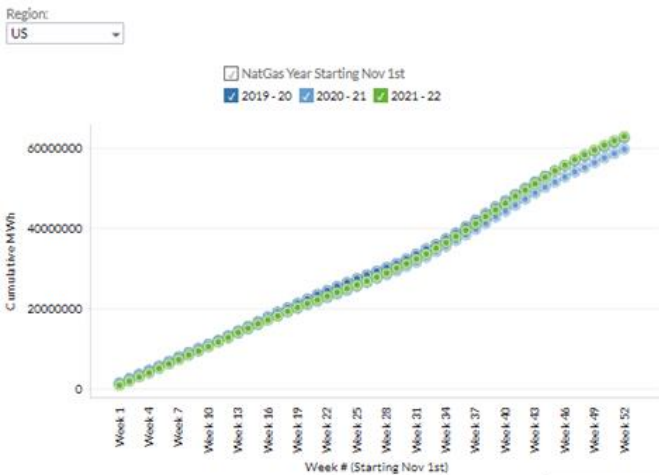


This week we start with a few charts on generation performances over the last year. The power mix story has been an important one, especially with natural gas generation being the balancing factor in almost all power jurisdictions.

With changes in total power demand increasing by only 1.5% over the last 12 months, it's very interesting to see how each generation type changed. The net change to natural gas generation was minimal, with the increased wind and solar helping offset the big drop in coal generation.

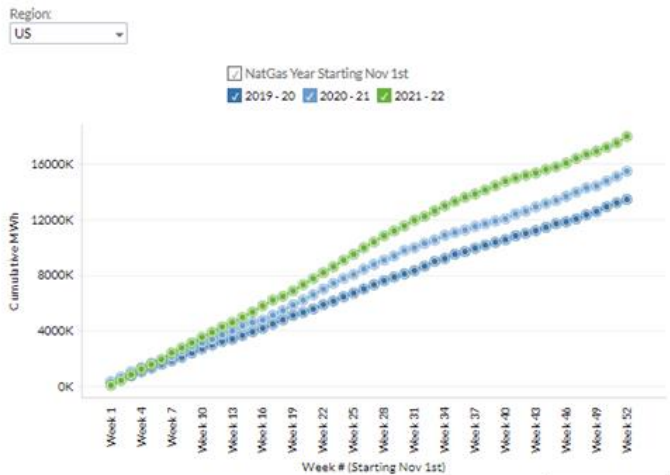
Wind +16%  
 Solar + 27%  
 NatGas +0.5%  
 Hydro +2%  
 Coal -10.4%  
 Nuke -1.8%

Cumulative #NatGas Generation (Starting Nov 1st)



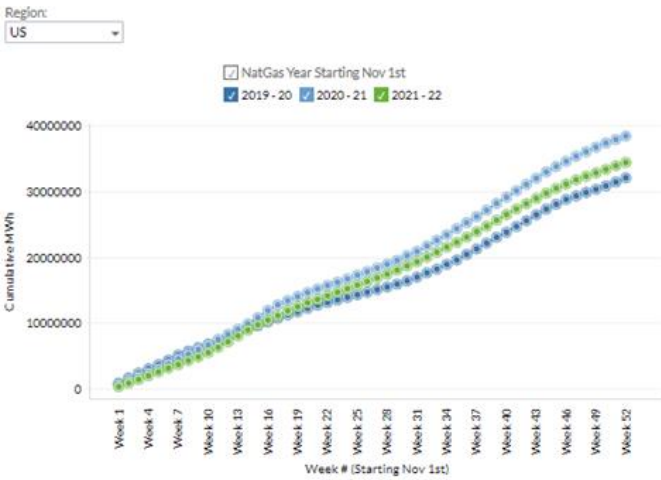
Powered by **ANALYTIX.AI**

Cumulative #Wind Generation (Starting Nov 1st)



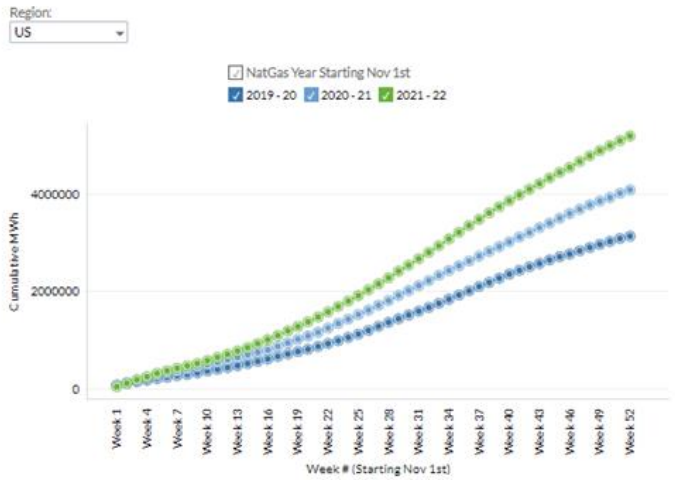
Powered by **ANALYTIX.AI**

Cumulative #Coal Generation (Starting Nov 1st)



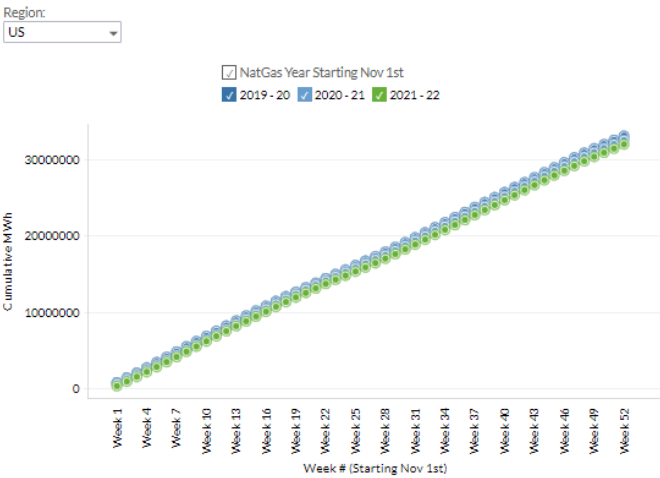
Powered by **ANALYTIX.AI**

Cumulative #Solar Generation (Starting Nov 1st)



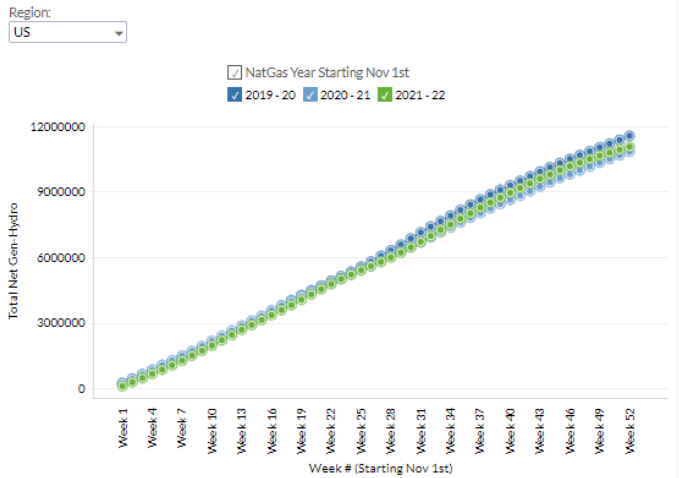
Powered by **ANALYTIX.AI**

Cumulative #Nuke Generation (Starting Nov 1st)



Powered by **ANALYTIX.AI**

Cumulative #Hydro Generation (Starting Nov 1st)

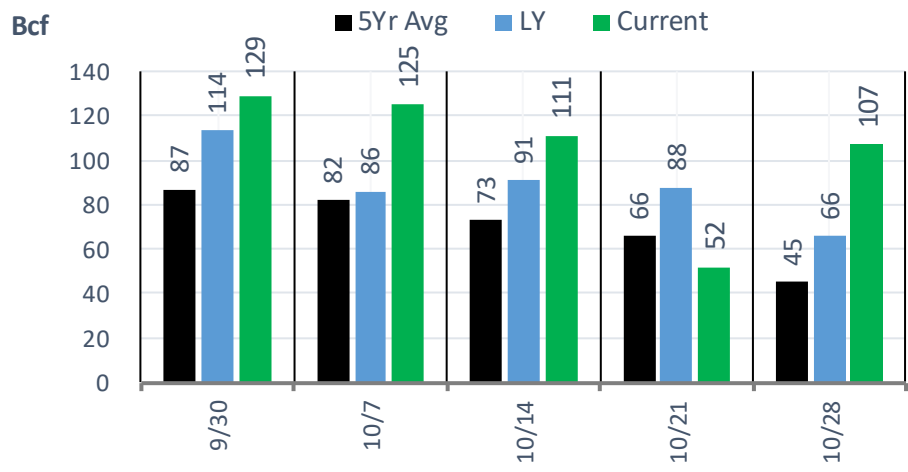


Powered by **ANALYTIX.AI**

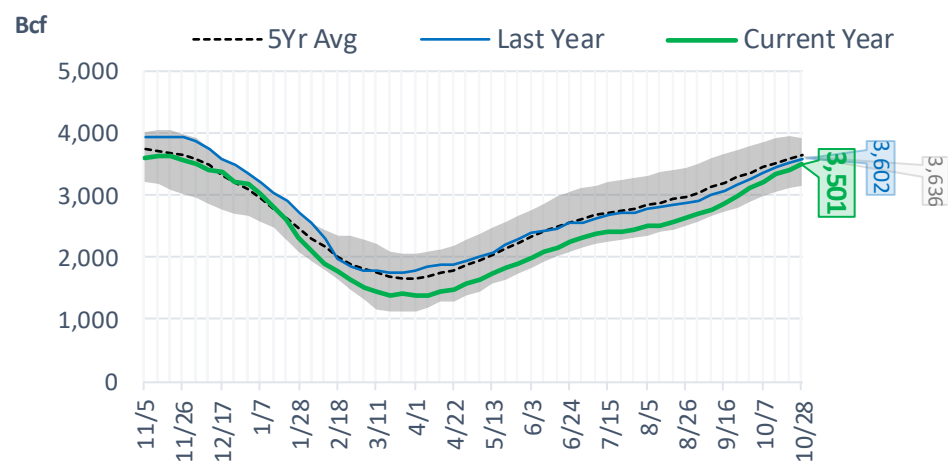
All the charts below can be viewed by power region here:  
<http://www.analytix.ai/cumulative-generation-by-type.html>

## EIA Storage Report

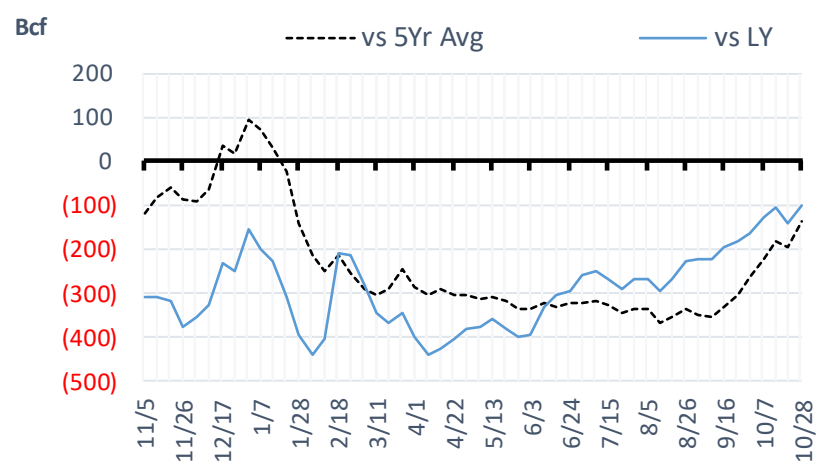
### Total Lower 48 YoY Weekly Change



### Total Lower 48 Storage Levels



### Total Lower 48 LY Surplus/Deficit

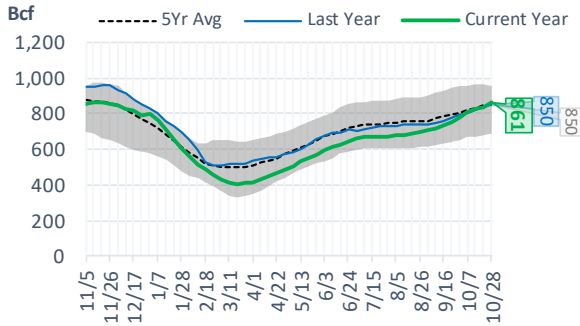


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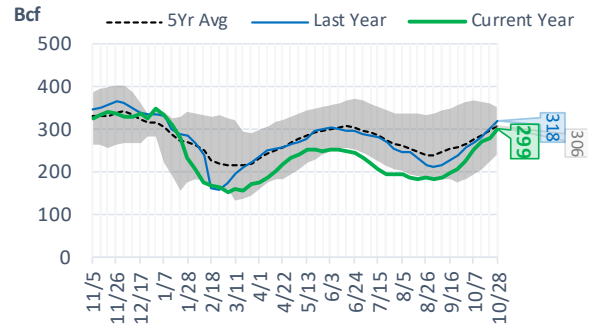
## Natural Gas Storage Stats - Last 5 Weeks

Week Ending	Current 28-Oct	Week - 1 21-Oct	Week - 2 14-Oct	Week - 3 7-Oct	Week - 4 30-Sep	Week - 5 23-Sep
<b>Total Lower 48 Storage Level</b>	<b>3501</b>	3394	3342	3231	3106	2977
<b>Weekly Change</b>	<b>+107</b>	+52	+111	+125	+129	+103
<b>vs LY</b>	<b>-101</b>	-142	-106	-126	-165	-180
<b>vs 5Yr Avg</b>	<b>-135</b>	-197	-183	-221	-264	-306
<b>S. Central Salt Storage Level</b>	<b>299</b>	277	271	253	225	204
<b>Weekly Change</b>	<b>+22</b>	+6	+18	+28	+21	+5
<b>vs LY</b>	<b>-19</b>	-24	-10	-15	-31	-33
<b>vs 5Yr Avg</b>	<b>-7</b>	-18	-11	-22	-41	-53
<b>S. Central NonSalt Storage Level</b>	<b>861</b>	839	828	804	778	754
<b>Weekly Change</b>	<b>+22</b>	+11	+24	+26	+24	+18
<b>vs LY</b>	<b>+11</b>	+1	+5	-4	-14	-18
<b>vs 5Yr Avg</b>	<b>+11</b>	-6	-6	-17	-30	-41
<b>Midwest Storage Level</b>	<b>1042</b>	1007	987	952	916	879
<b>Weekly Change</b>	<b>+35</b>	+20	+35	+36	+37	+35
<b>vs LY</b>	<b>-26</b>	-41	-36	-41	-50	-51
<b>vs 5Yr Avg</b>	<b>-30</b>	-47	-43	-49	-54	-58
<b>East Storage Level</b>	<b>848</b>	825	812	782	756	721
<b>Weekly Change</b>	<b>+23</b>	+13	+30	+26	+35	+31
<b>vs LY</b>	<b>-49</b>	-57	-46	-49	-50	-54
<b>vs 5Yr Avg</b>	<b>-55</b>	-68	-65	-74	-77	-86
<b>Mountain Storage Level</b>	<b>204</b>	199	195	190	184	176
<b>Weekly Change</b>	<b>+5</b>	+4	+5	+6	+8	+8
<b>vs LY</b>	<b>-9</b>	-13	-16	-19	-21	-24
<b>vs 5Yr Avg</b>	<b>-10</b>	-15	-17	-21	-24	-27
<b>Pacific Storage Level</b>	<b>247</b>	248	249	249	247	243
<b>Weekly Change</b>	<b>-1</b>	-1	0	+2	+4	+6
<b>vs LY</b>	<b>-9</b>	-7	-4	-2	0	0
<b>vs 5Yr Avg</b>	<b>-43</b>	-42	-41	-40	-39	-40

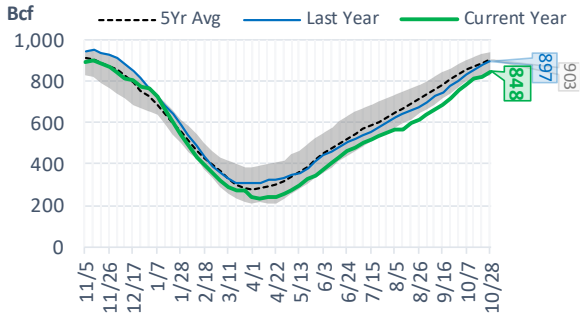
## NonSalt Storage Levels



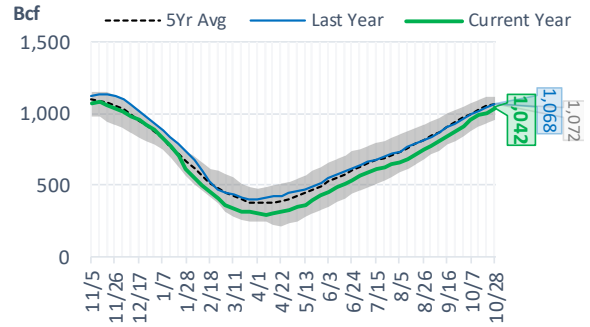
## Salt Storage Levels



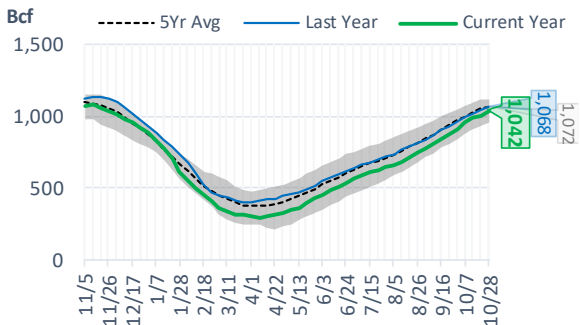
## East Storage Levels



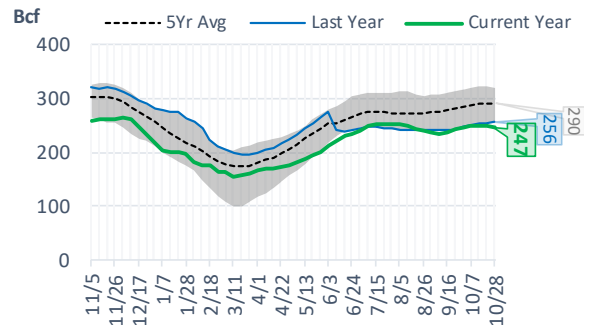
## Midwest Storage Levels



## Midwest Storage Levels



## Pacific Storage Levels



## EIA Storage Week Balances

	LY 5-Nov	7-Oct	14-Oct	21-Oct	LW 28-Oct	Current 4-Nov	WoW	vs. LY
<b>Lower 48 Dry Production</b>	<b>96.0</b>	<b>101.8</b>	<b>101.7</b>	<b>100.4</b>	<b>101.1</b>	<b>101.0</b>	▼ -0.1	▲ 5.0
<b>Canadian Imports</b>	<b>5.5</b>	<b>6.0</b>	<b>5.5</b>	<b>6.1</b>	<b>5.3</b>	<b>4.9</b>	▼ -0.4	▼ -0.6
L48 Power	30.3	30.5	30.7	30.8	28.9	29.5	▲ 0.6	-0.8
L48 Residential & Commercial	23.4	12.9	14.7	20.9	15.9	17.8	▲ 1.9	-5.6
L48 Industrial	22.0	20.8	20.3	20.0	21.1	21.3	▲ 0.2	-0.6
L48 Lease and Plant Fuel	5.4	5.7	5.7	5.6	5.6	5.6	▼ 0.0	0.3
L48 Pipeline Distribution	3.2	2.7	2.8	3.2	2.8	2.8	▲ 0.1	-0.3
<b>L48 Regional Gas Consumption</b>	<b>84.2</b>	<b>72.6</b>	<b>74.1</b>	<b>80.6</b>	<b>74.4</b>	<b>77.1</b>	▲ 2.7	▼ -7.1
<b>Net LNG Exports</b>	<b>10.9</b>	<b>11.0</b>	<b>11.0</b>	<b>11.5</b>	<b>11.4</b>	<b>11.9</b>	▲ 0.6	▲ 1.1
<b>Total Mexican Exports</b>	<b>6.1</b>	<b>6.7</b>	<b>6.6</b>	<b>6.7</b>	<b>6.4</b>	<b>6.3</b>	▼ -0.1	▲ 0.2
<b>Implied Daily Storage Activity</b>	<b>0.3</b>	<b>17.5</b>	<b>15.6</b>	<b>7.7</b>	<b>14.2</b>	<b>10.6</b>	-3.6	10.3
<b>EIA Reported Daily Storage Activity</b>	<b>1.0</b>	<b>17.9</b>	<b>15.9</b>	<b>7.4</b>	<b>15.3</b>			
<b>Daily Model Error</b>	<b>-0.7</b>	<b>-0.4</b>	<b>-0.3</b>	<b>0.3</b>	<b>-1.1</b>			

## Monthly Balances

	2Yr Ago Nov-20	LY Nov-21	Jul-22	Aug-22	Sep-22	Oct-22	MTD Nov-22	MoM	vs. LY
<b>Lower 48 Dry Production</b>	<b>91.2</b>	<b>96.4</b>	<b>97.8</b>	<b>98.2</b>	<b>100.6</b>	<b>101.3</b>	<b>100.6</b>	▼ -0.7	▲ 4.2
<b>Canadian Imports</b>	<b>4.6</b>	<b>5.3</b>	<b>5.9</b>	<b>5.4</b>	<b>5.9</b>	<b>5.7</b>	<b>4.2</b>	▼ -1.4	▼ -1.1
L48 Power	25.7	29.3	44.8	43.8	37.0	30.1	29.3	▼ -0.8	▼ 0.0
L48 Residential & Commercial	24.4	28.2	8.2	7.8	8.9	16.6	15.9	▼ -0.7	▼ -12.3
L48 Industrial	22.5	23.3	19.4	19.7	20.5	20.6	22.1	▲ 1.5	▼ -1.2
L48 Lease and Plant Fuel	5.0	5.4	5.5	5.5	5.5	5.7	5.6	▼ 0.0	▲ 0.2
L48 Pipeline Distribution	2.7	3.3	3.1	3.0	2.8	2.9	2.6	▼ -0.3	▼ -0.7
<b>L48 Regional Gas Consumption</b>	<b>80.3</b>	<b>89.5</b>	<b>81.0</b>	<b>79.9</b>	<b>74.7</b>	<b>75.9</b>	<b>75.6</b>	▼ -0.3	▼ -14.0
<b>Net LNG Exports</b>	<b>10.1</b>	<b>11.4</b>	<b>10.9</b>	<b>11.0</b>	<b>11.5</b>	<b>11.3</b>	<b>11.4</b>	▲ 0.1	▲ 0.0
<b>Total Mexican Exports</b>	<b>6.1</b>	<b>6.1</b>	<b>7.0</b>	<b>6.9</b>	<b>6.7</b>	<b>6.6</b>	<b>6.3</b>	▼ -0.3	▲ 0.2
<b>Implied Daily Storage Activity</b>	<b>-0.7</b>	<b>-5.3</b>	<b>4.8</b>	<b>5.8</b>	<b>13.6</b>	<b>13.2</b>	<b>11.6</b>		
<b>EIA Reported Daily Storage Activity</b>									
<b>Daily Model Error</b>					<b>-0.5</b>				

Source: Bloomberg, analytix.ai

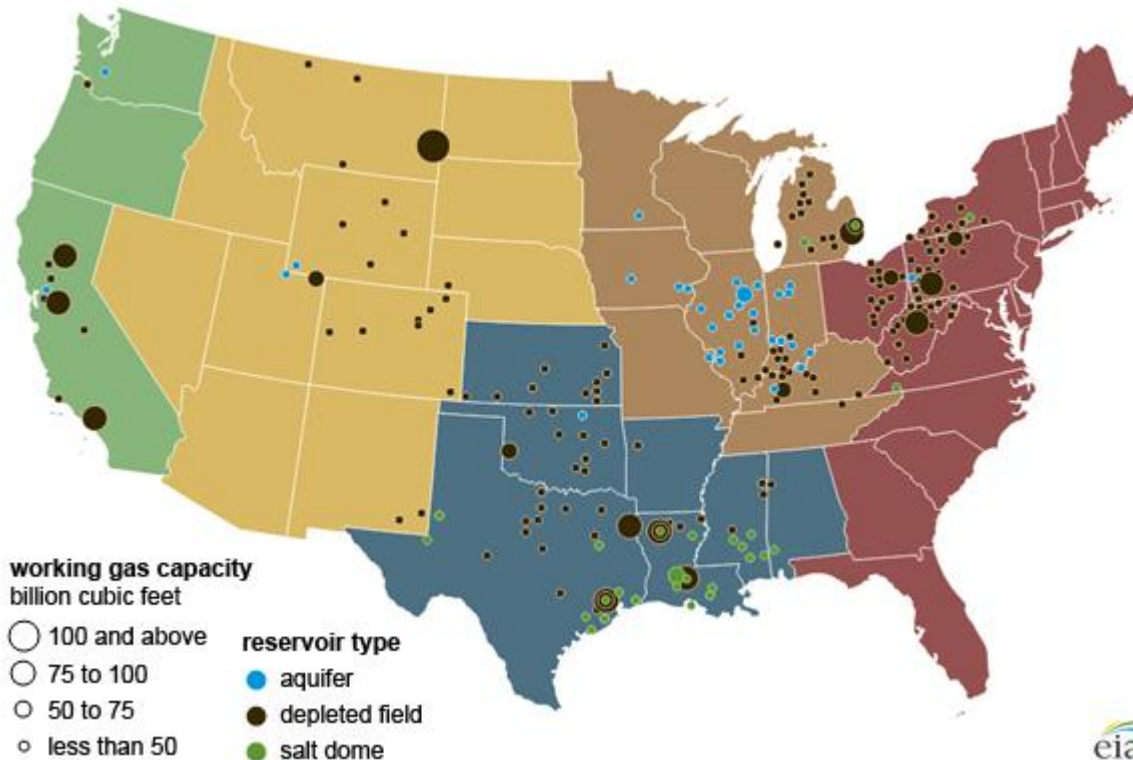
## Regional S/D Models Storage Projection

Week Ending 4-Nov

	Daily Raw Storage	Daily Adjustment Factor	Daily Average Storage Activity (Adjusted) *	Weekly Adjusted Storage Activity
L48	11.7	-0.5	11.2	78
East	-0.2	2.4	2.3	16
Midwest	3.4	0.5	3.9	27
Mountain	4.8	-4.1	0.7	5
South Central	3.7	1.0	4.7	33
Pacific	-0.1	-0.4	-0.5	-3

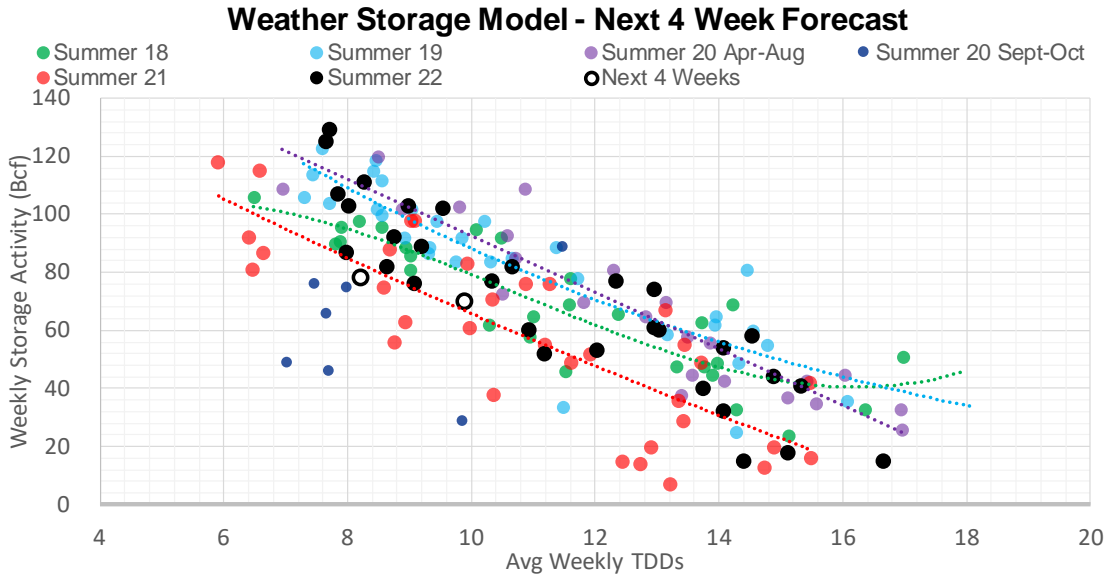
\*Adjustment Factor is calculated based on historical regional deltas

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



## Weather Model Storage Projection

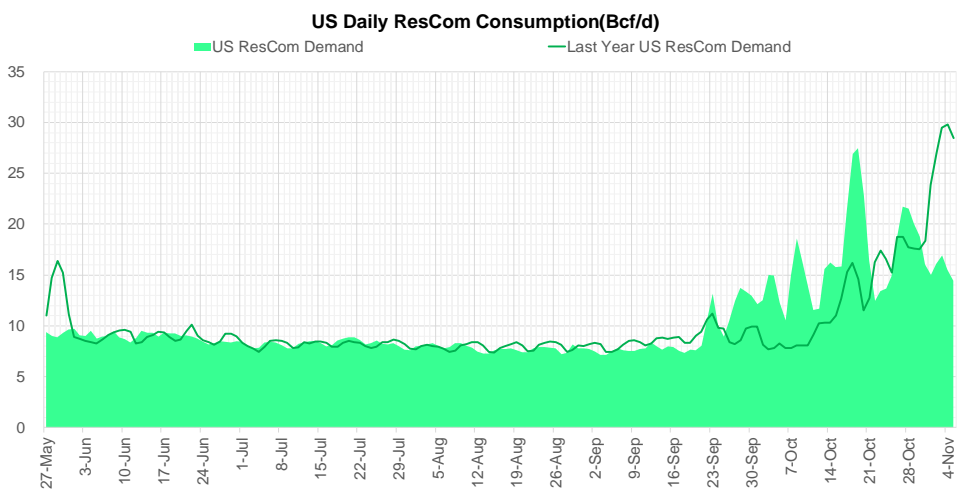
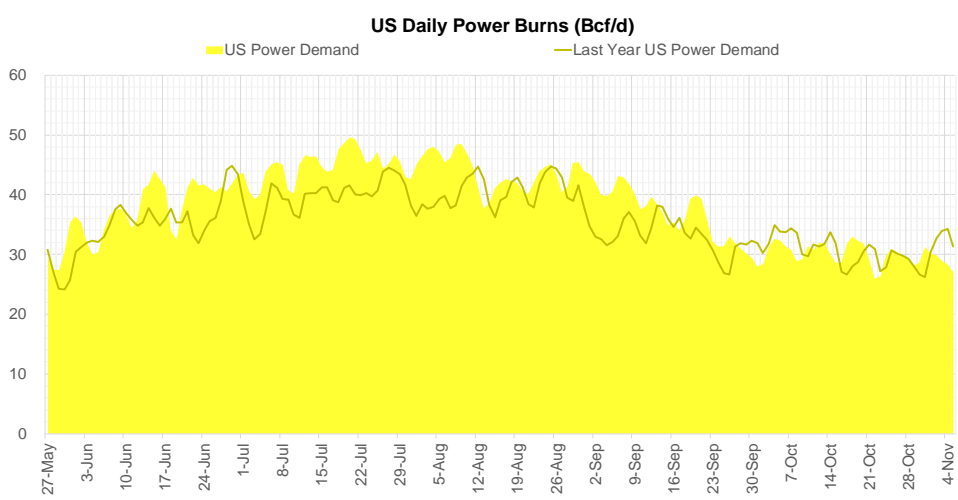
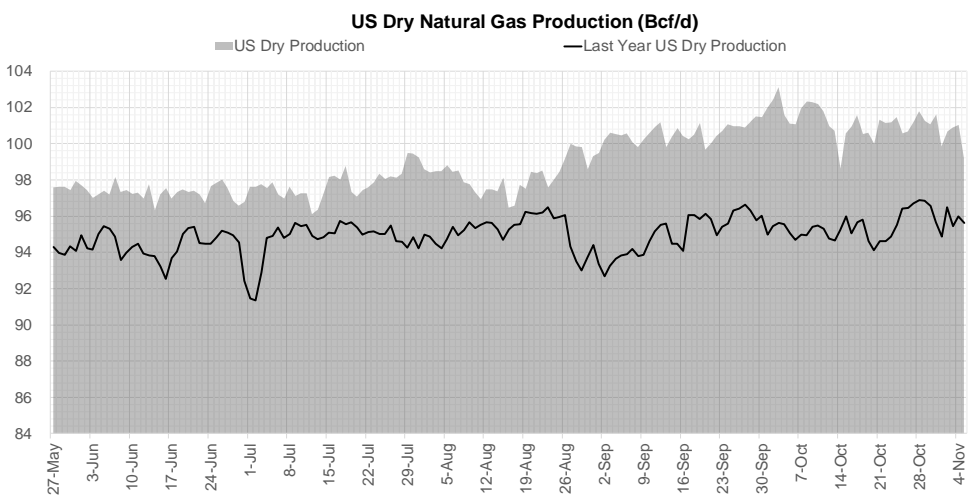
Next report and beyond		
Week Ending	GWDDs	Week Storage Projection
04-Nov	8.2	78
11-Nov	9.9	70
18-Nov	#N/A	#N/A
25-Nov	#N/A	#N/A



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



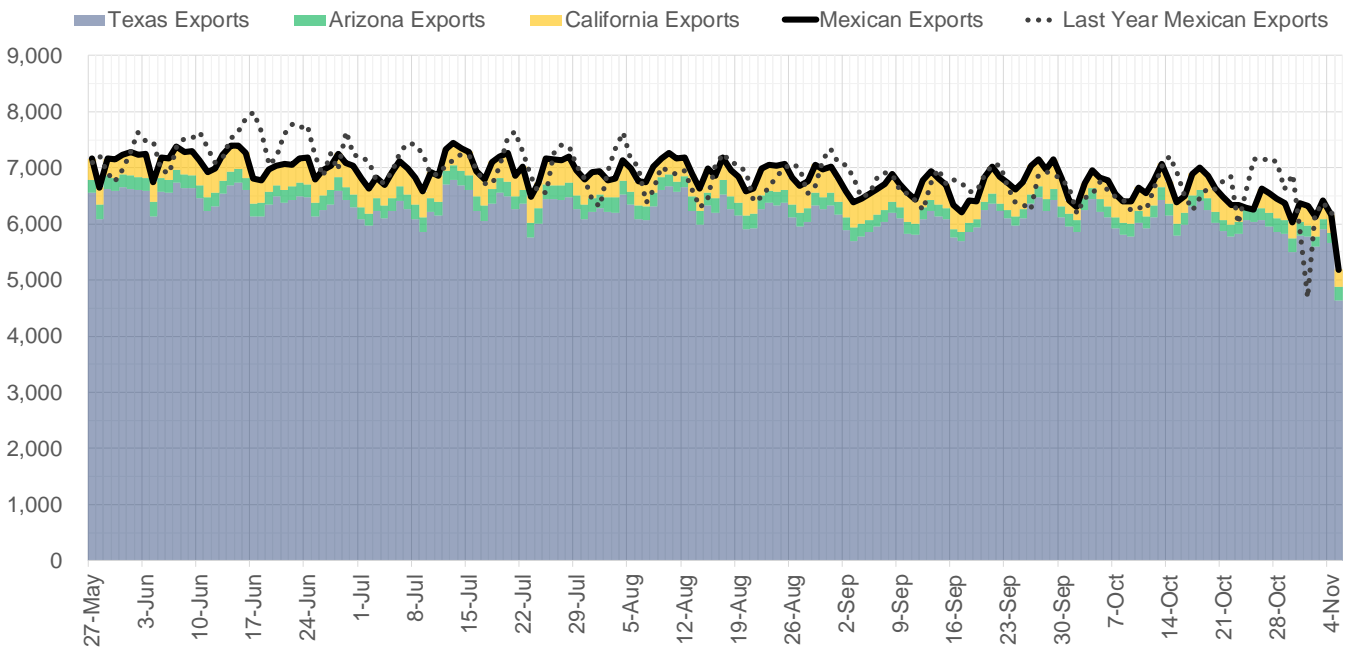
## Supply – Demand Trends



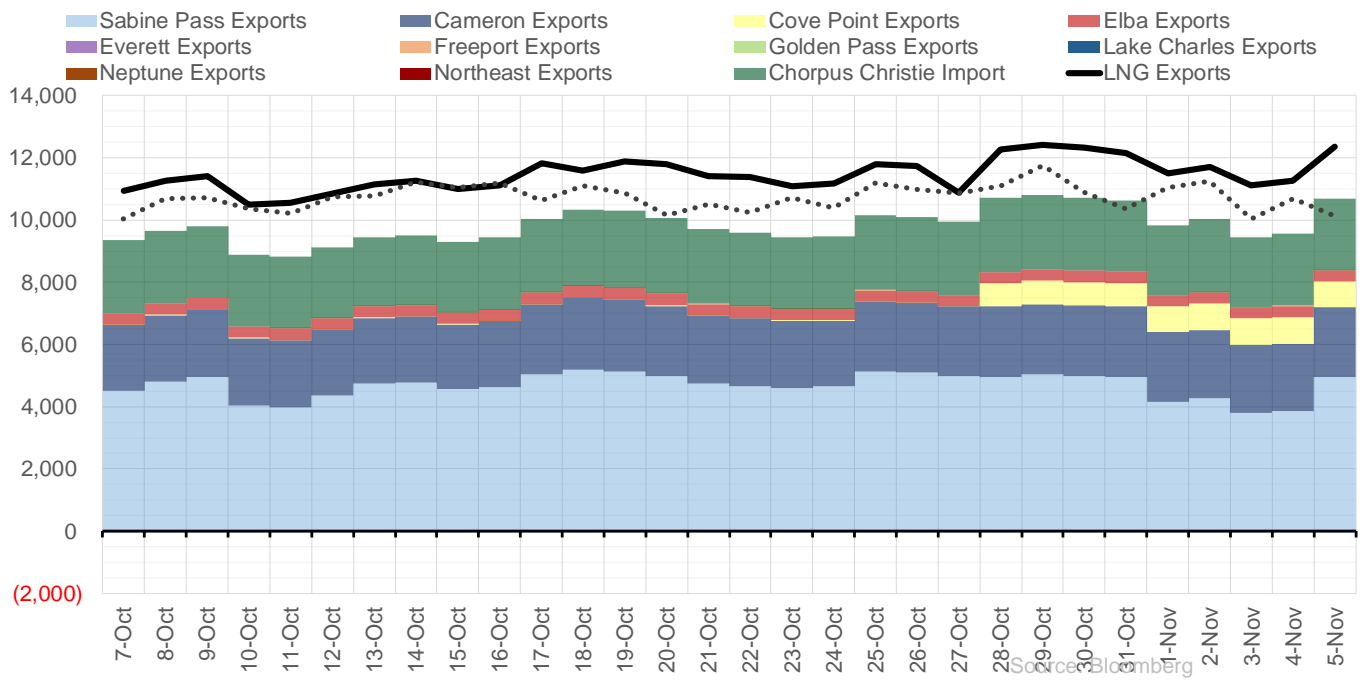
Source: Bloomberg

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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 and ICE data combined

CONTRACT MONTH	CONTRACT YEAR	PUT/CALL	STRIKE	CUMULATIVE VOL	CONTRACT MONTH	CONTRACT YEAR	PUT/CALL	STRIKE	CUMULATIVE OI
12	2022	P	4.75	4975	12	2022	P	4.00	53440
12	2022	P	4.50	4134	12	2022	P	5.00	35732
12	2022	P	5.00	3692	12	2022	P	4.50	32454
12	2022	P	4.00	3439	5	2023	P	2.00	28169
12	2022	P	5.50	2841	12	2022	C	10.00	27563
12	2022	P	4.25	2789	12	2022	P	6.00	26656
2	2023	C	12.00	2489	1	2023	C	10.00	25687
12	2022	C	8.00	2280	12	2022	P	3.50	25666
1	2023	P	5.50	1926	10	2023	P	3.00	24485
12	2022	C	7.00	1646	3	2023	C	10.00	23267
1	2023	C	15.00	1608	4	2023	P	3.00	22573
1	2023	C	10.00	1501	2	2023	C	10.00	21829
4	2023	P	4.00	1300	3	2023	P	4.00	21473
12	2022	C	10.00	1268	4	2023	P	3.50	20866
6	2023	P	4.00	1252	4	2023	P	2.00	20109
5	2023	C	7.00	1250	1	2023	P	5.00	19906
5	2023	P	4.00	1250	12	2022	C	8.00	19792
2	2023	C	9.00	1230	10	2023	P	2.50	19550
3	2023	P	4.00	1220	10	2023	P	4.00	19481
4	2023	C	7.00	1150	1	2023	P	4.00	19368
12	2022	P	6.00	1031	1	2023	P	3.00	19359
3	2023	P	3.00	1000	10	2023	P	2.00	19310
5	2023	C	6.00	965	5	2023	P	3.00	19008
12	2022	C	6.50	911	12	2022	P	3.00	18949
12	2022	P	5.75	896	3	2023	C	20.00	18945
12	2022	C	9.00	863	12	2022	C	7.00	18636
10	2023	P	4.50	825	12	2022	C	5.00	18366
3	2023	C	10.00	807	6	2023	P	3.00	18365
12	2022	P	5.25	805	4	2023	P	4.00	18210
1	2023	P	3.50	792	6	2023	P	3.50	17975
5	2023	P	4.50	751	5	2023	P	3.50	17910
4	2023	P	4.50	750	12	2022	P	5.50	17581
6	2023	C	7.00	750	10	2023	P	3.50	17558
6	2023	P	4.50	750	12	2022	C	6.00	17374
7	2023	C	7.00	750	9	2023	P	4.00	17361
7	2023	P	4.00	750	8	2023	P	3.00	17341
7	2023	P	4.50	750	7	2023	P	3.00	17340
8	2023	C	7.00	750	9	2023	P	3.00	17240
8	2023	P	4.00	750	8	2023	P	3.50	17111
8	2023	P	4.50	750	7	2023	P	3.50	16979
9	2023	C	7.00	750	9	2023	P	3.50	16969
9	2023	P	4.00	750	3	2023	P	3.00	16728
9	2023	P	4.50	750	5	2023	P	4.00	16681
10	2023	C	7.00	750	6	2023	P	2.00	16674
10	2023	P	4.00	750	6	2023	P	4.00	16573
3	2023	C	12.00	725	3	2023	C	8.00	16355
12	2022	C	7.20	721	2	2023	C	8.00	16288
1	2023	P	3.00	661	12	2022	C	4.00	16195
3	2023	C	9.00	636	7	2023	P	4.00	16044
					4	2023	P	2.75	15900

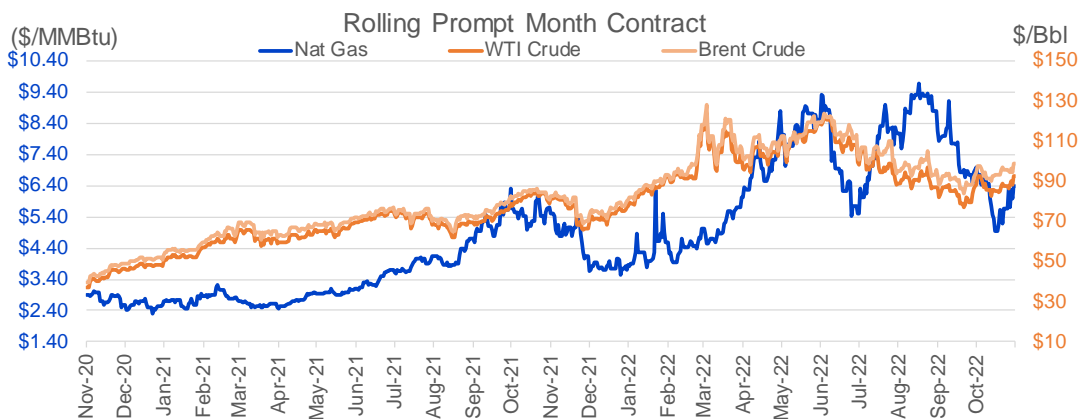
Source: CME, ICE

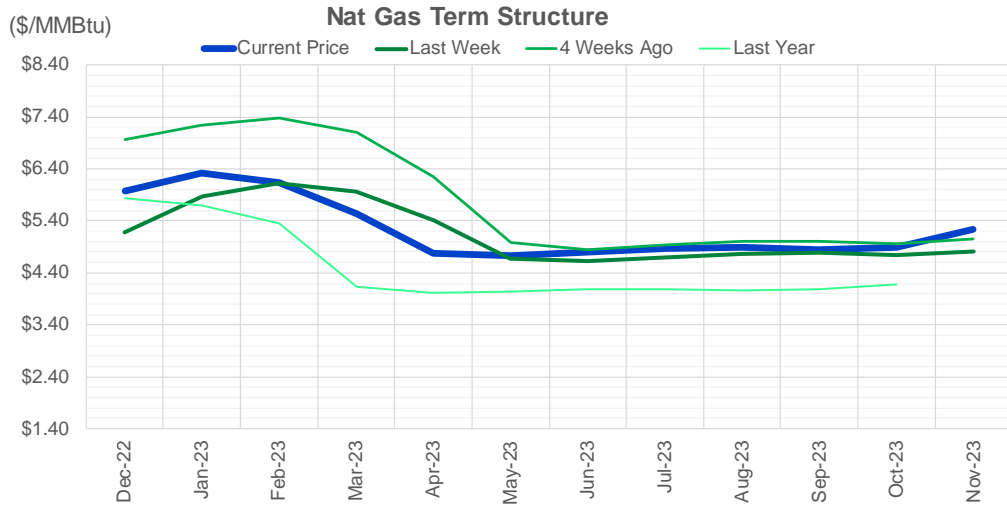
## Nat Gas Futures Open Interest

CME and ICE data 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
DEC 22	90671	96410	-5739	DEC 22	83489	79281	4209
JAN 23	140290	141420	-1130	JAN 23	73766	73813	-47
FEB 23	60062	60889	-827	FEB 23	66429	66091	338
MAR 23	100660	100854	-194	MAR 23	61255	61059	196
APR 23	81145	80479	666	APR 23	56908	56805	103
MAY 23	85920	86284	-364	MAY 23	60154	60024	130
JUN 23	23767	23747	20	JUN 23	49326	49575	-249
JUL 23	33949	34353	-404	JUL 23	49832	49829	3
AUG 23	23323	22878	445	AUG 23	47456	47594	-138
SEP 23	30035	30203	-168	SEP 23	45848	45931	-83
OCT 23	51782	51588	194	OCT 23	57174	57616	-442
NOV 23	21434	21407	27	NOV 23	47661	47650	11
DEC 23	28486	27685	801	DEC 23	42200	42377	-177
JAN 24	37443	36978	465	JAN 24	46592	46669	-77
FEB 24	11552	11437	115	FEB 24	30823	30819	4
MAR 24	23181	22877	304	MAR 24	37868	37971	-103
APR 24	22065	21679	386	APR 24	30965	31017	-52
MAY 24	9185	8961	224	MAY 24	29843	29628	215
JUN 24	3334	3220	114	JUN 24	26703	26768	-65
JUL 24	4247	4186	61	JUL 24	25490	25550	-61
AUG 24	3974	3981	-7	AUG 24	24986	25060	-75
SEP 24	2595	2631	-36	SEP 24	24903	24952	-50
OCT 24	9455	9133	322	OCT 24	29428	29524	-96
NOV 24	4924	4902	22	NOV 24	26289	26249	40
DEC 24	8847	8684	163	DEC 24	30142	30104	38
JAN 25	17882	17816	66	JAN 25	24563	23558	1005
FEB 25	1822	1791	31	FEB 25	15778	15785	-8
MAR 25	6254	6164	90	MAR 25	17733	17714	19
APR 25	5845	5837	8	APR 25	16507	16521	-14
MAY 25	2668	2618	50	MAY 25	15738	15115	623

Source: CME, ICE





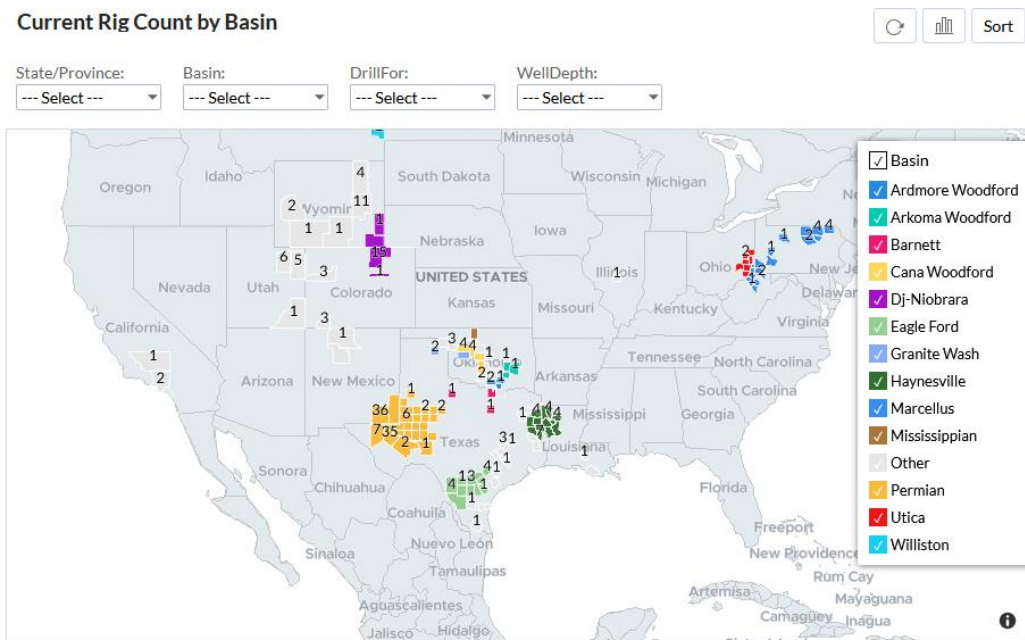
	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23
<b>Current Price</b>	<b>\$5.975</b>	<b>\$6.330</b>	<b>\$6.138</b>	<b>\$5.537</b>	<b>\$4.777</b>	<b>\$4.729</b>	<b>\$4.794</b>	<b>\$4.867</b>	<b>\$4.884</b>	<b>\$4.841</b>	<b>\$4.898</b>	<b>\$5.235</b>
Last Week	\$5.186	\$5.875	\$6.136	\$5.972	\$5.411	\$4.683	\$4.626	\$4.697	\$4.771	\$4.789	\$4.750	\$4.820
vs. Last Week	\$0.789	\$0.455	\$0.002	-\$0.435	-\$0.634	\$0.046	\$0.168	\$0.170	\$0.113	\$0.052	\$0.148	\$0.415
4 Weeks Ago	\$6.972	\$7.242	\$7.383	\$7.103	\$6.261	\$4.977	\$4.854	\$4.929	\$5.002	\$5.010	\$4.972	\$5.046
vs. 4 Weeks Ago	-\$0.997	-\$0.912	-\$1.245	-\$1.566	-\$1.484	-\$0.248	-\$0.060	-\$0.062	-\$0.118	-\$0.169	-\$0.074	\$0.189
Last Year	\$5.716	\$5.826	\$5.692	\$5.349	\$4.137	\$4.014	\$4.038	\$4.075	\$4.082	\$4.065	\$4.095	\$4.172
vs. Last Year	\$0.259	\$0.504	\$0.446	\$0.188	\$0.640	\$0.715	\$0.756	\$0.792	\$0.802	\$0.776	\$0.803	\$1.063

	Units	Current Price	vs. Last Week	vs. 4 Weeks Ago	vs. Last Year
NatGas Jul21/Oct21	\$/MMBtu	2.224	▲ 0.000	▲ 0.000	▲ 0.000
NatGas Oct21/Nov21	\$/MMBtu	0.361	▲ 0.000	▲ 0.000	▲ 0.000
NatGas Oct21/Jan22	\$/MMBtu	-1.817	▲ 0.000	▲ 0.000	▼ -1.602
NatGas Apr22/Oct22	\$/MMBtu	1.532	▲ 0.000	▲ 0.000	▲ 1.562
WTI Crude	\$/Bbl	92.61	▲ 4.710	▼ -0.030	▲ 11.340
Brent Crude	\$/Bbl	98.57	▲ 2.800	▲ 0.650	▲ 15.830
Fuel Oil, NY Harbour 1%	\$/Bbl	97.18	▲ 0.000	▲ 0.000	▲ 0.000
Heating Oil	cents/Gallon	391.48	▼ -63.500	▼ -10.390	▲ 145.920
Propane, Mt. Bel	cents/Gallon	0.88	▲ 0.026	▼ -0.024	▼ -0.493
Ethane, Mt. Bel	cents/Gallon	0.40	▼ -0.005	▼ -0.018	▼ -0.029
Coal, PRB	\$/MTon	12.30	▲ 0.000	▲ 0.000	▲ 0.000
Coal, PRB	\$/MMBtu	0.70			

Source: CME, Bloomberg

## Baker Hughes Rig Counts

### Current Rig Count by Basin



<http://www.analytix.ai/baker-hughes-rig-maps.html>

Powered by **ANALYTIX.AI**

Rotary Rig Count					
11/4/2022					
Baker Hughes					
U.S. Breakout Information	This Week	+/-	Last Week	+/-	Year Ago
Oil	613	3	610	163	450
Gas	155	-1	156	55	100
Miscellaneous	2	0	2	2	0
Directional	43	0	43	10	33
Horizontal	705	2	703	213	492
Vertical	22	0	22	-3	25
Canada Breakout	This Week	+/-	Last Week	+/-	Year Ago
Oil	141	-4	145	46	95
Gas	68	1	67	3	65
Major Basin Variances	This Week	+/-	Last Week	+/-	Year Ago
Ardmore Woodford	6	1	5	4	2
Arkoma Woodford	4	0	4	1	3
Barnett	3	0	3	3	0
Cana Woodford	28	0	28	6	22
DJ-Niobrara	20	0	20	8	12
Eagle Ford	70	0	70	30	40
Granite Wash	5	0	5	2	3
Haynesville	69	-1	70	23	46
Marcellus	41	0	41	13	28
Mississippian	1	0	1	1	0
Permian	346	0	346	75	271
Utica	12	0	12	2	10
Williston	41	2	39	17	24