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Standards

Howard Gugel, Vice President of Engineering and Standards
Board of Trustees Meeting
August 12, 2021

RELIABILITY | RESILIENCE | SECURITY




Project 2019-02

- Background
  - Provide increased options for entities to leverage third-party data storage and analysis systems
  - Clarify the protections expected when using third-party solutions (e.g., cloud services)
- Minority Issues
  - None
- Action
  - Adopt
    - CIP-004-7 – Cyber Security – Personnel & Training
    - CIP-011-3 – Cyber Security – Information Protection

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Proposed Rules of Procedure Revisions

Reliability Standards

Marisa Hecht, Counsel
Board of Trustees Meeting
August 12, 2021

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Proposed Revisions

- Section 300 – Reliability Standards Development
  - Remove two governmental reporting requirements
  - Clarify obligations after corporate structure change
  - Remove or update obsolete NERC staff titles and functional classes
- Appendix 3B – Procedure for Election of Members of the Standards Committee
  - Remove references to obsolete NERC staff title

Proposed Revisions

- Appendix 3D – Development of the Registered Ballot Body
  - Clarify General Counsel delegation of application review to legal staff
  - Clarify segment qualification guidelines regarding:
    - NERC actions after annual self-attestation;
    - Registered Ballot Body membership after corporate structure change; and
    - Regional Entity membership based on dissolution of two Regional Entities.

Development and Action

- Development
  - Posted for 45-day public comment period
  - Received seven sets of responses, including five sets of comments
    - Two suggested changes beyond the scope of this revision effort
    - One suggested retaining the reporting requirement regarding directives
    - Other comments suggested revisions, which NERC incorporated
- Action
  - Approve proposed revisions and direct staff to file

Questions and Answers

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Standards Efficiency Review Update

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Implementation status

- Evidence Retention Overhaul
  - Evidence proposal endorsed by Standards Committee (SC)
  - Rules of Procedure modifications approved by Board in May
  - Standards development document modifications in SC work plan
- Consolidate Information/Data Exchange Requirements
  - Standard Authorization Request posted for comment (Project 2021-06)
  - Drafting team nominations solicited
- Move requirements to guidance
  - Framework endorsed by Reliability and Security Technical Committee (RSTC)
  - Can be used for evaluation
- Prototype Standard
  - Concept endorsed by SC and incorporated into work plan

SER Final Report

- Two additional activities
  - Post collected proposed standards modifications to SER project page
  - Incorporate efficiency concepts into additional standards development processes

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Low Impact BES Cyber Asset Update

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Recent Activity

- Standards
  - Expected posting of changes to CIP-003 in August
  - Addresses February 2020 Board resolution
- Report filed with FERC on June 30
- Low Impact Criteria Review team
  - Team formed with varied expertise
  - Agreement on scope and deliverable
  - Work initiated on white paper
  - Input to be solicited before finalization

Questions and Answers

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2021 State of Reliability Report

Preview

John Moura, Director of Reliability Assessment
Donna Pratt, Performance Analysis Manager

Board of Trustees Meeting
August 12, 2021

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The State of Reliability: Objective

- Provide objective, credible, and concise information to policy makers, industry leaders, and the NERC Board of Trustees on issues affecting the reliability and resilience of the North American bulk power system (BPS)
  - Identify system performance trends and emerging reliability risks
  - Determine the relative health of the interconnected system
  - Measure the success of mitigation activities deployed

Key Findings

- Unprecedented conditions in 2020 challenged BPS resilience:
  - COVID-19 Pandemic
  - Historic hurricane season
  - Extreme heat with load shed and wildfires in the West
  - October 2020 ice storm in Texas
  - December 2020 supply chain compromise
- Escalated resource adequacy risk and a wide-spread heatwave across the Western Interconnection led to substantial load shedding in August
- Cybersecurity attacks and vulnerabilities remain a significant concern
- Favorable Trends
  - Improving restoration times of transmission system outages after extreme weather
  - Continued reduction in the misoperations rate
- Unfavorable Trends:
  - Highest AC circuit unavailability due to extreme weather
  - Highest transmission-related events that resulted in load loss

The North American BPS – By the Numbers

4,588,062,000 MWh
2020 Actual Energy

1,048,944 MW
2020 Summer Peak Capacity

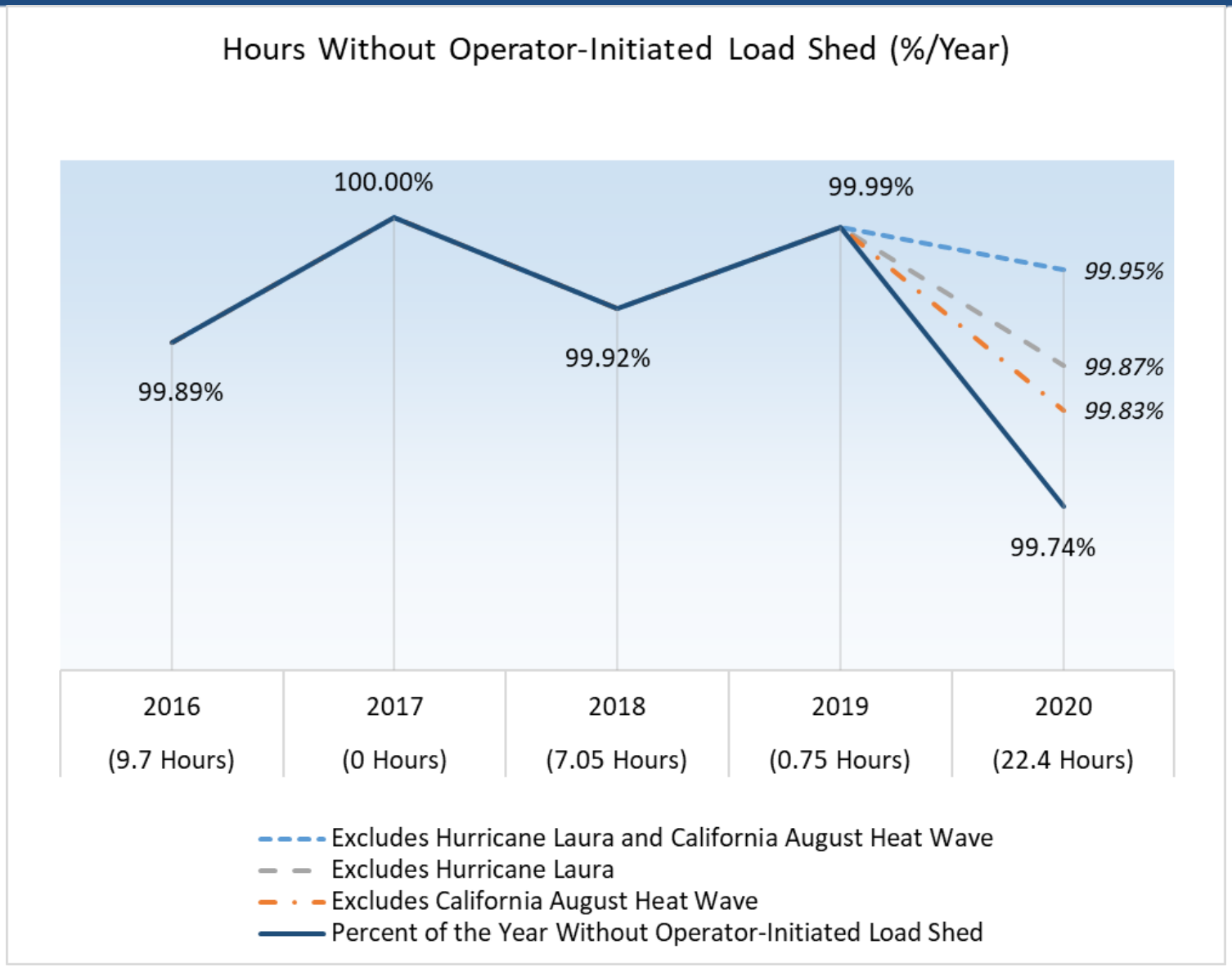
503,551 mi
Total Transmission Circuit Miles > 100kVm

6,009
Number of Conventional Generating Units > 20MW

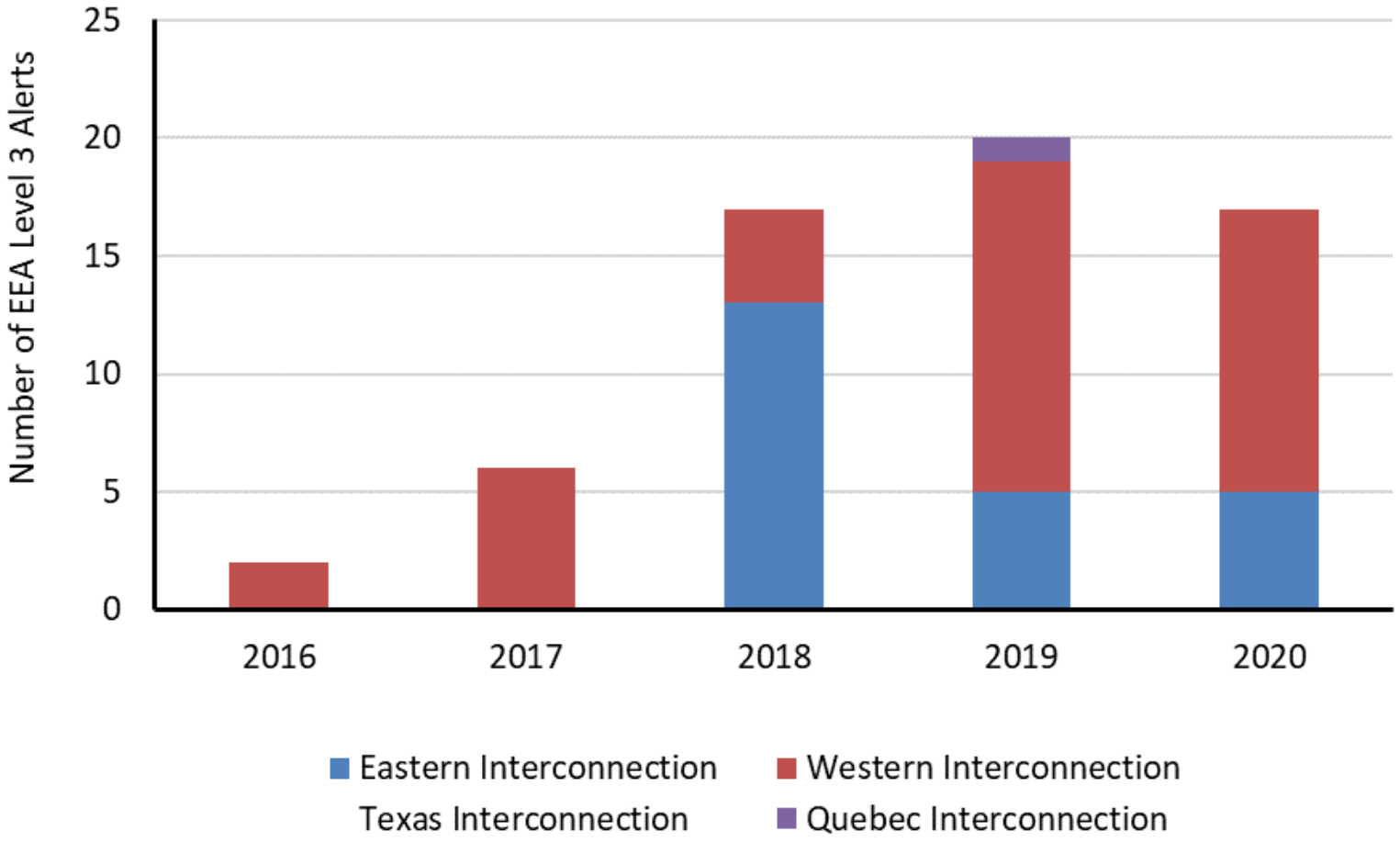
99.74%
Time with no operator-initiated firm load shedding associated with EEA-3 (13.8 GWh energy unserved or 0.0003% of total energy served)

0
Category 3, 4, or 5 Events (non-weather related)

Hours Without Operator-Initiated Firm Load Shed (%/year)



Number of EEA Level 3 Alerts by Interconnection



Reliability Indicator Categories

The reliability indicators below represent four core aspects to system performance that are measurable and quantifiable:

- **Resource Adequacy** - Does the system have enough capacity, energy, and ancillary services?
- **Transmission Performance and Availability** - Is the transmission system adequate?
- **Generation Performance and Availability** - What is the outage performance of the generation fleet?
- **System Protection and Distribution Performance** - Can the system remain stable and withstand disturbances?

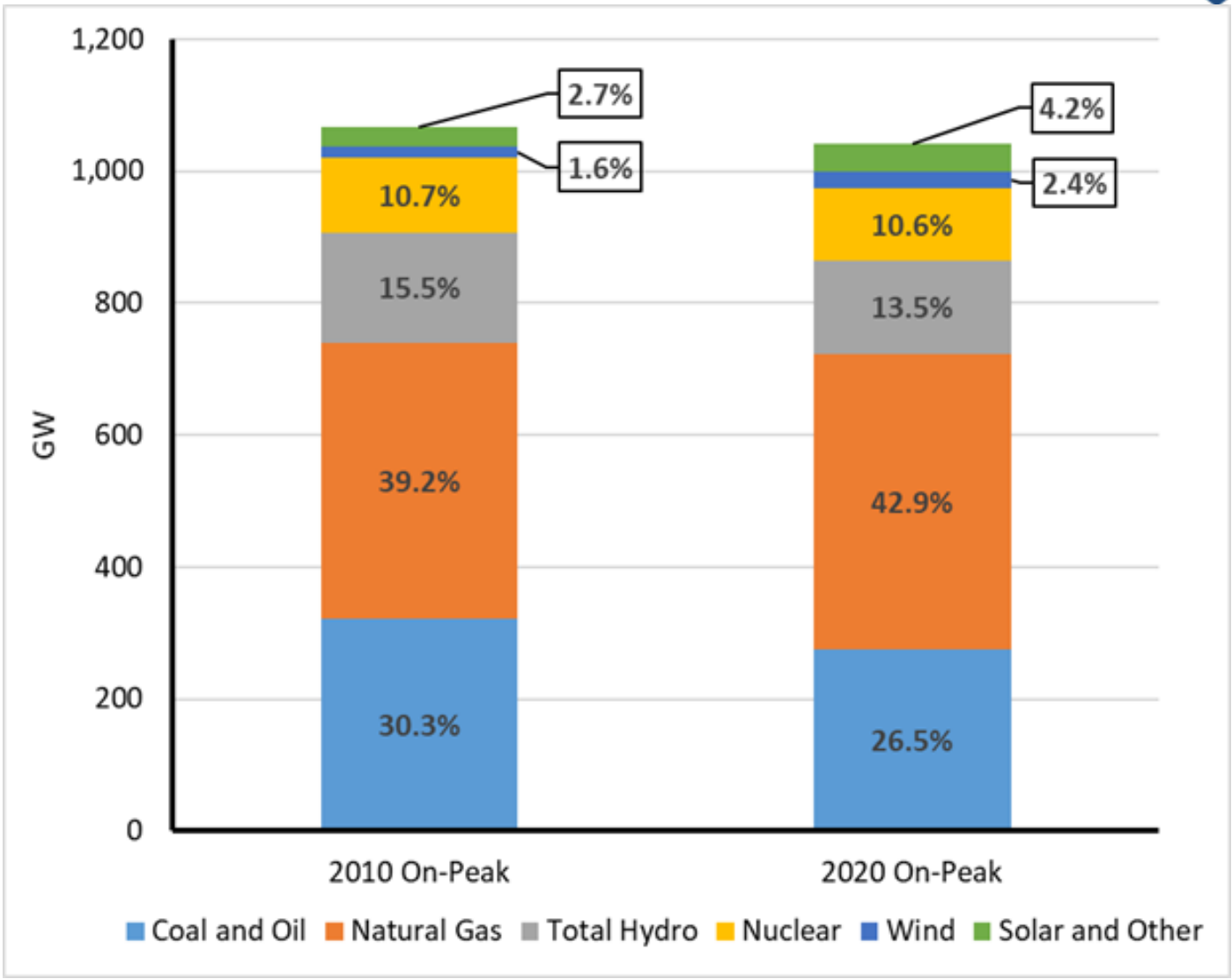
Red – Actionable, key finding

Yellow – Declining, heightened monitoring

Gray – Stable or no change

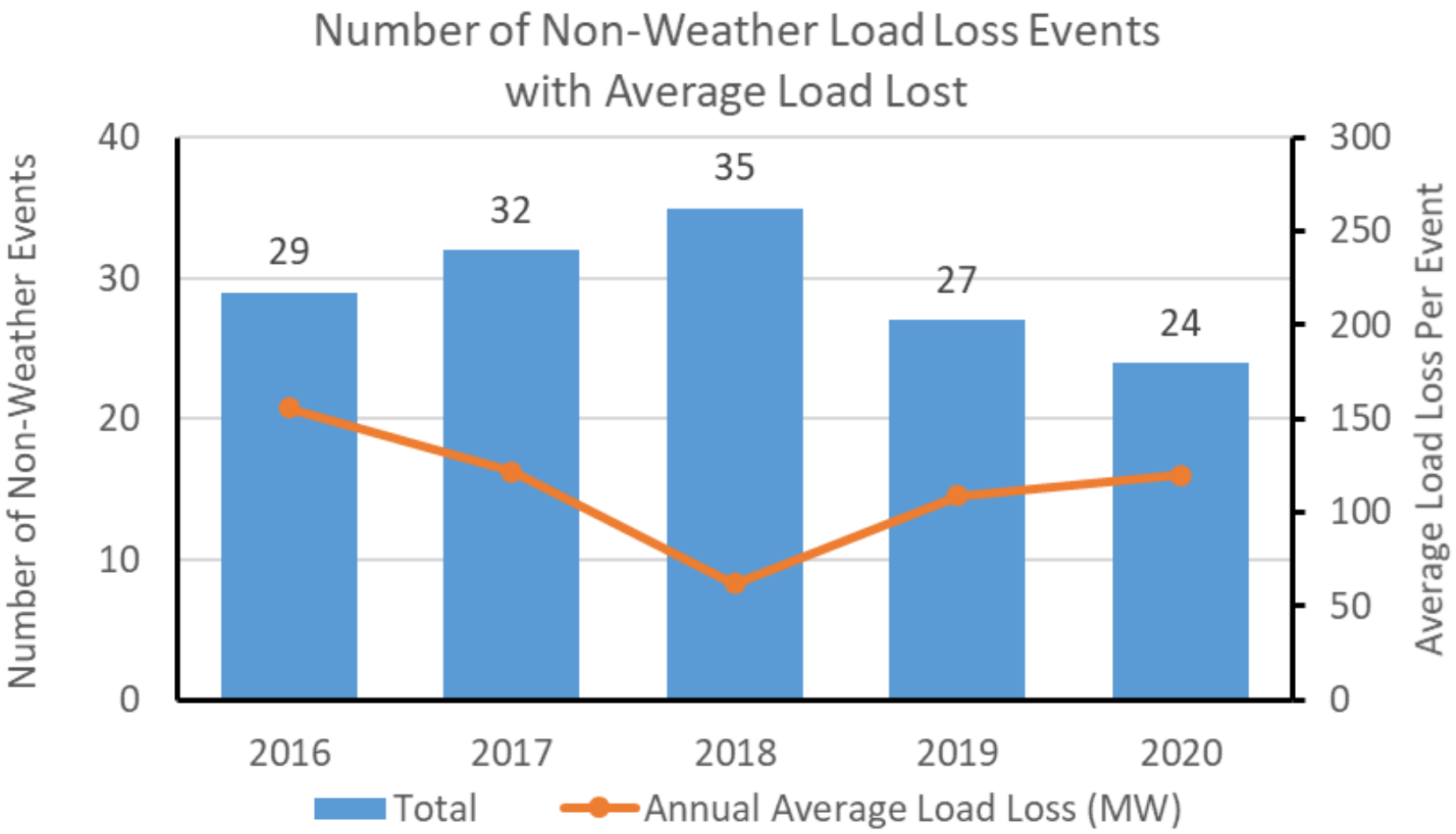
Green – Improving

NERC-Wide Resource Mix
On-Peak Capacity 10-Year Comparison

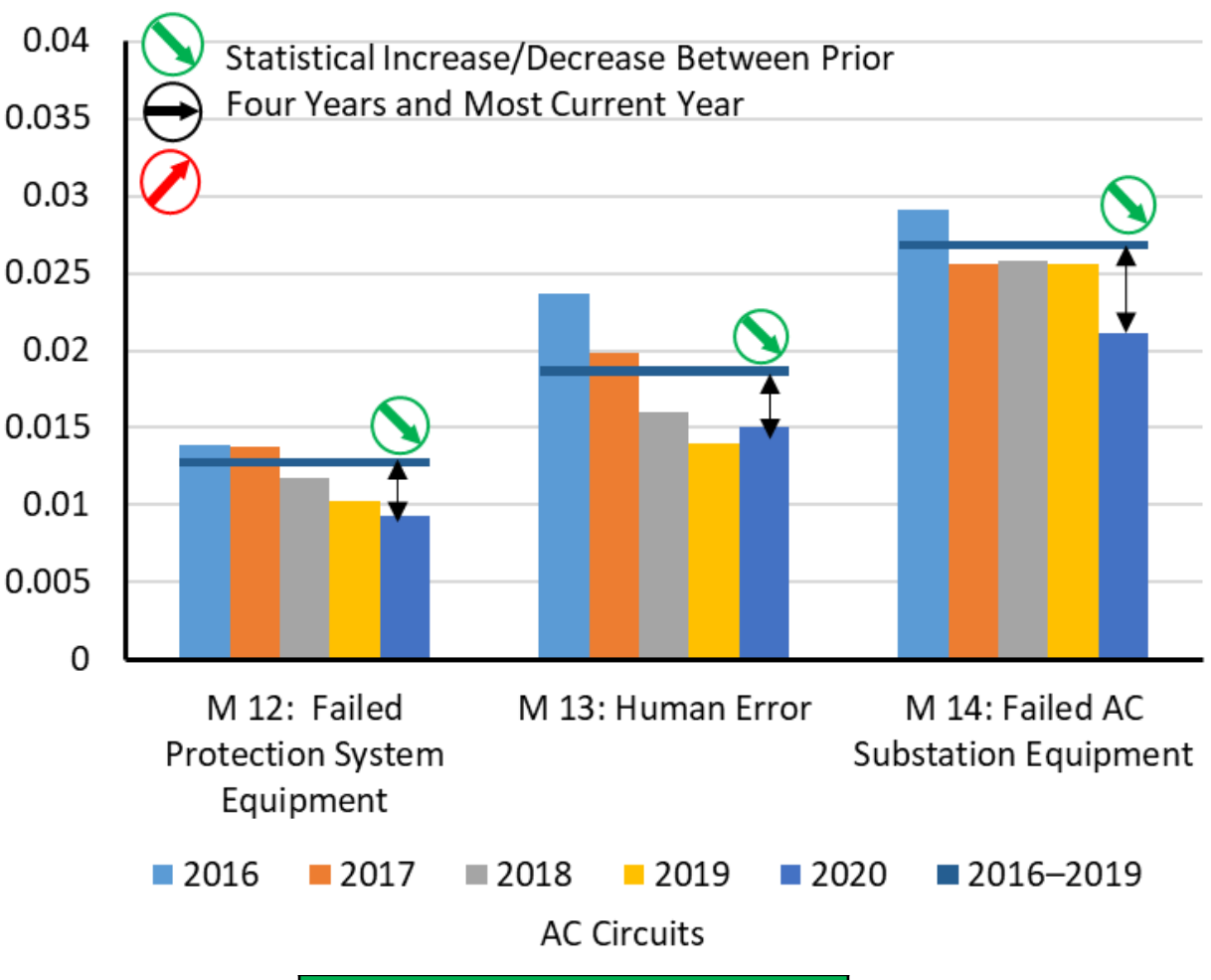


2020 Events and Trends

Transmission greater than 100kV

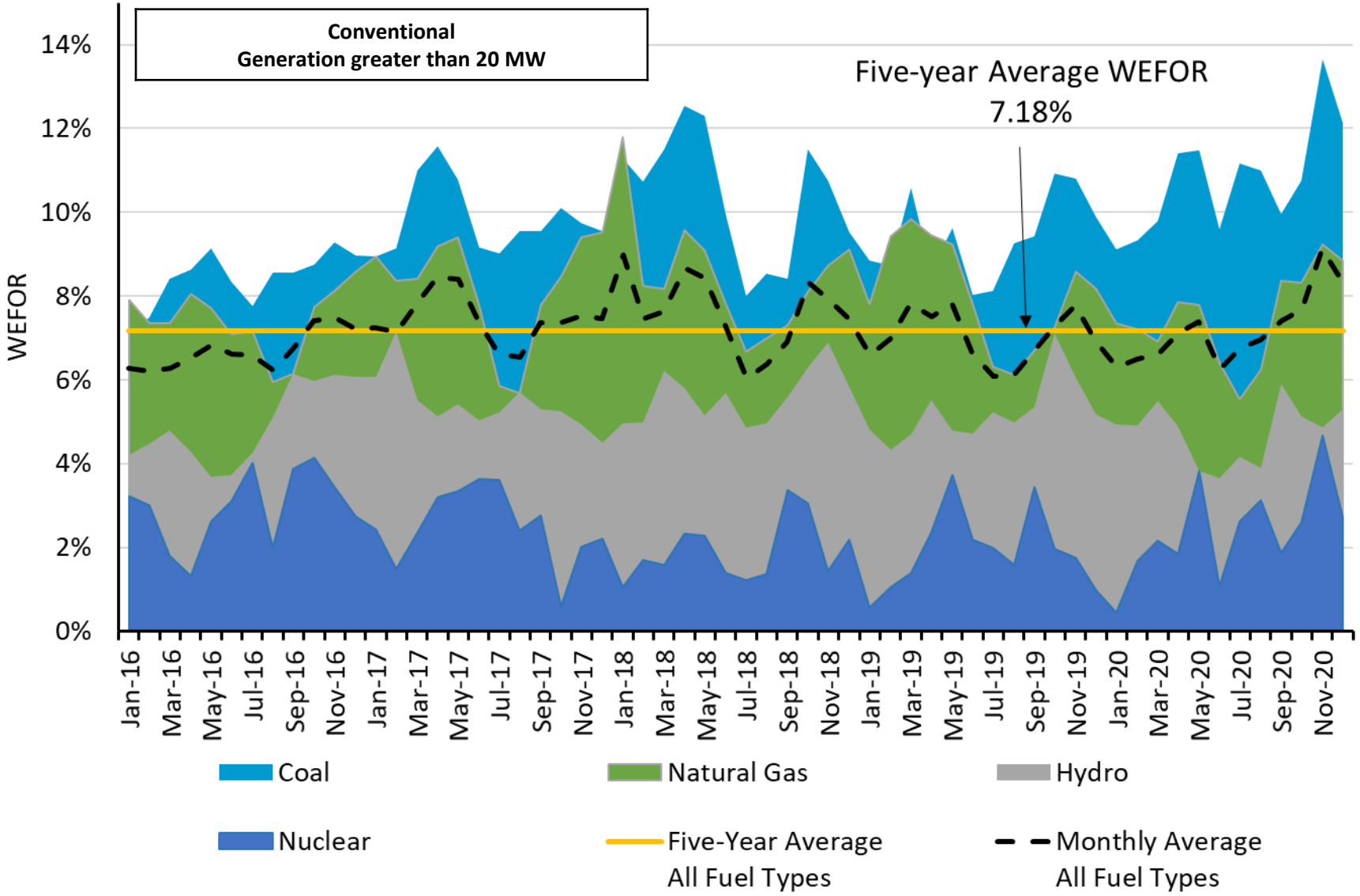


Reliability Indicators:
Transmission Outages

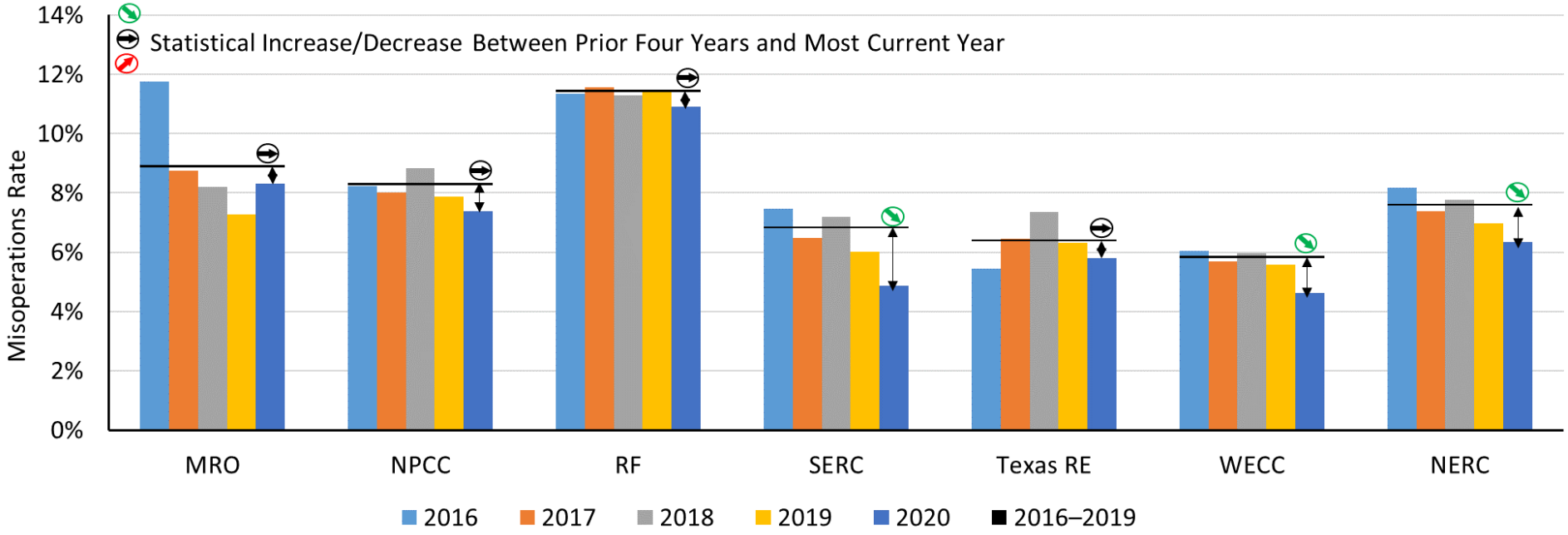


Protection System
Human Error
AC Substation Equipment

Conventional Generation Availability by Major Fuel Type

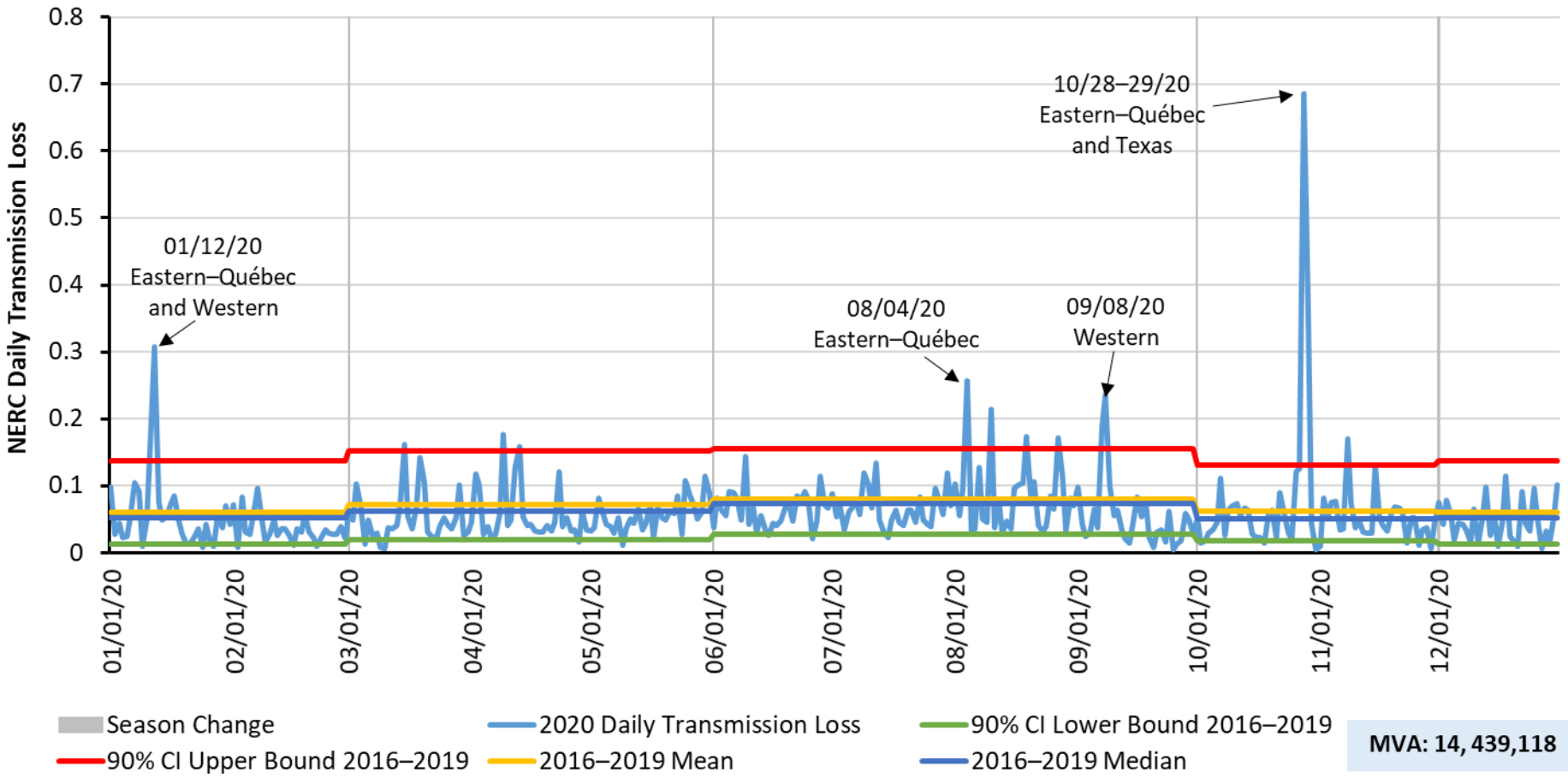


Reliability Indicators:
Protection System Misoperations

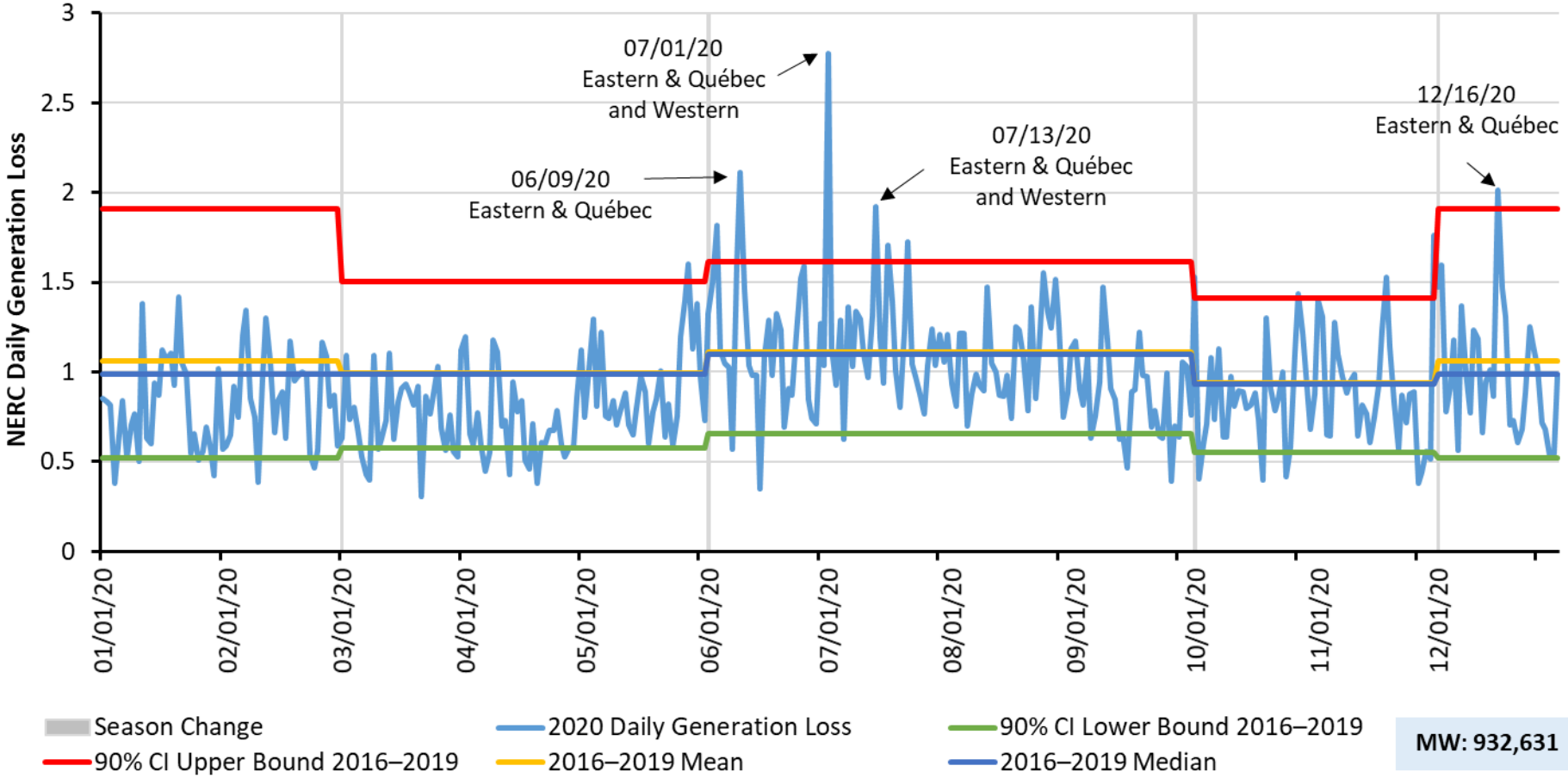


BES Protection Systems

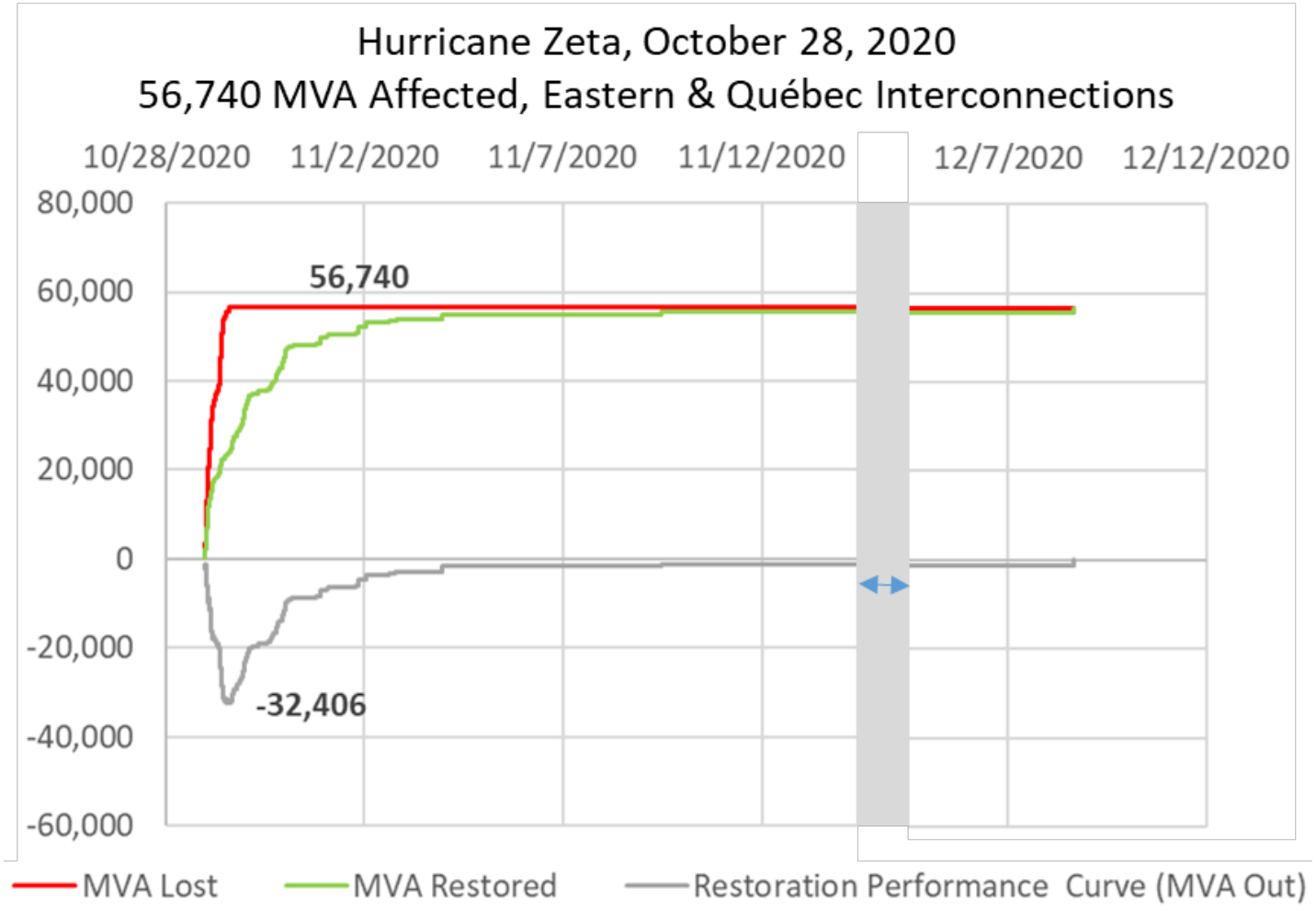
Priority Reliability Issues Example: Extreme Natural Events - Transmission



Priority Reliability Issues Example: Extreme Natural Events - Generation



Example: Transmission Outage Restoration Analysis



2021 SOR Release Schedule

Date	Milestone
August 12	Report presented to NERC Board of Trustees for acceptance
August 17	Target Release

Questions and Answers

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2021 ERO Reliability Risk Priorities Report

Nelson Peeler, Chair, RISC Committee
Board of Trustees Meeting
August 12, 2021

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RISC Objectives & Activities

- Objectives:
  - Develop the scope, priority and goals to mitigate known and emerging risks to bulk power system reliability
  - Provide a framework to effectively focus NERC and industry resources to improve reliability
- Biennial Activities
  - Reliability Leadership Summit
  - Industry risk survey
  - Identify Priority Risks
  - Identify Mitigating Activities
- Document result in RISC Report

Identified Risks

- 11 risks from multiple inputs (e.g., ERO Leadership Summit, Emerging Risks Survey results, Subject Matter Expertise)
  - Changing Resource Mix
  - Cyber Security Vulnerabilities
  - Resource Adequacy and Performance
  - Critical Infrastructure Interdependencies
  - Loss of Situational Awareness
  - Extreme Natural Events
  - Physical Security Vulnerabilities
  - Bulk Power System Planning
  - Control and Protection Systems Complexity
  - Human Performance and Skilled Workforce
  - Electromagnetic Pulse

Key Functional Areas

Four high level risk profiles:

Grid Transformation

A. Bulk Power System Planning

B. Resource Adequacy and Performance

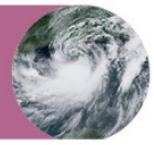
C. Increased Complexity in Protection and Control Systems

D. Situational Awareness Challenges

E. Human Performance and Skilled Workforce

F. Changing Resource Mix

Extreme Natural Events



A. Extreme Natural Events, Widespread Impact

- GMD

B. Other Extreme Natural Events

Security Risks

A. Physical

B. Cyber

C. Electromagnetic Pulse

Critical Infrastructure Interdependencies

A. Communications

B. Water/Wastewater

C. Oil

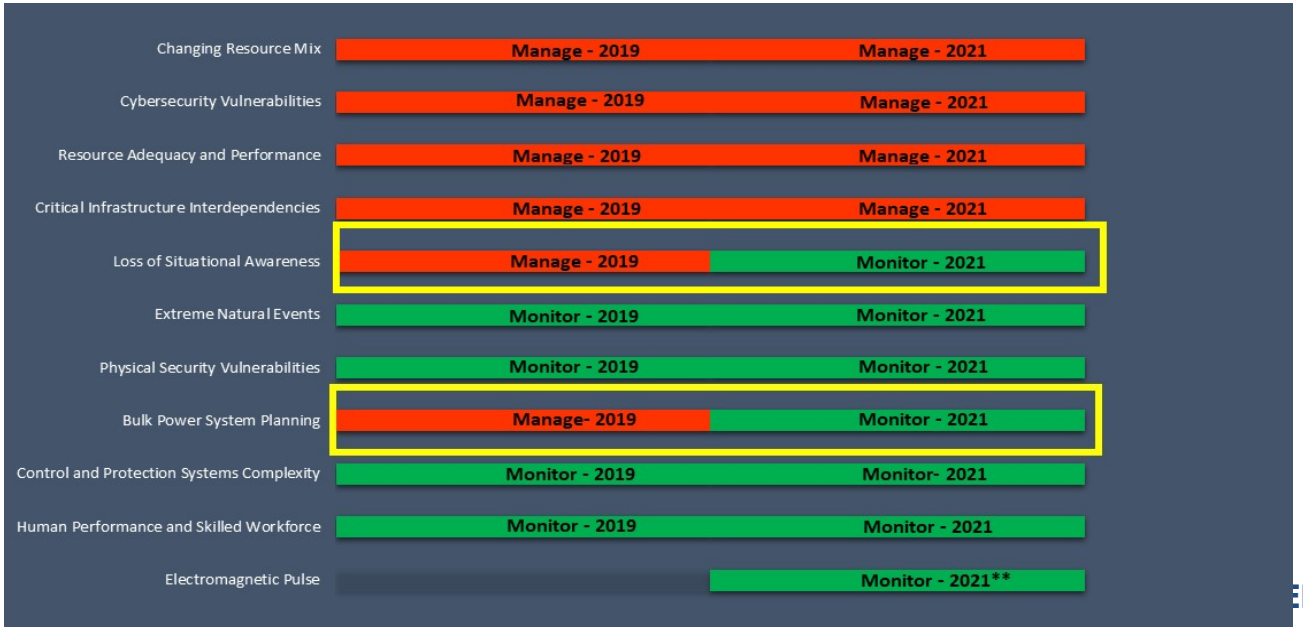
D. Natural Gas

Status of Industry Oversight Risk Ranking

The following chart reveals that Changing Resource Mix followed by Cybersecurity Vulnerabilities lead industry perception on the criticality of these risks. This information is useful for industry as a whole to prioritize and dedicate resources and budget.

Status of Industry Oversight Manage vs. Monitor

- **Manage** – risks are emerging, imminent, and pose significant threats and where thorough strategic planning and industry collaboration are needed for risk mitigation
- **Monitor** - risks that are of critical importance to BPS reliability but are considered well managed with established industry practices in place to mitigate and lessen potential impacts to BPS reliability
  - Extreme events shows monitor, but recent extreme events shows the resource mix is increasingly characterized as one that is sensitive to extreme, widespread, and long duration temperatures as well as wind and solar droughts. Information to be collected going forward on extreme events for which a great deal of experience is available, and events that industry is gaining experience and understanding in due to the grid transformation.
- Loss of Situational Awareness and Bulk Power System – Manage (2019) to Monitor (2021)



RISC/RSTC Coordination

The RISC/RSTC has commenced and will continue implementation of the coordination efforts identified in the *Framework to Address Known and Emerging Reliability and Security Risks*.

Drawing Conclusions

- Analysis of mitigating activities and the effects on risk likelihood and impacts, enable biennial comparison/trending
- A larger emphasis on immediate and short-term actionable activities to reduce risk
- Differentiation between actively manage versus monitor
- Prospectively it will be important for the RISC to:
  - Collaborate with the identified owners of the mitigating activities recommendations to understand actions implemented, if any, to address the risk and recommendations
  - Coordinate with the annual business plan and budget and ERO Enterprise Long-Term Strategy to ensure alignment of priorities and strategic execution on a going-forward basis

Action

- RISC seeks Board of Trustees acceptance of the report and approval for its formal publication.

Questions and Answers

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ERO 2021 Work Plan Priorities Q2 Update

Soo Jin Kim, Director of PRISM
Board of Trustees Meeting
August 12, 2021

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ERO Enterprise Long-Term Strategy Focus Areas

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 ERO Enterprise Work Objective Focus Areas

1. Energy Sufficiency
2. Cold Weather
3. Cyber Security

Status Key

Priority has been fully achieved

Priority is on track for 2021 completion

Priority is at risk for completion in 2021

Priority will not be reached in 2021

Status Summary as of Q2

- 57 individual work plan priorities (as updated in May)
  - 2 complete 
  - 53 on track for 2021 completion 
  - 2 at risk 
  - 0 will not be reached 

Focus Area 1: Risk-Based Focus in Standards, Compliance, & Enforcement

Key Objectives

1. Prioritize and support the development of new and/or enhancement of existing Reliability Standards for the following risks:

	Status Highlights (Through Q2)
Resource availability due to potential energy limitations in the operational timeframe	ERATF formed Q1, sent a survey to RSTC subgroups. Expects feedback from RAS in Q3
Transmission planning-related fuel scenarios for normal and extreme events	ERATF formed Q1, sent a survey to RSTC subgroups. Expects feedback from RAS in Q3
Supply chain risk mitigation for low impact BES Cyber Assets	Project 2020-03 initiated
Cold Weather Reliability Standard enhancements for generating units	Cold Weather Standards adopted by Board and filed with FERC
FERC/ERO Enterprise Mid-Central/Texas Cold Weather Inquiry -Begin implementation of Inquiry Actions	Waiting on the final inquiry report

Focus Area 1: Risk-Based Focus in Standards, Compliance, & Enforcement

Key Objectives

2. **Consistently embed internal control activities within the compliance monitoring program.**

3. **Develop strategy for appropriate oversight of the emerging resource mix.**

Status Highlights
(Through Q2)

Training embedded within the 2021 CMEP Staff Virtual Workshop held April 12-16; June 30, NERC and RE compliance monitoring staff provided presented to FERC staff how internal controls are considered throughout CMEP activities.

Strategy presented to Board in January in closed session. Board is supportive of approach

Focus Area 1: Risk-Based Focus in Standards, Compliance, & Enforcement

Key Objectives

Lower Priority Activities:

- Planning data, information exchange, and modeling of distributed energy resources
- Inverter protection and control interactions during grid disturbances

Status Highlights
(Through Q2)

- Various SARS presented to RSTC by IRPWG and SPIDERWG
- Various SARS presented to RSTC by IRPWG and SPIDERWG

Focus Area 2: Known and Emerging Risks to Reliability & Security

Key Objectives

1. **<u>Assessment</u>: Identify and assess performance trends and emerging factors impacting BPS reliability and make recommendations to address the following high-priority risks:**

- Energy storage technologies, applications, and use (Energy)
- Incorporating cybersecurity risks in BPS planning, engineering, and operations (Cyber)
- Supply Chain (Cyber)
- Load loss recovery from extreme events (resilience measures) (Energy/Cold Weather)

Status Highlights
(Through Q2)

- Storage Special Assessment published, webinars disseminated key findings.
- Security Integration and Technology Enablement Subcommittee (SITES) formed
- Ongoing work of Supply Chain Working Group (SCWG) of RSTC
- NERC Staff developing a white paper to support the collection of load loss data

Focus Area 2: Known and Emerging Risks to Reliability & Security

Key Objectives

2. <u>Mitigation</u>: Develop lessons learned, recommendations, and/or implement mitigations (e.g., guidelines, technical references, training, industry outreach):

	Status Highlights (Through Q2)
Increasing reliance on DER and resources below BES thresholds	RSTC authorized for 45-day comment on SPIDERWG Reliability Guideline on UFLS impacts
Increased amounts of distributed energy resources	SPIDERWG DER modeling survey to reveal potential gaps in practices
Supply Chain: Implement report recommendations	Continued modifications to CIP-003 to address supply chain for low impact BES Cyber Assets
FERC/ERO Enterprise Mid-Central/Texas Cold Weather Inquiry -Begin implementation of Inquiry Actions	Waiting on final inquiry report

Focus Area 2: Known and Emerging Risks to Reliability & Security

Key Objectives

Lower Priority Activities:

- Assessment: Electromagnetic Pulse
- Assessment: Energy Management Systems
- Mitigation: Unacceptable inverter performance
- Mitigation: Energy Management Systems

Status Highlights (Through Q2)

- Work continues on EMPWG
- 2021 EMS Special Assessment posting and update for 2022
- Two inverter loss events reported thru EAP (ERCOT, 5/9 & CAISO,6/24/2021. Q3 (7/15) IRPWG BESS guideline webinar
- Identify potential EMS lessons learned for publication

Focus Area 3: Strong E-ISAC-Based Security Capability

Key Objectives

1. Strategy:

- Execute strategic plan
- Develop OT technology risk mitigation strategy
- Evaluate extension of services to downstream natural gas sector
- Operationalize strategic partnerships
- Maintain cost effectiveness

Status Highlights (Through Q2)

- See progress on sub objectives 1.2, 1.2, 1.4, and 1.5
- Incorporating DOE 100 Day ICS Cybersecurity Initiative with CRISP OT Pilots into strategy document
- Daily information sharing and monthly meetings with DNG-ISAC continue - future integration evaluation being scoped
- Strategic partnership providing timely and actionable intel; Monthly meets w/CEA, NRECA, APPA, and MS-ISAC
- Slightly under budget, GridSecCon registration/sponsor fees to cover costs. Software consolidation going as planned.

Focus Area 3: Strong E-ISAC-Based Security Capability

Key Objectives

2. Information Sharing:

	Status Highlights (Through Q2)
Increase overall information sharing by partners and industry through targeted outreach	Upward, starting to flatten, sharing remains concentrated across ~10%, focus on small/medium munis & coops, con't outreach for the SMIRF Information Sharing Pilot.
Continue to expand CRISP participation and evaluate other sensor technologies	RISP Summit w/DOE (6/29); SYSLOG pilot, Dragos OT Pilot/100-day plan (Neighborhood Keeper), and NRECA/DOE Essence efforts exploring sensor technologies
Improve coordination and connectivity to Intelligence Community	Coordination with CCCS, DOE, DOD, DHS, FBI, and CISA on CRISP and GridEx
Continue to conduct threat workshops, webinars and develop products	In-person Unclassified Threat Workshops have been paused due to COVID; Special event webinars have taken their place; PSAG is virtual; Several new information products

Focus Area 3: Strong E-ISAC-Based Security Capability

Key Objectives

3. Analysis:

Deploy automated information sharing tools, Leverage E-ISAC Data Platform and extend to membership

Refine performance metrics

Status Highlights (Through Q2)

Automated information sharing on hold during first half of year due to dependency on new Portal. Plan to pilot in Q4 still on track;
EDP continues to be leveraged by the CTI and SecOps teams.
Plan to extend EDP to membership in 2022.

Analytical product measurement introduced in Q1;
Customer engagement score planned for Q4.

Focus Area 3: Strong E-ISAC-Based Security Capability

Key Objectives

4. Engagement:	Status Highlights (Through Q2)
Enhance E-ISAC portal and develop robust feedback mechanisms	First ever E-ISAC stakeholder feedback survey; New E-ISAC Portal (Salesforce) for Q3. Minor delay to ensure full information security controls and testing are in place.
Continue Industry Engagement Program and increase membership	Virtual IEP to implement Q4; Membership increasing due to real world incidents & GridEx, GridSecCon, or webinars.
Execute GridEx VI	Distributed Play: Final Planning Meeting for Planners; Executive Tabletop: sent industry and government invitations
Maintain Canadian engagement	Monthly CEA & quarterly SIPC meetings; Invited to participate in NRCan security exercise. IESO: monthly meetings, participating in automated information sharing task force and pilot.

Focus Area 4: Strengthen Engagement Across the Reliability & Security Ecosystem in North America

Key Objectives

1. Enhance outreach to stakeholder/policy organizations:

	Status Highlights (Through Q2)
Implement State outreach initiative, including -Harmonized communications on reliability assessments -Serve as a trusted resource to the states on reliability and security matters.	Implemented an ongoing NERC State outreach team have met on a regular basis
Enhance relationships with Canadian entities and support information exchange with international entities on reliability and security matters.	Ongoing with the E-ISAC on security. Outreach with Canada is ongoing, and NERC BOT will meet with Canadian regulators.
Cold Weather: Coordination with FERC, NERC and the Regions regarding the Joint Inquiry	Ongoing in support of developing findings and recommendations for a final Joint Inquiry report.
Cold Weather: Communication with key stakeholder/policy organizations on the Mid-South Cold weather event and assessments and Actions	Developing a communications plan based on the inquiry
Cyber: Communication with New Administration related to cybersecurity initiatives	Released a whitepaper (FERC-NERC) regarding Solarwinds.

Focus Area 4: Strengthen Engagement Across the Reliability & Security Ecosystem in North America

Key Objectives

2. Work with ERO Enterprise Communications Group (EROCG) to refine and further develop the ERO Enterprise Strategic Communication Plan, to:

- Develop sharing platforms
- Amplify initiatives and messages through expanded ERO Enterprise communication efforts.
- Implement activities from Work Plan

Status Highlights (Through Q2)

- Engaged with ERO Enterprise IT staff to coordinate launch of MS Teams across the ERO Enterprise -- functionality being worked by IT
- Coordinated and communicated messages on ERO Enterprise initiatives, activities to stakeholders, policymakers
- Provided consistent and coordinated outreach to raise awareness of ERO activities

Focus Area 4: Engagement Across the Reliability & Security Ecosystem in North America

Key Objectives

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

Status Highlights (Through Q2)

Outreach to FERC, DOE, NARUC, states and Trades.

Ongoing meetings with NATF, NAGF, and NAERM. Continued support of IEEE Standard 2800 by Bob Cummings.

RAPA Steering Group engagement to develop assessment approaches and coordinated release; EROCG engagement for coordinated messaging and outreach.

Focus Area 5: Capture Effectiveness, Efficiency, and Continuous Improvement Opportunities

Key Objectives

1. Complete the "Big 3“ (plus 1):

- 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)
- Communication with New Administration on cybersecurity initiatives (Cyber)

Status Highlights (Through Q2)

- Align R1 and the ERO SEL are in production. R2 was released on July 19th.
- Final recommendations presented to Board at May meeting
- The RSTC Q2 meeting in June, approved a number of Reliability Guidelines and ProbA Scenario Case Study Report.
- Released a whitepaper (FERC-NERC) regarding Solarwinds.

Focus Area 5: Capture Effectiveness, Efficiency, and Continuous Improvement Opportunities

Key Objectives

2. NERC:

	Status Highlights (Through Q2)
Finish 2021 at or below budget and maintain at least $3MM in operating reserves	Q2 projections in mid-July, expect to meet/exceed operating reserve target of $3MM. Actuals may be higher than budgeted due to the CRISP program OT pilot project
Implement flexible workforce and responsible reentry plans (as needed)	The flexible workforce ("Connected Workforce") went live in June and reentry plan update presented to staff in July
Execute new leases for ATL and DC Offices	Negotiations are ongoing

Focus Area 5: Capture Effectiveness, Efficiency, and Continuous Improvement Opportunities

Key Objectives

3. Regional Entities:

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. ERO Enterprise:

Transformation achieves process alignment and shared resources

Status Highlights (Through Q2)

Worked with REs and industry on proposed CMEP ROP revisions; CMEP practice guides, and Self-Logging Program.

Align and SEL implementation. Standardizing reporting of reserve categories for NERC Board and FERC. Working to implement MS Teams across ERO Enterprise. Implemented common secure communication tool. Held first-ever ERO Enterprise Town Hall. ERO Enterprise staff continue to share knowledge and best practices, identify ERO-wide efficiencies, and work together to tackle key issues.

Questions and Answers

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2021 First Quarter Reliability Indicators

Soo Jin Kim, Director of PRISM
Board of Trustees Meeting
August 12, 2021

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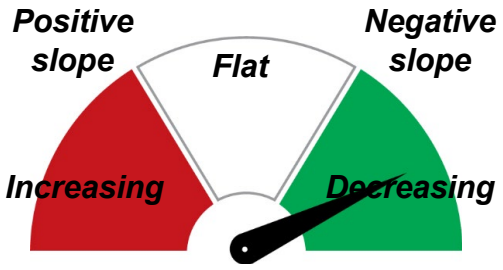
Indicator 1: Fewer, Less Severe Events

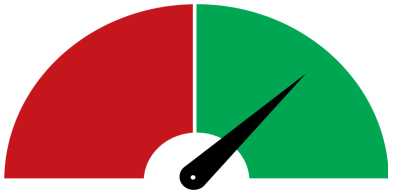
- **Why is it important?**
  - Provides a quantitative measure and trend of actual impacts on the BPS
- **How is it measured?**
  - Count: Number of Category 3 or above events
  - Trend: Statistical test is performed on the five-year cumulative daily event Severity Risk Index (eSRI) for (Category 1–3) events

Data (Annual Measurement) ▪ Threshold: No Category 3 or above events: *Zero is green, else is red*	**2021 Status** 
Data (Compared to a 5-year rolling average) ▪ Slope of eSRI line is flat to decreasing and does not show an increase above zero that is statistically significant (95% Confidence Interval). ▪ "2021 Status" relates to the slope of the 5 year rolling average (Positive, Flat, or Negative), not just the 2021 performance.	

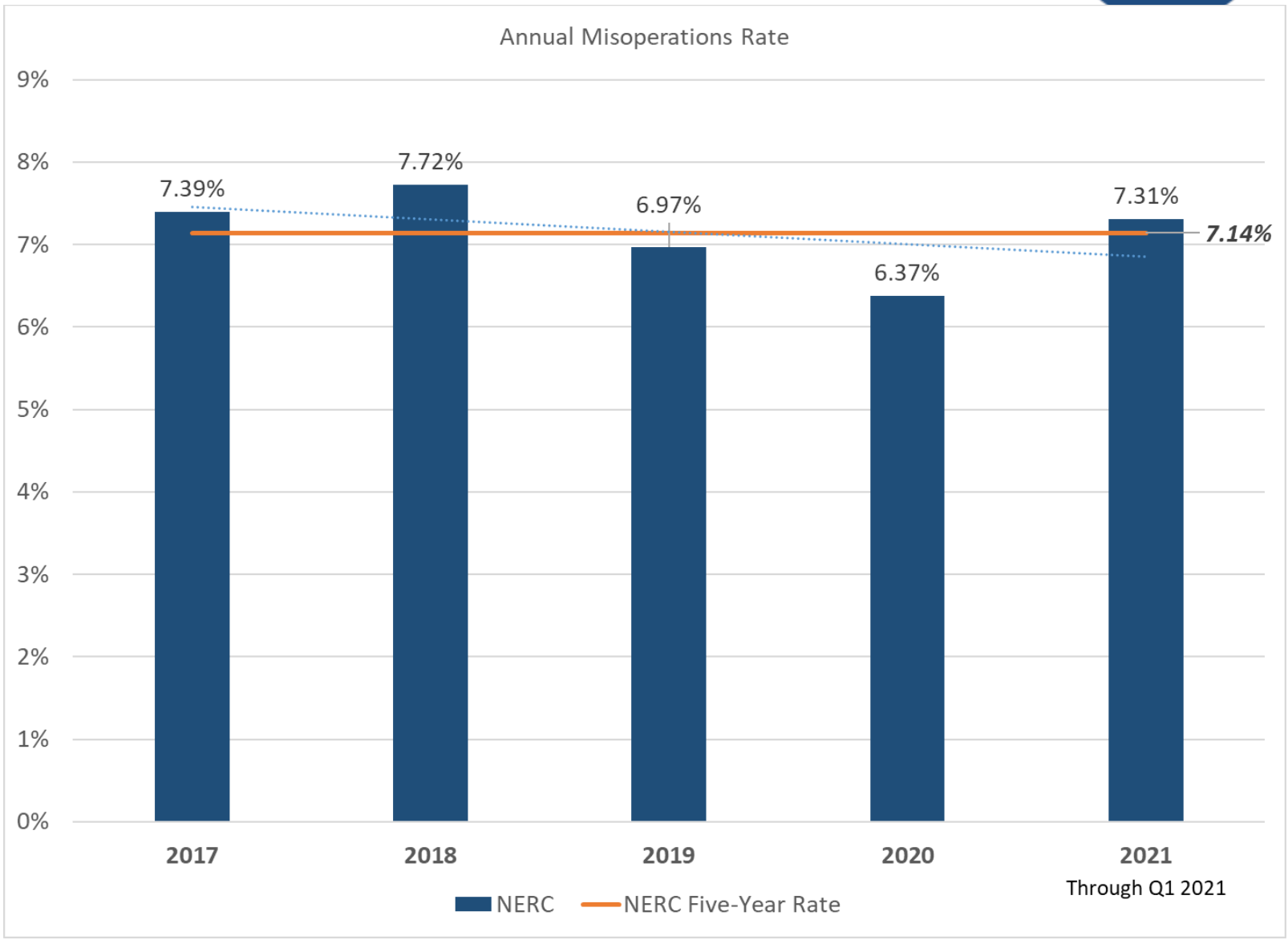
Indicator 2: Compliance Violations

- **Why is it important?**
  - Reduce risk to BPS reliability from Standard violations by registered entities
- **How is it measured?**
  - Moderate and serious risk noncompliance with a relevant history of similar past conduct: 8% of moderate and serious risk violations filed between 1/1/2021 to 7/1/2021 had relevant past conduct.
  - The number of violations discovered through self-reports: 87% of noncompliance submitted from 1/1/2021 to 7/1/2021 were self-reported.
  - Risk to the BPS based on the severity of Standard violations: 7% of the violations filed between 1/1/2021 to 7/1/2021 were assessed as serious risk.
    - *2% of past 5-year filings are assessed as serious risk.*

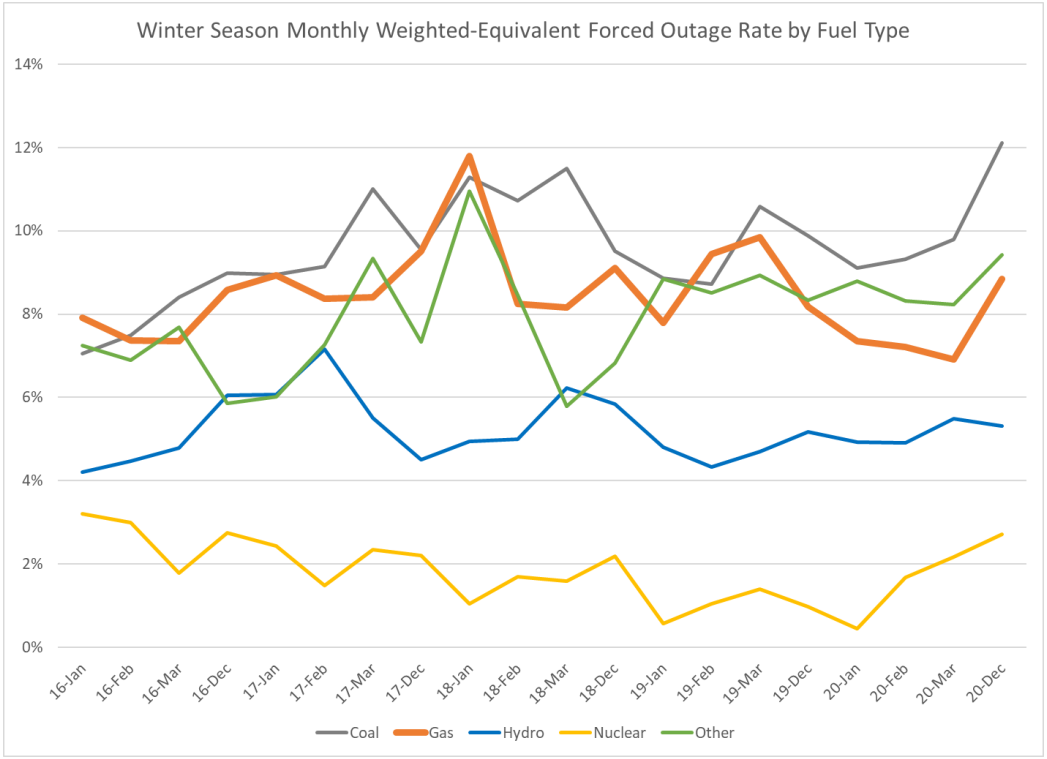
** For additional detail please refer to Q2 2021 CMEP report.*



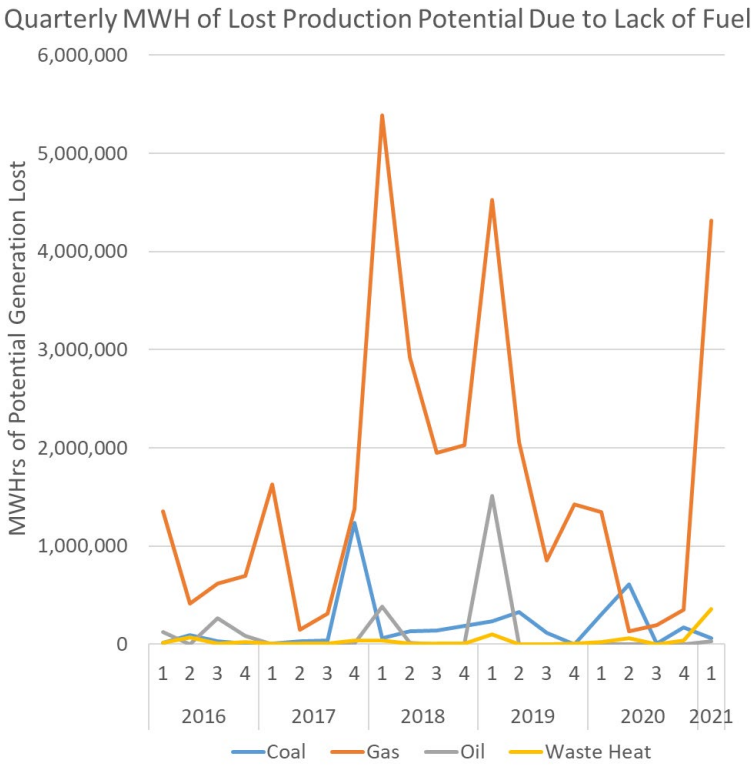
Indicator 3: Protection System Misoperations Rate



Indicator 4: Forced Outage Rate During Cold Weather Months and Potential Production MWH Loss Due to Lack of Fuel

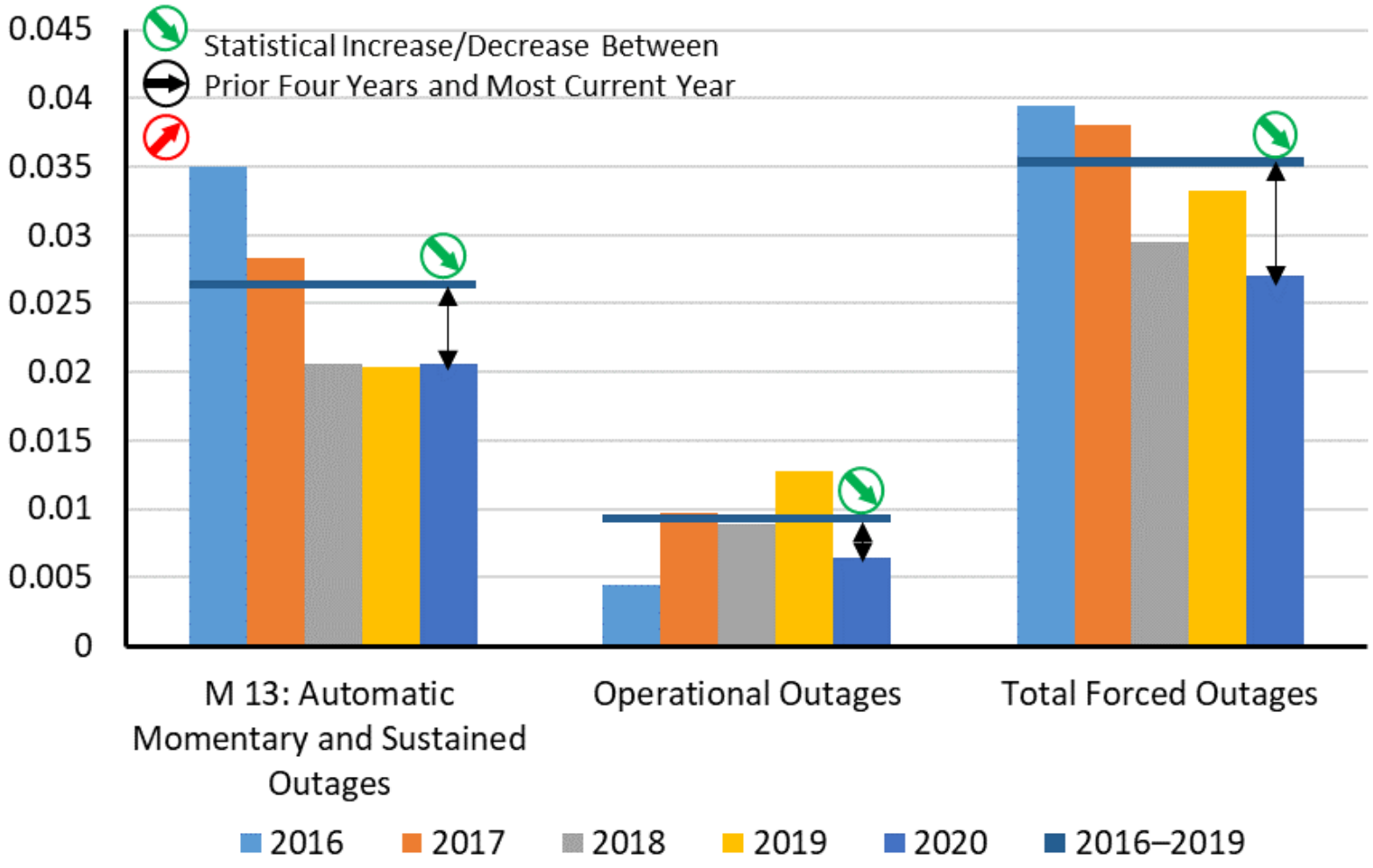


Winter Season Monthly Weighted EFOR by Fuel Type



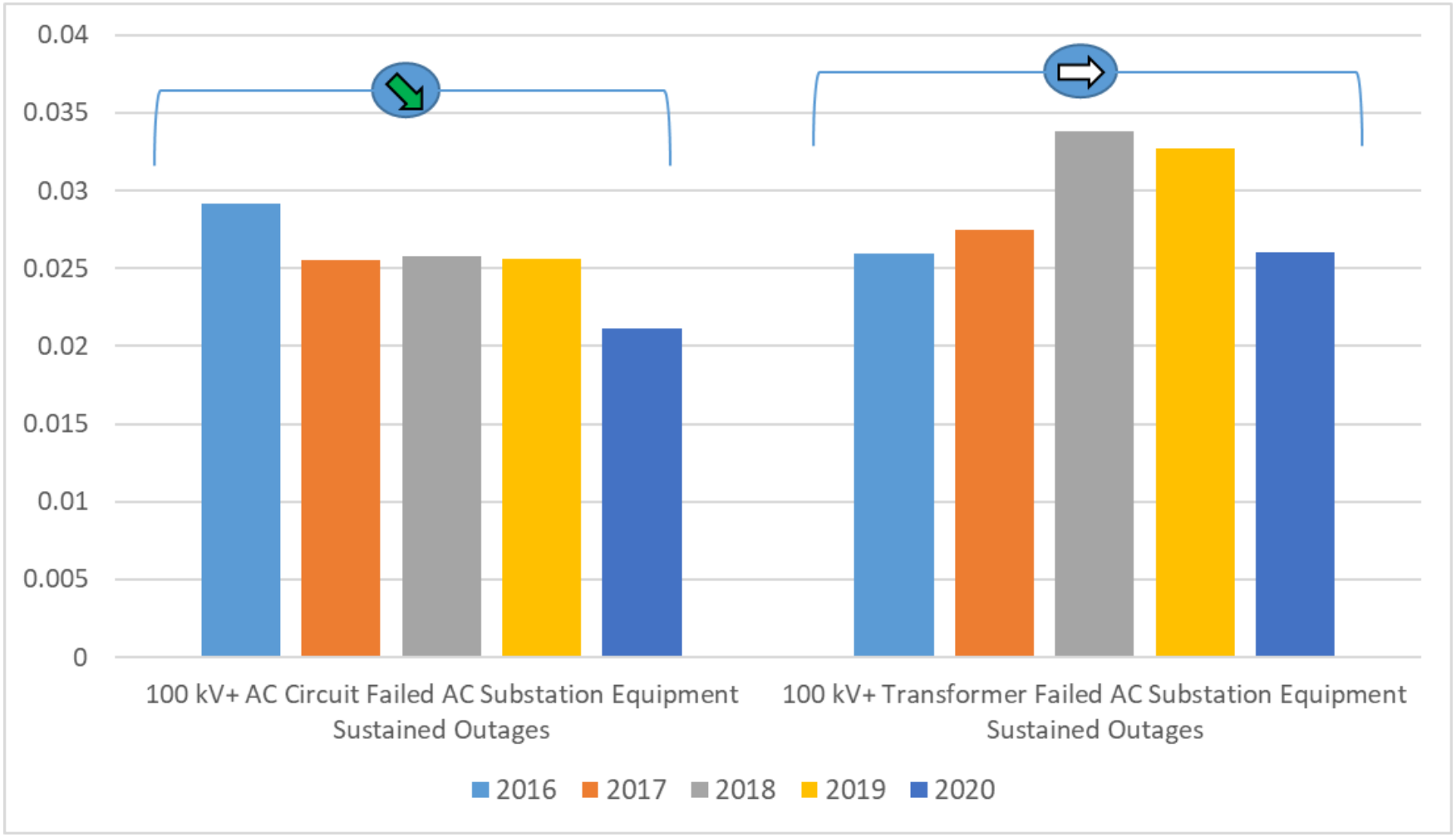
Percent of Potential Production Lost Due to Lack of Fuel

Indicator 5a: Operator or Other Human Performance Issues



Outages Caused by Human Error
AC Circuits

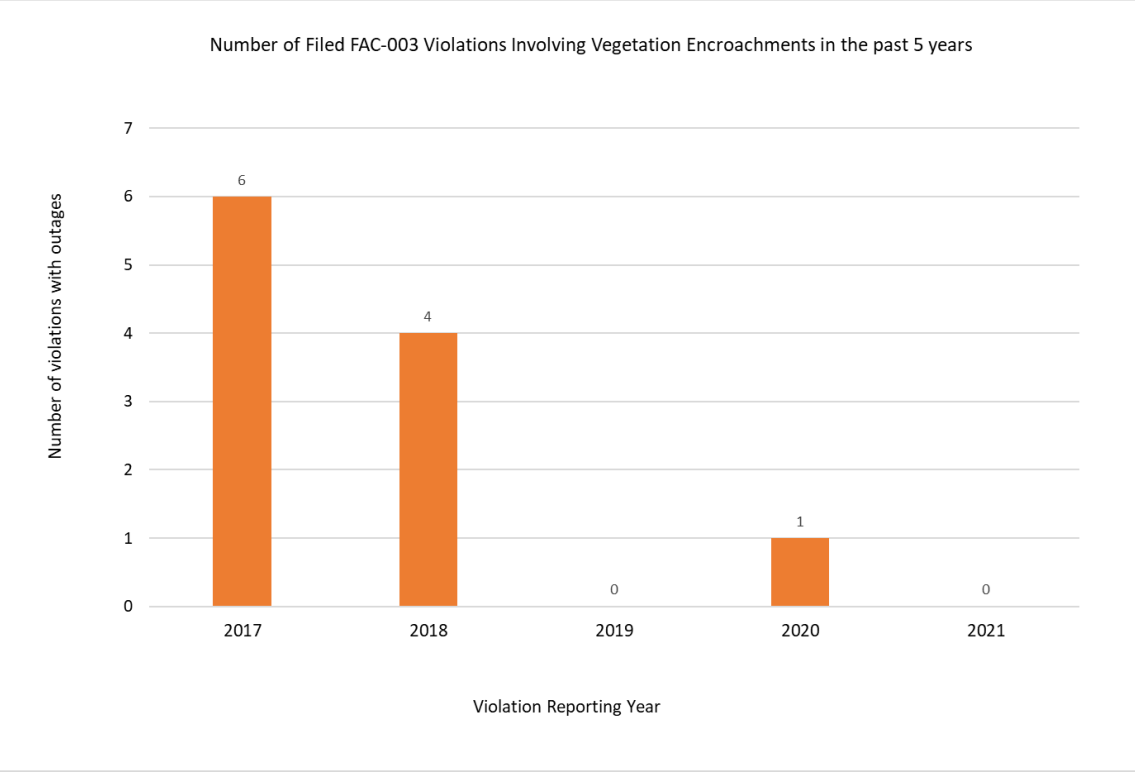
Indicator 5b: Substation Equipment Failures or Failed Circuit Equipment



Failed AC Substation Equipment

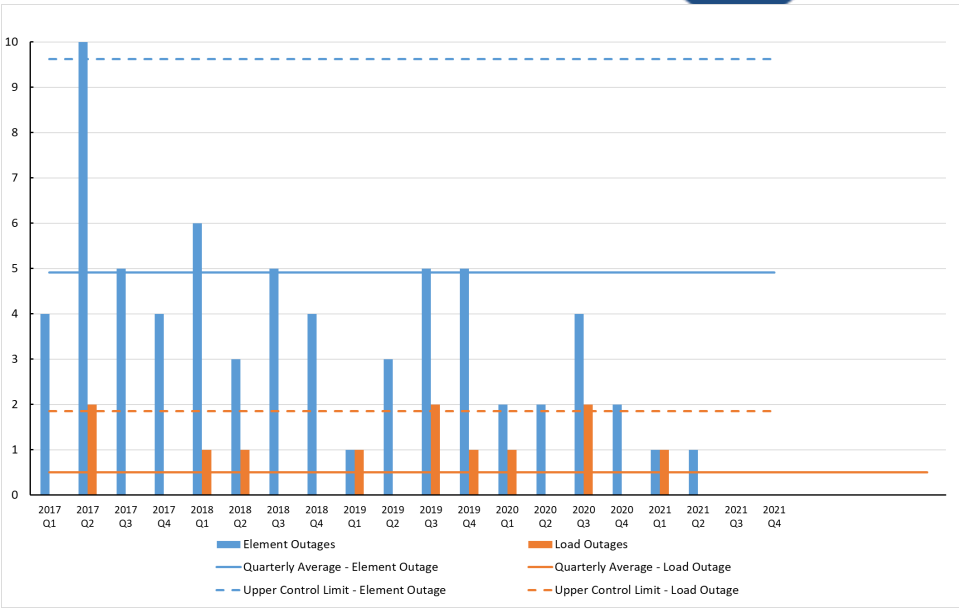
Indicator 5c: Vegetation Encroachment

- **How is it measured?**
  - Number of vegetation encroachments: 11 vegetation encroachments from inside of the right-of-way have been filed since 2017. The graph below shows those violations by reporting year.



Security Indicator 6 : Impactful Cyber and Physical Security Incidents

- **How is it measured?**
  - Number of applicable DOE OE-417 Electric Emergency Incident and Disturbance Reports and NERC EOP-004 Event Reports



Data (Compared to 2016-2018 Quarterly Baseline)

- No disruption* of BES operations due to cyber security incidents
  Zero disruptions of BES operations due to cyber attacks in 2021 Q2
- Number of disruptions* of BES operations due to physical security incidents: *Below baseline Upper Control Limit is green, else is red*
  One disruptions of BES operations (Zero with load loss) due to physical attacks in 2021 Q2

*A disruption means that a BES element was removed from service as a result of the cyber or physical incident

2020 Status

Cyber Security

Physical Security

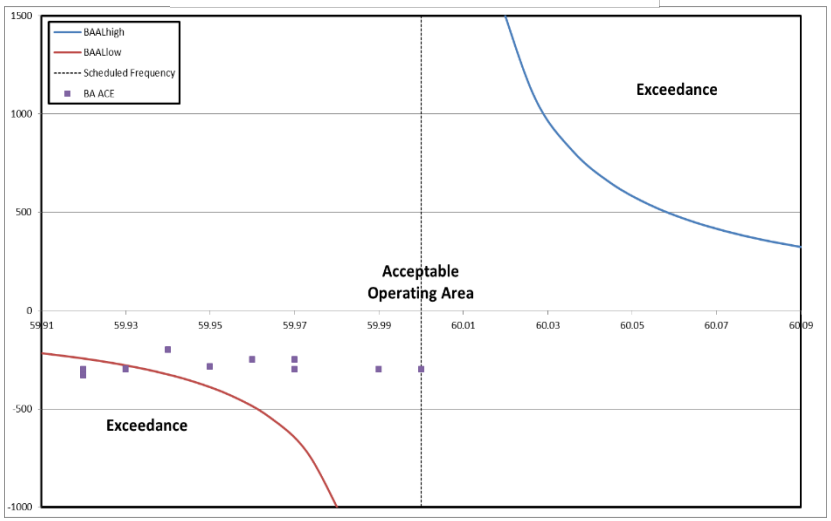
Indicator 7: Real Power Balancing Control Performance (BAAL)

Why is it important?

Each Balancing Authority (BA) is required to operate such that its clock-minute average of reporting area control error (ACE) does not exceed its clock-minute BA ACE limit (BAAL) for more than 30 consecutive clock-minutes. The purpose of this metric is to measure risk to the BPS by monitoring the trend in the number of clock minutes in which BAs return their ACE to within their BAAL after an exceedance has occurred.

How is it measured?

Success (green) is achieved when the linear regression line of the most recent four years of quarterly BAAL exceedances greater than or equal to 15 clock minutes has a statistically significant negative slope or when the slope of the time trend is statistically neither increasing nor decreasing. This equates to either improvement or no decline in performance. Failure (red) occurs if slope of the time trend is increasing with statistical significance.



Indicator 8: Interconnection Frequency Response

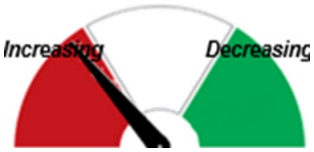
Why is it important?

Measures risk and impact to the BPS by evaluating the trend in the magnitude of the decline in Interconnection frequency experienced in each Interconnection during low frequency events selected for BAL-003-1 compliance. The Indicator will evaluate whether the risk of activating under frequency load shed devices is increasing or decreasing.

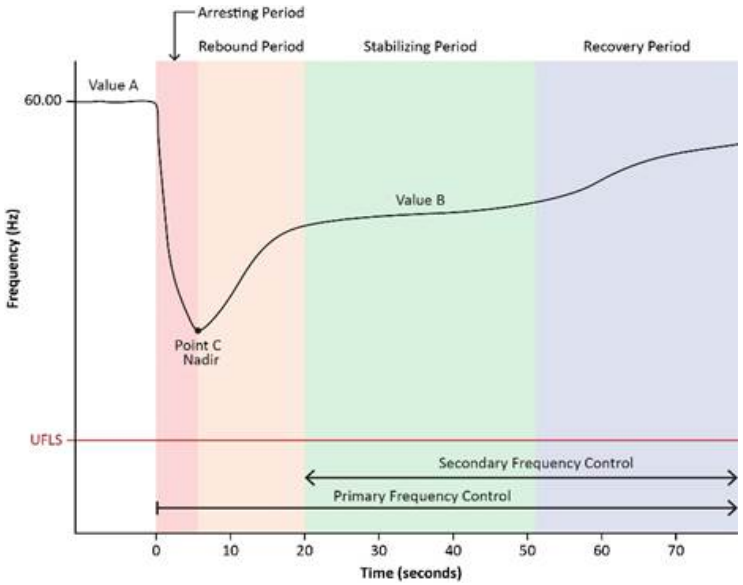
How is it measured?

Success (green) is achieved when the linear regression line of the most recent four years of quarterly mean values of Frequency A minus Frequency C has a statistically significant negative slope or when the slope of the time trend is statistically neither increasing nor decreasing. This equates to either improvement or no decline in performance where Interconnection risk has not changed or declined. Failure (red) occurs if the slope of the time trend is increasing with statistical significance or if under frequency load shedding is activated for any single BAL-003 frequency event in any Interconnection.

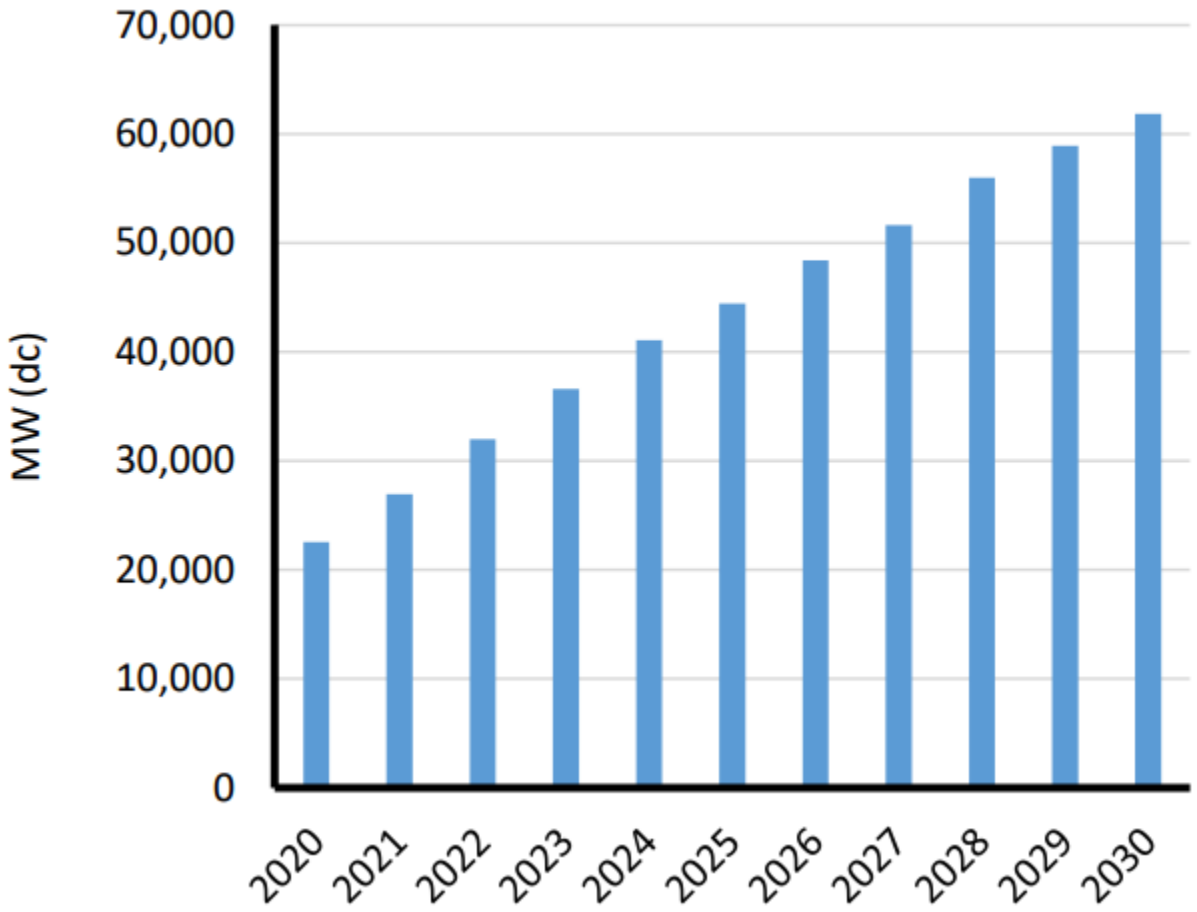
EI, WI, QI



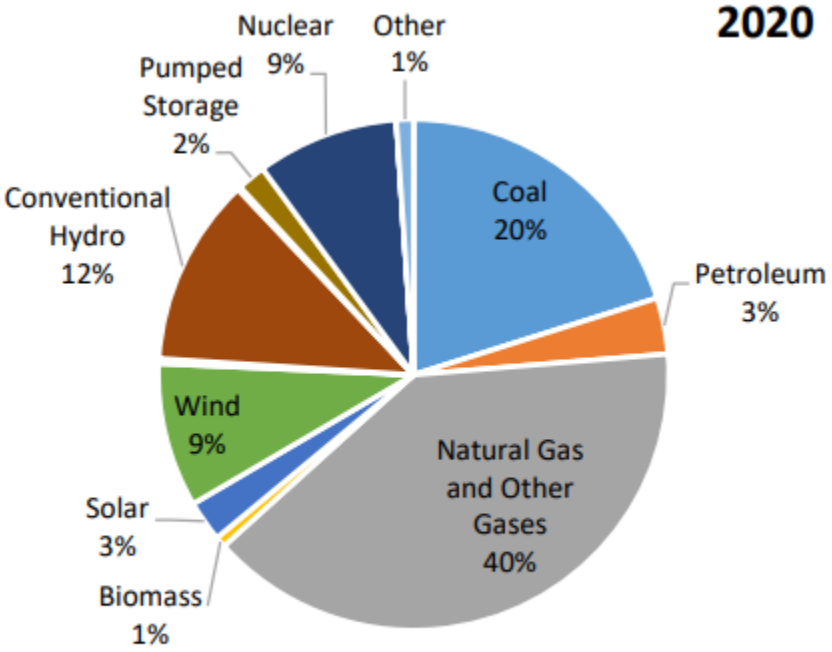
TI



Indicator 9: DER Penetration



Indicator 10: Measure of the Changing Resource Mix



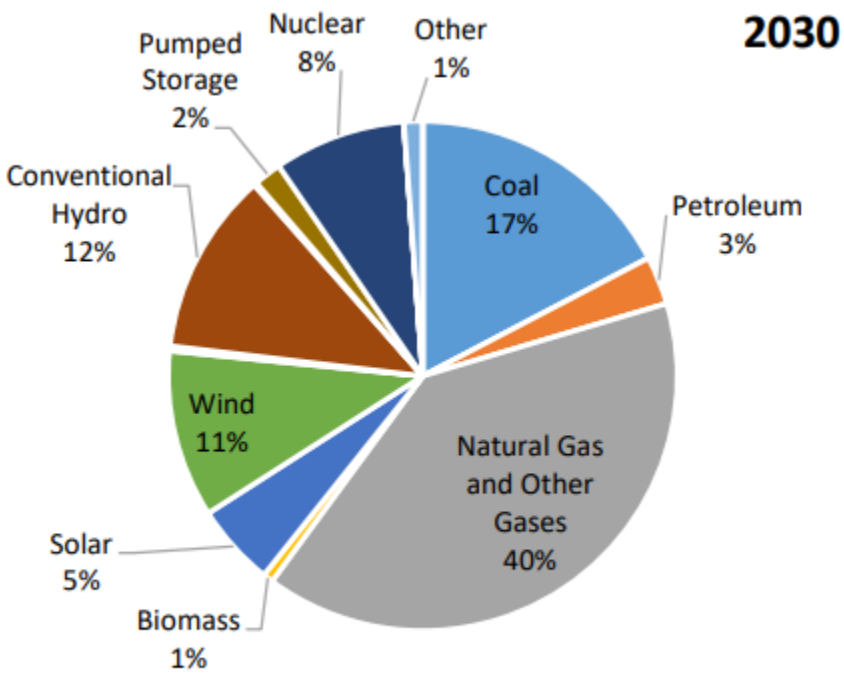


Figure 33: Installed Nameplate Capacity by Fuel Mix Trend (Includes Future Tier 1 Resources)

Indicator 10: Measure of the Changing Resource Mix

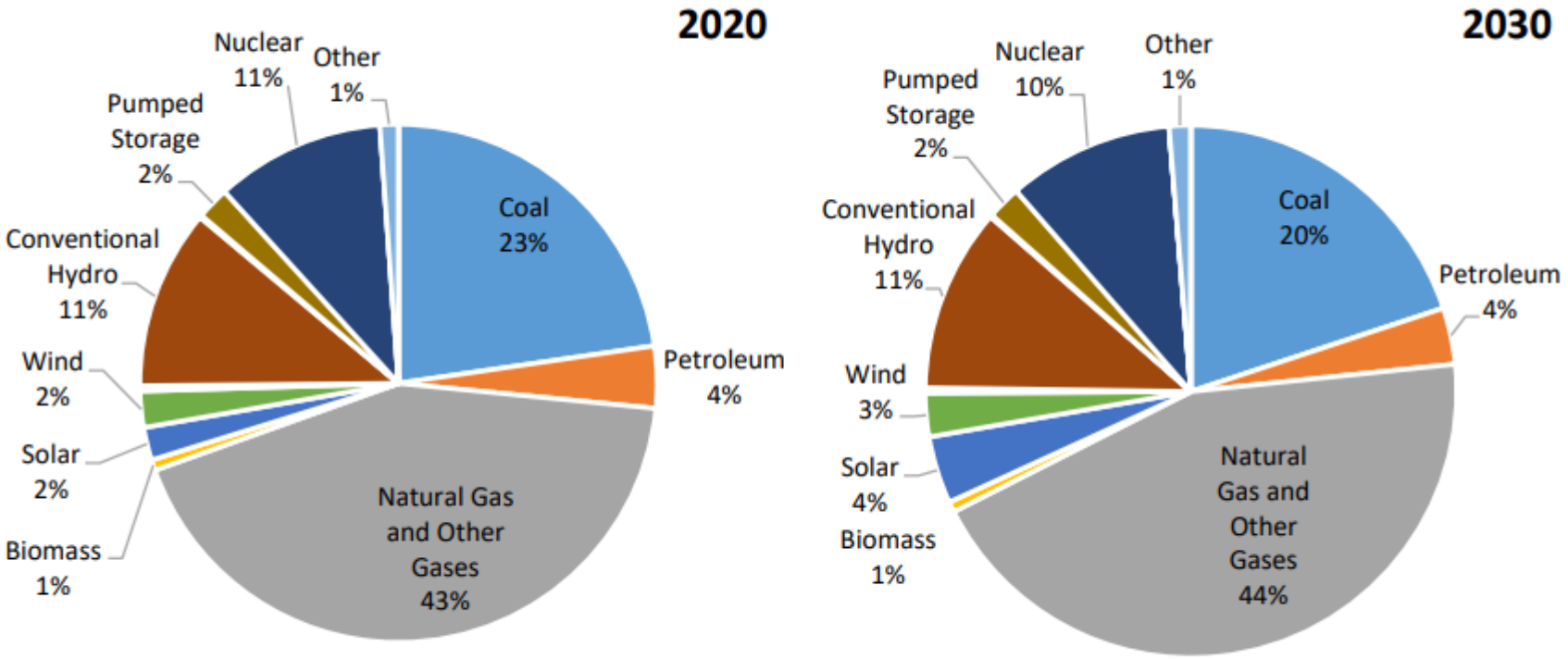


Figure 34: Installed On-Peak Anticipated Capacity Trend by Fuel Mix

Questions and Answers