

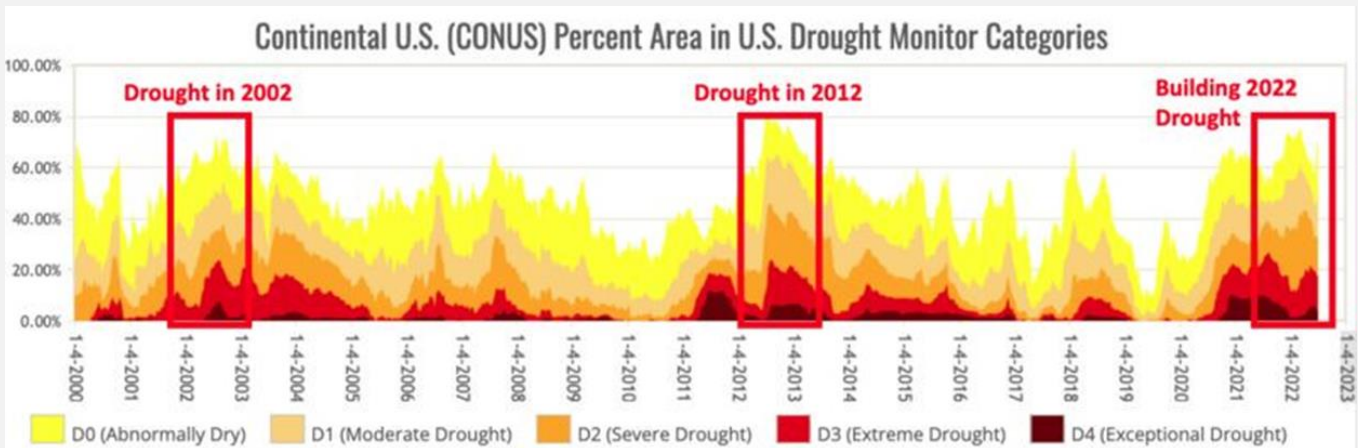
This week we start with how the “Hot/dry leads to more hot/dry”. The folks at [AtmosphericG2](#) (formerly WSI) put some great content up on enelyst.

Here is a link to the full script from James Caron and Ed Vallee:
<https://chat.enelyst.com/enelyst/pl/zqnwtnczrb8o7mgdxfk4fe3k6o>

Summer 2022 being hotter and drier than normal for much of the USA seems unprecedented, but similar conditions tend to occur during the negative phase of the Pacific Decadal Oscillation (PDO). In fact, summers of 2002 and 2012 were both anomalously hotter AND drier than normal across most of the USA under similar negative PDO phase when comparing to summer of 2022.

Summers of 2002 and 2012 were plagued by widespread drought conditions. As summers 2002 and 2012 progressed drought conditions worsened.

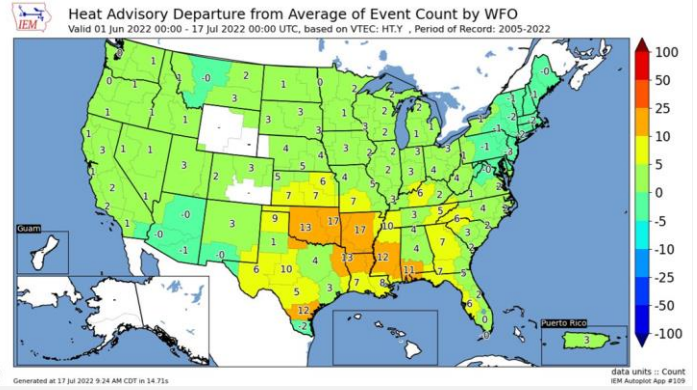
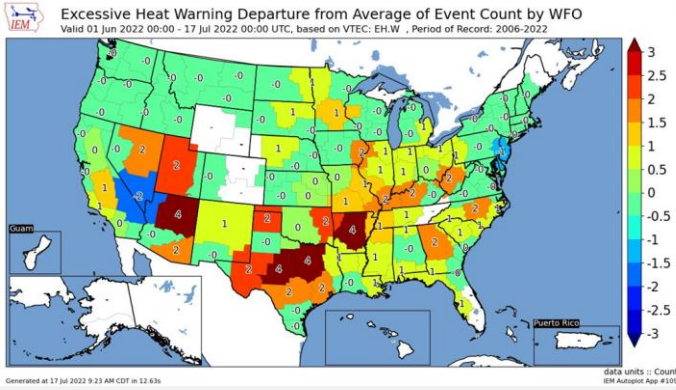
A positive feedback loop is likely setting up in 2022 where heat is feeding off of drought and vice versa.



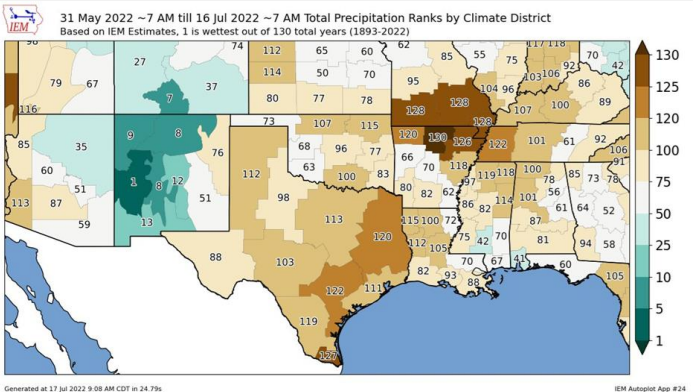
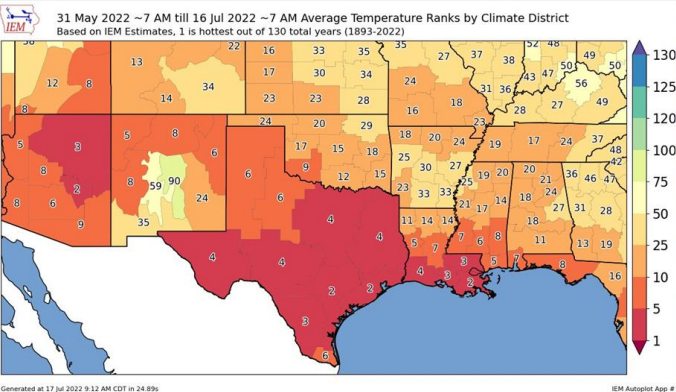
...given the ongoing issues with dryness and heat, Dr. Crawford has found significant correlation between JUL and AUG CDD. With this, our Aug CDD forecast is at 359 with upside risk....that is good enough for top 10 hottest on record...

Continuing on with good weather intel, the [National Weather Services Prediction Center](#) put a great [series of tweets](#) earlier this week. The premises of the tweets also revolve around the intense heat that we have observed in the Southern Plains.

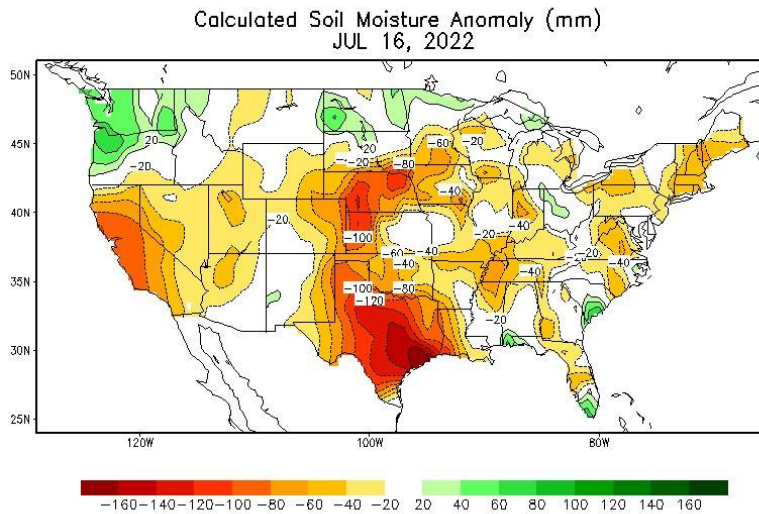
It is no secret that the Southern Plains have been anomalously hot during the first half of summer, with sustained heat and lack of precipitation leading to significantly more Excessive Heat Warning and Heat Advisory product issuances than average.



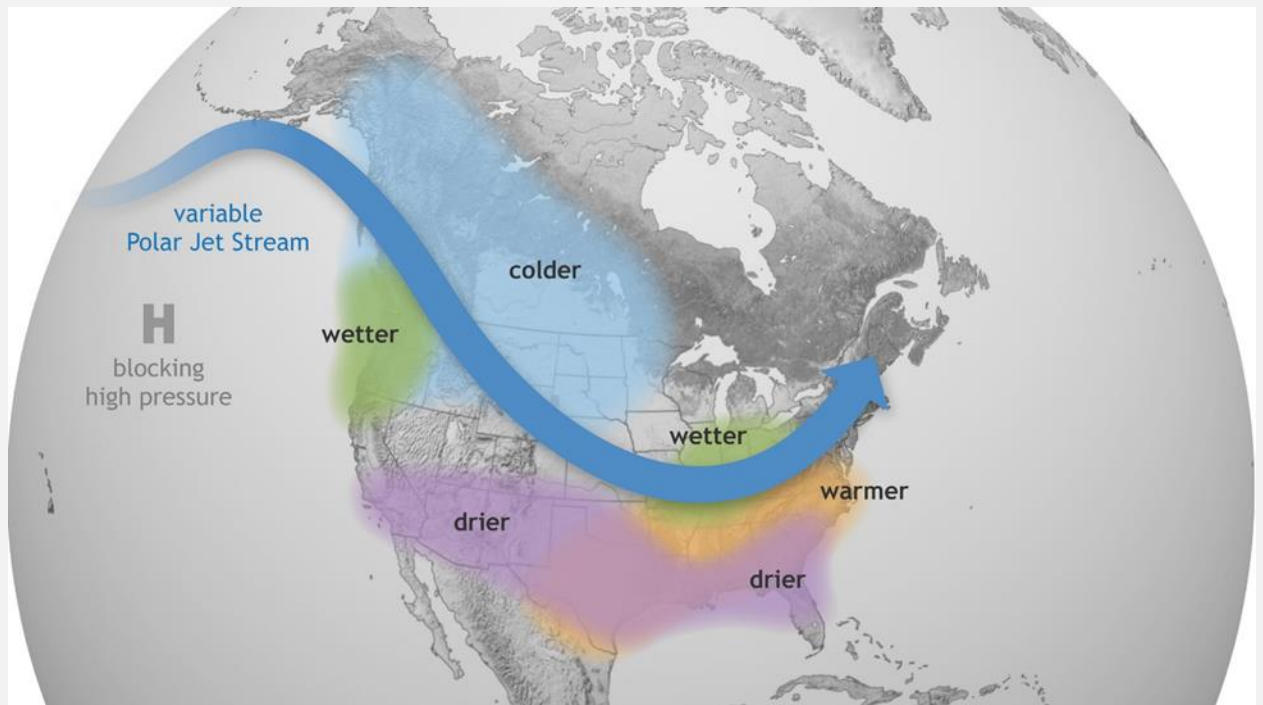
To put the current heat and dry conditions in perspective, much of the Southern Plains have experienced a top 15 driest AND hottest Jun 1 - Jul 16 period since 1893, leading to widespread drought and well-below average soil moisture values across the region.



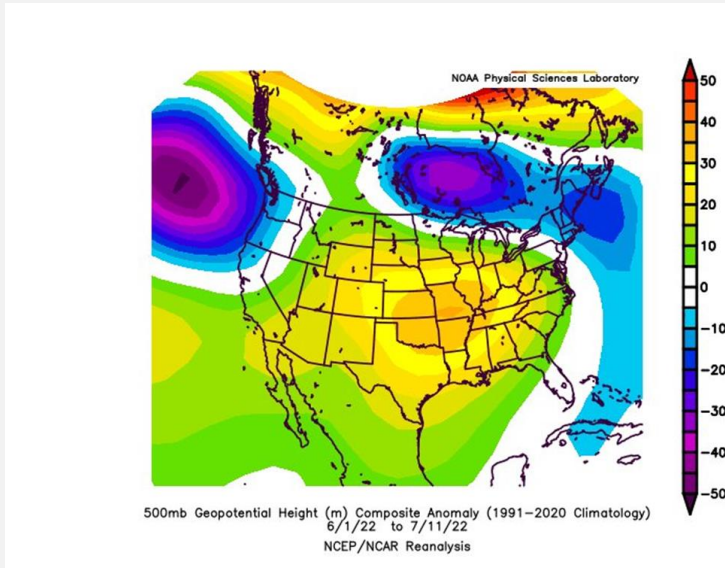
Unfortunately for this region, these prolonged conditions exacerbate the heat situation, as drier air leads to less evaporative cooling & a drier ground cannot absorb as much radiative heat from the sun causing the surface to heat up faster and reach higher temperatures.



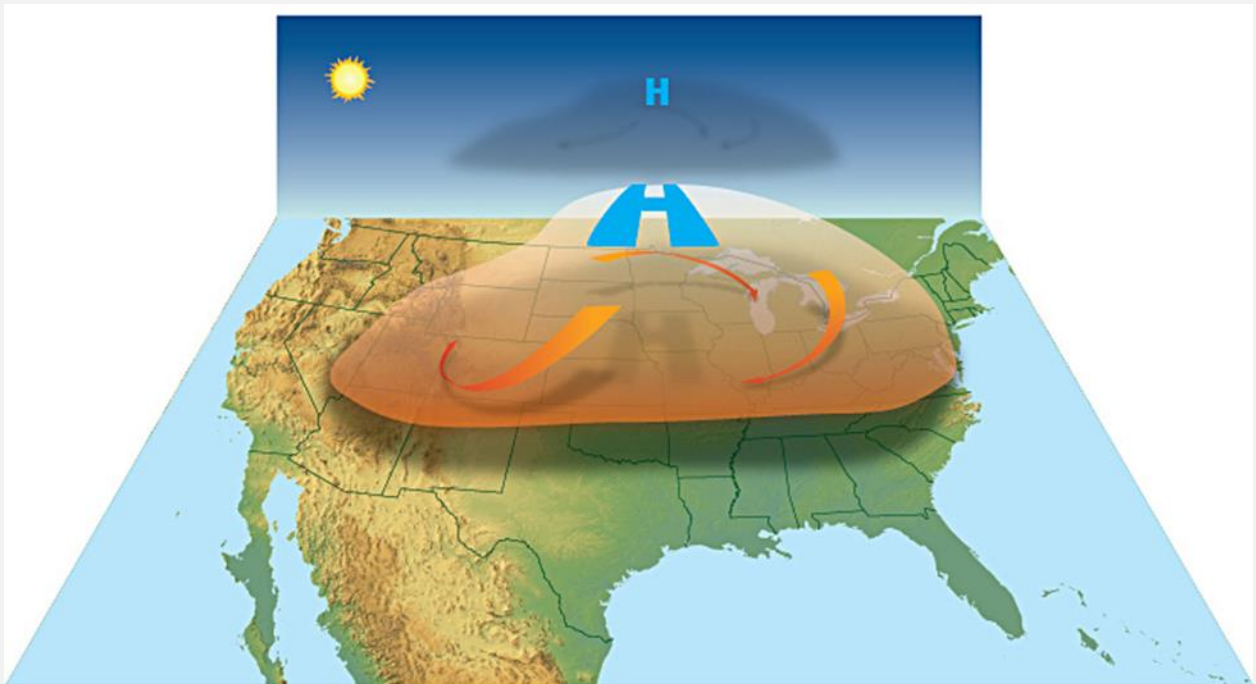
So what is causing this? We are currently experiencing a La Nina ENSO phase, which supports an overall drier pattern for the Southern Plains due to upper-level ridging in the western CONUS. However, every La Nina year is not alike.



This summer, the upper-level pattern since June 1 has produced prolonged ridging more focused in the central U.S., leading the Jet Stream to remain far north of the region and subsequently much of the precipitation.

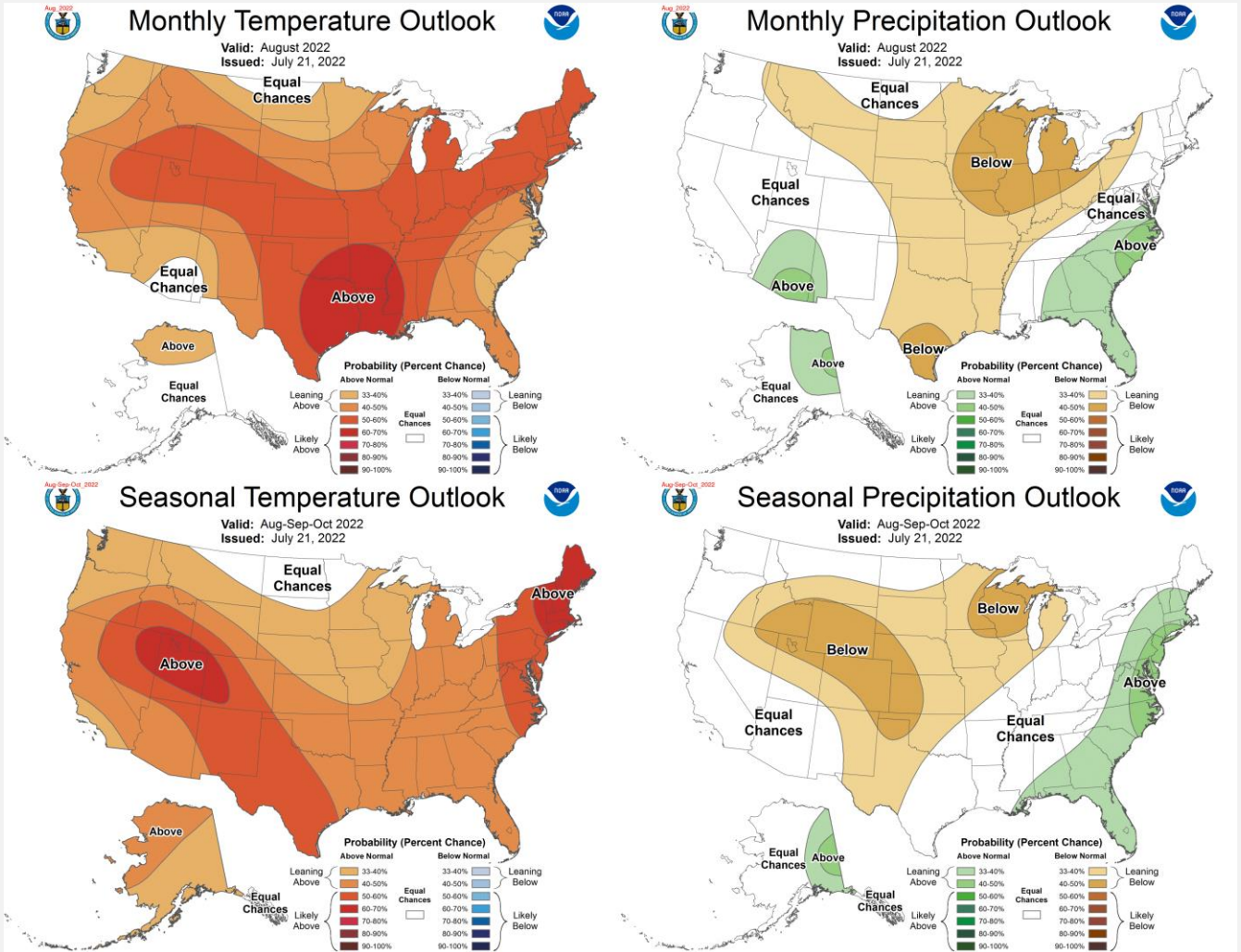


This pattern leads to a “heat dome” where higher pressure in the upper levels of the atmosphere promotes sinking air, stifling convection & trapping heat at the surface. This “dome” has barely budged this summer, causing sustained heat and dry conditions in the region.



Unfortunately, for those in the Southern Plains, @NWS continues to forecast sustained above-average temperatures and below-average precipitation through the end of the summer, and while there may be relief at times, the overall pattern favors continued anomalous warmth.

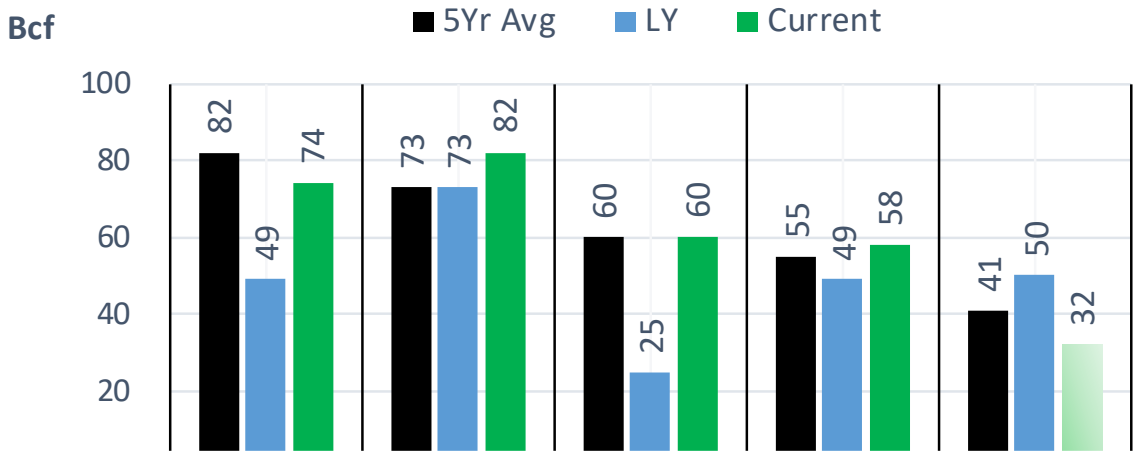
[Note: We switched the graphic from their tweet to the latest NOAA CPC outlook released on July 21]



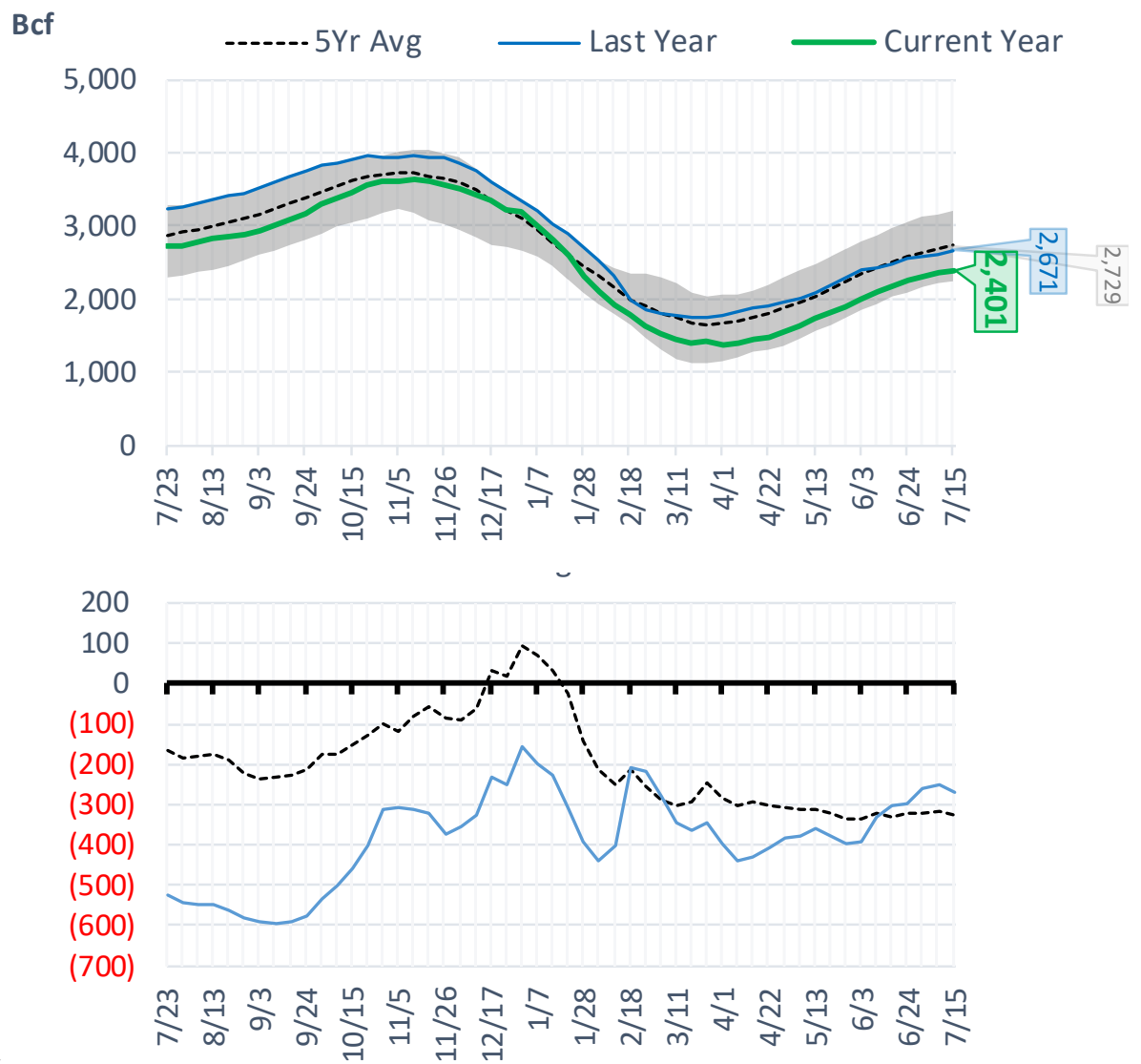
Bookmark this Link:

https://www.cpc.ncep.noaa.gov/products/predictions/multi_season/13_seasonal_outlooks/col/r/page2.gif

Total Lower 48 YoY Weekly Change



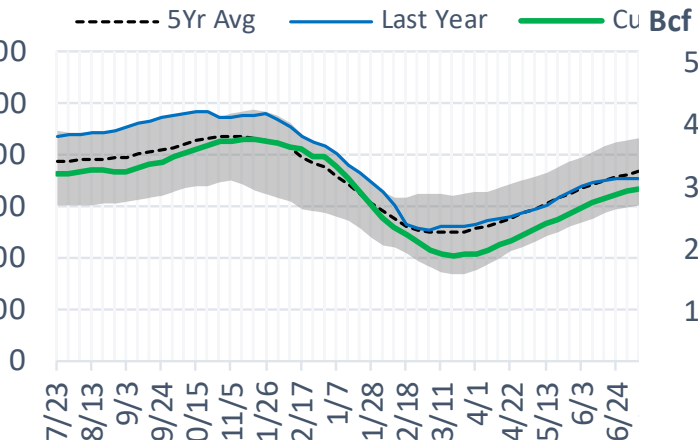
Total Lower 48 Storage Levels



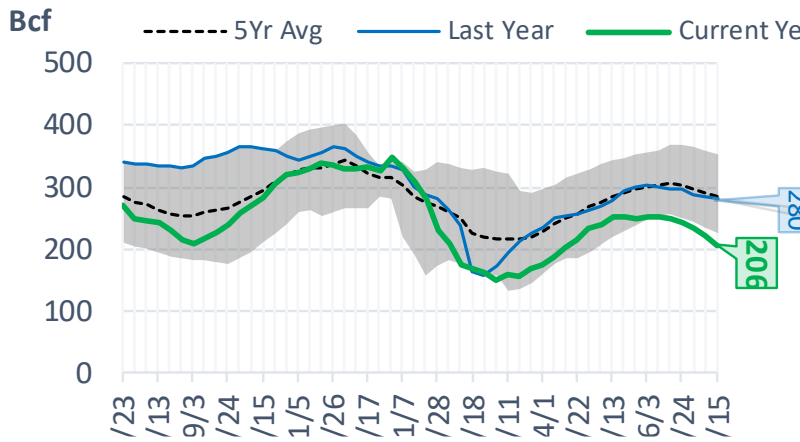
Natural Gas Storage Stats - Last 5 Weeks

Week Ending	Current 15-Jul	Week - 1 8-Jul	Week - 2 1-Jul	Week - 3 24-Jun	Week - 4 17-Jun	Week - 5 10-Jun
Total Lower 48 Storage Level	2401	2369	2311	2251	2169	2095
Weekly Change	+32	+58	+60	+82	+74	+92
vs LY	-270	-252	-261	-296	-305	-330
vs 5Yr Avg	-328	-319	-322	-322	-331	-323
S. Central Salt Storage Level	206	221	233	242	248	251
Weekly Change	-15	-12	-9	-6	-3	0
vs LY	-74	-62	-54	-54	-48	-48
vs 5Yr Avg	-77	-71	-64	-61	-57	-53
S. Central NonSalt Storage Level	669	669	657	644	628	612
Weekly Change	0	+12	+13	+16	+16	+19
vs LY	-52	-42	-49	-63	-69	-82
vs 5Yr Avg	-71	-66	-69	-72	-76	-76
Midwest Storage Level	608	586	562	535	506	482
Weekly Change	+22	+24	+27	+29	+24	+28
vs LY	-72	-73	-74	-84	-85	-85
vs 5Yr Avg	-63	-64	-65	-68	-71	-68
East Storage Level	521	501	482	461	430	407
Weekly Change	+20	+19	+21	+31	+23	+31
vs LY	-38	-39	-38	-48	-54	-52
vs 5Yr Avg	-66	-67	-66	-65	-71	-67
Mountain Storage Level	144	143	138	134	128	122
Weekly Change	+1	+5	+4	+6	+6	+4
vs LY	-39	-37	-38	-38	-40	-42
vs 5Yr Avg	-28	-26	-26	-24	-25	-25
Pacific Storage Level	253	249	240	235	231	221
Weekly Change	+4	+9	+5	+4	+10	+10
vs LY	+6	0	-6	-8	-8	-21
vs 5Yr Avg	-23	-27	-32	-31	-29	-34

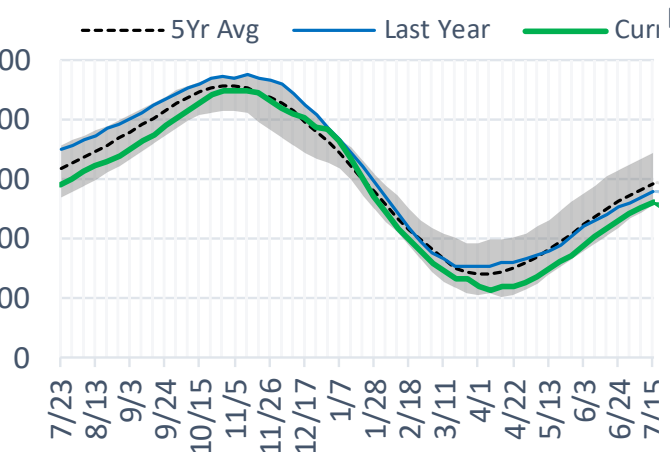
Salt Storage Levels



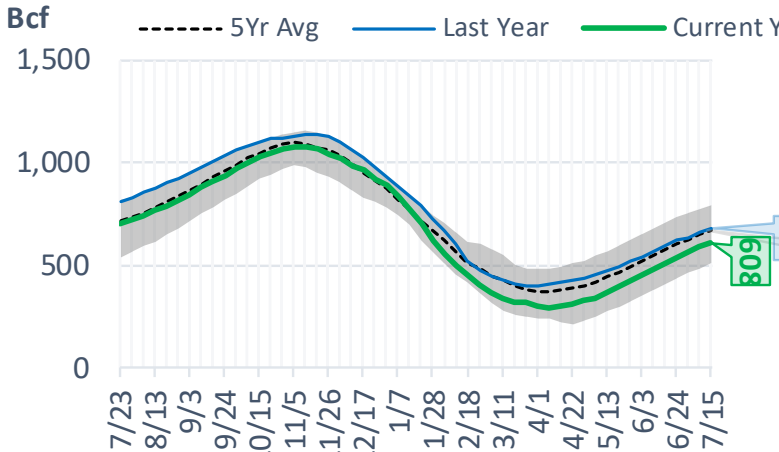
Salt Storage Levels



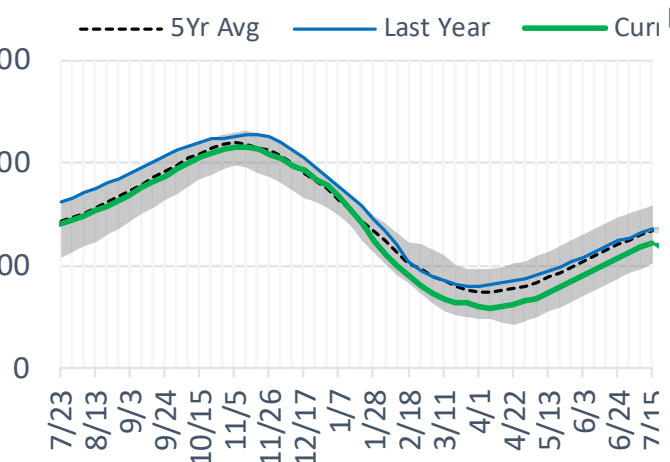
Midwest Storage Levels



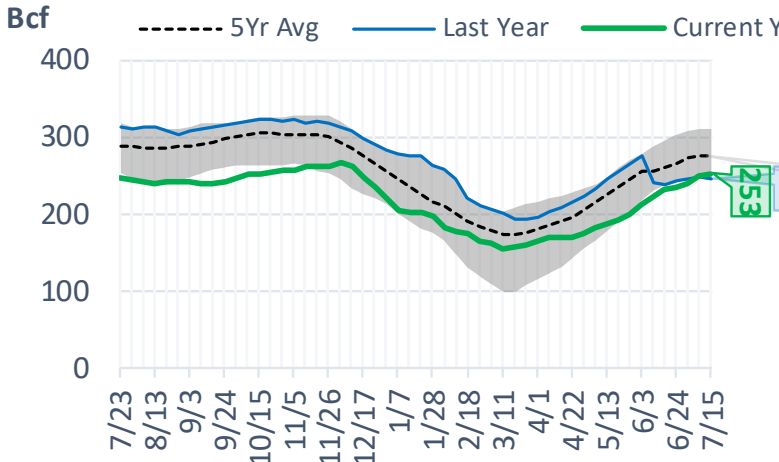
Midwest Storage Levels



West Storage Levels



Pacific Storage Levels



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EIA Storage Week Balances

	17-Jun	24-Jun	1-Jul	8-Jul	15-Jul	22-Jul	WoW	vs. 4W
Lower 48 Dry Production	96.7	96.7	97.0	97.0	96.3	97.2	▲ 0.9	▲ 0.4
Canadian Imports	6.1	5.6	5.7	5.6	6.0	6.2	▲ 0.1	▲ 0.4
L48 Power	37.8	37.7	40.1	41.1	42.8	45.4	▲ 2.6	▲ 5.0
L48 Residential & Commercial	8.3	8.7	8.2	8.3	8.4	8.7	▲ 0.3	▲ 0.3
L48 Industrial	21.5	20.1	20.1	20.2	21.6	21.1	▼ -0.5	▲ 0.6
L48 Lease and Plant Fuel	5.2	5.2	5.3	5.3	5.2	5.3	▲ 0.0	▲ 0.0
L48 Pipeline Distribution	2.5	2.5	2.6	2.6	2.7	2.9	▲ 0.2	▲ 0.3
L48 Regional Gas Consumption	75.3	74.2	76.3	77.4	80.7	83.3	▲ 2.6	▲ 6.1
Net LNG Exports	10.7	10.6	10.6	11.2	11.1	10.8	▼ -0.3	▼ -0.1
Total Mexican Exports	7.2	7.0	7.0	6.9	7.0	7.1	▲ 0.1	▲ 0.1
Implied Daily Storage Activity	9.6	10.5	8.8	7.2	3.5	2.1	-1.4	
EIA Reported Daily Storage Activity	10.6	11.7	8.6	8.3	4.6			
Daily Model Error	-1.0	-1.2	0.2	-1.1	-1.1			

Monthly Balances

	2Yr Ago	LY	MTD					MoM	vs. LY
	Jul-20	Jul-21	Mar-22	Apr-22	May-22	Jun-22	Jul-22		
Lower 48 Dry Production	89.0	93.5	93.4	95.2	96.2	96.8	96.8	▼ 0.0	▲ 3.3
Canadian Imports	4.4	5.2	5.2	5.8	5.1	5.7	5.9	▲ 0.3	▲ 0.8
L48 Power	43.8	39.7	25.4	24.7	28.8	36.8	43.1	▲ 6.3	▲ 3.4
L48 Residential & Commercial	7.9	8.1	31.5	22.5	12.3	8.5	8.4	▼ -0.1	▲ 0.3
L48 Industrial	20.1	20.8	19.7	21.5	21.1	20.8	20.6	▼ -0.2	▼ -0.2
L48 Lease and Plant Fuel	4.9	5.1	5.2	5.2	5.2	5.2	5.2	▲ 0.0	▲ 0.2
L48 Pipeline Distribution	2.6	2.5	2.9	2.6	2.3	2.5	2.7	▲ 0.3	▲ 0.2
L48 Regional Gas Consumption	79.3	76.2	84.7	76.6	69.8	73.8	80.1	▲ 6.3	▲ 3.9
Net LNG Exports	3.3	10.8	12.9	12.3	12.5	11.2	11.1	▼ -0.1	▲ 0.2
Total Mexican Exports	5.9	7.1	6.5	6.7	7.0	7.1	7.0	▼ -0.1	▼ -0.1
Implied Daily Storage Activity	4.9	4.6	-5.4	5.4	12.0	10.5	4.6		
EIA Reported Daily Storage Activity									
Daily Model Error									

Source: Bloomberg, analytix.ai

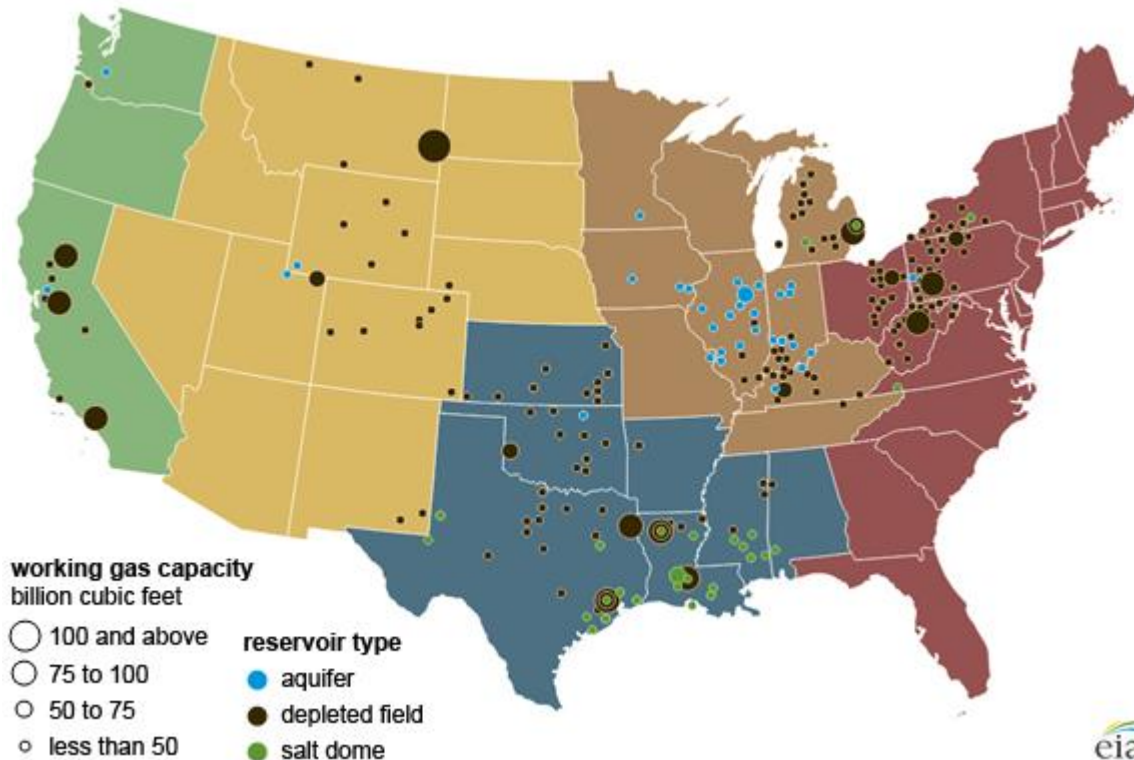
Regional S/D Models Storage Projection

Week Ending 22-Jul

	Daily Raw Storage	Daily Adjustment Factor	Daily Average Storage Activity (Adjusted) *	Weekly Adjusted Storage Activity
L48	3.0	-0.8	2.2	15
East	0.3	1.8	2.1	15
Midwest	3.0	-0.9	2.1	15
Mountain	4.4	-4.1	0.3	2
South Central	-5.4	3.2	-2.2	-16
Pacific	0.6	-0.8	-0.2	-1

*Adjustment Factor is calculated based on historical regional deltas

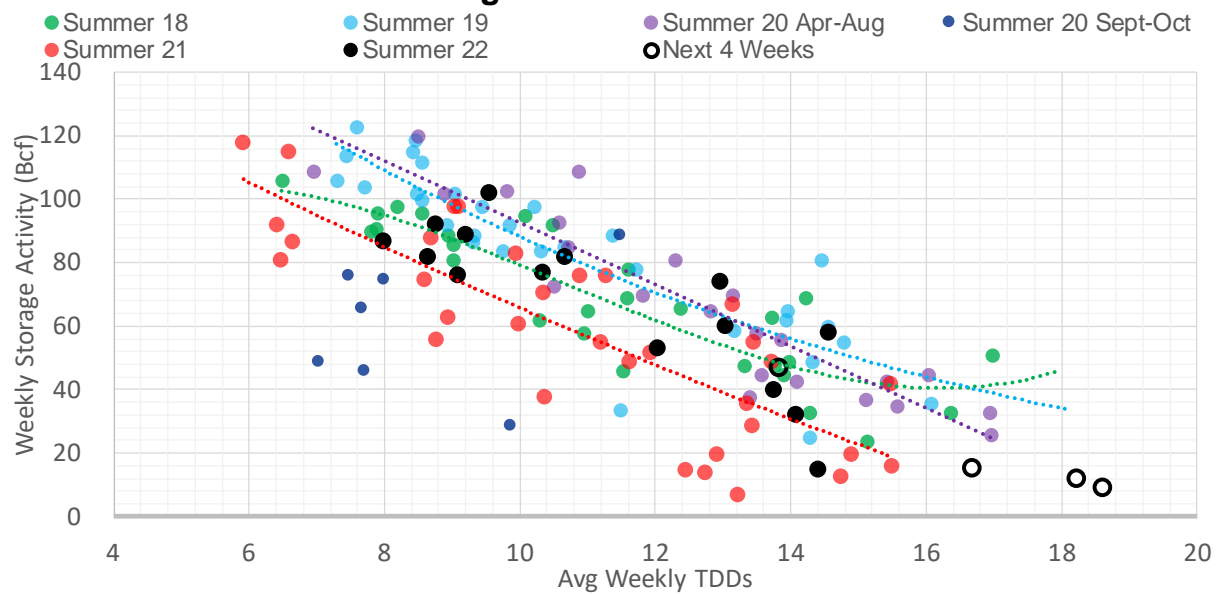
U.S. underground natural gas storage facilities by type (July 2015)



Weather Model Storage Projection

Next report and beyond		
Week Ending	GWDDs	Week Storage Projection
22-Jul	16.7	15
29-Jul	18.6	9
05-Aug	18.2	12
12-Aug	13.8	47

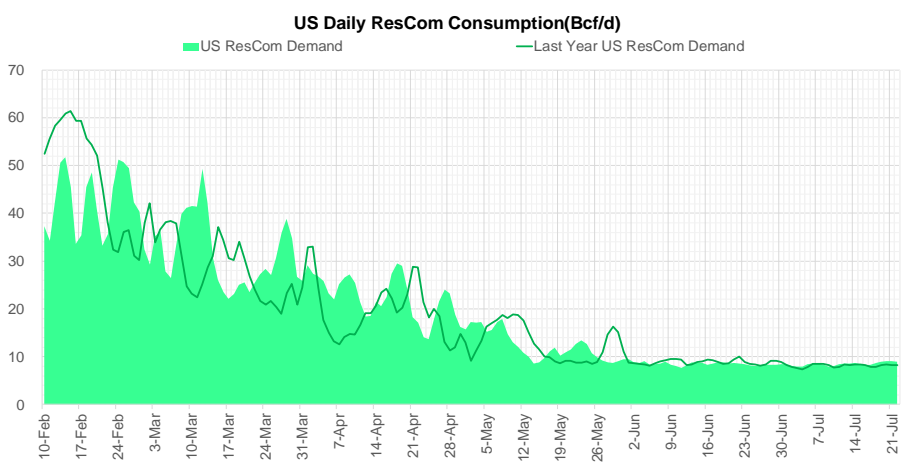
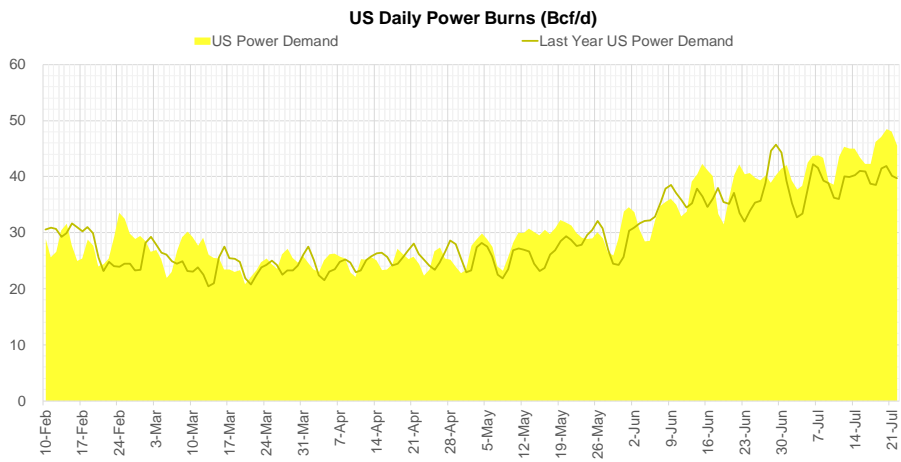
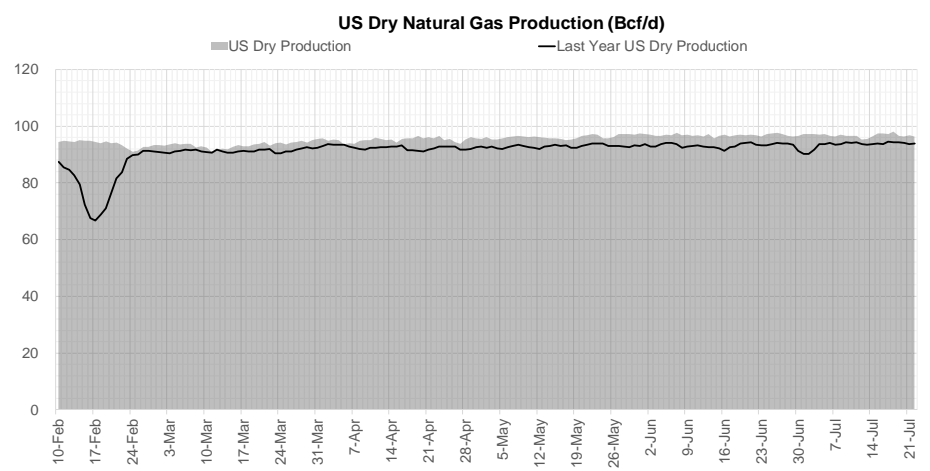
Weather Storage Model - Next 4 Week Forecast



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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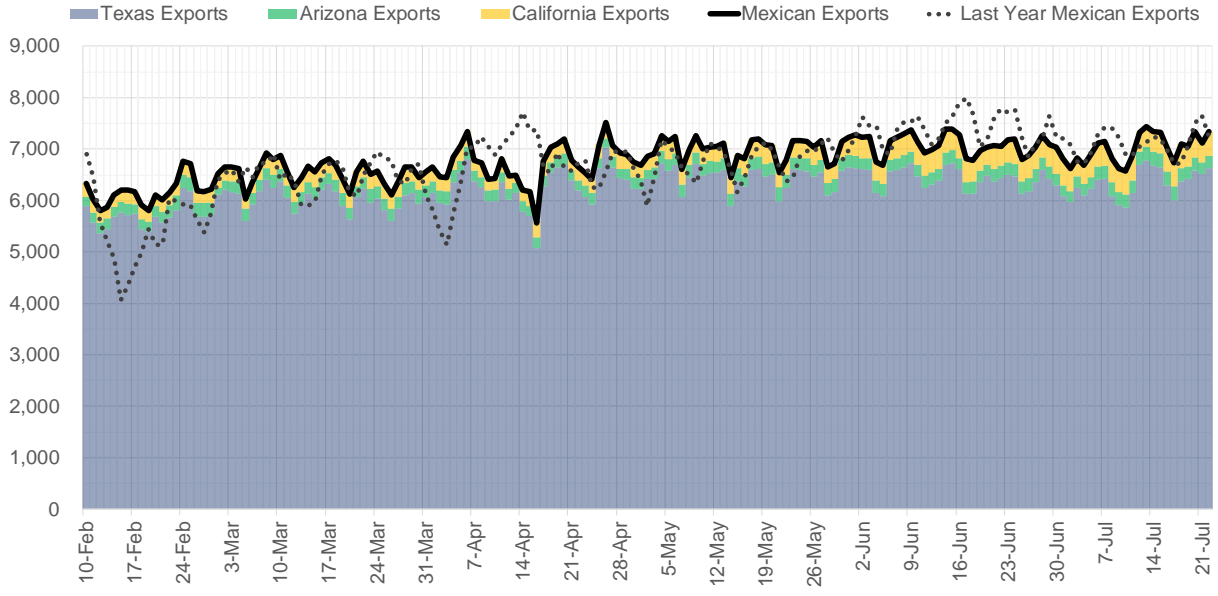
Supply – Demand Trends



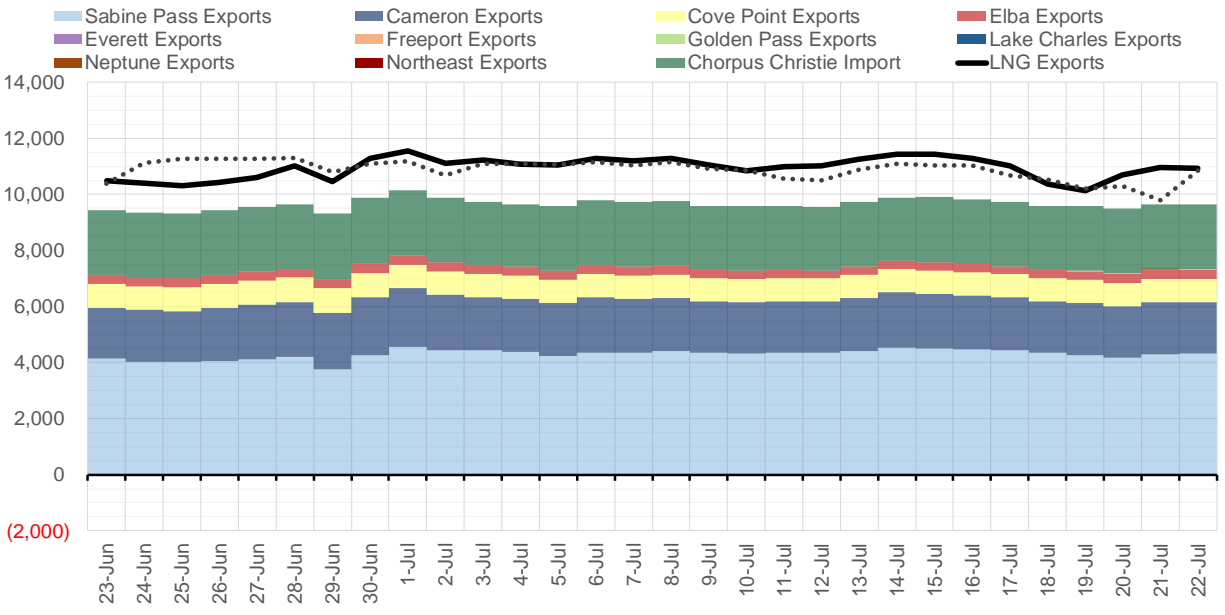
Source: Bloomberg

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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 and ICE data combined

CONTRACT MONTH	CONTRACT YEAR	PUT/CALL	STRIKE	CUMULATIVE VOL	CONTRACT MONTH	CONTRACT YEAR	PUT/CALL	STRIKE	CUMULATIVE OI
8	2022	C	10.00	7508	8	2022	C	10.00	42265
8	2022	C	9.00	6930	8	2022	C	12.00	36981
8	2022	C	10.50	5710	10	2022	C	6.00	35992
8	2022	C	8.00	5169	10	2022	P	3.00	32165
8	2022	P	7.00	5014	8	2022	C	10.50	29686
8	2022	C	8.50	4321	10	2022	P	2.50	28388
8	2022	P	7.50	3608	8	2022	C	7.00	28350
9	2022	P	5.00	2360	10	2022	P	6.00	24393
10	2022	P	3.00	1898	9	2022	C	6.00	24373
8	2022	C	8.75	1828	9	2022	C	10.00	23450
8	2022	P	8.00	1755	10	2022	C	5.00	23268
10	2022	P	7.00	1753	8	2022	C	12.10	22001
9	2022	P	6.50	1677	5	2023	P	2.00	21027
4	2023	P	4.00	1665	10	2022	P	3.50	20940
8	2022	C	7.50	1632	8	2022	C	9.00	20573
8	2022	P	6.50	1585	9	2022	P	4.00	20225
8	2022	P	7.25	1555	8	2022	P	6.00	19831
4	2023	P	3.50	1555	9	2022	C	7.00	19784
9	2022	C	9.00	1517	10	2022	P	4.00	19782
10	2022	C	11.00	1517	8	2022	C	6.00	19779
10	2022	C	9.00	1436	3	2023	C	10.00	19238
8	2022	P	6.75	1427	9	2022	C	9.00	19170
9	2022	C	8.00	1427	8	2022	P	7.00	19050
8	2022	C	9.50	1342	1	2023	C	10.00	18602
10	2022	P	3.50	1327	12	2022	C	5.00	18218
10	2022	C	10.00	1235	10	2022	P	5.00	18128
3	2023	C	10.00	1171	3	2023	P	3.00	18012
8	2022	P	7.10	1134	8	2022	C	8.00	17927
3	2023	C	20.00	1100	10	2022	C	10.00	17569
9	2022	C	11.00	1075	8	2022	P	5.00	16934
9	2022	P	3.50	1004	10	2022	P	2.00	16679
10	2022	P	2.80	1000	9	2022	P	3.00	16601
10	2022	C	8.00	996	10	2022	C	8.00	16547
2	2023	C	8.00	950	2	2023	C	10.00	16289
8	2022	C	11.00	930	8	2022	P	4.00	16119
8	2022	C	8.25	911	9	2022	C	4.00	15970
10	2022	C	7.75	813	10	2023	P	2.50	15705
10	2022	C	7.55	801	12	2022	P	5.00	15488
11	2022	C	8.00	800	9	2022	P	2.50	15476
11	2022	C	11.00	800	8	2022	P	3.00	15408
1	2023	C	12.00	800	10	2022	C	7.00	15131
2	2023	C	12.00	800	10	2022	P	3.25	15117
10	2022	P	2.50	789	4	2023	P	3.00	14929
9	2022	C	10.00	768	9	2022	C	9.50	14901
12	2022	C	12.00	750	9	2022	P	2.75	14887
12	2022	P	4.00	750	9	2022	P	5.00	14772
1	2023	P	4.00	750	10	2023	P	2.00	14254
3	2023	C	12.00	750	8	2022	P	5.50	14223
9	2022	P	6.00	724	12	2022	C	6.00	13937
					10	2023	P	3	13755

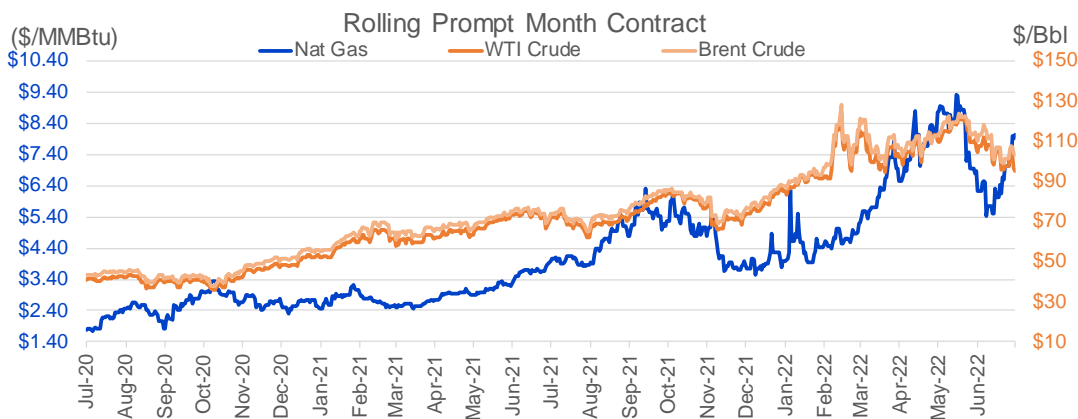
Source: CME, ICE

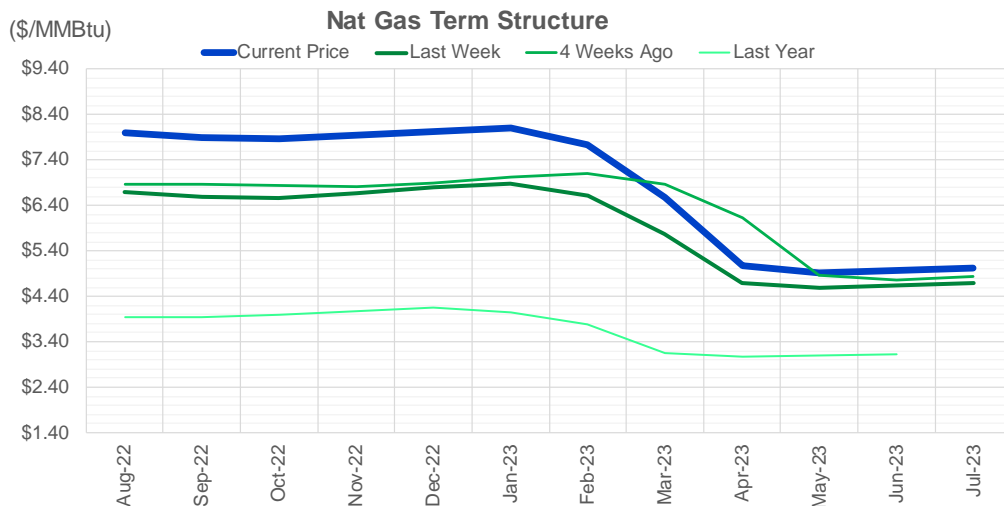
Nat Gas Futures Open Interest

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
AUG 22	19145	25793	-6648	AUG 22	76360	74567	1794
SEP 22	164529	163843	686	SEP 22	76556	77637	-1081
OCT 22	92307	93279	-972	OCT 22	73721	73168	554
NOV 22	67669	67128	541	NOV 22	59966	61127	-1161
DEC 22	49887	49575	312	DEC 22	64729	64417	312
JAN 23	71157	71572	-415	JAN 23	64047	63871	176
FEB 23	32823	32560	263	FEB 23	56583	55890	693
MAR 23	48597	47947	650	MAR 23	52026	52041	-15
APR 23	62069	62449	-380	APR 23	51782	51930	-148
MAY 23	58804	56493	2311	MAY 23	50773	50617	157
JUN 23	21512	21254	258	JUN 23	45153	45080	73
JUL 23	19987	19577	410	JUL 23	43777	43783	-7
AUG 23	18910	18811	99	AUG 23	42930	42814	115
SEP 23	16456	16294	162	SEP 23	42026	42036	-10
OCT 23	44304	43722	582	OCT 23	48749	48592	156
NOV 23	12500	12430	70	NOV 23	44610	44896	-286
DEC 23	11262	11594	-332	DEC 23	40340	40323	17
JAN 24	17395	17523	-128	JAN 24	39381	39205	177
FEB 24	7547	7525	22	FEB 24	29073	28958	115
MAR 24	16065	16598	-533	MAR 24	33796	33757	39
APR 24	13747	14009	-262	APR 24	28037	28029	8
MAY 24	6635	6621	14	MAY 24	26961	26953	8
JUN 24	2400	2429	-29	JUN 24	23877	23860	17
JUL 24	2184	2181	3	JUL 24	23988	23588	400
AUG 24	3183	3180	3	AUG 24	23518	23910	-393
SEP 24	1845	1838	7	SEP 24	23464	23449	15
OCT 24	8526	8521	5	OCT 24	26370	26632	-262
NOV 24	4708	4711	-3	NOV 24	24743	24562	182
DEC 24	7138	7133	5	DEC 24	27764	27601	163
JAN 25	14900	14904	-4	JAN 25	19932	19884	49

Source: CME, ICE






	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23
Current Price	\$8.007	\$7.899	\$7.870	\$7.944	\$8.030	\$8.109	\$7.726	\$6.588	\$5.074	\$4.923	\$4.975	\$5.028
Last Week	\$6.689	\$6.589	\$6.574	\$6.677	\$6.789	\$6.883	\$6.604	\$5.764	\$4.702	\$4.592	\$4.647	\$4.703
vs. Last Week	\$1.318	\$1.310	\$1.296	\$1.267	\$1.241	\$1.226	\$1.122	\$0.824	\$0.372	\$0.331	\$0.328	\$0.325
4 Weeks Ago	\$6.858	\$6.872	\$6.835	\$6.826	\$6.905	\$7.019	\$7.110	\$6.876	\$6.121	\$4.873	\$4.770	\$4.836
vs. 4 Weeks Ago	\$1.149	\$1.027	\$1.035	\$1.118	\$1.125	\$1.090	\$0.616	-\$0.288	-\$1.047	\$0.050	\$0.205	\$0.192
Last Year	\$3.959	\$3.938	\$3.935	\$3.990	\$4.084	\$4.141	\$4.053	\$3.781	\$3.157	\$3.064	\$3.092	\$3.126
vs. Last Year	\$4.048	\$3.961	\$3.935	\$3.954	\$3.946	\$3.968	\$3.673	\$2.807	\$1.917	\$1.859	\$1.883	\$1.902

	Units	Current Price	vs. Last Week	vs. 4 Weeks Ago	vs. Last Year
NatGas Jul21/Oct21	\$/MMBtu	2.224	▲ 0.000	▲ 0.000	▲ 1.865
NatGas Oct21/Nov21	\$/MMBtu	0.361	▲ 0.000	▲ 0.000	▲ 0.304
NatGas Oct21/Jan22	\$/MMBtu	-1.817	▲ 0.000	▲ 0.000	▼ -2.022
NatGas Apr22/Oct22	\$/MMBtu	2.448	▲ 1.280	▲ 1.495	▲ 2.467
WTI Crude	\$/Bbl	96.35	▲ 0.570	▼ -7.920	▲ 24.440
Brent Crude	\$/Bbl	103.86	▲ 4.760	▼ -6.190	▲ 30.070
Fuel Oil, NY Harbour 1%	\$/Bbl	97.18	▲ 0.000	▲ 0.000	▲ 0.000
Heating Oil	cents/Gallon	359.03	▼ -5.910	▼ -74.760	▲ 145.770
Propane, Mt. Bel	cents/Gallon	1.14	▲ 0.002	▼ -0.069	▲ 0.050
Ethane, Mt. Bel	cents/Gallon	0.57	▲ 0.034	▼ -0.066	▲ 0.258
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					
7/22/2022					
Baker Hughes 					
U.S. Breakout Information	This Week	+/-	Last Week	+/-	Year Ago
Oil	599	0	599	212	387
Gas	155	2	153	51	104
Miscellaneous	4	0	4	4	0
Directional	40	0	40	7	33
Horizontal	687	1	686	248	439
Vertical	31	1	30	12	19
Canada Breakout	This Week	+/-	Last Week	+/-	Year Ago
Oil	124	-1	125	31	93
Gas	71	5	66	16	55
Miscellaneous	0	0	0	-1	1
Major Basin Variances	This Week	+/-	Last Week	+/-	Year Ago
Ardmore Woodford	2	-2	4	0	2
Arkoma Woodford	5	0	5	4	1
Barnett	4	0	4	4	0
Cana Woodford	29	2	27	13	16
DJ-Niobrara	16	0	16	5	11
Eagle Ford	70	1	69	38	32
Granite Wash	6	1	5	4	2
Haynesville	68	0	68	20	48
Marcellus	38	0	38	10	28
Mississippian	1	0	1	1	0
Permian	349	-1	350	107	242
Utica	11	0	11	1	10
Williston	38	0	38	20	18