NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

DRAFT

Energy Management Recommendations for Long Duration Extreme Winter and Summer Conditions

Introduction and Background

Recently, the Bulk Electric System has experienced challenges to meet energy demands put on the system under relatively longer duration (several days to weeks) extreme heat or cold weather events. Recent events in California and Texas have highlighted the need to assess current operating practices and identify some recommended improvements so that system operations personnel are better prepared to address these challenges. Historically, ensuring sufficient resource capacity was considered enough to meet reliability needs for the most part because it was implied that the fuel to operate those resources will most likely be available. The extreme nature and relatively longer duration of these weather events along with the changing resource mix have highlighted that availability of required energy to meet the demand needs to be carefully assessed in all operating time horizons and in all operating hours and not just at the peak load hour in addition to resource capacity.

In the first quarter of 2021, NERC and its Regional Entities (RE) put together a list of reliability issues associated with long-duration extreme winter and summer conditions. Subsequently, in April 2021, a team of subject matter experts (SME) from several REs reviewed this initial list and put it into a roadmap that could be taken up in the future by other teams at NERC, such as the Energy Reliability Assessment Taskforce, for further action. Below are the summary of key recommendations and two tables (one for winter and one for summer) created by these teams that capture the various reliability issues associated with extreme temperature long-duration events and the associated recommendations to address those issues in the operational time horizons (seasonal, outage coordination, day-ahead, and real-time).

Summary of Key Recommendations

1. Reliability Coordinators (RC)/Balancing Authorities (BA)/Transmission Operators (TOP) should perform assessments and create or add to seasonal operating plans for the upcoming season (by October 1 for winter and by April 1 for summer season) with special emphasis on meeting severe weather energy requirements while also considering resource limitations such as icing, snow impacts, low hydro, solar profiles, etc. Energy aspects of this plan should be informed and updated as per seasonal planning assessments.
    a. Seasonal planning assessments should include the following:
        i. Energy constraints for the upcoming season (Evaluate capacity impacts not just on peak but throughout extreme weather to consider overall energy needs.)

ii. Resource flexibility/ramping capabilities (focusing on all operating hours and not just peak-load hour)

iii. Import capability of the system and resource availability constraints on external systems during extreme weather events

iv. Load forecasting practices that consider extreme events

b. Seasonal operating plans (informed by the seasonal planning assessments above) should include the following:

i. Plans to address challenges to meet energy demands under extreme heat or cold conditions

ii. Potential for utilization of additional transmission capacity (by calculating transmission limits based on real-time system conditions)

iii. Steps to obtain temporary relief from local, state, and federal environmental regulations

iv. Communications protocols and requirements with government, media, and the public (as appropriate)

c. These seasonal plans should be monitored in the period prior to real-time operations and actions taken as appropriate based on weather outlook to assure readiness while there is time to stock up on fuel and supplies and to mobilize. In real-time, monitoring should consider these energy-related needs to improve communications with neighbors, regulators, and fuel suppliers; manage resources with fuel switching and demand response for energy needs; and minimize duration and unintended consequences of load shedding or other emergency actions.

d. Outage coordination, day-ahead, real-time energy assessments:

i. RC and BA energy assessments should include energy constraints, ramping capability, system import capability, plant derates, and accurate load forecasting practices.

e. Plant availability factors

f. As part of the seasonal, outage coordination, day-ahead and real-time energy assessments, plant derates due to winter/summer conditions should be considered for their impact on energy needs, not just capacity. This includes unavailability due to weather, fuel constraints (natural gas restrictions), derates for alternate fuels, and derates due to temperature and potential issues with increased forced outages or delayed starts based on plant ambient ratings and historical performance.

g. Manual Load Shedding

i. Emergency plans should look for critical sub-sector electrical loads (e.g., loads that have interdependency with natural gas or water systems) so that they are excluded from manual load shedding. These should be factored into seasonal plans.

ii. Load shedding capability should be confirmed during the period prior to real-time operations and monitored during execution as well as recovery if called upon during real-time.

iii. Track demand response to ensure that critical sub-sector loads are excluded from interruption and overall response is managed, considering limitations to duration of availability and magnitude.

Appendix A: Winter Reliability Issues (for the following time horizons: Seasonal Planning, 21-Day Ahead/Outage Coordination, Real-time)	
Reliability Issue #1: What is the variability of renewable resources for winter?	
Considerations	**Time Horizon For Considerations**
a. Energy assessment must account for the variability of wind and solar resources. b. Extreme conditions may persist for multiple days and impact these resources.	**Seasonal/Outage Coordination/Real-Time**

Discussion:

- The variability of these resources requires evaluation in all time horizons. The addition of wind and solar resources is dramatically changing the characteristics of the generation fleet. The increased renewable energy penetration into the electric power system is producing significant changes to operations, planning, and market practices. Seasonal capacity assessments and planning efforts must include consideration for the sensitivity of the new technology to extreme cold weather that may be much lower than 50th percentile peak capacity values.
- While forecasting tools are improving, icing and cloud cover impacts remain difficult to accurately predict, cold fronts can stall for hours or days, and high winds can cause temporary feathering of turbines or stowing of solar trackers across a wide area. Reduced output from renewables increases the reliance on conventional resources, which will make up the difference in energy production below seasonal expectations and serve increased loads in extreme cold.
- The output of wind generation may change significantly in extreme conditions due to a variety of factors that may depend on the type of turbines and location:
  - Wind turbine units vary in their cold weather packages and may reach low-temperature shutdown during extreme temperatures, resulting in lengthy unavailability if those extreme cold conditions occur.
  - Seasonal and operations planning should consider wind speed drops due to the lack of pressure gradient across geographically large extreme weather systems on wind resource availability and its correlation with wind resource production. Frontal passages may increase wind speeds and output.
  - The assessment should consider the potential lengthy impact to wind turbine production caused by icing since turbines cannot be safely entered and energy production is lost. It is recommended to focus on extreme cases (high load/high outages) and consider using the WIceAtlas created by the VTT Technical Research Center.

Solar PV energy production in extremes may be affected by difficult-to-predict cloud cover impacts or by snow buildup. PV plants are generally able to withstand extreme cold, but inverters may have temperature limitations.

Appendix A: Winter Reliability Issues (for the following time horizons: Seasonal Planning, 21-Day Ahead/Outage Coordination, Real-time)	
Reliability Issue #2: What are the issues around load forecasting?	
Considerations	**Time Horizon For Consideration**
c. Sufficiency of current load forecasting practices to account for energy needs in extreme cold d. Impact of significant temperature changes within a short period e. Potential demand response duration and amount identification along with limitations for extreme scenarios f. Identification and correction of past load forecast errors g. Electrification of the grid reflected in load forecasting during extreme scenarios h. Role of distribution providers for more granular load forecasts	**Seasonal/Outage Coordination/ Real-Time**
Discussion: Extreme scenarios must be examined seasonally for potential impacts beyond the 90th percentile on a seasonal basis. Winter peak load forecasts in parts of the country will likely need to reflect a marked increase in electric consumption during extreme low temperatures. Resistance heating and building insulation may drive nonlinear load increases with current technology. Cold weather patterns can shift in time and location, resulting in significant deviation in load during near-term operations.	
Reliability Issue 3: What are the resource capacity and availability considerations—as related to energy adequacy?	
Considerations	**Time Horizon For Consideration**
a. Minimum and maximum operating/starting temperature requirements b. Area-wide energy outlook prepared by October 1 of each year that covers energy sufficiency overall under extreme long-duration cold weather events, including clouds/snow/icing c. Fuel procurement—day ahead versus spot market and/or firm versus non-firm d. Storage provisions (for coal or fuel oil from on-site supplies) e. Resource readiness seminar covering preparation for extreme conditions f. Identify likely temperature based derates for units during cold weather and how those derates are accounted for in the BAs assessments and RCs OPAs g. Timing and method of communicating capacity and availability restrictions to the RC/BA/TOP	**Seasonal/Outage Coordination/Real-Time**

Appendix A: Winter Reliability Issues (for the following time horizons: Seasonal Planning, 21-Day Ahead/Outage Coordination, Real-time)	
Reliability Issue 3: What are the resource capacity and availability considerations as related to energy adequacy?	
Considerations	**Time Horizon For Consideration**
Discussion: ▪ Resource planning processes should focus on mitigating resource adequacy risk during tight operating conditions and account for resource's winter capabilities that differ significantly from summer capabilities. ▪ RC/BA/TOPs should consider creating or augmenting winter seasonal operating plans by October 1 with special emphasis on meeting extreme weather condition energy requirements (cold, icing, clouds, etc.). This is somewhat distinct from capacity (peak) needs. ▪ As part of the seasonal, outage coordination, day-ahead, and real-time energy assessments, plant availability should be considered, particularly for thermal plants. This may include derates due to historical or plausible fuel supply concerns (use of alternate fuels to replace natural gas) as well as evaluation of potentially higher unavailability due to some plant's temperature limitations but also the possibility of startup issues or equipment failures in extreme cold seen in extreme conditions. ▪ Readiness training for the season should focus on communication of status as well as plant cold weather preparations. ▪ BAs should develop winterization guidelines to assist generators with preparation for mitigating the effects of winter risk and to provide a clear understanding of the BAs' capacity and availability expectations, especially during extreme weather conditions.	
Reliability Issue 4: Do we need to consider hourly ramping requirements (current practices vs. future needs)?	
Considerations	**Time Horizon For Consideration**
a. During critical operating hours, such as after sunset, consider if there enough resources available to offset reduction in solar output b. Wind and solar changes (wind die-offs and cloud cover) c. Possible need for ramping products more granular than hourly d. Coordination with natural gas pipelines/suppliers during stressed system conditions on the natural gas infrastructure, to ensure adequate fuel availability and system capability to support large natural gas draws	**Real-Time**
Discussion: ▪ BAs must consider resource ramp rates to maintain ACE and meet BAL standard requirements. ▪ Consider ramp-related ancillary services products including margins during peak ramping forecast. ▪ Consider enhanced natural gas-electric coordination.	

Appendix A: Winter Reliability Issues (for the following time horizons: Seasonal Planning, 21-day ahead/Outage Coordination, Real-time)	
Reliability Issue 5: What are reserve requirements considerations?	
Considerations	**Time Horizon For Consideration**
a. Different types of reserves required by the standards, how they are calculated, and sufficiency of requirements b. Other reserve considerations for extreme conditions c. Zonal reserves to insure deliverability during high energy transfers	**Seasonal/Outage Coordination/ Real-Time**
Considerations	**Time Horizon For Consideration**
Discussion: BAs are required to meet reserve requirements as outlined in the BAL standards. Extreme cold conditions may merit a temporary increase in reserves to offset higher forced outage rates. Generators may also require procurements for natural gas deliveries in advance or warm up boilers, this may merit consideration to assure reserves and energy in advance of the operating day**.**	
Reliability Issue 6: Are there fuel supply issues to consider for winter?	
Considerations	**Time Horizon For Consideration**
a. Evaluate typical fuel variability for winter given increased demand expected for non-electric uses. Certain locations may be prone to curtailments.	**All**
b. Conduct dual fuel assessments (fuel surveys, fuel swapping capabilities and requirements, environmental limitations, replenishment plans/contracts, optimization of energy/environmentally limited resources) to ensure resources are available to switch to the fuel that is not in short supply: i. Understand how much fuel must be on-site (also a consideration under Reliability Issue 3) ii. Understand fuel supply chains and how they all simultaneously shrink and disappear during extreme weather, including natural gas and liquid fuels, and identify alternative supply chains iii. Consider potential fuel sharing plans to optimize energy availability iv. Preseasonal unit startups (also a consideration under Reliability Issue 3) v. Advance unit startups (also a consideration under Reliability Issue 3)	**Seasonal/Outage Coordination**

Appendix A: Winter Reliability Issues (for the following time horizons: Seasonal Planning, 21-day ahead/Outage Coordination, Real-time)	
Reliability Issue 6: Are there fuel supply issues to consider for winter?	
c. Advance unit startups (also a consideration under reliability issue scheduling units in advance and out of merit to ensure they secure fuel needs (i.e., not waiting until next / "just in time" natural gas market nomination period))	**Real-Time**
d. Coordination with natural gas pipelines/suppliers during stressed system conditions on the natural gas infrastructure to ensure adequate fuel availability and system capability to support large natural gas draws	**Outage Coordination/ Real-Time**
Discussion: • Winter seasonal assessments should consider how historical or extreme natural gas supply issues, along with coal pile freezing, may affect the aggregate energy production as well as alternate fuel use readiness or testing. • During the weeks prior, details on fuel storage should be firmed up to allow resupply/topping off as well as confirm availability, and coordination with natural gas suppliers increased.	
Considerations	
• Closer to real time, energy-based decisions to optimally utilize available fuel mix to meet daily energy readiness becomes key. • Decisions to secure and maintain on-site fuel for non-dual-fuel resources (e.g., coal stockpiles, oil inventories) with additional margin	
Reliability Issue 7: How should imports be incorporated into seasonal energy assessments?	
Considerations	**Time Horizon For Consideration**
a. Imports should be firm capacity to be considered in seasonal assessment. Susceptibility of imports to curtailment should be evaluated. b. Evaluation of emergency nonfirm capacity options should be discussed with neighboring entities but not depended upon. c. Import capability should be monitored in terms of its ability to support energy needs and coordinated with internal energy sources prior to and during real-time operations.	**Seasonal**
d. Additional analysis should be incorporated into assessments to better understand and evaluate the risks associated with reliance on firm imports, particularly those associated with ac ties.	**Seasonal/Outage Coordination/ Real-Time**

<table>
<tr><th colspan="2">Appendix A: Winter Reliability Issues (for the following time horizons: Seasonal Planning, 21-day ahead/Outage Coordination, Real-time)</th></tr>
<tr><td colspan="2">Reliability Issue 7: How should imports be incorporated into seasonal energy assessments?</td></tr>
<tr><td colspan="2">Discussion:
Imports are firm energy and firm transmission as part of seasonal energy assessments for planning reserve margin.
Emergency assistance should be evaluated and coordinated with neighboring entities for best use to meet energy needs.
The ability of the system to support firm commitments, for a range of scenarios, needs to be incorporated into assessments.</td></tr>
<tr><td colspan="2">Reliability Issue 8: How can the maximum transmission capacity be utilized?</td></tr>
<tr><td>Considerations</td><td>Time Horizon For Consideration</td></tr>
<tr><td>a. Determine ahead of the season under what conditions emergency transfer capability can be used to increase flows, including imports into deficient areas:
i. For stability-based import limits, use real-time tools to determined import limits as opposed to conservative seasonal limits.
ii. Potential impacts on transmission equipment due to low ambient temperature or icing merit consideration</td><td>Seasonal/Outage Coordination</td></tr>
<tr><td>b. Assess, where possible, if emergency conditions warrant/allow relief of certain performance criteria with respect to specified contingencies and constraints (i.e., breaker failure contingencies, double-circuit tower contingencies, etc.).</td><td>Real Time</td></tr>
<tr><td>Considerations</td><td>Time Horizon For Consideration</td></tr>
<tr><td colspan="2">Discussion: As part of seasonal plan, consider using additional transmission capacity (by calculating transmission limits based on real-time system conditions in winter that may allow for higher facility ratings in cold weather). At the same time, consider potential impacts from weather-induced outages based on factors such as historical performance.</td></tr>
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Appendix A: Winter Reliability Issues (for the following time horizons: Seasonal Planning, 21-day ahead/Outage Coordination, Real-time)	
Reliability Issue 9: What are the considerations for demand response and load-shedding plans?	
Considerations	
a. Awareness of critical loads (e.g., natural gas wellheads, compressor stations) and removal from manual load-shedding, under frequency load shedding (UFLS), and UVLS	**Seasonal**
b. Feeder rotations for long duration or high MW value outages. Need for flexibility while maintaining maximum amount of load shed capability. Recognition that winter results may differ	**Seasonal/ Real-Time**
c. Encourage increased amounts of demand response, particularly in areas where negligible amounts exist to provide additional energy reserves both during and prior to load shedding.	**Seasonal/Outage Coordination/ Real-Time**
d. Evaluate demand response programs to differentiate between summer vs. winter critical loads (e.g., natural gas supply chain facilities should not be part of winter demand response program) and the efficiency of participating DR loads based on seasonal operating period. Consider limitations on demand response participation during long duration scenarios.	**Seasonal**
e. Encourage the coordination and optimization of natural-gas-electric demand response programs.	**All**
f. Proliferation of behind-the-meter resources and its impact on load shedding, UFLS and UVLS programs.	**Seasonal/Outage Coordination/ Real-Time**
Discussion: Manual load shedding plans should look at critical electrical loads so that they don't get shed as part of manual load shedding. Also, the seasonal plan should identify the maximum capability for load shedding and communications on status. During the weeks prior to operations, communications with distribution providers should evaluate plan effectiveness under expected conditions and confirm critical customer contacts. In real-time, the status of plans due to distribution outages as well as restoration impacts (inrush/delays due to equipment issues) should be available.	

Appendix A: Winter Reliability Issues (for the following time horizons: Seasonal Planning, 21-day ahead/Outage Coordination, Real-time)	
Reliability Issue 10: What regulatory matters should be considered as part of Energy Management Plan	
Considerations	**Time Horizon For Consideration**
a. Develop plans with state and federal agencies to eliminate fuel transportation limitations (e.g., lifting trucking constraints to ensure adequate fuel supplies). b. Evaluate options to gain relief from local, state, and federal emission/environmental limitations under 202C or other state/federal statutes. c. Review options for presidential declaration of grid security emergency. d. Revisit/consider waiver process with respect to the Merchant Marine Act of 1920 (Jones Act) for liquid natural gas or fuel oil delivery by water.	**Seasonal/Outage Coordination/ Real-Time**
Discussion: Seasonal energy management plans should ensure that there are plans to seek relief from local, state, and federal environmental regulations. During the period prior to real-time, these plans should be implemented with minimal delay when required to avoid consequences like generator shutdowns for legal clarifications.	
Reliability Issue 11: What assessments should be made by RCs, Bas, and TOPs to ensure energy sufficiency?	
Considerations	**Time Horizon For Consideration**
a. Seasonal assessments b. Rolling forward-looking assessments	**Seasonal/Outage Coordination/ Real-Time**
Discussion: Seasonal, outage coordination, and real-time assessments should include the following: • Energy constraints for the upcoming season – in winter these may involve extreme scenarios from history initially then adjusted when extreme weather conditions are initially forecasted • Resource flexibility/ramping assessments and look at current capabilities and to ensure sufficient energy in all operating hours of the day (not just focus on peak load hour). Import capability of the system and resource availability constraints on external systems during extreme cold weather events	

Appendix A: Winter Reliability Issues (for the following time horizons: Seasonal Planning, 21-day ahead/Outage Coordination, Real-time)	
Reliability Issue 12: What should be the communications requirements?	
Consideration	**Time Horizon For Consideration**
a. Prior to extreme weather, communicate with individual resources to understand the individual constraints they may have during the event b. Unit warm-up, out of merit start-up c. Identify providers that have limited but useful amounts of energy and track availability. d. Appeal to generators to order additional fuel supplies and execute extreme weatherization plans for resources e. Public outreach programs that reinforce the importance of unified messaging. f. In advance of and during emergencies, the messaging by representatives of RCs, balancing areas, regional cross-sector utilities (e.g., electric, natural gas, water, etc.), and federal, state, and local governments should be unified. g. Must provide timely, clear, consistent, and actionable information to the public as well as commercial and industrial customers to facilitate mitigation of emergency events by reinforcing the need for extreme conservation measures to keep customer load connected while protecting life and critical infrastructure. h. The use of technology for communications (e.g., emergency text messages, Facebook, Twitter, YouTube) i. Establish communication channels with NOAA/FEMA and other federal agencies for emergency preparedness and response. j. Under extreme circumstances, state governors should deliver the call to action.	**Seasonal/Outage Coordination/ Real-Time**
Discussion: Seasonal Energy Management plan should include communications protocols and requirements (as appropriate). Above are some examples to consider to include in the plan. Other times horizons would likely incorporate into existing emergency communications plans and drills.	

Appendix B: Summer Reliability Issues (for the following time horizons: Seasonal Planning, 21-day ahead/Outage Coordination/Real-time)	
Reliability Issue #1: What is the variability of renewable resources for summer?	
Considerations	**Time Horizon For Consideration**
a. The variability of wind and solar resources should be accounted for in the energy assessments. b. Extreme conditions may persist for multiple days and impact resources.	**Seasonal/Outage Coordination/Real-Time**
Discussion: In the outage coordination and real-time time horizons for summer, wind/solar forecasts are fairly accurate. However, for seasonal capacity assessments and seasonal planning there is value in evaluating energy impacts during extreme events. Additionally, for shorter term time horizons (outage coordination, real-time etc.) unexpected extreme events could occur, therefore evaluation of and preparation for energy availability for extreme events could become critical.	
Reliability Issue #2: What are the issues around load forecasting?	
Considerations	**Time Horizon For Consideration**
a. Current load forecasting practices should be assessed for sufficiency in hot conditions b. Impact of significant temperature changes within a short period	**Seasonal**
Discussion: Summer peak load forecasts are typically well prepared in outage coordination and real-time time horizons. Entities should ensure that their load forecasting practices consider extreme events especially in the seasonal time horizon.	
Reliability Issue 3: What are the resource capacity and availability considerations?	
Considerations	**Time Horizon For Consideration**
a. Minimum and maximum operating/starting temperature requirements b. Area-wide energy outlook prepared by April 1 of each year that covers the energy situation overall under extreme long-duration heat events, including cloud/smoke cover. c. Temperature based derates for the units during hot weather and accounting of derates in the BAs assessments and RCs OPAs	**Seasonal/Outage Coordination/Real-Time**

Appendix B: Summer Reliability Issues (for the following time horizons: Seasonal Planning, 21-day ahead/Outage Coordination/Real-time)	
Reliability Issue 3: What are the resource capacity and availability considerations?	
Discussion: • RC/BA/TOPs should consider creating a seasonal operating plan for the upcoming summer season by April 1 with special emphasis on meeting the severe temperature energy requirements (e.g., drought conditions). • As part of the seasonal, outage coordination, and real-time energy assessments, plant derates should be considered (especially for thermal/nuclear plants etc.).	
Reliability Issue 4: Do we need to consider hourly ramping requirements? Current practices vs. future needs.	
Considerations	**Time Horizon For Consideration**
a. During critical operating hours, such as after sunset, ensure there are enough resources available to offset reduced solar output and increased demand.	**Seasonal/Outage Coordination/Real-Time**
Discussion: RCs/BAs/TOPs should consider creating a seasonal operating plan for the upcoming summer season by April 1 with special emphasis on meeting the severe temperature energy requirements (e.g., drought conditions). As part of the seasonal, outage coordination, and real-time energy assessments, plant derates should be considered (especially for thermal/nuclear plants, etc.).	
Reliability Issue 5: What are reserve requirements considerations?	
Considerations	**Time Horizon For Consideration**
a. Different types of reserves required by the standards, how they are calculated, and requirement sufficiency b. Other reserve considerations under extreme heat	**Seasonal/ Outage Coordination/ Real-Time**
Discussion: BAs are required to meet reserve requirements per BAL standards. Extreme heat may warrant procurement of additional reserves.	
Reliability Issue 6: Are there fuel supply issues to consider for summer?	
Considerations	**Time Horizon For Consideration**
a. Evaluate fuel variability for summer. b. Conduct dual fuel assessments to ensure resources can switch to the fuel that is not in short supply and how much fuel must be on-site: i. Understand fuel supply chains and how they all simultaneously shrink and disappear during extreme weather including natural gas and liquid fuels and identify alternative supply chains	**N/A**

Appendix B: Summer Reliability Issues (for the following time horizons: Seasonal Planning, 21-day ahead/Outage Coordination/Real-time)	
Reliability Issue 6: Are there fuel supply issues to consider for summer?	
ii. Consider potential fuel sharing plans to optimize energy availability.	
Discussion: Fuel variability under extreme weather events is a more prominent issue for winter than summer. However, entities should ensure that sufficient fuel supply is available for extreme conditions.	
Reliability Issue 7: How imports should be incorporated into seasonal energy assessments?	
Considerations	**Time Horizon For Consideration**
a. Imports should be firm capacity to be considered in seasonal assessment.	**Seasonal**
Reliability Issue 8: How can the maximum transmission capacity be utilized?	
Considerations	**Seasonal**
Discussion: Imports are firm energy and firm transmission as part of seasonal energy assessments for planning reserve margin.	
a. Electric import certainty for wide-spread weather events and determine ahead of the season under what conditions emergency transfer capability can be used to increase imports into the deficient area: i. For stability-based import limits, use real-time tools to determined import limits as opposed to conservative seasonal limits. ii. Require the use of ambient temperature adjusted limits on all transmission facilities where the conductor rating is the limitation	**Seasonal**
Discussion: As part of seasonal plan, consider including plans to utilize additional transmission capacity (by calculating transmission limits based on real-time system conditions)**.**	
Reliability Issue 9: What are the considerations for demand response and load-shedding plans?	
Considerations	**Time Horizon For Consideration**
a. Maintain awareness of critical loads, such as natural gas wellheads and compressor stations, and remove from manual load-shedding, demand response, UFLS and UVLS b. Feeder rotations for long duration outages	**Seasonal/ Outage Coordination/ Real-Time**
Discussion: Load shedding and demand response plans should incorporate critical electrical loads (feeders supplying natural gas plants and compressor stations that supply power to generation stations in turn) so that they aren't subject to manual load shedding.	

Appendix B: Summer Reliability Issues (for the following time horizons: Seasonal Planning, 21-day ahead/Outage Coordination/Real-time)	
Reliability Issue 10: What regulatory matters should be considered as part of Energy Management Plan?	
Considerations	**Time Horizon For Consideration**
a. Develop plans with state and federal agencies to eliminate fuel transportation limitations (e.g., lifting trucking constraints to ensure adequate fuel supplies). b. Options to gain relief from local, state and federal emission limitations under 202C c. Review options for presidential declaration of Grid Security Emergency. d. Encourage increased amounts of demand response, particularly in areas where negligible amounts exist, to provide additional energy reserves.	**Seasonal**
Discussion: Seasonal energy management plans should consider requests to seek relief from local, state, and federal environmental regulations in advance of possible needs to avoid delays when the need arises closer to real-time.	
Considerations	**Time Horizon For Consideration**
Reliability Issue 11: What assessments should be made by RCs, BAs, and TOPs to ensure energy sufficiency?	
Considerations	**Time Horizon For Consideration**
a. Seasonal assessments b. Rolling forward looking assessments	**Seasonal/Outage Coordination/Real-Time**
Discussion: Seasonal, Outage Coordination, Real-time Assessments should include: • Energy constraints (low hydro conditions, solar profiles etc.) for the upcoming season • Resource flexibility/ramping assessments (Look at current capabilities and to ensure sufficient energy in all operating hours of the day (not just focus on peak load hour.)) • Import capability of the system and resource availability constraints on external systems during extreme heat events	

Appendix B: Summer Reliability Issues (for the following time horizons: Seasonal Planning, 21-day ahead/Outage Coordination/Real-time)	
Reliability Issue 12: What should be the communications requirements?	
Considerations	**Time Horizon For Consideration**
a. Prior to extreme weather, evaluate individual resources to understand the individual constraints they may have during the event. b. Unit warm-up, out of merit start-up c. Identify providers that have limited, but useful amounts of energy and track availability. d. Appeals to generators to order additional fuel supplies and execute extreme weatherization plans for resources e. Public outreach programs should reinforce the importance of unified messaging. f. In advance of and during emergencies, messaging should be unified by representatives of RCs, BAs, regional cross-sector utilities (electric, natural gas, water, etc.), federal, state, and local governments. g. Must provide timely, clear, consistent, and actionable information to the public as well as commercial and industrial customers to facilitate mitigation of emergency events by reinforcing the need for extreme conservation measures to keep customer load connected while protecting life and critical infrastructure. h. Use technology for communications, such as emergency text messages, Facebook, Twitter, YouTube, or other social media. i. Establish communication channels with NOAA/FEMA and other federal agencies for emergency preparedness and response. j. Under extreme circumstances, state governors should deliver the call to action.	**Seasonal/Outage Coordination/Real-Time**
Discussion: Seasonal energy management plans should include communications protocols and requirements (as appropriate). Above are some examples to consider to include in the plan.	