Standards Actions

Howard Gugel, Vice President of Engineering and Standards
Board of Trustees Meeting
February 6, 2020
• Background
  - Address Reliability Standards impacted by the Risk Based Registration (RBR) initiative

• Action
  - Adopt:
    - FAC-002-3 – Facility Interconnection Studies; IRO-010-3 – Reliability Coordinator Data Specification and Collection; MOD-031-3 – Demand and Energy Data; MOD-033-2 – Steady-State and Dynamic System Model Validation; NUC-001-4 – Nuclear Plant Interface Coordination; PRC-006-4 – Automatic Underfrequency Load Shedding; and TOP-003-4 – Operational Reliability Data.
• Background
  ▪ Based on disturbance analyses and the PRC-024-2 Gaps Whitepaper
  ▪ Clarifies and corrects technical issues for inverter-based resources

• Action
  ▪ Adopt PRC-024-3 – Frequency and Voltage Protection Settings for Generating Resources
• Background
  ▪ Corrective action plans (CAP) for supplemental GMD event vulnerabilities
  ▪ ERO approval required for CAP extension requests

• Action
  ▪ Adopt TPL-007-4 – Transmission System Planned Performance for Geomagnetic Disturbance Events
• Reliability Benefits
  - Drafting team revised BAL-001-TRE-1 to:
    - remove the governor deadband and droop setting requirements for steam turbines in a combined cycle train; and
    - seek clarification of the responsible entity for Frequency Measurable Event exclusion requests.
  - Drafting team made changes specified in the *Summary of Changes*

• Action
  - Adopt BAL-001-TRE-2 - Primary Frequency Response in the ERCOT Region
Questions and Answers
2019 ERO Enterprise Dashboard
Fourth Quarter Status

Thomas Coleman, Director of Risk Issue Management
Board of Trustees Meeting
February 6, 2020
Reliability Indicator 1: Fewer, Less Severe Events

• **Why is it important?**
  - Measures risk to the bulk power system (BPS) from events on the Bulk Electric System (BES)

• **How is it measured?**
  - Cumulative eSRI line in the composite daily event Severity Risk Index (eSRI) for Category 1–3 events (see pages 2-3 of ERO Event Analysis Process for category determination)

<table>
<thead>
<tr>
<th>Data (Annual Measurement)</th>
<th>2019 Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold: No Category 3 or above events: Zero is green, else is red</td>
<td><img src="image" alt="2019 Status Indicator" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data (Compared to a 5-year rolling average)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope of eSRI line is flat to decreasing and does not show an increase above zero that is statistically significant (95% Confidence Interval).</td>
<td><img src="image" alt="Slope Indicator" /></td>
</tr>
<tr>
<td>“2019 Status” relates to the slope of the 5-year rolling average (Positive, Flat or Negative), not just the 2019 performance.</td>
<td></td>
</tr>
</tbody>
</table>
Reliability Indicator 2: Compliance Violations

• Why is it important?
  ▪ Reduce risk to BPS reliability from Standard violations by registered entities

• How is it measured?
  ▪ Compliance History* of with moderate/serious risk noncompliance
  ▪ The number of violations discovered through self-reports, audits, etc.
  ▪ Risk to the BPS based on the severity of Standard violations

<table>
<thead>
<tr>
<th>Data (Annual Measurement)</th>
<th>2019 Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate and serious risk repeat violations filed with FERC on organizations that</td>
<td>48</td>
</tr>
<tr>
<td>have Compliance History (based on 2017 metric)</td>
<td></td>
</tr>
<tr>
<td>---- Current number is 102</td>
<td>45</td>
</tr>
<tr>
<td>Data (Annual Measurement)</td>
<td>75%</td>
</tr>
<tr>
<td>Percent of noncompliance self-reported (Self-certified noncompliance is not included)</td>
<td>80%</td>
</tr>
<tr>
<td>(same as 2018 metric)</td>
<td></td>
</tr>
<tr>
<td>---- Current number is 75%</td>
<td></td>
</tr>
<tr>
<td>Data (Compared to a 3-year rolling average)</td>
<td>5%</td>
</tr>
<tr>
<td>The number of serious risk violations resolved compared to the total noncompliance</td>
<td>4%</td>
</tr>
<tr>
<td>resolved (based on 2018 metric)</td>
<td></td>
</tr>
<tr>
<td>---- Current number is 1.4%</td>
<td></td>
</tr>
</tbody>
</table>

* To measure the effectiveness of the risk-based CMEP in reducing noncompliance, NERC reviews moderate and serious risk violations and includes them in one of three categories: 1) noncompliance with no prior compliance history; 2) noncompliance with prior compliance history that does not involve similar conduct; and 3) noncompliance with compliance history that includes similar conduct.
Why is it important?
- Protection system misoperations exacerbate the impacts

How is it measured?
- Annual Misoperations rate and the annual loss of load for events with misoperations

Data (Year-Over-Year Comparison)
- Q3-Q2 comparison misoperations rate based on collection interval (95% Confidence Interval) (Based on 2018 Metric)
- Includes four years through Q2 2018. Data for year five not available until Q3 dashboard.

Data (Year-Over-Year Comparison)
- Q3-Q2 comparison for qualified events with misoperations and loss of load (load loss/number of events) during the collection interval (95% Confidence Interval)

2019 Status
- 7.5%
- 7.0%

No Change
- +MW/event
- -MW/event
### RI 4: Events Caused by Gas-Fired Unit Forced Outages Due to Cold Weather or Gas Unavailability

#### Why is it important?
- Reduce risk to BPS reliability due to gas-fired unit outages during cold weather or gas unavailability

#### How is it measured?
- Firm load loss due to cold weather or gas unavailability
- MWh of potential production lost initiated by cold weather and gas unavailability

#### Data (Annual Measurement)
- No firm load loss due to gas-fired unit outages during cold weather: *Zero is green, else is red* (Cold weather months: January – March and December of the same calendar year)  
  *As of 12/31/2019, Metric status is Green.*

#### Data (Annual Measurement) (Match with 4.4, year defined as Q3-Q2)
- No firm load loss due to gas unavailability: *Zero is green, else is red*  
  *As of 12/31/2019, Metric status is Green.*

#### Data (Compared to a 5-year rolling average)
- Percentage of winter period net MWh of potential production lost due to gas-fired unit outages during cold weather (Cold weather months: January – March and December of the same calendar year)  
  *Five-year average: 0.0067%*

#### Data (Compared to a 5-year rolling average)
- Percentage of annual net MWh of potential production lost due gas unavailability compared to a 5-year rolling average (Due to data availability, year defined as Q3-Q2)  
  *Five-year average: 0.1483%*
Why is it important?

- Measures risks to BPS reliability from three priority causes:
  1. Operator or other human performance issues
  2. Substation equipment failures or failed circuit equipment
  3. Vegetation encroachment
Reliability Indicator 5a: Operator or Other Human Performance Issues

How is it measured?

- Number of transmission line outages caused by Human Error divided by the total inventory of circuits

Data (Compared to a 5-year rolling average)

- Annual outage rate* decreasing compared to a 5-year rolling average (95% Confidence Interval) (Based on 2018 metric)

*Due to data availability, collection year defined as Q3-Q2
• **How is it measured?**
  - Number of transmission line outages caused by AC substation equipment outage failures and failed AC circuit equipment (such as transformers), divided by the total inventory of circuits

**Data (Compared to a 5-year rolling average)**
- Annual outage rate* decreasing compared to a 5-year rolling average (95% Confidence Interval) (Based on 2018 metric)

*Due to data availability, collection year defined as Q3-Q2
Reliability Indicator 5c: Vegetation Encroachment

• How is it measured?
  ▪ Number of potential FAC-003 violations*

  Year: #
  2019: 0
  2018: 3
  2017: 6
  2016: 0
  2015: 3

  Mean = 3  Standard deviation = 2.7

Data* (Compared to a 5-year rolling average)
  ▪ Number of vegetation encroachments, excluding fall-ins, decreasing (within one standard deviation, based on small sample size) (Based on 2018 metric) -- 5-year average is 3.0

<table>
<thead>
<tr>
<th>Year</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>0</td>
</tr>
<tr>
<td>2018</td>
<td>3</td>
</tr>
<tr>
<td>2017</td>
<td>6</td>
</tr>
<tr>
<td>2016</td>
<td>0</td>
</tr>
<tr>
<td>2015</td>
<td>3</td>
</tr>
</tbody>
</table>

Data** (Compared to a 5-year rolling average)
  ▪ Fall-ins: Number of vegetation encroachments decreasing (within one standard deviation, based on 6-year sample) -- 5-year average is 23.8

<table>
<thead>
<tr>
<th>Year</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>0</td>
</tr>
<tr>
<td>2018</td>
<td>3</td>
</tr>
<tr>
<td>2017</td>
<td>20</td>
</tr>
<tr>
<td>2016</td>
<td>21</td>
</tr>
</tbody>
</table>
• Why is it important?
  ▪ Measures risk and impact to the BPS from cyber or physical security attacks

• How is it measured?
  ▪ Based on industry-submitted OE-417 and/or EOP-004 Electric Emergency Incident and Disturbance Reports*

  *As more data becomes available this metric will be enhanced to provide increased granularity of this risk

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Data (Annual Measurement), based on 2018 metric

- No disruption** of BES operations due to cyber attacks
  *Zero disruptions of BES operations due to cyber attacks in 2019 Q4*
- No disruption** of BES operations due to physical attacks: *Zero is green, else is red*
  *Five disruptions of BES operations due to physical attacks in 2019 Q4*

**A disruption means that a BES facility was removed from service as a result of the cyber or physical incident
• Why is it important?
  ▪ Measures risk to the BPS by monitoring the number of Disturbance Control Standard (DCS) events that are greater than the Most Severe Single Contingency (MSSC)

• How is it measured?
  ▪ Information received by NERC based on the BAL-002 Reliability Standard
  ▪ Due to the timing in Balancing Authority data submittals the metric is updated one quarter in arrears
  ▪ Measures a rolling 7 year quarterly time trend testing for statistical significance

**Data (Quarterly Measurement), New**
  ▪ **Green**: a time trend line of the most recent 7 years of quarterly DCS events > MSSC has a statistically significant negative slope
  ▪ **Middle**: no statistically significant trend for the slope
  ▪ **Red**: a time trend line of the most recent 7 years of quarterly DCS events > MSSC has a statistically significant positive slope
  ▪ **Metric Results through 3Q19: Green** - DCS data for the most recent 28 quarters shows a statistically significant decreasing trend

**2019 Status**
- No Statistical Trend
- Increasing Trend
- Decreasing Trend
Reliability Indicator 8: Interconnection Frequency Response

• Why is it important?
  ▪ Measures risk and impact to the BPS by measuring the interconnection frequency response performance measure (IFRM) for each BAL-003-1 event as compared to the Interconnection Frequency Response Obligation (IFRO)

• How is it measured?
  ▪ IFROs are calculated and recommended in the Frequency Response Annual Analysis Report for Reliability Standard BAL-003-1.1 implementation
  ▪ IFRM performance is measured for each event by comparing the resource (or load) MW loss to the frequency deviation
  ▪ Due to the timing in selection of events the metric is updated one quarter in arrears.

Data (Quarterly & Annual Measurement), New
  ▪ IFRM for each BAL-003-1 event is compared to the IFRO for each quarter of the 2019 operating year
  ▪ Success is no Interconnection experiencing a BAL-003-1 frequency event where IFRM performance is below their respective IFRO: Zero is green, else is red
  ▪ **Metric Results through 3Q19:** No Interconnection experienced a BAL-003-1 event where their IFRM was below their IFRO

2019 Status
Questions and Answers
Reliability Coordination in the Western Interconnection

February, 2020

Branden Sudduth
Vice President RPPA
RC Transition Status

- RC West began operations of its expanded RC footprint on November 1
- SPP RC began operations of the SPP West RC footprint on December 3
- Peak Reliability ceased operations December 3
Transition Accomplishments

- Western Interconnection Model
- IRO-002-6 Methodology
- Data Sharing
- WECC Interchange Tool Administration
- Transition to Western Data Sharing Pool
- SOL Methodologies
- Time Monitor Transition
- Enhanced Curtailment Calculator

RC Transition
Next Steps

- Transition to Reliability and Security Oversight activities
- Assurance visits around coordination and collaboration
- Regular updates at WECC Operating Committee meetings
- Engagement with RC governance and coordination committees
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bsudduth@wecc.org