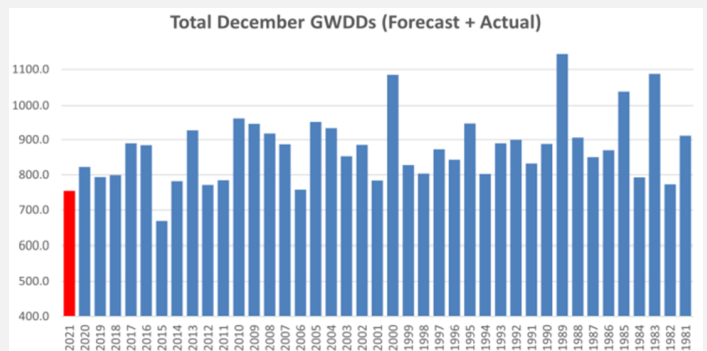
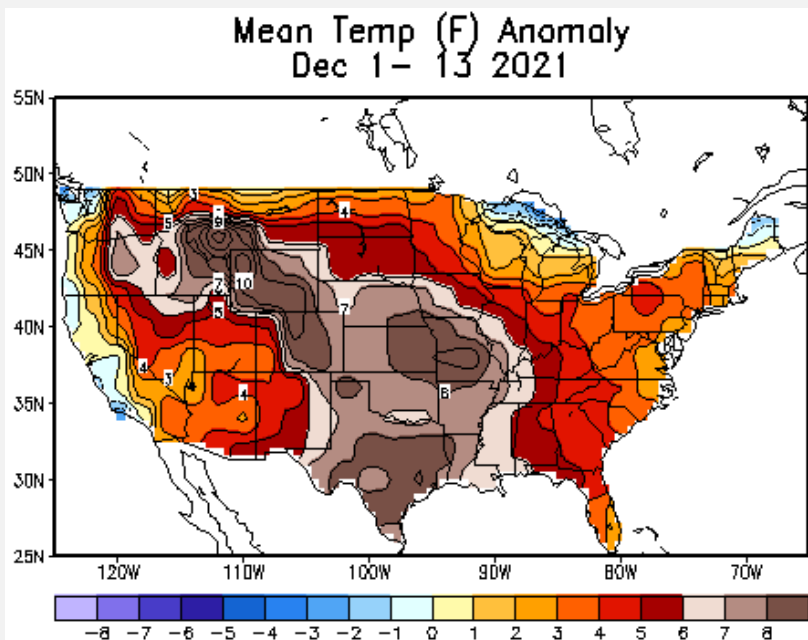


This weekend's commentary starts with a seasonal update from Brian Lovern at [Bespoke Weather](https://www.bespokeweather.com) for our clients.

Please send any questions/comments to [brian@bespokeweather.com](mailto:brian@bespokeweather.com)

December has been quite the warm month, so far, with virtually the entire nation seeing above-normal temperatures, and a huge chunk of the nation seeing month-to-date anomalies of +5F or more. We are easily on pace for the 2nd warmest December on record, behind only December 2015.

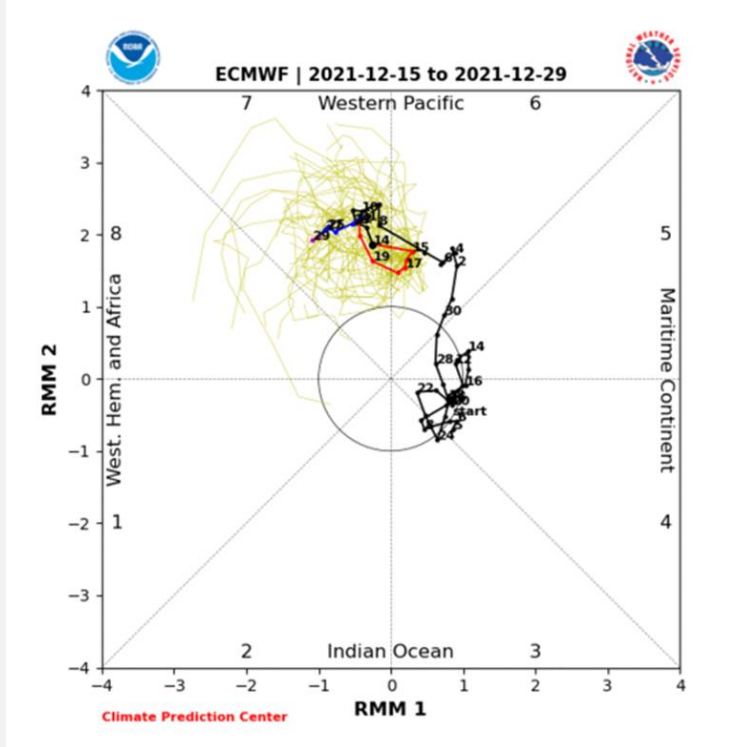
### Month-to-Date Temperature Anomalies



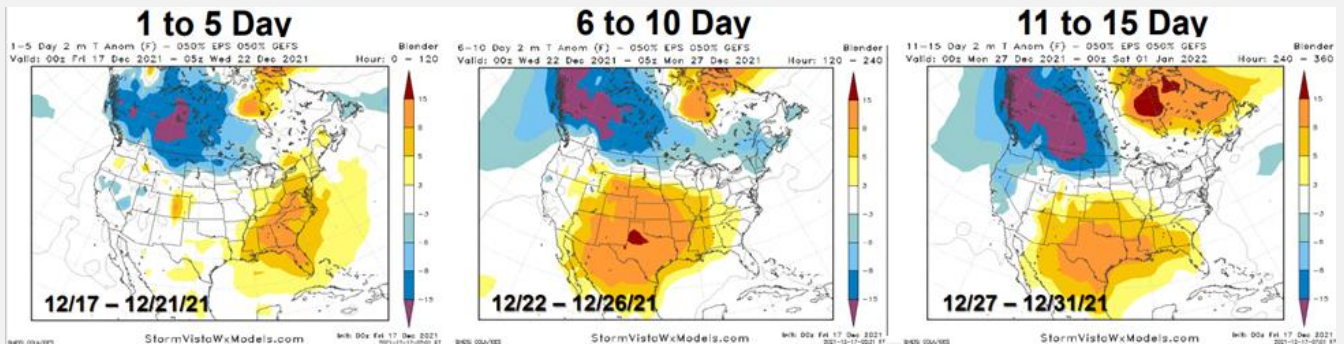
That said, we are seeing signs of a material change on the way, as forcing mechanisms shift in the coming days. The Madden-Julian Oscillation (MJO), a measure of forcing from the tropics, is set to move into phase 7, which favors colder risks, at least in the northern half of the nation, especially when in a La Niña base state, which we currently have in place.

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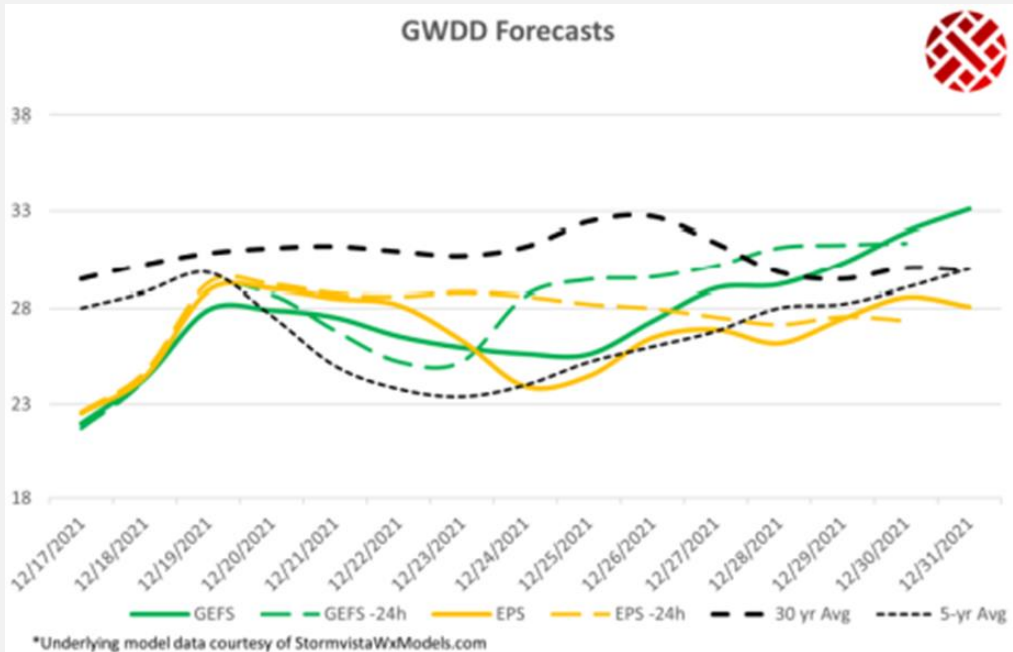
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The latest forecast indeed shows such a shift, with a strong cold source up in Canada, which is able to bleed into the northern U.S. as we head into the final week to ten days of the month.

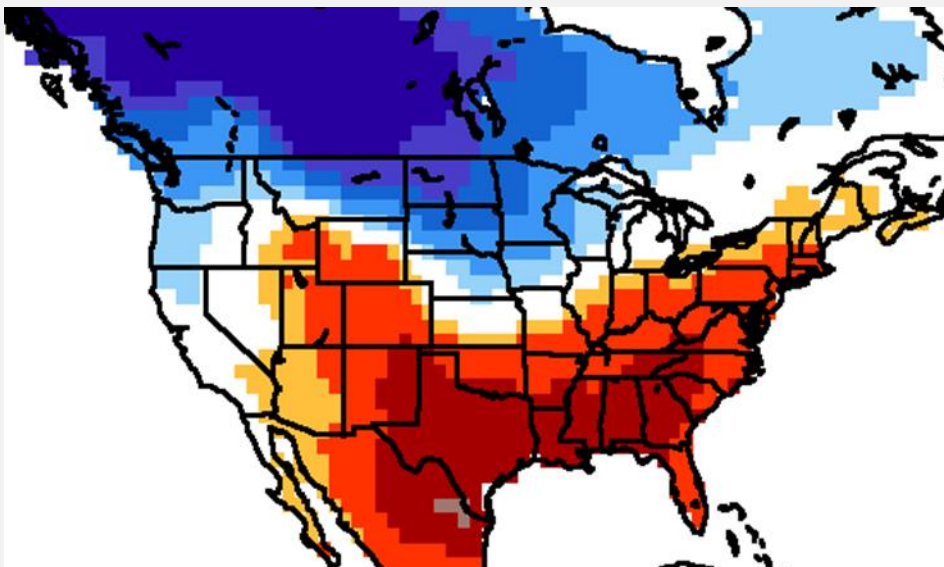


With warmth hanging on in the South, it's not a colder-than-normal pattern on the national level, but is enough to push Gas-Weighted Degree Days (GWDDs) up toward normal, still representing quite a step change from the high-end warmth that has been dominating the pattern



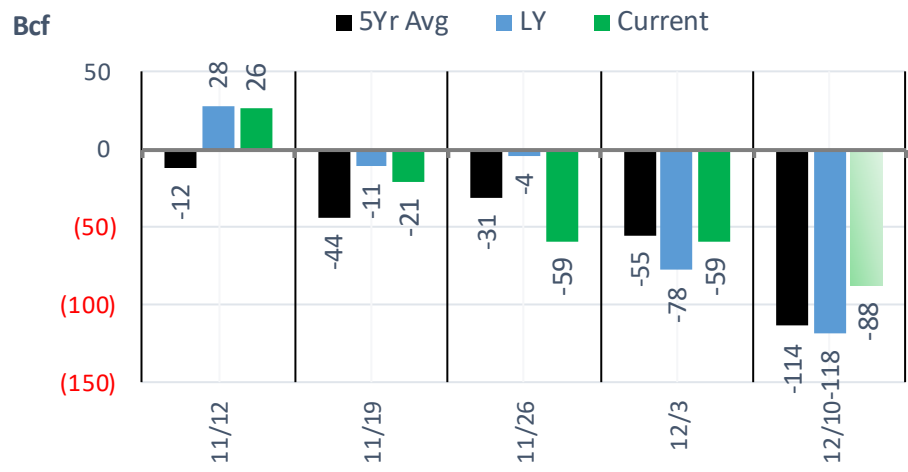
We do believe there is some risk to step colder, yet, as we end the month and head into the start of January, given the tropical forcing shift, and even some blocking that sets up in the NAO region, though we are not convinced it will rule the entire month of January. The latest CFS forecast for January actually shows more warm than cold, which can work out, but we feel the path will be such that colder risks are favored early in the month, and warmer risks later in the month. As such, expect volatility to be a theme moving forward.

For reference, the CFS' latest January outlook:

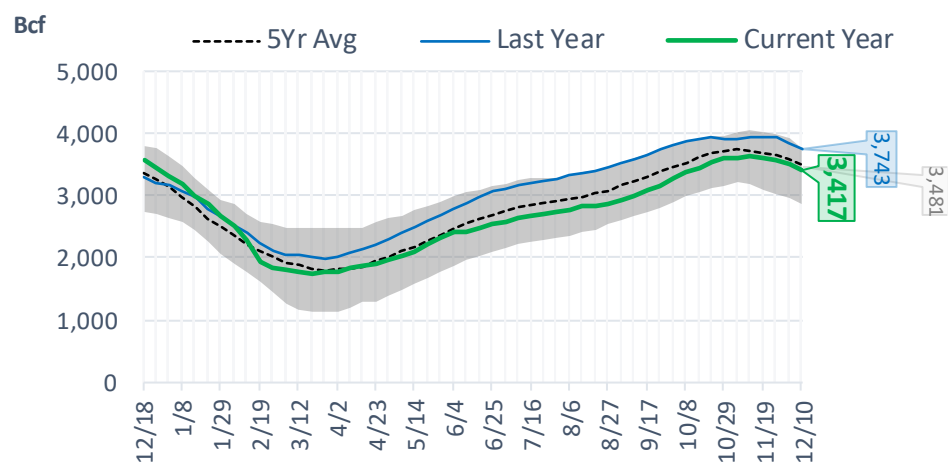


## EIA Storage Report

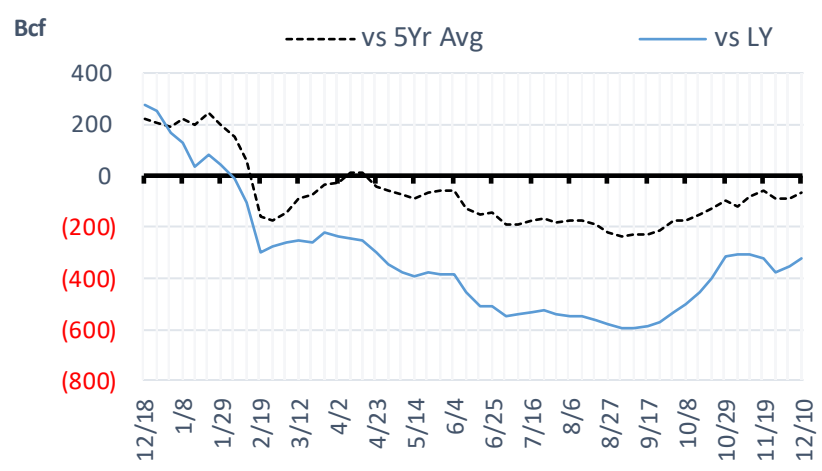
### Total Lower 48 YoY Weekly Change



### Total Lower 48 Storage Levels



### Total Lower 48 LY Surplus/Deficit

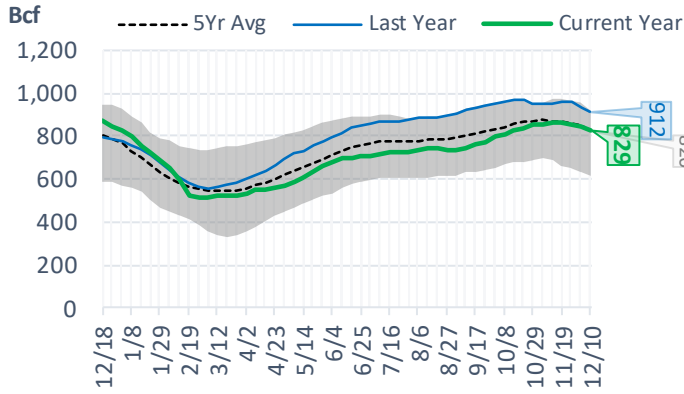


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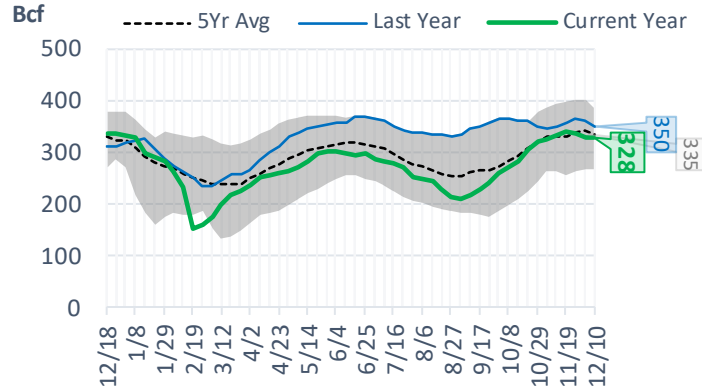
## Natural Gas Storage Stats - Last 5 Weeks

Week Ending	Current 10-Dec	Week - 1 3-Dec	Week - 2 26-Nov	Week - 3 19-Nov	Week - 4 12-Nov	Week - 5 5-Nov
<b>Total Lower 48 Storage Level</b>	<b>3417</b>	3505	3564	3623	3644	3618
Weekly Change	-88	-59	-59	-21	+26	+7
vs LY	-326	-356	-375	-320	-310	-308
vs 5Yr Avg	-64	-90	-86	-58	-81	-119
<b>S. Central Salt Storage Level</b>	<b>328</b>	328	335	338	331	324
Weekly Change	0	-7	-3	+7	+7	+4
vs LY	-22	-34	-31	-17	-18	-21
vs 5Yr Avg	-7	-14	-3	+8	+1	-4
<b>S. Central NonSalt Storage Level</b>	<b>829</b>	842	851	859	860	850
Weekly Change	-13	-9	-8	-1	+10	-2
vs LY	-83	-95	-107	-97	-95	-98
vs 5Yr Avg	+3	-8	-9	-6	-11	-23
<b>Midwest Storage Level</b>	<b>982</b>	1019	1043	1066	1079	1075
Weekly Change	-37	-24	-23	-13	+4	+4
vs LY	-82	-80	-81	-68	-58	-51
vs 5Yr Avg	-18	-17	-15	-9	-12	-21
<b>East Storage Level</b>	<b>818</b>	843	867	889	900	897
Weekly Change	-25	-24	-22	-11	+3	-2
vs LY	-68	-75	-67	-48	-51	-46
vs 5Yr Avg	-12	-16	-8	-1	-8	-18
<b>Mountain Storage Level</b>	<b>199</b>	206	206	210	212	213
Weekly Change	-7	0	-4	-2	-1	0
vs LY	-25	-27	-34	-32	-29	-30
vs 5Yr Avg	-6	-7	-12	-10	-8	-9
<b>Pacific Storage Level</b>	<b>261</b>	266	263	262	261	258
Weekly Change	-5	+3	+1	+1	+3	+2
vs LY	-46	-47	-55	-58	-58	-64
vs 5Yr Avg	-24	-28	-37	-40	-42	-46

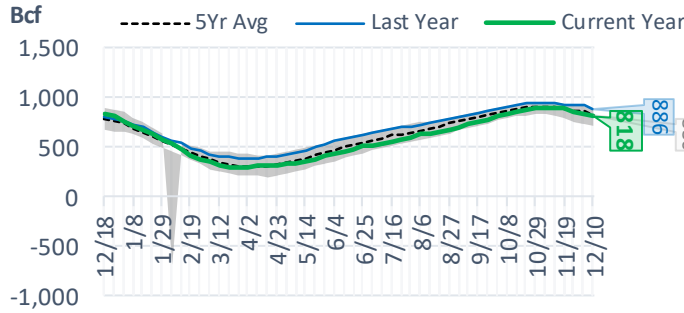
## NonSalt Storage Levels



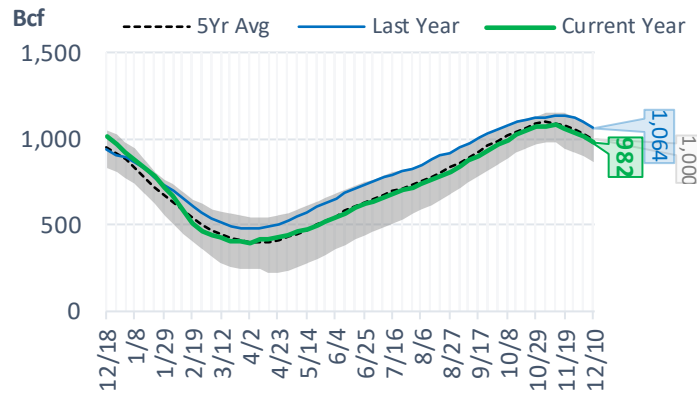
## Salt Storage Levels



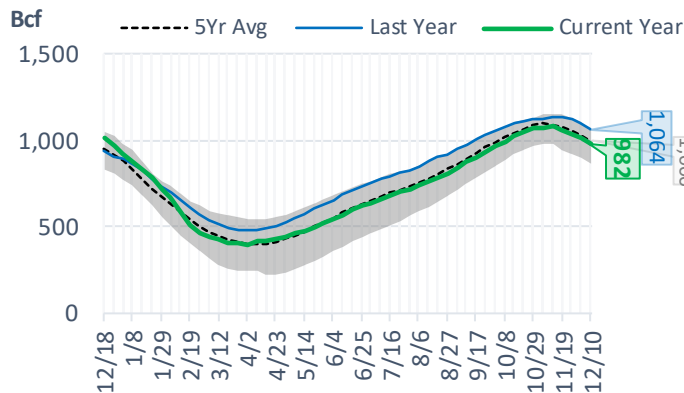
## East Storage Levels



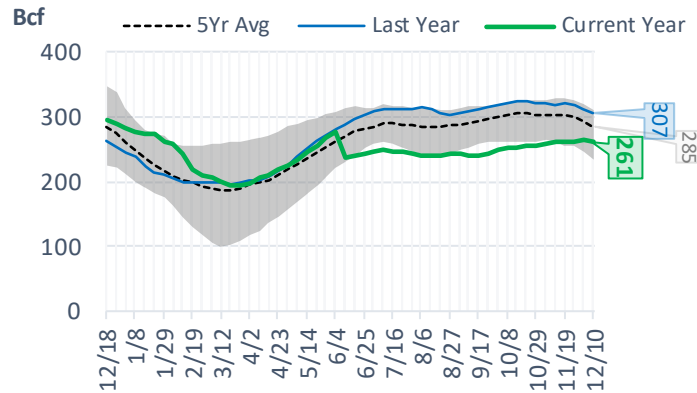
## Midwest Storage Levels



## Midwest Storage Levels



## Pacific Storage Levels



## EIA Storage Week Balances

	12-Nov	19-Nov	26-Nov	3-Dec	10-Dec	17-Dec	WoW	vs. 4W
<b>Lower 48 Dry Production</b>	<b>95.9</b>	<b>95.1</b>	<b>96.2</b>	<b>96.9</b>	<b>96.8</b>	<b>96.5</b>	▼-0.3	▲0.2
<b>Canadian Imports</b>	<b>5.1</b>	<b>4.9</b>	<b>5.5</b>	<b>5.6</b>	<b>5.3</b>	<b>4.6</b>	▼-0.7	▼-0.7
L48 Power	27.5	27.8	29.2	28.8	29.1	28.2	▼-0.9	▼-0.5
L48 Residential & Commercial	23.6	28.0	33.3	33.2	35.5	31.5	▼-4.0	▼-1.0
L48 Industrial	21.4	23.1	22.4	22.5	23.8	24.2	▲0.5	▲1.3
L48 Lease and Plant Fuel	5.2	5.2	5.2	5.3	5.2	5.2	▼0.0	▼0.0
L48 Pipeline Distribution	2.7	3.0	3.3	3.3	3.2	3.0	▼-0.2	▼-0.2
<b>L48 Regional Gas Consumption</b>	<b>80.3</b>	<b>87.0</b>	<b>93.5</b>	<b>93.1</b>	<b>96.9</b>	<b>92.2</b>	▼-4.7	▼-0.4
<b>Net LNG Exports</b>	<b>11.2</b>	<b>11.1</b>	<b>11.7</b>	<b>11.8</b>	<b>12.0</b>	<b>11.9</b>	▼-0.2	▲0.2
<b>Total Mexican Exports</b>	<b>6.2</b>	<b>6.0</b>	<b>6.0</b>	<b>6.4</b>	<b>6.4</b>	<b>6.1</b>	▼-0.3	▼-0.1
<b>Implied Daily Storage Activity</b>	<b>3.2</b>	<b>-4.2</b>	<b>-9.6</b>	<b>-8.8</b>	<b>-13.3</b>	<b>-9.2</b>	4.2	
<b>EIA Reported Daily Storage Activity</b>	<b>3.7</b>	<b>-3.0</b>	<b>-8.4</b>	<b>-8.4</b>	<b>-12.6</b>			
<b>Daily Model Error</b>	<b>-0.5</b>	<b>-1.2</b>	<b>-1.1</b>	<b>-0.4</b>	<b>-0.7</b>			

## Monthly Balances

	2Yr Ago Dec-19	LY Dec-20	Aug-21	Sep-21	Oct-21	Nov-21	MTD Dec-21	MoM	vs. LY
<b>Lower 48 Dry Production</b>	<b>95.9</b>	<b>91.6</b>	<b>94.0</b>	<b>93.5</b>	<b>94.0</b>	<b>95.9</b>	<b>96.5</b>	▲0.7	▲5.0
<b>Canadian Imports</b>	<b>4.5</b>	<b>5.8</b>	<b>5.1</b>	<b>5.1</b>	<b>5.4</b>	<b>5.3</b>	<b>4.9</b>	▼-0.4	▼-0.8
L48 Power	29.3	28.0	40.1	33.0	30.2	28.8	28.6	▼-0.1	▲0.7
L48 Residential & Commercial	39.1	40.3	7.9	8.7	13.2	29.6	32.7	▲3.2	▼-7.6
L48 Industrial	24.6	23.4	21.5	20.3	20.3	22.3	23.8	▲1.5	▲0.4
L48 Lease and Plant Fuel	5.2	5.0	5.1	5.1	5.1	5.2	5.2	▲0.0	▲0.3
L48 Pipeline Distribution	3.4	3.4	2.6	2.3	2.3	3.1	3.1	▼0.0	▼-0.3
<b>L48 Regional Gas Consumption</b>	<b>101.6</b>	<b>100.0</b>	<b>77.2</b>	<b>69.4</b>	<b>71.3</b>	<b>88.9</b>	<b>93.4</b>	▲4.5	▼-6.6
<b>Net LNG Exports</b>	<b>7.8</b>	<b>11.0</b>	<b>10.5</b>	<b>10.3</b>	<b>10.6</b>	<b>11.4</b>	<b>11.9</b>	▲0.5	▲0.9
<b>Total Mexican Exports</b>	<b>4.9</b>	<b>5.8</b>	<b>6.9</b>	<b>6.7</b>	<b>6.6</b>	<b>6.1</b>	<b>6.3</b>	▲0.2	▲0.5
<b>Implied Daily Storage Activity</b>	<b>-13.8</b>	<b>-19.5</b>	<b>4.6</b>	<b>12.1</b>	<b>10.9</b>	<b>-5.3</b>	<b>-10.1</b>		
<b>EIA Reported Daily Storage Activity</b>									
<b>Daily Model Error</b>									

Source: Bloomberg, analytix.ai

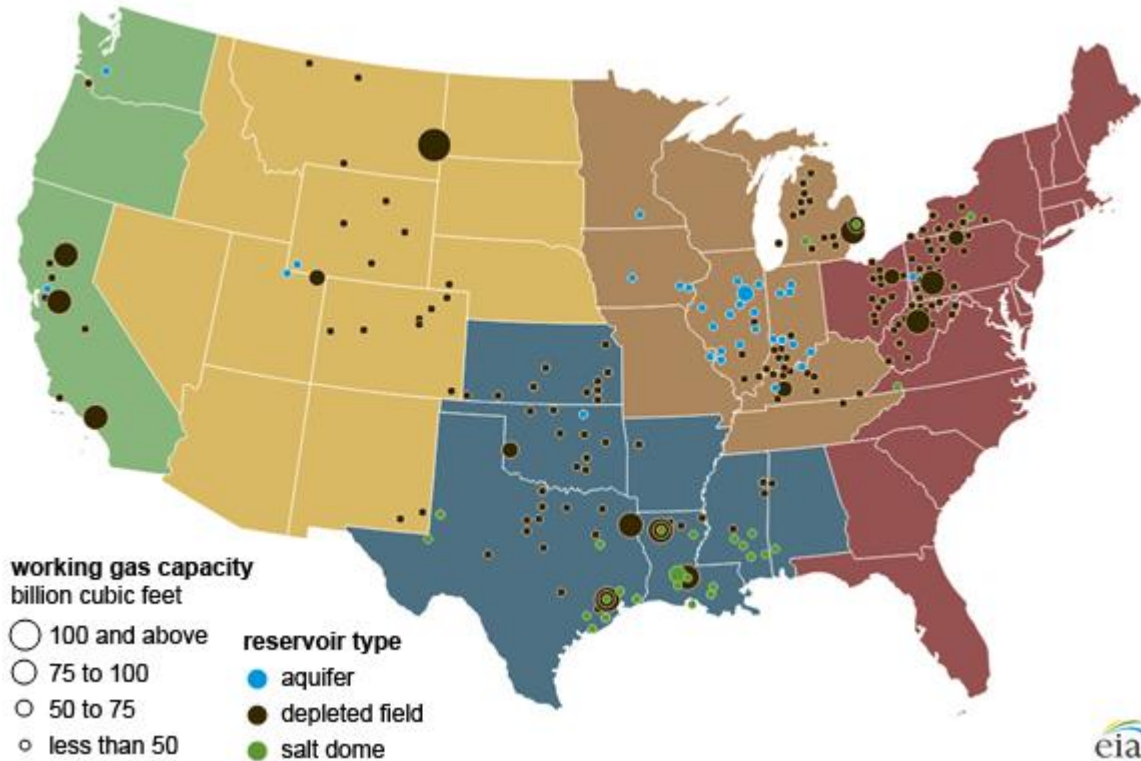
## Regional S/D Models Storage Projection

Week Ending 17-Dec

	Daily Raw Storage	Daily Adjustment Factor	Daily Average Storage Activity (Adjusted) *	Weekly Adjusted Storage Activity
L48	-9.4	1.1	-8.3	-58
East	-3.2	2.3	-0.9	-6
Midwest	-3.2	0.1	-3.0	-21
Mountain	1.8	-3.4	-1.5	-11
South Central	-3.8	2.5	-1.3	-9
Pacific	-1.1	-0.5	-1.6	-11

\*Adjustment Factor is calculated based on historical regional deltas

U.S. underground natural gas storage facilities by type (July 2015)

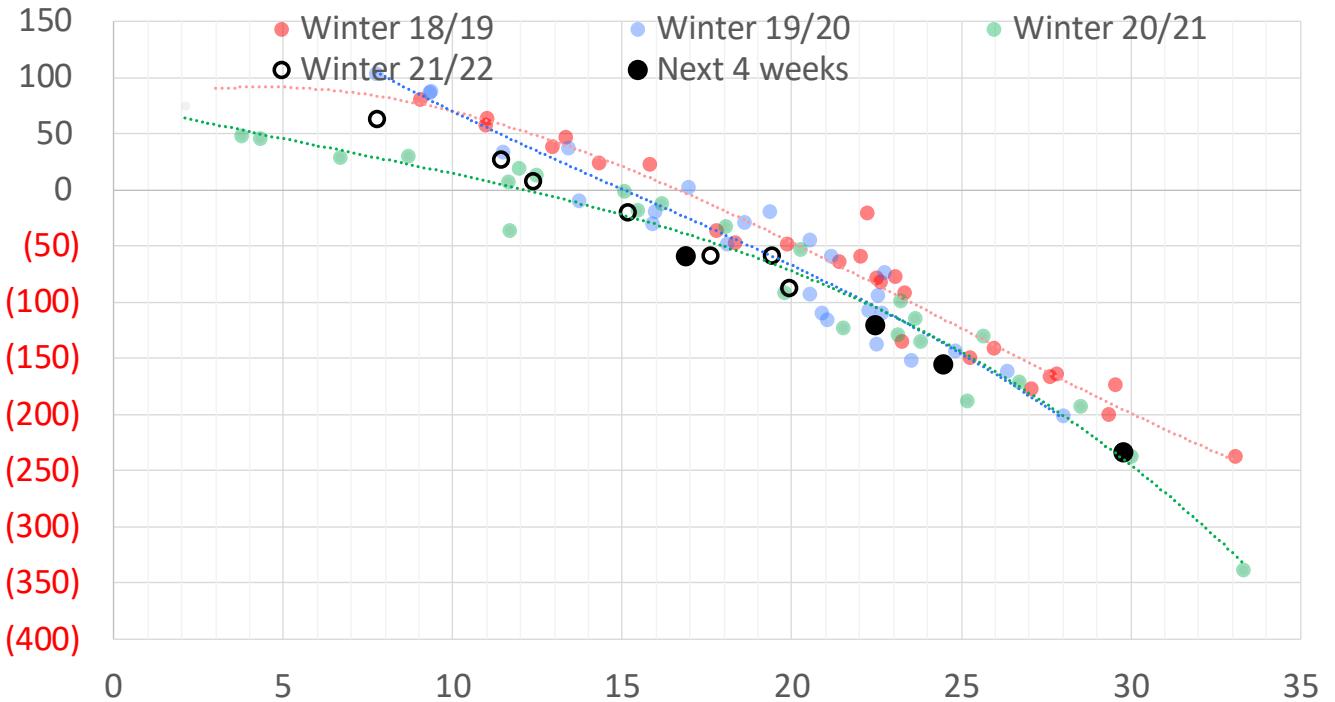




## Weather Model Storage Projection

Next report and beyond		
Week Ending	GWDDs	Week Storage Projection
17-Dec	17	-58
24-Dec	22	-120
31-Dec	24	-155
07-Jan	30	-234

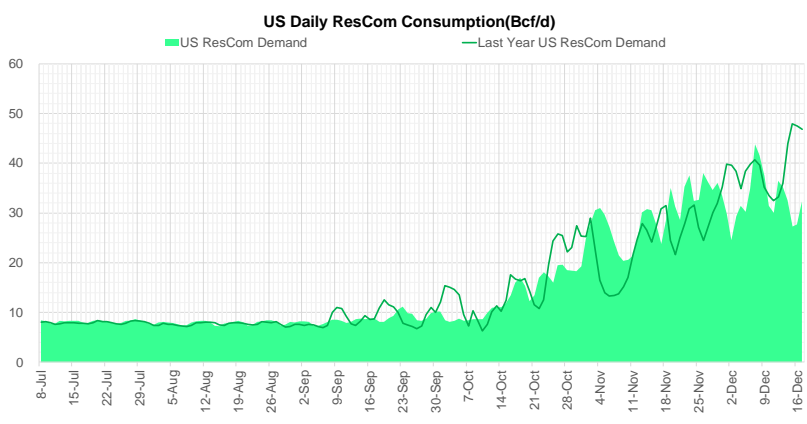
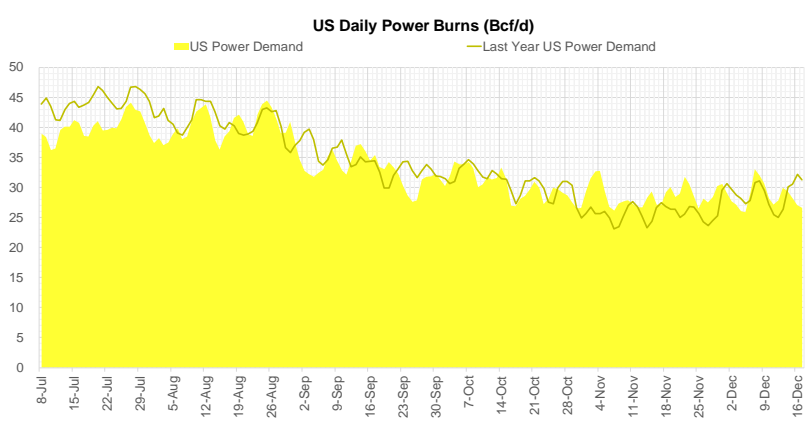
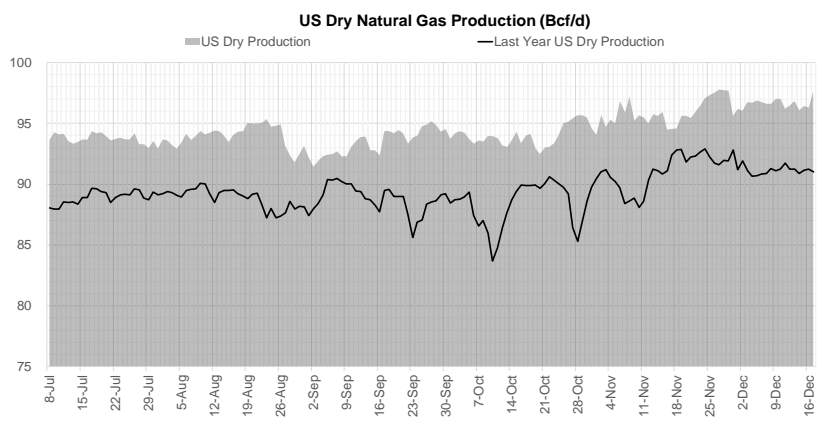
### Weather Storage Model - Next 4 Week Forecast



**Note:** this is not our official end of season forecast. This chart signifies where storage levels end with 10-year normal weather and current market tightness relative to last year

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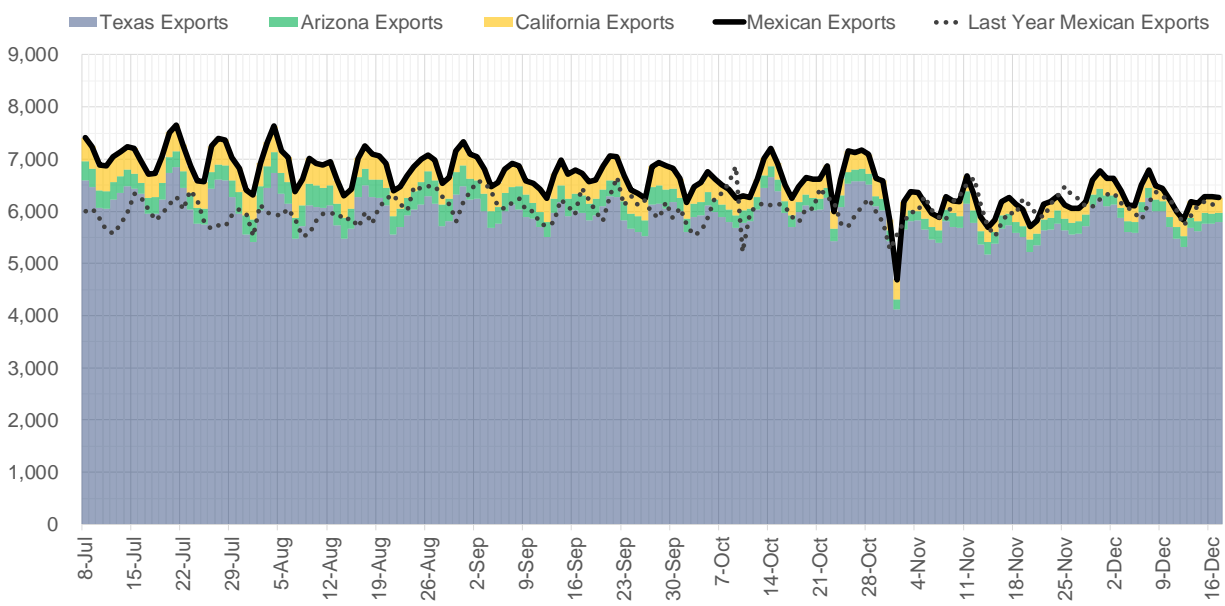
## Supply – Demand Trends



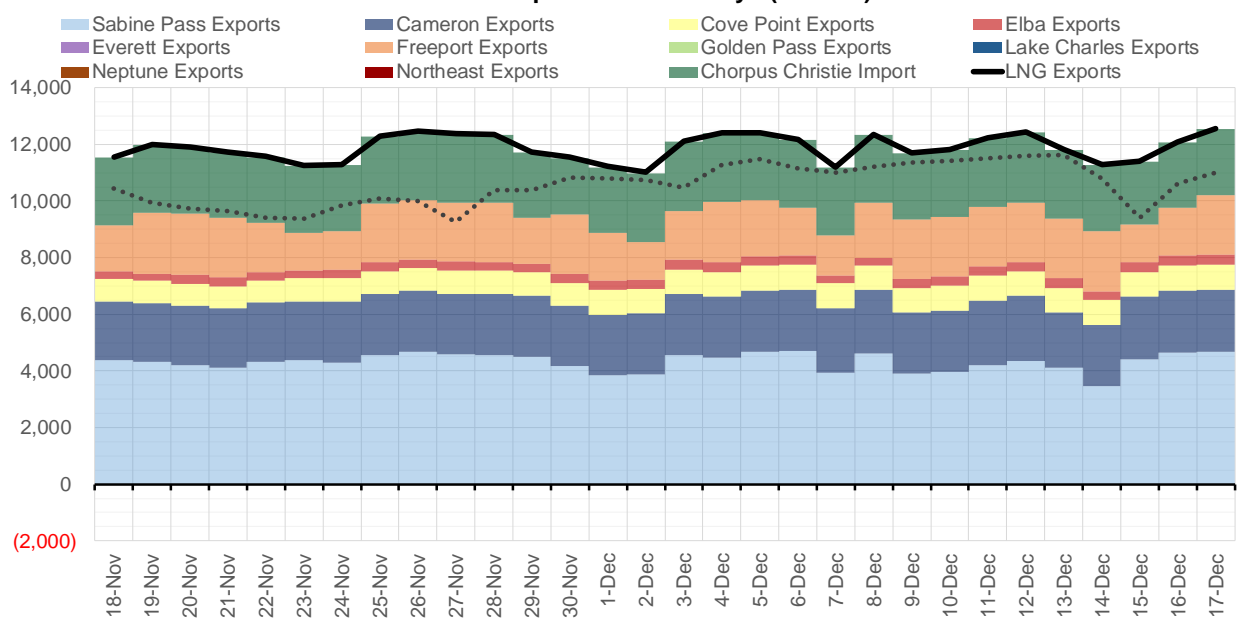
Source: Bloomberg

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## Mexican Exports (MMcf/d)



## Net LNG Exports - Last 30 days (MMcf/d)



Source: Bloomberg

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## Nat Gas Options Volume and Open Interest CME, ICE and Nasdaq Combined

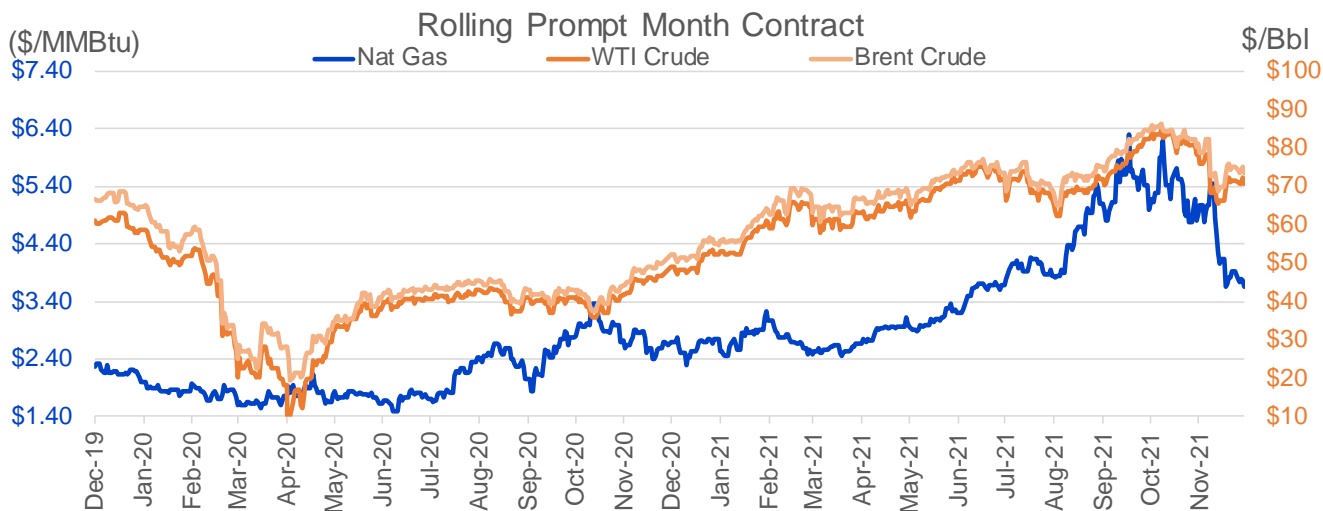
CONTRACT MONTH	CONTRACT YEAR	PUT/CALL	STRIKE	CUMULATIVE VOL	CONTRACT MONTH	CONTRACT YEAR	PUT/CALL	STRIKE	CUMULATIVE OI
1	2022	C	4.00	5774	3	2022	C	10.00	36441
1	2022	C	4.50	5387	1	2022	C	4.00	28861
1	2022	C	4.25	5165	1	2022	P	3.00	27272
3	2022	C	7.00	2451	1	2022	P	4.00	26887
1	2022	P	3.50	1767	3	2022	C	8.00	25755
3	2022	C	4.00	1590	3	2022	C	5.00	25056
1	2022	P	2.75	1540	1	2022	C	5.00	24706
2	2022	C	6.00	1014	1	2022	P	2.75	23364
4	2022	C	5.00	839	1	2022	C	6.00	23061
1	2022	P	4.00	788	2	2022	C	5.00	22855
1	2022	C	5.00	760	3	2022	C	6.00	20881
3	2022	C	5.00	729	1	2022	P	3.50	20699
1	2022	P	3.75	681	4	2022	C	5.00	20381
1	2022	P	3.25	669	12	2022	C	5.00	20297
3	2022	P	3.50	658	3	2022	P	2.50	20146
3	2022	C	8.00	600	4	2022	C	3.00	19710
2	2022	C	7.00	582	3	2022	C	4.00	18974
2	2022	P	3.00	573	1	2022	C	10.00	18356
2	2022	P	3.50	547	1	2022	C	7.00	17695
3	2022	C	10.00	537	3	2022	P	4.00	17649
1	2022	C	4.20	520	1	2022	C	4.50	17556
3	2022	C	12.00	500	2	2022	C	4.00	17545
11	2023	P	3.00	475	2	2022	C	6.00	17524
12	2023	P	3.00	475	2	2022	P	3.50	17441
1	2022	C	4.10	470	1	2022	P	3.25	17386
3	2022	P	2.50	453	3	2022	P	3.50	17273
1	2022	C	4.75	452	3	2022	P	3.00	17220
2	2022	C	4.50	444	2	2022	P	4.00	15803
3	2022	C	6.50	437	5	2022	C	5.00	15498
2	2022	C	5.00	409	4	2022	P	2.50	15492
1	2022	C	3.90	398	3	2022	C	7.00	15460
3	2022	P	3.00	373	10	2022	C	5.00	15416
2	2022	C	5.50	355	6	2022	C	5.00	15392
4	2022	P	3.50	350	10	2022	C	6.00	14275
2	2022	P	3.75	345	2	2022	P	3.00	14028
1	2022	C	4.30	312	2	2022	C	5.50	13785
2	2022	C	6.50	308	2	2022	C	10.00	13737
1	2022	C	4.60	305	5	2022	C	3.00	13733
2	2022	C	7.50	304	3	2022	P	5.00	13507
2	2022	C	4.00	295	1	2022	C	8.00	13468
1	2022	C	3.75	291	6	2022	C	3.00	13438
1	2022	C	3.85	287	10	2022	P	2.00	13297
1	2022	P	3.85	287	12	2022	C	4.50	13274
3	2022	P	2.00	283	7	2022	C	3.00	13230
4	2025	P	2.25	265	8	2022	C	3.00	13226
5	2025	P	2.25	265	9	2022	C	3.00	13225
6	2025	P	2.25	265	3	2022	C	3.00	13178
7	2025	P	2.25	265	8	2022	C	5.00	13168
8	2025	P	2.25	265	10	2022	C	3.00	13114
					12	2022	C	5.25	13113

Source: CME, Nasdaq, ICE

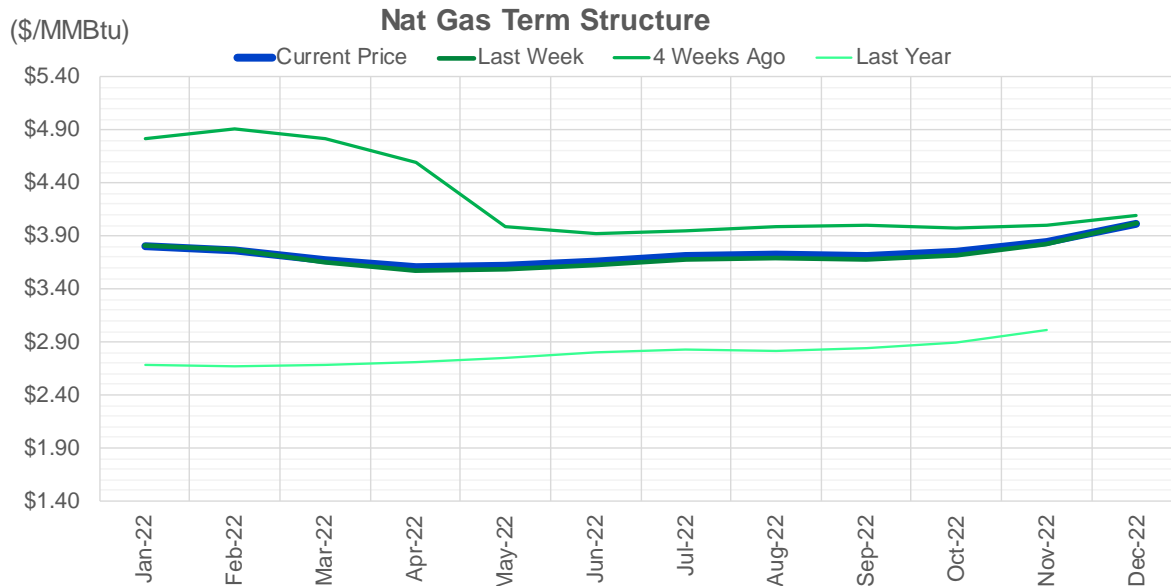
## Nat Gas Futures Open Interest CME, ICE and Nasdaq Combined

CME Henry Hub Futures (10,000 MMBtu)				ICE Henry Hub Futures Contract Equivalent (10,000 MM			
	Current	Prior	Daily Change		Current	Prior	Daily Change
JAN 22	75657	85656	-9999	JAN 22	88505	93109	-4604
FEB 22	113597	107852	5745	FEB 22	76765	75904	860
MAR 22	247145	244566	2579	MAR 22	91290	89843	1447
APR 22	87047	85229	1818	APR 22	71797	71882	-86
MAY 22	113523	114401	-878	MAY 22	70473	70959	-487
JUN 22	52282	51322	960	JUN 22	54715	54757	-42
JUL 22	42234	40610	1624	JUL 22	58744	58492	252
AUG 22	32633	32582	51	AUG 22	55287	55190	97
SEP 22	45672	45475	197	SEP 22	56332	56380	-48
OCT 22	74991	75231	-240	OCT 22	63994	64213	-219
NOV 22	34865	35118	-253	NOV 22	50750	50400	350
DEC 22	33358	33000	358	DEC 22	59015	58422	593
JAN 23	38999	40528	-1529	JAN 23	46626	46049	577
FEB 23	11642	11854	-212	FEB 23	35990	35758	232
MAR 23	26184	26815	-631	MAR 23	40671	40424	247
APR 23	19347	19450	-103	APR 23	39975	40929	-954
MAY 23	13058	13152	-94	MAY 23	35803	35780	23
JUN 23	10005	9952	53	JUN 23	32232	32171	61
JUL 23	7458	7512	-54	JUL 23	31699	31637	62
AUG 23	4733	4700	33	AUG 23	32712	32635	78
SEP 23	7279	7278	1	SEP 23	31182	31128	54
OCT 23	11753	11411	342	OCT 23	35689	35538	151
NOV 23	6090	6067	23	NOV 23	35060	35008	52
DEC 23	8806	8818	-12	DEC 23	32335	32297	38
JAN 24	6929	6936	-7	JAN 24	23485	23463	22
FEB 24	1577	1570	7	FEB 24	16357	16358	-1
MAR 24	9185	9185	0	MAR 24	22253	22208	46
APR 24	4438	4438	0	APR 24	15585	15579	6
MAY 24	2058	2058	0	MAY 24	16023	16009	13
JUN 24	929	929	0	JUN 24	16414	16362	52

Source: CME, ICE



The risk of trading futures and options and other derivatives involves a substantial risk of loss and is not suitable for all persons. Each person must consider whether a particular trade, combination of trades, or strategy is suitable for that person's financial means and objectives. Past results are not necessarily indicative of future results. This communication may contain links to third party websites which are not under the control of and are not maintained by ION Energy Group, and ION Energy Group is not responsible for their content.




	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
<b>Current Price</b>	<b>\$3.802</b>	<b>\$3.761</b>	<b>\$3.668</b>	<b>\$3.602</b>	<b>\$3.614</b>	<b>\$3.660</b>	<b>\$3.711</b>	<b>\$3.727</b>	<b>\$3.714</b>	<b>\$3.745</b>	<b>\$3.842</b>	<b>\$4.013</b>
Last Week	\$3.815	\$3.774	\$3.658	\$3.575	\$3.583	\$3.628	\$3.680	\$3.695	\$3.684	\$3.721	\$3.823	\$4.015
vs. Last Week	-\$0.013	-\$0.013	\$0.010	\$0.027	\$0.031	\$0.032	\$0.031	\$0.032	\$0.030	\$0.024	\$0.019	-\$0.002
4 Weeks Ago	\$4.816	\$4.914	\$4.824	\$4.593	\$3.986	\$3.923	\$3.951	\$3.993	\$3.998	\$3.978	\$4.007	\$4.090
vs. 4 Weeks Ago	-\$1.014	-\$1.153	-\$1.156	-\$0.991	-\$0.372	-\$0.263	-\$0.240	-\$0.266	-\$0.284	-\$0.233	-\$0.165	-\$0.077
Last Year	\$2.677	\$2.681	\$2.665	\$2.687	\$2.705	\$2.751	\$2.807	\$2.827	\$2.816	\$2.838	\$2.894	\$3.016
vs. Last Year	\$1.125	\$1.080	\$1.003	\$0.915	\$0.909	\$0.909	\$0.904	\$0.900	\$0.898	\$0.907	\$0.948	\$0.997

	Units	Current Price	vs. Last Week	vs. 4 Weeks Ago	vs. Last Year
NatGas Jul21/Oct21	\$/MMBtu	2.224	▲ 0.000	▲ 0.000	▲ 2.192
NatGas Oct21/Nov21	\$/MMBtu	0.361	▲ 0.000	▲ 0.000	▲ 0.301
NatGas Oct21/Jan22	\$/MMBtu	-2.075	▼ -0.048	▼ -1.229	▼ -2.364
NatGas Apr22/Oct22	\$/MMBtu	0.149	▼ -0.008	▲ 0.132	▲ 0.118
WTI Crude	\$/Bbl	72.38	▲ 1.440	▼ -6.630	▲ 24.020
Brent Crude	\$/Bbl	75.02	▲ 0.600	▼ -6.220	▲ 23.520
Fuel Oil, NY Harbour 1%	\$/Bbl	97.18	▲ 0.000	▲ 0.000	▲ 0.000
Heating Oil	cents/Gallon	226.63	▲ 1.600	▼ -11.770	▲ 77.110
Propane, Mt. Bel	cents/Gallon	1.04	▲ 0.023	▼ -0.225	▲ 0.404
Ethane, Mt. Bel	cents/Gallon	0.33	▼ -0.004	▼ -0.066	▲ 0.137
Coal, PRB	\$/MTon	12.30	▲ 0.000	▲ 0.000	▲ 0.000
Coal, PRB	\$/MMBtu	0.70			

Source: CME, Bloomberg

## Baker Hughes Rig Counts

Rotary Rig Count					
12/17/2021					
Baker Hughes 					
U.S. Breakout Information	This Week	+/-	Last Week	+/-	Year Ago
Oil	475	4	471	212	263
Gas	104	-1	105	23	81
Miscellaneous	0	0	0	-2	2
Directional	32	1	31	11	21
Horizontal	521	0	521	213	308
Vertical	26	2	24	9	17
Canada Breakout	This Week	+/-	Last Week	+/-	Year Ago
Oil	104	-6	110	63	41
Gas	62	-5	67	1	61
Miscellaneous	1	1	0	1	0
Major Basin Variances	This Week	+/-	Last Week	+/-	Year Ago
Ardmore Woodford	1	1	0	1	0
Arkoma Woodford	2	0	2	2	0
Cana Woodford	25	0	25	18	7
DJ-Niobrara	11	0	11	5	6
Eagle Ford	44	0	44	18	26
Granite Wash	4	0	4	3	1
Haynesville	47	1	46	7	40
Marcellus	29	-1	30	2	27
Permian	288	2	286	114	174
Utica	11	0	11	5	6
Williston	27	0	27	16	11