Winter Preparedness / Summer Review Webinar

2020





DUKE ENERGY®

BUILDING A **SMARTER** ENERGY FUTURE℠

Ryan Kelley, Manager II System Operations Engineering

Safety

Safety

- Evacuation Route
  - Know your evacuation route and location
- Shelter-In-Place Location
  - Know your shelter-in-place location
- Slips, Trips, Falls
  - Make sure your area is clear of obstructions
- Hygiene/Health
  - Follow Health and Safety guidance (e.g. handwashing)
  - Stay at home as much as possible

Ryan Kelley, Manager II System Operations Engineering

Overview & Agenda

Overview

- The focus is on reviewing our preparations for the 2020-21 Winter and our performance during the 2019 Summer.

- Business unit presentations
  - High level overview of gaps for summer
  - Review of winter performance

- How will the webinar work?
  - All attendees will be muted to reduce background noise.
  - Please hold questions till the end.
  - Presentation will be recorded and placed on Transmission Dashboard Sharepoint

Agenda

- Opening Comments – Sam Holeman
- Business Unit Presentations
  - All Groups
    - Communications – Paige Layne
    - Meteorology – Max Thompson
    - Environment, Health & Safety – Brenda Zamora
    - NERC Project 2019-06: Cold Weather– Ryan Kelley
    - Nuclear Generation – Rick Green
    - Fossil/Hydro Generation– Rick Llewellyn
    - Distribution & DSM – Greg Disher & Mark Kametches
    - Fuels and System Optimization – Scott Burnside
  - Non-Marketing Personnel Only
    - System Operations – Daniel Stephens
    - Super Peak – Derek Messmore
- Questions and Discussion

Sam Holeman, VP Transmission System Planning and Operations

Opening Comments

Paige Layne, Director Communications

Customer Experience & Services

Communications

Communications Overview

Sample Timeline of Communications (As directed by Grid Operations)

Your Corp. Comm Team

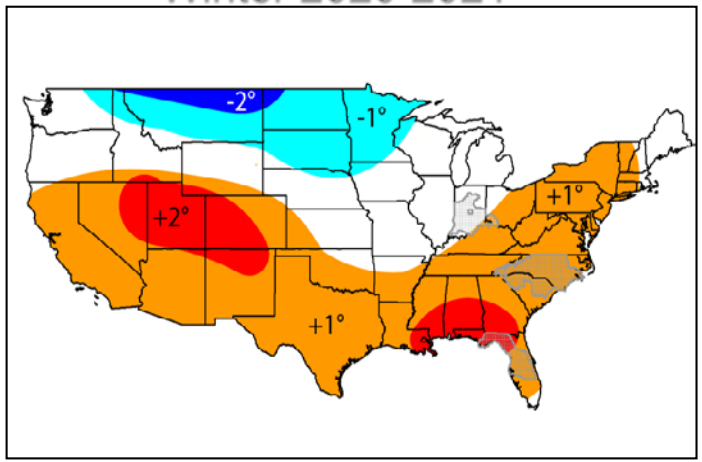
- Paige Layne – Carolinas
- Valerie Patterson – Florida, Midwest
- Debra Smith – Emergency Communications
- Loree Elswick – Employee Communications

Max Thompson, Senior Meteorologist

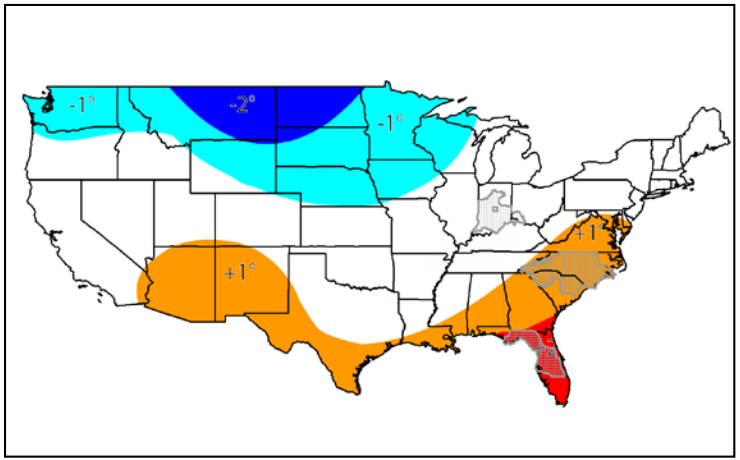
Meteorology

Winter 2020-2021 Outlook

Winter 2020-2021

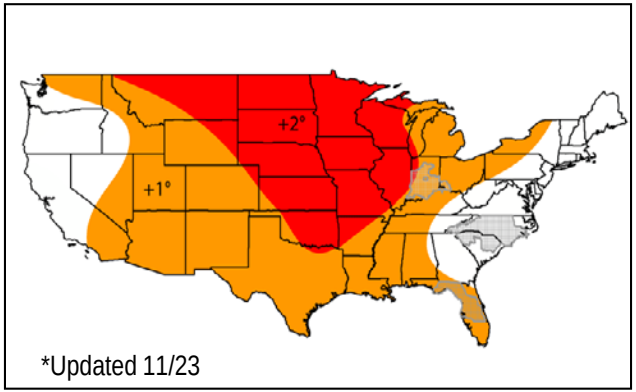


Previous Winter 2020-2021 Forecast



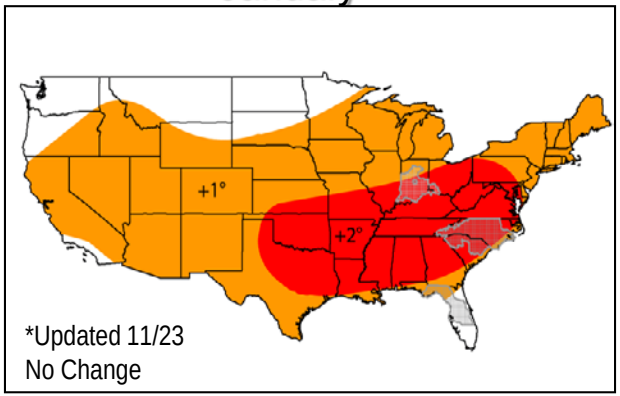
Winter 2020-2021 Breakdown & Spring 2021 First Glance

December



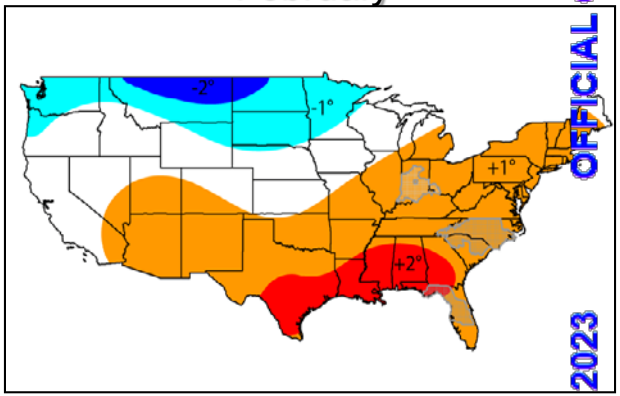
*Updated 11/23

January

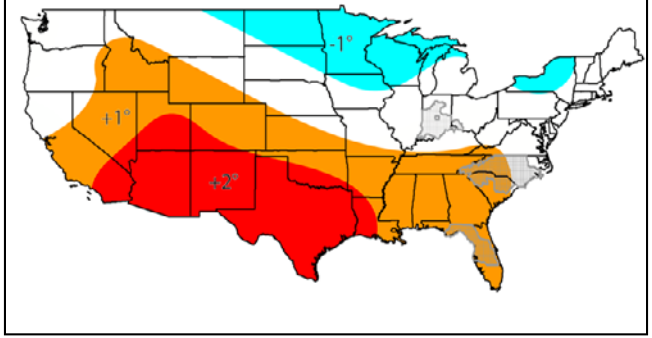


*Updated 11/23
No Change

February

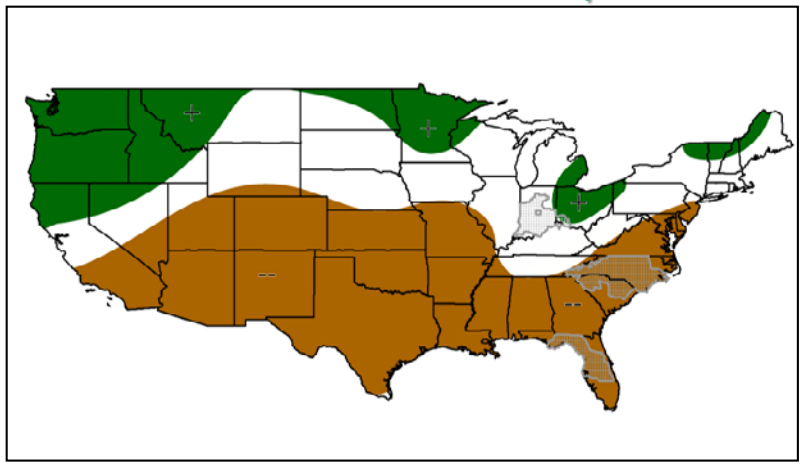


Spring 2021



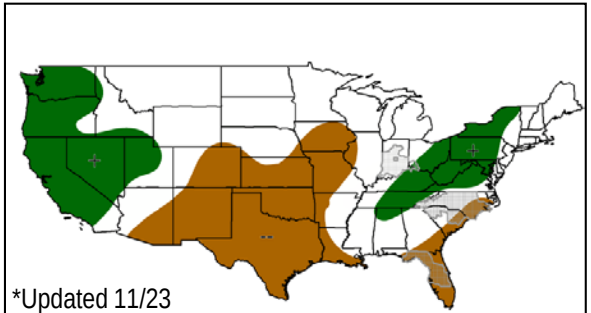
Winter 2021 Precipitation Outlook

Winter 2020-2021 Precipitation



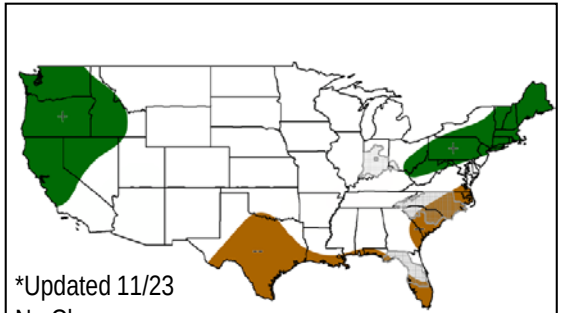
Region	Winter	Dec	Jan	Feb
Carolinas	85%	100%	85%	70%
Midwest	110%	100%	95%	120%
Florida	75%	80%	80%	70%

December



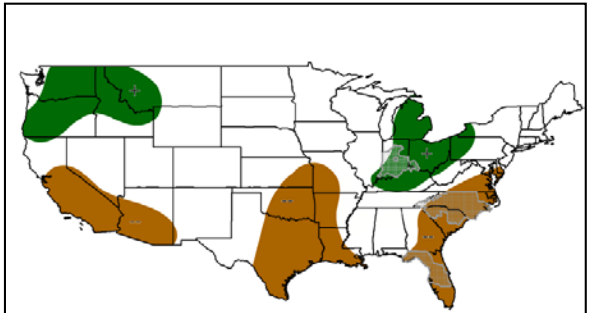
*Updated 11/23

January

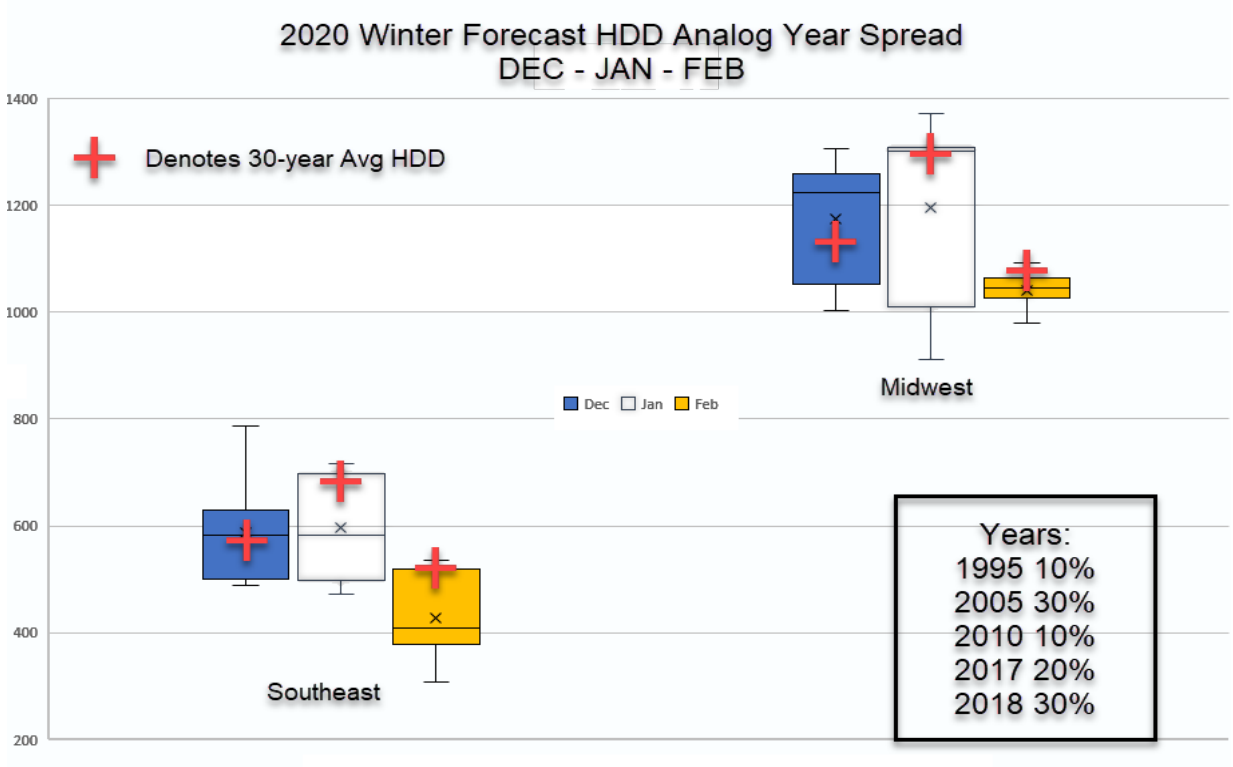


*Updated 11/23
No Change

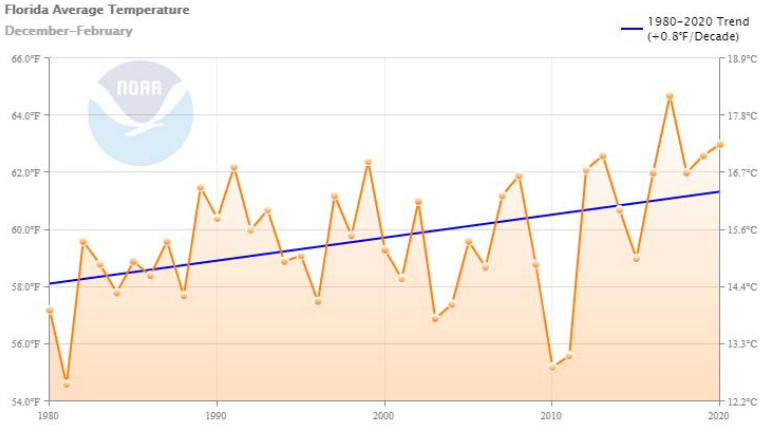
February

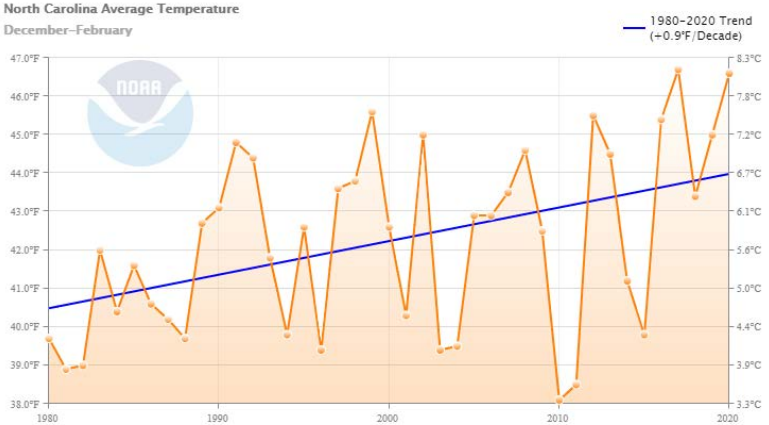


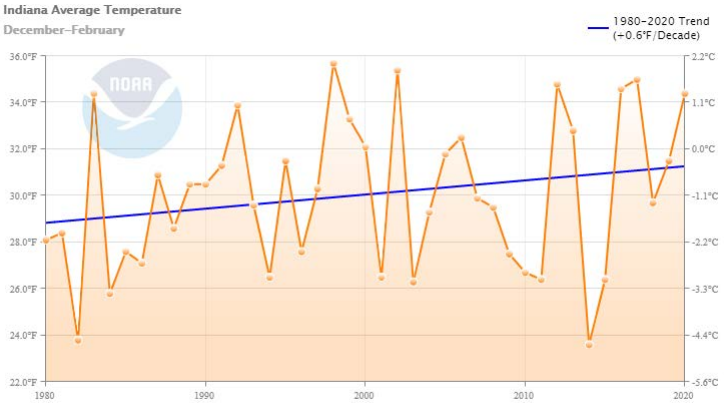
Degree Day Outlook



Winter Temperature Trends



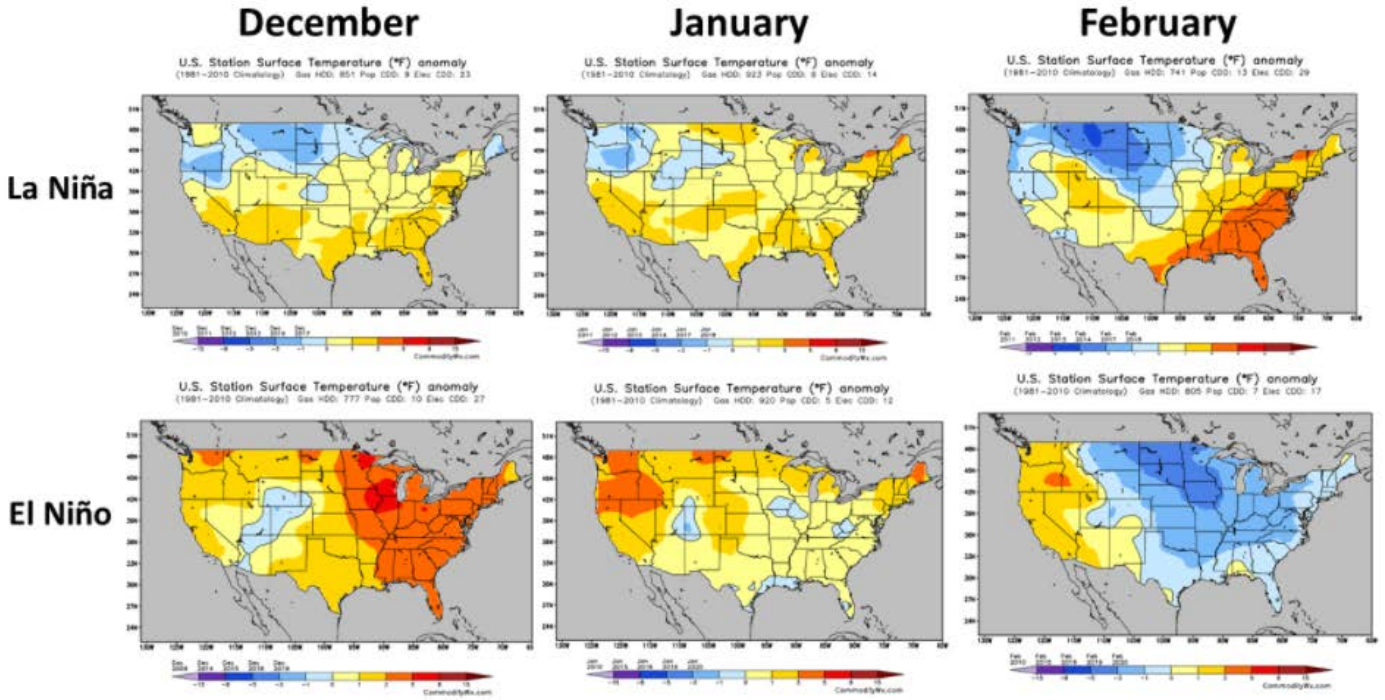




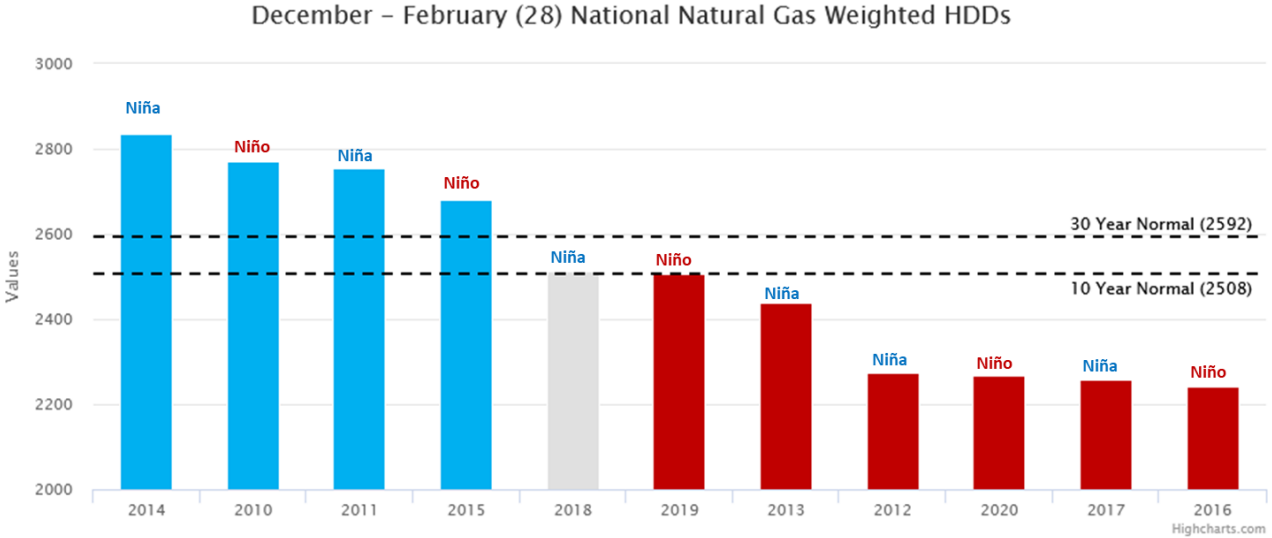
- Heating Degree Days are trending lower (1980-2020)
  - -78°Df* NC
  - -54°Df IN
  - -38°Df FL
- FL shows 33°Df increase in CDD

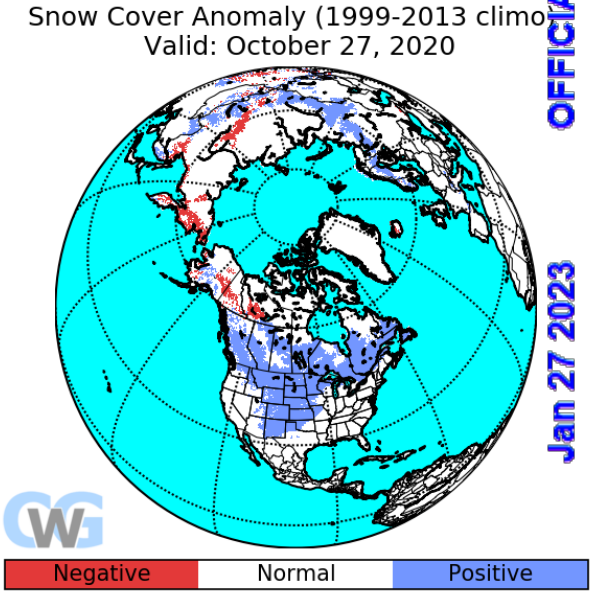
*°Df = Fahrenheit Degree-Days

La Nina vs El Nino Continued



	Niño	Niña
St.Dev	5.82	6.79
Mean	27.7	27.3
Coldest	44.3	47.4
Warmest	12.6	10.3





Winter 2020-2021 Outlook – Forecast Glossary

Atlantic Multidecadal Oscillation (AMO): A mode of variability, or signal occurring in the North Atlantic Ocean and which measures a field of sea surface temperatures (SST). This signal fluctuates between warm and cool phases usually on 20-30 year increments; currently, the AMO is in a weakening warm phase.

Arctic Oscillation (AO): The AO is a pattern where atmospheric pressure at polar and middle latitudes fluctuates between a negative and positive phase. The negative phase allows cold air to plunge into the Midwestern and Eastern US, while the positive phase brings opposite conditions.

Arctic Sea Ice Extent: Sea ice is simply frozen ocean water that is apart of the Earth's cryosphere. Arctic sea ice is obviously located in the Arctic Sea, or the North Pole. The greater extent of sea ice has been correlated to colder winter temperature anomalies across the Eastern US.

Atmospheric Blocking: 'Blocks' are large-scale patterns in the atmospheric pressure field that are nearly stationary, effectively "blocking" or redirecting west-to-east migratory cyclones. They are also known as blocking highs or lows, and can remain in place for several days or even weeks, causing similar weather patterns for an extended period of time.

El Nino – Southern Oscillation (ENSO): Refers to variations in the temperature of the surface of the tropical eastern Pacific Ocean (El Nino or La Nina) and in air surface pressure in the tropical western Pacific. These fluctuations are correlated to both precipitation and temperature anomalies across the United States, especially during the winter and summer months.

North Atlantic Oscillation (NAO): The NAO is a large-scale fluctuation in atmospheric pressure between the subtropical Atlantic high pressure and the sub-polar low pressure system near Iceland and Greenland and is quantified in the NAO index. Surface pressure drives winds and wintertime storms from west to east affecting climate from New England to western Europe.

- **NAO Index**: This index measures the surface pressure anomalies between the Icelandic low and Atlantic high. A +NAO phase will lead to warmer temperatures and a decrease in snow days for the Eastern US, while conversely, a –NAO phase will lead to colder Eastern US temperatures and an increase in snow days.

Pacific Decadal Oscillation (PDO): A described pattern of climate variation, similar to the AMO, on a timescale of decades. It is characterized by SST anomalies comparing the north-central Pacific to near the Aleutians and Gulf of Alaska. It primarily affects weather patterns in the Pacific NW, but also impacts weather patterns downstream over the East.

Pacific/North American Teleconnection (PNA): The PNA is an influential climate pattern in the Northern Hemisphere and consists of varying temperature anomalies in the western and eastern US. The PNA is strongly influenced by ENSO, where a positive phase tends to be associated with El Nino, and negative with a La Nina. In the a positive phase, the PNA correlates to deep troughing over the east and below average temperatures, and converse for a positive phase.

Quasi-Biennial Oscillation (QBO): The QBO is a quasi-periodic oscillation of the equatorial zonal wind between easterlies and westerlies in the tropical stratosphere with a mean period of 25 to 31 months. An eastward phase correlates to colder surface temperatures across the Eastern US during winter, while conversely westerly phase correlates to warmer anomalies.

Siberian Snow Cover: Extent of snow that covers the Siberian region in Russia, and can be correlated to greater risk for cold anomalies across the Eastern US during the winter season.

Brenda Zamora, Senior Health and Safety Specialist

Environmental Health & Safety

Environmental, Health & Safety

- Key Issues
  - Preventing injuries
  - Preparing for storm response
  - Supporting generation

Health & Safety Winter Injury Prevention

- Winter safety messages
  - Safety Alert on Winter Hazards – Slips/Trips/Falls and Winter Driving at this Link
- Preventing Slips/ Trips on Ice/ Snow
  - Make advanced preparations for facility snow and ice removal
- Employee Nurse Care
  - Resources available here.



Winter Preparation for Employees

- Review Winter Human Performance Initiative HPI Techniques:
  - Make part of Pre Job Briefings
    - Slips Trips and Falls - Penguin Walk
    - Dress in Layers
    - Review Signs of Frost Bite and Overexertion

Select the appropriate footwear for weather conditions

- Head up
- Shoulders back
- Bend knees and take small steps making sure the entire foot hits the surface at the same time

Winter Preparation for Employees

- Additions to Standard PPE
  - Hard Hat Cover and Balaclavas
  - Winter Eye Protection – Enclosed and Anti Fog Lens
  - Warmer Hand Protection
  - Cold Temp Reflective Wear
  - Anti Slip/Ice Gripper Shoe Attachments

Winter Vehicle Preparation

- For Site Vehicles, ATV's, and Snow Plows
  - Complete Vehicle Inspections
    - Check Batteries, Anti Freeze, Window Washer Fluids, Tires, Ice Scrappers, Brakes and Safety Equipment
  - Check Snow Plow Attachments & Sand Spreader Boxes
  - Check Site Fuel Tanks and Confirm Fuel Winter Blends

Environmental, Health & Safety

- Storm Response
  - EHS/ H&S professionals embedded in travelling response crews as they deploy to other regions.
  - Nurses available to support storm response.
  - Environmental spill response abilities
    - 24/7 hotlines
      - T&D
        Carolina and MW: 800-527-3853
        Florida: 866-769-1266
      - Generation
        Regional Environmental SME or Generation Spill Coordinator Hotline: 800-510-7439
    - Spill remediation activities
  - Storm messaging coordinated with business units.

Winter Preparation for Process Equipment

- Plant Heating - Checks
  - Auxiliary Boiler – Perform Periodic Operational Test
  - Check Station Steam and Electric Heaters
  - Check Ancillary Buildings HVAC & Plumbing Systems

- Safety Equipment - Checks
  - Fire protection (transformer deluges)
  - Outdoor Eye Wash Stations (warm and tepid)

Winter Preparation – Health & Safety Resources

	RESOURCES	LINK OR PHONE #
1	Safety Alert on Winter Hazards – Slips/Trips/Falls and Winter Driving	Click here
2	Employee Care Nurse	Click here
3	Hotline (24/7): T&D Environmental spill response	Carolina & MW: 800-527-3853 Florida: 866-769-1266
4	Hotline (24/7): Generation environmental spill response	800-510-7439

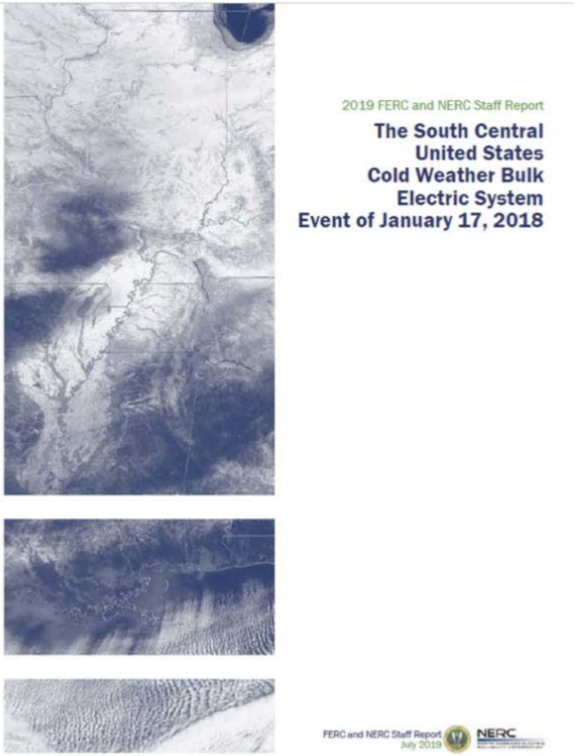


Ryan Kelley, Manager II System Operations Engineering

NERC Project 2019-06: Cold Weather

Scope

- Background
  - In July 2019, the FERC and NERC staff report titled The South Central United States Cold Weather Bulk Electronic System Event of January 17, 2018 was released.
  - SPP submitted a SAR proposing a new standard development project to review and address the recommendations in the Report.
- Goals
  - Ensure an adequate reliability and situational awareness by preparing generation for cold weather performance
  - Utilize existing standards to the extent possible (EOP-011, IRO-010, TOP-003)



SAR Info

- Generator Owner/Generator Operator develops and implements cold weather preparedness plans, procedures, and awareness training based on factors such as geographical location and plant configurations
- GO/GOP communicates BES generating unit's associated design specification/performance/limitations to BA/RC/TOP
- GO/GOP communicates when local forecasted cold weather conditions are expected to limit performance or availability.
- RC, BA, TOP incorporates the data to perform their respective Operational Planning Analysis, develop its Operating Plans, or determine the expected availability of contingency reserves for the appropriate next day operating horizon
- Where can I find more information?
  - NERC Project page
    - Project 2019-06: Cold Weather
- FERC-NERC Joint Report
  - South Central Cold Weather Event_Jan 2018_FERC-NERC Report

Timeline

Rick Green, Corporate Functional Area Manager

Nuclear Generation

Nuclear Generation

- Status of Winter 2020 Preparations:
  - BNP:
    - All actions complete
  - CNS:
    - Heat tracing on the 1B Condenser Cooling water pump is defective.
  - HNP
    - All actions complete
  - MNS
    - All actions complete
  - ONS
    - All actions complete
  - RNP
    - All actions complete

Nuclear Generation

- Summer 2020 Issues Noted:
  - BNP:
    - No issues noted
  - CNS:
    - No issues noted
  - HNP
    - No issues noted
  - MNS
    - No issues noted
  - ONS
    - No issues noted
  - RNP
    - No issues noted

Rick Llewellyn, Director FHO Operations & Governance

Fossil/Hydro Generation

Greg Disher, Manager Grid Management
Mark Kametches, Senior Products and Services Manager

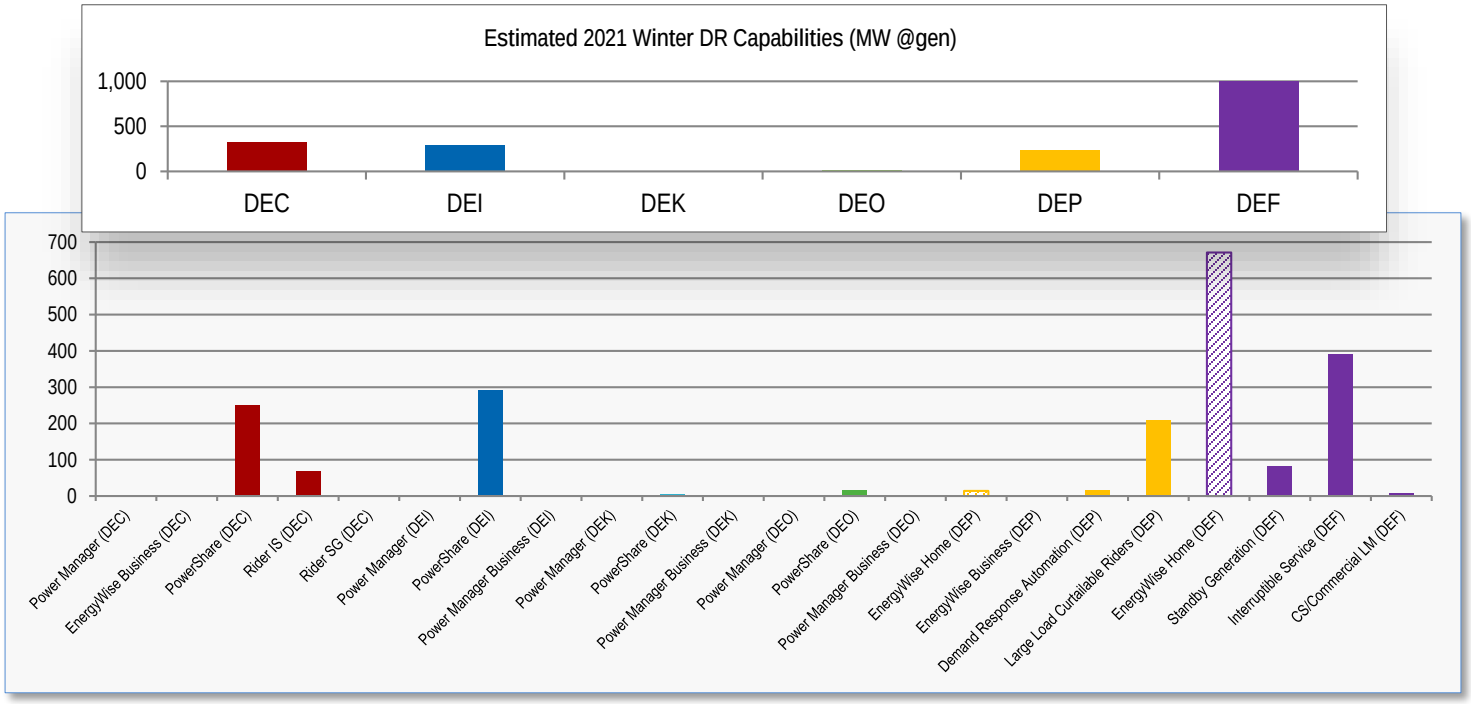
Distribution & DSM

Distribution Winter Preparedness

	Duke Energy West (DEC)	Duke Energy East (DEP)	Duke Energy Florida (DEF)	Duke Energy Midwest (DEMW)
Grid Readiness "Common Actions"	**Grid Actions Proactive:** • Partner and Coordinate with ECC and Distribution Field counterparts • DCC/Grid will operate in an elevated awareness level monitoring system conditions. • Load transfers will be implemented where needed to provide adequate operating margins. • Abnormal system conditions will be returned to normal where possible. • Distribution IT systems hands off, if needed to ensure software operability • Alarm Adjustments make sure proper season settings are set • Review "Planned Switching Procedures" and rescheduled as necessary **Grid Actions Reactive:** • Load transfers as needed • Additional resources may be requested to perform restoration due to additional sectionalizing and cold load pickup requirements after an extended outage. • Review and adjust DSCADA alarms			
Voltage Reduction	**None**	Two Emergency Levels • EM1 - 2.9% • EM2 - 5.0% DSDR ~3.6% on average	Normal CVR (Conservation Voltage Reduction) w 2-levels • Level 1 - 2.5% • Level 2 - 3.0%	**Ohio** Continuous Energy Reduction and Demand Reduction targeting 2% **Kentucky/Indiana** None
Power Factor Control	**None**	Power Factor Control via (Yukon)	Power Factor Control via (Yukon)	Power Factor Control
Load Shed	**Shed:** Automated **Rotation Plans:** Automated **Rotation Interval:** 15 min **Total Load:** ~9100	**Shed:** Automated **Rotation Plans:** Automated **Rotation Interval:** 15 min **Total Load:** ~4000 MW	**Shed:** Automated **Rotation Plans:** Automated **Rotation Interval:** 20 min **Total Load:** 5400 MW	**Shed:** Automated/Manual **Rotation Plans:** Manual **Rotation Interval:** Varied **Total Load:** ~2750 MW

Distribution - DSM

- Coordination with internal stakeholders
- Functional updates and testing of load management systems
- Non-residential participant engagement through LAM to ensure readiness and to update notification systems
- **Continued monitoring of COVID-19 impacts on curtailable loads**



Scott Burnside, Manager Unit Commitment

Fuels and System Optimization

Carolinas Power – As-Available Capacity Agreement DEC/DEP

- A capacity agreement enables DEC and DEP to sell each other capacity when one entity is short reserves, and the other entity has excess.
- The price is identified in the tariff, and is evaluated relative to other market offers.
- The advantage is that capacity can be sold/bought for targeted hours without necessarily flowing any capacity-backed energy…. Which should be more economical than many bundled market offers.
- We utilized this agreement twice last winter, up to 600 MWs and a total of 6,100 MWH, and 20 times this past summer/early fall, up to 500 MWs and a total of 42,400 MWH.

Carolinas Power – Capacity Availability – Inside DEC

Generator	Owner	BA	MW	Comments
Cleveland County	Southern Company	DEC	185	Potentially available for Capacity Purchase. Unsold capacity also used for SOCO's pool load
Rowan	Southern Company	DEC	150	Potentially available for Capacity Purchase. Unsold capacity also used for SOCO's pool load
Cleveland	NCEMC	DEC	185 & 135	May need portion for their load… 8:30 AM strike w/ SOCO
Rowan	NCMPA	DEC	150	May need portion for their load… 8:30 AM strike w/ SOCO
Cleveland	NCMPA	DEC	185	May need portion for their load… 8:30 AM strike w/ SOCO
Rowan	Macquarie	DEC	150	Mac. has option with SOCO, December only.
Kings Mountain CC	CPP	DEC	150 to 225	Varies based on customer load.

Carolinas Power – Capacity Availability – Outside DEC/PEC

Generator	Owner	BA	MW	Comments
Hillabee	Exelon	SOCO	300	Subject to trans limits.
Yadkin Hydro	Macquarie	YAD	Up to 175	Mac. is marketing options for power out of Yadkin
PJM	Macquarie	PJM	200+	Mac. can supply Firm generation out of PJM that can be tied to DNR
Franklin	Macquarie	SOCO	100	Mac. has option on firm gen. Has firm path across SOCO.

Natural Gas DEC Focus

- January 21-March 21 Forward NYMEX Gas Strip ~ $2.82 MMBtu/day as of 11/28/2020, Summer 2020 averaged $1.88 MMBtu/day
- Forecasted Winter Premium (Basis) for Carolinas Delivery January- February is $0.95
- Fundamentals
  - Production ~90 Bcf/d, 5 Bcf/d lower compared to 2019
  - Associated Gas from oil production -7 Bcf/day, Not available to balance market
  - Storage 3.9Tcf- 9% higher than 2019,7% higher than 5yr average. Expect faster drawdown due to less associated spot gas

- Manage Supply and Pipeline Restrictions
  - Transco limited gas burn flexibility, 24 hour monitoring coordination between power, ECC and unit commitment critical to avoiding penalties.
  - Maximize storage and intraday supply flexibility
  - Utilize Transco IT Park and Loan pipeline agreement when available

Fuel Oil Inventory Management

- Gas - Fuel oil economics: $3.00MMbtu vs ~ $8.75MMBtu
- No exceptions to on and offsite fuel inventory levels
- Emergency trucking contracts in place for 10-15 dedicated trucks Dec – Feb for both DEC and DEF
- If necessary, Open delivery window at plants to 24 hrs.
- Leverage power markets, daily optimization of firm natural gas deliverability
- Limit testing during cold weather events
- Firm Transport in service to Asheville CC increases reliability