



Natural Gas TODAY

For Municipal Gas Systems



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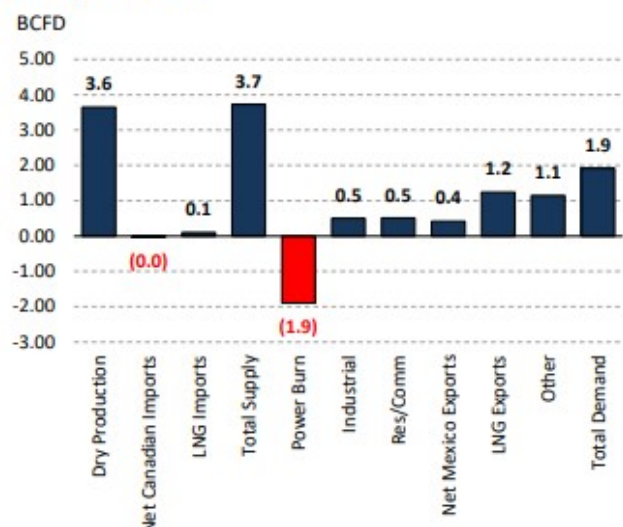
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Winter 2022-2023 Natural Gas Market Outlook

Despite production growth, demand gains will keep L48 storage below 5-year average

Summer Natural Gas Supply and Demand Summary	2022-2023 Winter	2021-2022 Winter	2020-2021 Winter	2019-2020 Winter	Difference vs Last Winter	Difference vs Last Three Winters
Supply (BCFD)						
Dry Production	98.2	94.5	90.1	95.1	3.6	4.9
Net Canadian Imports	5.6	5.6	5.5	4.6	(0.0)	0.3
LNG Imports	0.2	0.1	0.1	0.2	0.1	0.0
Total Supply	103.9	100.2	95.8	99.8	3.7	5.3
Demand (BCFD)						
Power Burn	27.0	28.7	26.8	29.0	(1.7)	(1.2)
Industrial	25.3	24.8	23.9	24.5	0.5	0.9
Res/Comm	37.7	37.2	37.3	36.4	0.5	0.7
Net Mexico Exports	5.9	5.5	5.4	5.2	0.4	0.5
LNG Exports	13.4	12.2	10.3	8.5	1.2	3.1
Other	8.8	7.6	7.2	7.6	1.2	1.3
Total Demand	118.1	116.0	111.0	111.2	2.1	5.4
Average Withdrawal (BCFD)	14.2	15.8	15.2	11.3	(1.6)	0.1
Total Withdrawal (BCF)	2,133	2,254	2,119	1,720	(121.6)	101.6
HDDs	3,437	3,327	3,398	3,294	110.0	97.3

Natural Gas Supply and Demand, 2022/23 Winter vs 2021/22 Winter



Source: Energy Ventures Analysis

- ◆ Compared to last winter, U.S. natural gas dry gas production is expected to grow by a resounding 3.6 BCFD, driven by Haynesville and higher associated gas output. Canada imports remain nearly flat, but the widened US-Canada basis differentials could lead to higher Canadian supply.

- ◆ On the demand side of the ledger, the estimated weather-normalized power burn outlook for Winter 22/23 is lower by 1.9 BCFD YoY, while the decline will be largely offset by higher industrial demand and LNG exports. LNG feedgas demand is expected to grow by a total of 1.2 BCFD and Mexico pipeline flows are expected to grow by 0.4 BCFD.

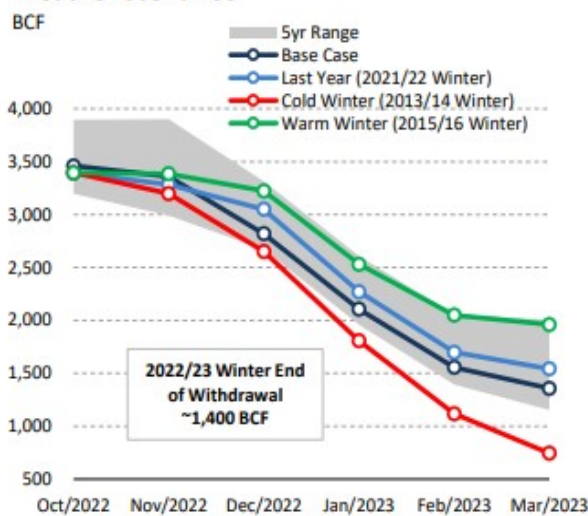
- ◆ Looking back to last winter, the U.S. natural gas markets finished the 2021-22 winter with a tighter balance. Although reliability was not impacted, freeze-offs during extreme cold events briefly limited natural gas production and

simultaneously added heating demand. Ongoing coal supply shortages, the commissioning of an additional 1.6 BCFD of LNG exporting capacity, and higher industrial demand limited storage injection gains.

- ◆ Geopolitical tensions in Europe resulted in fuel reliability concerns for coal, oil, and gas supply for international energy markets, driving increased price volatility.

- ◆ Henry Hub prices surged to \$10/MMBTU in August 2022, reflecting the strong global and domestic demand outlook and the inflationary shock from energy prices, although U.S. natural gas prices remain exponentially lower than natural gas prices in Europe and Asia.

End-of-Winter Storage Level under Different Weather Scenarios



Source: Energy Ventures Analysis

- ◆ Looking forward, U.S. natural gas markets will remain tight this winter assuming normal conditions. Low coal stockpiles and skyrocketing coal prices have

Continued on page 2.

RENEWABLE IDENTIFICATION NUMBERS (RINS) EXPLAINED

WHAT ARE RENEWABLE IDENTIFICATION NUMBERS?

Renewable Identification Numbers (RINs) are credits that were created as part of the Renewable Fuel Standard (RFS), a program that aims to reduce greenhouse gas (GHG) emissions and expand the United States' renewable fuels sector.

In accordance with the RFS, obligated parties (refiners or importers of gasoline or diesel fuel) are required to meet a Renewable Volume Obligation (RVO) that is set annually by the Environmental Protection Agency (EPA). To demonstrate compliance with the RVO, obligated parties can either blend renewable fuels, such as renewable natural gas (RNG), into transportation fuels or obtain RINs. RINs are a tradeable commodity that can be bought attached to renewable fuels or in the market by obligated parties. RINs are typically retired for compliance by obligated parties based on their RVO after the end of the compliance year. Those RINs not retired for compliance can be carried over to the next compliance year.

ABOUT THE RENEWABLE FUEL STANDARD

The Renewable Fuel Standard program is a national policy, authorized under the Energy Policy Act of 2005 and further expanded under the Energy Independence and Security Act of 2007 that requires a certain volume of renewable fuel to be blended with petroleum-based transportation fuel, heating oil or jet fuel. The EPA determines which fuels are eligible to quality as renewable fuel under the RFS program. Among other requirements, fuels must achieve a reduction in greenhouse gas emissions as compared to a 2005 petroleum baseline.

Renewable fuels and their associated RINs fall into four categories based on the feedstock used, fuel type produced, energy inputs and GHG reduction thresholds, among other requirements.

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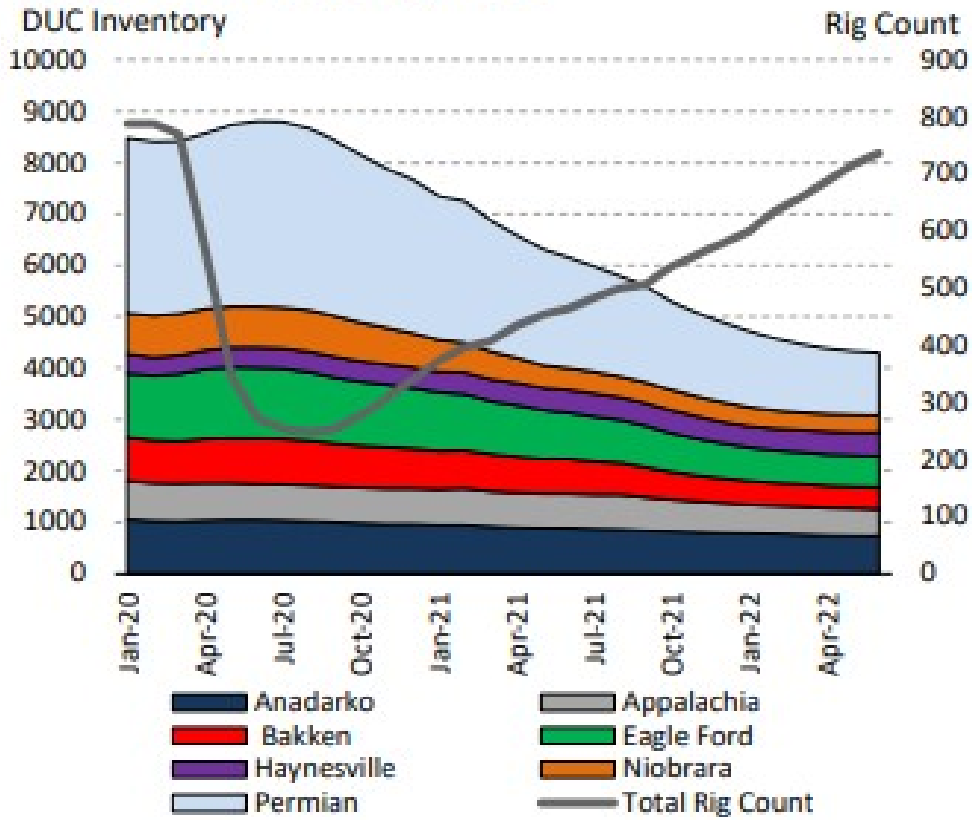
Natural Gas 2022-2023 Winter Outlook

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countered much higher natural gas prices ultimately limiting traditional switching between coal and natural gas. Despite higher gas prices, high electric demand has supported gas-fired generation this summer. However, given regional gas forward market prices, coal-fired and oil-fired generation will play a critical role for this coming winter heating season. Solid LNG demand overseas will also keep U.S. LNG terminals operating at or above the nameplate capacity. Beyond that, U.S. LNG exporting capacity will remain steady at 13.5 BCFD until 2024.

- ◆ Although the extensive gain in oil and gas prices should incentivize more drilling, limited takeaway capacity, increased price volatility, military conflict in Europe, and uncertainty around the permitting process and how ESG concerns will be factored into future investments are fueling uncertainty around the long-term supply potential. EVA expects a moderate near-term production growth as North American producers stick to financial disciplines to avoid over-investment.
- ◆ Last winter's gas production averaged 4.7 BCFD higher than the previous winter, with Permian and Haynesville leading the growth, underscoring strength in both associated and non-associated gas production. U.S. dry gas production rose to 96 BCFD in Dec-2021, the highest level observed since the pandemic. Natural gas production

Drilled but Uncompleted Wells Inventory in Major U.S. Producing Areas



will likely resume the upward trend seen before the cold weather of January through March, although the magnitude of growth remains uncertain.

- ◆ The price rally will likely incentivize more drilling activity in the short term, especially with the steady decline of the drilled-but-uncompleted wells (DUC) inventory. The number of DUC wells has been falling at a 4% monthly rate since April 2021, but has slowed recently. To maintain or expand the current output, new drillings are another indicator of increased natural gas production activity.
- ◆ U.S. gas-weighted producers are forecast to increase CAPEX by 30% in 2022 while oil-focused producers are expected to raise spending by 17%. However, with

the inflationary shock and an ongoing decline in the DUC units the published budget may only be able support a moderate growth from the current production level. EVA expects U.S. dry gas output to average 98,2 BCFD in Winter 2022/2023, ~4% higher YoY.

- ◆ The DUC inventory remains below the pre-pandemic level as the upstream sector suffered from equipment/labor shortages and inflated costs. However, rig counts are much higher than 2020 levels.
- ◆ The development of takeaway capacity also plays a role in E&P investment. The certification of new gas projects, including pipelines and LNG terminals, will be subject to greater scrutiny if FERC finalizes its certificate and GHG policy statements in their

current problematic forms that require the consideration of difficult-to-quantify indirect and cumulative GHG emissions.

- ◆ Summer 2022 set the stage for the coming winter. Looking back at Summer 2022, despite much higher Henry Hub prices, dispatch cost competition between gas-fired and coal-fired generation was higher than expected due to rising coal costs.
- ◆ Higher prices for replacement coal due to spikes in international coal markets will keep the competition between coal and gas tight for the winter, especially in the eastern part of the country. Coal stockpile levels have not recovered despite the strong utilization of gas-fired generation displacing coal-fired generation. Given the current state of the U.S. coal market, coal plant dispatch is likely to be limited throughout 2023. Coal prices for Eastern markets are nearly 5x higher YoY.
- ◆ In 2022, nearly 17 GW of coal capacity will be retired while 10GW of gas-fired units will be added – the biggest annual capacity shift for each resource category since 2019.
- ◆ 2022 will also be a milestone year for renewable installations. Nearly 45 GW of new wind, solar, and battery storage resources are scheduled to be integrated into the generation mix. However, supply chain constraints owing to the pandemic delays, the Russia-Ukraine conflict, and the expected U.S. ban on Chinese panels allegedly produced using forced labor have increased uncertainties to the project timelines.
- ◆ Drought concerns in the West pose a threat to hydropower generation. With the delays in renewable installation, rapid retirement in coal capacity, and restricted hydropower availability, gas-fired generators will remain the primary swing resource to ensure grid reliability.
- ◆ Going forward, it will be essential to ensure that gas-fired generators have sufficient infrastructure to provide the flexibility needed to accommodate the higher ramping requirements of the growing number of variable resources coming online.
- ◆ The uncertainty over Russian gas supply to Europe surged after Russia invaded Ukraine. The potential disruption of Russian pipeline gas threatens the economy of Europe as it supplies 40% of EU's natural gas imports.
- ◆ The risk premium is likely to keep prices at TTF (European

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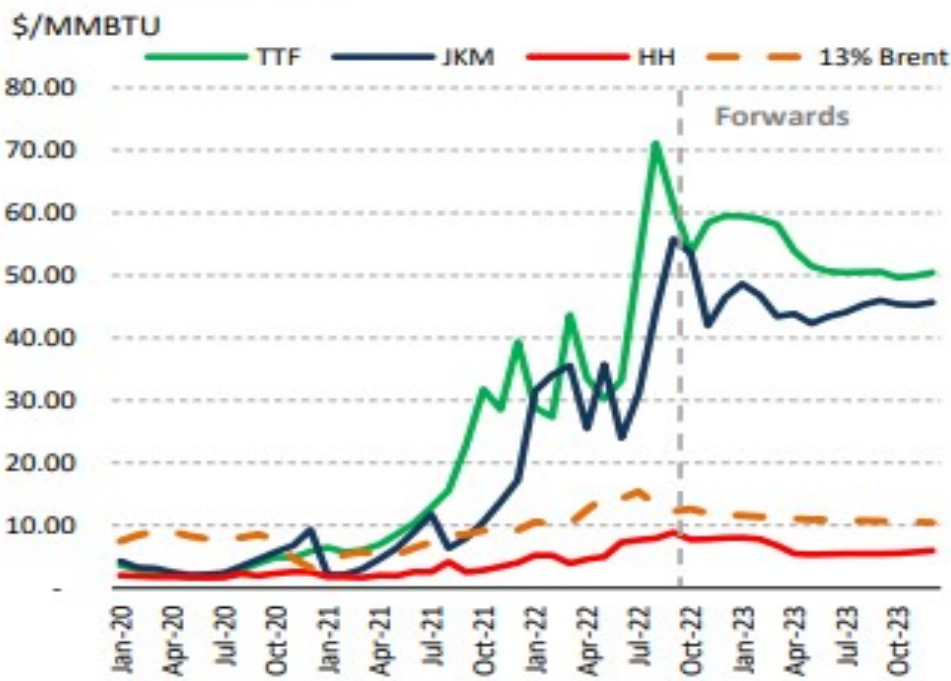


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Natural Gas 2022/23 Winter Outlook

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Global LNG price



Source: ICE. Future curves are based on 8/17/2022 settlements

benchmark) trading above the JKM (Asian benchmark) index until Europe secures alternative sources. The suspension of Nord Stream 2, originally projected to double Russian gas deliveries to Germany, created a substantial market share for spot LNG cargoes.

- European storage remained below the seasonal normal as of April, but the deficit against the 5-yr average has narrowed with increased LNG supply and energy conservation. The European Commission has announced a target to refill the EU gas storage to 80% of capacity by November 1 while reducing the purchase of Russian gas by two-thirds before the end of the year. (Russian gas flows via Nord Stream 1 have been at zero since it began maintenance on 8/31/22). However, the path to meeting those goals can be rocky.

- U.S. LNG has become an increasingly important strategic energy source in Europe. The percentages of U.S. LNG cargoes flowing to Europe expanded from 18% in Q3 2021 to over 50% in Q1 2022, as European gas prices gained strength on Russian supply risk, trading at a premium above the Asian LNG benchmark JKM.

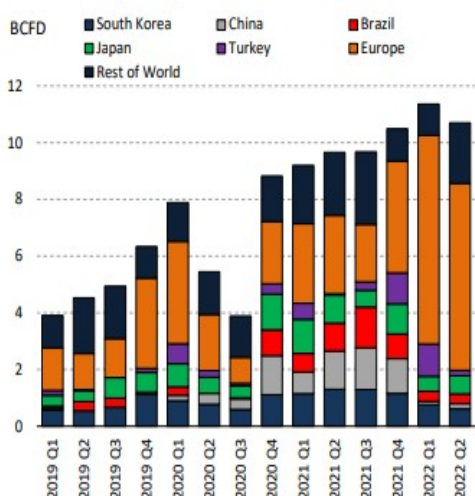
- President Biden's pledge to supply 15 billion cubic meters (BCM) more LNG (1.6 BCFD) to the EU in 2022 will not have significant impact on U.S. LNG feedgas demand as all seven U.S. exporting plants were already operating at capacity. Instead, the announcement could redirect more U.S. cargoes from other markets to Europe, which was already in motion given European price signals over the past two quarters.

- As of March 2022, seven projects totaling 12.8 BCFD of exporting capacity are operating or are currently undergoing commissioning.

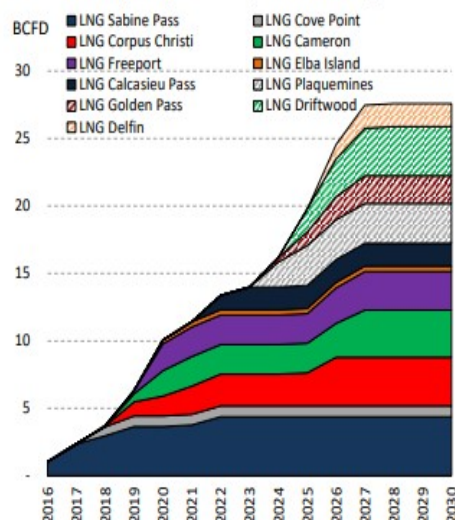
- Based on the current forward market settlements, estimated netbacks of U.S. LNG exports to NW Europe and NE Asia remained above \$30/MMBTU through 2023. In the near term, U.S. LNG feedgas demand will be constrained at the nameplate capacity. The next major expansion is expected during the 2024/2025 timeframe.

- EVA expects U.S. LNG feedgas demand to average 13.4 BCFD this winter, if the Freeport LNG terminal returns to service in mid-November as currently expected.

U.S. LNG Export by Destination

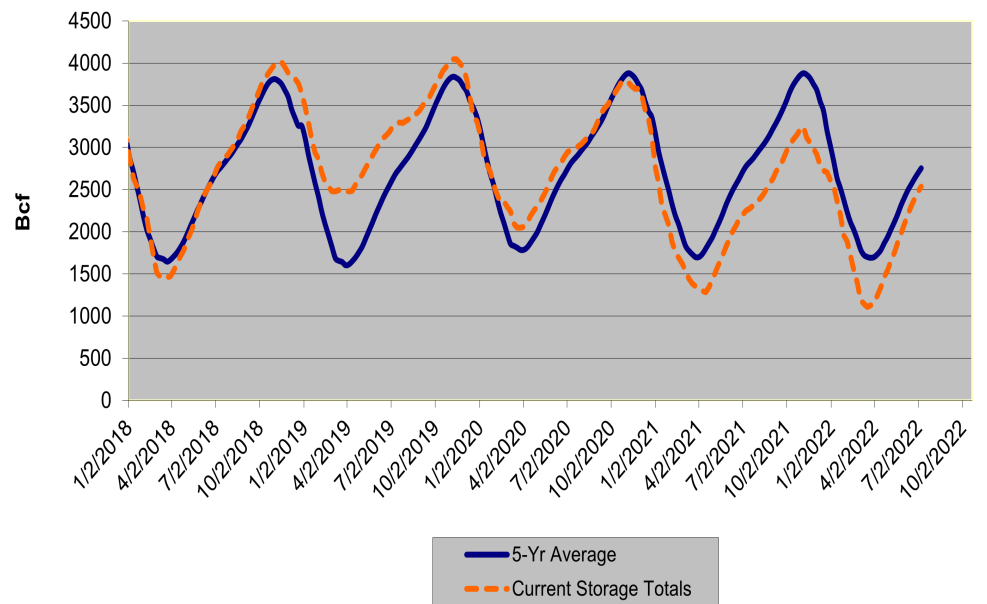


U.S. LNG Capacity Development through 2030

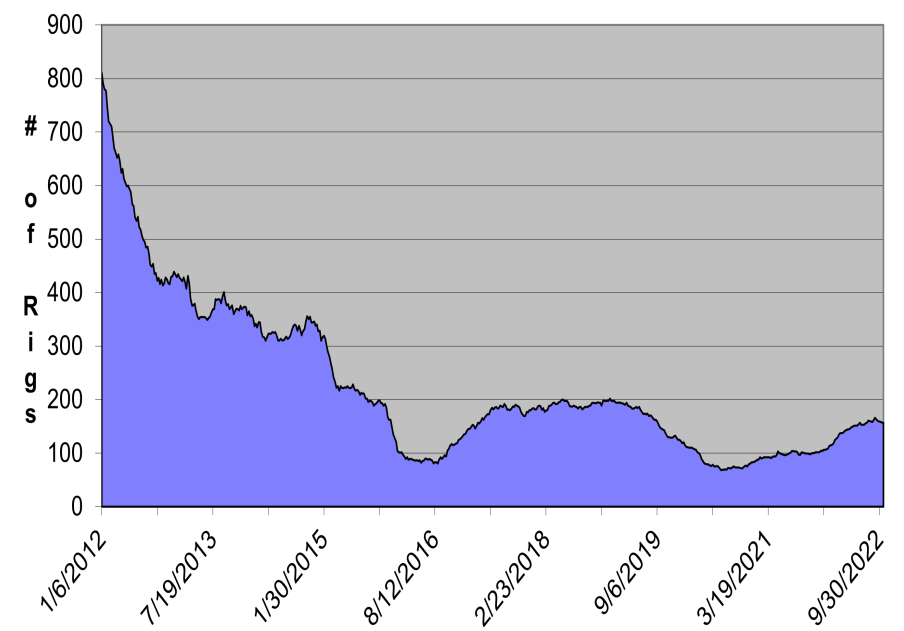


Snapshots

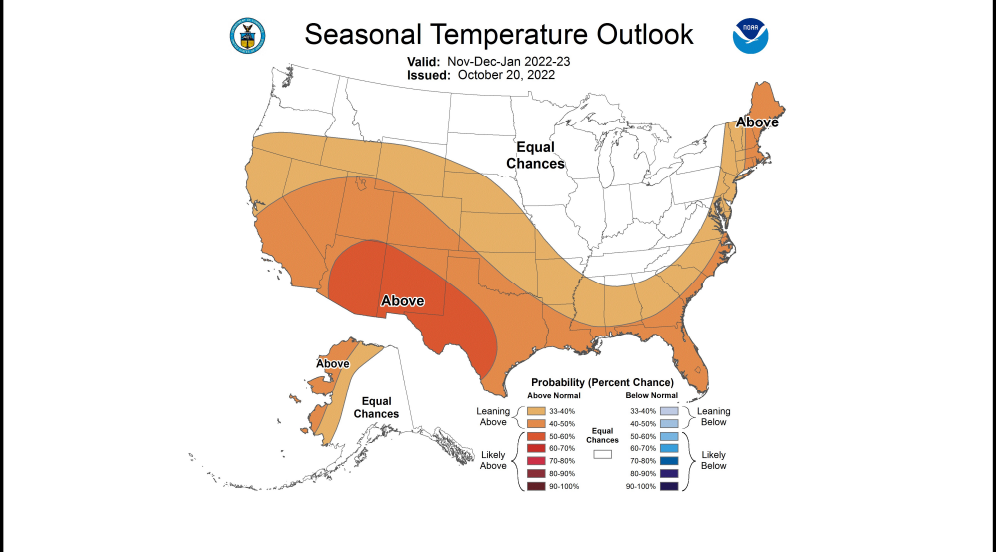
Natural Gas Storage



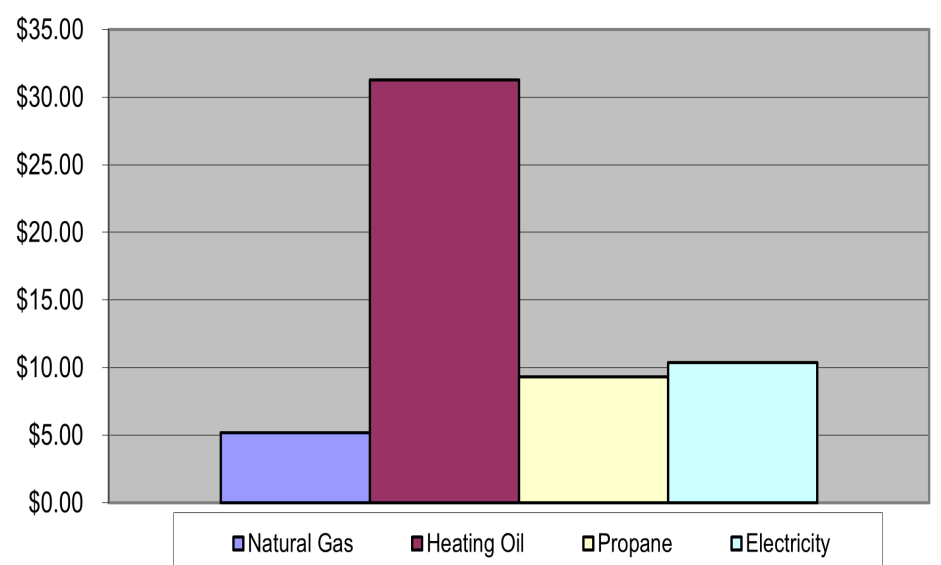
Natural Gas Rig Count



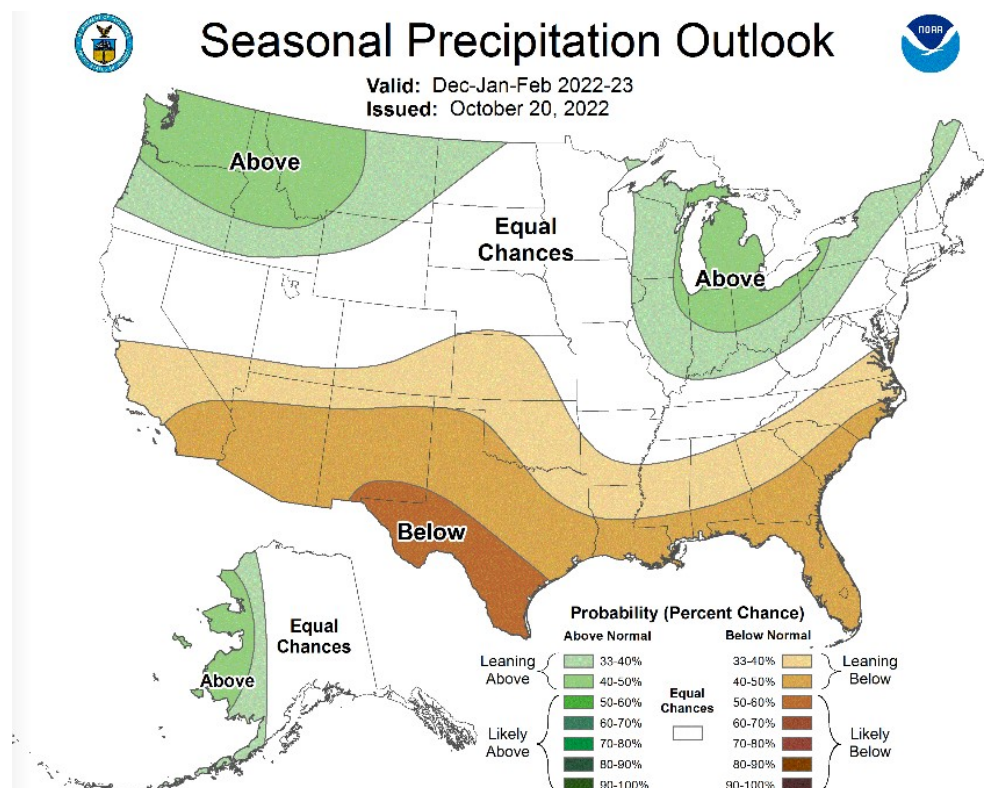
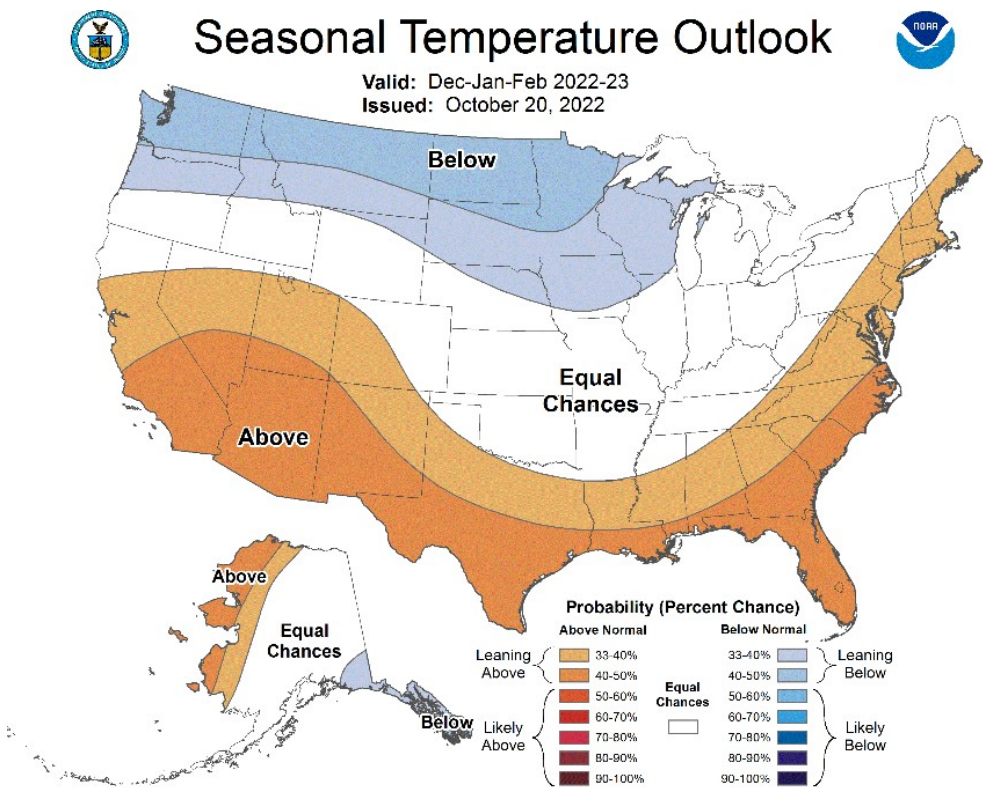
Seasonal Temperature Outlook November – December – January



Price Per MMBtu As Of October 27, 2022



CLIMATE PREDICTION CENTER EARLY WINTER OUTLOOK



The November-December-January 2022-2023 temperature outlook depicts elevated odds for above-normal seasonal mean temperature for western Alaska, much of the western U.S. to include the central Great basin, central and southern Rockies, and the Southwest, eastward to include much of the central and southern Great Plains, areas of the Southeast and along the Atlantic seaboard. The greatest likelihood for warmer than normal temperatures is for the Southwest and southern Great Plains. The expectation of La Nina conditions and enhanced odds for associated common impacts, on average over many events - is a primary driver of the evolution of the temperature outlooks.

Above-normal seasonal precipitation amounts are favored for the west coast of Alaska, the Pacific Northwest and the northern Rockies. Drier-than-normal conditions are most likely along the southern tier of the U.S. from California eastward to the southern Plains and Southeast with the greatest likelihood for southern Texas.

Areas depicted in white and labeled "EC" (Equal-Chances) are regions where climate signals are weak and so there are equal odds for either above-, near- or below-normal seasonal mean temperatures and total precipitation amounts.

La Nina conditions have remained in place throughout the summer and into the autumn months of 2022 in the Pacific Ocean as indicated by both ocean and atmospheric indicators and a La Nina Advisory remains in effect. Its influence continues to contribute to the temperature and precipitation outlook through the upcoming winter months into early Spring 2023.

Equatorial Pacific Ocean surface temperature departures are negative from just west of the Date Line to the South American coast with anomalies in many areas at or less than -1.0 degrees C with some locations in the eastern Pacific reaching -1.5 degrees C or less. A strong reservoir of colder than normal water is observed via ocean temperatures along the equator from 155 W to 90 W at a depth ranging from near the surface to 200 meters depth in the east-central Pacific. The negative ocean temperature anomalies in the area range from -4.0 to -6.0 degrees C in some places. This colder than average water supports maintenance of La Nina conditions in the equatorial Pacific into the winter months.

The atmospheric state is displaying characteristics quite consistent with La Nina with enhanced convection on average in proximity to Indonesia and suppressed convection near the Date Line. Trade winds are considerably enhanced and upper-level westerly wind anomalies are present in the

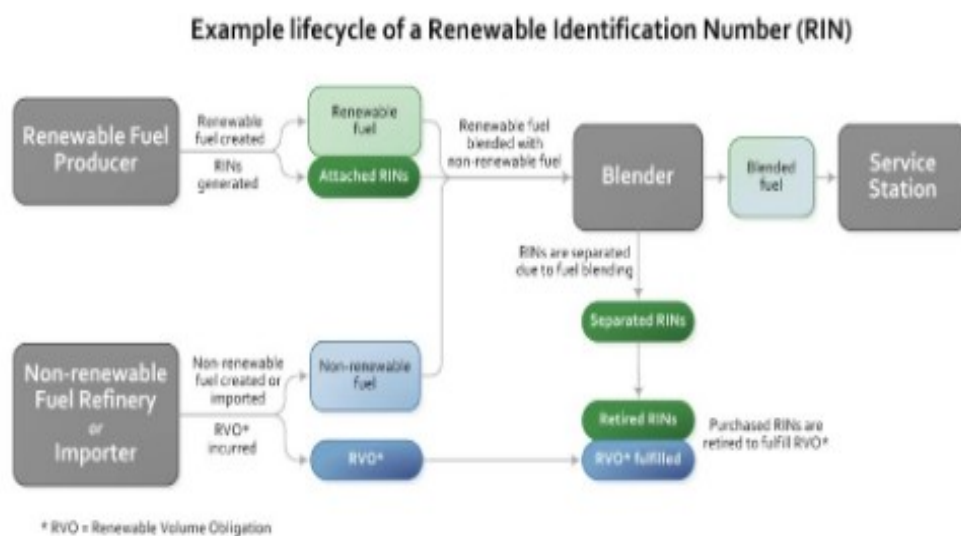
central Pacific with symmetric cyclonic circulations both north and south of the equator.

Large areas of above-normal sea surface temperatures (SSTs) reside in both the north Pacific and north At-

lantic oceans. More local coastal SSTs are above-normal for coastal waters near the northwest coast of Alaska as well as the entire West coast of the continental United States. Anomalous SSTs along the east coast are more mixed at the current time.

RENEWABLE IDENTIFICATION NUMBERS (RINS) EXPLAINED

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- ◆ D3- Cellulosic Biofuel
- ◆ D4- Biomass Based Diesel
- ◆ D5- Advanced Biofuel
- ◆ D6- Renewable fuel

RENEWABLE NATURAL GAS & RINS

RNG produces D3 RINs when used as a transportation fuel in the form of liquid natural gas or compressed natural gas. In addition to helping or-

ganizations improve their environmental impact, leveraging RNG and the RINs generated from it offer commercial opportunities. Economically, D3 RINs have a significant revenue upside, and as of April 2022, are trading at more than \$3/gallon. RIN prices are driven by the U.S. economy's shift towards natural gas with its associated reduction in carbon emissions, and being a cheaper alternative to diesel.

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The IMGA Evening Report is an excellent way to stay up to date on NY-MEX prices, weather, gas storage, and industry news. Each issue includes the days closing market prices for natural gas futures and crude oil, as well as a short commentary on market movement and industry related news.

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