

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Board of Trustees Open Meeting Presentations

November 5, 2020

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Standards Actions

Howard Gugel, Vice President of Engineering and Standards
Board of Trustees Meeting
November 5, 2020

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- Background

- Address FERC Order No. 850 directive to add Electronic Access Control or Monitoring Systems to supply chain requirements
- Address NERC Supply Chain Report recommendation to add certain Physical Access Control Systems to supply chain requirements
- Regulatory filing deadline of December 26, 2020

- Action

- Adopt:
 - CIP-005-7 – Cyber Security – Electronic Security Perimeter(s)
 - CIP-010-4 – Cyber Security – Configuration Change Management and Vulnerability Assessments
 - CIP-013-2 – Cyber Security – Supply Chain Risk Management

- Status
 - Posted for industry comment from August 11 – September 9, 2020
 - Endorsed by Standards Committee on September 24, 2020
- Action
 - Approve the 2021-2023 Reliability Standards Development Plan



Questions and Answers

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2021 ERO Work Plan Priorities

Mark Lauby, Senior Vice President & Chief Engineer
Board of Trustees Open Meeting
November 5, 2020

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1. Expand Risk-Based Focus in Standards, Compliance Monitoring, and Enforcement
2. Assess and Catalyze Steps to Mitigate Known and Emerging Risks to Reliability and Security
3. Build a Strong E-ISAC-Based Security Capability
4. Strengthen Engagement across the Reliability and Security Ecosystem in North America
5. Capture Effectiveness, Efficiency, and Continuous Improvement Opportunities

2021 Key Objectives	
1.	<p>Prioritize and support the development of new and/or enhancement of existing Reliability Standards for the following risks:</p> <ul style="list-style-type: none"> • Resource availability due to potential energy limitations in the operational timeframe • Transmission planning-related fuel scenarios for normal and extreme events • Supply chain risk mitigation for low impact BES Cyber Assets • Planning data, information exchange, and modeling of distributed energy resources • Inverter protection and control interactions during grid disturbances
2.	Consistently embed internal control activities within the compliance monitoring program
3.	Develop strategy for appropriate oversight of the emerging resource mix

2021 Key Objectives	
1.	<p>Assessment: Identify and assess performance trends and emerging factors impacting BPS reliability and make recommendations to address the following high-priority risks:</p> <ul style="list-style-type: none"> • Energy storage technologies, applications, and use • Incorporating cybersecurity risks in BPS planning, engineering, and operations • Electromagnetic Pulse • Energy Management Systems • Supply Chain • Load loss recovery from extreme events (resilience measures)
2.	<p>Mitigation: Develop lessons learned, recommendations, and/or implement mitigations (e.g., guidelines, technical references, training, industry outreach)</p> <ul style="list-style-type: none"> • Unacceptable inverter performance • Increasing reliance on DER and resources below BES thresholds • Increased amounts of distributed energy resources • Energy Management Systems • Supply Chain: Implement report recommendations

	2021 Key Objectives
1.	<p>Strategy:</p> <ul style="list-style-type: none"> • Execute strategic plan • Develop OT technology risk mitigation strategy • Evaluate extension of services to downstream natural gas sector • Operationalize strategic partnerships • Maintain cost effectiveness
2.	<p>Information Sharing:</p> <ul style="list-style-type: none"> • Increase overall information sharing by partners and industry through targeted outreach • Continue to expand CRISP participation and evaluate other sensor technologies • Improve coordination and connectivity to Intelligence Community • Continue to conduct threat workshops, webinars and develop products
3.	<p>Analysis:</p> <ul style="list-style-type: none"> • Deploy automated information sharing tools, Leverage E-ISAC Data Platform and extend to membership • Refine performance metrics
4.	<p>Engagement:</p> <ul style="list-style-type: none"> • Enhance E-ISAC portal and develop robust feedback mechanisms • Continue Industry Engagement Program and increase membership • Execute GridEx VI • Maintain Canadian engagement

2021 Key Objectives

1. Enhance outreach to stakeholder/policy organizations
 - Implement State outreach initiative, including
 - Harmonized communications on reliability assessments
 - Serve as a trusted resource to the states on reliability and security matters.
 - Enhance relationships with Canadian entities and support information exchange with international entities on reliability and security matters.
2. Work with ERO Enterprise Communications Group (ERO CG) to refine and further develop elements of the *ERO Enterprise Communication Strategy* to
 - Develop sharing platforms
 - Amplify initiatives and messages through expanded ERO Enterprise communication efforts.
 - Implement activities from Work Plan
3. Sustain and expand stakeholder outreach through in-person and virtual meetings using Webex conferences where possible.
4. Support corollary activities within industry, Forums, and trades, e.g. U.S. DOE’s North American Energy Resilience Model (NAERM), IEEE Standard 2800, EPRI, and NATF/NAGF.
5. Improve processes and presentation of Seasonal Assessments towards coordinated and quicker release with Regional Entities

2021 Key Objectives	
1.	<p>Complete the “Big 3”</p> <ul style="list-style-type: none"> • Roll-out Align Release 1, 2 and 3 along with the ERO SEL , supported by stakeholder outreach and education, end-use training, and business unit readiness activities • Complete the CIP and Phase II of the O&P Standards Efficiency Reviews • Successful implementation of the Reliability and Security Technical Committee (RSTC)
2.	<p>NERC</p> <ul style="list-style-type: none"> • Finish 2021 at or below budget and maintain at least \$3MM in operating reserves
3.	<p>Regional Entities</p> <ul style="list-style-type: none"> • With Regional Entity and stakeholder feedback, continue evaluation of compliance monitoring and enforcement processes for efficiency • Implement opportunities to centralize and/or standardize processes
4.	<p>ERO Enterprise</p> <ul style="list-style-type: none"> • Transformation achieves process alignment and shared resources



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Cold Weather Preparedness Update

Howard Gugel, Vice President of Engineering and Standards
Board of Trustees Meeting
November 5, 2020

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- Reliability Guideline on Generating Unit Winter Readiness
- Winter Readiness reports have been released since 2011
- Several reports have been released on cold weather events that impacted the BPS:
 - February 2011 Southwest Cold Weather Event
 - January 2014 Polar vortex
 - January 2018 South Central United States Cold Weather Event
- Several Lessons Learned, webinars, and annual assessments have also addressed cold weather impacts to the BPS.

- Cold weather preparedness plans, procedures, and awareness training
- Existing data specifications modified to require:
 - Design specification or historical demonstrated performance
 - Notification of generating unit capability or availability limitations
- Use data to perform operational requirements

- Cold Weather Standard Authorization Request accepted
- Standards Drafting Team appointed
- Project will address *2019 FERC and NERC Staff Report: The South Central United States Cold Weather Bulk Electric System Event of January 17, 2018* findings
- Standard Drafting Team meetings:
 - October 27 – 29, 2020
 - November 10 – 12, 2020
- Initial Posting: Early 2021



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2020-2021 Winter Reliability Assessment

Stephen Coterillo, Engineer, Reliability Assessments
Board of Trustees Meeting
November 5, 2020

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- NERC's Winter Reliability Assessment (WRA) examines potential regional resource deficiencies and operating reliability concerns
 - Describes industry preparations to manage seasonal risks
- Developed with the Reliability Assessment Subcommittee (RAS) and reviewed by the Reliability and Security Technical Committee

2020–2021 Winter Reliability Assessment

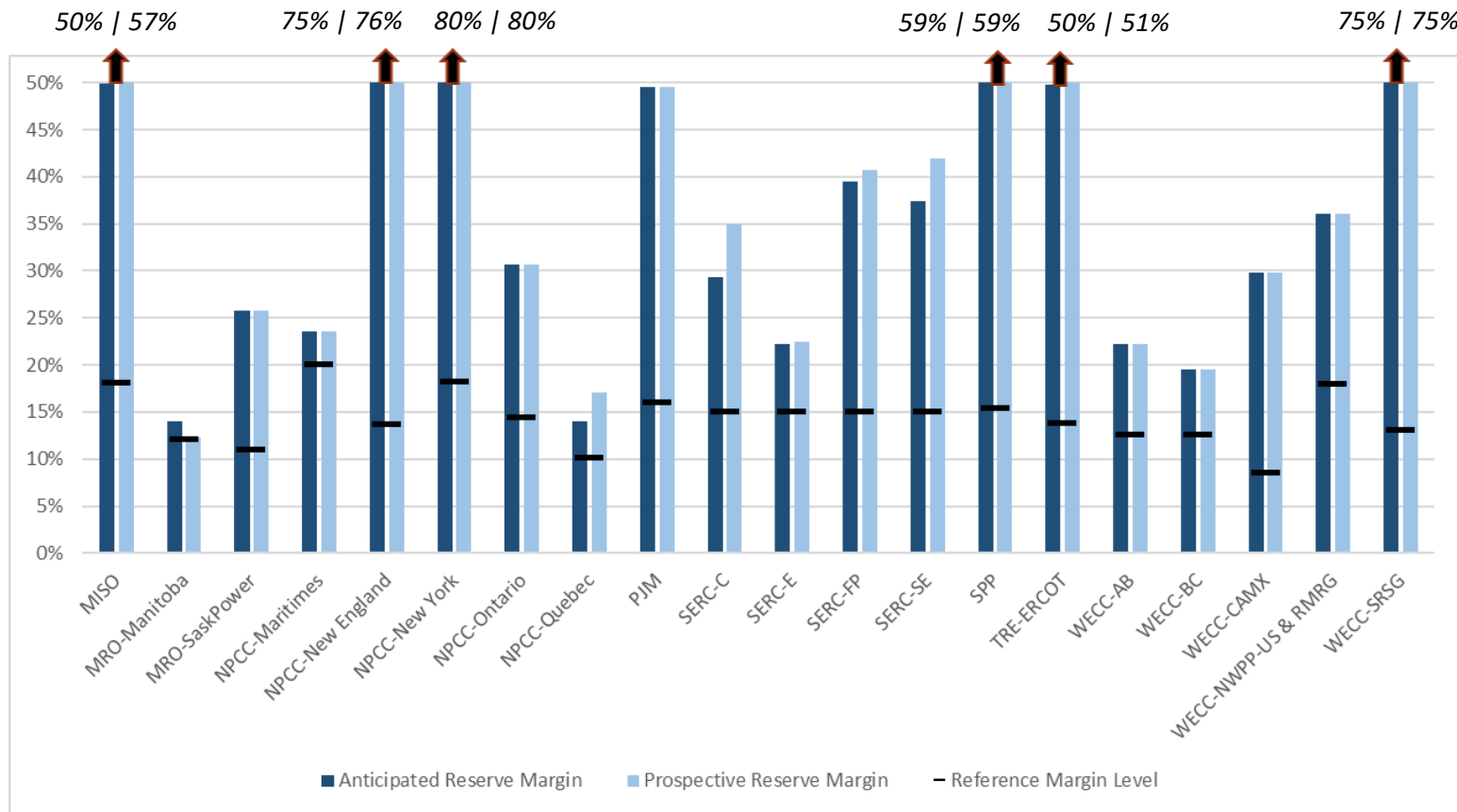
November 2020



- Sufficient resources are expected for the upcoming winter under normal winter weather conditions
- Fuel and energy assurance risk remains a concern in some areas
 - ISO-NE and NYISO continue to monitor fuel supply risk to natural gas fired generation on its coldest days
 - SERC is monitoring gas pipeline *force majeure* outages, although generators have redundant supply infrastructure and firm contracts in place
- Extreme weather continues to pose risk to BPS reliability
 - Operational risk assessments show extreme conditions that may result in the use of operating mitigations or energy emergency alerts to meet extreme peak demands
 - Widespread and prolonged periods of cold temperatures can reduce the ability of capacity/energy transfers from neighbors

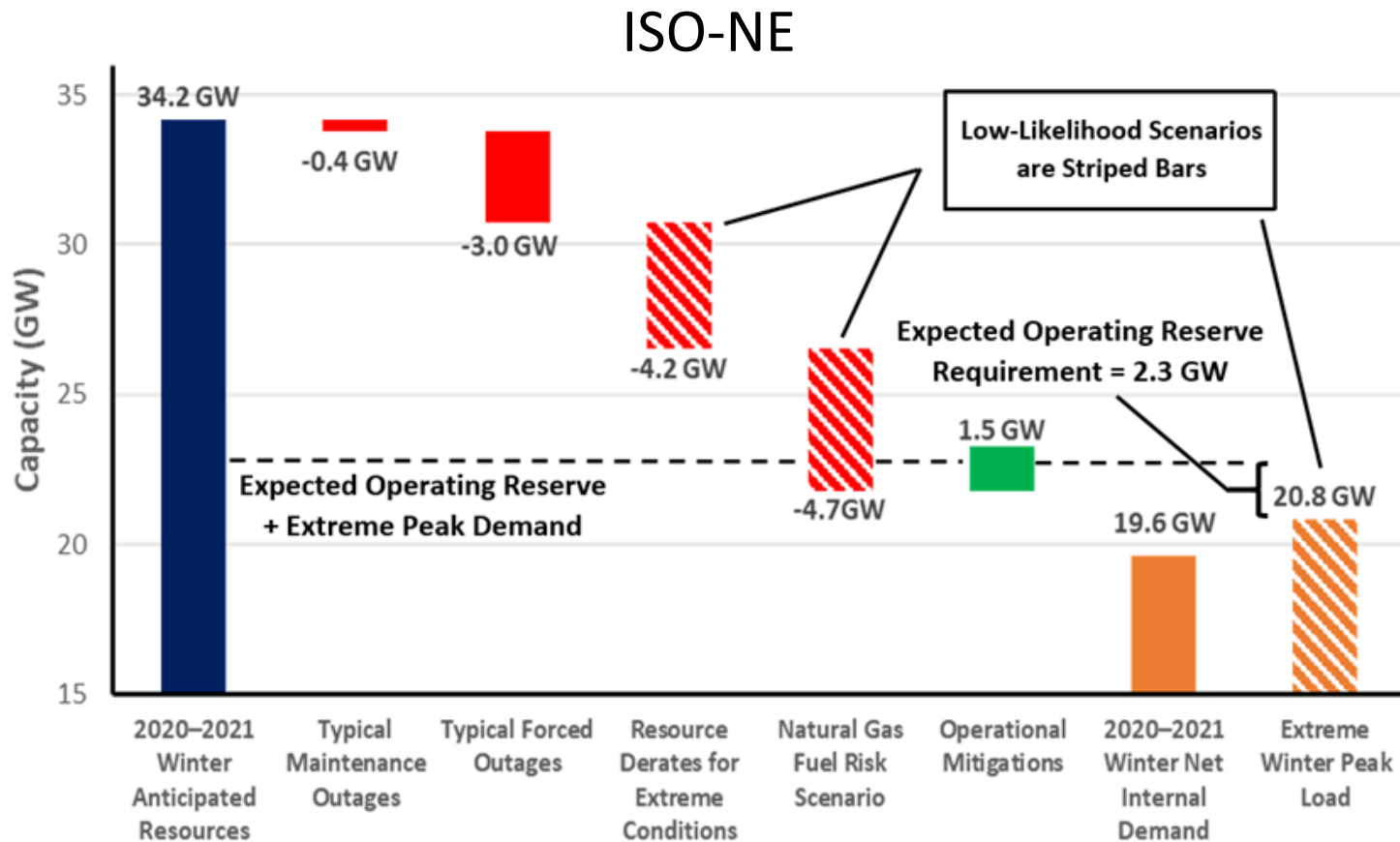
- The unlikely event of extreme generation outages and peak loads from extreme weather may result in reliability risk for:
 - MISO
 - Maritimes
 - ERCOT
 - WECC-NWPP & RMRG
- The ongoing pandemic is causing uncertainty in electrical demand projections and presents heightened cybersecurity risk
 - No specific threats or degradation to reliability and security are identified
- Damaged electricity infrastructure in SW Louisiana from the 2020 hurricanes affects the area's redundancy and resilience
 - Expected to be restored in early winter

- Reserve Margins are above Reference Margin Levels in all areas



Winter 2020-2021 Anticipated and Prospective Reserve Margins

- Operational risk scenarios analyze the effects of extreme conditions on meeting operating reserve targets



Date	Milestone
Week of October 19	Report sent to Reliability & Security Technical Committee for review
Week of November 2	Report sent to NERC Executive Management for approval
November 9	Final Report sent to NERC Board of Trustees and MRC
Week of November 9	Target report release



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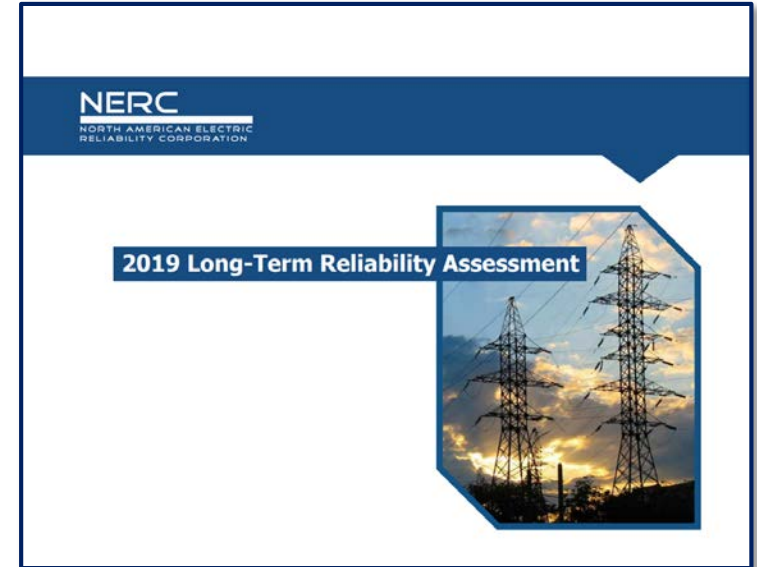
2020 Long-Term Reliability Assessment

Mark Olson, Manager, Reliability Assessments
Board of Trustees Meeting
November 5, 2020

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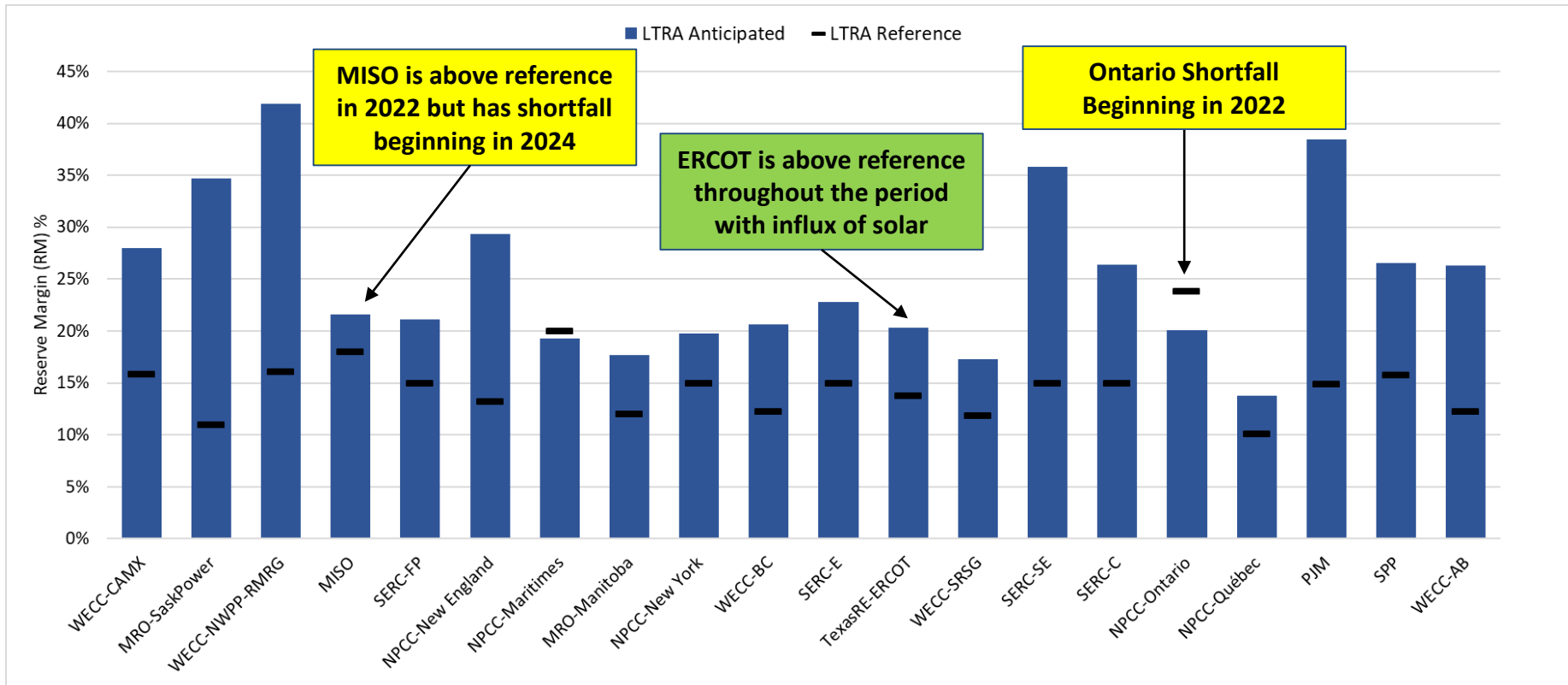


- Reliability
 - Resource Adequacy
 - Operating Reliability
- Transmission adequacy
- Demand and Generation forecasts
- Demand-Side Management
- Regional coordination
- Key issues - emerging trends
 - Technical challenges
 - Evolving market practices
 - System elements/dynamics
 - Potential legislation/regulation



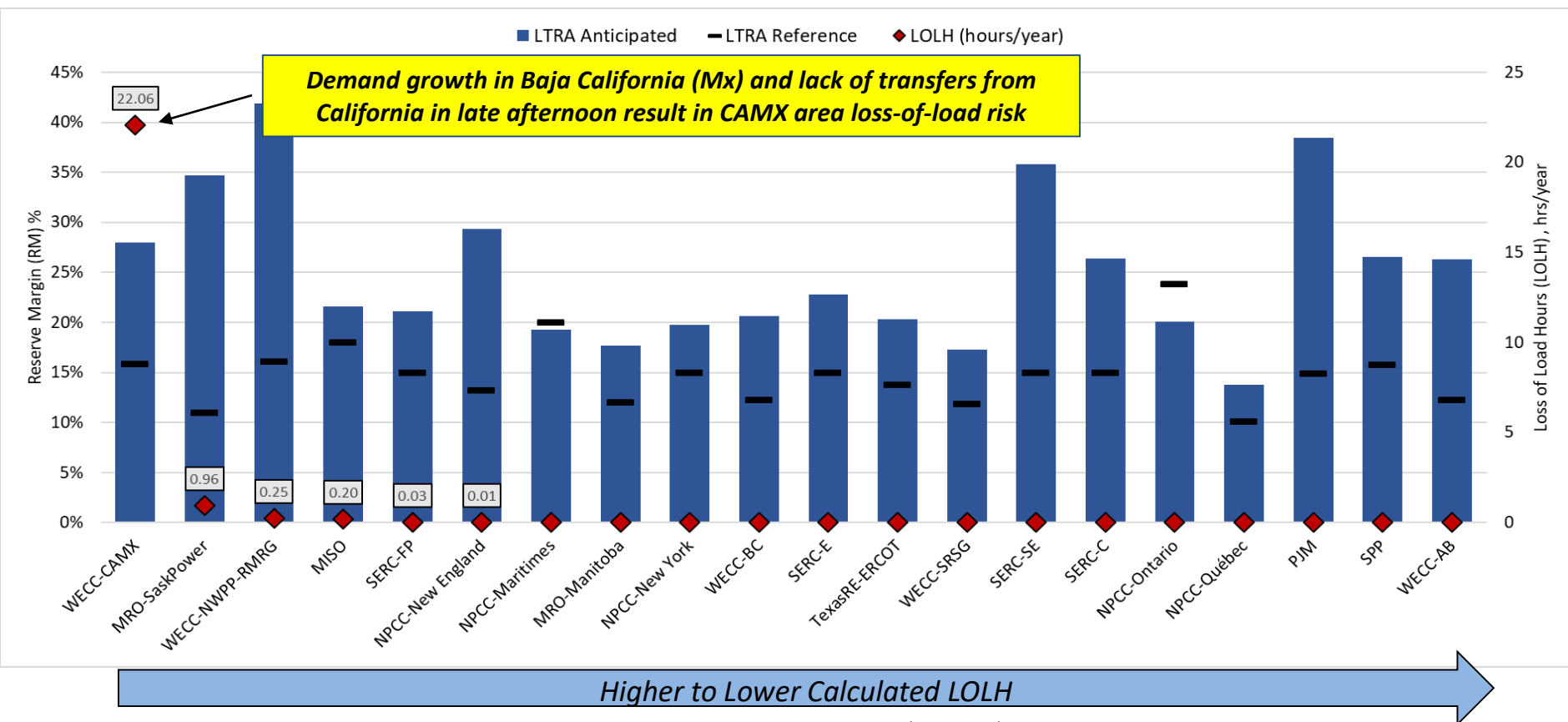
- The LTRA report was reviewed by the NERC Reliability and Security Technical Committee (RSTC) in October
- Findings cover five topics:
 - Planning Reserve Margins
 - Assessing Resource Adequacy across All Hours (Energy Assurance)
 - Changing Resource Mix
 - Distributed Energy Resource Impacts
 - Pandemic Impacts
- NERC Staff is preparing the report and recommendations for Board and MRC review beginning on November 24

- Planned reserves fall below the Reference Margin Level in NPCC-Ontario and MISO during the first five years
 - Resource on-peak capacity is sufficient in all other areas



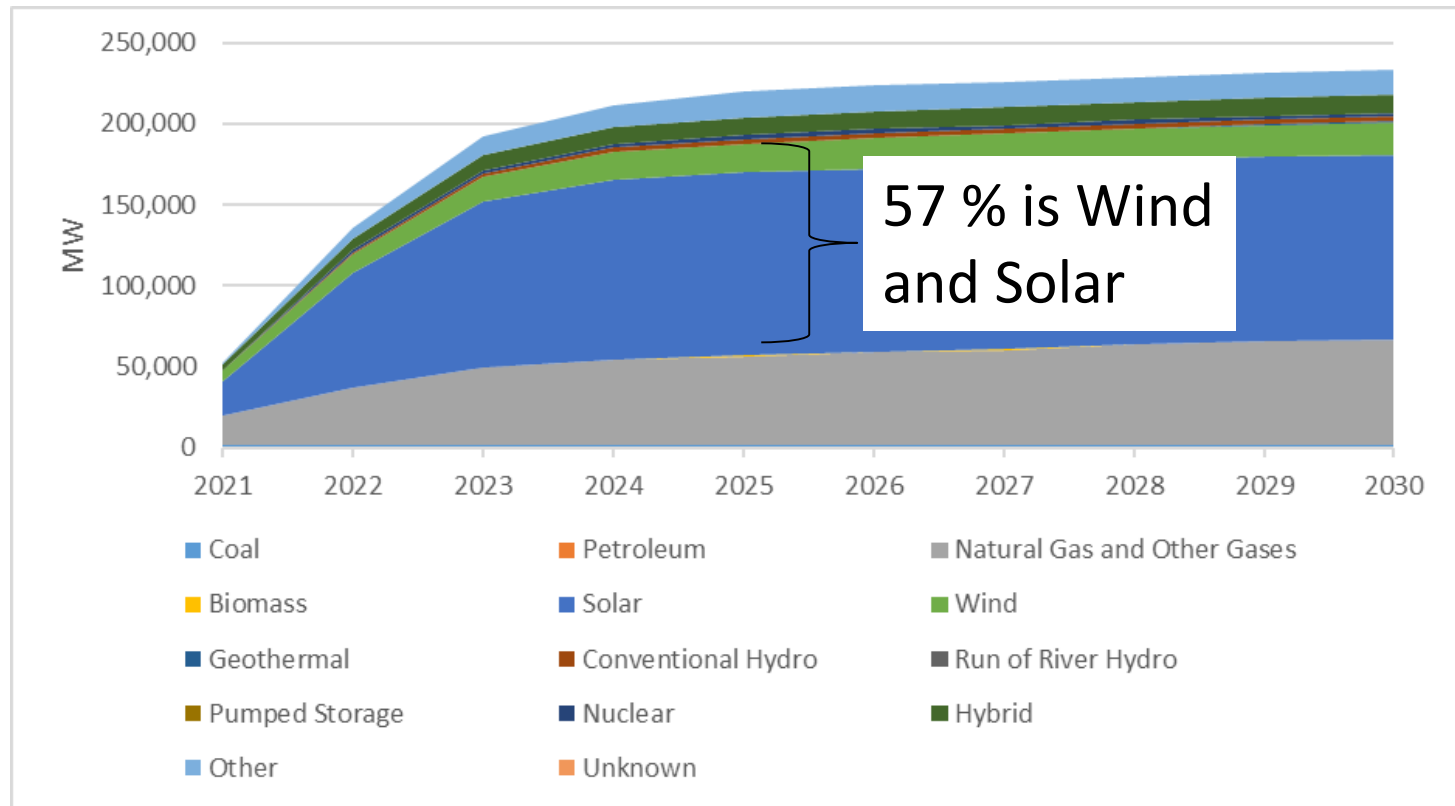
Anticipated Reserve Margins and Reference Margin Levels for 2022 Peak Season

- Probabilistic evaluations of all demand hours identify resource adequacy risks at peak and off-peak
 - Increasing risk is seen in parts of West Interconnection, MISO, and Texas



Reserve Margins and Loss-of-Load Hours (LOLH) for 2022 Peak Season

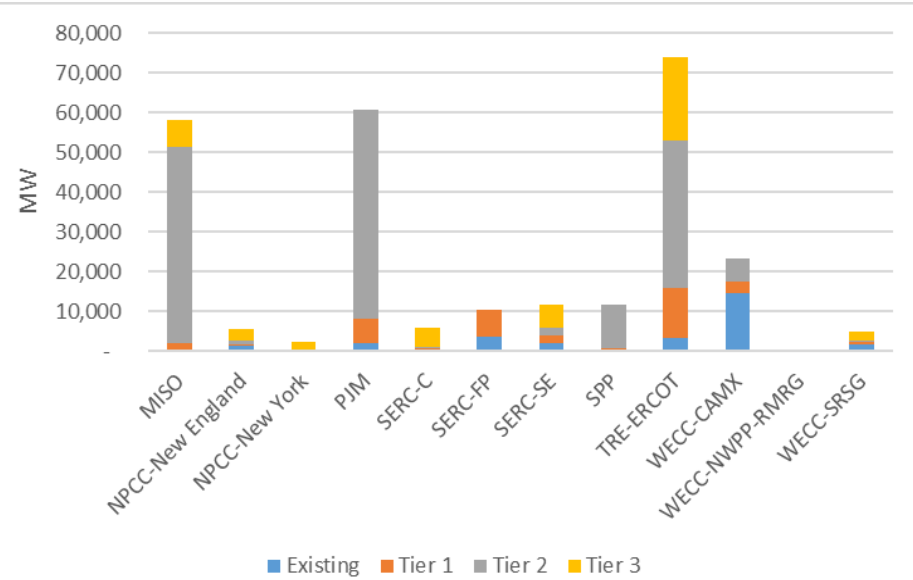
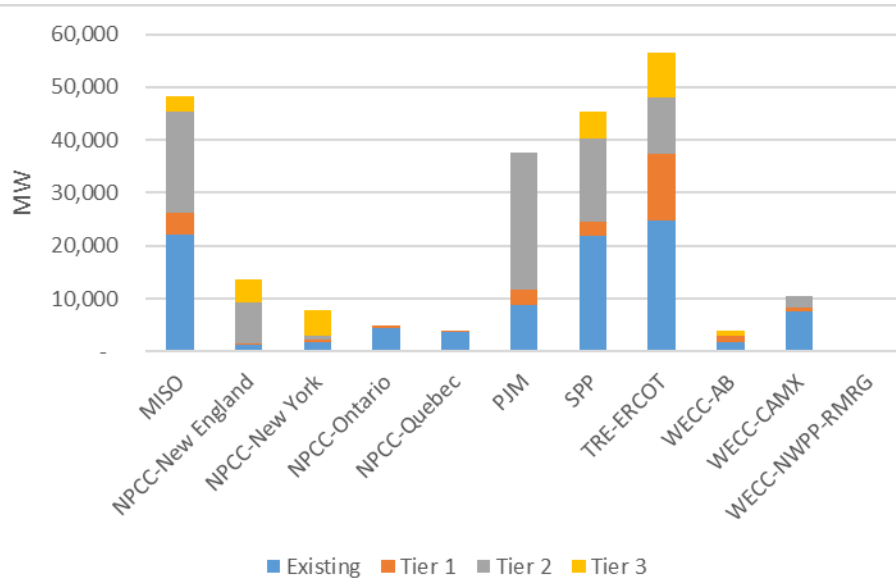
- Variable generation is surpassing natural gas-fired generation for future capacity additions to the grid



On-Peak Capacity of Generation Additions in Planning (Tiers 1 and 2) Through 2030

Variable Resources are Overtaking Other New Generation

- Texas, PJM, and MISO have the most Solar and Wind Generation in planning over the 10-year assessment period

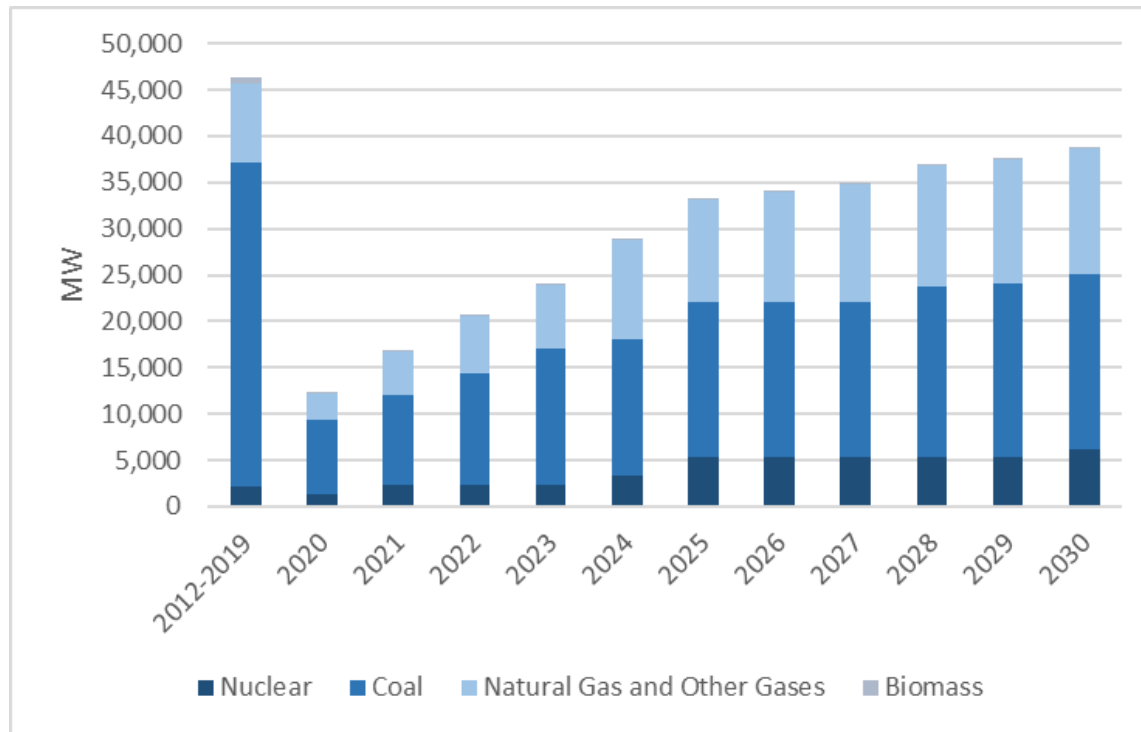


Wind

Solar

Existing and In-Planning Resources Through 2030 (Nameplate)

- Additional fossil-fueled generator retirements are anticipated as a result of economic uncertainty and policy goals
 - Projections below are for Confirmed Retirements ONLY



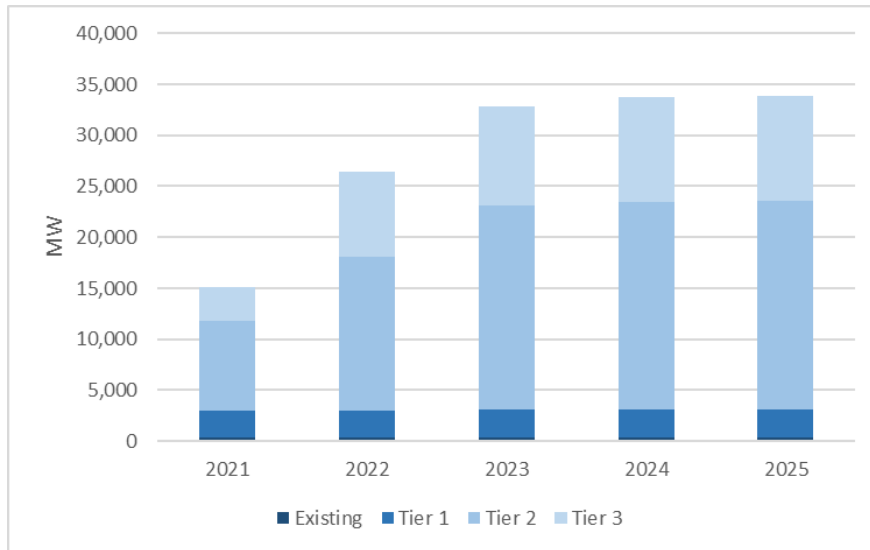
Capacity Retirements Since 2012 and Projected Cumulative Retirements Through 2030 (Confirmed)

- Future resource retirements are challenging to predict, but are expected to be higher than what is committed

Area	2022 Capacity Projected in 2018		2022 Capacity Projected in 2020		2022 Capacity Based On 2018 Stress-Test	
	Coal (MW)	Nuclear (MW)	Coal (MW)	Nuclear (MW)	Coal (MW)	Nuclear (MW)
MISO	57,792	11,955	51,948	12,169	40,454	6,575
NPCC New England	917	3,331	533	3,321	644	3,331
NPCC New York	1,011	3,364	-	3,343	707	3,334
PJM	54,432	28,620	52,405	32,626	38,103	15,602
SERC-E	17,384	8,653	15,552	12,104	12,169	4,759
SERC-SE	18,979	8,018	16,935	6,918	13,286	5,818
SPP	23,439	1,943	23,172	1,944	16,407	1,173
TRE-ERCOT	14,696	4,981	13,995	4,973	10,287	4,981

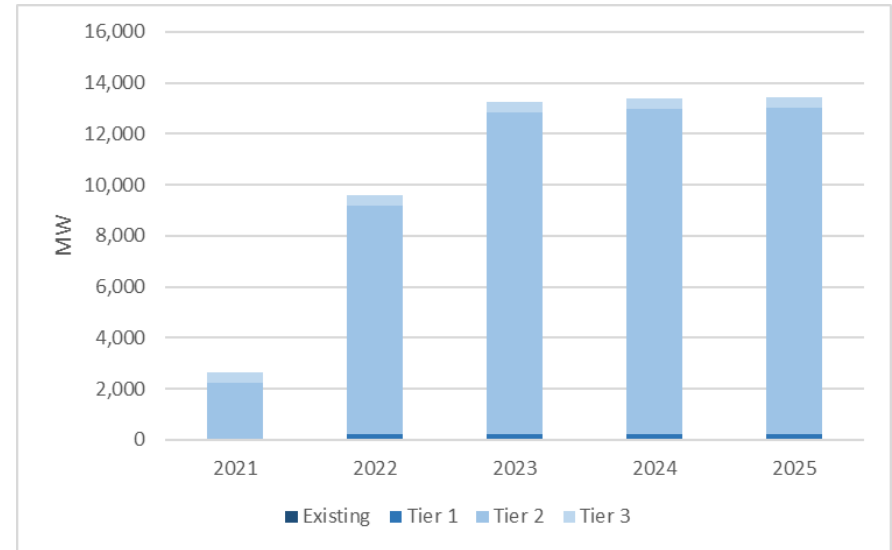
Projections of Year 2022 capacity made in 2018 and 2020. Projections on the left are based on LTRA data and confirmed retirements. Capacity on the right is a 2018 stress-test scenario (*NERC Generation Retirements Report*)

- Rapid growth and development over the next five years
 - Grid planners and operators need to address modeling, study, and operating issues in the near term for reliable integration



Battery Storage (Existing and Planning)

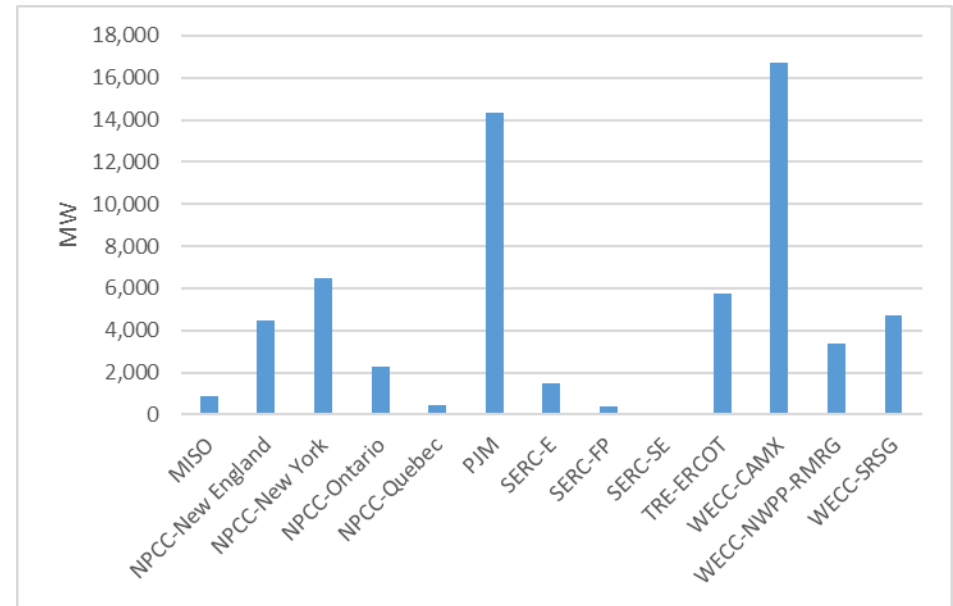
- **370 MW** Existing
- **23 GW** in Tier 1 and 2



Hybrid Generation (Existing and Planning)

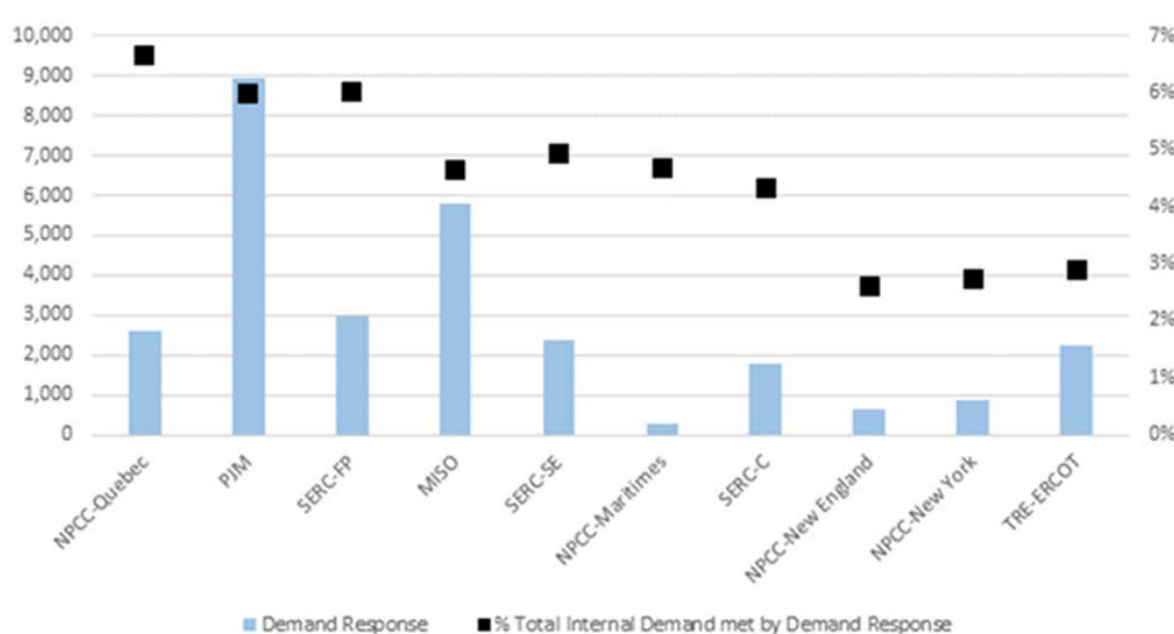
- **<100 MW** Existing
- **13 GW** in Tier 1 and 2

- NERC-wide solar DER are expected to nearly double over the next five years, and triple over the next ten years
- Texas, Ontario, and areas in the U.S. Northeast are approaching impactful levels of DER presently seen in the Western Interconnection



Projected Cumulative Distributed Solar PV Capacity by 2030

- With the health crisis comes uncertainty in demand forecasts
 - Summer operating experience in many areas showed increased residential demand that can offset decreased commercial/industrial load
- Reduced industrial load can affect the availability of controllable demand response programs

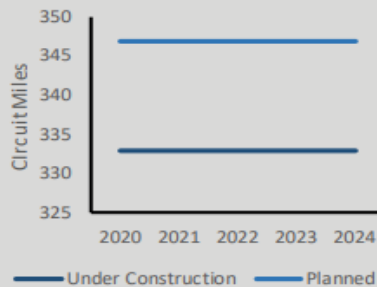


Projected 2021 Peak Season Demand Response – Assessment Areas with Highest DR Contribution to Meeting Total Peak Demand



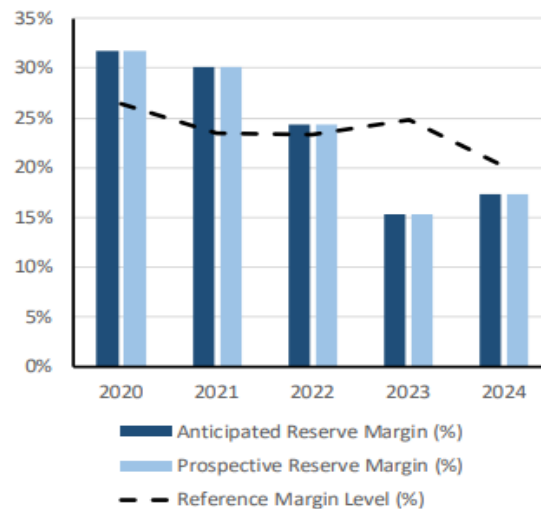
NPCC-Ontario

The Independent Electricity System Operator (IESO) is the BA and Reliability Coordinator for the province of Ontario. In addition to administering the area's wholesale electricity markets, the IESO plans for Ontario's future energy needs. The province of Ontario covers more than 415,000 square miles and has a population of more than 14 million people. Ontario is interconnected electrically with Québec, MRO-Manitoba, states in MISO (Minnesota and Michigan), and NPCC-New York.

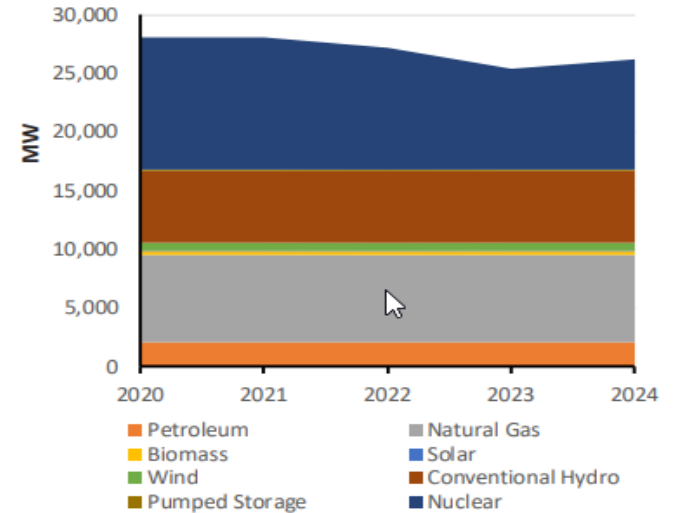


Projected Transmission Circuit Miles

Demand, Resources, and Reserve Margins (MW)							2019 LTRA Data			
Quantity	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Total Internal Demand	22,094	22,372	22,649	22,819	23,128	23,307	23,195	23,289	23,723	24,186
Demand Response	794	794	794	794	794	794	794	794	794	794
Net Internal Demand	21,300	21,577	21,855	22,025	22,333	22,513	22,401	22,495	22,928	23,392
Additions: Tier 1	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010
Additions: Tier 2	0	0	0	0	0	0	0	0	0	0
Additions: Tier 3	0	0	0	0	0	0	0	0	0	0
Net Firm Capacity Transfers	0	0	0	0	0	0	0	0	0	0
Existing-Certain and Net Firm Transfers	27,059	27,059	26,174	24,386	25,192	23,243	24,080	24,080	24,014	24,834
Anticipated Reserve Margin (%)	31.78%	30.09%	24.39%	15.31%	17.32%	7.73%	12.00%	11.54%	9.14%	10.49%
Prospective Reserve Margin (%)	31.78%	30.09%	24.39%	15.31%	17.32%	7.73%	12.00%	11.54%	9.14%	10.49%
Reference Margin Level (%)	26.39%	23.43%	23.30%	24.75%	20.07%	19.07%	23.40%	21.53%	21.58%	21.70%



Planning Reserve Margins

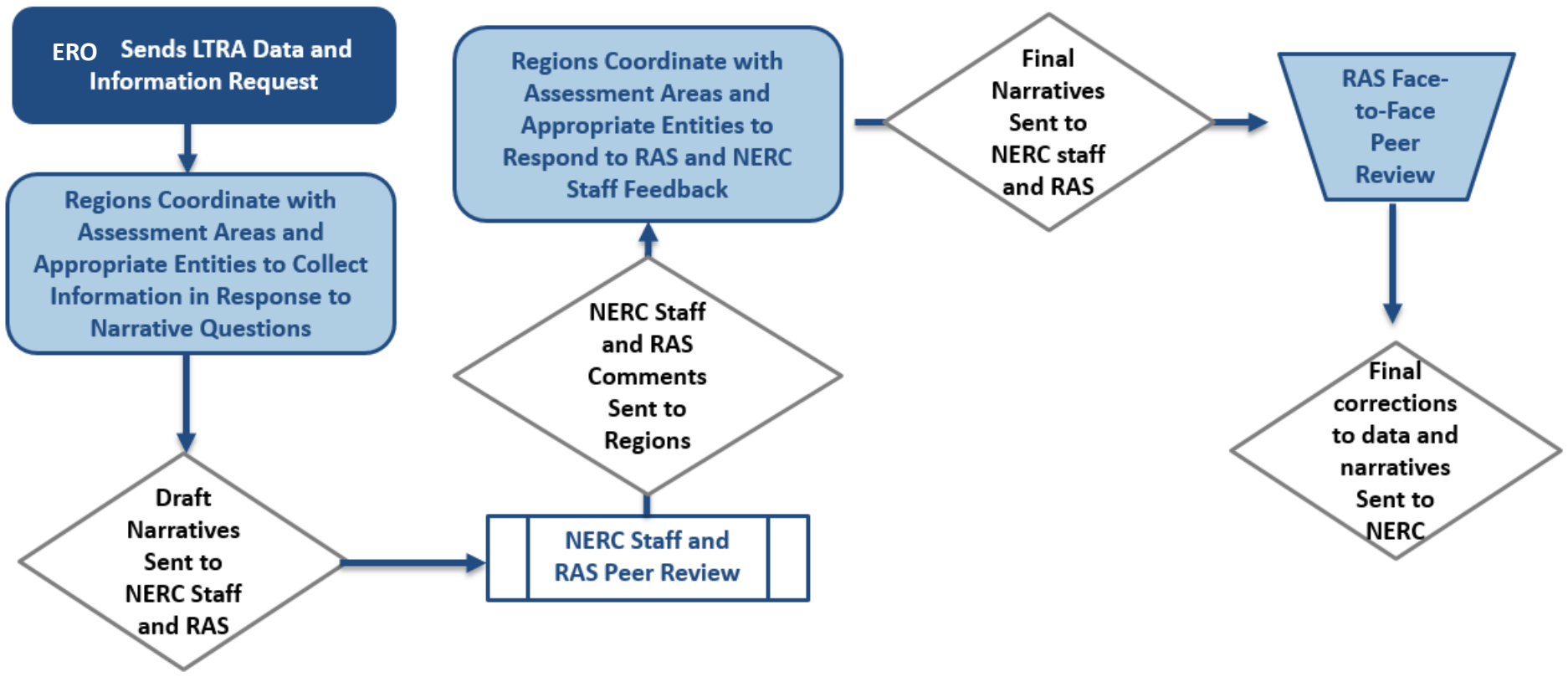


Existing and Tier 1 Resources

Date	Milestone
October 7	Report sent to Reliability and Security Technical Committee (RSTC)
November 24	Report sent to MRC and NERC Board
December 10	NERC Board Conference Call on report acceptance
December 17	Report release



Questions and Answers



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Addressing Known and Emerging Reliability and Security Risks

Reliability and Security Technical Committee and Reliability Issues Steering
Committee Joint Presentation

Nelson Peeler, Chair, RISC and Greg Ford, Chair, RSTC
Board of Trustees Meeting
November 5, 2020

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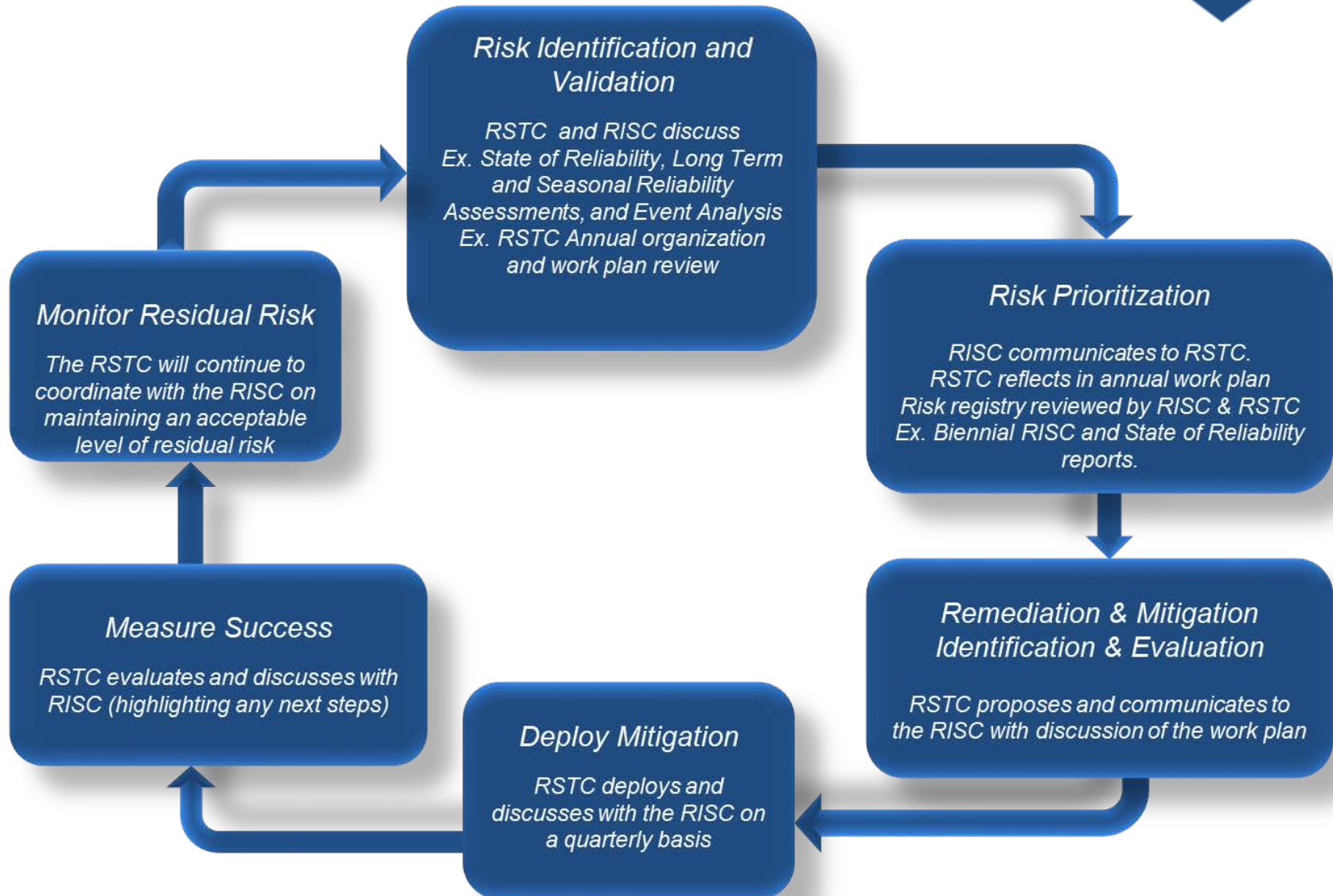


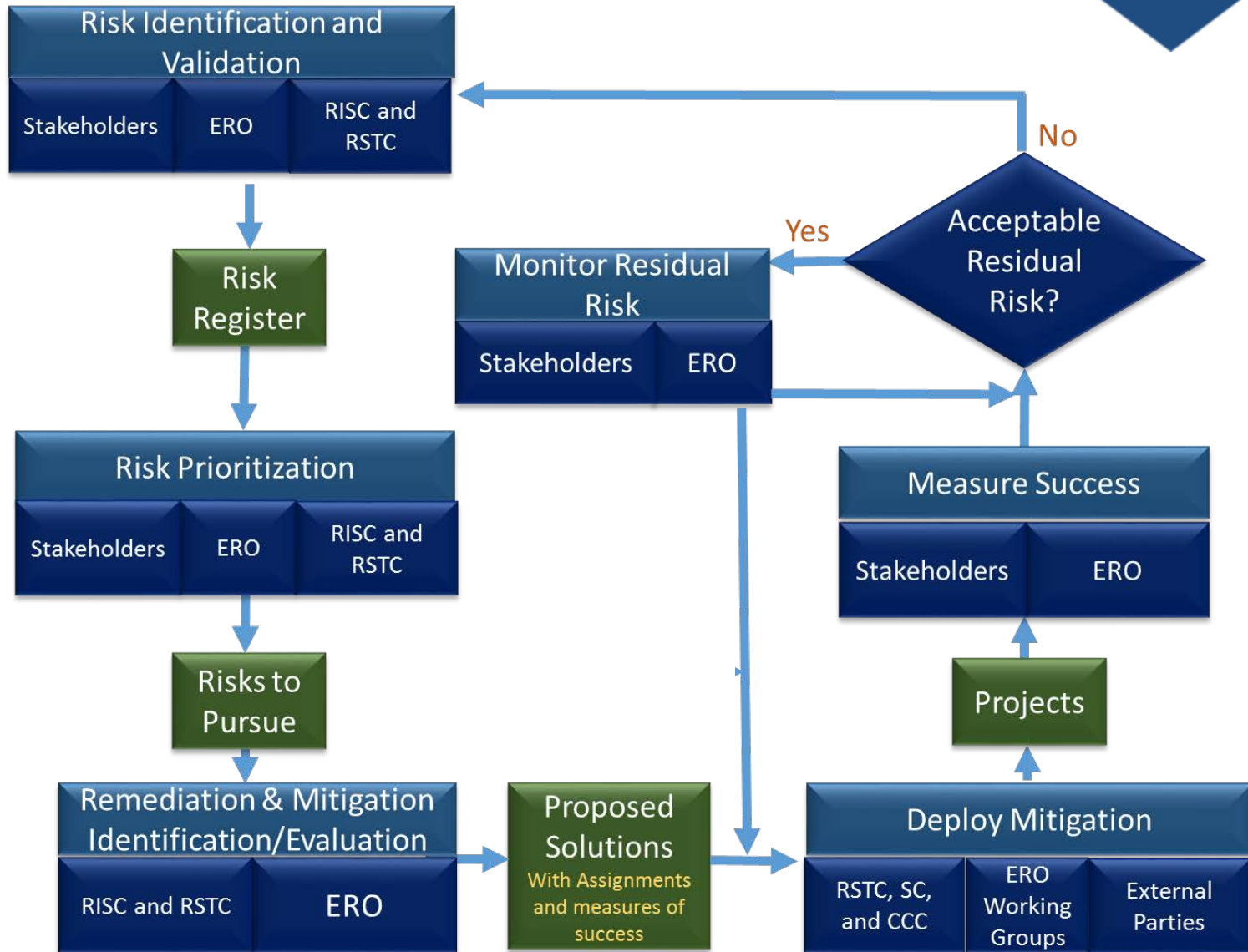
- Advisory committee that triages and provides front-end, high-level for risks of strategic importance to bulk power system (BPS) reliability, security and resilience
- Assists the Board, NERC standing committees, NERC staff, regulators, Regional Entities, and industry stakeholders in establishing a common understanding of the scope, priority, and goals for the development of solutions to address these risks
- Provides a framework for steering, developing, formalizing, and organizing recommendations to focus resources on the critical risks to improve the reliability, security and resilience of the BPS

Advances the reliability and security of the interconnected bulk power system (BPS) of North America by:

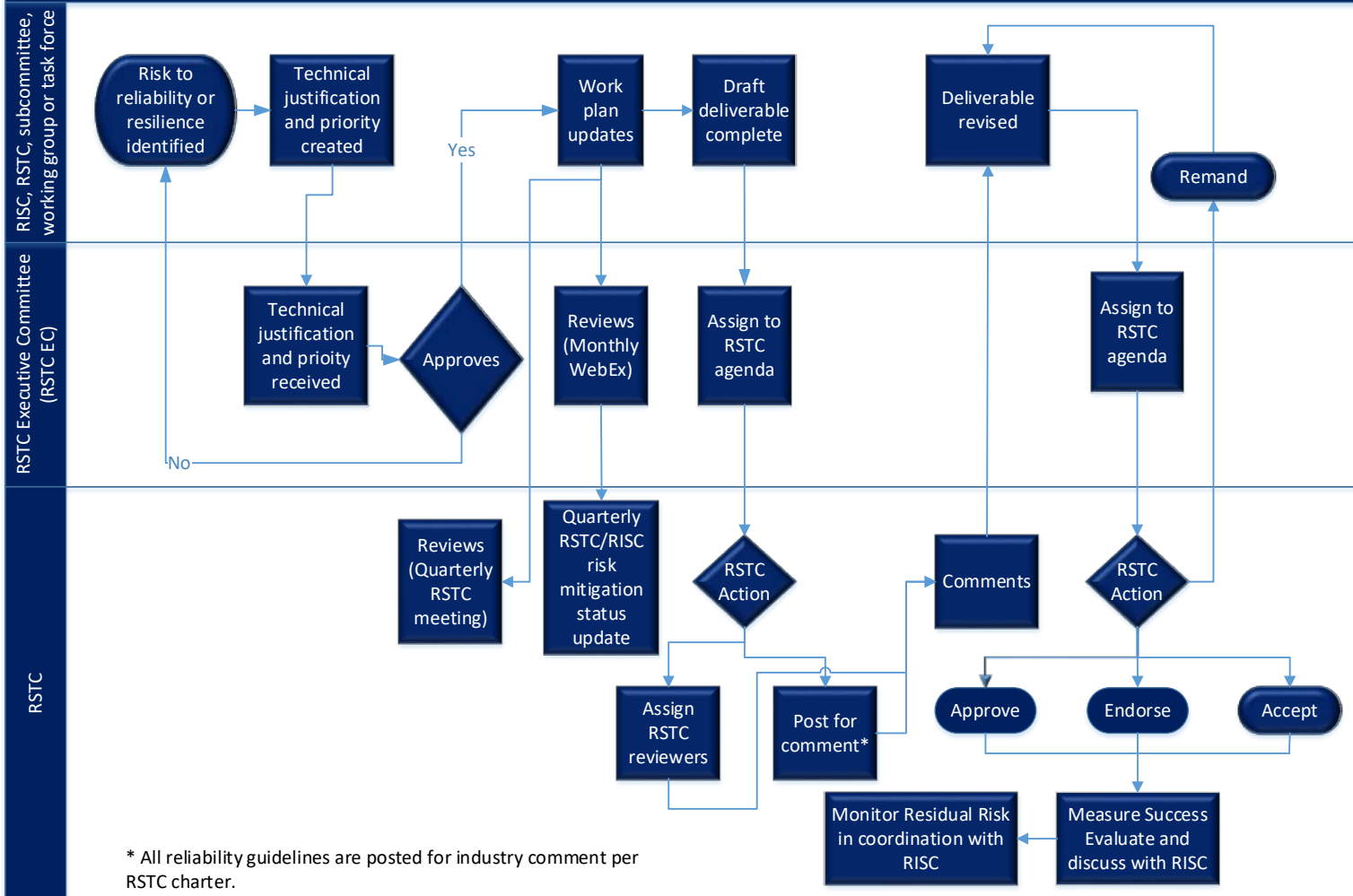
- Creating a forum for aggregating ideas and interests, drawing from diverse industry stakeholder expertise, to support the ERO Enterprise's mission
- Leveraging such expertise to identify solutions to study, mitigate, and/or eliminate existing and emerging risks to the BPS
- Coordinating and overseeing implementation of RSTC subgroup work plans.

1. Risk Identification
2. Risk Prioritization
3. Mitigation Identification and Evaluation
4. Mitigation Deployment
5. Measurement of Success
6. Monitor Residual Risk





Reliability and Security Committee (RSTC) Work Product Notional Process



- **RISC 2021 Reliability Leadership Summit – January 26-27, 2020**
- **RISC ERO Reliability Risks Priorities Report – Targeted August 2021**
- **Consider Formalizing the Standing Committee Coordinating Group (SCCG)**
 - The SCCG includes the leadership from all Board Standing Committees
 - Can support the coordination between committees as mitigations are being developed through the Six-Step Framework



Questions and Answers