- Recommend the establishment of subgroups to support the Reliability Advisory Council work plan as appropriate. Oversee and provide direction to any subgroups.
- Support the preparation of special assessments and seasonal readiness plans by regional Reliability Coordinators and as may be directed by NERC or the MRO Board of Directors from time to time.
- Review and assess the overall reliability of the MRO region and interregional bulk electric system for long-term planning horizons based on reports from regional Planning Coordinators as may be directed by NERC or the MRO Board of Directors from time to time.
- Support the development of the annual MRO Regional Risk Assessment by identifying risks, trends, and mitigating activities.

RAC Key Responsibilities cont.

- Review significant BES events (generally, Category 2 or higher) which occurred in the MRO Region and the resulting reports and approve larger scale event reports (Category 3 and higher) to assure the appropriate analysis is performed and that any lessons learned are identified and shared with the industry.
- Provide input and guidance on system protection and control matters, including Reliability Standards development, misoperation reviews, and reviews of remedial action schemes.
- Support the applicable NERC program areas.

The Reliability Advisory Council Charter can be found here.

Meetings

- The MRO RAC will meet quarterly or as necessary, in person or via conference call and/or web meeting.
- All MRO council chairs and vice chairs will meet with the OGOC the day before the fourth quarter regularly scheduled board meeting to review the council's accomplishments during the past year and to develop work plans for the following year.
- Meetings of the RAC are open to public attendance; however, the meeting may be called into closed session by the chair or vice chair. Additional meeting requirements related to agendas and minutes, voting and proxy, and rules of conduct are outlined in MRO Policy and Procedure 3 - Establishment, Responsibilities, and Procedures of Organizational Groups and MRO Representation on NERC Organizational Groups.
- Meeting costs incurred by RAC members are reimbursable by MRO according to MRO Policy and Procedure 2 – Expense Reimbursement.

Meeting/Event Dates

Upcoming RAC Meeting Dates

Meeting/Event	Date
Quarter 1	March 1, 2023
Reliability Conference	May 17, 2023
Quarter 2	May 18, 2023
Quarter 3	August 10, 2023
Quarter 4	November 9, 2023

Guidelines for Meetings

- **Meeting Agendas:**
  - Short agenda posted one month prior to meeting
  - Agenda Packet posted one week prior to meeting
- **Meeting Minutes:**
  - Support Staff/Liaison will review up to two weeks after meeting takes place
  - Council will review for one week
  - Council will vote to approve

Work Plan

MRO RAC 2023 Work Plan

col	Work Item	Source	Activity	Timing	Responsible Party	Item Audience	Item Type	Status	Notes
1	Conduct outreach and awareness	RAC Charter/MRO Strategic Priority 3	Conduct a minimum of 2 webinars/outreach in 2023 to increase reliability and decrease risk to the reliable and secure operations of the bulk power system. Annual Reliability Conference, webinars- lessons learned, newsletter articles, Standard Application Guides	Periodically	RAC Members	OGOC	Work Plan	Open	The 2023 Reliability Conference is scheduled for May 16-17, 2023 in St. Paul, MN at the MRO office. A subgroup of RAC members will be formed to develop topics and speakers. The council will also be holding their annual Cold Weather Preparedness Workshop in Q4 and a Long Term Reliability Assessment Webinar in January of 2023. Develop and hold a webinar on Energy Reliability Planning in 2023.
2	Provide Reliability Standard Reviews	RAC Charter/MRO Strategic Priority 3	Regular interface with other councils(CMEPAC and SAC) as it relates to standard development or standard application guidance. Look for opportunities to provide input from an Operational and Planning perspective.	Periodically	RAC Members	OGOC	Work Plan	Open	The RAC will continue to attend NSRF meetings periodically in 2023 with an assigned member as well as look at opportunities to provide guidance for standards relevant to operations and planning. There will also be more opportunies for this in Q3 of 2023 with adjacent council meetings scheduled.
3	Review significant events or disturbances on the BES	RAC Charter/MRO Strategic Priority 3	Review of significant BES events and any resulting reports within the MRO Region and outside the region as relevant.	Periodically	RAC Members	OGOC	Work Plan	Open	The RAC will review any significant events or disturbances with a focus on the MRO region from a specific entity at quarterly meetings as necessary.
4	Development of the MRO Regional Risk Assessment	RAC Charter/MRO Strategic Priority 3	Support the development of the annual MRO Regional Risk Assessment by identifying risks, trends and mitigating activities. Use the Risk Matrix tool to assess, quantify, and prioritize reliability risks. This also includes continuous	Qtr 3	RAC Members	OGOC	Work Plan	Open	MRO Staff and MRO RAC Members will discuss and prioritize potential regional risks annually to support the development of the MRO RRA. The RAC will also provide two resources to support MRO staff in ranking risks for the 2024 RRA utilizing the Reliability Risk Matrix.
5	Support Regional representation on NERC organizational groups	RAC Charter	Review NERC Representative reports and provide guidance and feedback to the representatives. The RAC will continue to evaluate the need to follow specific NERC groups with representatives as the RSTC makes changes to the working group structure.	Periodically	RAC Members	OGOC	Work Plan	Open	MRO Staff and MRO RAC Members will look into any new working groups formed as well as existing working groups to determine the need to follow them. In 2023 the RAC will move forward with implementing small teams to focus on each of the 5 NERC groups to help with engagment of the NERC Representative and potentially create more outreach ideas.
6	Review the summary of misoperations across the MRO Region (prepared by MRO staff)	PRS Charter	The Protective Relay Subgroup will review misoperations across the region to ensure that misoperations are effectively identified and mitigated.	Periodically	PRS Members	OGOC	Work Plan	Open	The PRS will look into potential lessons learned and targeted outreach for any misoperations. The group will also focus on regional misoperations during the quarterly meetings in a closed session where members perform an in-depth analysis in small breakout groups.

The items above this row are seeking/have been granted OGOC approval. The items below this row are example ideas on how the advisory council could implement any approved work plan items.

MRO Protective Relay Subgroup

The purpose of the MRO Protective Relay Subgroup (PRS) is to identify, review and discuss system protection and control issues relevant to the reliability of the bulk electric system and to develop and implement regional procedures for applicable NERC PRC standards. The PRS reports to the Reliability Advisory Council (RAC).

Link to webpage: https://www.mro.net/organizational-groups/reliability-advisory-council/protective-relay-subgroup/

Protective Relay Subgroup Membership

MRO's PRS consists of 19 members:

- Pursuant to Policy and Procedure 3 - Establishment, Responsibilities, and Procedures of Organizational Groups and MRO Sponsored Representative on NERC Organizational Groups, membership of organizational groups shall be determined based upon experience, expertise and geographic diversity and to the extent practicable, shall include a balanced representation of the sectors.
- Membership is based on geographic representation (locale).

MRO PRS Roster

Member	Term End	Company
Adam Daters	12/31/24	ITC Holdings
Alex Bosgoed	12/31/25	Saskatchewan Power Corporation
Casey Malskeit	12/31/25	Omaha Public Power District
Cody Remboldt	12/31/24	Montana-Dakota Utilities
David Weir	12/31/25	Western Area Power Administration
David Wheeler	12/31/23	Southwestern Public Services Co.
Dennis Lu, Vice Chair	12/31/23	Manitoba Hydro
Derrick Schlangen	12/31/23	Great River Energy
Glenn Bryson	12/31/24	American Electric Power
Greg Hill	12/31/25	Nebraska Public Power District
Greg Sessler	12/31/23	American Transmission Company
Jeff Beasley	12/31/25	Grand River Dam Authority
Josh Erdman	12/31/24	Xcel Energy
Lynn Schroeder	12/31/25	Sunflower Electric Power Corporation
Rochelle Trefry	12/31/25	MidAmerican Energy Company
Ryan Einer, Chair	12/31/23	Oklahoma Gas & Electric
Sarah Marshall	12/31/24	Alliant Energy
Scott Paramore	12/31/24	Kansas City Board of Public Utilities
Terry Fett	12/31/23	Central Iowa Power Cooperative

PRS Key Responsibilities

- Develop, maintain, and implement regional procedures as needed that address the requirements of NERC PRC standards.
- Annually review the MRO summary of Misoperations to identify Lessons Learned and communicate these lessons with MRO membership.
- Trend the Event Analysis reports submitted to MRO for the purpose of identifying misoperations that are causing, or increasing the severity of, these events. Through the PRS, work with the Entities involved with these events to assure that the misoperations are effectively identified and mitigated. Assure that any protection-related Lessons Learned of value to the industry are prepared and submitted to NERC Event Analysis staff.
- Prepare as necessary additional reports/whitepapers that identify methods that can reduce the likelihood or severity of system events or misoperations that can lead to system events.
- Review Remedial Action Schemes (RAS) as necessary to verify protection system functionality and/or assess operability.
- Provide technical input related to system protection and control to MRO.

Meetings

- The MRO PRS will meet quarterly or as necessary, in person or via conference call and/or web meeting.
- Meetings of the PRS are open to public attendance; however, the meeting may be called into closed session by the chair or vice chair. Additional meeting requirements related to agendas and minutes, voting and proxy, and rules of conduct are outlined in MRO Policy and Procedure 3 - Establishment, Responsibilities, and Procedures of Organizational Groups and MRO Representation on NERC Organizational Groups
- Meeting costs incurred by PRS members are reimbursable by MRO according to MRO Policy and Procedure 2 – Expense Reimbursement

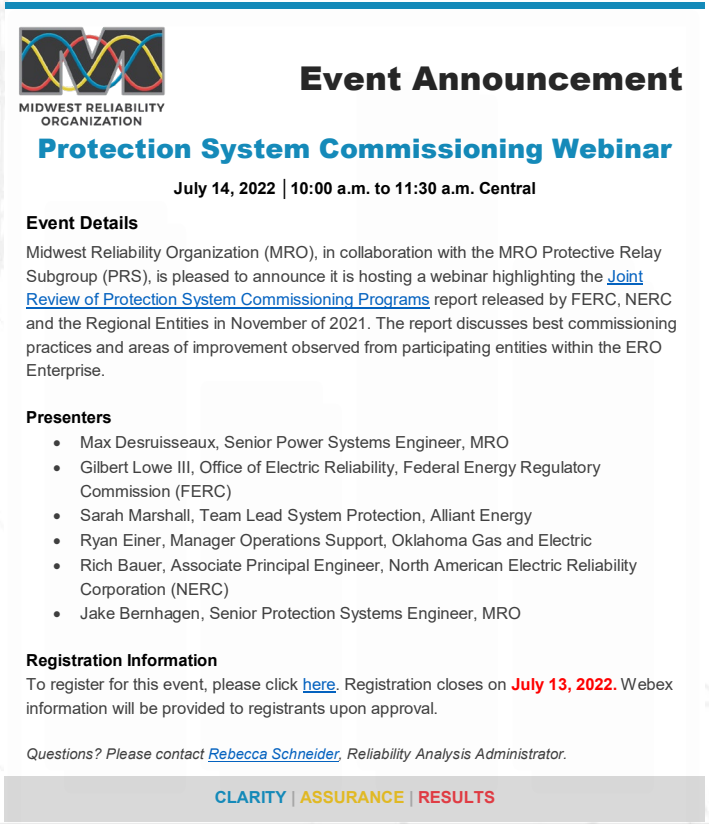
Meeting Dates

Upcoming PRS Meeting Dates

Meeting/Event	Date
Quarter 1	March 14, 2023
Quarter 2	June 27, 2023
Quarter 3	September 6, 2023
Quarter 4	December 5, 2023

Webinars

- **Title**
- **Executive Summary**
- **Date/Time for dry run and webinar**
- **Presenter/Speaker Information**
  - Title
  - Company
  - Phone number
  - Email
- **Council Support Member**
- **MRO Support Staff**
- **Presentation**



MIDWEST RELIABILITY ORGANIZATION

Event Announcement

Protection System Commissioning Webinar

July 14, 2022 | 10:00 a.m. to 11:30 a.m. Central

Event Details

Midwest Reliability Organization (MRO), in collaboration with the MRO Protective Relay Subgroup (PRS), is pleased to announce it is hosting a webinar highlighting the Joint Review of Protection System Commissioning Programs report released by FERC, NERC and the Regional Entities in November of 2021. The report discusses best commissioning practices and areas of improvement observed from participating entities within the ERO Enterprise.

Presenters

- Max Desruisseaux, Senior Power Systems Engineer, MRO
- Gilbert Lowe III, Office of Electric Reliability, Federal Energy Regulatory Commission (FERC)
- Sarah Marshall, Team Lead System Protection, Alliant Energy
- Ryan Einer, Manager Operations Support, Oklahoma Gas and Electric
- Rich Bauer, Associate Principal Engineer, North American Electric Reliability Corporation (NERC)
- Jake Bernhagen, Senior Protection Systems Engineer, MRO

Registration Information

To register for this event, please click here. Registration closes on **July 13, 2022.** Webex information will be provided to registrants upon approval.

Questions? Please contact Rebecca Schneider, Reliability Analysis Administrator.

CLARITY | ASSURANCE | RESULTS

Important Links

RAC mailing list: mrorac@mro.net **Please be sure to whitelist**

PRS mailing list: mroprs@mro.net **Please be sure to whitelist**

RAC Public Site: https://www.mro.net/organizational-groups/reliability-advisory-council/

PRS Public Site: https://www.mro.net/organizational-groups/reliability-advisory-council/protective-relay-subgroup/

Expense Reimbursement: MRO Policy and Procedure 2 – Expense Reimbursement

Member Responsibilities: MRO Policy and Procedure 3- Establishment, Responsibilities

Confidentiality Policy: MRO Policy and Procedure 5 (Confidentiality Policy)

MRO Contact Information

MRO Website: http://www.mro.net

Address: 380 St. Peter Street, Suite 800
Saint Paul, MN 55102
Phone: 651-855-1760 (main)

MRO RAC Support Staff
Bryan Clark
Director of Reliability Analysis
Phone: 651-256-5171
Bryan.clark@mro.net

MRO PRS Support Staff
Jake Bernhagen
Sr. Systems Protection Engineer
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Jake.bernhagen@mro.net

MRO Support Staff
Rebecca Schneider
Reliability Analysis Administrator
Phone: 651-855-1740
Rebecca.schneider@mro.net

AGENDA

Consent Agenda

a. Approve November 16, 2022 meeting minutes

Dick Pursley, Reliability Advisory Council Chair

Action

Discussion

Report

Chair Pursley will lead this discussion during the meeting.

MIDWEST RELIABILITY ORGANIZATION

380 St. Peter St, Suite 800
Saint Paul, MN 55102
www.MRO.net
651-855-1760

Draft Minutes of the Reliability Advisory Council Meeting

St. Paul, MN and Webex

Wednesday, November 16, 2022, 9:01 a.m. to 2:29 p.m. Central

Notice for this meeting was electronically posted to the MRO website on October 19, 2022.
A final agenda, including advanced reading materials, was also posted on November 9, 2022.

1. Call to Order and Determination of Quorum

The Reliability Advisory Council (RAC) Chair, Dick Pursley called the meeting to order at 9:01 a.m. Pursley 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. Chair's Remarks

Chair Pursley highlighted a new agenda item 10 Planning Coordinator Updates from Southwest Power Pool (SPP) and Midcontinent Independent System Operator (MISO). The next quarter updates will be from Manitoba Hydro (MH) and Saskatchewan Power Corporation (SPC). He also highlighted agenda item 11a Long-Term Reliability Assessment (LTRA), 11b Regional Winter Assessment (RWA), and 11c Regional Risk Assessment (RRA).

Pursley reviewed upcoming events and meeting schedules.

Pursley advised that 2023 leadership on the RAC would be decided in January 2023 and voted on electronically. He stated that the Vice Chair position may become open and encouraged members to consider leadership. Pursley pointed members to the ERO Enterprise Facility Ratings Best Practice Report on the NERC website. He also shared that Mark Gutzmann, Xcel Energy, would be receiving the Compass Award for eleven years of service as the MRO Representative on the NERC System Protection and Control Working Group (SPCWG) and recognized him for his contributions to the working group.

4. Consent Agenda

The RAC reviewed the consent agenda, which included draft minutes from the August 17, 2022 meeting. Also included were the nominee recommendations for the RAC, Protective Relay Subgroup (PRS) and MRO Representatives on the NERC Inverter-Based Resource Performance Subcommittee (IRPS) and the NERC System Protection and Control Working Group (SPCWG) which will be reviewed by the OGOC for approval. A typo was noted and corrected in the August 17, 2022 minutes.

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

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5. MRO Board of Directors, OGOC and General Update

Clark provided a recap of the third quarter OGOC meeting on Sept. 21, 2022, at which the OGOC held a risk roundtable discussion regarding Variable Transmission Line Ratings. Ron Gunderson attended the risk roundtable on behalf of the RAC. The RAC must identify a representative to attend the next OGOC Risk Roundtable at the first quarter meeting on April 12, 2023. The topic has not yet been determined.

6. Reliability and Security Technical Committee Meeting Update

Reliability Advisory Council and RSTC member, John Stephens, provided a recap of the Reliability and Security Technical Committee (RSTC) meeting from Sept. 13-14, 2022, which was held at the MRO offices. Topics included Inverter Based Resources (IBR) and Distributed Energy Resources (DER) as well as Generating Availability Data System (GADS). The RSTC approved the 2022 Winter Assessment and reviewed the 2022 Long-Term Reliability Assessment (LTRA). Sector elections for the RSTC are in progress. The next meeting is scheduled for December 6-7, 2022.

7. MRO Representatives on NERC Subgroups

NERC Electric Gas Working Group (EGWG) – Jaimin Patel
The NERC EGWG has not met since the last RAC meeting. The EGWG sent out an Effectiveness Survey in regards to the Bulk Power System Reliability Guideline: Fuel Assurance and Fuel-Related Reliability Risk Analysis on September 27, 2022.

NERC Inverter Based Resource Performance Subcommittee (IRPS) – David Brauch
Brauch provided an overview of the recent IRPS activities, which included an EOP-004 Standard Authorization Request (SAR) and IRPS guideline revisions to incorporate IEEE 2800. Several accomplishments were noted in Brauch's report, including several technical presentations on Grid Forming control schemes and their uses via Webex on October 20, 2022. Brauch reported that the amount of Grid-Forming inverters to maintain stability does not depend on IBR penetration but the number of synchronous machines online. A RAC member asked who is studying the number of synchronous machines needed online to maintain stability. Brauch mentioned that NERC is taking the lead on this study. There was also a discussion about EMT Modeling and specialized studies. There was further discussion around how to mandate the installation of Grid Forming inverters and changes to pro forma interconnection agreements. Discussion ensued.

NERC System Planning Impacts from DER Working Group (SPIDERWG) – Wayne Guttormson
Guttormson provided a recap of the meeting on Oct. 31 and Nov. 1, 2022. Several work plan deliverables will be submitted for RSTC action at the December 2022 meeting, including two Standard Authorization Requests (SAR), a Reliability Guideline, and a white paper.

NERC System Protection and Control Working Group (SPCWG) – Mark Gutzmann
Gutzmann provided a written report noting several key areas of focus including FERC Order 881a, Footnote 13 to Table 1 of TPL-001-5.1, and testing requirements under PRC-005-6 due to IEC-61850. The SPCWG published an Inter-Entity Short Circuit Model white paper. No challenges were noted.

NERC Energy Reliability Assessment Task Force (ERATF) – Tom Whynot
A written report was not provided for the NERC ERATF because the task force had not met since the last RAC meeting. The next meeting is scheduled for November 30, 2022.

8. 2022 Work Plan Update

Action Item Review.
Chair Pursley reviewed the action items in the 2022 work plan. Updates were made accordingly. Discussion ensued.

2023 Work Plan
The RAC members drafted a 2023 work plan largely based on many of the key objectives from the 2022 work plan. MRO staff will clean up the draft 2023 work plan following this meeting in preparation for requesting approval from the OGOC at their meeting scheduled for November 30, 2022.

A Reliability Conference Planning Committee was formed to start planning for the 2023 conference which will take place on May 16-17 in St. Paul, MN. The committee members are Dick Pursley, Dallas Rowley, Bryn Wilson, Jeremy Severson and Bryan Clark.

Reliability Risk Matrix Updates
Clark reported that the Reliability Risk Matrix is being considered by a small subteam under the NERC RISC. In the meantime, the MRO has been using the matrix over the past two years for their annual regional risk assessments. The RAC agreed to remove the Reliability Risk Matrix from the 2023 Work Plan.

Cold Weather Preparedness Workshop Debrief
RAC member, Bryn Wilson, provided a debrief of the Cold Weather Preparedness Workshop which took place on October 12, 2022. Wilson commented on the informative presentations and the strong attendance with 303 virtual participants. RAC member, C.J. Brown, acted as the emcee for the webinar. The presenters were Jacob Zettel, Montana-Dakota Utilities (MDU), Tom Whynot, Manitoba Hydro (MH) and Matthew Harward, Southwest Power Pool (SPP). The workshop feedback from the survey was largely positive. Wilson volunteered to draft a newsletter article about the workshop that will include a link to a recording of the workshop.

9. Reliability Coordinator Updates

Midcontinent Independent System Operator (MISO)
Andy Witmeier, RAC member, provided an oral report. Witmeier noted fall weather has been moderate and MISO operations were as expected. MISO continues to see peak and average loads returning to pre-COVID levels. Energy prices are reflecting high natural gas prices as compared to last year. There are sufficient resources to cover the winter peak load forecast. MISO is projecting a peak load of 102 GW in January 2023 with available generator capacity of 113 GW.

Winter 2022-2023 forecast is for slightly warmer than normal temperatures in the south and slightly colder than normal in the central and north regions. January shows an increased likelihood in reliance on Load Modifying Resources (LMRs) and operating reserves if there is a significant cold front. Witmeier reported that FERC has approved their season adequacy construct. Therefore, MISO is moving to a seasonal construct next year and members will need to procure generation for all four operating seasons vs. procuring generation based only on summer peak conditions.

Saskatchewan Power Corporation (SPC)
Binod Shrestha, RAC member, provided an oral report on expected operations during the 2022-2023

winter season. Shrestha noted that SPC is expecting winter (November – April) loads between 3,300 MW and 3,700 MW. Most of the generation fleet is powered by coal, gas and hydro. Fuel supply is expected to be adequate for the winter season. Wind installed capacity is approximately 650 MW with only ten percent assumed for capacity purposes. SPC has no significant planned transmission outages this winter and expects to have a 28 percent reserve margin. Shrestha noted no capacity concerns for the upcoming winter or any supply or transportation issues for coal or natural gas.

Southwest Power Pool (SPP)
C.J. Brown, RAC member, provided an oral report on winter readiness for the upcoming season. Brown presented highlights from SPP's winter workshop. Loads are forecasted to be between 42 – 45 GW with no resource challenges expected. He noted continued struggles to approve planned maintenance at generating stations due to resource alerts during cold weather events. Brown concluded by indicating that the winter outlook looks good unless another extreme winter storm occurs. A member asked if requested outages on transmission facilities for routine maintenance are also being denied by SPP. Brown commented that it had more to do with the Generation Assessment Process (GAP) than transmission. A member commented about increased generation capacity and stress on the transmission system.

10. Planning Coordinator Updates

Southwest Power Pool (SPP)
Jason Davis, SPP, provided an oral report on planning activities underway within SPP. Davis reported on the regional findings from their latest Integrated Transmission Plan which identified three low-voltage events, eighteen thermal events and nine breaker replacements. To address the issues identified, SPP is recommending four rebuilds (1 in Iowa, 3 in Oklahoma). Terminal equipment replacements were also identified at various regional borders. Davis noted a capacitor addition needed in New Mexico to address low-voltage issues. SPP's Board approved their latest Integrated Transmission Plan in October 2022.

SPP recently completed a study evaluating a transmission service request for transmission service into Saskatchewan. The analysis was completed and identified a need for two additional 230 kV lines with terminal upgrades. SPP will coordinate with the Canadians regarding the identified connections. Davis indicated that Saskatchewan Power Corporation is currently working on their study for this transmission service request. Davis noted a Presidential permit will be needed to increase SPP's export capability into Canada. A member asked how many 230 kV lines were being added.

To accommodate scheduling conflicts, Chair Pursley moved one Planning Coordinator Update (Agenda Item 10a) further back on the agenda. These minutes reflect the order in which the reports were provided.

Midcontinent Independent System Operator (MISO)
RAC member, Andy Witmeier, provided an update on MISO's Long-Range Transmission Plan (LRTP) and other Planning Coordinator Activities. Tranche 1 of MISO's LRTP was approved in July by the MISO Board and represents the first iteration of regional transmission development that includes 18 projects across the MISO Midwest region estimated at $10.3B. The identification of the Tranche 2 Portfolio is starting now – MISO is updating the Futures' assumptions and building models to begin reliability analysis. The Tranche 3 Portfolio will be focused on MISO's southern footprint and is targeted

at being approved in December 2024. There was a question about the projects' support of NW Ohio and SE Michigan.

Witmeier next provided an overview of the MISO-SPP Joint Targeted Interconnection Queue (JTIQ) Study. The SPP-MISO JTIQ Study focuses on optimizing transmission needed for generator interconnection across the seams for the evolving resource mix. Witmeier noted a FERC filing is planned for the first quarter of 2023 that will update how affected system studies are done between SPP and MISO as well as propose a cost allocation for JTIQ projects. Witmeier also provided a summary of the new interconnection requests submitted as part of the 2022 Definitive Planning Phase which includes 956 requests totaling 171 GW of new generation across MISO. A RAC member asked what assumptions are used to determine when the LRTP projects would be in service to accommodate new resources in the upcoming interconnection studies. A RAC member also asked how MISO manages the queue for new interconnection requests. Discussion ensued.

11. Assessment Review

Review Long-Term Reliability Assessment (LTRA)
MRO Principal Reliability Assessment Engineer, Salva Andiappan, presented the 2022 Long-Term Reliability Assessment (LTRA) Report. The 5-year projected reserve margins for each of the MRO Planning Coordinators (PC) was reviewed. Andiappan also presented the Solar and Wind nameplate capacity for each PC, illustrating existing and planned additions through 2032. Transmission development trends were also reviewed. A tentative date of January 19, 2023 was selected for the 2022 LTRA webinar. Discussion ensued.

Upon a motion duly made and seconded, the RAC accepted the 2022 LTRA Report prepared by each of the MRO Planning Coordinators – Manitoba Hydro (MH), Midcontinent Independent System Operator (MISO), Saskatchewan Power Corporation (SPC) and Southwest Power Pool (SPP).

MRO Regional Winter Assessment (RWA)
Next, Andiappan provided an overview of the MRO 2022/2023 Regional Winter Assessment (RWA). Andiappan highlighted these key findings: possible energy shortfalls could occur across the MISO region during extreme winter peak load conditions with unplanned generation outages. SPP, MH and SPC anticipate sufficient resources to meet reserve margin requirements under normal and extreme demand for the 2022/2023 winter season. Coal delivery issues could be an emerging reliability concern for MISO and SPP. Long-term trends indicate increasing generation forced outage rates.

There was discussion about the 46 misoperations between December 1, 2021 and February 28, 2022 with nearly half being attributed to human errors. The group discussed possible causes including loss of institutional knowledge due to an aging workforce (retirements), more complex relay systems, and the use of contractors. A member suggested reaching out to ReliabilityFirst to see if they have a Lessons Learned that could be shared with the Protective Relay Subgroup (PRS).

MRO Regional Risk Assessment (RRA)
MRO Principal Technical Advisor, Mark Tiemeier, provided an overview of the MRO 2023 Regional Risk Assessment (RRA). Tiemeier noted that the RRA is a foundational document that drives MRO's annual work plan, the organizational groups' work plans, and MRO's strategic plan. It began with risk identification which concluded in September and then the risks were ranked. Volunteers from each

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advisory council helped rank the risks using the Reliability Risk Matrix. Gayle Nansel and Jason Weiers were the RAC members who volunteered to help rank the risks during a two-day session in October. The report will be published in January 2023. A member asked how the RRA is communicated to stakeholders. Tiemeier commented that communications to external stakeholders is being discussed by MRO staff to identify ways to improve outreach and awareness. Clark advised that MRO staff is willing to give a presentation to entities at their location upon request.

12. NERC Standards Review Forum Update

RAC member, Gayle Nansel, provided an update of the NERC Standards Review Forum (NSRF). Nansel will continue to attend the NSRF meetings, review the weekly meeting minutes and forward items to the RAC for discussion at future RAC meetings.

13. Protective Relay Subgroup Update

MRO Senior Systems Protection Engineer, Jake Bernhagen, provided an update on behalf of the Protective Relay Subgroup (PRS). Bernhagen highlighted items for the upcoming fourth quarter meeting that is scheduled on December 6, 2022, including a pilot to review the quarterly misoperations during the meeting. He commented that a challenge is expressing the total number of misoperations as a percent of the total number of operations being misleading because of the declining number of total operations. As a result of the total operations declining, the number of misoperations in the MRO region did not look favorable during the second quarter and the trend was expected to continue in the third quarter. Bernhagen noted that MRO staff is exploring alternative ways to share this information to show that the number of misoperations is going down with time. A member asked about planned outreach efforts in 2023, and a suggestion was made to hold a lessons learned webinar regarding best practices for commissioning.

14. 2023 Meeting Dates

Chair Pursley reviewed the 2023 meeting dates for the RAC, as well as the other councils and subgroups. It was noted that the RAC fourth quarter meeting on November 8, 2023 may conflict with the 2023 Minnesota Power Systems Conference (MIPSYCON).

15. RAC Member Roundtable

Chair Pursley invited member participants to share other relevant industry observations. Topics discussed included, potential Electromagnetic Pulse (EMP) weapon or attacks, new RAC leadership in 2023, and Great River Energy's plans to move its control center to Maple Grove, Minnesota.

16. Other Business and Adjourn

Having no further business to discuss, the meeting was adjourned at 2:29 p.m.

Prepared by: Rebecca Schneider, Reliability Analysis Administrator.
Reviewed and Submitted by: Bryan Clark, Director of Reliability Analysis

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Exhibit A – Meeting Attendees

Reliability Advisory Council Members Present	
Name	**Organization**
Dick Pursley, Chair	Great River Energy
Jason Weiers, Vice Chair	Otter Tail Power Company
Andy Witmeier	MISO
Binod Shrestha	Saskatchewan Power Corporation
C.J. Brown	Southwest Power Pool, Inc.
Dallas Rowley	Oklahoma Gas & Electric
Derek Brown	Evergy
Dwayne Stradford	American Electric Power
Gayle Nansel	Western Area Power Administration
Jeremy Severson	Basin Electric Power Cooperative
John Stephens	City Utilities of Springfield Missouri
Nandaka Jayasekara	Manitoba Hydro
Ron Gunderson	Nebraska Public Power District
W. Bryn Wilson	Oklahoma Gas & Electric
MRO Staff Present	
Name	**Title**
Bryan Clark	Director of Reliability Analysis
Rebecca Schneider	Reliability Analysis Administrator
Margaret Eastman	Security Administrator
Lisa Stellmaker	Executive Administrator
Mark Tiemeier	Principal Technical Advisor
Salva Andiappan	Principal Reliability Assessment Engineer
Jake Bernhagen	Senior Systems Protection Engineer

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John Grimm	Principal Systems Protection Engineer
Steen Fjalstad	Director of Security
Kristine Albrecht	Human Resource Generalist
Cris Zimmerman	Manager of Outreach and Stakeholder Engagement
Other Attendees	
Name	**Organization**
David Brauch	MISO
Wayne Guttormson	Saskatchewan Power Corporation
Jaimin Patel	Saskatchewan Power Corporation
Jason Davis	Southwest Power Pool
Derek Cherneski	Saskatchewan Power Corporation
Larry Brusseau	Corn Belt Power Cooperative
Josh Ross	Southwest Power Pool

AGENDA

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
March 1, 2023

OGOC Annual Risk Meeting Summary

- 2022 Accomplishments
- 2023 Work Plan Review
- 2023 Risks Review
  - 2023 Focus Areas
  - Prioritization of Work Plan

Joint Council Meeting

- **Q1 OGOC Meeting Risk Roundtable**
  - April 12th, 2023
  - *TBD*

Future Meeting Dates

- **Q1 OGOC Meeting**
  - April 12, 2023
- **Q1 BOD Meeting**
  - April 13, 2023
- **Q2 OGOC Meeting**
  - June 14, 2023
- **Q2 BOD Meeting**
  - June 15, 2023

Questions

AGENDA

Reliability and Security Technical Committee (RSTC) Update
John Stephens, Reliability Advisory Council and RSTC Member

Action
Information

Report
- RSTC met remotely on December 6-7
- Standard Authorization Requests (SAR)
    - IRPS SAR Approved for EOP-004-4—Event Reporting by Inverter Based Resources - **COMPLETE**
        - SAR Comment Period/Nominations open through March 8, 2023
    - IRPS SAR Approved for PRC-004-6—Inverter Based Resource Performance expectations - **COMPLETE**
        - SAR Comment Period/Nominations open through March 23, 2023
    - SPIDERWG presented a Draft SAR for FAC-001 and FAC-002 to ensure that Distribution Providers have documented facility interconnection requirements so that the aggregate impact of DERs can be modelled and coordinated across the Transmission-Distribution interface.
- Reliability Guidelines
    - Approved posting for comments of IRPS EMT Modeling Guidelines for BPS-connected Inverter Based Resources
        - Comments closed on February 20, 2023
    - Approved SPIDERWG Parameterization of the DER_A Model for Aggregate DER - **COMPLETE**
- Other Actions
    - Approved Load Modeling Working Group (LMWG) Technical Reference Document on Load Modeling Composition. Retirement of 2015 NERC Load Composition Guideline. - **COMPLETE**
    - Approved LMWG Whitepaper on Transient Voltage Response Criteria - **COMPLETE**
    - Approved (3) Supply Chain Working Group (SCWG) Security Guidelines:
        - Supply Chain Secure Equipment Delivery - **COMPLETE**
        - Cyber Security Risk Management Lifecycle - **COMPLETE**
        - Open Source Software – **COMPLETE**
    - Approved SPIDERWG Whitepaper on Battery Storage and DER Modeling Practices – **COMPLETE**
    - Approved SITES Whitepaper: Cybersecurity for DERs and DER Aggregators - **COMPLETE**
- Membership
    - Sector elections concluded in December 2022
    - Slate of At-Large members approved at February NERC Board of Trustees meeting
- Next Meeting is scheduled for March 22-23, 2023

AGENDA

MRO Representatives on NERC Subgroups – Written Reports

a. NERC Electric Gas Working Group (EGWG)

Jaimin Patel, SaskPower and RAC Member

Action

Information

Report

Since the last RAC meeting, the EGWG had WebEx meeting on February 9, 2023. The last meeting agenda is posted on the NERC website. Future meeting date/time is included in the meeting agenda.

Following is a summary of EGWG activity.

Areas of Focus

- **Discussion on 2023-24 EGWG Work Plan**
  There were mainly five work plan items presented that related to,
  - Gas-Electric planning basis
  - Cold weather report recommendation 6 (information sharing & monitoring)
  - Cold weather report recommendation 8 (finalise/publish natural gas design basis and RTO's natural gas & electric coordination reliability guideline)
  - Reliability guideline metrics (perform reliability guideline triennial review/update and issue for comment – adding a section on metrics)
  - Review and update March 2020 Reliability Guideline: Fuel Assurance and Fuel-Relate Risk Analysis for Bulk Power System – adding design basis for a gas electric study.

- **NAESB Gas-Electric Harmonization Forum Update**
  - Refer to below link to follow this forum activities/updates/meetings.
    NAESB Gas-Electric Harmonization Forum

Accomplishments

- EGWG has approved and posted Design Basis for a Natural Gas Study Whitepaper.

Challenges

- None identified for this report.

Please provide any comment/feedback/follow-up question regarding above summary.

AGENDA

MRO Representatives on NERC Subgroups – Written Reports

b. NERC Inverter-Based Resource Performance Subcommittee (IRPS)

David Brauch, MISO and RAC Member

Action

Information

Report

AGENDA

MRO Representatives on NERC Subgroups – Written Reports

c. NERC System Planning Impacts from DER Working Group (SPIDERWG)

Wayne Guttormson, SaskPower and RAC Member

Action

Information

Report

Last SPIDERWG meeting was held on February 1st and 2nd. The meeting covered the following coordination and analysis sub-group activities of the working group. Agenda package posted on SPIDERWG site (System Planning Impacts from DER Working Group (SPIDERWG) (nerc.com)). Draft minutes to be posted.

General Activities:

- Review of DER Workshop held December 14th 2022. Materials and recording posted at the SPIDERWG website.
- Work plan Review
- General update of WG scope
- Presentation on Distribution System Characteristics, Practices, and Relevance to DER and Composite Load Modeling

Coordination Activities:

- Standards Committee Engagement
  - Engagement with ongoing Standards Projects from SARs that originated from SPIDERWG work (Project 2022-02 for TPL-001 and MOD-032 SARs)
- White Paper Update: Security Risks Posed by DER and DER Aggregator
  - joint work with SITES
  - approved outline of whitepaper
- White Paper Update: Variability, Uncertainty, and Data Collection for the BPS with DER Aggregators
  - Release of an internal survey
- Proposed SAR's: FAC-001, FAC-002, MOD-031
  - Final review
- Proposed SARs Update:
  - Medium Priority
    - EOP-004 – Reporting of aggregate DER loss during events
      - Collaborating with NERC PAS and EAS
    - EOP-005 – Telemetry requirements for DERs and/or DPs
      - Collaborating with NERC RTOS and EAS
  - Lower Priority
    - BAL-003 – Ensure accounting of DER in balancing equations and functions.
    - PRC-006 – Clarify "load" in imbalance equation
    - TOP-001, -002, -003, and -010 – Revise OPA and RTA to explicitly enumerate aggregate DER

Analysis Activities:

- White Paper Update: Modelling of DER Aggregators and DERMS Functional Impacts
- Guideline Final Review: Modeling Merge (Tranche 3) – DER Modeling and Model Verification
- Guideline Update: BPS Planning under Increasing DER
- White Paper Update: DER Aggregators and DERMS Functional Modeling

Next meeting is scheduled for May 2nd and 3rd. Meeting may be held at the NPCC office. Additional meeting dates scheduled for 2023 are August 1st and 2nd, and October 24th and 25th.

Areas of Focus

Following work plan deliverables are being submitted for RSTC action at the March 2023 meeting.

- SAR's: FAC-001 & FAC-002 – for **Endorsement**
- Reliability Guideline: BPS Perspectives on the Adoption of 1547-2018 – for **Approval**
- SAR for Revisions to MOD-031 Standard – **RSTC Reviewers**

RSTC held a Work Plan Summit - January 31-February 1, 2023 to map out work plan for SPIDERWG.

Accomplishments

- White Paper: Distributed Battery Energy Storage and Multiple Types of DER Modeling – **Approved** by RSTC
- Reliability Guideline: Parameterization of the DER_A Model for Aggregate DER – for **Approval**

Challenges

- RSTC strategic plan released identifying three DER risks for SPIDERWG to work on:
    - Insufficient modeling, data, and/or study requirements to ensure adequate planning, protection, and operation of the BPS
    - Insufficient evaluation of the potential impacts of DER-IBR by planning authorities
    - Insufficient BPS situational awareness to determine operating state, reserve and other operational requirements, and maintain operational control.

AGENDA

MRO Representatives on NERC Subgroups – Written Reports

d. NERC System Protection and Control Working Group (SPCWG)

Lynn Schroeder, Sunflower Electric Power Corporation

Action

Information

Report

Areas of Focus

1. Development of position paper related to FERC order 881 to determine if there may be impacts to PRC-023. Final draft scheduled for approval by SPCWG in April, followed by RSTC in March.
    - DRAFT Summary includes - Believes that no changes to PRC-023-4 are necessary and that the systems do not need to be set to meet the margin required in PRC-023-4 for the AAR that are determined. However, does recommend that entities review all protection system loadability for relays to which PRC-023-4 applies and any new lines that fall under the orders to ensure that there is sufficient margin above anticipated normal and emergency AAR. (i.e., Relays should allow some margin above the maximum loadability required by the new AAR to ensure it will not trip under load. However, it is not required to meet the margins in PRC-023-4, because that standard applies to the highest seasonal rating, not AAR.)
2. Technical Reference related to maintenance for ethernet based P&C. With changes in technology, there is a need to review NERC Standards and how maintenance for Ethernet based P&C systems fit into those standards. The SPCWG is developing a Technical Reference Document to provide industry guidance for impacts of systems such as 61850 architectures on NERC Protection System definition and related standards. The team is finalizing the drafted outline.
3. Review of “Determination of Practical Transmission Relaying Loadability Settings” document. This is to address the concerns of the issue in appendix C where it says a trip can be issued instead of stating that the scheme can be unblocked, as well as an overall review to bring up to date as appropriate. The PRC-023-6 SDT has recommended quite a bit of edits to Appendix C that are also being considered in the review.
4. Review of “Transmission System Phase Backup Protection” document. This is an overall review to bring it up to date as appropriate. Effort is underway to align with the current standards, such as TPL-001. Likely to become a TR document.
5. TPL-001 footnote 13.d. discussed. Proposed by industry that the exception for monitored trip coil should be expanded to include monitored control circuit. SAR drafted by industry to address.

Accomplishments

- PRC019 Implementation Guidance posted for industry. Note: Related Technical Reference previously posted by SPCWG.
- Cold weather recommendations addressed by SPCWG and provided to the RSTC.
    - Recommendation 13: To address frequency value and rate of change it is recommended to add the amplification codes to be implemented by the PAS -

81o/81u, RoCoF.

- Recommendation 22: After review, the SPCWG determined that it is not necessary to revise the Reliability Standard PRC-006-5 to address slowly declining frequency over tens of minutes where generator tripping due to an underfrequency condition is possible. Instead, such conditions where there is an adequate time for manual intervention should be addressed by manually balancing load and generation in a timely manner. It is recommended to consult the Real Time Operating Subcommittee for further guidance.

Challenges

1. Increased IBR across the grid and their impacts to system protection, such as modeling and injection characteristics during fault conditions. Continued liaison with IRPS, IEEE PRSC, and further involvement with SPIDERWG to assist in identification and solutions of protection related IBR challenges.

AGENDA

MRO Representatives on NERC Subgroups – Written Reports

e. NERC Energy Reliability Assessment Task Force (ERATF)

Tom Whynot, Manitoba Hydro and RAC Member

Action

Information

Report

Status of the ERATF Sub-committee for the RAC. The core of this report is based on the group's whitepaper released in February by the standards drafting team February 2023.

The Energy Reliability Assessment Task Force has determined that energy assessments should be carried for shorter-term operations planning (weeks) and for long term operations planning (years)

Justification

The need for these energy assessments is driven by a growing blind spot in guaranteed generation due to a combination of factors:

Environmental and weather events can strain fuel supply chains and additionally drive load to exceed existing forecasts based on historical data.

The increase of renewable fueled generation has increased a variability factor of generation that is dispatchable.

The predicted rise of demand on the North American grid is largely being met with generation with "just-in-time" fuels without on-site storage that momentary disruptions to the supply chain will result in capacity loss.

Past events have illustrated these concerns:

- In February 2011 an arctic cold front in the southwest United States resulted in generation outages and natural gas facility outages.
- In January 2014, a polar vortex affected the central and eastern United States and Texas.
- In January 2018, the south-central United States experienced many generation outages resulting in emergency measures.
- In 2021, California's Oroville hydroelectric facility was shut down when reservoir levels, due to drought conditions, dropped below its minimum operating elevation.
- In February 2021, a cold weather event impacted fuel and energy availability in the states of Mississippi, Louisiana, Arkansas, Oklahoma, and Texas.

What is an Energy Reliability Assessment?

Currently, capacity assessments cover a peak load target that available Generation is ensured to be available for.

An Energy Assessment would add a time value for sustaining a benchmark of load and assurance that the fuel resources supplying the generation mix is guaranteed.

The following table from the report compares Capacity versus Energy Assessments:

Table 1.1: Capacity Assessment versus Energy Reliability Assessment

	Capacity Assessment	Energy Reliability Assessment
Demand Representation	Uses forecasted load scenario(s) that represent a snapshot in time (e.g., 50:50 load, 90:10 load, peak hour load).	Uses time-series demand to incorporate the load changes throughout each day, hour, or year.
	Uses individual snapshots of fixed loads, typically on-peak demand.	Includes flexible load and net-load variability.
Supply Representation	Uses statistical representation of generator availability to calculate capacity contributions (e.g., UCAP[11], ELCC[12]) resulting in a single value that represents all outage potential at a single point in time.	Represents generator outages based on separate outage modes (e.g., equipment failure, fuel unavailability, network issues), each with a different probability of occurrence, impact, and duration.
Transmission Representation	The transmission model is likely to be similar for a capacity and energy reliability assessment. It is possible to use the exact same model for both types of analysis.	The added complexity of an energy reliability assessment may require a different, potentially simpler, transmission model.
Risk and Reliability Evaluation	Evaluates reliability by simulating snapshots of BPS operation.	Evaluates time-series of BPS operation with fuel stock and other finite resources to be considered.
	Uses clearly defined industry standard capacity or reserve margins to measure the system's adequate level of reliability in terms of magnitude of insufficient supply.	Measures energy-based metrics to evaluate magnitude, duration, and frequency of energy insufficiency over the study period. These metrics are still in their infancy and have not yet been well developed or standardized.

In Summary, the intent is to achieve energy reliability over a duration of time increasing the scope to generation mix's fuel supplies, rather than a snapshot looking at a peak and limited to the Generation itself.

Energy Assurance assessments much be balanced to satisfy reliability and investment risk.

Balancing the Philosophies of Deterministic as opposed to Probabilistic

Case example:

If you were tasked with submitting a plan to your city hall to prepare for natural disasters, you could choose to present two extreme case plans.

Plan A, Probabilistic - If you submitted an extremely wide scoped probabilistic emergency preparedness plan to your respective city hall outlining the requirement to fund and build for flood and forest fire infrastructure and construct it simultaneously. You would likely encounter extreme resistance to your plan on the grounds it's wildly expensive and unlikely that both scenarios will occur close to one another.
Your plan A would be rejected on excessive cost that may not have its value gained.

Plan B, Deterministic - If you submitted as conservative plan that was extremely deterministic and forecasts no flooding or fires in the next ten years, you would likely encounter resistance that your plan is overly optimistic and leaves everything to chance.
Your plan B would be rejected for not accounting for forecast variability leading to excessive enterprise risk.
To ensure the assessment meets its goals, parameters must be defined.
An Energy Assessment will be designed with stipulations on Frequency, Horizon, and Duration in mind.

Table 1.4: Definitions of Study Frequency, Horizon and Duration

	Definition	Example
Study Frequency	How often a study is performed	Performed once per year
Study Horizon	How far in advance the study analyzes	Analyzed year one through year five
Study Duration	The length of time of the study	Studied a 90-day period

Energy demand considerations in performing an Energy Assessment:

- Instantaneous (Peak) Demand vs Prolonged demand
- Behavior of Demand
- Usage of Controllability of Demand
- Distributed Energy Resources

Energy Supply Considerations

- Fuel Assurance and Logistics
- Outage and Failure Modes

Transmission and Reliance on Inter-area Interchange (External Assistance)
Storage
Operational Characteristics and Balance of Supply and Demand.

Conclusion

To navigate the changing landscape of the North American Electric Grid, additional factors must be added to planning models. Defining and applying Energy Assessments will develop a reliable system in an unknown future.

AGENDA

2023 Work Plan Update

a. Review Action Items

Dick Pursley, Reliability Advisory Council Chair

Action

Discussion

Report

Chair Pursley will lead this discussion during the meeting.

AGENDA

2023 Work Plan Update

b. NERC Rep Guidance Document

Bryan Clark, Director of Reliability Analysis, MRO

Action

Discussion

Report

Bryan Clark will lead this discussion during the meeting.

AGENDA

2023 Work Plan Update

c. 2023 Reliability Conference Update

Bryn Wilson, Reliability Advisory Council Member

Action

Discussion

Report

Bryn Wilson will lead this discussion during the meeting.

AGENDA

Reliability Coordinator Updates

a. Midcontinent Independent System Operator (MISO)
Andy Witmeier, MISO and RAC Member

Action
Information

Report
Andy Witmeier will provide an oral report during the meeting.

AGENDA

Reliability Coordinator Updates

b. Saskatchewan Power Corporation (SPC)

Binod Shrestha, SPC and RAC Member

Action

Information

Report

Binod Shrestha will provide an oral report during the meeting.

AGENDA

Reliability Coordinator Updates

c. Southwest Power Pool (SPP)

Scott Aclin, Balancing Authority Manager, SPP

Action

Information

Report

Scott Aclin will provide an oral report during the meeting.

AGENDA

Planning Coordinator Updates

a. Saskatchewan Power Corporation (SPC)
Binod Shrestha, SPC and RAC Member

Action
Information

Report
Binod Shrestha will provide an oral report during the meeting.

AGENDA

Planning Coordinator Updates

b. Manitoba Hydro

Nandaka Jayasekara, Manitoba Hydro and RAC Member

Action

Information

Report

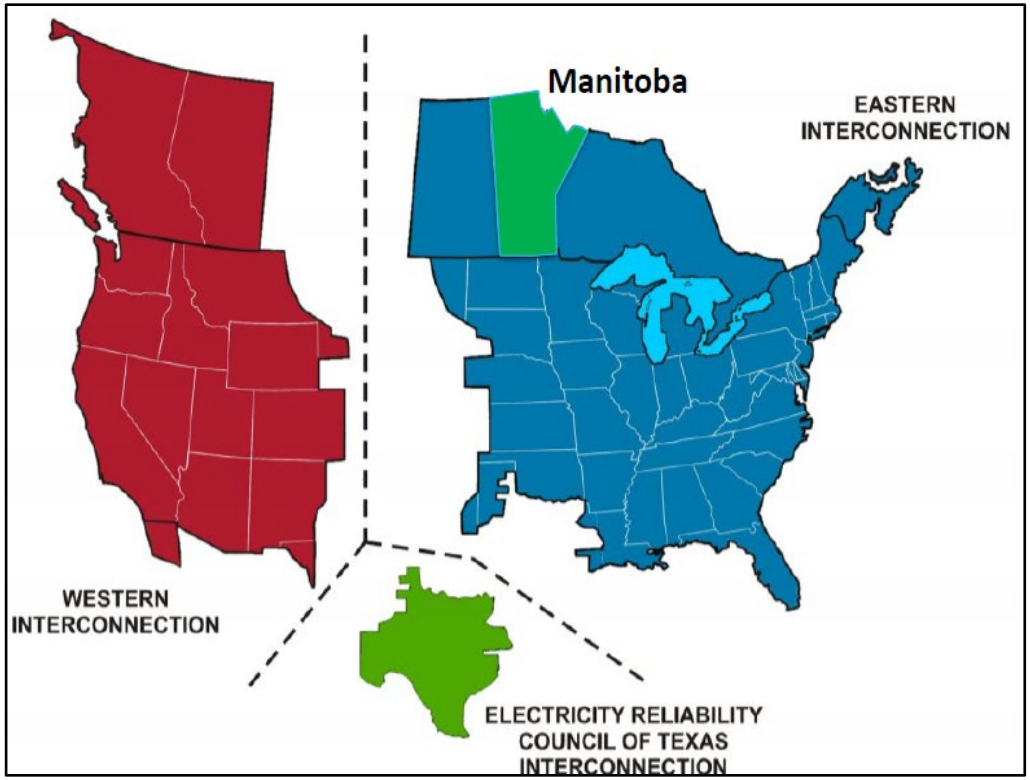
Nandaka Jayasekara will provide an oral report during the meeting.

Manitoba Hydro
Planning Coordinator Updates

MRO Reliability Advisory Council (RAC)
March 01, 2023

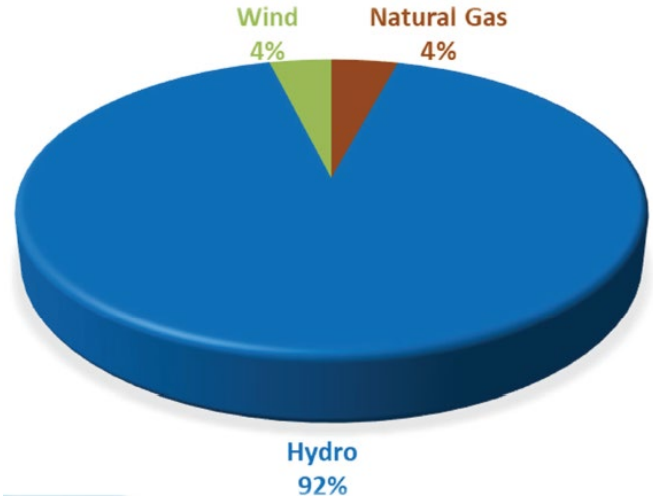
Manitoba Hydro Overview

- 601,000 electric customers
- Generation capacity: 6195 MW (Winter)
- Predominantly hydroelectric system
- Winter peaking:
  - All-time peak: 4910.5 MW on January 30, 2019 (Temperature: -39.8 °C)
- Provincial peak load growth is around 1.0% per year for the next decade
- Planning Coordinator and Balancing Authority in Manitoba
- Coordinating member of MISO



Generation: Installed Nameplate Capacity

Resource	Nameplate Capacity
Hydro	6205 MW
Natural Gas	280 MW
Wind	259 MW
Total	**6744 MW**



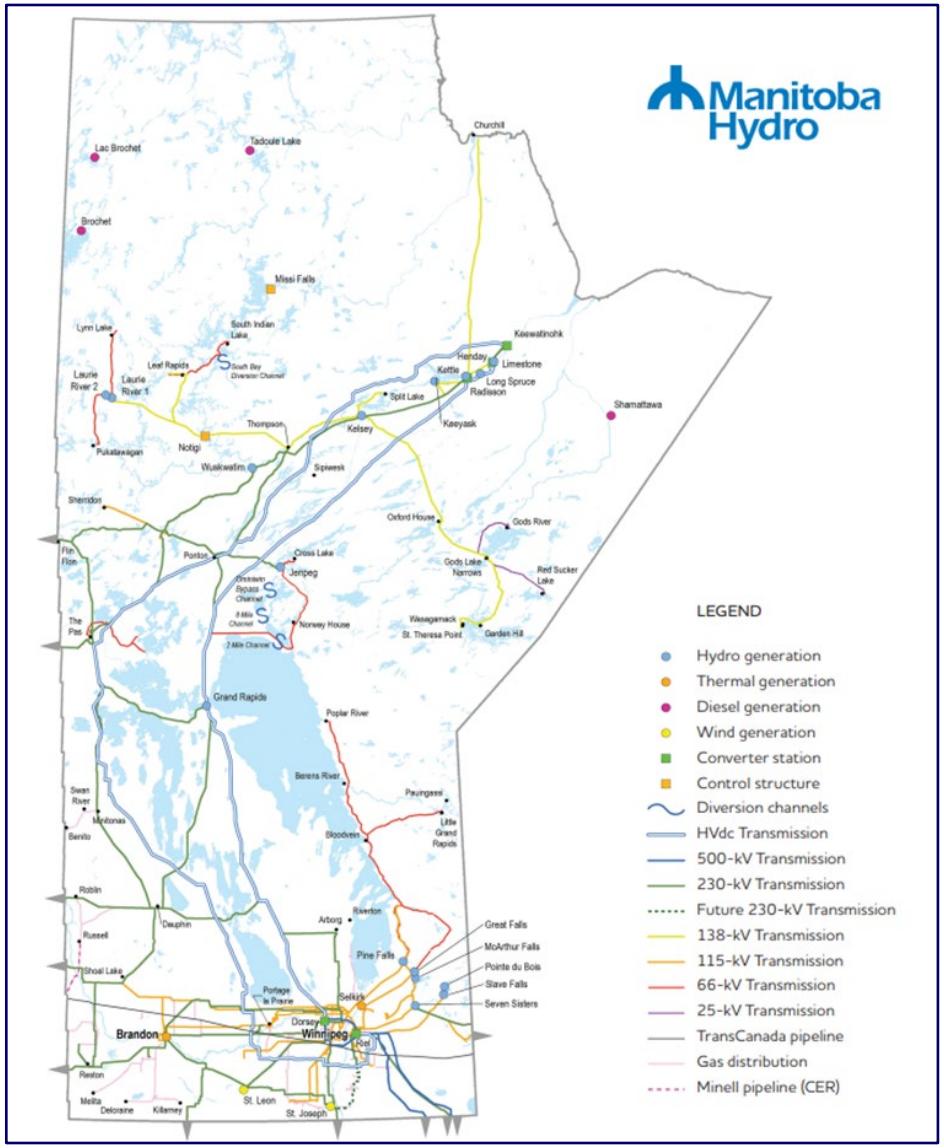
- Approximately 70% of Manitoba's generated power is transmitted from the north to the south via the HVDC system's Bipoles I, II and III.

Distributed Energy Resources

- Distributed energy resources and behind the meter generation:
  - 36 MW of solar PV distributed energy resources as of April 2022
- Modest solar growth anticipated over the next 5 years
- No impact to winter peak load

MANITOBA HYDRO'S TRANSMISSION SYSTEM LONG-TERM PLAN

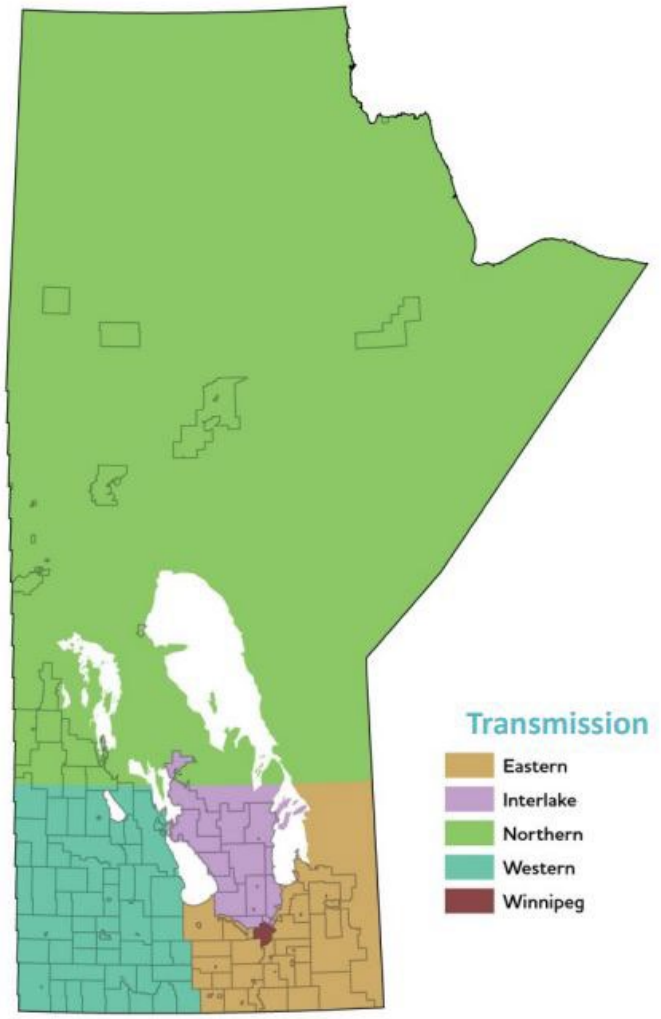
- The plan describes the proposed additions, enhancements, replacements, and refurbishments that are needed to ensure Manitoba Hydro can continue to safely deliver reliable electric service to our customers.
- Most transmission projects are identified based on load forecast analysis, system performance assessments, and asset condition assessments.
- The drivers behind these projects are improving safety, serving local load growth, maintaining or improving reliability, increasing efficiency and addressing aging infrastructure.
- Other transmission projects are triggered by customer requests for load connection, generation connection or transmission service.



https://www.oasis.oati.com/woa/docs/MHEB/MHEBdocs/Long_Term_Transmision_Plan.pdf

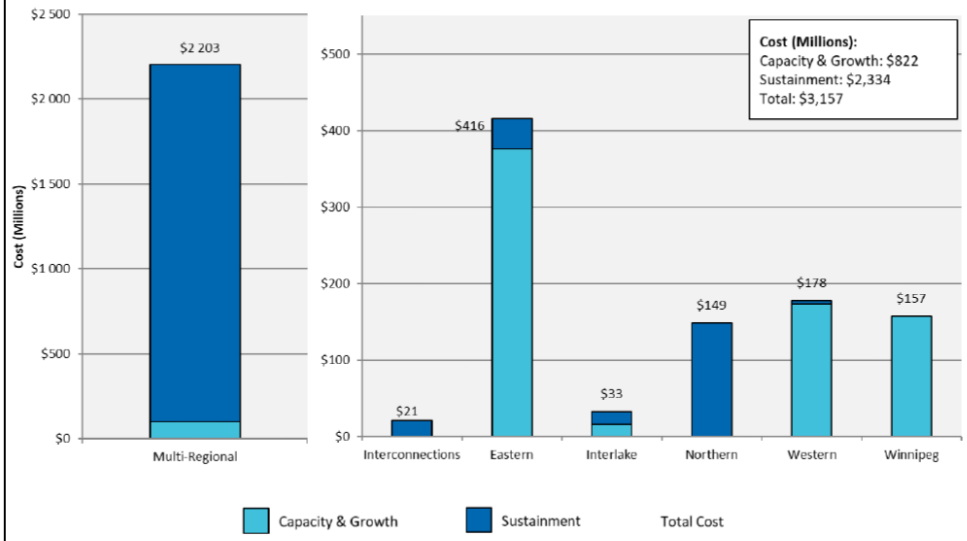
Manitoba Planning Regions

- Categorized as either being associated with Capacity & Growth, or for Sustainment
- Further classified according to the region of the province where customers will benefit
- Many projects will benefit customers in more than one region (multi-regional)

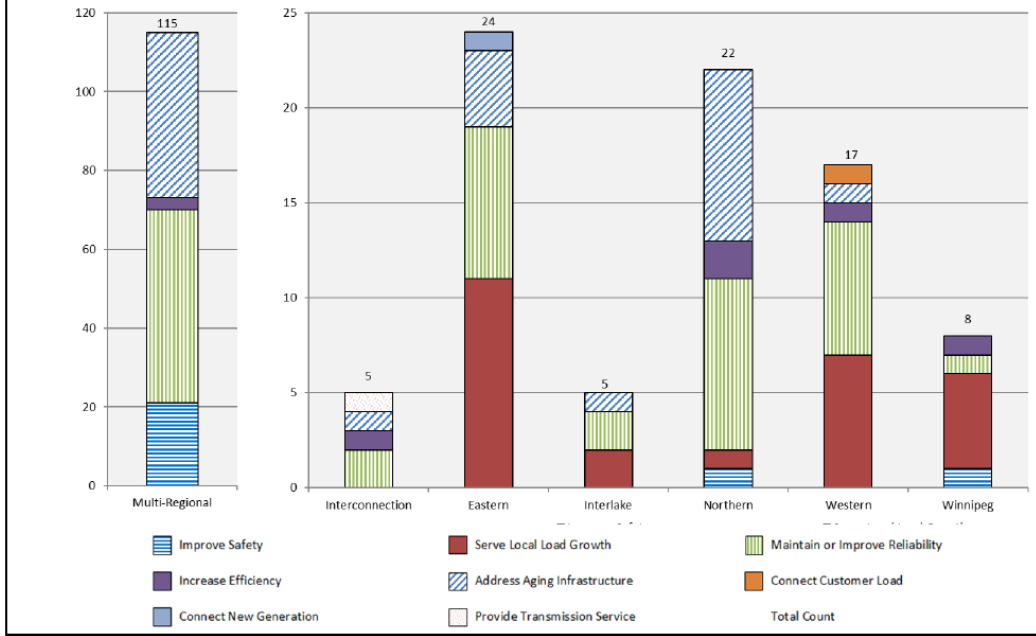


Manitoba Hydro

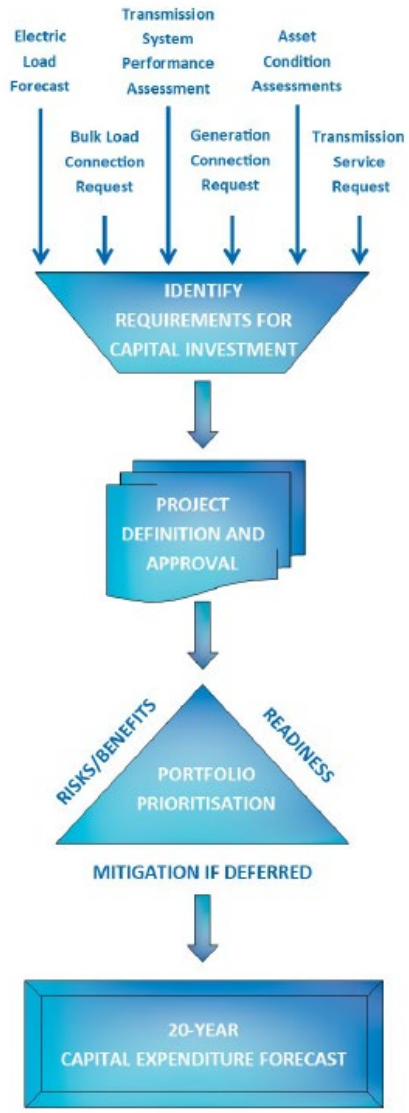
Planned Expenditures by Region and Investment Category



Count of Investment Drivers by Region



Transmission Capital Planning & Approval Process



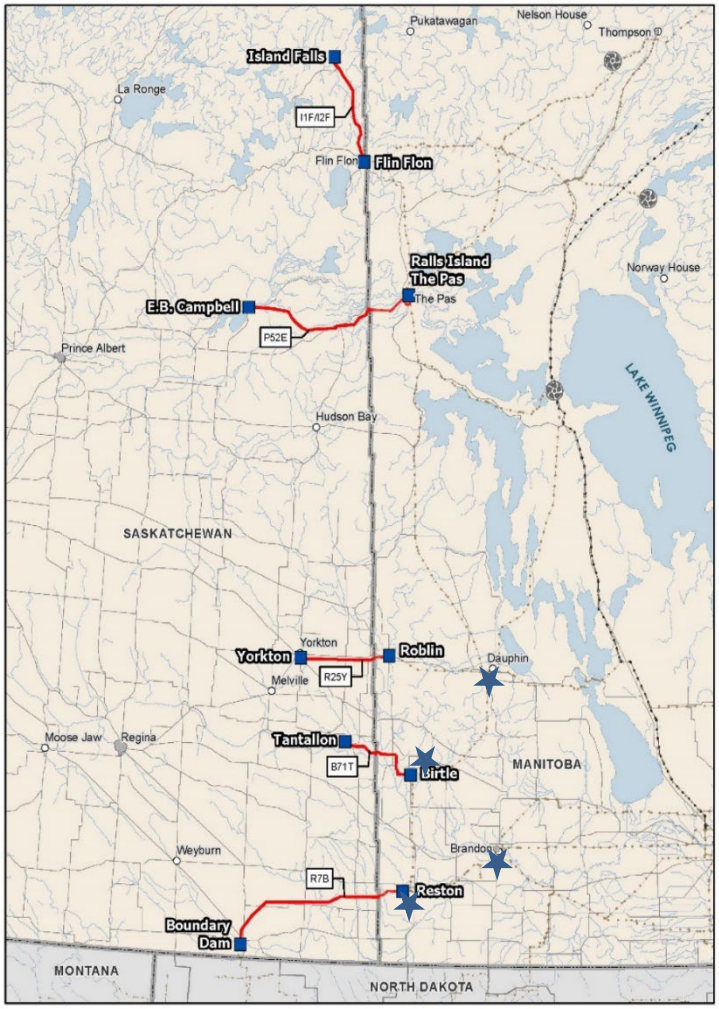
MH-US TSRs in study mode

- 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

- 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 available, import increase is more difficult. SIS expected by end of March 2023.

Manitoba Hydro

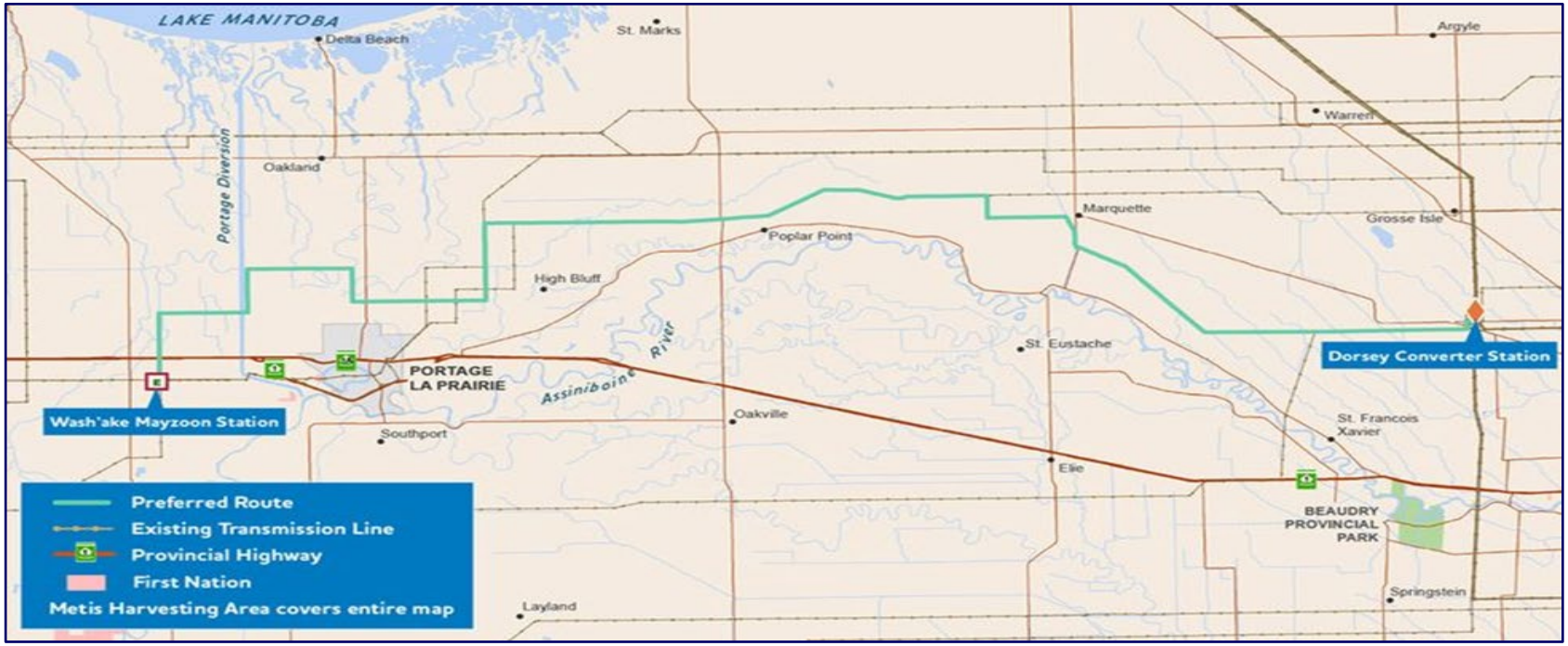
Interconnection Projects - Committed



- 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: Raven Lake CT ratio, B69R CT ratio, C28R wave trap, Reston 15 MVAr cap, Dauphin 3x15 MVAr cap.

Manitoba Hydro

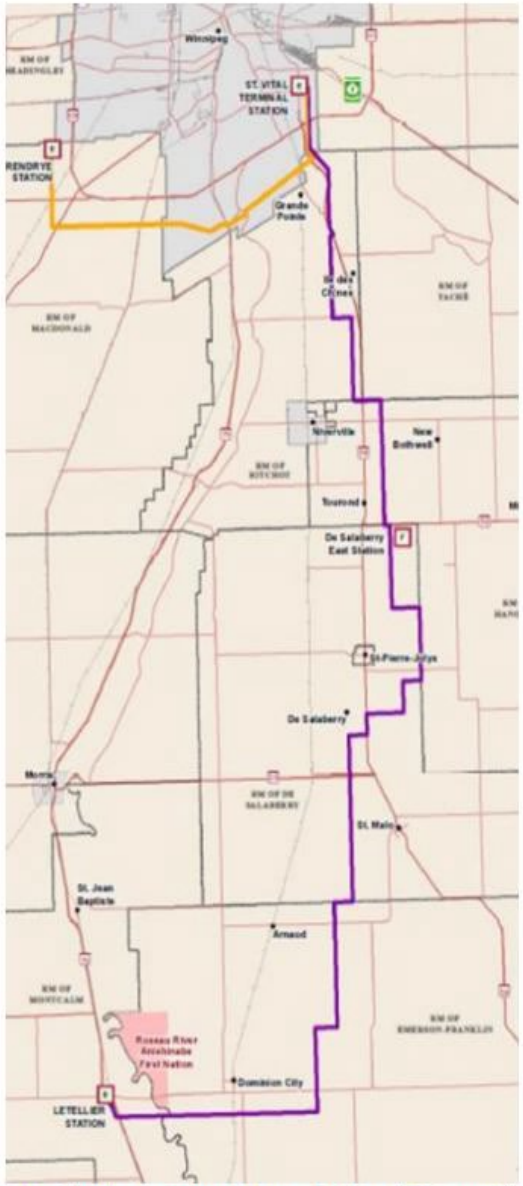
Western Region Projects – Committed



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: May 2027.

Eastern Region Projects – Committed



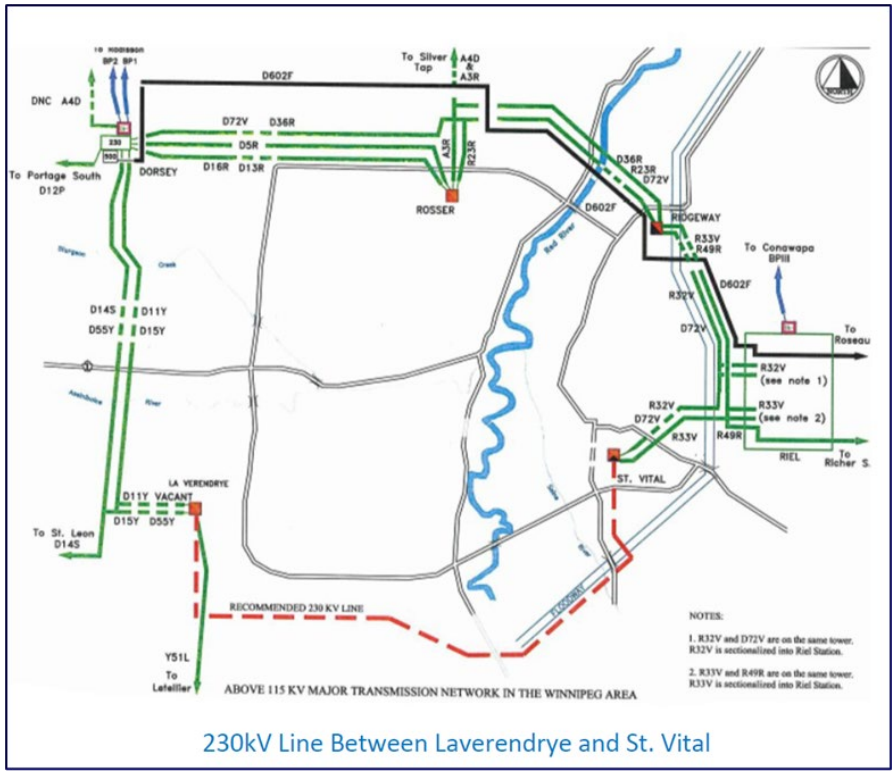
Map Showing Approximate Route of V78G and G79L, as well as Location of De Salaberry Station

De Salaberry-Letellier 230 kV Transmission Line (G79L)

- Scope: construction of a new 230 kV 78-km transmission line between Letellier Station and the new De Salaberry East Station.
- In-service in November 2022.
- St. Vital to De Salaberry (V78G) placed in service in 2018.
- Driver: serve local load growth.

Manitoba Hydro

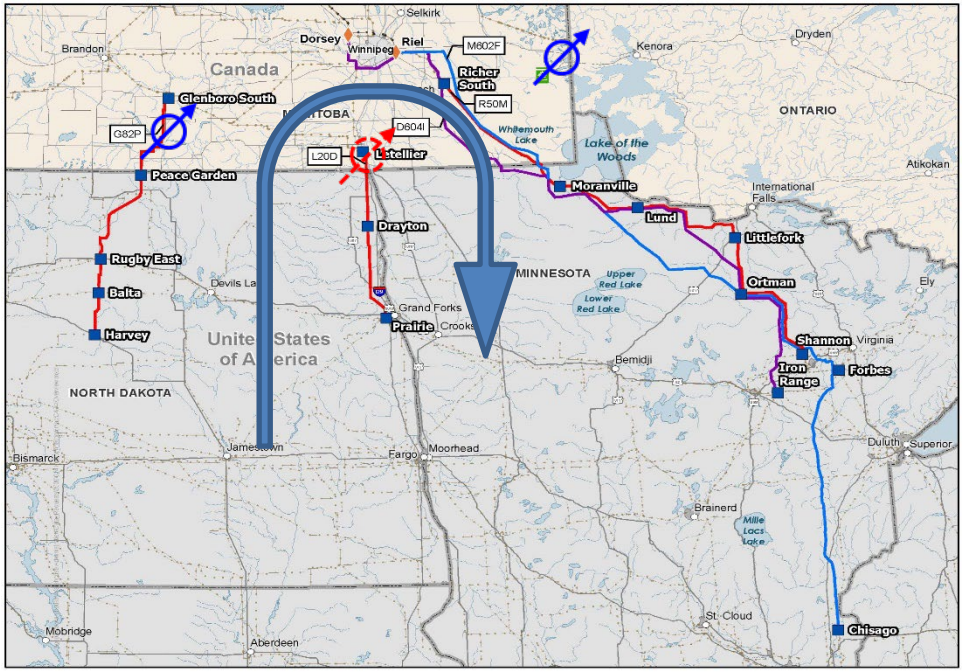
Laverendrye – St. Vital 230 kV Transmission Line (Y36V) – Committed



230kV Line Between Laverendrye and St. Vital

- **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.
- ISD: October 31, 2023

Interconnection Projects– L20D PST - Not Committed



- Scope: installation of a 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. MTEP 2020 West Phase 2.
- Plan to revise Affected System Study in Phase 3 in March 2023.
- Queue coordination with SPP may be required if PST design impacted. DPP 2020 West Jan 6, 2021 (DPP start). SPC-SPP queued (2x250) on Nov 2, 2021. DPP2021 West Dec. 8, 2021 (DPP Start)

Manitoba Hydro

Multi-Regional Projects – Not Committed

Bipole II Pole 3 Modernization/Replacement

Scope: replace Pole 3 valves, valve base electronics, valve and valve hall cooling, control and protection and various auxiliary systems as they are reaching end-of-life

- Driver: end-of-life
- ISD: October 2028/2029

Bipole I Controls Replacement

- Scope: replace Pole 1 pole/master and Pole 2 valve/pole/master controls
- Driver: end-of-life
- ISD: October 2028/2029

Northern Collector System Upgrades

- Scope: upgrade the Northern Collector System to increase the transfer capacity between Bipole I and Bipoles II/III (45 km line from Radisson to Henday)
- Driver: ensure ongoing system reliability – in event BP1 VG failure.
- ISD: October 2026

Manitoba Hydro

Transmission Assessment Process

Manitoba Hydro prepares transmission system reliability studies periodically as part of applicable Manitoba and NERC Standards including but not limited to the following:

– Transmission planning assessment every year (MH-TPL-001-4)
– Under frequency load shedding design assessment every five years (PRC-006-3)
– Physical security risk assessment every three years (CIP-014-2)
– Review of Remedial Action Schemes every five years (PRC-012-2)
– Geomagnetic disturbance vulnerability assessment every five years (MHTPL-007-2)

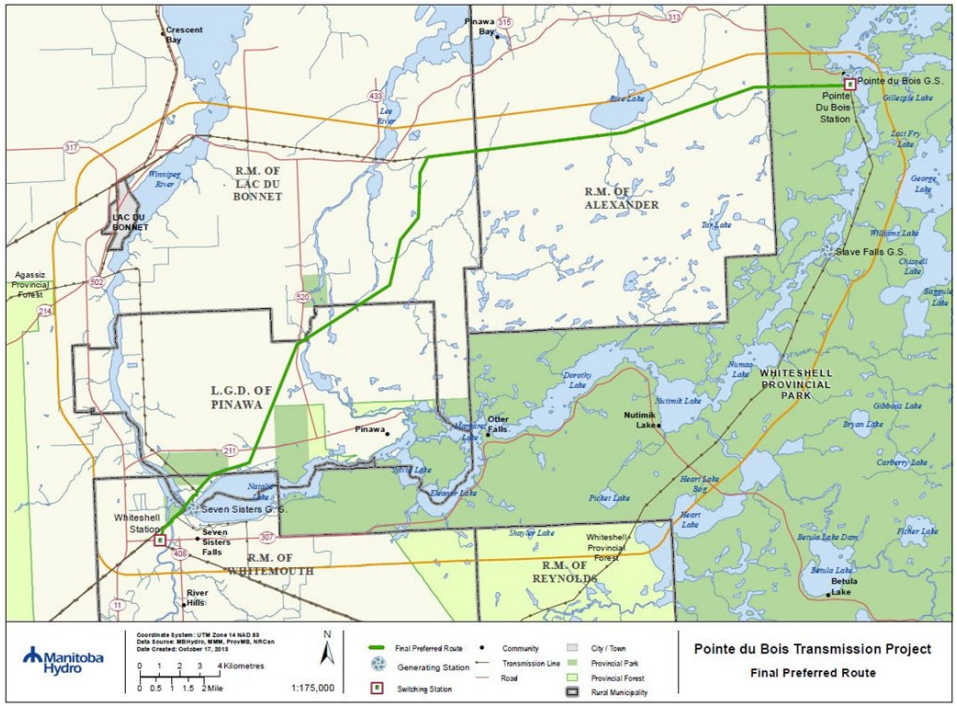
Generation - Committed

Keeyask (630 MW NRIS/65 MW ERIS):

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

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

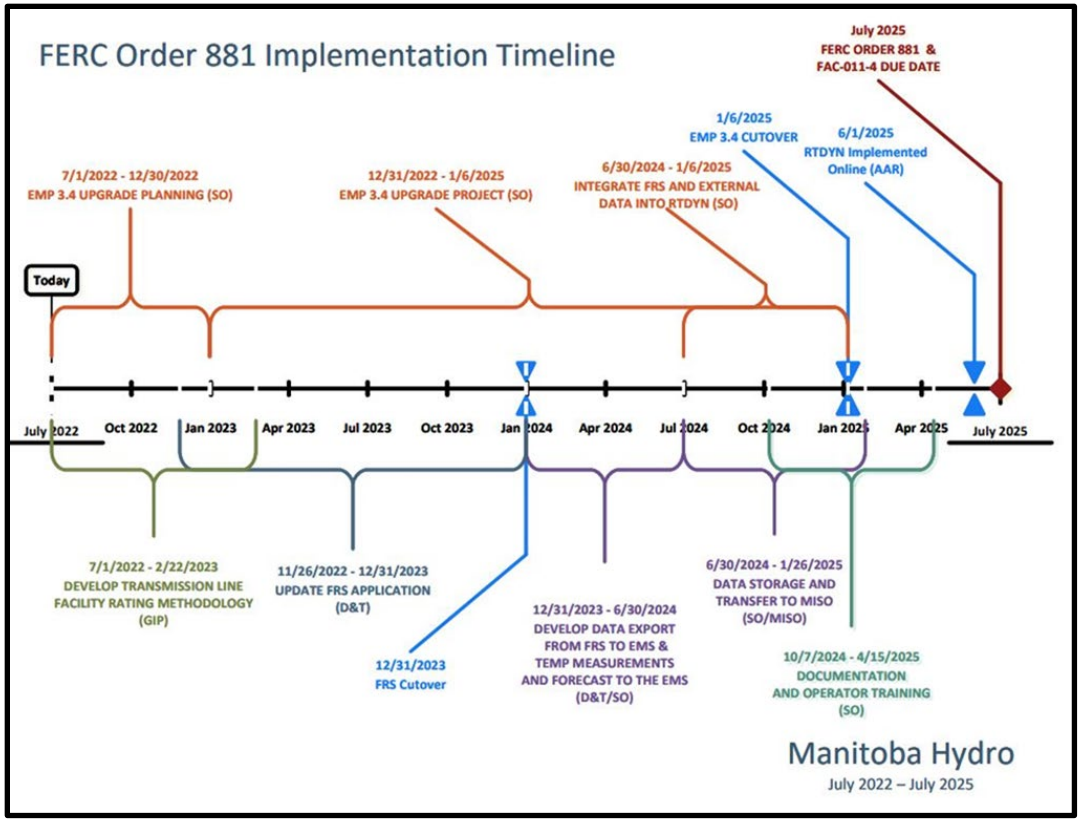
Pointe du Bois Redevelopment:



- Pointe du Bois increases from 35 MW to 106 MW (8 units will be replaced)
- Construct new 42-km 115 kV line PW75
- Retire 66 kV P lines (P3/P4)
- Upgrade Slave Falls RAS
- Project has received Board approval.
- ISD September 2027

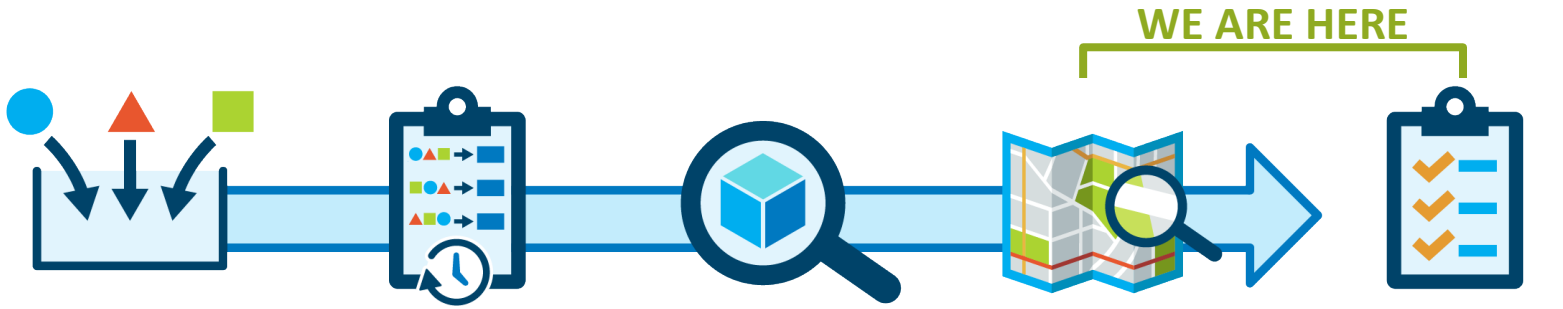
Manitoba Hydro

FERC Order 881 Implementation



- Update Facility Rating database to include:
  – Four Seasons Ratings, Normal and Emergency (15/30 min)
  – AARs(day/night, emergency 15/30 min).
- Update the Facility Rating Methodology(work in progress):
  – identifying four-seasons, day/night classification and corresponding ambient assumptions
- Implement AAR in the Control Centre (System Operations):
  – divide province into temperature zones and identify facilities in each zone, upgrade the EMS
- Considering piloting a DLR sensor project and integrate in RTDYN by 2025.

Integrated Resource Plan



- Manitoba Hydro's first IRP is anticipated to be published in Summer 2023
- The Integrated Resource plan includes natural gas and electricity resources and infrastructure including generation, transmission, distribution and non-wires solutions
- 4 Engagement Phases provide valuable feedback into the plan's development

Integrated Resource Plan (hydro.mb.ca)

MH's Long-Term Strategic Plan:strategy_2040.pdf (hydro.mb.ca)

Enterprise Plan FY 22/23 (hydro.mb.ca)

Manitoba Hydro

Manitoba Hydro

AGENDA

MRO Regional Risk Assessment (RRA)

Mark Tiemeier, Principal Technical Advisor, MRO

Action

Information

Report

Mark Tiemeier will provide an update during the meeting.

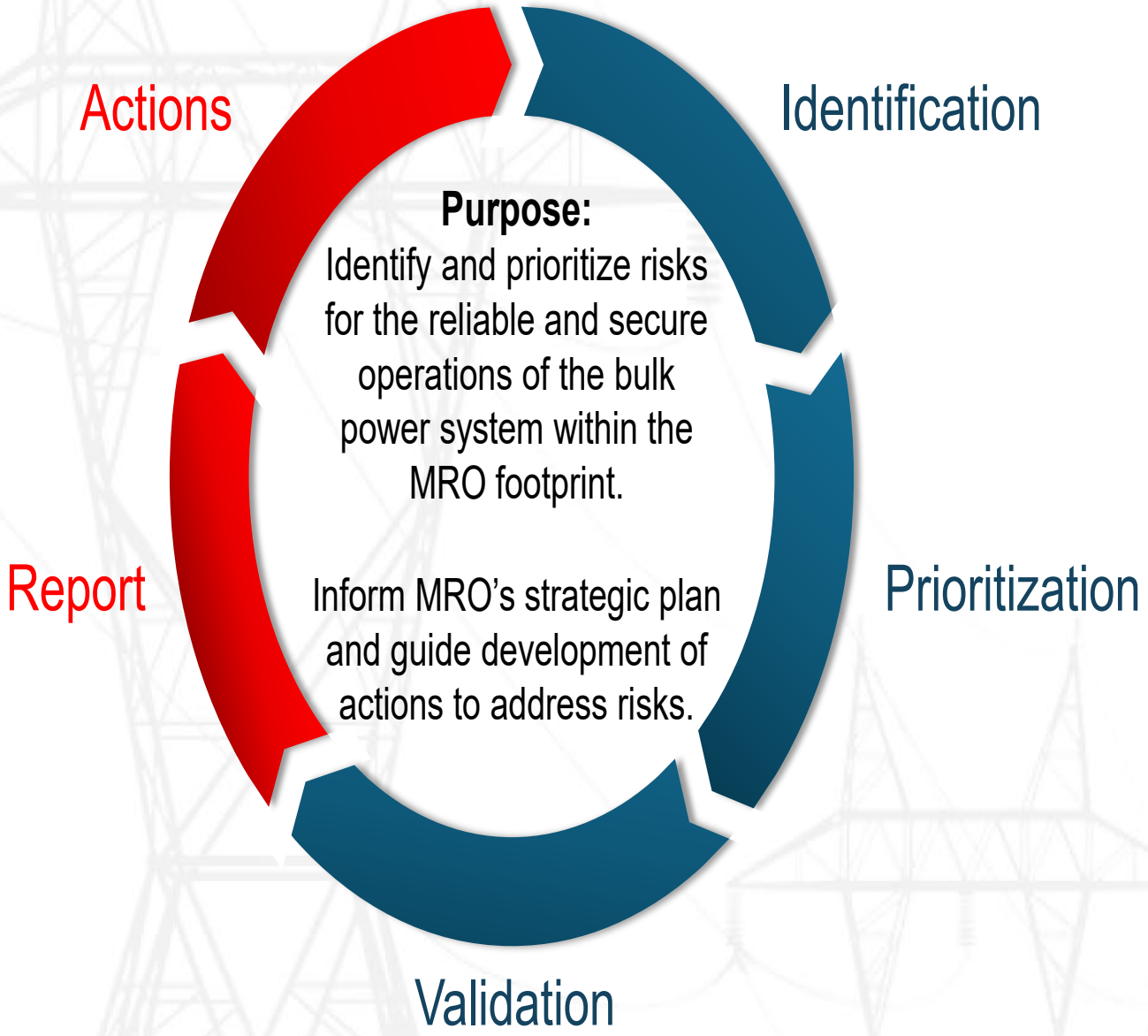
MIDWEST RELIABILITY ORGANIZATION

MRO 2023 Regional Risk Assessment

Mark Tiemeier

Principal Technical Advisor

Regional Risk Assessment Process

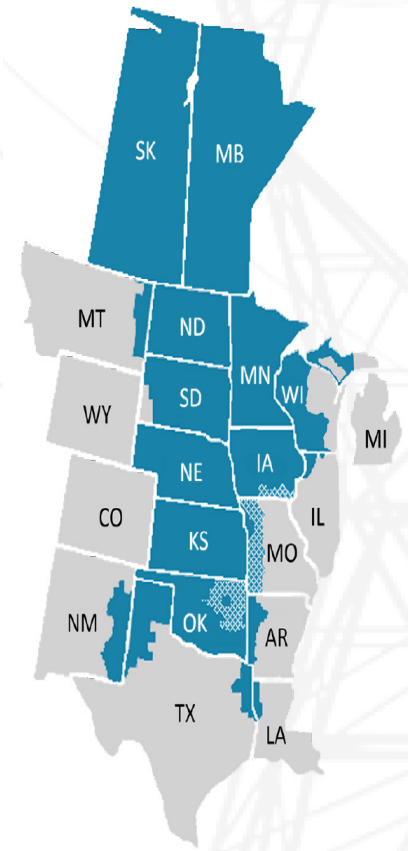


MIDWEST RELIABILITY ORGANIZATION

MRO 2023 Regional Risk Assessment

Top risks to the reliable and secure operation of the North American bulk power system in MRO's regional footprint.

Territory



About Us

As part of the ERO Enterprise, MRO is committed to a shared mission to identify, prioritize and assure effective and efficient mitigation of risks to the reliability and security of the North American bulk power system in its regional footprint.

Read more at www.MRO.net

MRO Reliability Risk Matrix: Risk Rankings

Consequence / Impact (C)		Likelihood (L) L1 Very Unlikely	L2 Unlikely	L3 Possible	L4 Likely	L5 Almost Certain
C5	Severe					
C4	Major				4,5,6,16	
C3	Moderate		2	9,12,13	1	
C2	Minor			3,7,8,10,14,17	15	
C1	Negligible			11		

LOW
MEDIUM
HIGH
EXTREME

Top risks are reflected in orange above and described below. A full list of risks assessed can be found in the final report.

Assessment Overview

- Extreme weather, consumer demand, and changes in technology and generation resources continue to present a rapidly increasing number of challenges to grid planners and operators. Physical and cyber security risks also continue to evolve at an unprecedented pace.
- MRO's annual *Regional Risk Assessment* considers continent-wide risks to reliability and security of the North American bulk power system and determines which are more likely to occur and would have a higher impact in MRO's region.
- This report is focused on risk identification, prioritization and mitigation and highlights for industry the priorities needed to collaboratively address these challenges. It also serves to inform key decision makers of challenges the industry faces and the policies and regulations that will help define a variety of proposed solutions.
- **READ MRO'S 2023 REGIONAL RISK ASSESSMENT**

Key Findings: Top Reliability and Security Risks in MRO's Territory

Model Assumptions

RISK 1. Assumptions used in bulk power models to plan and operate the grid have not accounted for the rapid increase in inverter-based and distributed energy resources, challenging industry's ability to accurately assess current and future system characteristics.

Planning Reserves

RISK 4. Traditional methods to calculate Planning Reserve Margin are inadequate to properly plan for the generation capacity needed to meet increasingly uncertain system operations, especially during extreme weather events.

Energy Reliability

RISK 5. Increased uncertainty from changing energy supply and customer demand challenge the grid's ability to meet load for all hours of the year. There is no comprehensive planning that assesses assurance of available energy and fuel sources over all time periods to maintain grid reliability.

Generation Unavailability

RISK 6. Generation availability assumed during cold weather, particularly in the southern U.S., has been shown to be unrealistically high due to a lack of generation winterization and natural gas curtailments.

Transmission Line Ratings

RISK 12. Use of constant overhead transmission line ratings year-round (non-seasonal) limits available transmission capacity and leads to inefficient real-time decisions when system conditions deviate from assumptions that drive rating calculations, such as cooler temperatures or during emergency operations.

Insider Threats

RISK 9. Employees or contractors using their knowledge and authorized access of critical systems to do harm to the bulk power system is a continued, substantial threat to organizations and the reliability of the grid.

Malware/ Ransomware

RISK 13. Phishing attacks can introduce malware or ransomware to corporate IT systems, which can impact critical systems necessary for reliable bulk power system operations through direct or in-direct connections those systems have to IT networks.

Supply Chain Compromise

RISK 16. A cyber security event carried out through the vendor supply chain can broadly impact bulk power system reliability, especially where the vendor is a market leader providing systems used for system operation.

Bulk Power Model Assumption Accuracy

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major			
C3	Moderate		2021, 2022	2023
C2	Minor			

- **Models built to plan and operate system**
- **Impact of changing generation mix**
  - Generation dispatch
  - Reduced short circuit current
- **Impact of changing load characteristics**
  - Distributed Energy Resources
  - Electrification

Conservative Practices to Calculate PRM

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major		2021	2022, 2023
C3	Moderate			
C2	Minor			

PRM = Margin between Anticipated Generation & Anticipated Load

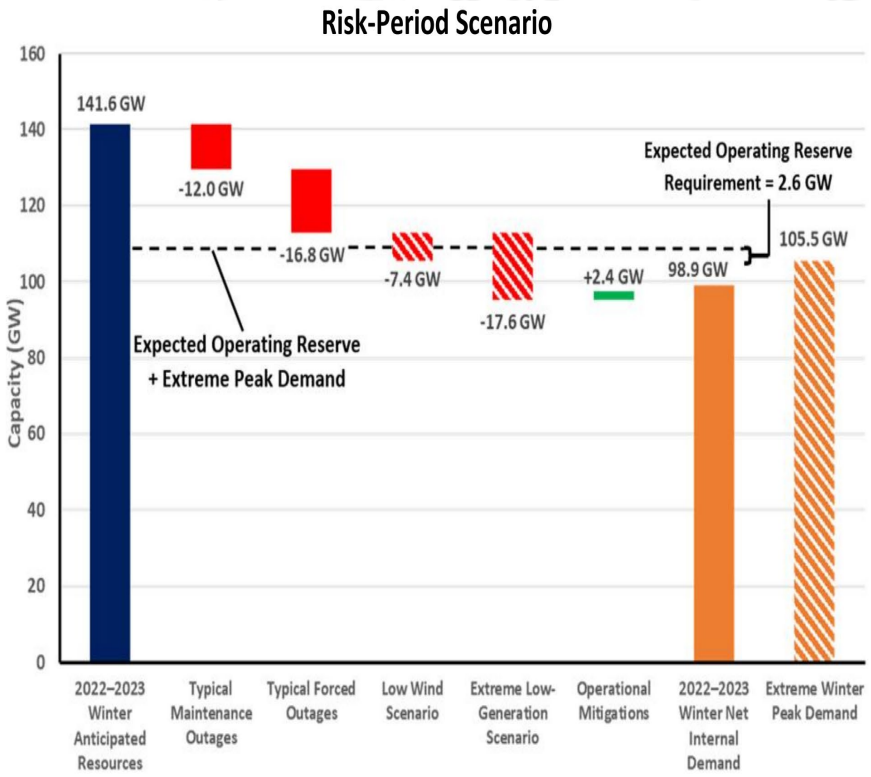
To calculate PRM, need several assumptions

- Accredited generation capacity
- Expected generation outages (planned and forced)
- Forecasted peak load

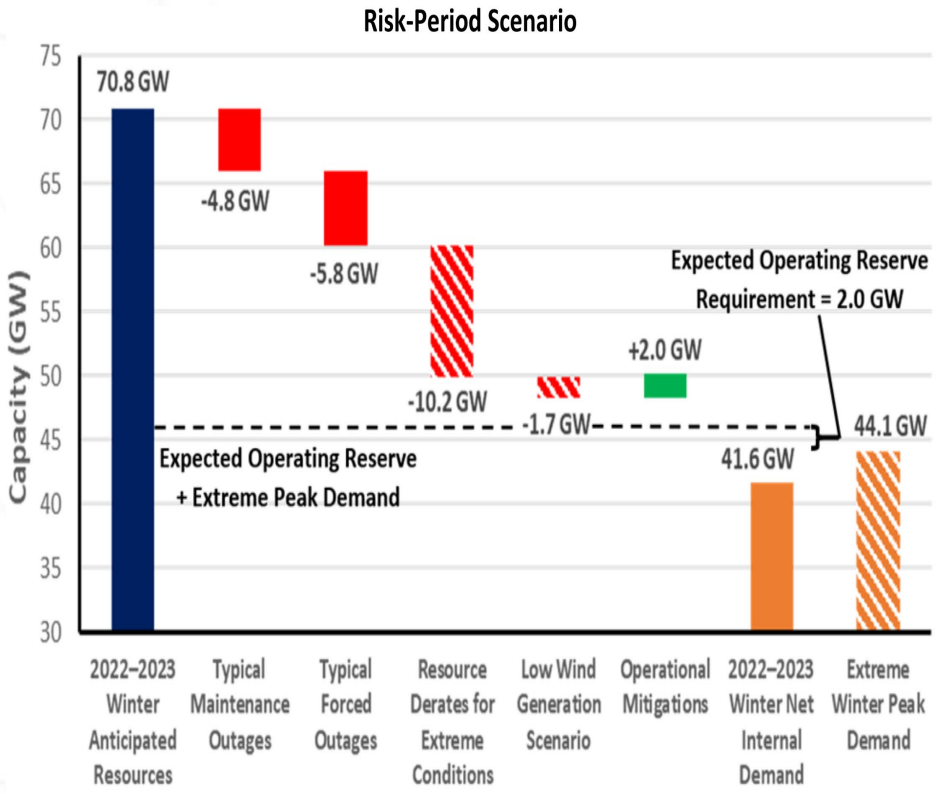
Conservative Practices to Calculate PRM

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major		2021	2022, 2023
C3	Moderate			
C2	Minor			

MISO Winter '22/23



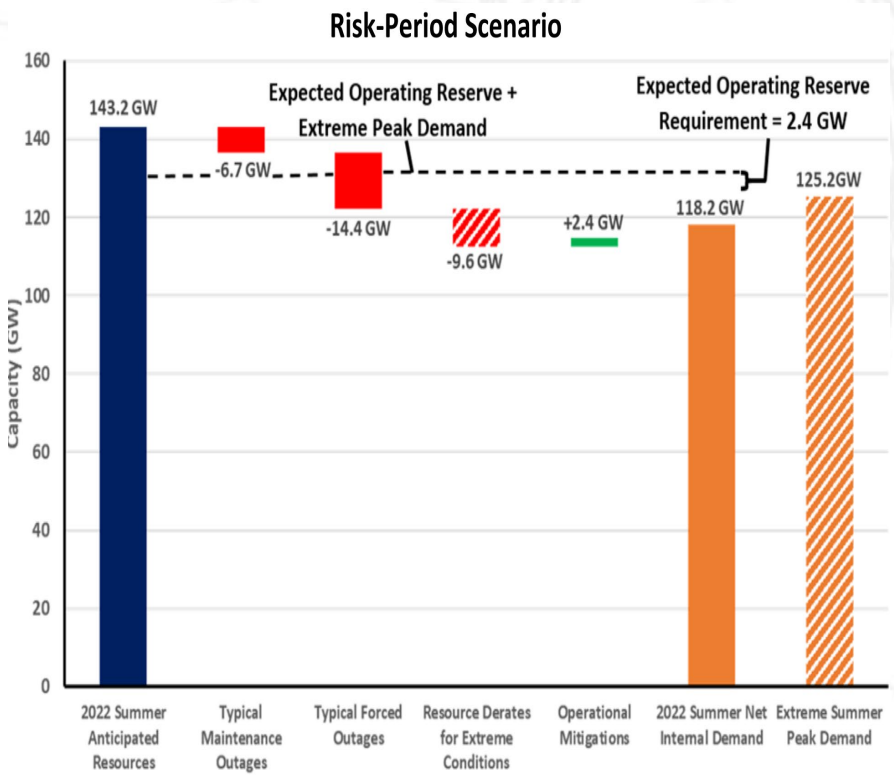
SPP Winter '22/23



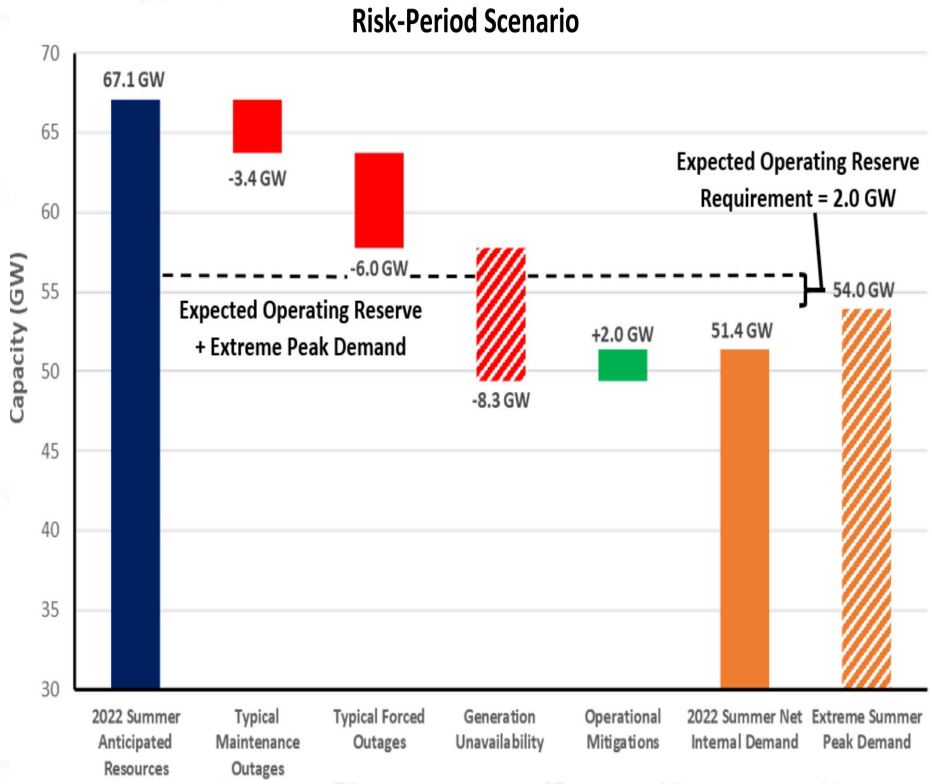
Conservative Practices to Calculate PRM

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major		2021	2022, 2023
C3	Moderate			
C2	Minor			

MISO Summer '22



SPP Summer '22

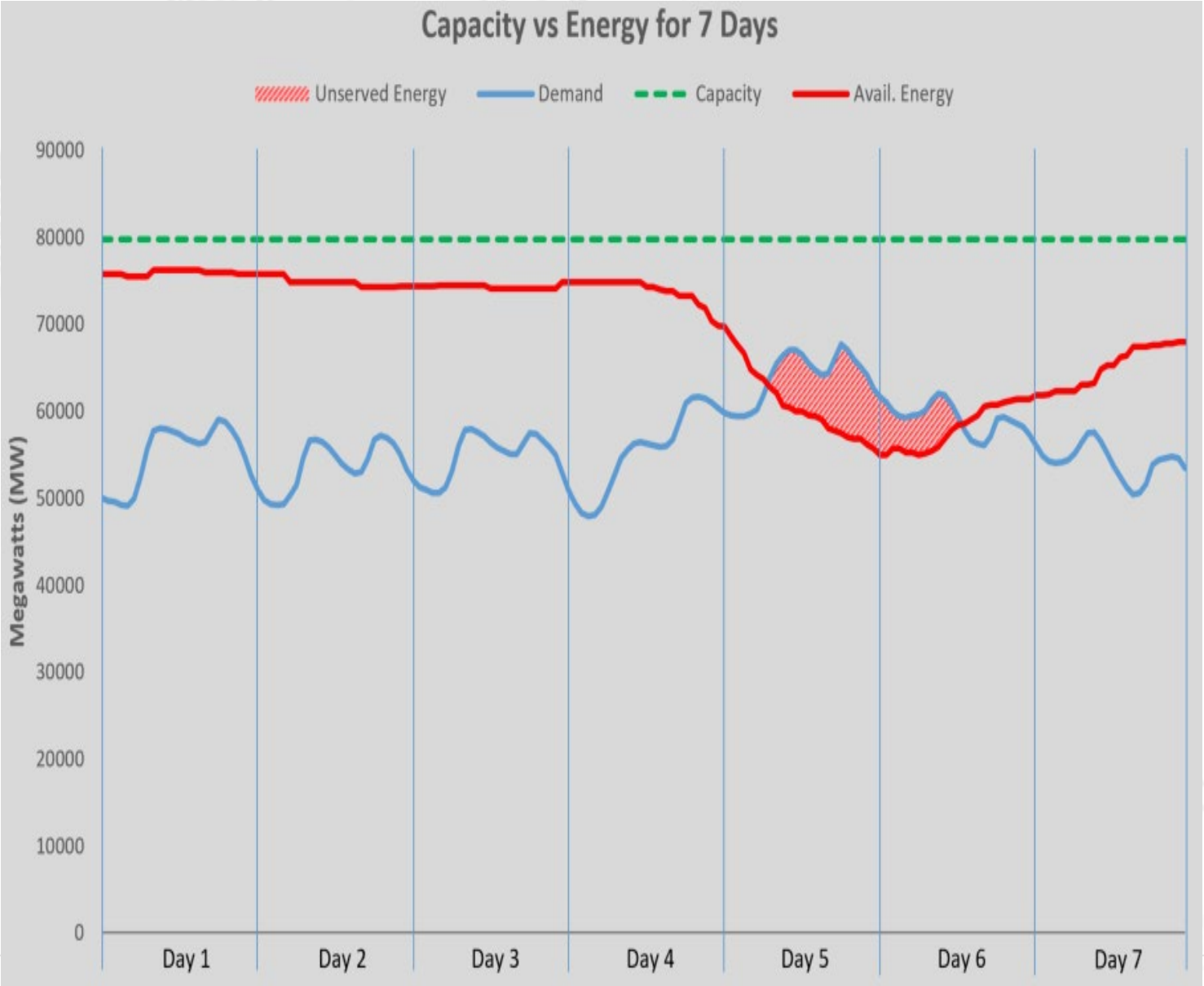


Energy Reliability Planning

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major		2022	2023
C3	Moderate			
C2	Minor			

- **Energy availability needed for 8,760 hours a year**
- **Account for:**
  - Unassured fuel supplies
  - Inconsistency of variable generation output
  - Volatility in forecasted load

Capacity ≠ Energy



Energy Reliability Planning

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major		2022	2023
C3	Moderate			
C2	Minor			

- **NERC Energy Reliability Assessment Task Force (ERATF)**
  - Standard Authorization Requests (SARs) accepted
  - Goal to create Energy Reliability Assessments

Generation Unavailability during Severe Cold Weather

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major			2022, 2023
C3	Moderate			
C2	Minor			

- Natural gas generation not winterized for sub-freezing temperatures (especially south-central US)
- Electric/Gas infrastructure interdependencies
- Forced outages strain energy availability to meet load

Generation Unavailability during Severe Cold Weather

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major			2022, 2023
C3	Moderate			
C2	Minor			

- MRO Generator Winterization Program
- Cold Weather Preparedness Workshop
- NERC Alert: Cold Weather Preparations for Extreme Weather Events
- NAESB Gas-Electric Forum

Overhead Transmission Line Ratings

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major			
C3	Moderate		2023	
C2	Minor		2021, 2022	

- Seasonal and emergency ratings not fully used
- Impact of FERC Order 881-A

Changing Sources of Reactive Power

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major			
C3	Moderate	2022, 2023	2021	
C2	Minor			

- Retiring synchronous generation that provided dynamic reactive power
- Replacement reactive needs shifting to non-generation resources that perform differently

Inadequate IBR Ride-Through Capability

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major			
C3	Moderate	2022	2021	
C2	Minor		2023	

- IBR fault response largely a configured control vs. physical response of a synchronous machine
- Recent events in Texas and California

Inadequate IBR Ride-Through Capability

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major			
C3	Moderate	2022	2021	
C2	Minor		2023	

Solar and Wind Nameplate Capacity, Existing and Planned Additions through 2031										
Assessment Area	Nameplate MW of Solar					Nameplate MW of Wind				
	Existing	Tier 1	Tier 2	Tier 3	Total	Existing	Tier 1	Tier 2	Tier 3	Total
MISO	728	10,989	53,756	4,907	**70,380**	22,854	5,593	14,649	730	**43,826**
MH	0	0	0	0	**0**	259	0	0	0	**259**
SPC	2	10	10	57	**79**	242	385	200	100	**927**
SPP	278	444	32,170	149	**33,041**	27,535	4,604	16,892	0	**49,031**
Total	1,008	11,443	85,936	5,113	**103,500**	50,890	10,582	31,741	830	**94,043**

Existing Solar 1,008 MW

Queued Solar: 102,492 MW

Existing Wind 50,890 MW

Queued Wind: 43,153 MW

MISO 2022 Gen Interconnection Queue: 164 GW renewable or storage (171 GW total)

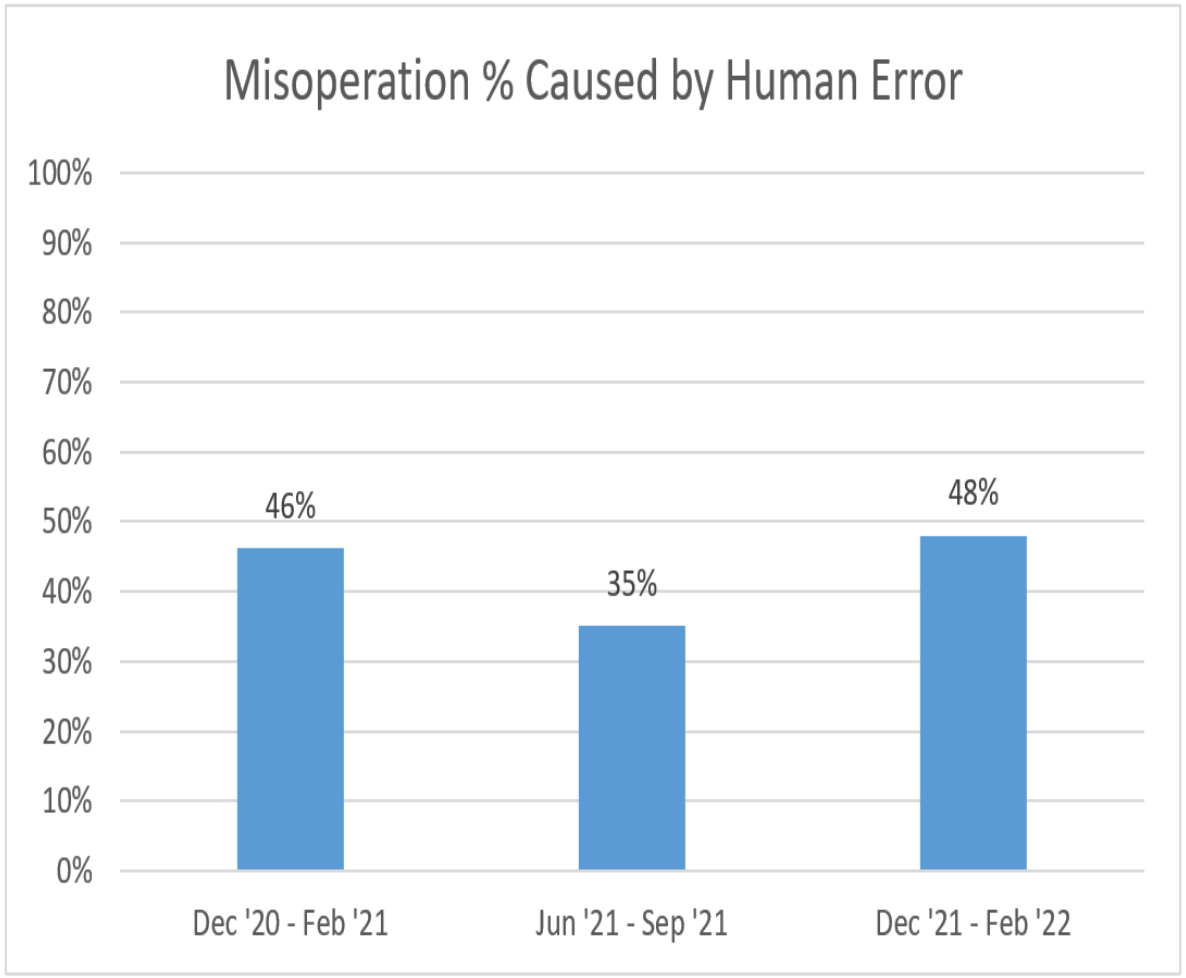
Material and Equipment Availability

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major			
C3	Moderate			
C2	Minor		2023	

- Lower material inventories
- Longer equipment lead times
- Reduced resilience in storm response
- Delays in completing projects

Misoperations Due to Human Errors

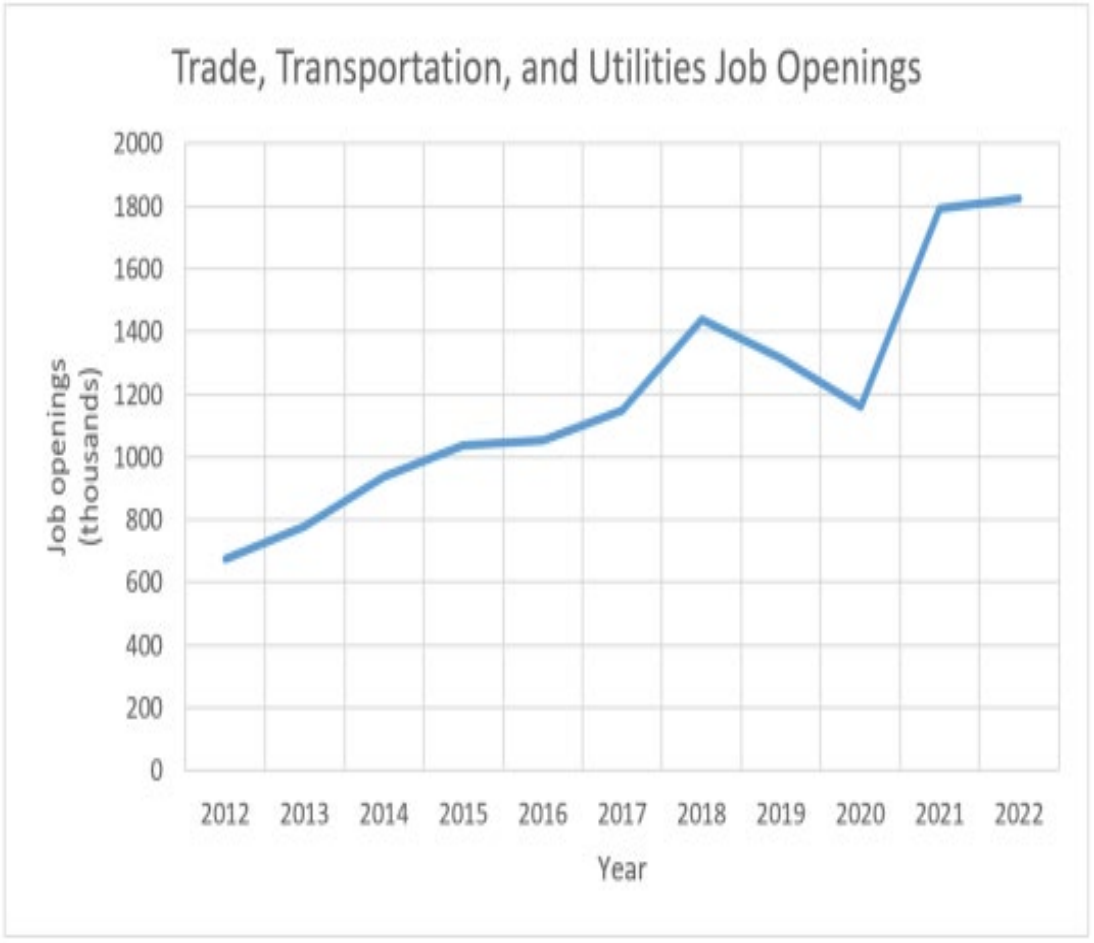
		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C3	Moderate			2021
C2	Minor			2022
C1	Negligible		2023	



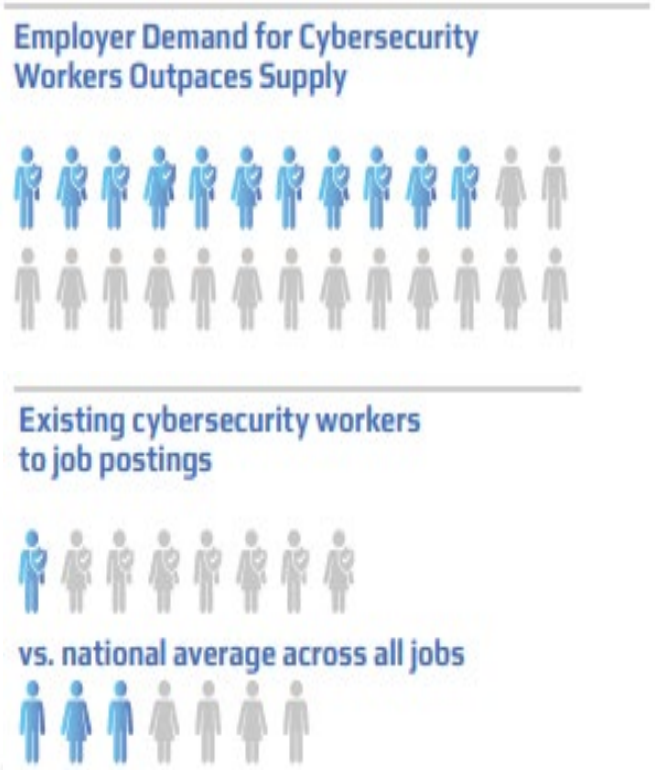
MRO Protection System Commissioning Webinar
7/14/2022

Tightening Supply of Expert Labor

Consequence / Impact (C)		Likelihood (L)		
		L2	L3	L4
		Unlikely	Possible	Likely
C4	Major			
C3	Moderate			
C2	Minor		2021, 2022	2023



* U.S. Bureau of Labor Statistics



* Graphic from www.cyberseek.org

Questions

AGENDA

NERC Standards Review Forum (NSRF) Update

Gayle Nansel, Reliability Advisory Council Member

Action

Information

Report

Gayle Nansel will provide an update during the meeting.

AGENDA

Protective Relay Subgroup (PRS) Update

Jake Bernhagen, Senior Systems Protection Engineer, MRO

Action

Information

Report

Jake Bernhagen will provide an update during the meeting.

AGENDA

2023 Meeting Dates

Dick Pursley, Reliability Advisory Council Chair

Action

Information

Report

Chair Pursley will provide an overview during the meeting.

	Q1 2023	Q2 2023	Q3 2023	Q4 2023
RAC	3/1	5/18	8/10	11/9
SAC	2/22	5/24	8/8	10/12
CMEPAC	2/21	5/31	8/9	10/19
PRS	3/14	6/27	9/6	12/5
OGOC	4/12	6/14	9/13	11/15
BOD	4/13	6/15	9/14	11/16

MRO CONFERENCE DATES 2023	
Q1	**RAM Conference: March 21-22, 2023 networking reception and conference (hybrid)**
Q2	**Reliability Conference: May 16-17, 2023 networking reception and conference (hybrid)**
Q3	**CMEP Conference: July 25-26, 2023 networking reception and conference (hybrid)**
Q4	**Security Conference: September 26-28, 2023 networking reception, training and conference (hybrid); Oklahoma City, OK**

AGENDA

RAC Member Roundtable
Dick Pursley, Reliability Advisory Council Chair

Action
Discussion

Report
Chair Pursley will lead this discussion during the meeting.

AGENDA

Other Business and Adjourn

Dick Pursley, Reliability Advisory Council Chair

Action

Discussion

Report

Chair Pursley will lead this discussion during the meeting.