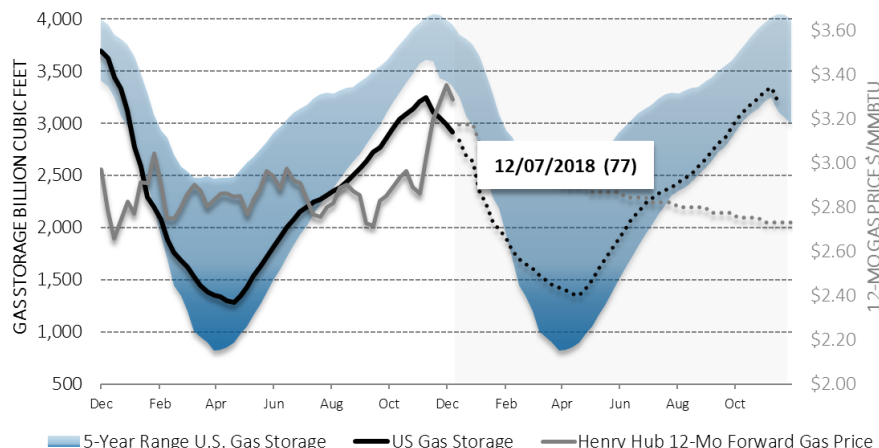


Natural Gas Storage vs Natural Gas Price



NATURAL GAS

- Because of a delay due to the closure of federal agencies on December 5, the EIA reported last Friday that, for the week ending November 30, U.S. inventories decreased by 63 bcf, more or less tracking market expectations. It reported Thursday morning that, for the week ending December 7, U.S. inventories decreased by 77 bcf, slightly smaller than the expected withdrawal of 79 bcf. The storage withdrawal for same week last year was 69 bcf, and the five-year average withdrawal for the same week is about 78 bcf. Total stockpiles now stand at 2,914 bcf, down by 19.9% from a year ago and 19.9% below the five-year average for the same week.

POWER MARKETS

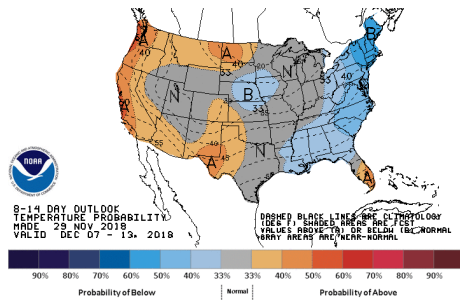
West Whereas last week's low-pressure system boosted demand to yield average index prices around \$85/MWh and \$78/MWh in SP15 and Mid-C, respectively. This week's milder temperatures have suppressed prices. In the term markets, forwards for prompt-month January have fallen partly because of the drop in natural gas prices.

ERCOT In all zones, real-time prices have settled in the low \$30s/MWh, comparable to last week's prices. Mild weather over the next two weeks should put even more of a lid on real-time prices. Basis has collapsed by \$14/MWh in the West Zone but expanded to \$3.30/MWh from \$0.56/MWh in the South Zone. The fall in term natural gas futures has overtaken the corresponding rise in heat rates to lower fixed prices for 2019.

East Chilly winter temperatures in the Northeast have increased heating demand. As a result, on-peak index prices have averaged around \$70/MWh over the week in Mass Hub. In the term market, prompt-month January has been flat in PJM West Hub but approximately \$3/MWh higher than last week in Mass Hub. Attention will now be focused on winter forecasts, which will influence how much the market will run up or down in the coming weeks.

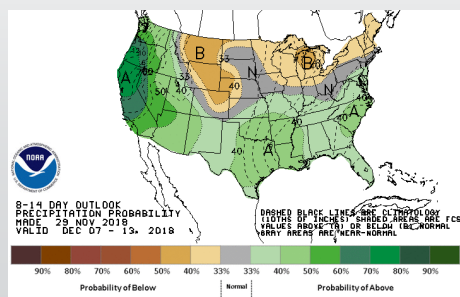
- Given recent forecasts pointing to mild weather in the next 6-10 days in most parts of the country, futures for January delivery dropped by 13.8 cents and 27.1 cents on Tuesday and Wednesday, respectively. They traded at \$4.279/MMBtu in advance of today's report, dipped to \$4.233/MMBtu immediately afterward, and closed even lower at \$4.124/MMBtu.

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WEATHER

- During the 1-to-5-day forecast period, temperatures are expected to be above average in the East and Pacific Northwest.
- The 6-to-10-day forecast period should feature a short spell of cold weather in the Northeast, but conditions should generally remain warmer than usual.
- Over the 11-to-15-day forecast period, temperatures are expected to stay relatively high in the East but turn normal to slightly below normal in the Pacific Northwest.



Utilization of Drones in the Energy Space

To serve its rather large base of more than 2.4 million electric customers in the states of Missouri and Illinois (which, as shown in the accompanying map, is a pretty vast area), Ameren uses thousands of miles of transmission lines. Like most things, those lines either deteriorate over time or become damaged and consequently need to be repaired or replaced. Historically, Ameren has evaluated the needs of such infrastructure either manually through drive-by inspections by its utility workers or visually through helicopter fly-bys. Obviously, either approach is not only very time-consuming but also very expensive.

Fortunately, this problem may soon be a thing of the past for Ameren and other utilities, thanks to advances in a certain technology: drones. Having been granted a special waiver from the Federal Aviation Administration to operate a drone remotely, Ameren has recently been experimenting with drone flights to examine a total of 60 miles of its transmission lines with promising results. Whereas using a helicopter to do the same job typically costs \$1,200 to 1,600 per mile, some estimates indicate that using drones has cost Ameren only \$200 to \$300 per mile, saving the utility thousands of dollars.

If all utilities end up fully implementing drones for this purpose, cost would not be the only major benefit. For example, because utilities could examine their lines more frequently, repairs could be made in a more timely matter. Such improved responsiveness could not only reduce repair costs but also help prevent the type of wildfires sometimes caused by faulty transmission lines. Ultimately, consumers could see lower transmission costs while enjoying better reliability.



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