AGA
American Gas Association

2025 Natural Gas Readiness Forum Summit

Atlanta, Georgia

November 18 – 19, 2025

Welcome and AGA Antitrust Compliance Guidelines

Karen Harbert
President & CEO
American Gas Association

Matthew Agen
Chief Regulatory Counsel, Energy
American Gas Association

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American Gas Association

— Opening Remarks

Ann Rendahl
Commissioner, NARUC President
Washington Utilities & Transportation Commission

Todd Snitchler
President & CEO
Electric Power Supply Association

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National Weather Forecast & Energy Outlook
Weather Forecast for Late 2025 & Early 2026

Will Lanxton, Meteorologist
Georgia Emergency Management & Homeland Security Agency

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Georgia Emergency Management & Homeland Security Agency

2025–2026 Winter Weather Outlook

Will Lanxton

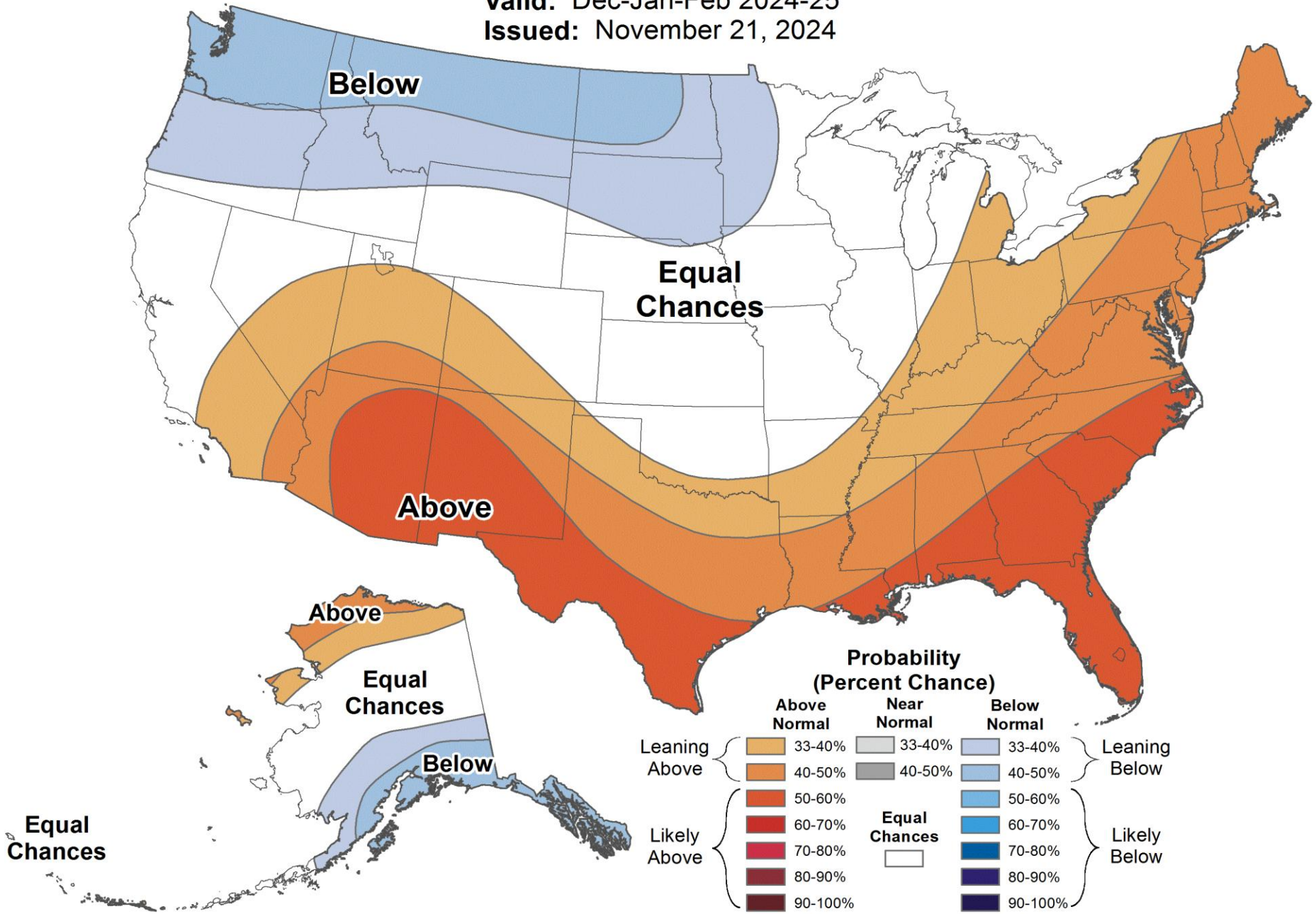
State Meteorologist

Key Points

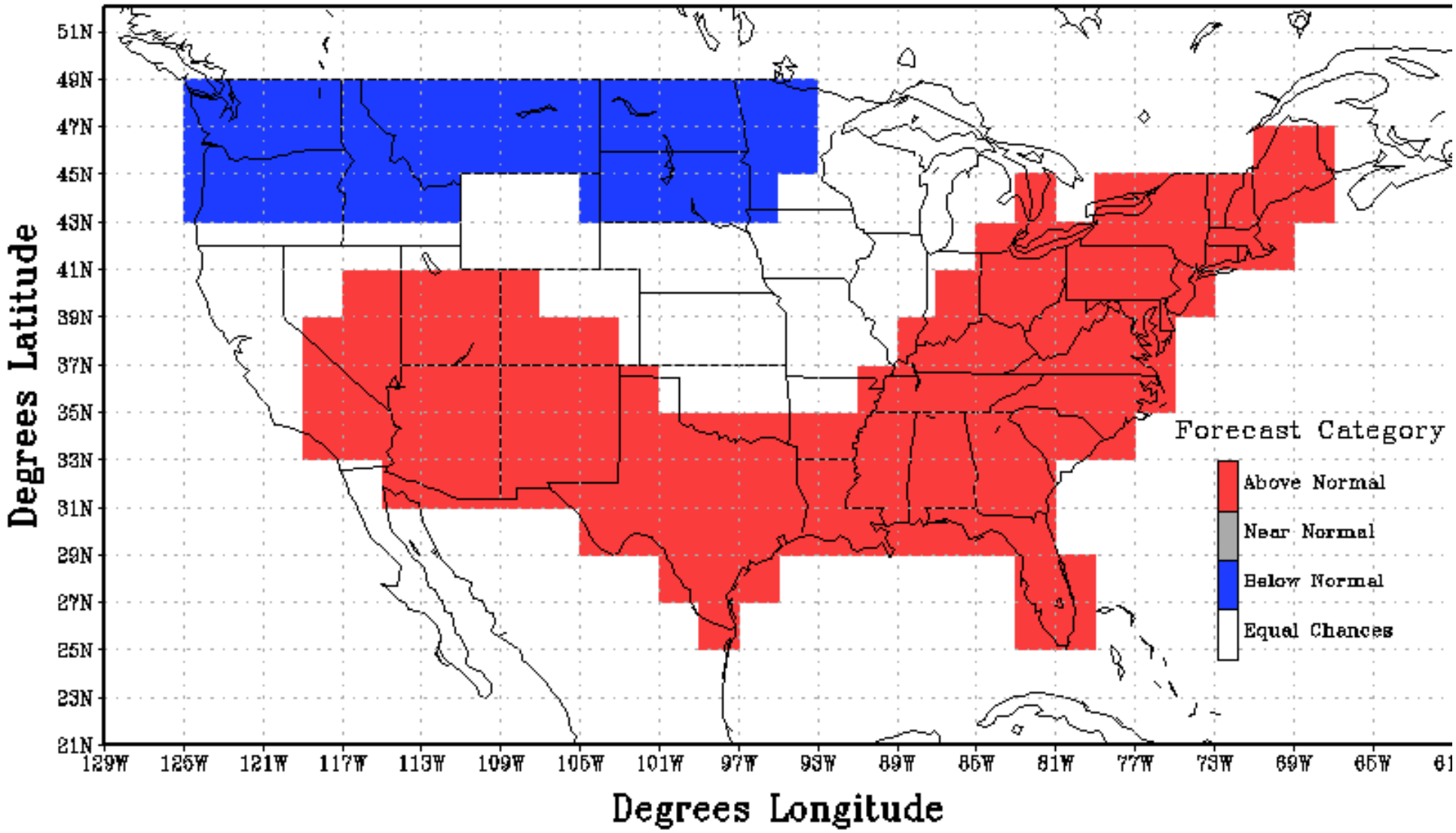
- This winter looks a lot like last winter
- Seasonal outlooks have limitations
  - 90-day outlooks will have ups and downs
  - “Average seasons” often include major swings
- A weaker polar vortex leads to more cold air outbreaks over the eastern U.S.
- Early-to-mid winter (late November through January) this year as opposed to mid-to-late winter (January through February) last year
- Recent analog winters: ‘13–‘14 and ‘24–‘25

Seasonal Temperature Outlook

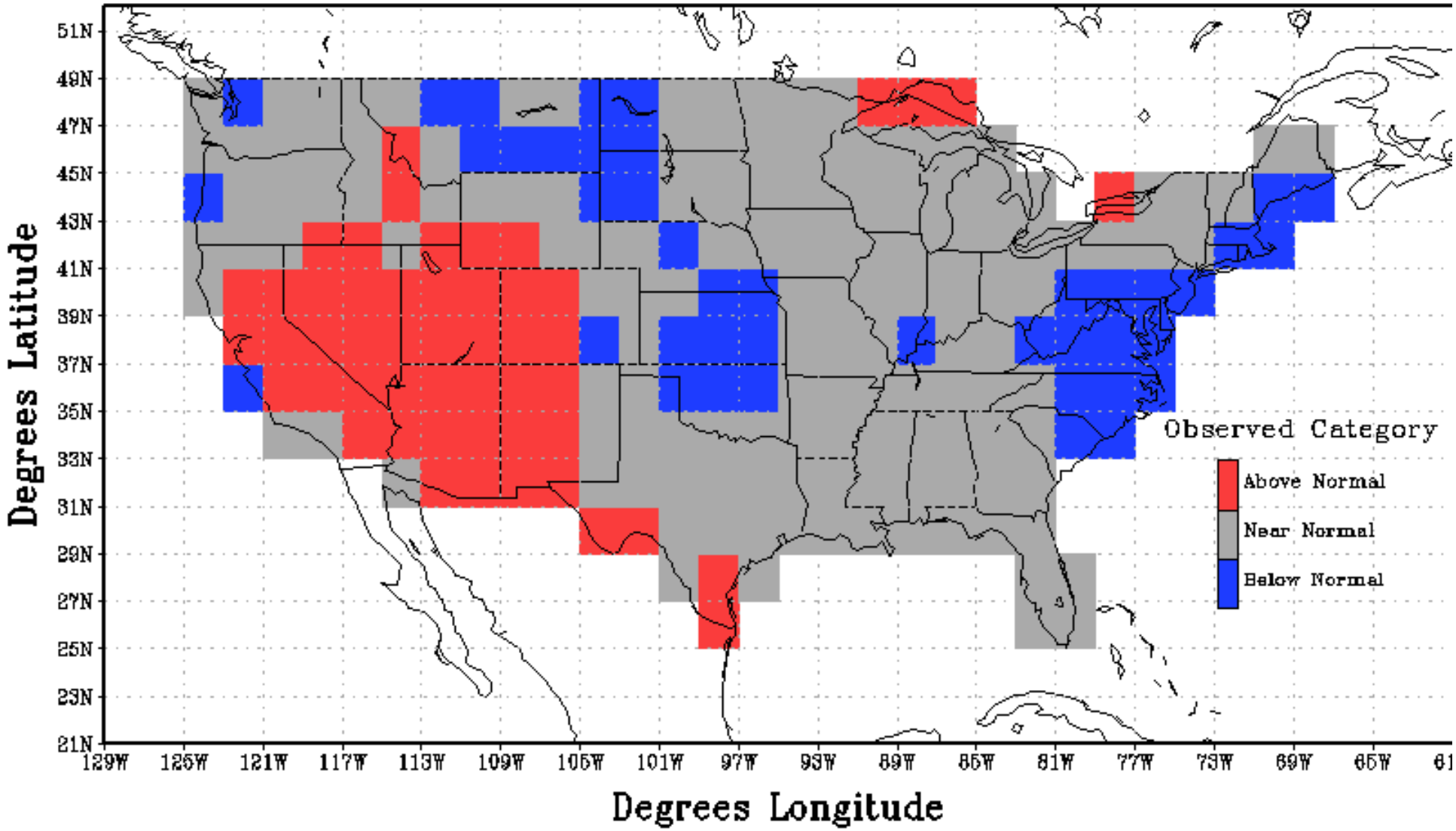
Valid: Dec-Jan-Feb 2024-25
Issued: November 21, 2024



Categorical Temperature Official Forecast
Issued: Nov 2024 Valid: Dec-Jan-Feb 2024-25

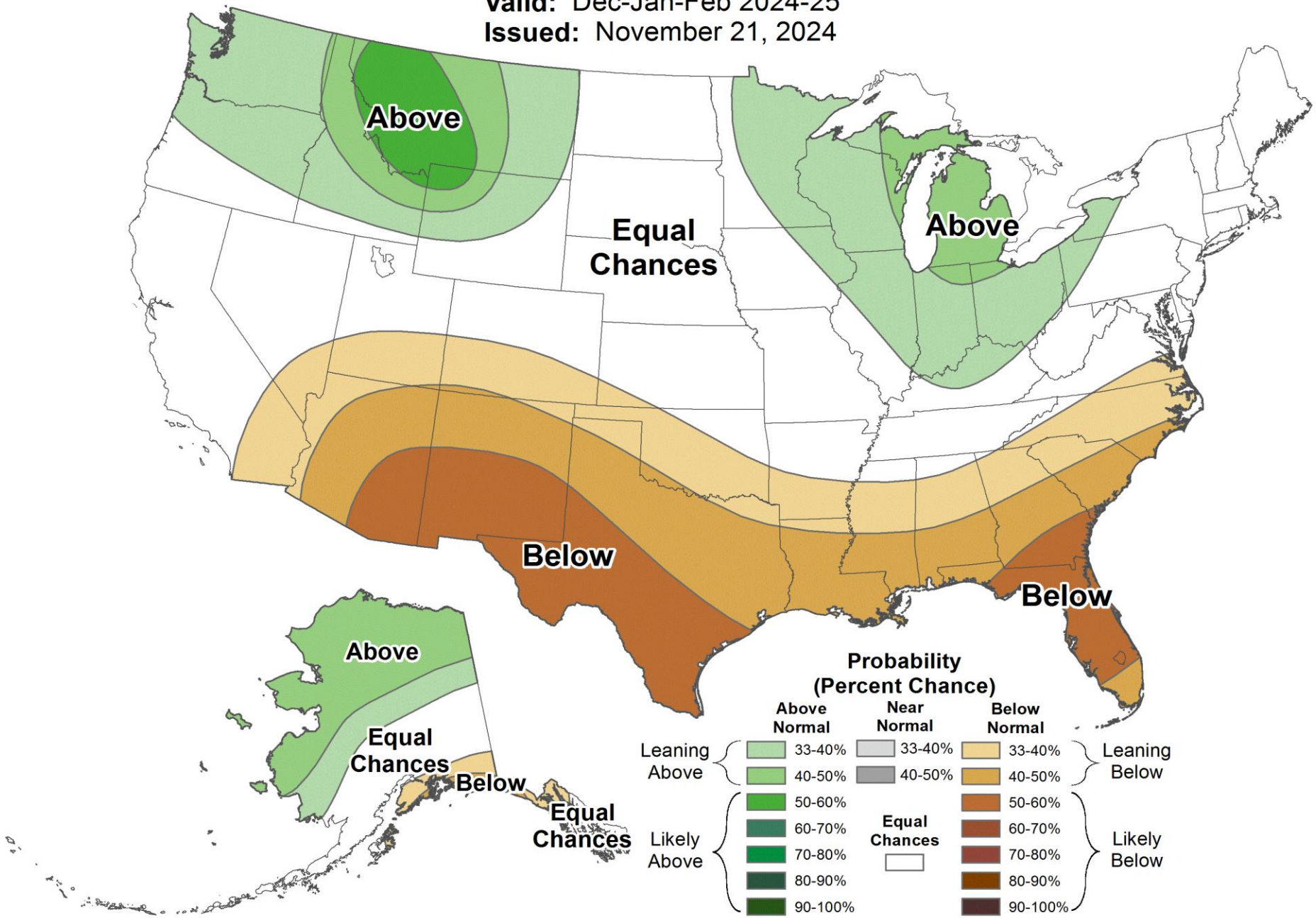


Categorical Temperature Observations
Valid: Dec–Jan–Feb 2024–25

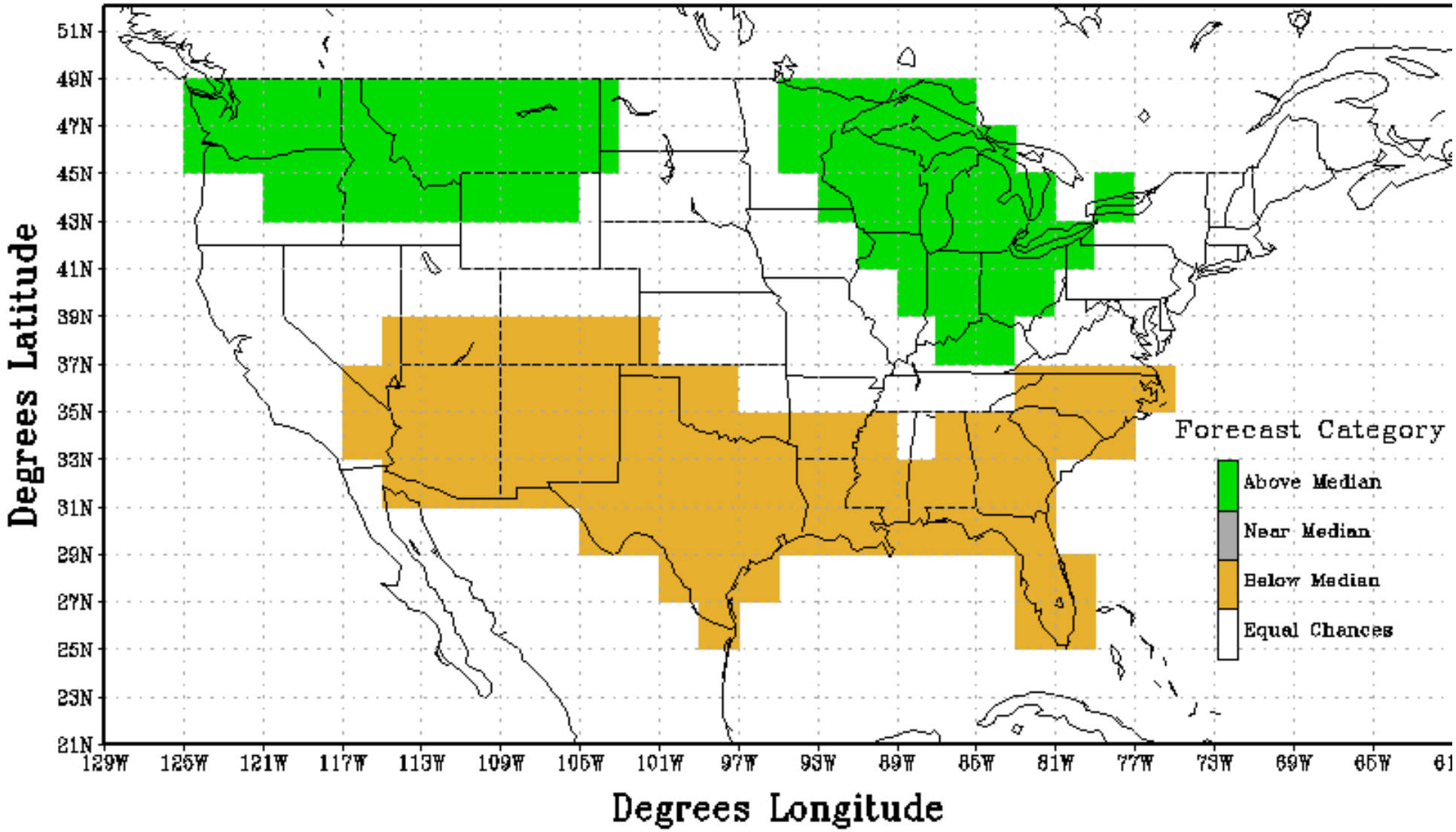


Seasonal Precipitation Outlook

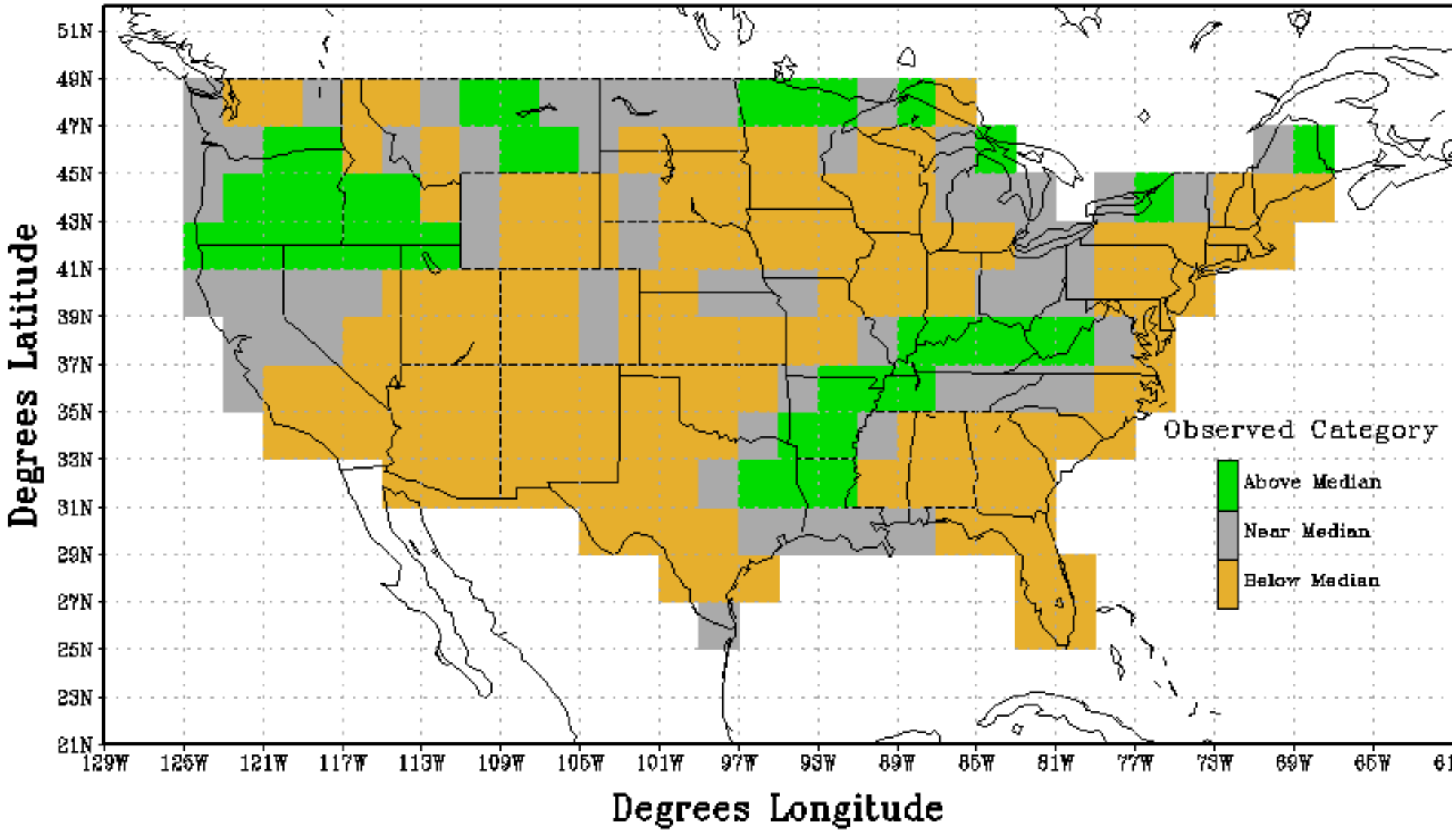
Valid: Dec-Jan-Feb 2024-25
Issued: November 21, 2024

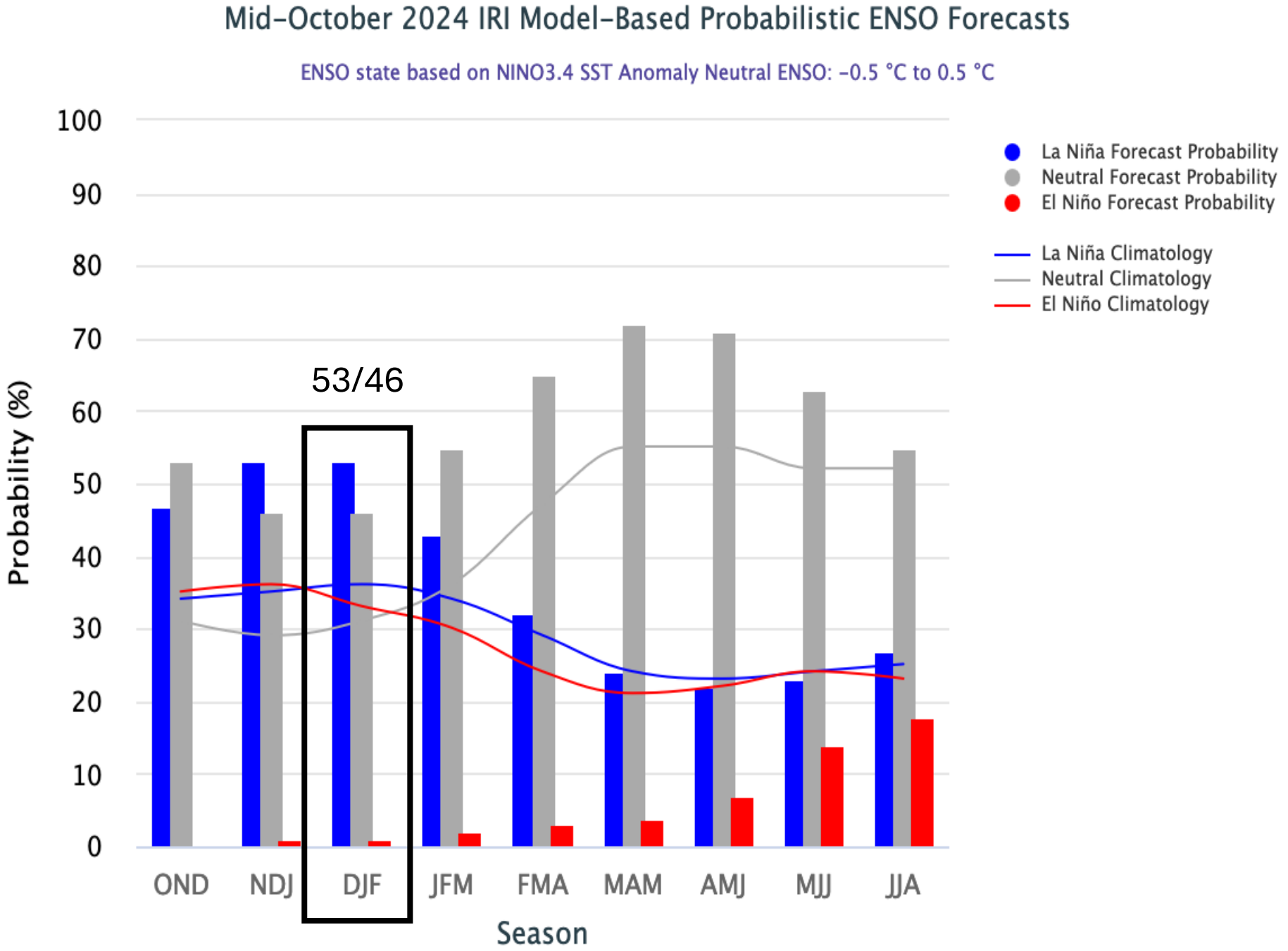


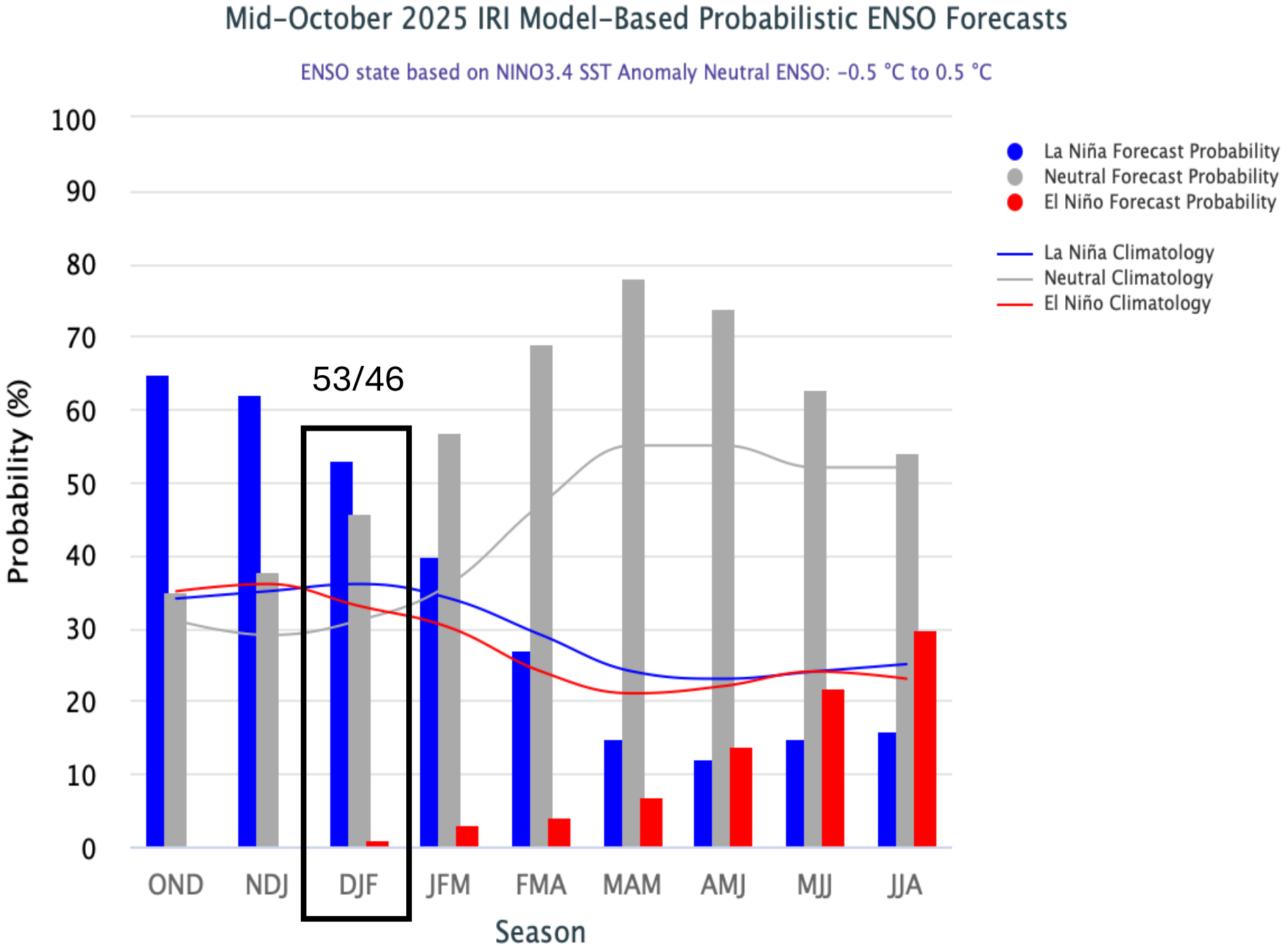
Categorical Precipitation Official Forecast
Issued: Nov 2024 Valid: Dec-Jan-Feb 2024-25



Categorical Precipitation Observations
Valid: Dec-Jan-Feb 2024-25




Mid-October 2024 IRI Model-Based Probabilistic ENSO Forecasts
ENSO state based on NINO3.4 SST Anomaly Neutral ENSO: -0.5 °C to 0.5 °C
Probability (%)
100
90
80
70
60
50
40
30
20
10
0
53/46
OND
NDJ
DJF
JFM
FMA
MAM
AMJ
MJJ
JJA
Season
La Niña Forecast Probability
Neutral Forecast Probability
El Niño Forecast Probability
La Niña Climatology
Neutral Climatology
El Niño Climatology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La Niña Forecast Probability
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El Niño Forecast Probability
La Niña Climatology
Neutral Climatology
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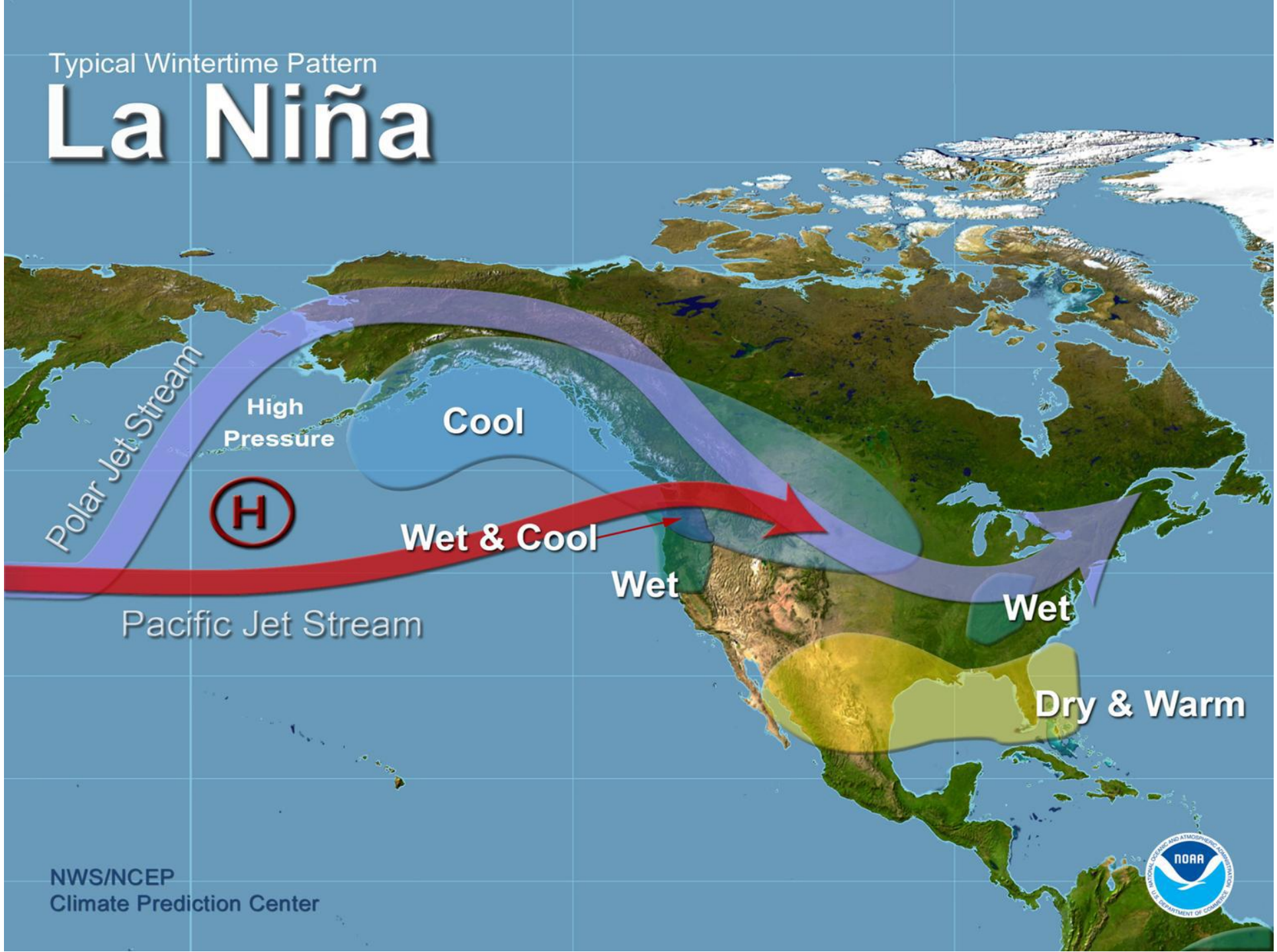
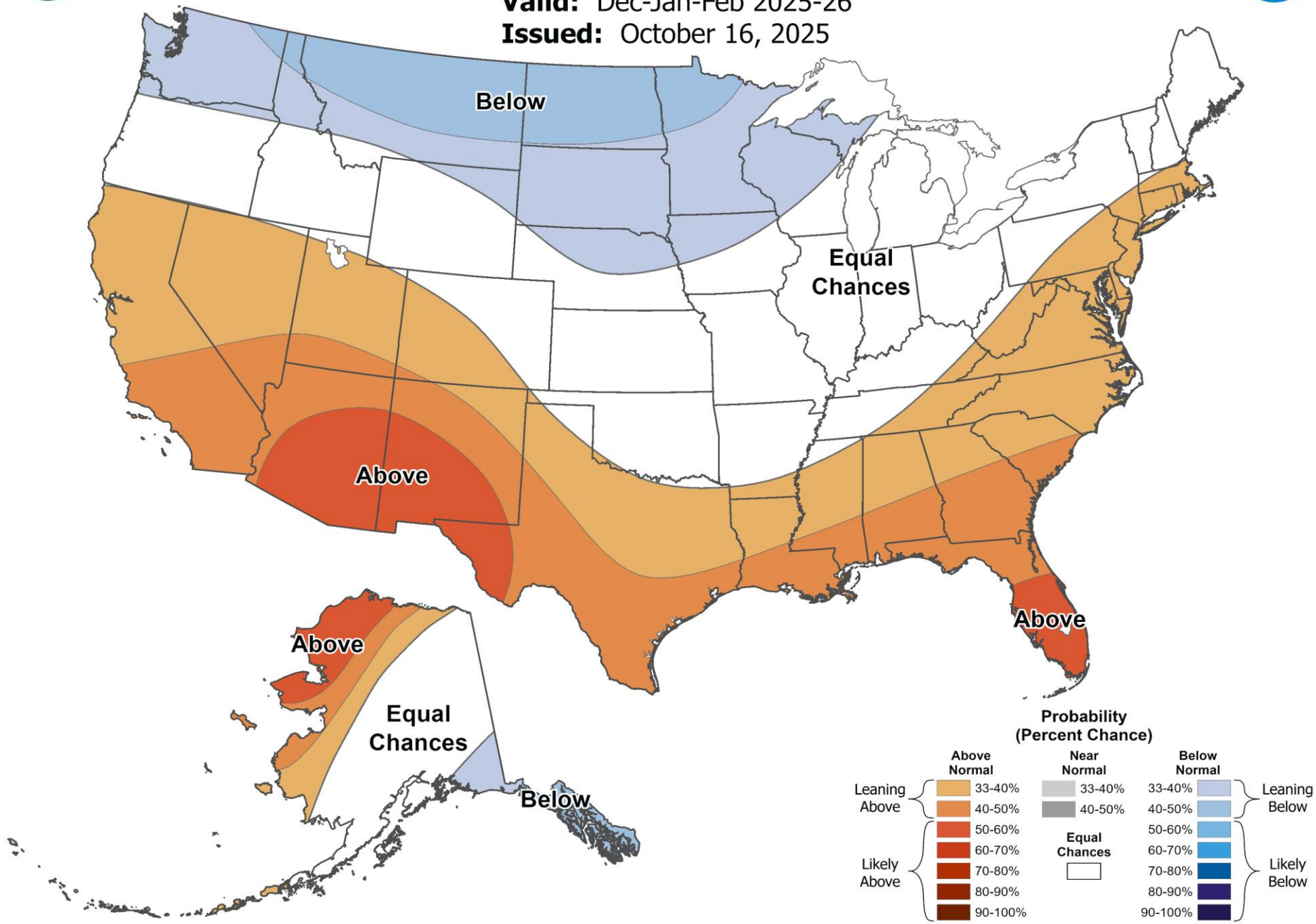

Typical Wintertime Pattern
La Niña
Polar Jet Stream
High Pressure
H
Cool
Wet & Cool
Wet
Wet
Dry & Warm
Pacific Jet Stream
NWS/NCEP
Climate Prediction Center
NOAA

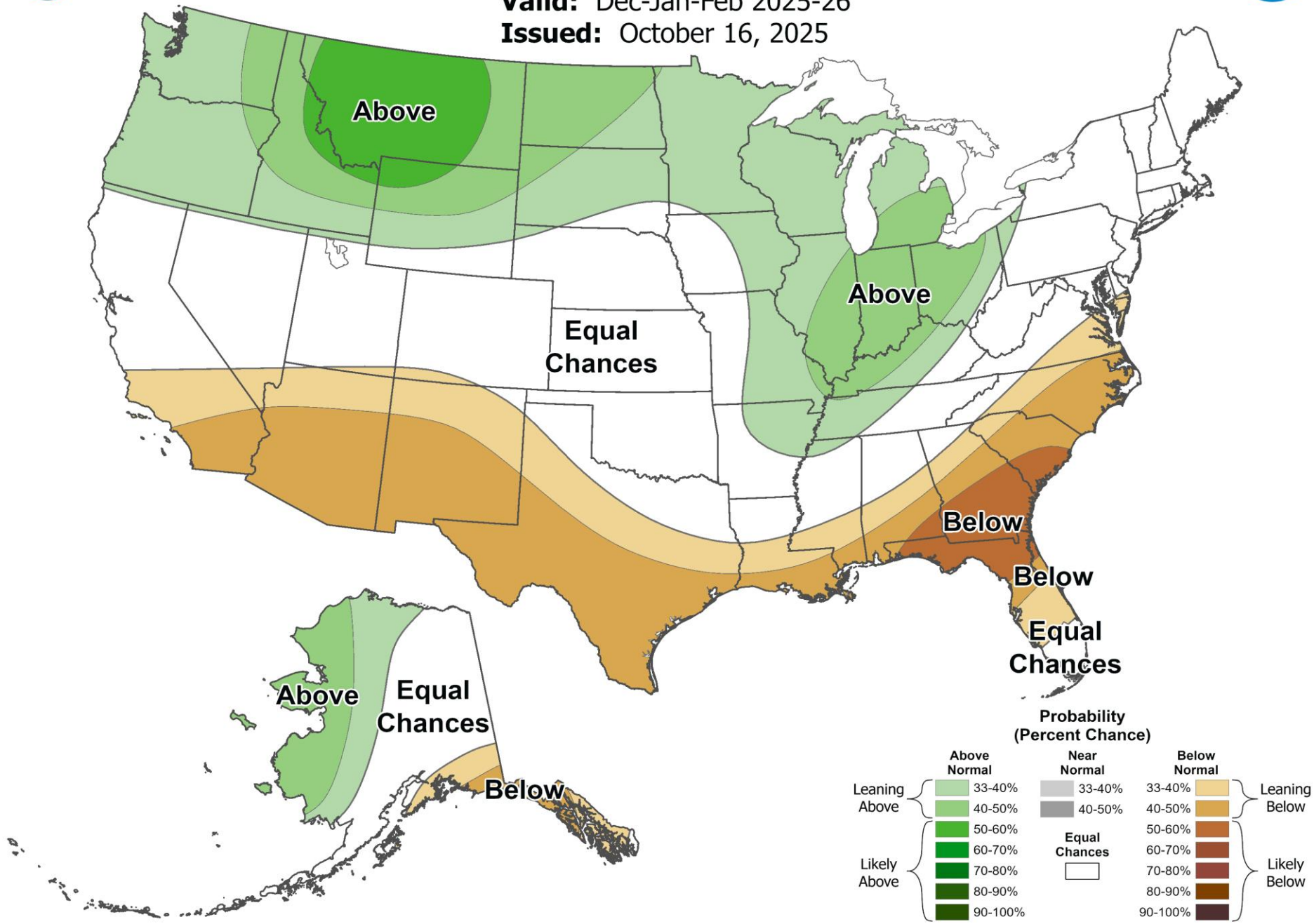
Seasonal Temperature Outlook

Valid: Dec-Jan-Feb 2025-26
Issued: October 16, 2025



Seasonal Precipitation Outlook

Valid: Dec-Jan-Feb 2025-26
Issued: October 16, 2025



Other Factors Influencing Winter

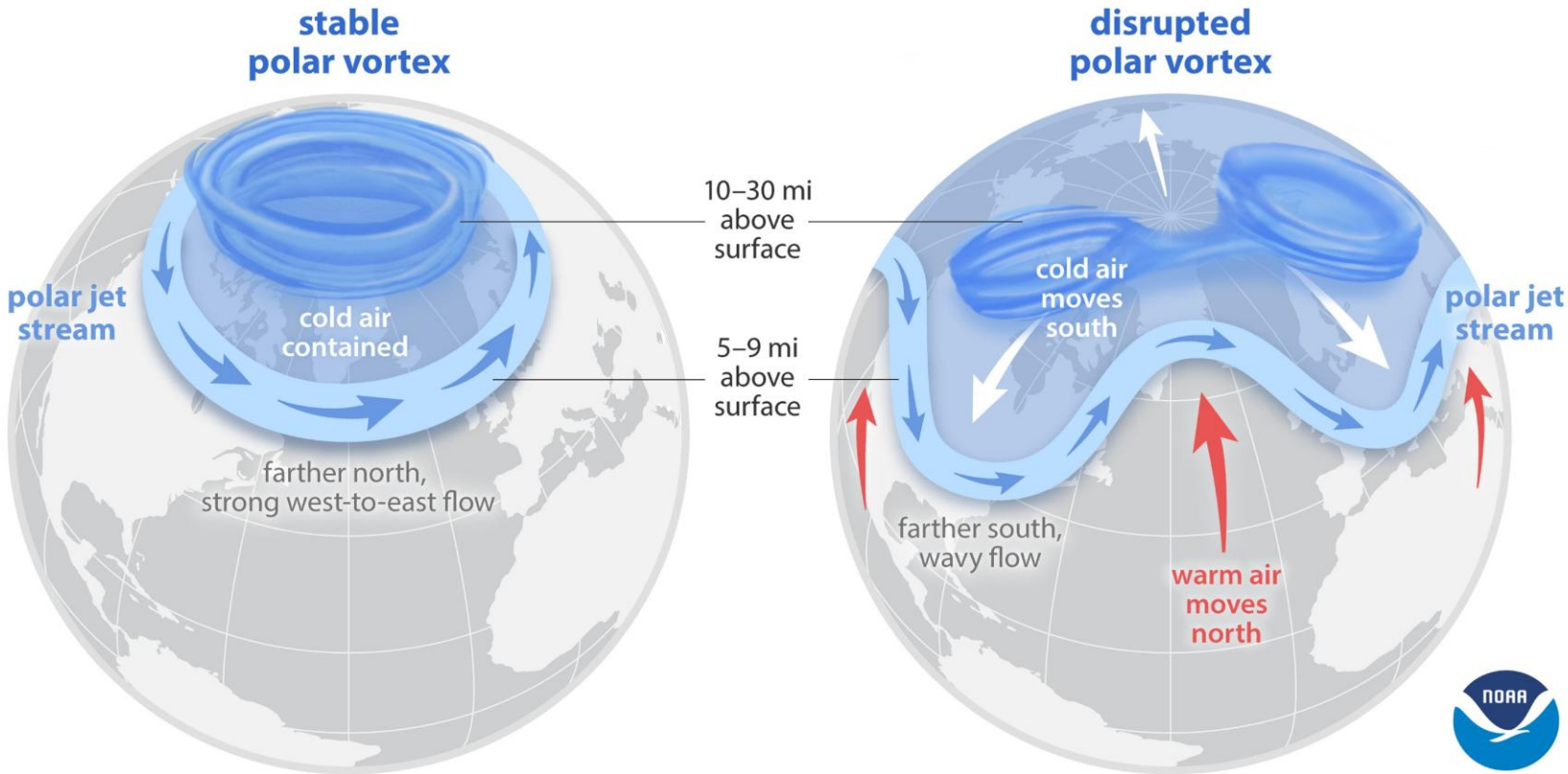
- ENSO (El Niño/La Niña) is a primary driver, but there are many other factors at play
- Warm waters in the North Pacific and North Atlantic (very similar to a year ago)
- These factors reinforce Northern Pacific ridge pattern, which when combined with a weaker polar vortex can lead to increased cold air outbreaks across the eastern U.S.

Understanding the polar vortex

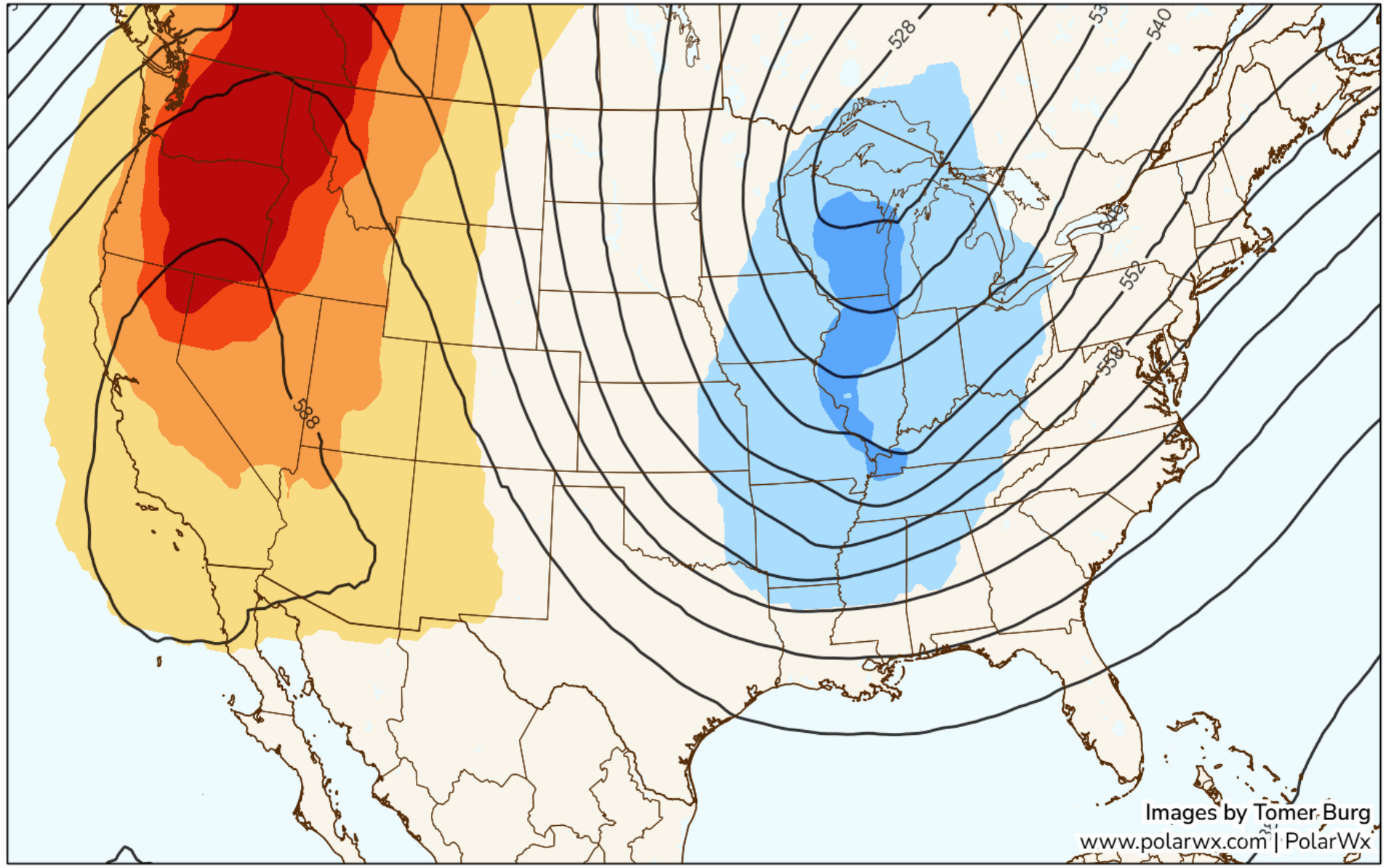
The Arctic polar vortex is a strong band of winds in the stratosphere, surrounding the North Pole 10–30 miles above the surface.

The polar vortex is far above and typically does not interact with the polar jet stream, the flow of winds in the troposphere 5–9 miles above the surface. But when the polar vortex is especially strong and stable, the jet stream stays farther north and has fewer "kinks." This keeps cold air contained over the Arctic and the mid-latitudes warmer than usual.

Every other year or so, the Arctic polar vortex dramatically weakens. The vortex can be pushed off the pole or split into two. Sometimes the polar jet stream mirrors this stratospheric upheaval, becoming weaker or wavy. At the surface, cold air is pushed southward to the mid-latitudes, and warm air is drawn up into the Arctic.



NOAA Climate.gov
2021


0.25° GFS • 500-hPa Height 3-Week Percentile Rank (ERA5, 1979-2021)
Init: 1800 UTC Sun 9 Nov 2025 | Hour: [0] | Valid: 1800 UTC Sun 9 Nov 2025
Contour: 500-hPa Geopotential Height
528
540
552
558
588
Images by Tomer Burg
www.polarwx.com | PolarWx
500-hPa Height Percentile
Record Low
0.5%
1%
2.5%
10%
Perc. Rank
90%
97.5%
99%
99.5%
Record Max

Takeaways

- This winter looks a lot like last winter
- Expect major swings, but generally warmer and drier in the southern U.S. and cooler and wetter in the northern U.S.
- A weaker polar vortex leads to more cold air outbreaks over the eastern U.S.
- Early-to-mid winter (late November through January) this year as opposed to mid-to-late winter (January through February) last year
- Earlier severe weather season

Questions?

National Weather Forecast & Energy Outlook
Natural Gas Outlook

Richard Meyer
Vice President, Energy Markets, Analysis,& Standards
American Gas Association

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A New Era for Growth

A Natural Gas Industry Outlook

RICHARD MEYER VICE PRESIDENT, ENERGY MARKETS ANALYSIS & STANDARDS

November 2025

About AGA

The American Gas Association, founded in 1918, represents more than 200 local energy companies that deliver clean natural gas throughout the United States. There are more than 79 million residential, commercial and industrial natural gas customers in the U.S., of which 94 percent — more than 74 million customers — receive their gas from AGA members. Today, natural gas meets more than one-third of the United States' energy needs.

Notice

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State of Play

Record Gas Demand

Industrial reshoring, growing electric power requirements, LNG exports, new consumers

Record Gas Supply

Return to historical natural gas pricing trends

Affordability Front of Mind

Rising electricity prices, while natural gas remains an affordable solution

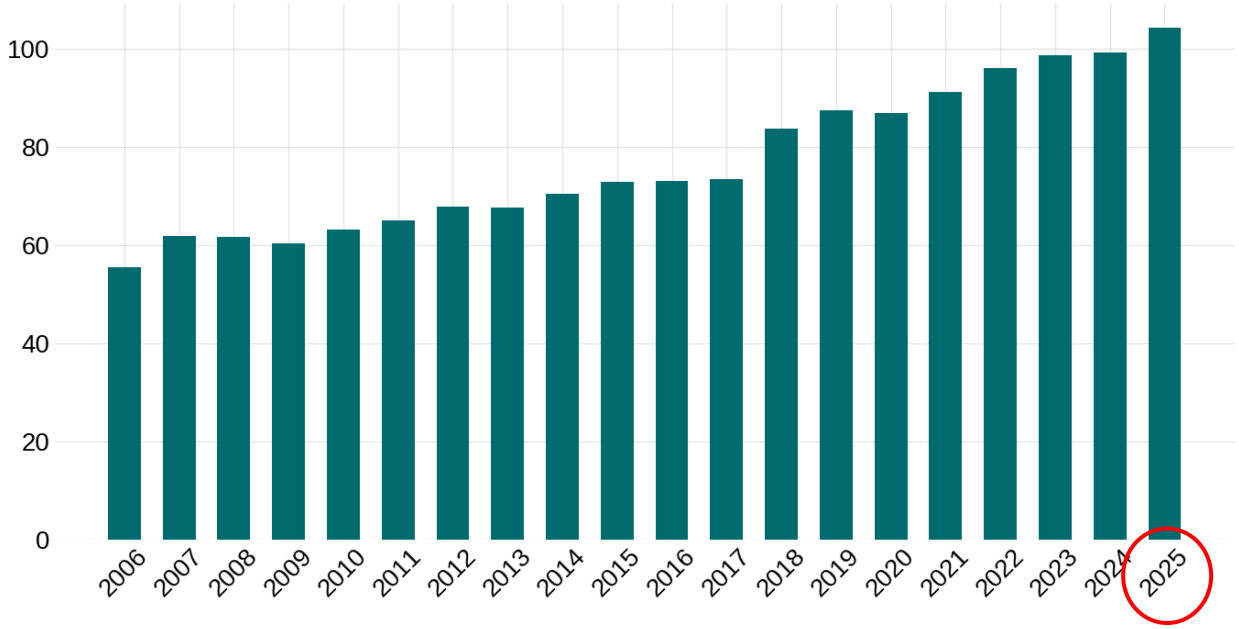
The Need to Build

Infrastructure additions are needed, and permitting reform is key

Natural gas demand and production are at a record high

Demand

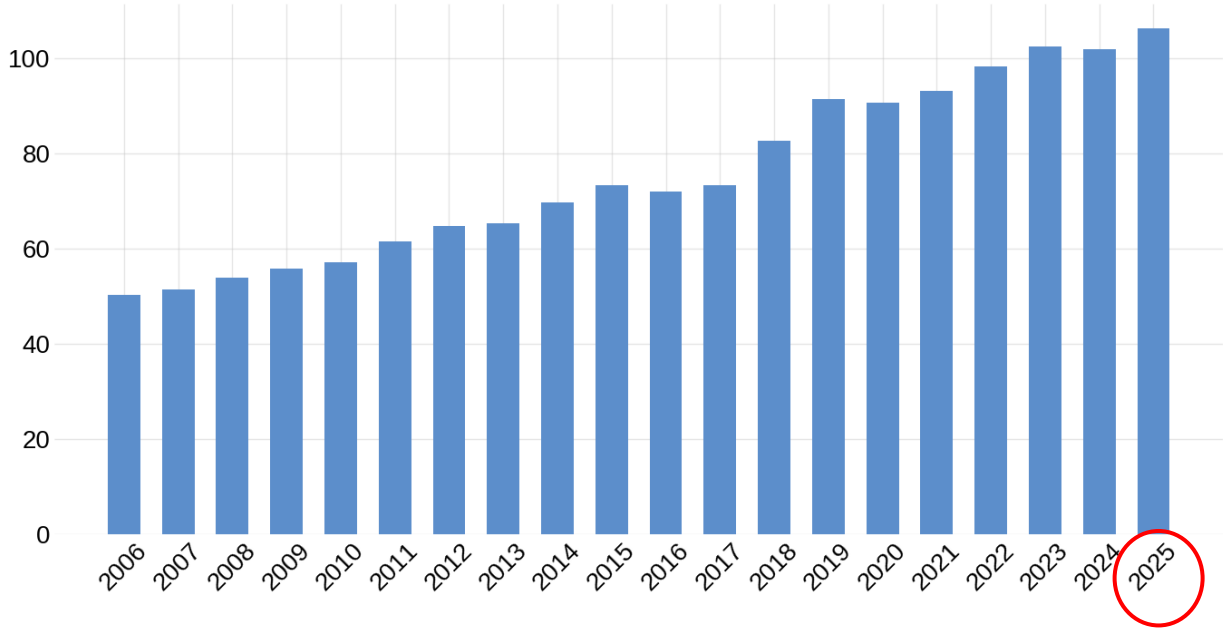
Total Natural Gas Demand, Lower-48 YTD thru Nov 17
Bcf per day



Source: S&P Global Commodity Insights, ©2025 by S&P Global Inc., Chart: American Gas Association, Data as of Nov 17, 2025, Subject to Revision

Production

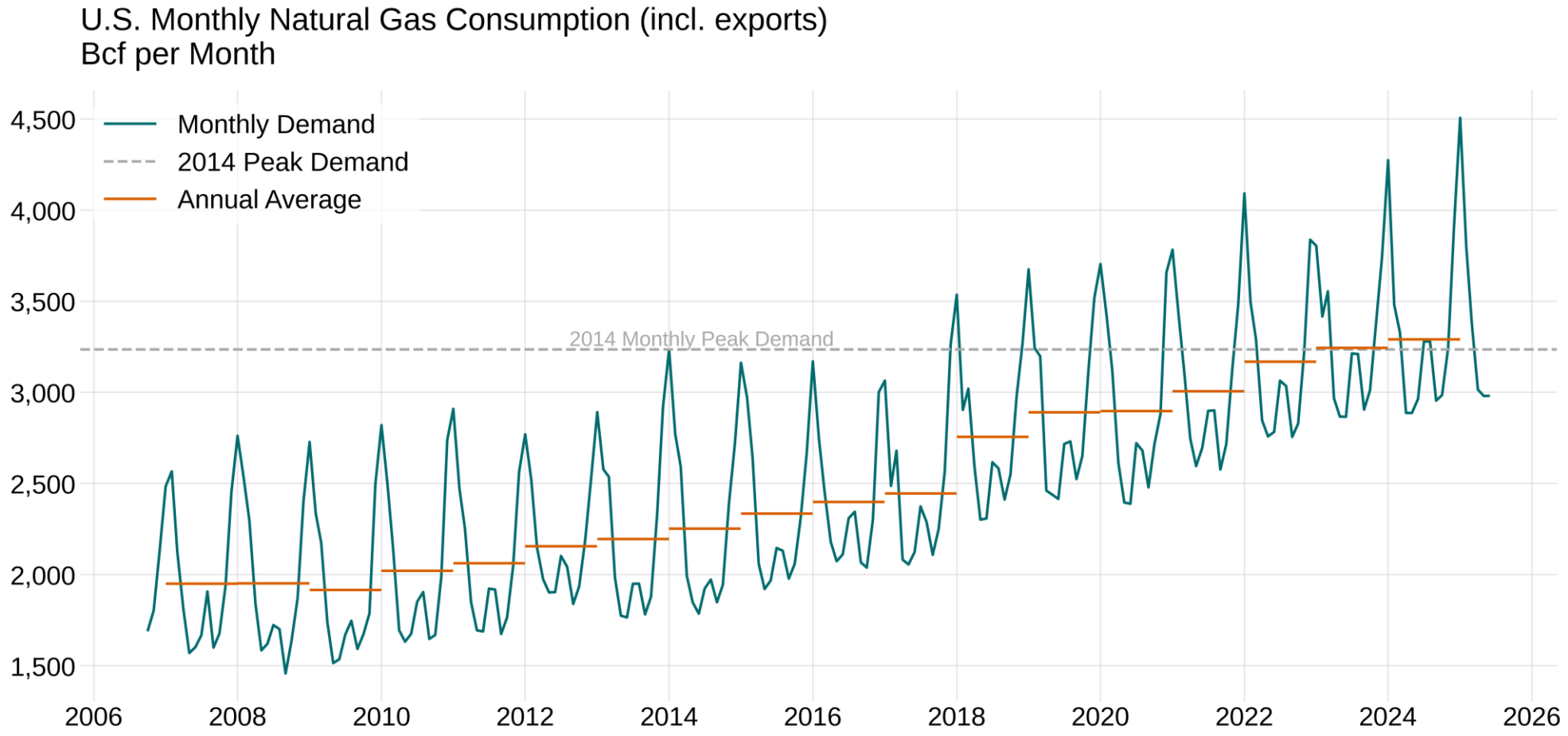
Natural Gas Production, Lower-48 YTD thru Nov 17
Bcf per day



Source: S&P Global Commodity Insights, ©2025 by S&P Global Inc., Chart: American Gas Association, Data as of Nov 17, 2025, Subject to Revision

U.S. natural gas consumption set seven monthly records and an annual record in 2024

Natural gas demand growing over time

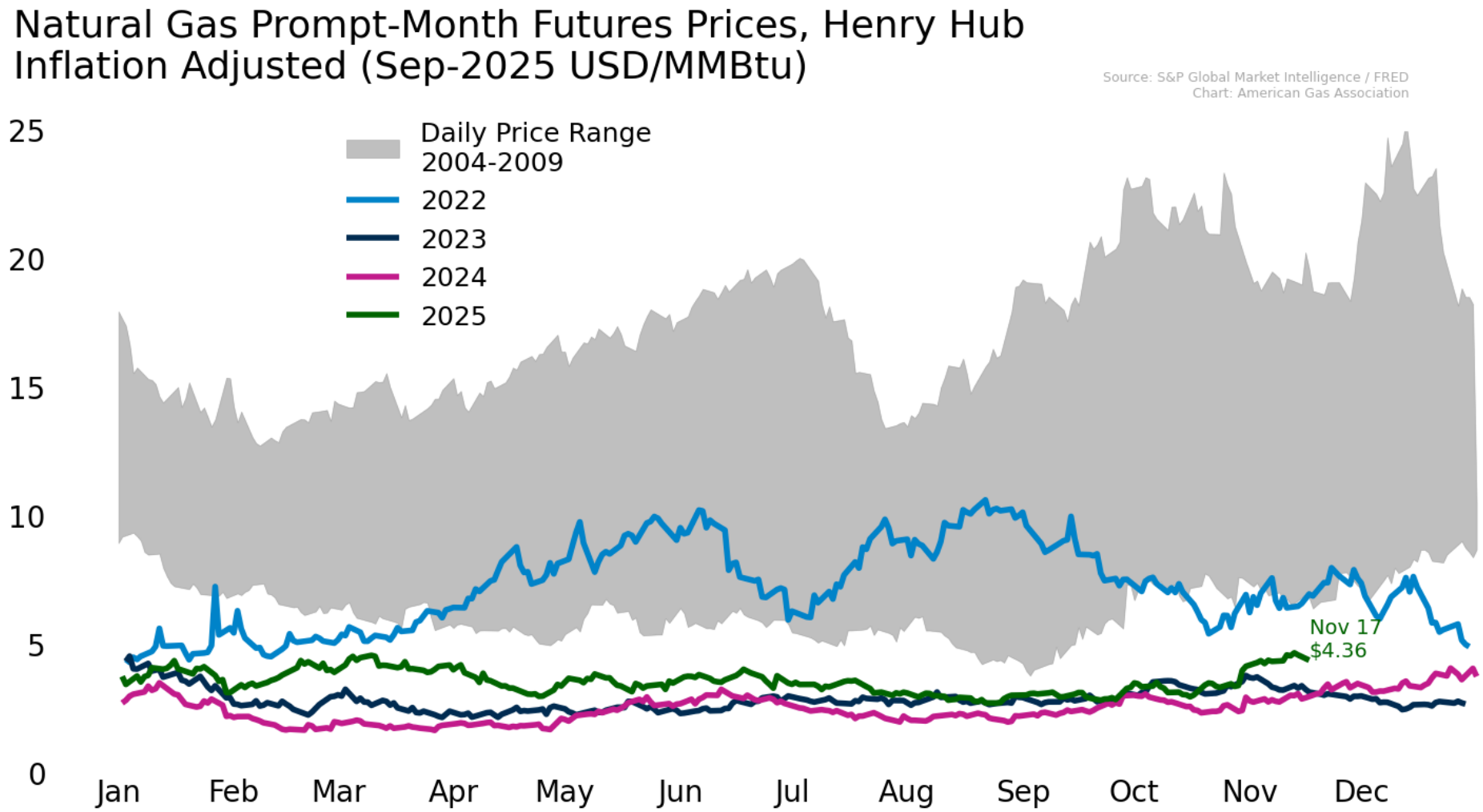


Gas Demand

Source: S&P Global Commodity Insights, ©2025 by S&P Global Inc. Chart: American Gas Association, Data as of Jul 11, 2025, Subject to Revision

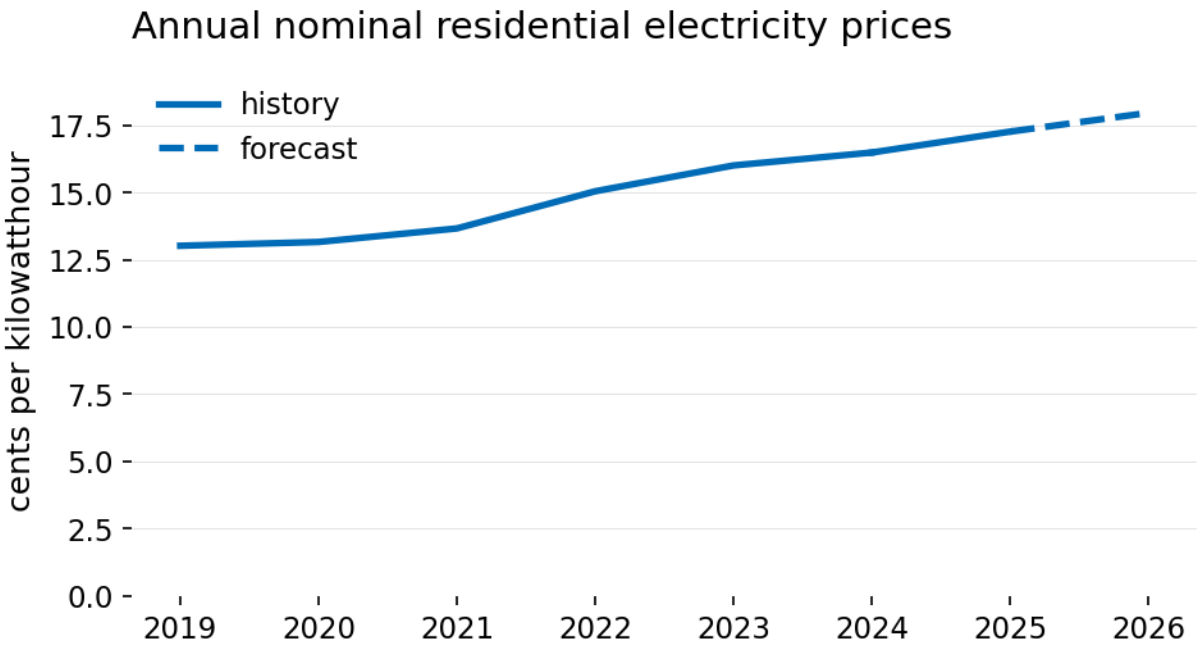
Inflation-adjusted prices are much lower compared to history

Natural gas futures prices

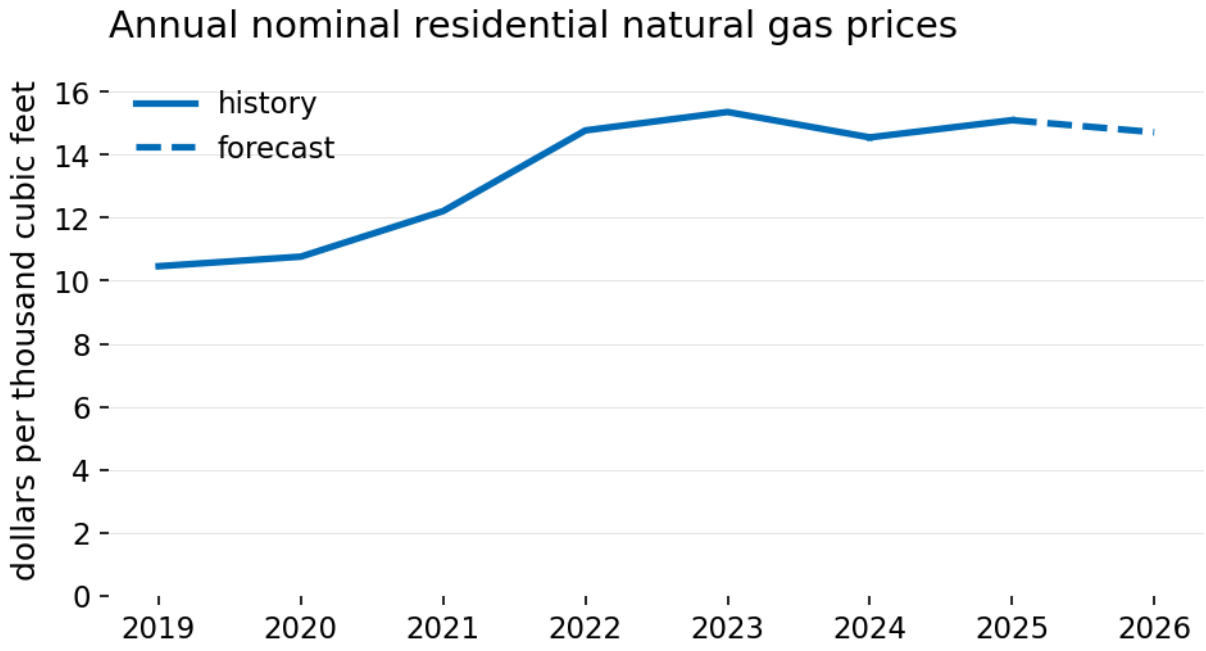


Residential electricity prices expected to rise while natural gas falls

Residential energy prices

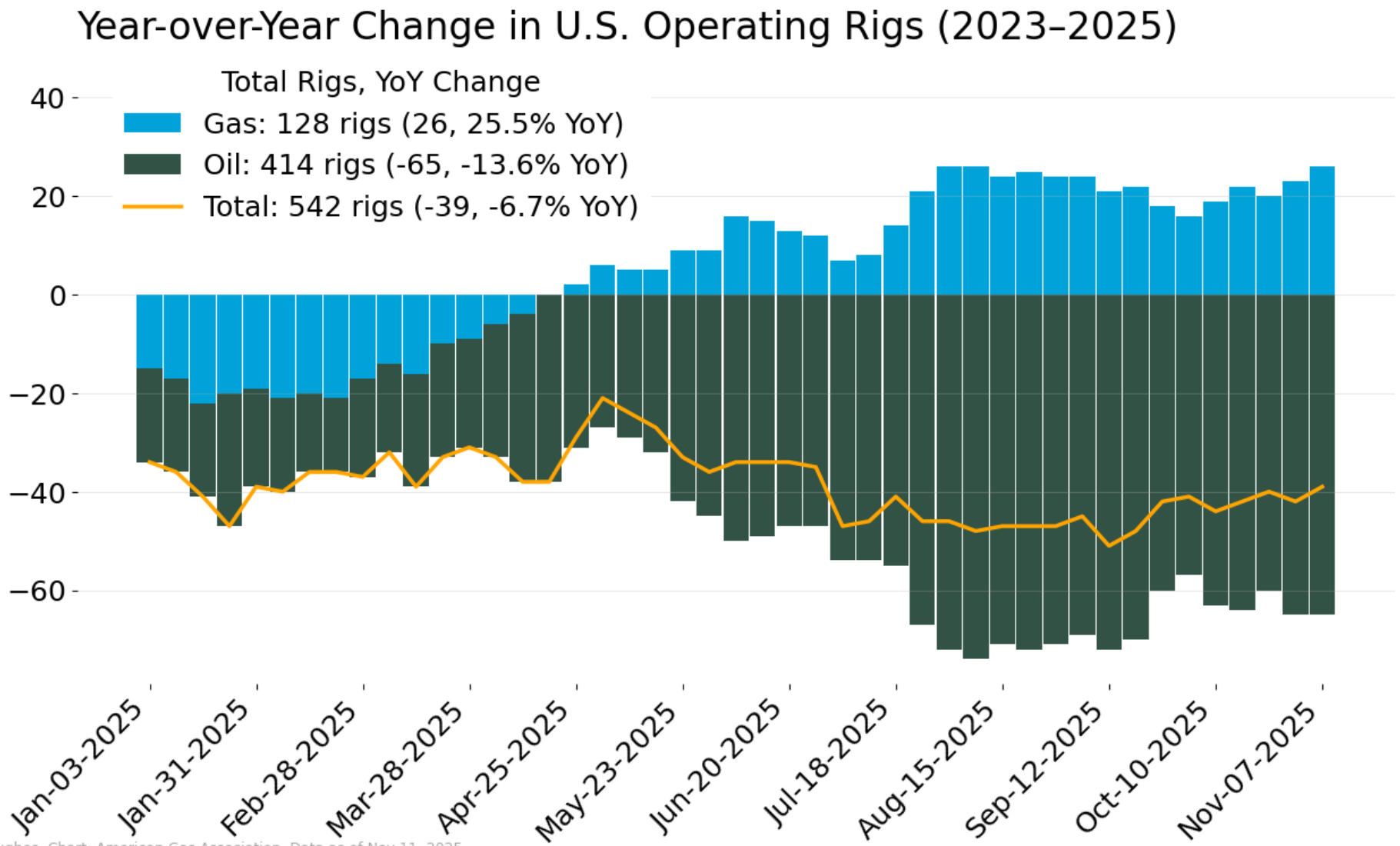


Data source: U.S. Energy Information Administration, Short-Term Energy Outlook, November 2025



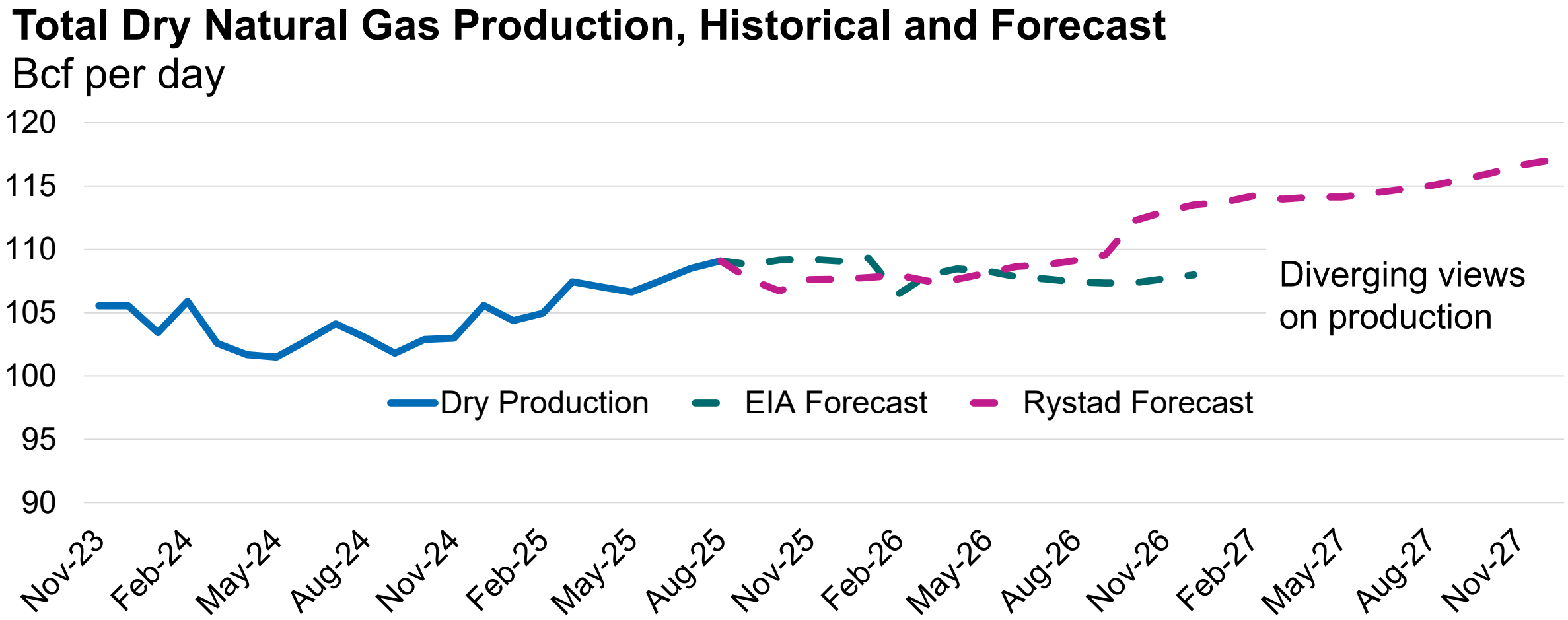
Data source: U.S. Energy Information Administration, Short-Term Energy Outlook, November 2025

Natural gas drilling rig count up 26% as oil has declined



Source: Baker Hughes, Chart: American Gas Association, Data as of Nov 11, 2025

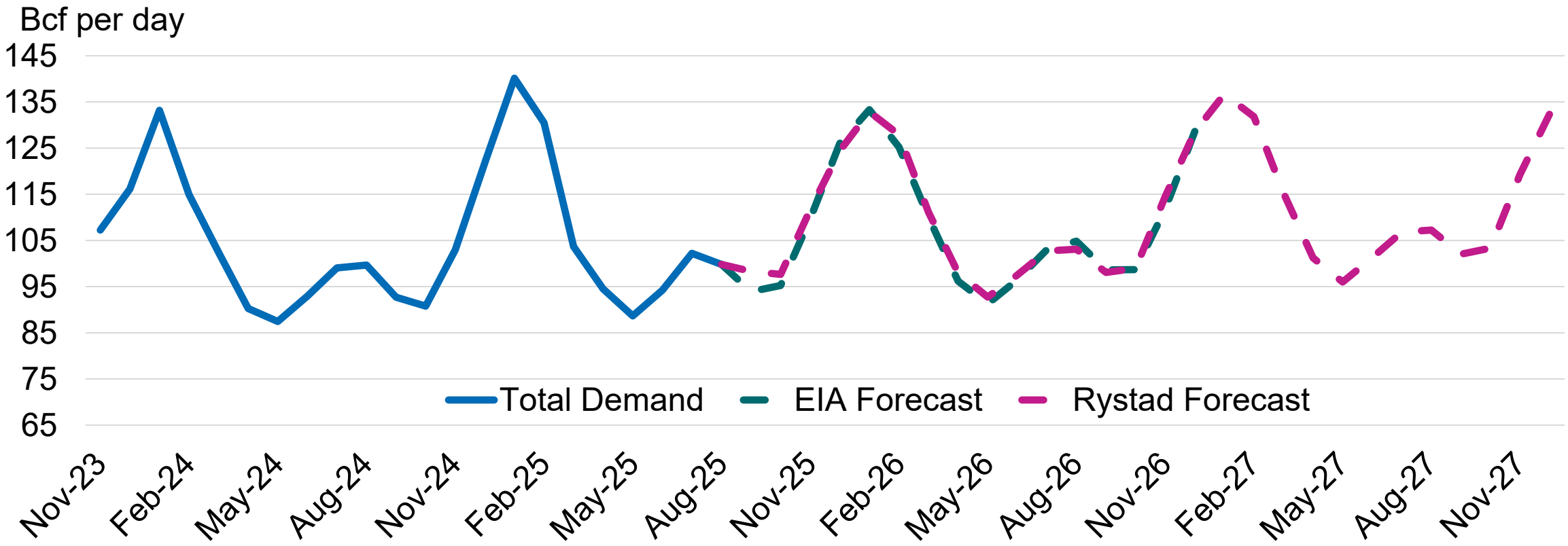
Natural gas production expected to rise; different views on timing



Sources: Energy Information Administration, November 2025 Short-Term Energy Outlook; Rystad Energy Forecasts benchmarked from August 2025 production data from EIA.

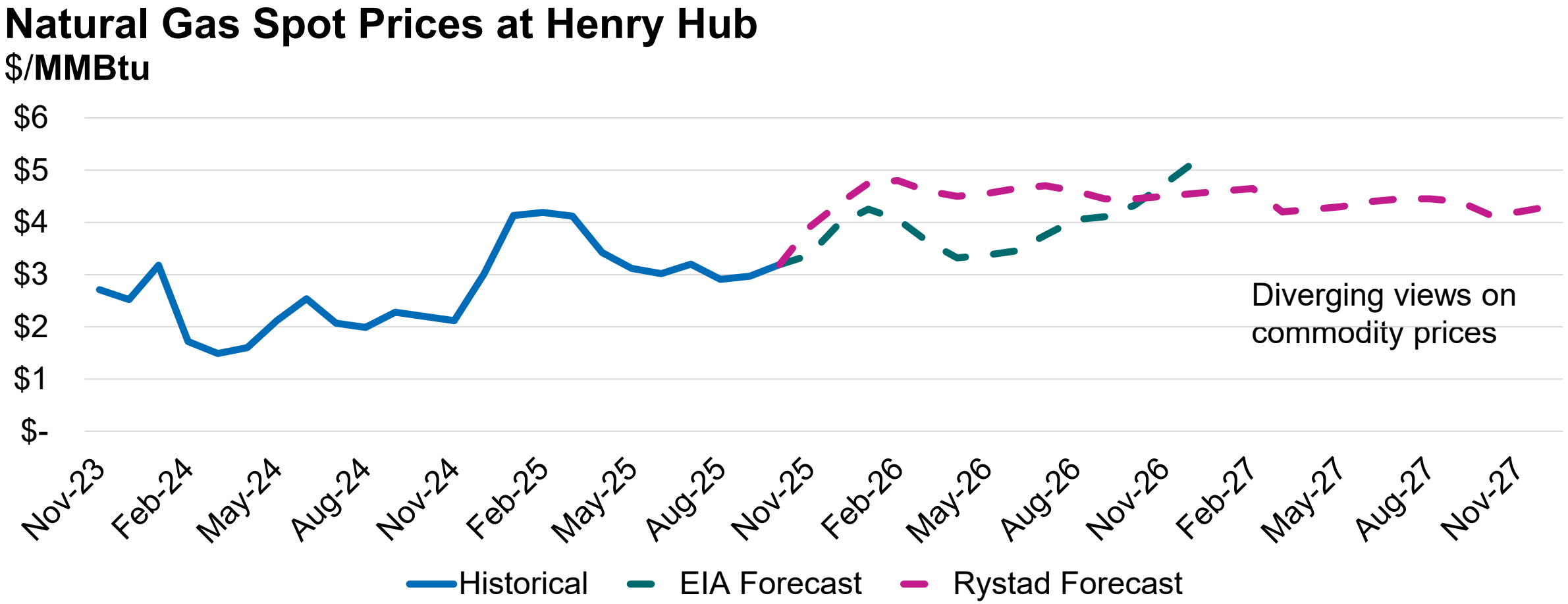
Natural gas use is expected to grow, driven by LNG exports, industrial demand, and the electric power sector.

Total Natural Gas Demand Including Exports, Lower-48



Sources: Energy Information Administration, November 2025 Short-Term Energy Outlook; Rystad Energy Forecasts benchmarked from August 2025 demand data from EIA.

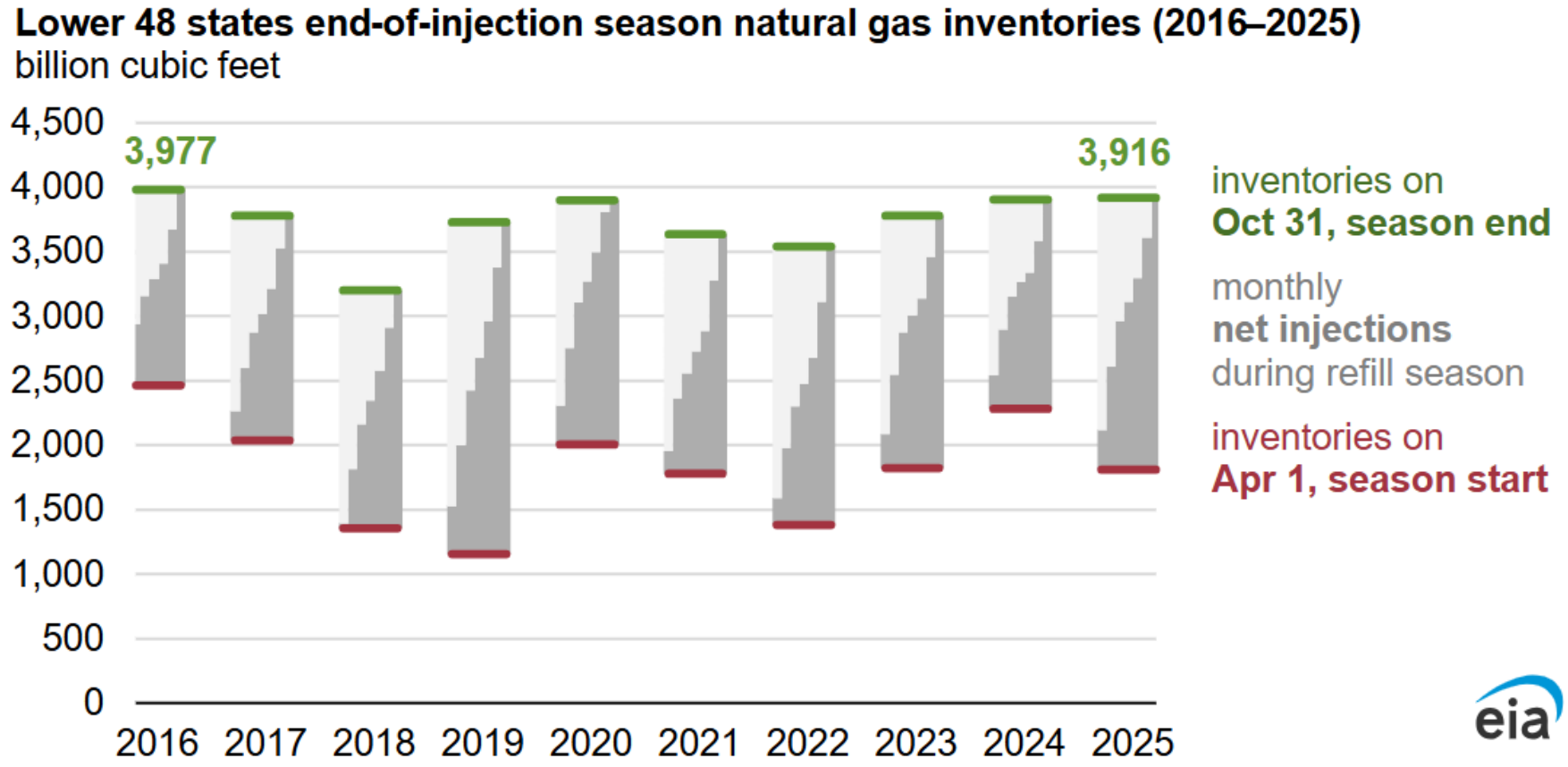
Outlooks for natural gas prices into 2026-2027 differ. Pricing in all cases remains low relative to historical levels.



Sources: Energy Information Administration, November 2025 Short-Term Energy Outlook; Rystad Energy Forecasts benchmarked from October 2025 price data from EIA.

U.S. natural gas inventories enter winter at the highest level since 2016

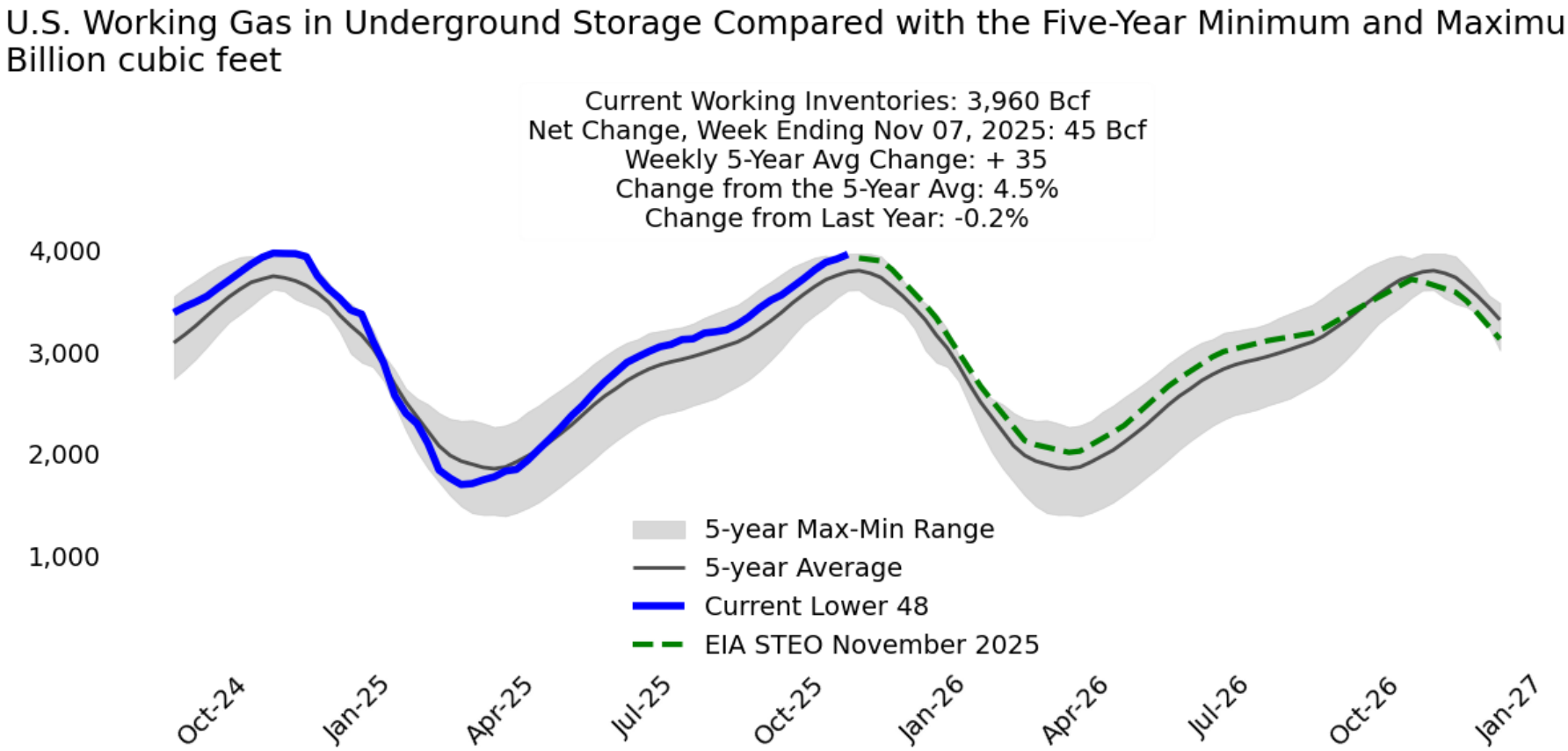
Underground natural gas storage



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook* (STEO), November 2025

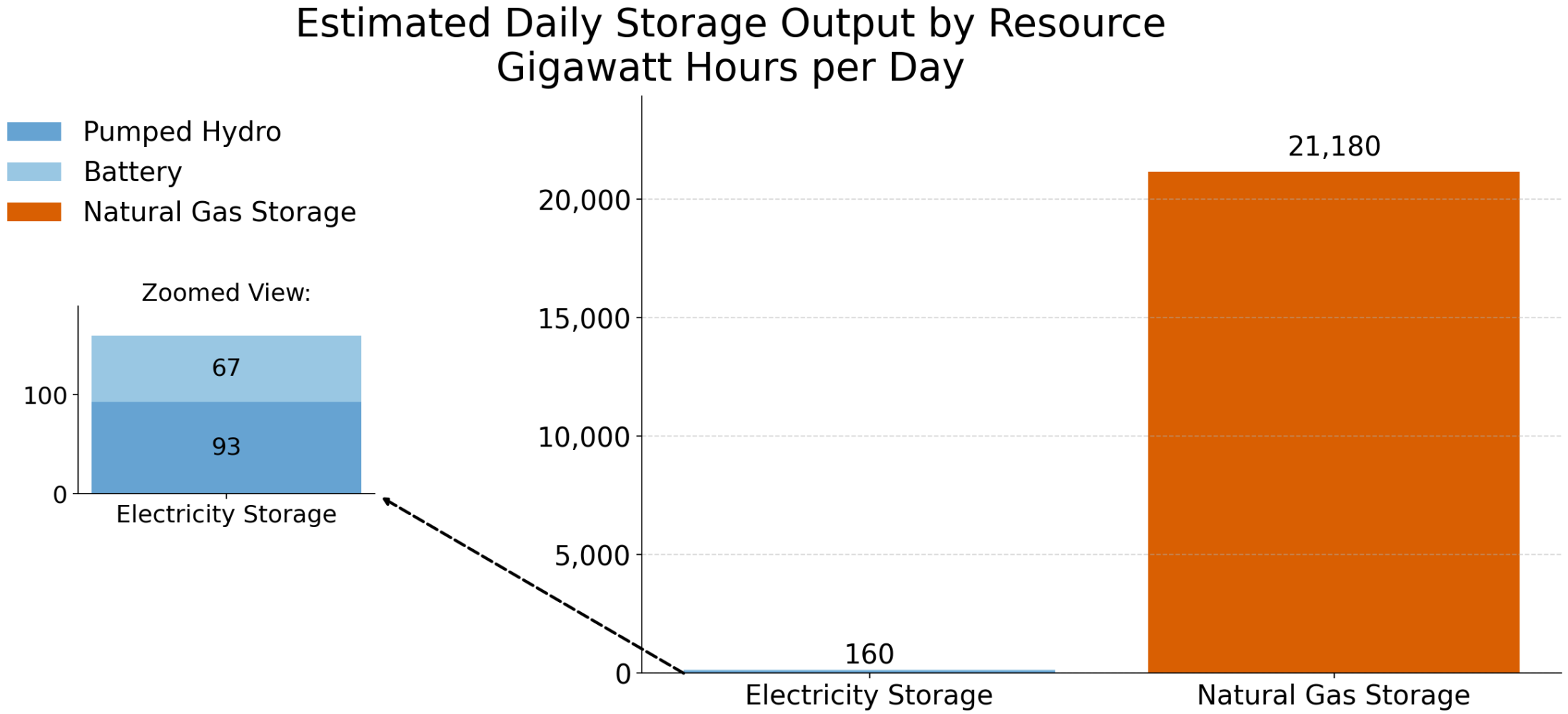
EIA expects natural gas inventories to remain above average through the winter.

Natural gas storage



Source: U.S. Energy Information Administration, Chart: American Gas Association, Data as of Nov 14, 2025, Subject to Revision
The shaded region represents the five-year range relative to the reporting period for the historical data. Projections utilize current five-year data available.
EIA STEO Release: November 2025

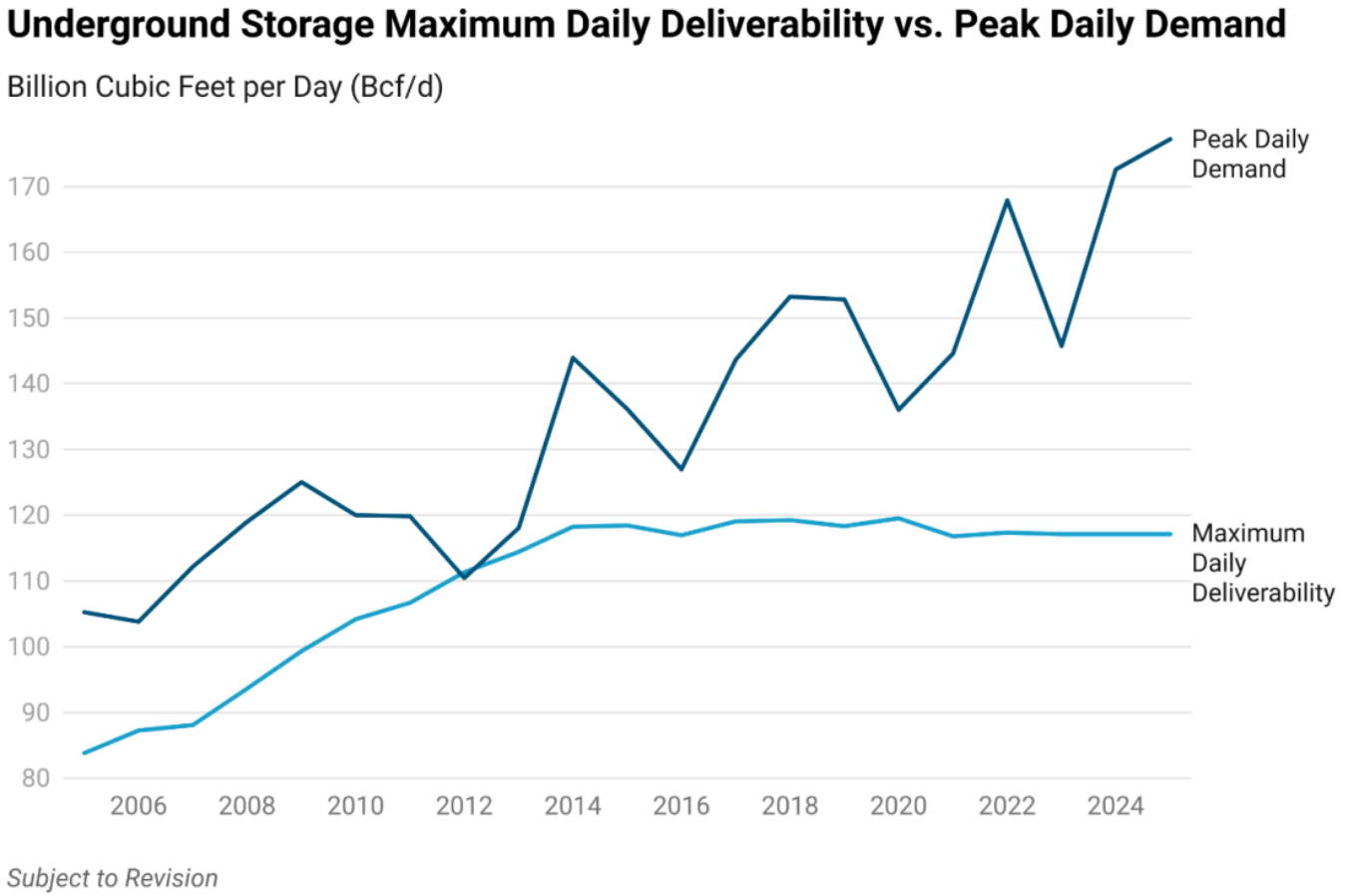
Storage is a critical balancing tool for natural gas utilities during the winter, with a daily dispatch capacity 130x greater than electric storage



Source: Energy Information Administration, S&P Global Commodity Insights, Data as of Sept 11, 2025. NG output on Jan 21, 2025. Electric output estimated using EIA June 2025 maximum nameplate capacity * maximum daily dispatch capacity.

More natural gas storage is needed. Natural gas peak demand has grown while maximum storage deliverability has been flat

Peak demand vs natural gas storage

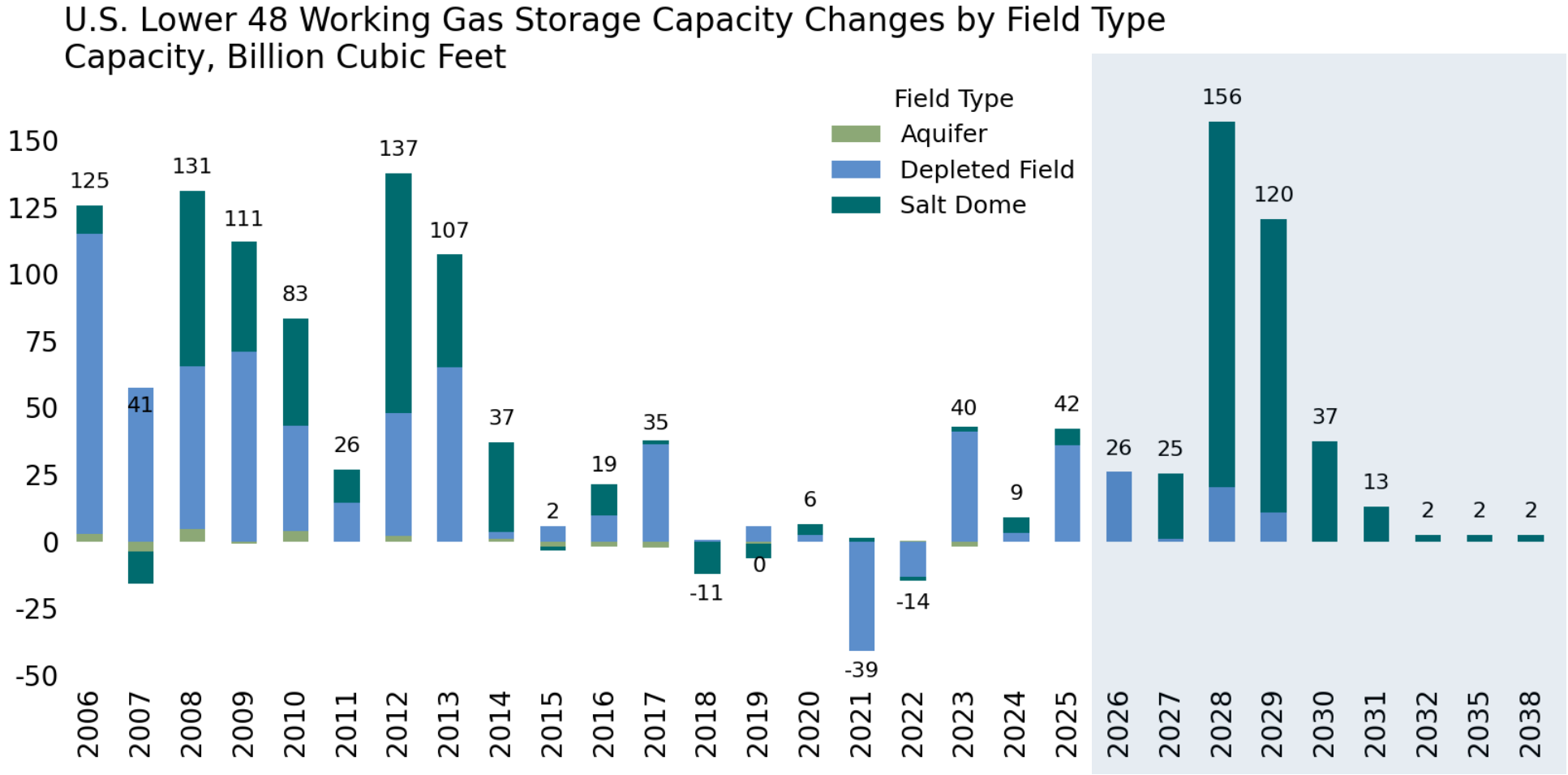


Subject to Revision

Source: Energy Information Administration, S&P Global Commodity Insights © 2025 by S&P Global, Inc. • Created with Datawrapper

More than 400 Bcf of natural gas storage additions now expected through 2030, largely located in Gulf Coast, Rockies, & Southeast

Working Gas Storage Additions

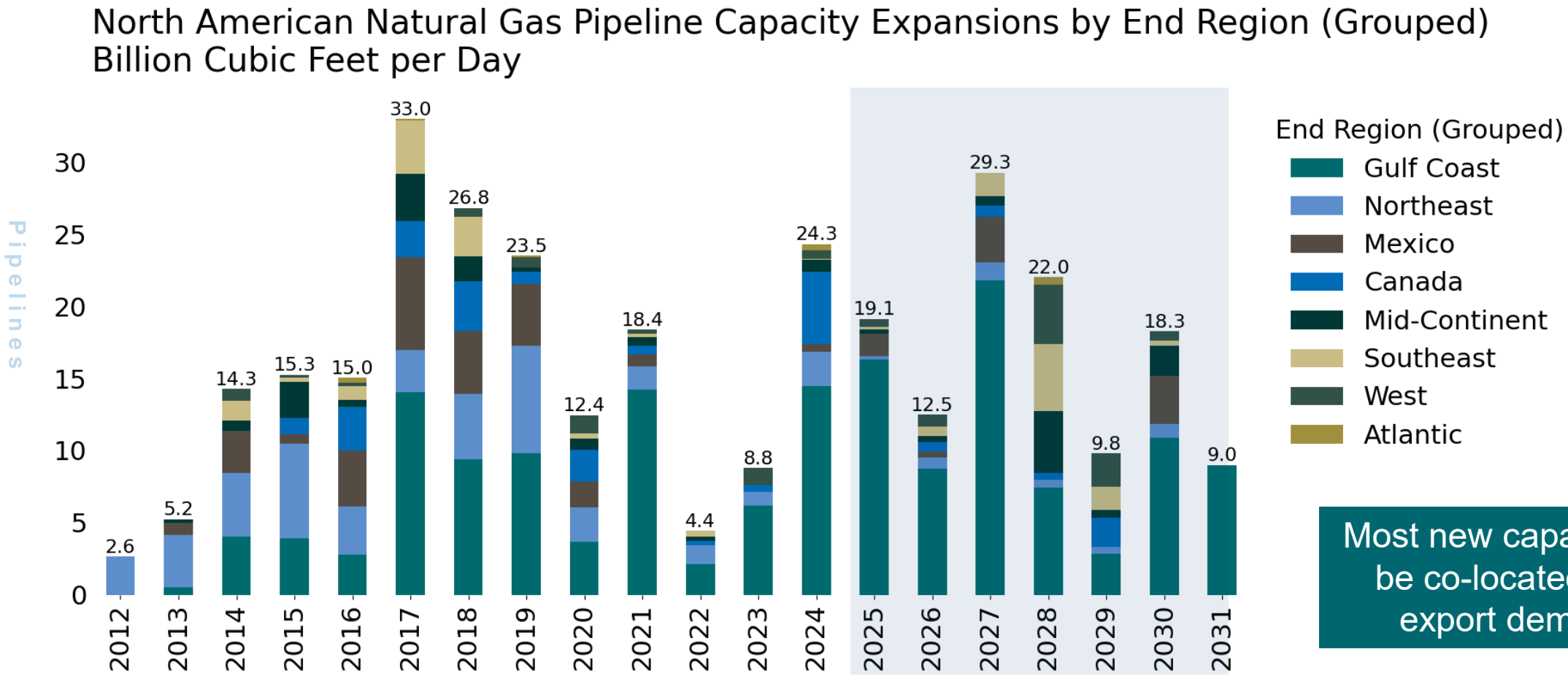


Gas Storage

Source: S&P Global Commodity Insights, ©2025 by S&P Global Inc., Chart: American Gas Association, Data as of Oct 16, 2025, Subject to Revision

New pipeline capacity is expected, largely intrastate projects located in the Gulf Coast. Interstate projects outside of the South remain a challenge.

New pipeline capacity

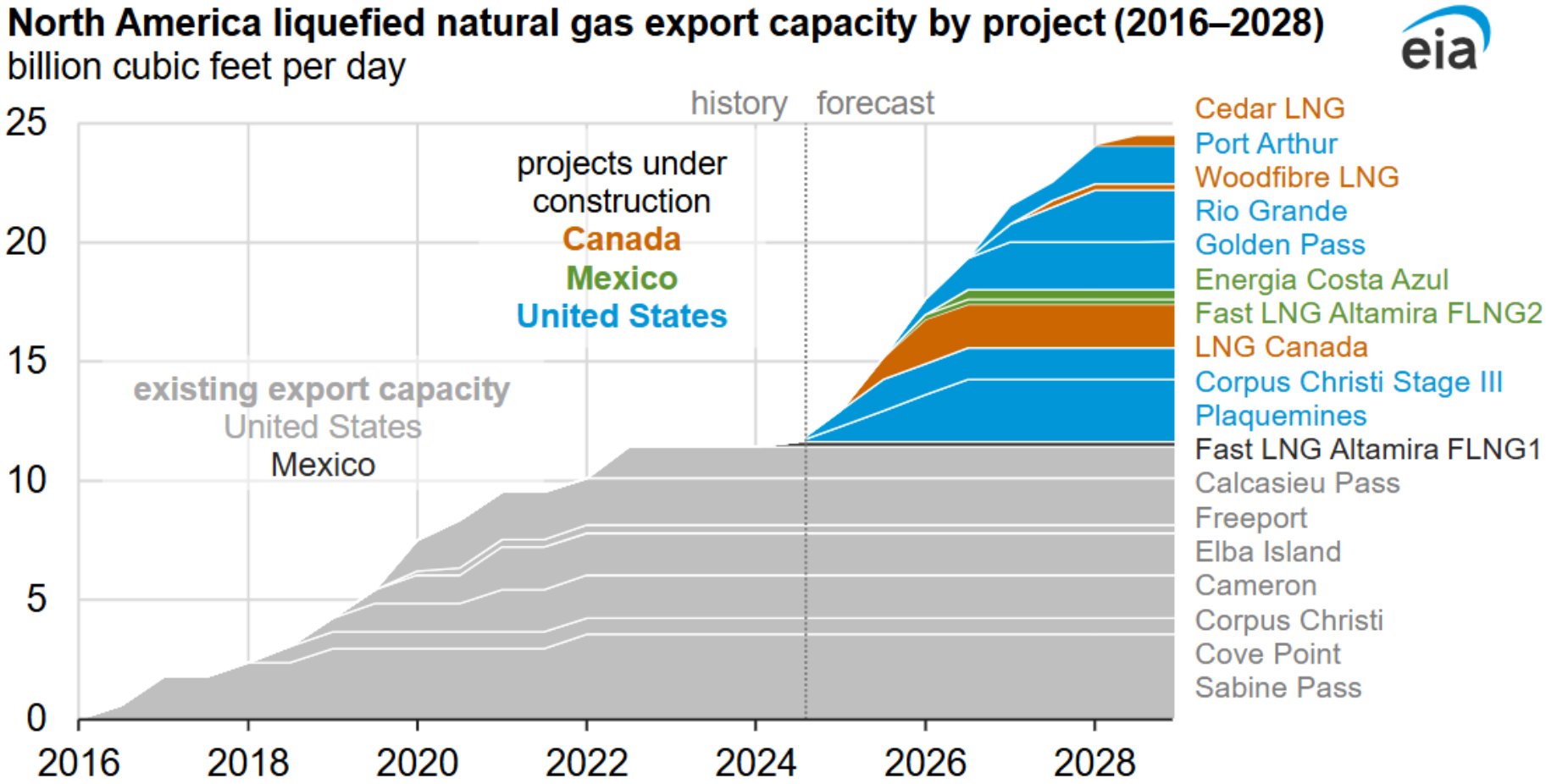


Most new capacity will be co-located with export demand

Source: S&P Global Commodity Insights, ©2025 by S&P Global Inc., Chart: American Gas Association

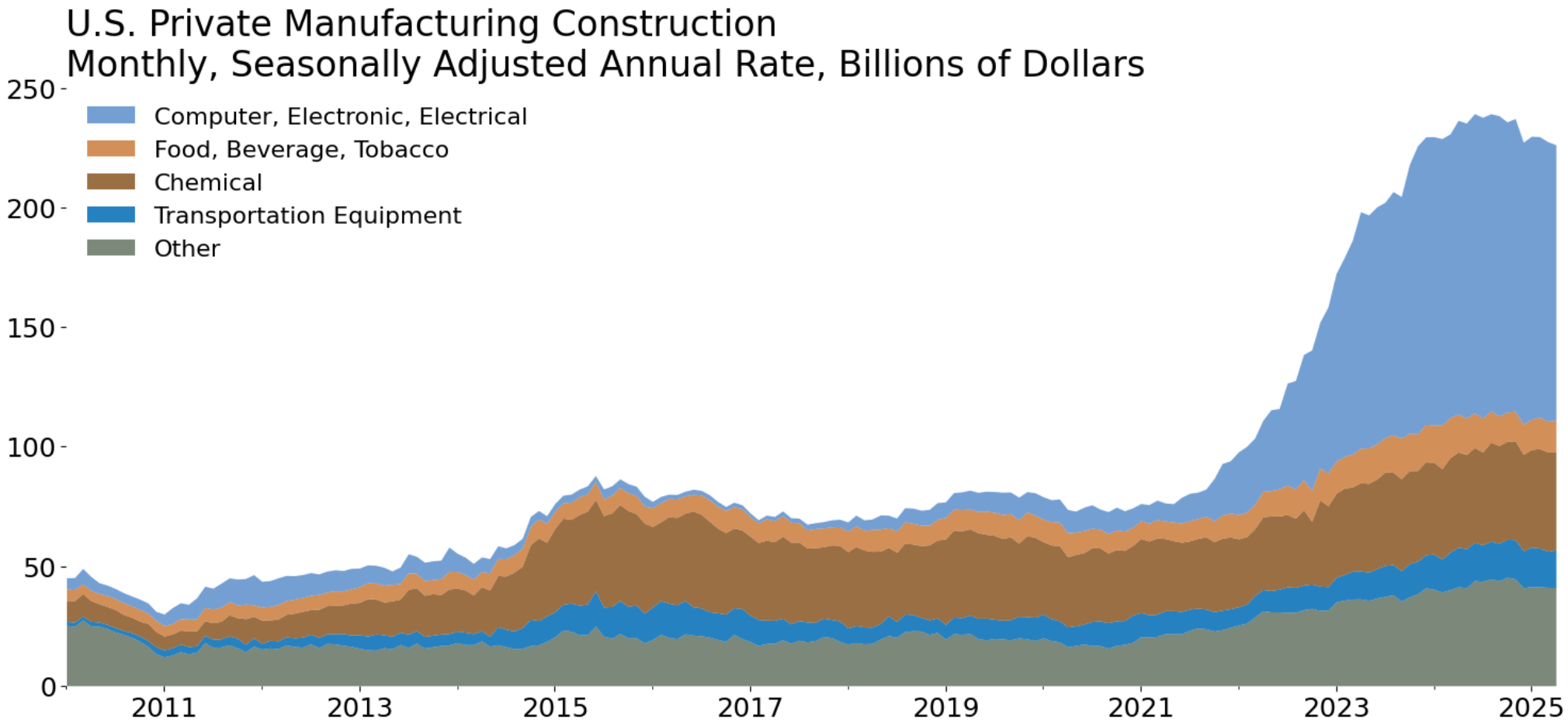
U.S. LNG export capacity set to more than double by 2028

Export capacity for liquefied natural gas



Manufacturing investment has tripled in four years, spurred by computer, electronic, and electrical spending

Manufacturing Construction

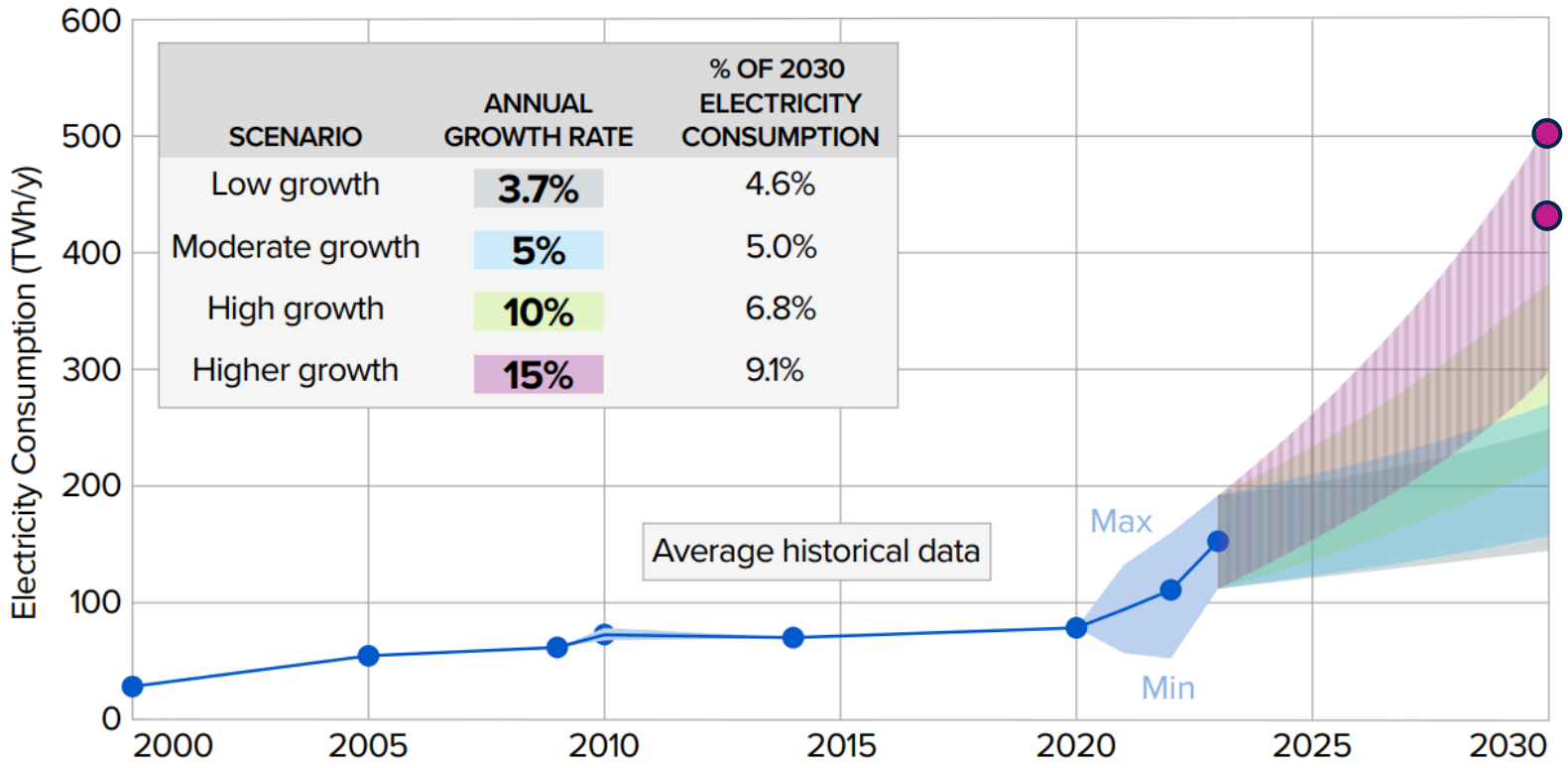


Source: U.S. Census Bureau | Chart: American Gas Association

Data center electricity demand projected to grow. How fast?

Data Center Electricity Demand Outlook (2024 Forecast)

Projections of potential electricity consumption by U.S. data centers: 2023–2030



International Energy Agency, Nov. 2025

International Energy Agency, April 2025

Figure ES-1. *Projections of potential electricity consumption by U.S. data centers: 2023–2030 . % of 2030 electricity consumption projections assume that all other (non-data center) load increases at 1% annually.*

Final Thoughts

Gas demand and supply is growing

LNG exports, industrial demand, and electric power sector consumption drive new requirements.

New infrastructure is necessary

Gas pipeline and storage infrastructure will be necessary to meet growing demand and maintain price stability.

Natural gas is critical for reliability

Gas for electric power remains essential for meeting load growth and peak requirements. Maintaining generation, fuel deliverability, and infrastructure is essential for reliability.

Recurring AGA Projects

Scan this QR code to receive AGA's Natural Gas Market Indicators in your inbox.

Energy Insights

AGA's Energy Insights dive into topics and trends relevant to the natural gas market, member utilities, and consumers. Visit https://www.aga.org/topics/energy-insights/ for more information.

Natural Gas Market Indicators (NGMI)

NGMI is a biweekly publication focused on natural gas market trends such as supply, demand, prices, imports and exports, and storage inventories. Visit https://www.aga.org/topics/ngmi/ for more information.

Surveys and Data Collection

AGA distributes and analyzes responses from several surveys throughout the year. As one example, the Winter Heating Season Performance Survey collects data on winter heating planning from members to track trends on preparedness.

Contact

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National Weather Forecast & Energy Outlook
Electric Outlook

John Moura
Director, Reliability Assessment & Systems Analysis
North American Electric Reliability Corporation

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NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

2025/26 Winter Reliability Assessment

NERC Reliability Assessments

National Natural Gas Readiness Forum Summit
November 18, 2025
John Moura, Director, Reliability Assessment and Performance Analysis

Annual Winter Assessment Highlights

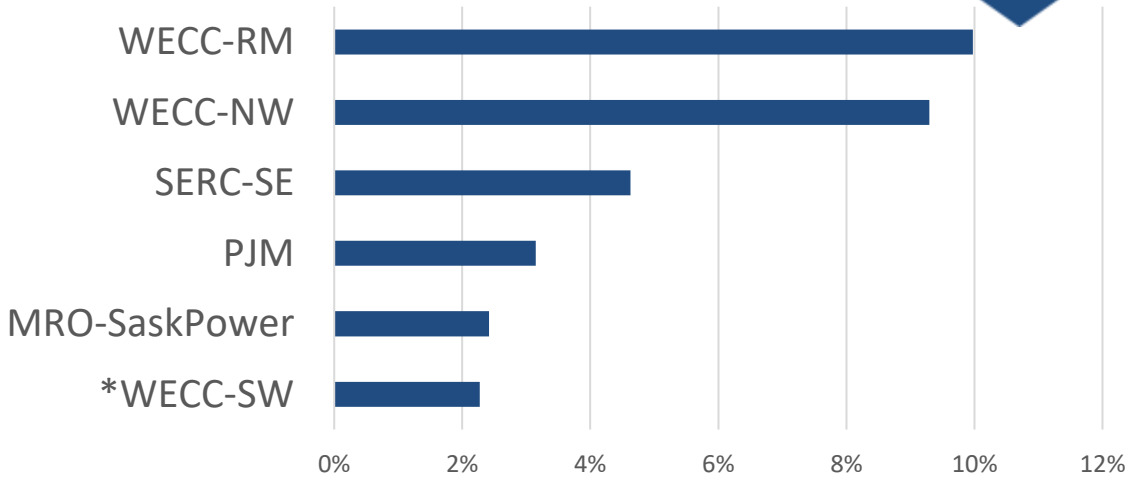
Key Takeaways

- Resources are adequate across North America for expected peak conditions
- Regulatory and industry initiatives appear to be reducing winter reliability risks
  - Past two winters indicate improvement in the delivery of natural gas to generators since winter storms Elliott and Uri with overall less natural gas production decline during cold weather and fewer natural gas infrastructure force majeures
- Extreme winter cold weather challenges for BPS reliability
  - Uneven application of voluntary natural gas infrastructure freeze protection mitigations across most of North America
  - Timing misalignments between the natural gas and electric markets challenge fuel procurement over holiday weekends

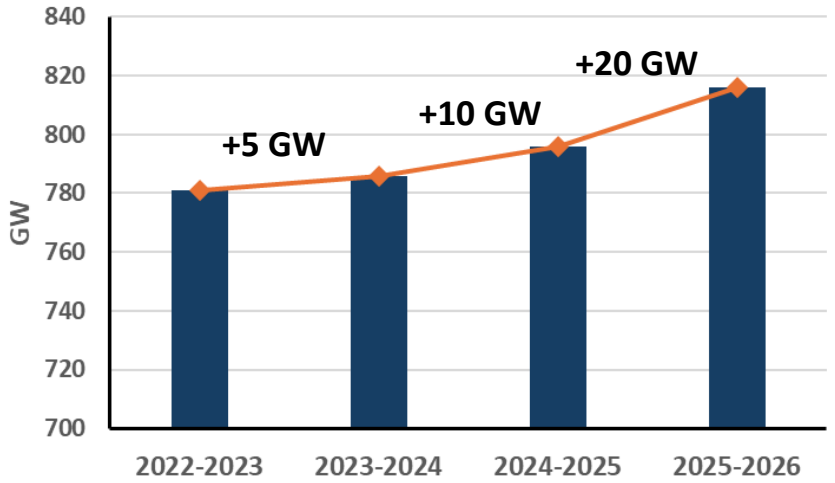
The WRA examines resource adequacy, risk scenarios, and industry preparations for the winter season.

Rising Winter Demand

- Aggregate peak demand for all NERC assessment areas has risen by 20 GW (2.5%) since last Winter.
- Reserve margins in WECC-Basin and WECC-RM have fallen precipitously since Winter 2024-2025.
- In light of demand growth, winter capabilities of the future resource mix for adequacy remain of paramount concern for planners.

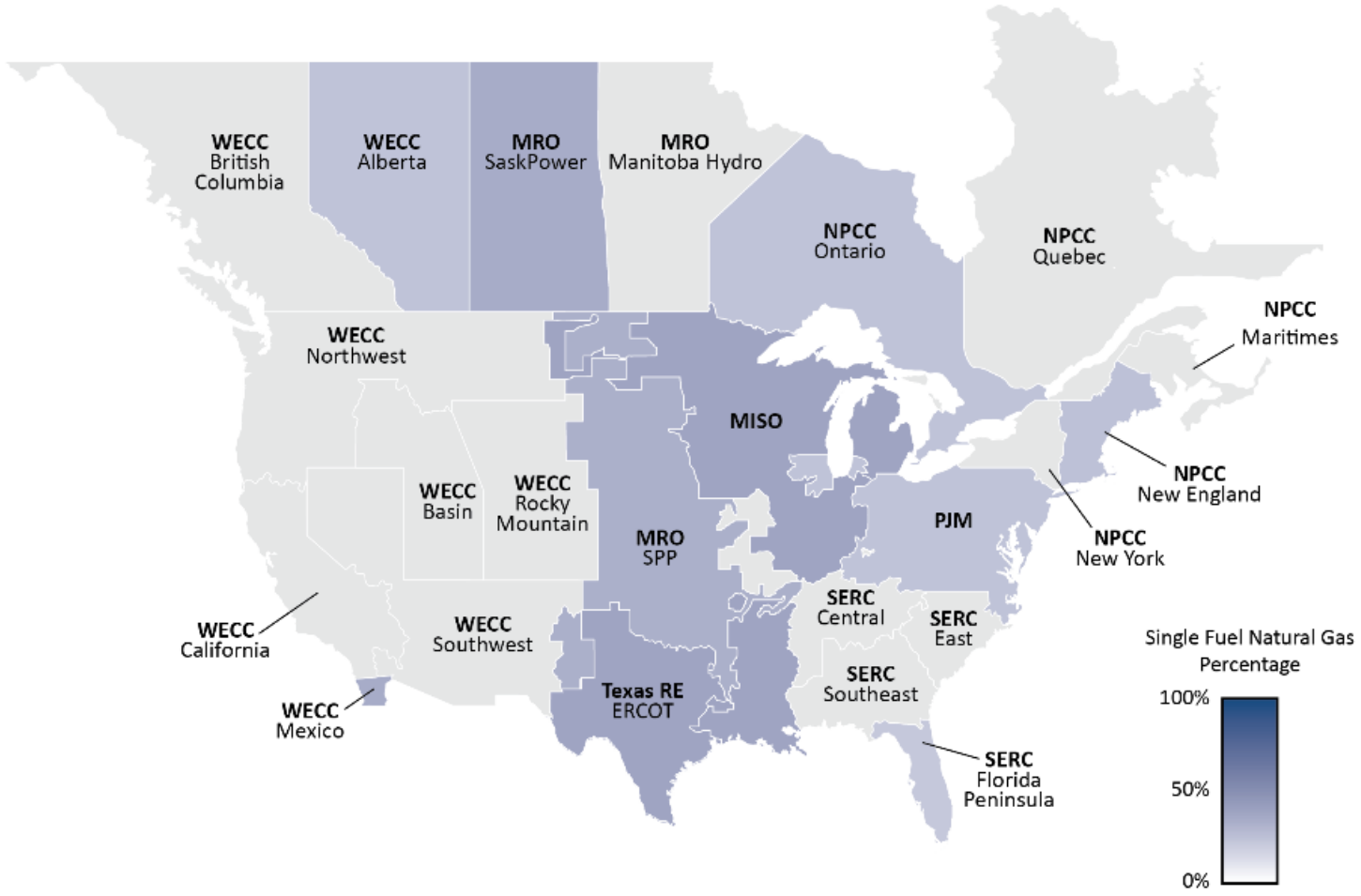


Annual Increase in Peak Winter Demand (2% or More)



**Among the higher growth areas for consecutive years*

Single Fuel Gas-Fired Capacity 2025–2026 Winter



Note: Areas with less than 20% natural gas are shown in light gray.

Single-Fuel Natural-Gas-Fired Generation

	Winter Capacity (GW)	Contribution to Total Winter Resource Mix
MISO	63.9	38%
TRE-ERCOT	53.0	38%
WECC-MX	2.2	34%
MRO-SaskPower	2.5	34%
SPP	33.4	32%
NPCC-New England	12.1	24%
PJM	60.9	23%
WECC-AB	13.9	23%
NPCC-Ontario	8.0	23%
SERC-FP	45.6	21%
WECC-CA	35.9	18%
WECC-SW	21.5	17%
WECC-Basin	4.9	16%
WECC-RM	6.2	14%
SERC-C	17.0	13%
SERC-SE	21.5	13%
WECC-NW	8.7	12%
SERC-E	11.3	9%
NPCC-New York	5.0	8%
NPCC-Maritimes	0.5	7%
MRO-Manitoba	0.3	4%
WECC-BC	0.1	1%
NPCC-Quebec	0.0	0%

2025-2026 WRA Risk Areas

Supply shortages anticipated during extreme conditions

NPCC-Maritimes: Imports needed for peak demand

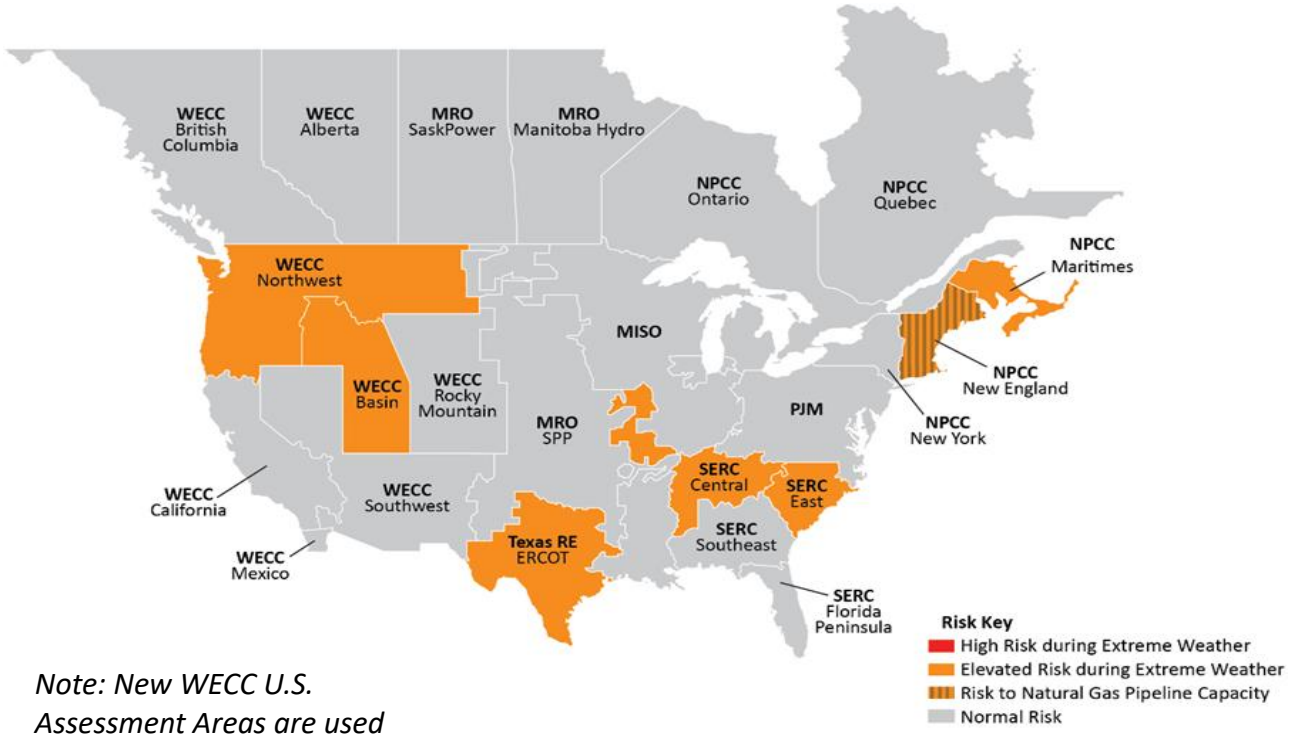
NPCC-New England: Stored fuels that mitigate natural gas infrastructure limitations can be depleted in extended extreme conditions

SERC-Central: Reserves are not sufficient for assessed extreme demand scenarios

SERC-East and Southeast: Resource shortages can occur during early morning hours in extreme cold

TexasRE-ERCOT: Strong load growth is contributing to continued risk of supply shortfalls in extreme cold

WECC-Northwest and Basin: Regional resources may not be sufficient during extreme conditions that cause thermal plant outages and wind performance issues



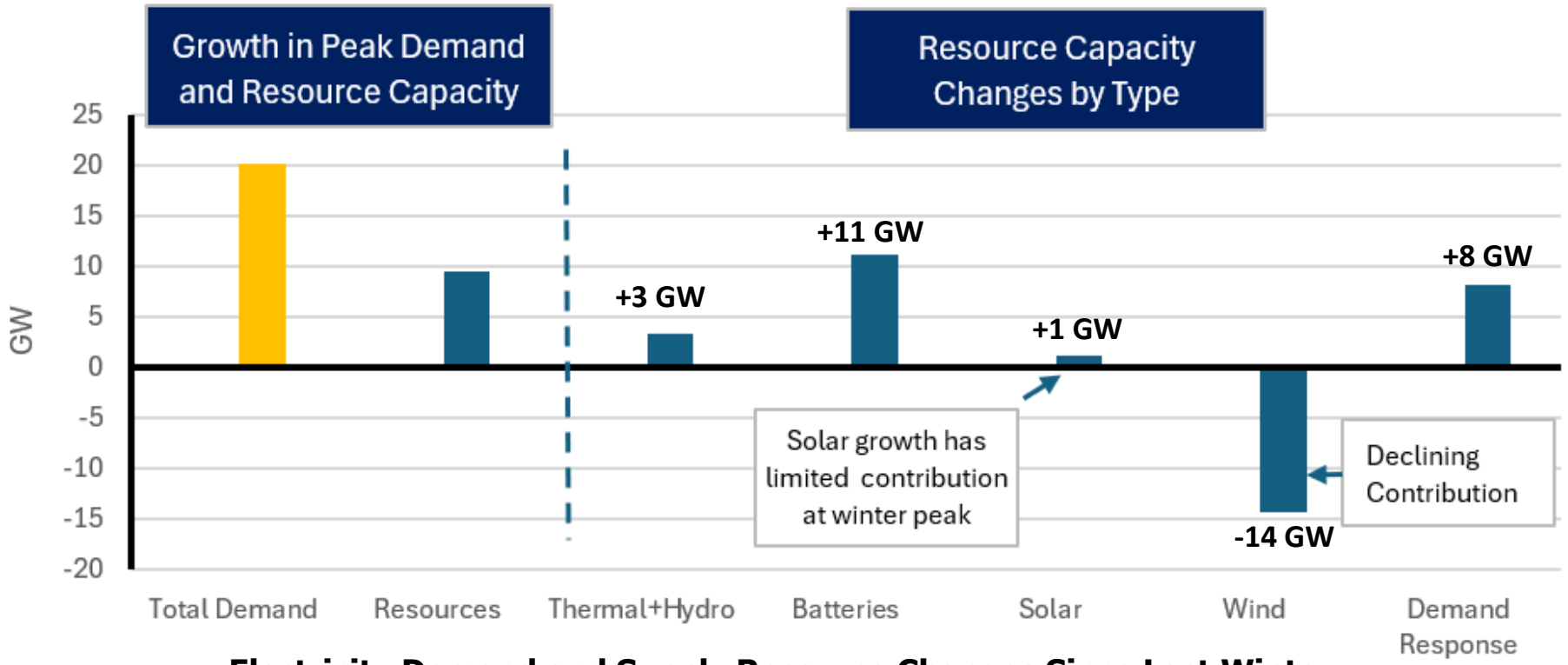
Note: New WECC U.S. Assessment Areas are used in the 2025-2026 WRA

Seasonal Risk Assessment Summary	
High	Potential for insufficient operating reserves in normal peak conditions
Elevated	Potential for insufficient operating reserves in above-normal conditions
Normal	Sufficient operating reserves expected

Extreme conditions include 90/10 demand scenarios, historical high generator outage rates, and low variable energy resource scenarios

Resource gains fall short of rising winter demand

- Total BPS resources have increased by 9.4 GW since last winter (net change)
- Batteries and expanded demand response account for most additions
- An increasingly complex resource mix brings additional challenges for operators

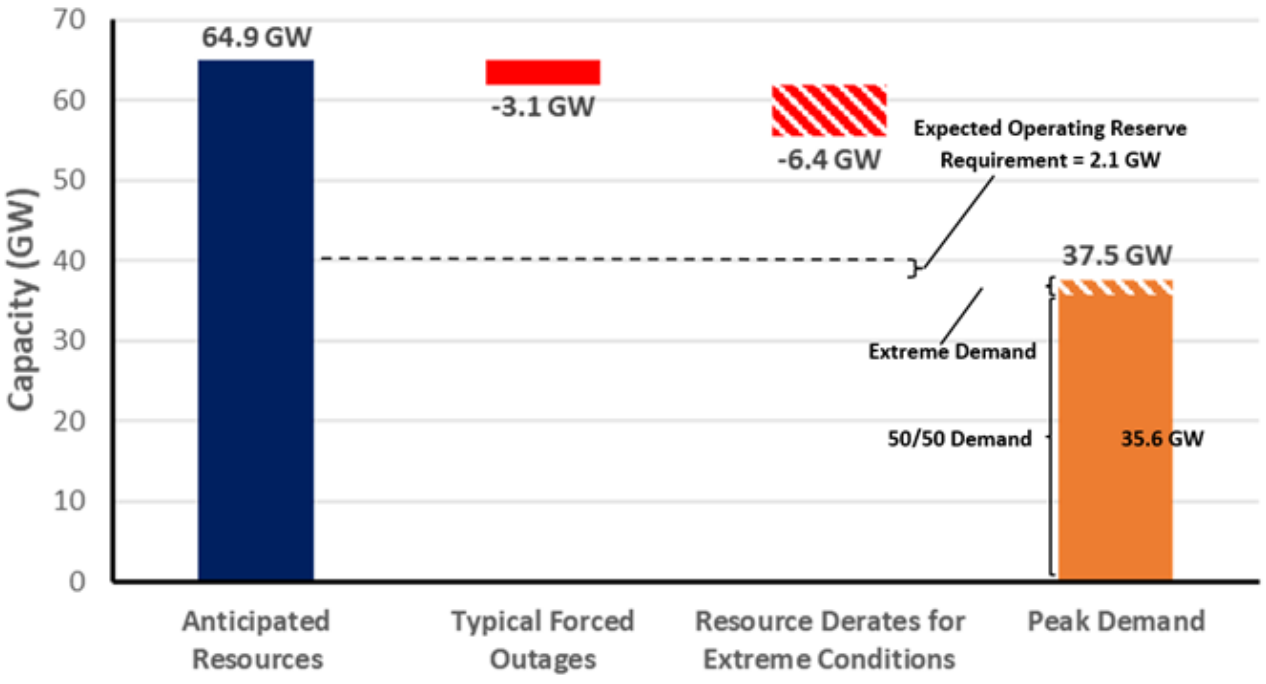


Electricity Demand and Supply Resource Changes Since Last Winter

2024-2025 WRA - Normal & Elevated Risk Profiles

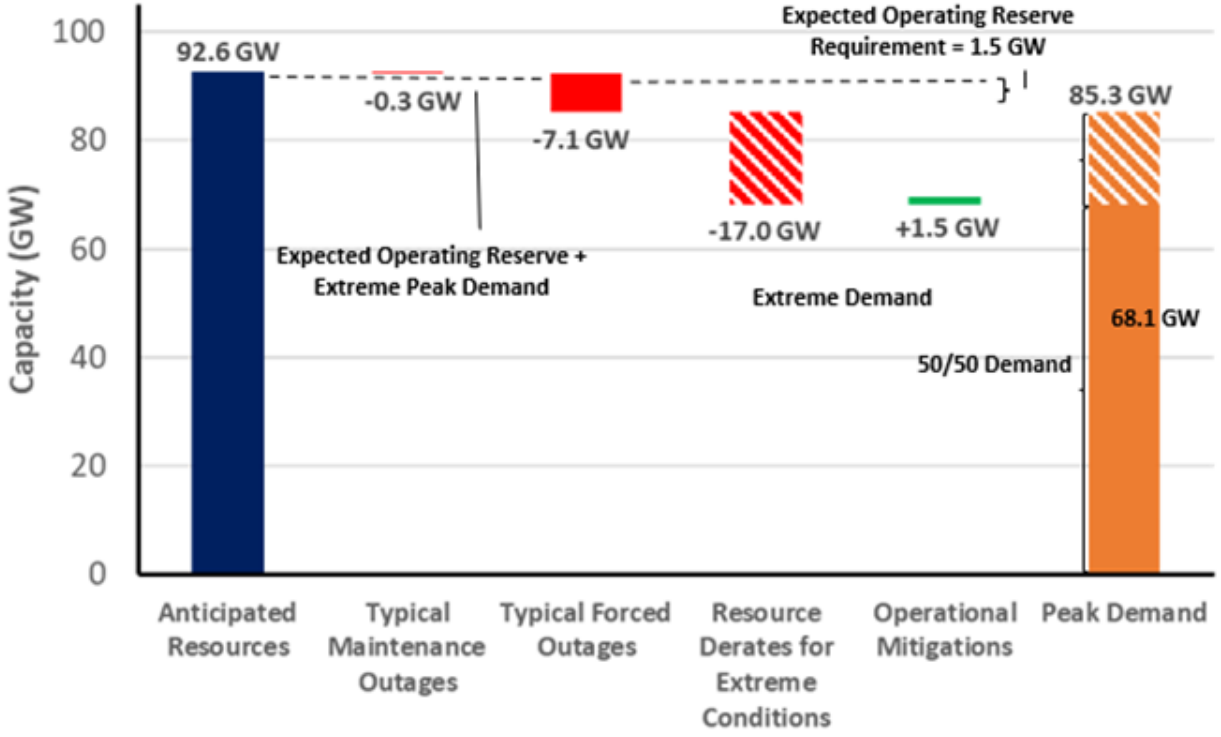
Normal Risk

2025-2026 Winter Risk Period Scenario
WECC-California



Elevated Risk

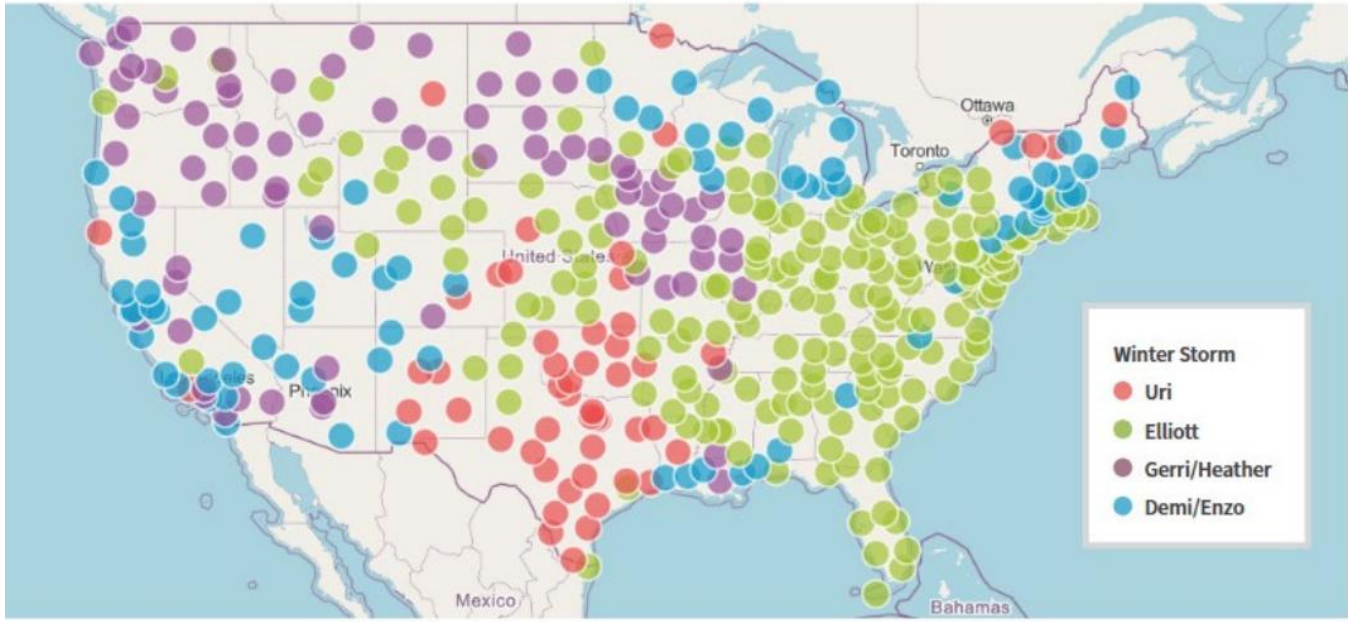
2025-2026 Winter Risk Period Scenario
TexasRE-ERCOT



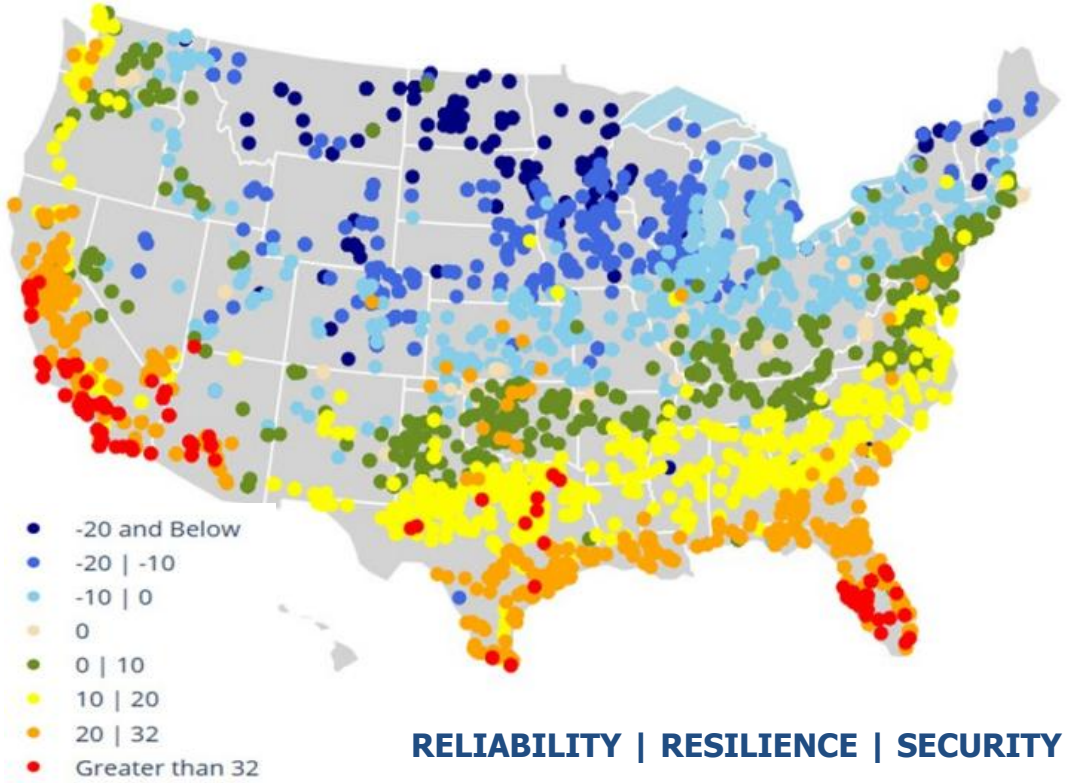
Extreme Cold Weather Temperature Resilience

- January 2025 Arctic Storms resulted in no load shed events
- Improved generator performance attributed to weatherization, early unit commitment

- Reliability standards implemented in 2023 and 2025 require generator cold weather plans and operator coordination
- 96% of total net winter capacity report extreme cold weather temperatures (ECWT) at or below 32 degrees F



Source: NOAA (via Velocity Suite, © 2025 Hitachi Energy, The Velocity Suite



2025-26 WRA Recommendations

- **State regulators and policy makers** – support environmental and transportation waivers when requested to manage potential emergencies

For grid owners and operators:

- **Cold Weather Preparations** – Operators should review seasonal operating plans, communications protocols, and lessons-learned
- **Fuel** – Balancing Authorities (BA) should implement generator fuel surveys to monitor the adequacy of fuel supplies
- **Generator Readiness** – GO/OPs should complete winter readiness preparations, deploy weatherization packages in advance of winter storms, frequently check mitigations; & maintain awareness of natural gas procurement/transportation close dates that precede long holiday weekends.
- **Load Forecasting** – BA should anticipate load forecasts uncertainty and be prepared to manage potential reserve deficiencies

Key Reliability Risks / Mitigation Opportunities

From Reliability Insights

1.Natural Gas Supply and Transportation Risks

- Production Well Freeze-Offs and Winterization
- Dependence on Electricity
- Pipeline Constraints
- Facility Outage / Disruption

2. Electric and Gas Market Harmonization Risks

- Fuel and Transportation Scheduling
- Unit Commitment
- Operational Coordination
- Planning Coordination

3. Resource Adequacy and Capacity to Support Large Ramps Risks

- Resource Performance During Winter Peak Demand
- Generation Preparedness and Fuel Assurance

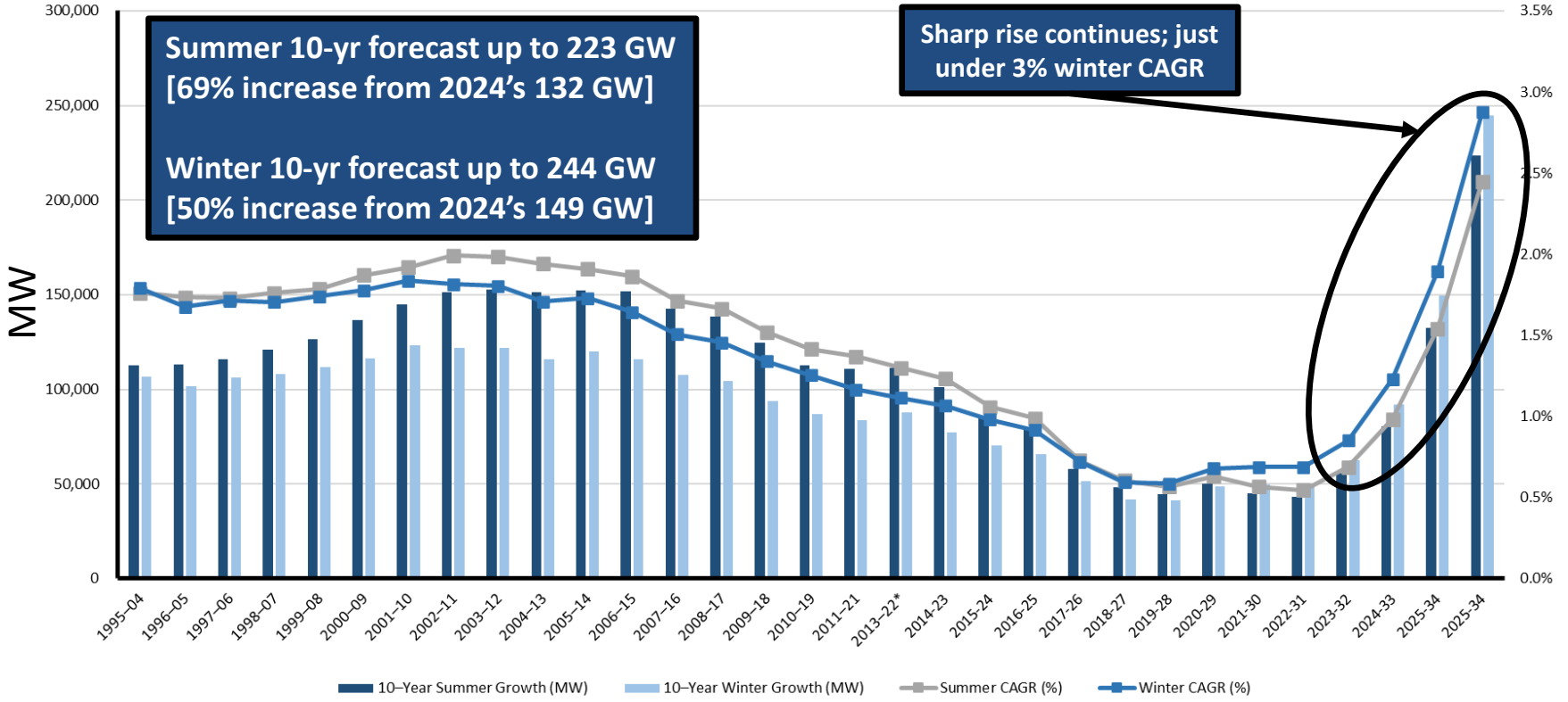
4. Vulnerabilities in Generator Winterization Risks

- Implementation Challenges
- Actual Winter Conditions More Severe than Design Capability
- Back-up Fuel Unavailability

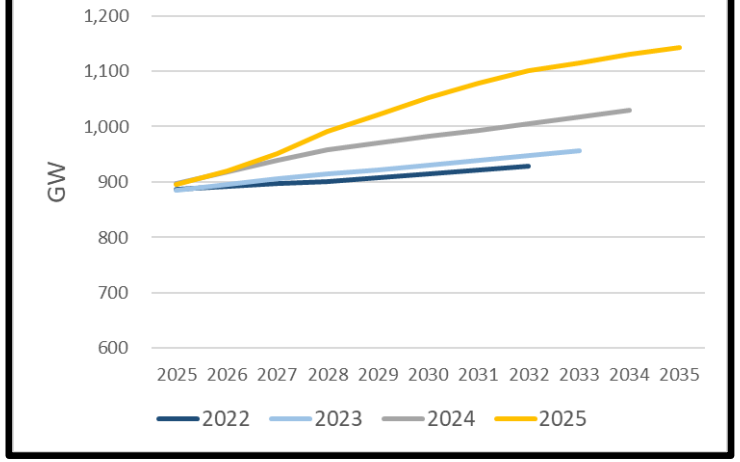
Mitigation Opportunities

- Enhanced Winterization
- Capacity and Energy Planning Enhancements
- Operational Coordination and Preparedness
- Improved Communication Protocols
- Market Reforms
- Cross-Market and Regulatory Coordination

2025 LTRA Data | **Demand Growth Continues to Accelerate**



The charts on this slide show peak demand growth (MW), which is the sum of area demand at the time of peak demand



10-year BPS Summer Peak Demand Growth

With 10-year Growth From Previous LTRA

Other demand insights:

- Data centers and other new load types are making demand more complex
- Data center load factors are more round-the-clock than other load types (e.g., heating, industrials) causing load to remain high over more hours
- More load variability as some large loads can respond to grid or demand conditions

Preliminary, do not cite

Questions and Answers

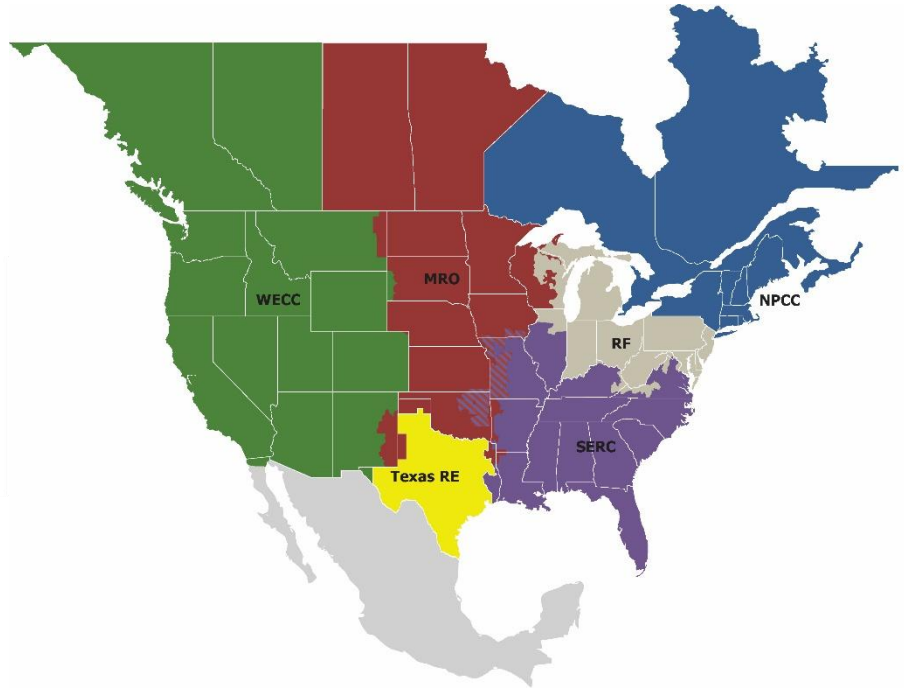
Break
2:45 – 3:15

American Gas Association

Winter Preparedness for Energy Reliability
Overview of January 2025 Arctic Events

Kal Ayoub
Director, Office of Electric Reliability
Federal Energy Regulatory Commission

AGA
American Gas Association



System Performance Review of the January 2025 Arctic Events

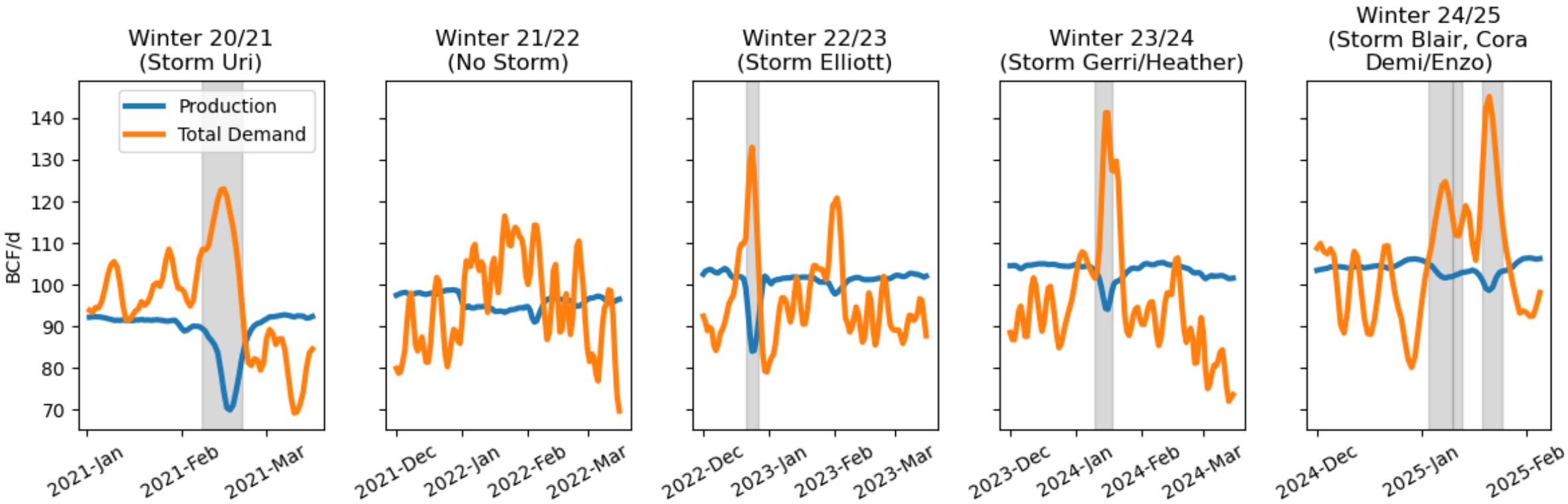
National Natural Gas Readiness Forum Summit: November 18, 2025

This presentation and its contents were prepared by the staff of the Federal Energy Regulatory Commission (FERC) in consultation with staff from the North American Electric Reliability Corporation (NERC) and its Regional Entities. The presentation, its contents, and the accompanying remarks do not necessarily reflect the views of FERC, NERC, or any of its Regional Entities.

Major Takeaways

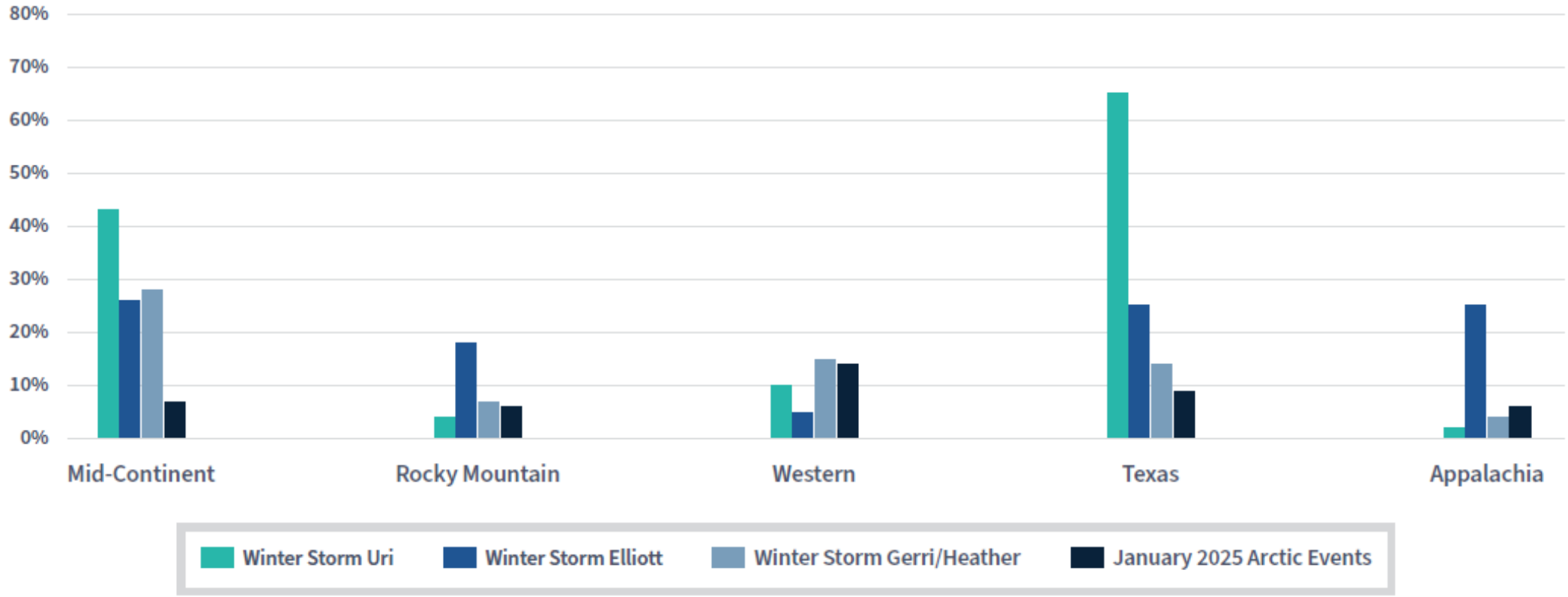
- The January 2025 arctic events review identified-improved communication and coordination between the natural gas and electric industries successfully navigating natural gas and electric demand as well as generation outages.
- Generators appeared to perform better compared to prior winter storms, in part due to:
  - Improved winter preparedness;
  - Increased situational awareness; and
  - Implementing lessons learned from prior extreme cold weather events and report recommendations.
- The natural gas system performed well with only minor production declines and *force majeures*.
- There is a continued need to implement recommendations from prior reports, studies, and reviews.

Winter Natural Gas Production and Demand



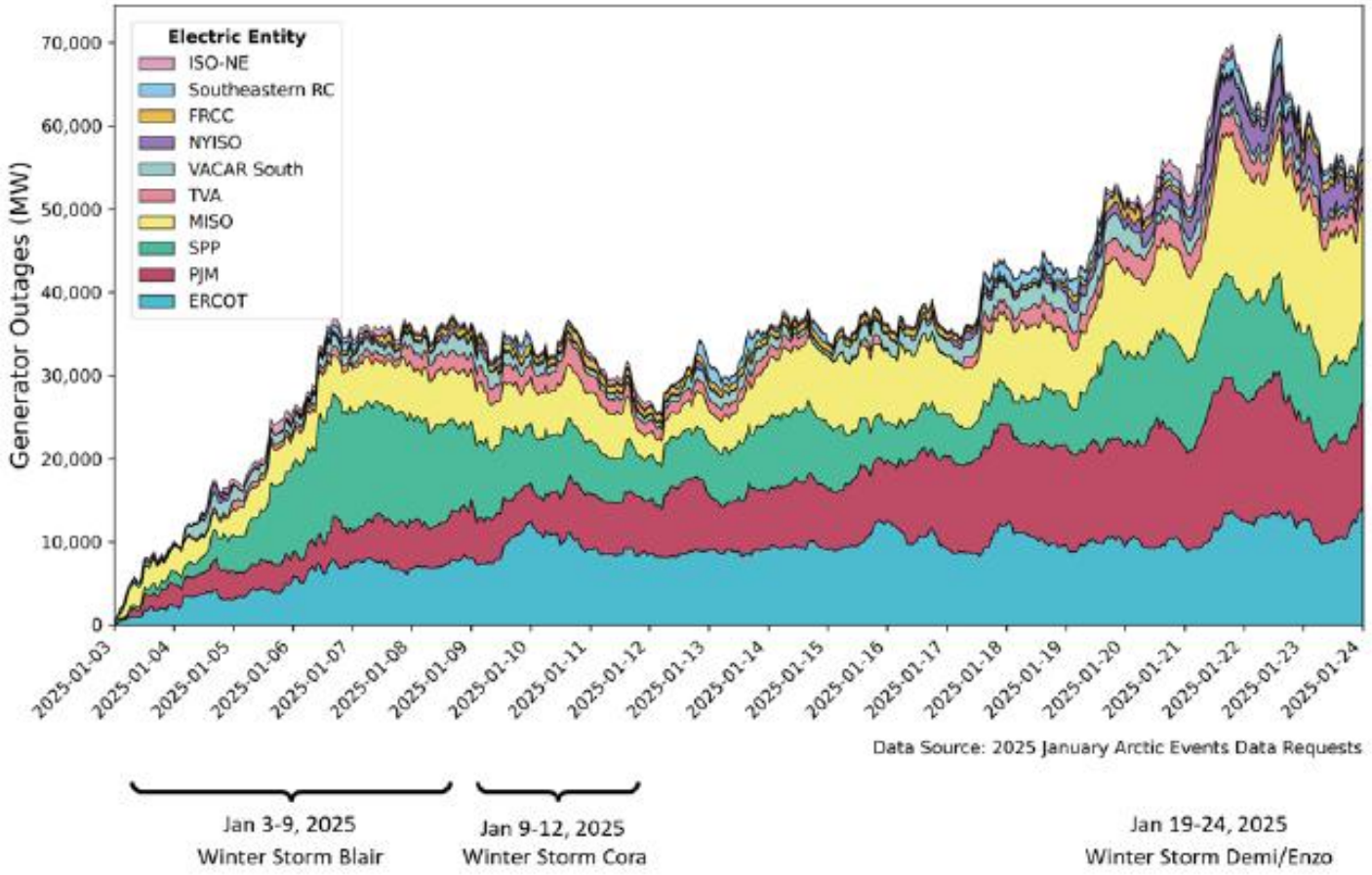
Source: S&P Global

Natural Gas Production Declines



Source: S&P Global Commodity Insights. © 2025 by S&P Global Inc.

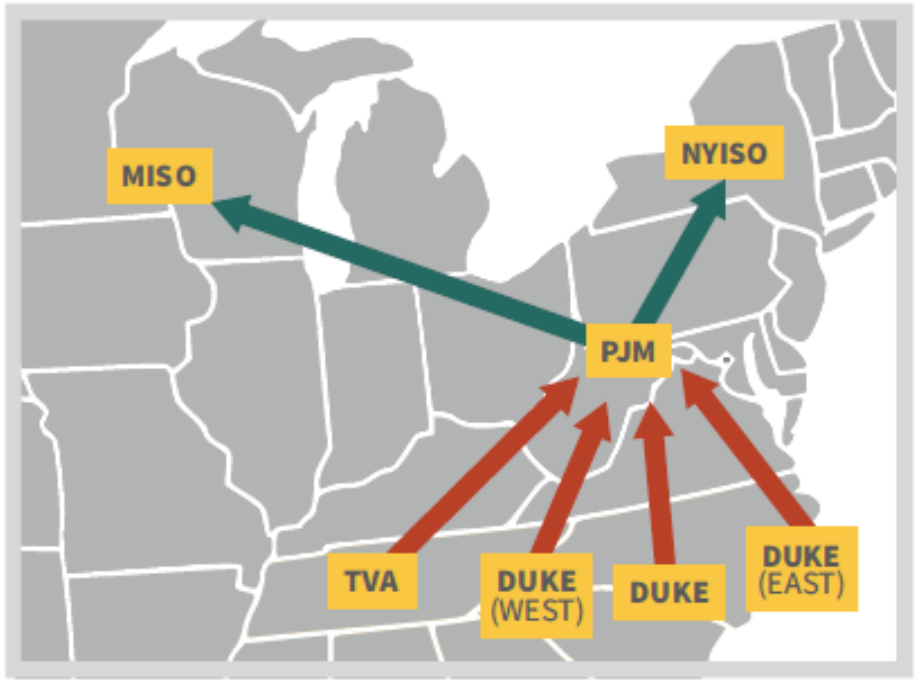
Cumulative Incremental Unplanned Generator Outages in the Eastern and Texas Interconnections from January 2-24, 2025



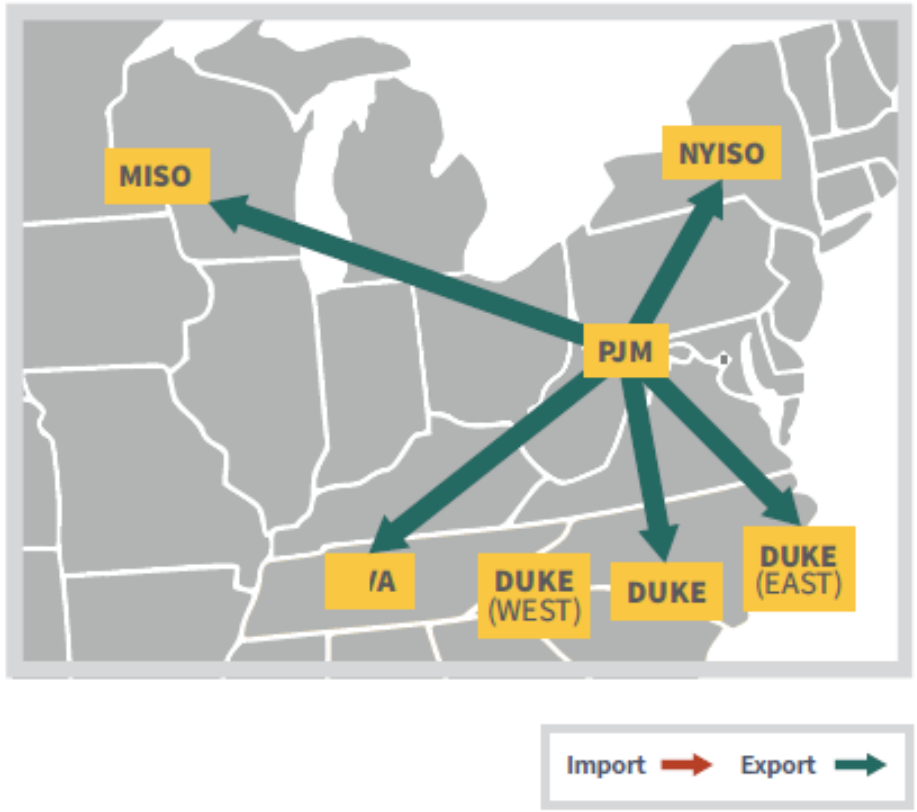
Source: 2025 January Arctic Events Data Requests

Energy Transfers

TYPICAL WINTER HOUR
Average Net Intercange = 1962 MW



DEMI/ENZO DEMAND PEAK
Average Net Intercange = 7650 MW

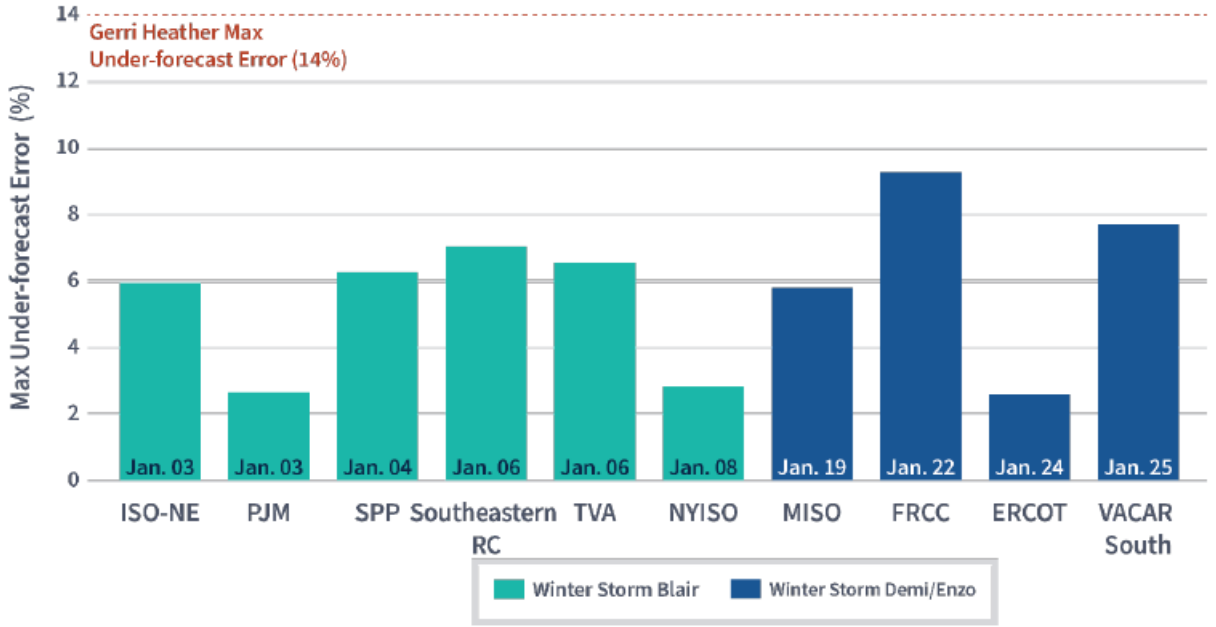


PJM interchange at time of maximum demand (1/22/2025 at 8:00 AM to 9 AM EST)

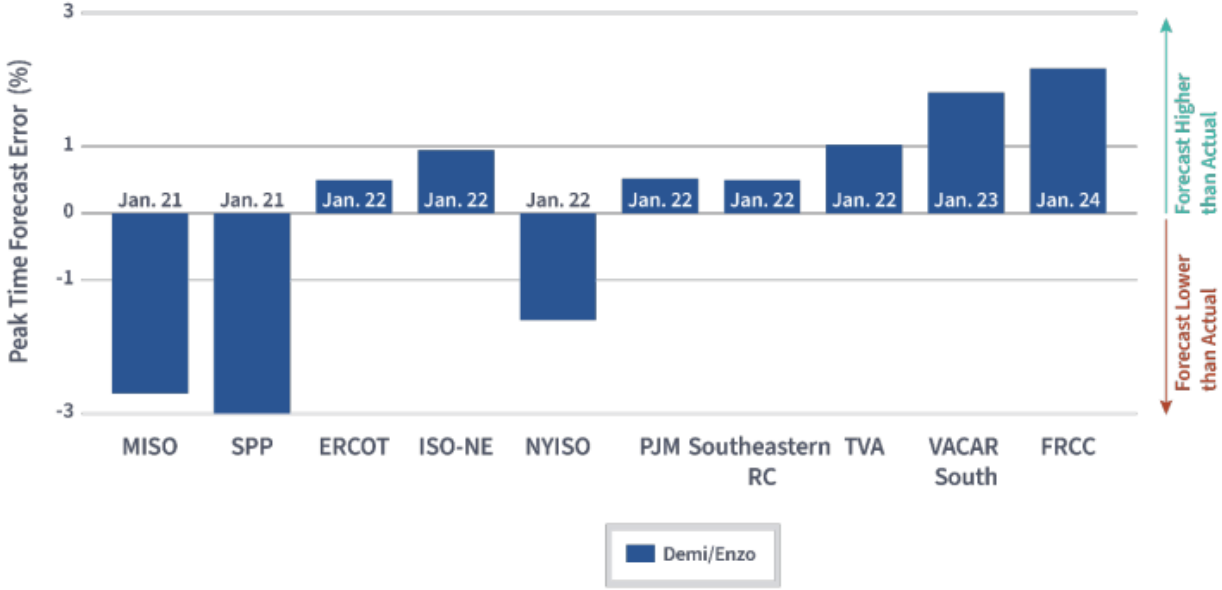
Source: Energy Information Administration (EIA)

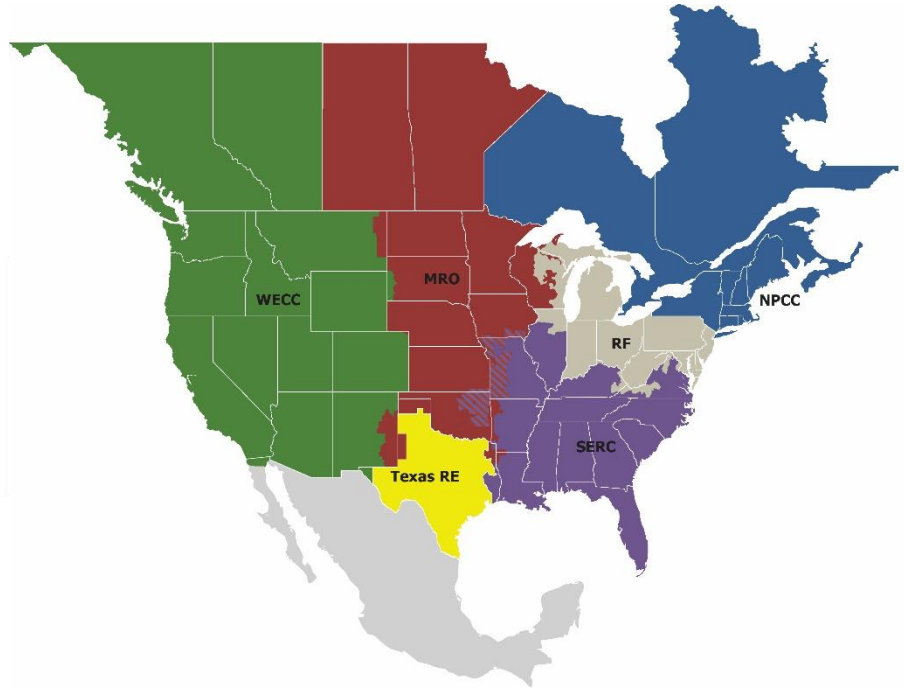
Load Forecasting

Largest Under-Forecast Percent Error – January 2025



Forecast Percent Error at Peak Demand – January 2025





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Winter Preparedness for Energy Reliability
Federal Perspective

Bernard McNamee
Partner and Former Commissioner
McGuireWoods

AGA
American Gas Association

Winter Preparedness for Energy Reliability
State Perspective

Jim Kerr
Chairman, President & CEO
Southern Company Gas

Commissioner, NARUC
President
Washington Utilities &
Transportation Commission

Jehmal Hudson
Commissioner
Virginia State Corporation
Commission

Tricia Pridemore
Commissioner

Closing Remarks

Karen Harbert
President & CEO
American Gas Association

AGA
American Gas Association