This was quite the week for price volatility. The market's mood shifted to the bullish side ahead of option expiry on Friday, and the Oct contact settlement tomorrow. Trading volume had already moved to the winter strip last week, and with the dropping production levels, there is more interest in next summer.

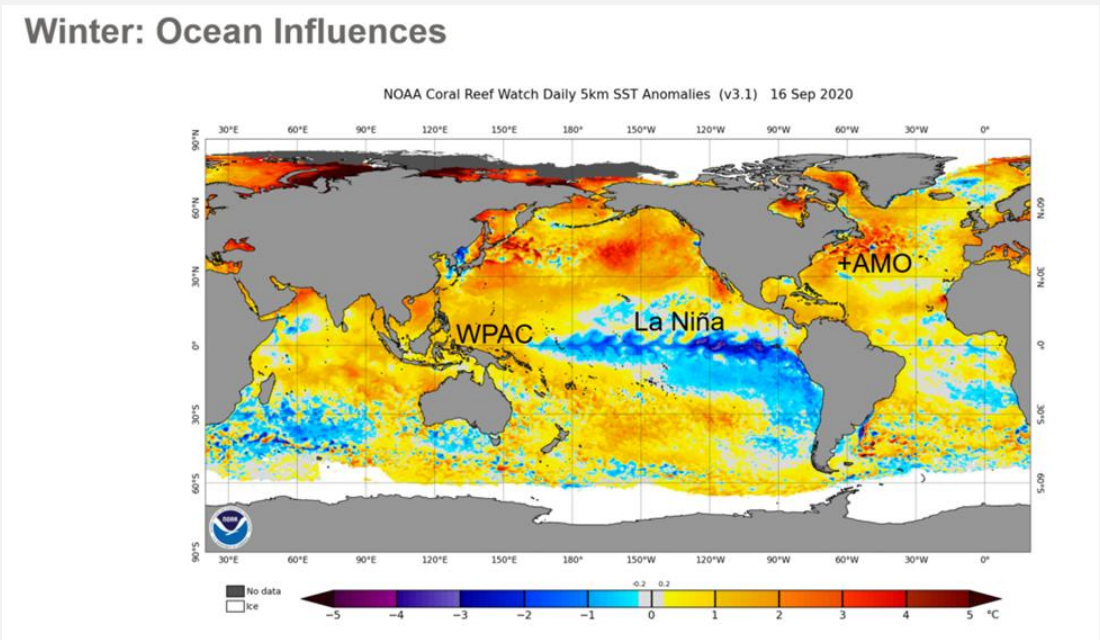
In this week's report, we turn to a quick note on the changes to the GFS Ensemble model last week and winter weather forecasts.

Let's start with the GFS Ensemble. This is the first change for the model in about 5 years and brings it up to speed with the GFS Operational model (FV3). The upgrade includes an expanded number of ensemble members, from 21 (old) to 31 (new), and better resolution to 0.25° (~25km) throughout its projections.

The GFS EN will take longer to run, about 2.5 hours versus the 1 hour of the previous version. The model begins at the same time as the GFS OP (about an hour earlier than in the previous version) and now finishes about an hour later.

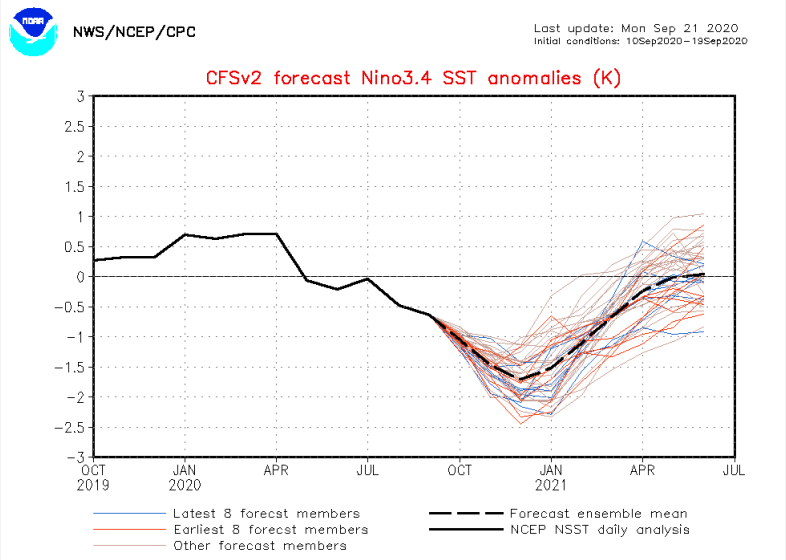
Overall, skill for near-surface temperatures should be slightly improved. Here is a link with more of an explanation.

The following images are from Maxar from a winter update outlook was posted on enelyst. The main oceanic influences that are driving this winter's forecast are three areas in particular of note — the obvious cool La Niña in the equatorial Pacific, the warm waters of the West Pacific (WPAC), and the warm waters of the Atlantic (+AMO).



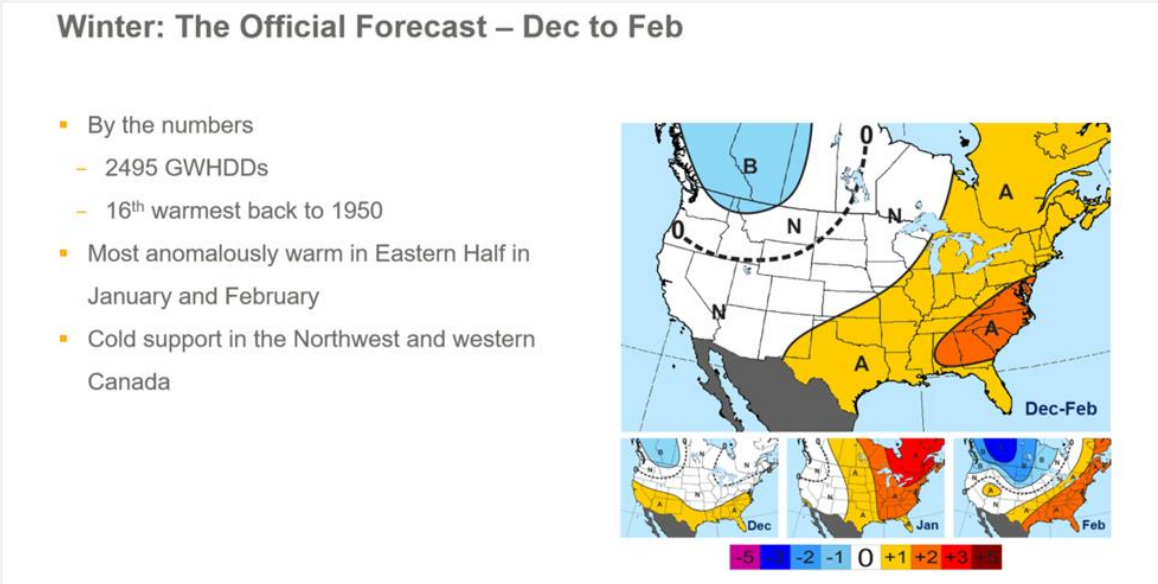
Market Report

La Niña aiming for weak to moderate intensity going into October with latest NOAA CFS model getting more aggressive with strong intensity potential deeper into Q4. The warm waters in the West tend to correlate with temperatures in winter – particularly in the Southwest and the Northeast. Finally, the +AMO is historically a warm influence in winter. 3 signals lining up.



Below is Maxar's winter forecast. They are calling for above-normal temperatures across the South and East, and below normal for the Northwest. This is a fairly typical La Nina type winter.

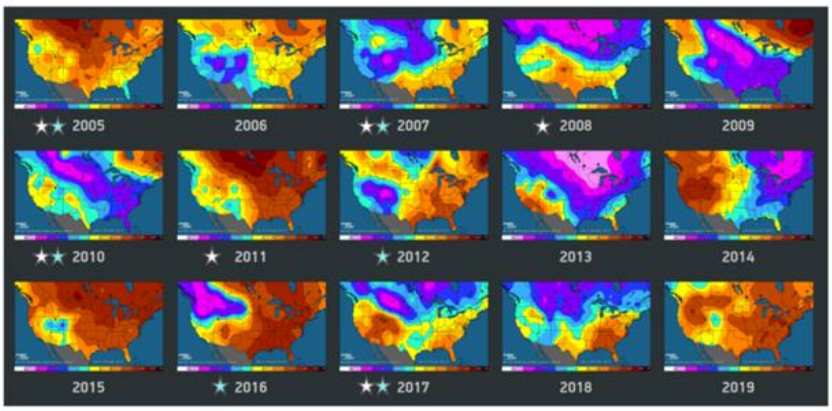
The forecast calls for Dec through Feb having 2495 GWHDDs. This is higher than the 2301 GWHDDS for the same winter months last year.



Looking at the past 15 winters, you see a variety of winter outcomes. The white stars represent past La Nina winters, and the green stars represent the most frequently used analog years by Maxar's forecasters.

Past 15 Winters (DJF)

- In the past 15 years:
  - 3 winters top 20 cold
    - 2013-14 ranked 8th
  - 8 winters top 20 warm
    - Includes top 4
  - 4 Middle of the road
  - But…5 in a row warmer than normal

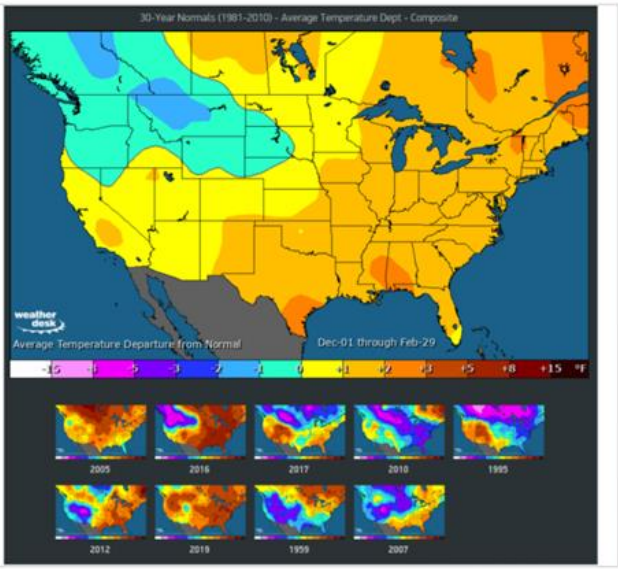


Below is a more detailed look at the analogs used by Maxar's forecasters. 2005-06 was the top analog year which was used by 14 or 82% of Maxar's forecasters. The larger map shows a weighted composite of all the analog years - which as expected looks like their winter forecast.

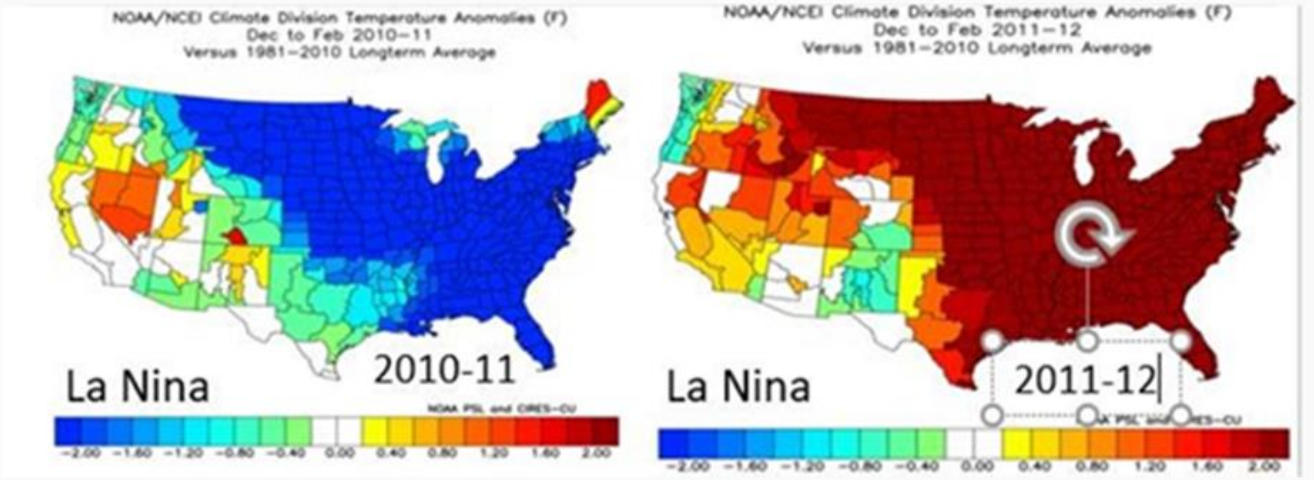
Winter: Forecaster Analogs

Year	# of forecasters	% of forecasters	Dec - Feb GWHDDs	Rank (Since 1950)
2005-06	14	82%	2418	11th Warmest
2016-17	10	59%	2263	1st Warmest
2017-18	9	53%	2525	20th Warmest
2010-11	7	41%	2764	18th Coldest
1995-96	6	35%	2734	23rd Coldest
2012-13	6	35%	2446	14th Warmest
2019-20	6	35%	2301	4th Warmest
1959-60	5	29%	2616	41st Coldest
2007-08	5	29%	2636	40th Coldest

- 4 top-15 warm seasons among the analogs
  - Including 2 in the top-5
- Zero top-15 cold seasons
  - Coldest analog ranks 18th at 2764 GWHDDs
- La Niña represented in 6 of 9 analogs
  - 2 ENSO-Neutral cases
  - 1 El Niño (last year)
- Analog set yields 2495 GWHDD average

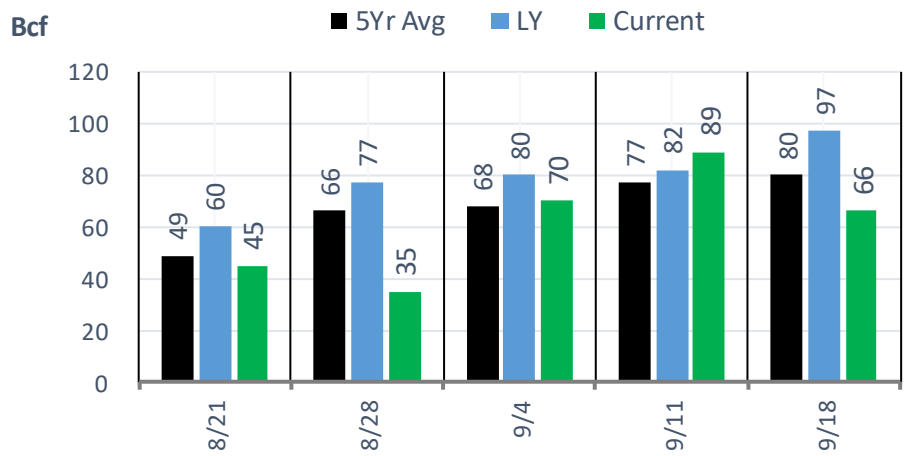


We finish this note with a bit of caution around La Nina winters. Not all La Nina events are the same. So regardless of how strong the signal, other factors can play a role leading to a totally different outcome. Below is two back to back winters that ended up vastly different.

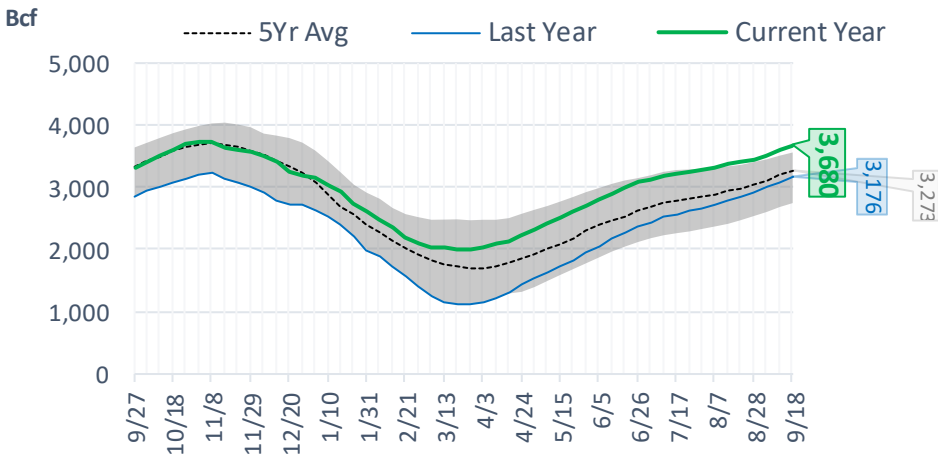


EIA Storage Report

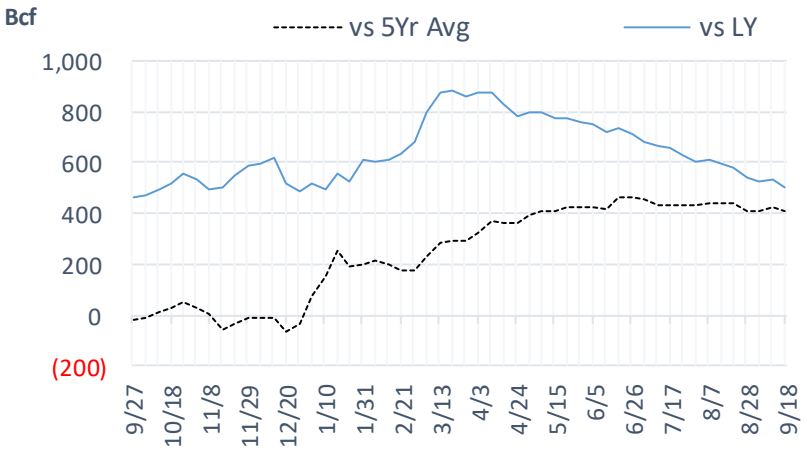
Total Lower 48 YoY Weekly Change



Total Lower 48 Storage Levels



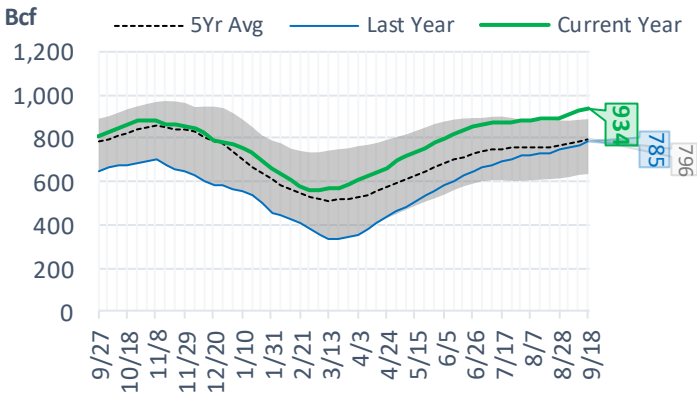
Total Lower 48 LY Surplus/Deficit



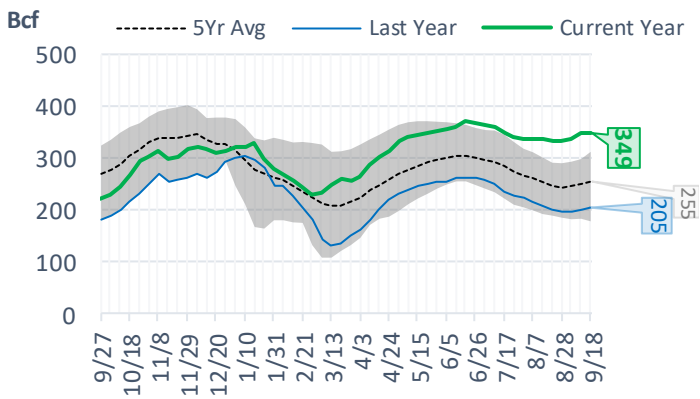
Natural Gas Storage Stats - Last 5 Weeks

Week Ending	Current 18-Sep	Week - 1 11-Sep	Week - 2 4-Sep	Week - 3 28-Aug	Week - 4 21-Aug	Week - 5 14-Aug
Total Lower 48 Storage Level	**3680**	3614	3525	3455	3420	3375
Weekly Change	**+66**	+89	+70	+35	+45	+43
vs LY	**+504**	+535	+528	+538	+580	+595
vs 5Yr Avg	**+407**	+421	+409	+407	+438	+442
S. Central Salt Storage Level	**349**	349	335	331	334	335
Weekly Change	**0**	+14	+4	-3	-1	-2
vs LY	**+144**	+149	+137	+133	+133	+127
vs 5Yr Avg	**+94**	+98	+89	+87	+87	+82
S. Central NonSalt Storage Level	**934**	927	908	895	889	888
Weekly Change	**+7**	+19	+13	+6	+1	+5
vs LY	**+149**	+157	+152	+150	+155	+159
vs 5Yr Avg	**+138**	+142	+134	+127	+127	+130
Midwest Storage Level	**1009**	983	953	924	904	880
Weekly Change	**+26**	+30	+29	+20	+24	+24
vs LY	**+85**	+95	+100	+108	+123	+129
vs 5Yr Avg	**+95**	+101	+104	+107	+121	+123
East Storage Level	**851**	825	805	789	775	750
Weekly Change	**+26**	+20	+16	+14	+25	+12
vs LY	**+66**	+69	+73	+84	+99	+97
vs 5Yr Avg	**+48**	+46	+49	+55	+66	+62
Mountain Storage Level	**225**	221	216	212	212	209
Weekly Change	**+4**	+5	+4	0	+3	+3
vs LY	**+33**	+34	+35	+36	+40	+42
vs 5Yr Avg	**+24**	+24	+22	+22	+25	+25
Pacific Storage Level	**312**	310	308	304	306	313
Weekly Change	**+2**	+2	+4	-2	-7	-1
vs LY	**+28**	+32	+33	+27	+29	+40

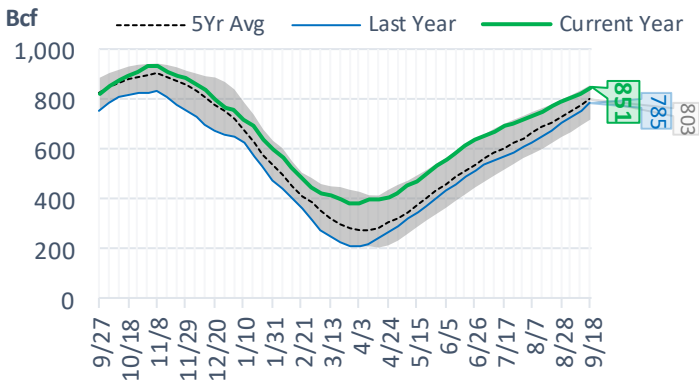
NonSalt Storage Levels



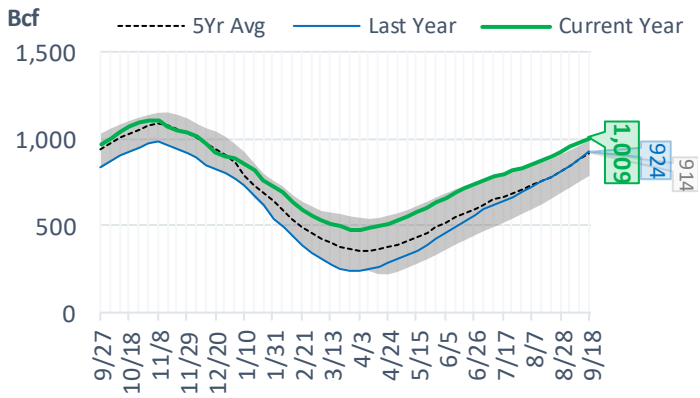
Salt Storage Levels



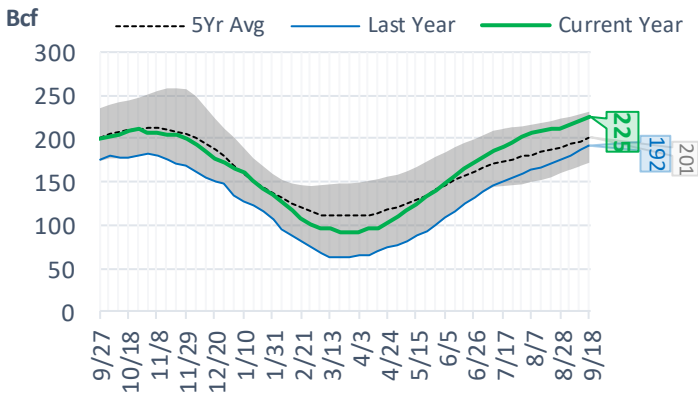
East Storage Levels



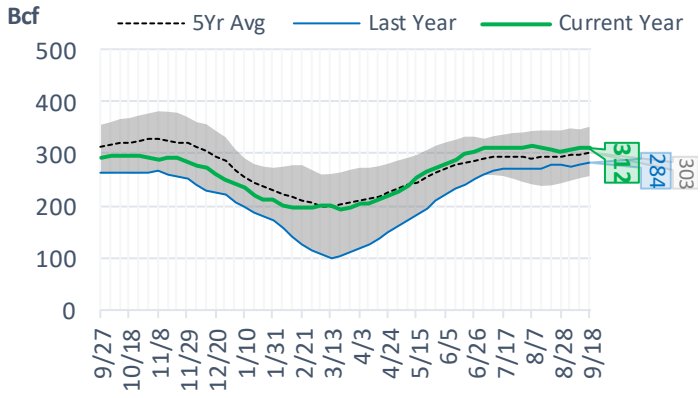
Midwest Storage Levels



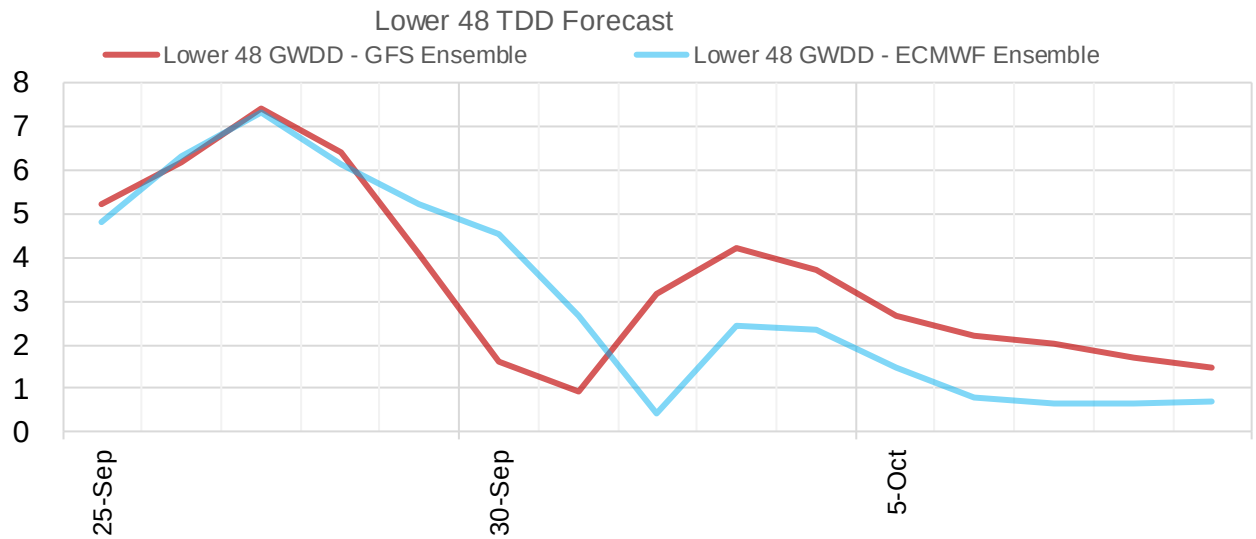
Mountain Storage Levels

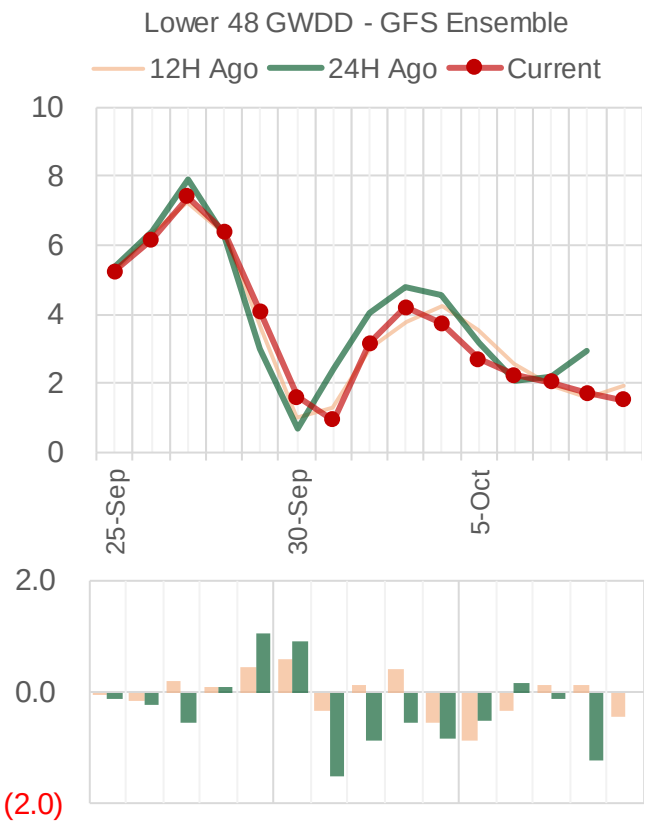


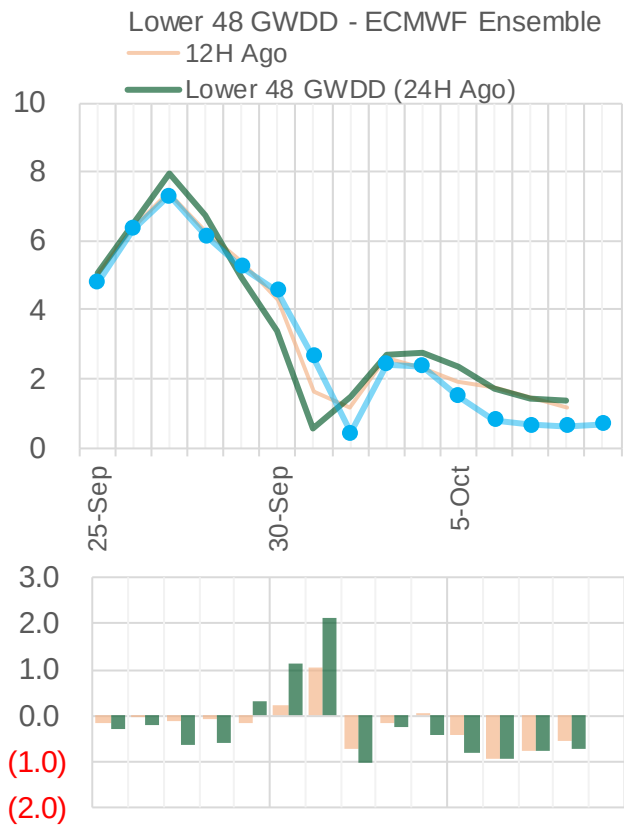
Pacific Storage Levels



Current Short-term Weather Model Outlooks (00z)







Source: WSI , Bloomberg

EIA Storage Week Balances

	21-Aug	28-Aug	4-Sep	11-Sep	18-Sep	25-Sep	WoW	vs. 4W
Lower 48 Dry Production	**87.2**	**86.0**	**86.3**	**88.3**	**87.1**	**86.2**	**-0.9**	**-0.7**
Canadian Imports	**4.7**	**5.2**	**4.4**	**3.8**	**3.8**	**3.6**	**-0.2**	**-0.7**
L48 Power	40.0	41.6	37.3	35.2	33.2	30.6	-2.7	-6.2
L48 Residential & Commercial	8.2	8.3	7.8	8.8	8.5	10.3	1.9	2.0
L48 Industrial	20.4	19.6	19.6	18.8	20.4	19.1	-1.2	-0.5
L48 Lease and Plant Fuel	4.8	4.8	4.8	4.9	4.9	4.8	0.0	0.0
L48 Pipeline Distribution	2.2	2.3	2.1	2.1	2.0	1.9	0.0	-0.2
L48 Regional Gas Consumption	**75.6**	**76.6**	**71.6**	**69.8**	**68.9**	**66.8**	**-2.1**	**-4.9**
Net LNG Exports	**4.7**	**3.9**	**3.0**	**5.2**	**7.3**	**5.8**	**-1.4**	**1.0**
Total Mexican Exports	**6.2**	**6.6**	**6.5**	**6.4**	**6.2**	**6.4**	**0.2**	**0.0**
Implied Daily Storage Activity	**5.3**	**4.1**	**9.5**	**10.8**	**8.4**	**10.7**	**2.3**	
EIA Reported Daily Storage Activity	**6.4**	**5.0**	**10.0**	**12.7**	**9.4**			
Daily Model Error	**-1.1**	**-0.9**	**-0.5**	**-1.9**	**-1.0**			

Monthly Balances

	2Yr Ago Sep-18	LY Sep-19	May-20	Jun-20	Jul-20	Aug-20	MTD Sep-20	MoM	vs. LY
Lower 48 Dry Production	**85.2**	**93.5**	**85.8**	**85.1**	**86.6**	**86.8**	**87.0**	**0.1**	**-6.5**
Canadian Imports	**4.5**	**4.7**	**3.9**	**4.0**	**4.4**	**4.8**	**3.8**	**-1.1**	**-0.9**
L48 Power	34.3	36.4	26.9	34.8	43.9	40.6	33.7	-6.9	-2.7
L48 Residential & Commercial	8.5	8.3	12.9	9.0	8.6	8.1	9.0	0.9	0.7
L48 Industrial	21.6	22.2	18.9	18.4	17.8	19.6	19.4	-0.2	-2.9
L48 Lease and Plant Fuel	4.8	5.2	4.8	4.9	4.9	4.8	4.8	0.0	-0.4
L48 Pipeline Distribution	2.0	2.1	1.9	2.0	2.4	2.2	2.0	-0.2	-0.1
L48 Regional Gas Consumption	**71.2**	**74.3**	**65.5**	**69.1**	**77.5**	**75.3**	**68.9**	**-6.3**	**-5.3**
Net LNG Exports	**3.1**	**6.2**	**6.7**	**4.0**	**3.3**	**4.0**	**5.8**	**1.7**	**-0.4**
Total Mexican Exports	**5.1**	**5.4**	**4.9**	**5.7**	**6.1**	**6.3**	**6.4**	**0.1**	**1.0**
Implied Daily Storage Activity	**10.3**	**12.4**	**12.6**	**10.2**	**4.1**	**6.1**	**9.6**		
EIA Reported Daily Storage Activity									
Daily Model Error									

Source: Bloomberg, analytix.ai

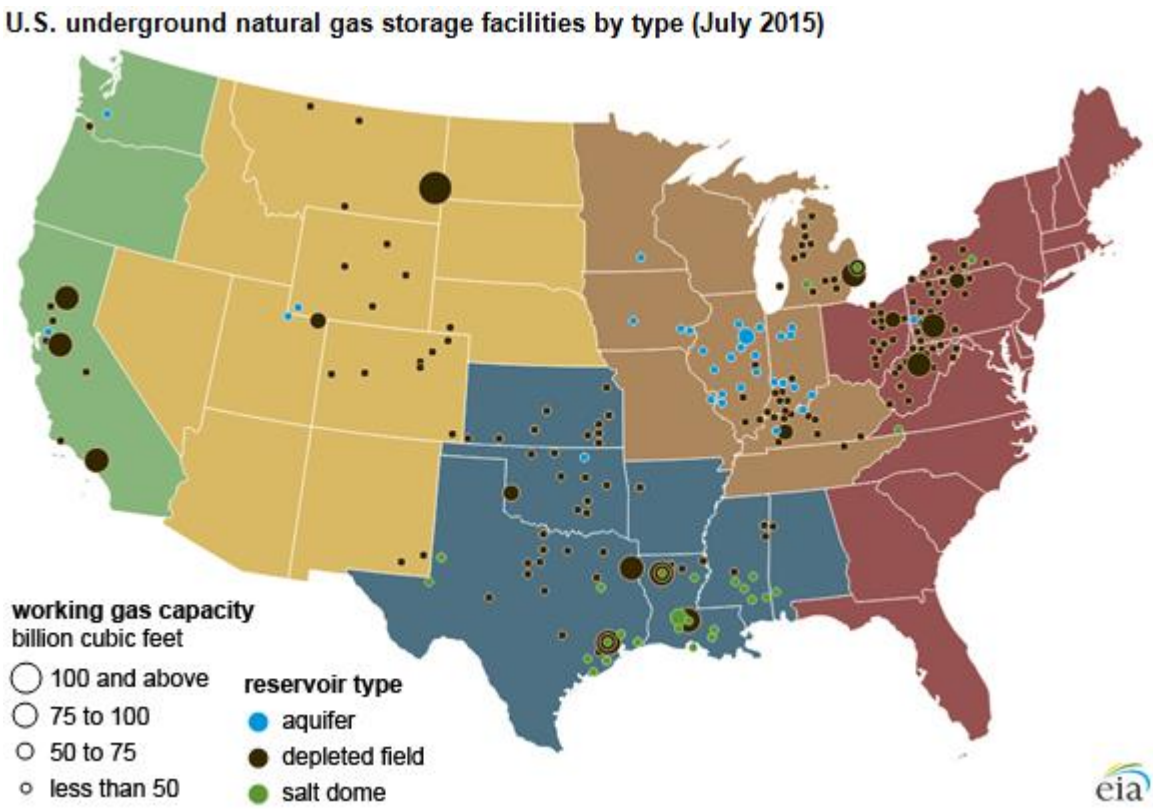
Market Report

Regional S/D Models Storage Projection

Week Ending 25-Sep

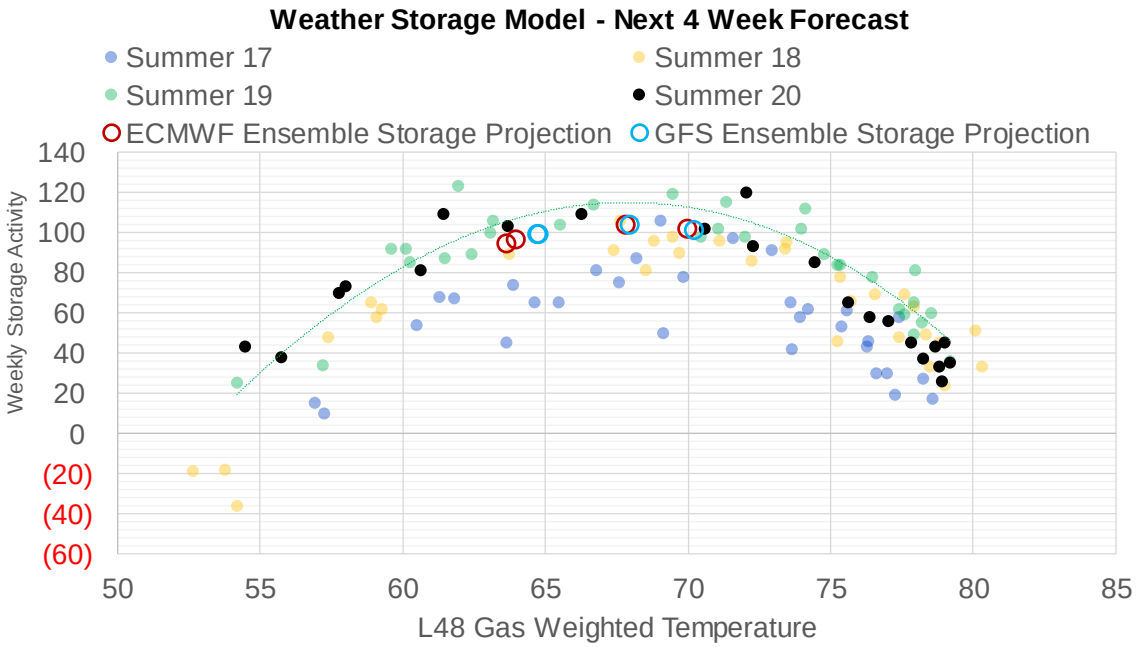
	Daily Raw Storage	Daily Adjustment Factor	Daily Average Storage Activity (Adjusted) *	Weekly Adjusted Storage Activity
L48	10.5	1.4	11.9	83
East	0.7	1.7	2.5	17
Midwest	3.5	0.4	3.8	27
Mountain	3.9	-2.9	1.0	7
South Central	1.0	2.8	3.8	26
Pacific	1.3	-0.5	0.8	6

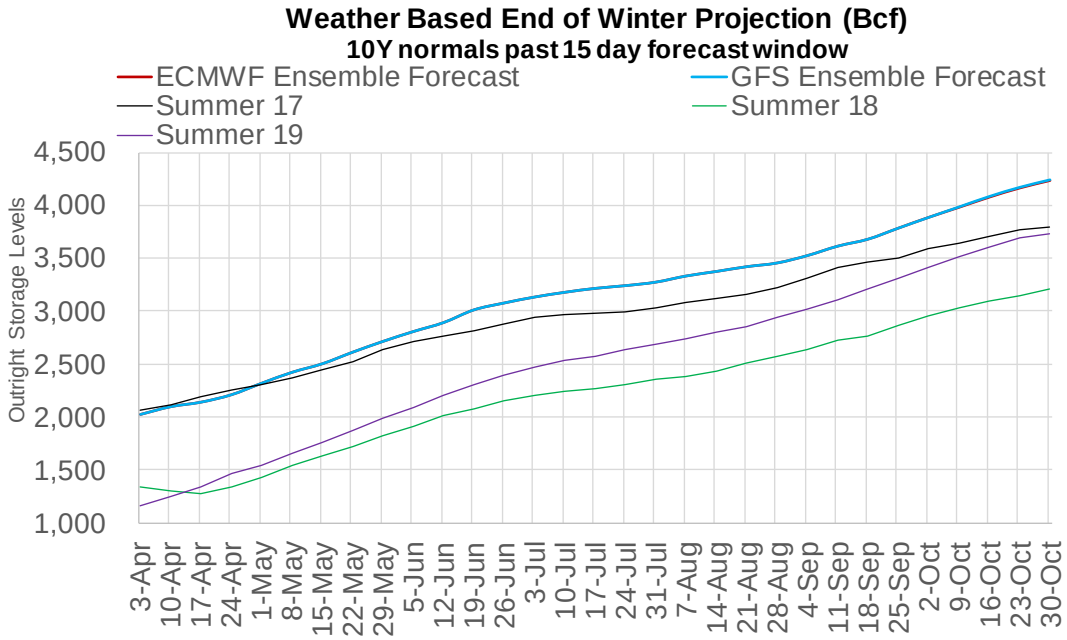
*Adjustment Factor is calcuated based on historical regional deltas



Weather Model Storage Projection

Next report and beyond	
Week Ending	Week Storage Projection
2-Oct	102
9-Oct	97
16-Oct	98





Weather Model Storage Projection to End of Season

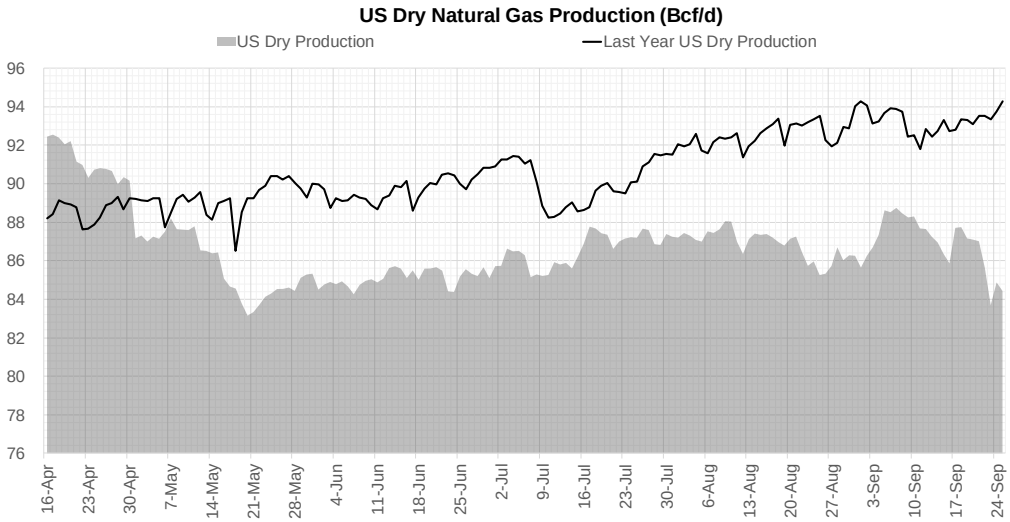
L48 Storage Trajectory from Weather Model

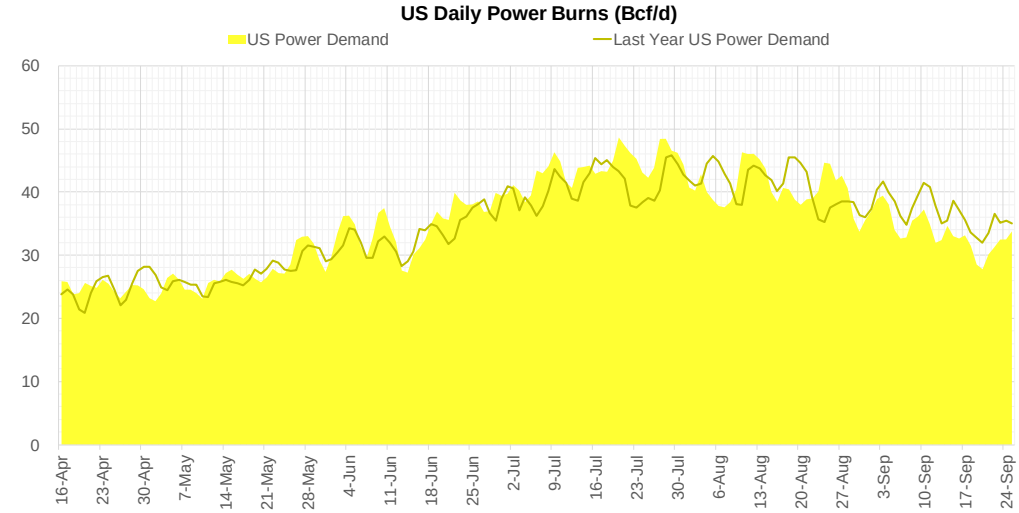
Forecast Storage Levels

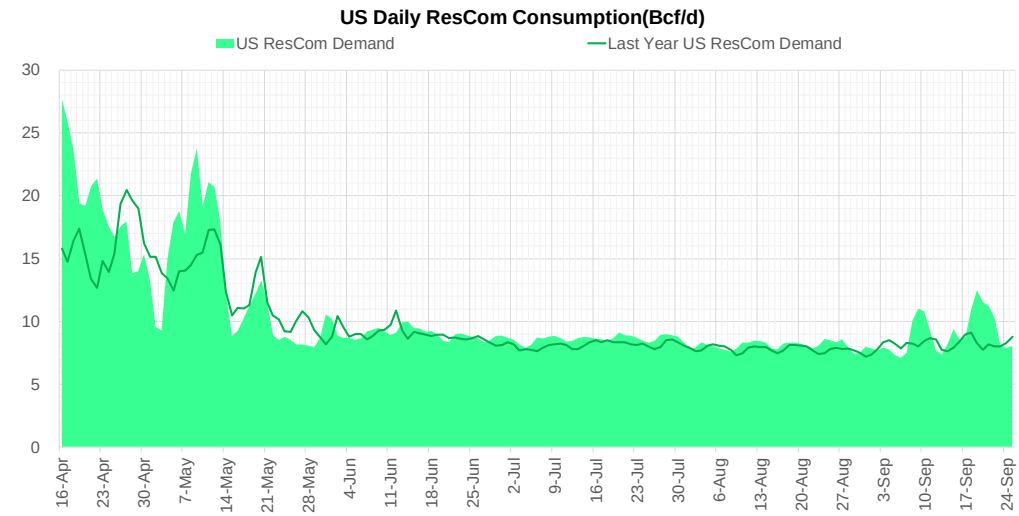
	Report Storage Level	vs. LY	vs 5Yr Avg	Reported Chg	Estimate Chg *	LY Chg	vs. LY	5Yr Avg Chg	vs. 5Yr
3-Apr-20	2024	876	324	38		25	13	6	32
10-Apr-20	2097	876	370	73		73	0	27	46
17-Apr-20	2140	827	364	43		92	(49)	49	(6)
24-Apr-20	2210	783	360	70		114	(44)	74	(4)
1-May-20	2319	796	395	109		96	13	74	35
8-May-20	2422	799	413	103		100	3	85	18
15-May-20	2503	779	407	81		101	(20)	87	(6)
22-May-20	2612	778	423	109		110	(1)	93	16
29-May-20	2714	762	422	102		118	(16)	103	(1)
5-Jun-20	2807	748	421	93		107	(14)	94	(1)
12-Jun-20	2892	722	419	85		111	(26)	87	(2)
19-Jun-20	3012	739	466	120		103	17	73	47
26-Jun-20	3077	712	466	65		92	(27)	65	0
3-Jul-20	3133	685	454	56		83	(27)	68	(12)
10-Jul-20	3178	663	436	45		67	(22)	63	(18)
17-Jul-20	3215	656	436	37		44	(7)	37	0
24-Jul-20	3241	626	429	26		56	(30)	33	(7)
31-Jul-20	3274	601	429	33		58	(25)	33	0
7-Aug-20	3332	608	443	58		51	7	44	14
14-Aug-20	3375	595	442	43		56	(13)	44	(1)
21-Aug-20	3420	580	438	45		60	(15)	49	(4)
28-Aug-20	3455	538	407	35		77	(42)	66	(31)
4-Sep-20	3525	528	409	70		80	(10)	68	2
11-Sep-20	3614	535	421	89		82	7	77	12
18-Sep-20	3680	504	407	66		97	(31)	80	(14)
25-Sep-20					104	109	(5)	78	26
2-Oct-20					102	102	(0)	86	16
9-Oct-20					97	102	(5)	87	10
16-Oct-20					98	92	6	75	23
23-Oct-20					86	89	(3)	67	19
30-Oct-20					71	49	22	52	19
			2251	**2596**	**(345)**	**2024**	**227**		

* first 15D change is an average of the GFS Ensemble and ECMWF Ensemble

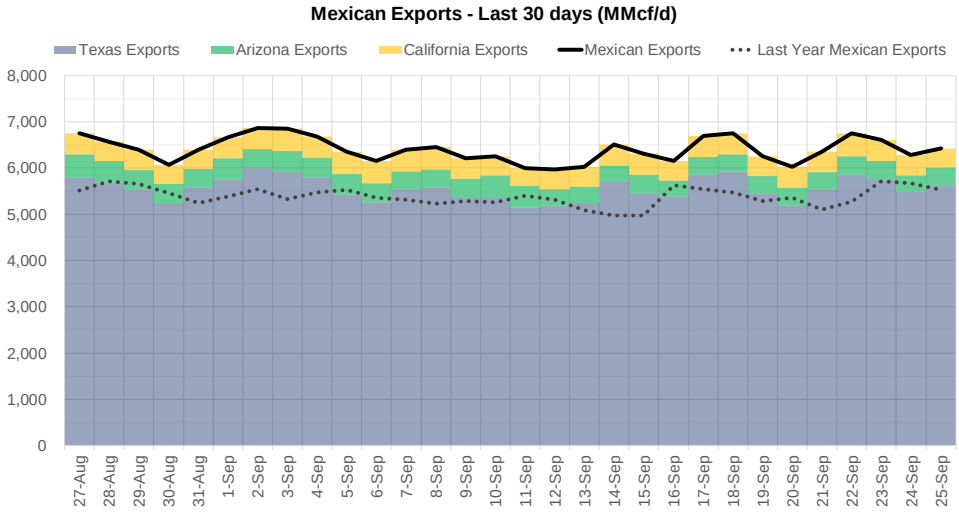
Supply – Demand Trends

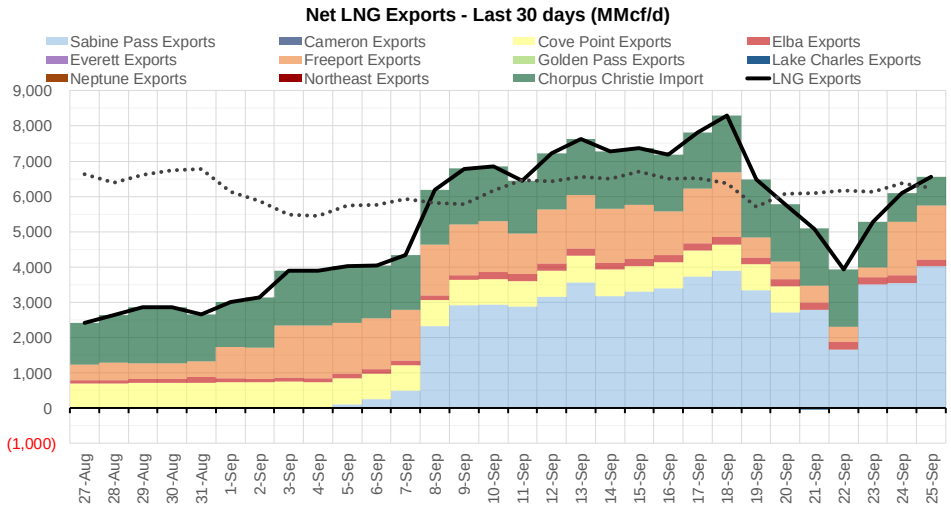






Source: Bloomberg





Source: Bloomberg

Nat Gas Options Volume and Open Interest

CME, ICE and Nasdaq Combined

CONTRACT MONTH	CONTRACT YEAR	PUT/CALL	STRIKE	CUMULATIVE VOL
10	2020	P	2.00	10743
10	2020	C	2.25	8994
10	2020	P	2.10	7935
10	2020	C	2.50	5723
12	2020	C	4.00	5335
10	2020	P	1.90	5273
11	2020	C	3.50	5016
10	2020	C	2.15	4513
11	2020	C	4.00	4431
10	2020	C	2.30	4368
11	2020	P	2.25	3927
10	2020	C	2.40	3925
10	2020	P	2.15	3850
10	2020	C	2.35	3760
10	2020	P	2.05	3670
10	2020	C	2.10	3620
10	2020	C	2.20	3514
11	2020	P	2.00	3382
11	2020	C	3.25	3140
10	2020	P	2.20	2966
11	2020	C	3.00	2578
1	2021	C	5.00	2562
10	2020	P	2.25	2341
1	2021	C	3.50	2298
3	2021	P	2.25	2208
11	2020	C	3.75	2025
1	2021	P	3.00	1850
2	2021	P	2.25	1825
3	2021	C	4.00	1805
11	2020	C	2.90	1788
1	2021	C	3.00	1780
1	2021	P	2.25	1701
10	2020	C	2.60	1664
5	2021	C	3.25	1575
1	2021	C	3.25	1568
10	2020	P	1.75	1520
1	2021	C	3.75	1503
1	2021	P	2.00	1350
11	2020	P	2.50	1332
12	2020	C	3.25	1251
10	2020	P	1.85	1189
12	2020	P	2.50	1153
11	2020	P	2.30	1147
11	2020	C	3.40	1130
12	2020	C	5.00	1036
10	2020	P	1.80	1033
10	2020	P	1.95	1001
1	2022	C	4.00	1000
11	2020	C	4.90	928

CONTRACT MONTH	CONTRACT YEAR	PUT/CALL	STRIKE	CUMULATIVE OI
10	2020	C	2.75	50073
10	2020	C	3.00	48326
10	2020	P	2.00	45878
10	2020	P	1.50	42161
10	2020	P	1.75	38187
10	2020	P	2.25	37291
10	2020	C	2.50	35614
10	2020	P	1.60	35553
3	2021	P	2.00	33152
4	2021	C	5.00	32747
11	2020	C	3.50	28908
11	2020	C	5.00	28051
3	2021	C	3.25	27403
11	2020	P	2.00	27250
10	2020	P	1.25	27111
3	2021	C	4.00	26960
10	2020	C	2.25	25420
11	2020	P	2.25	24677
12	2020	P	2.00	24629
10	2020	P	1.80	23961
10	2020	P	2.10	23954
1	2021	C	3.50	23577
3	2021	C	6.00	23510
10	2020	C	3.25	23427
10	2020	C	2.00	23393
10	2020	P	1.90	23199
1	2021	C	4.50	23176
12	2020	P	2.50	22700
10	2020	P	1.00	22550
3	2021	C	3.00	22161
10	2020	C	2.10	22076
10	2020	P	2.20	22014
10	2020	P	1.30	20777
1	2021	C	5.00	20406
11	2020	C	3.00	19630
3	2021	C	3.50	19584
10	2020	C	2.80	19238
10	2020	C	3.50	18823
11	2020	C	3.25	18274
10	2020	P	1.85	18096
11	2020	P	2.50	18055
10	2020	C	2.40	17828
10	2020	C	2.60	17718
2	2021	C	5.00	17247
1	2021	C	3.00	16884
1	2021	C	3.75	16303
12	2020	C	4.00	16190
1	2021	P	2.50	16123
10	2020	C	2.15	16026
10	2020	P	1.7	15942.25

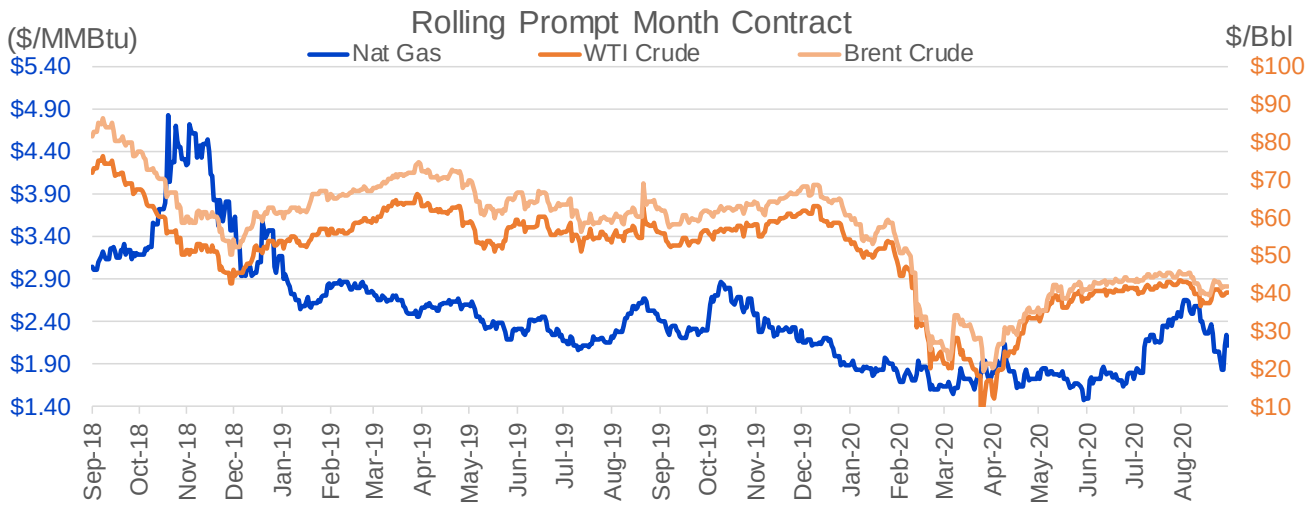
Source: CME, Nasdaq, ICE

Nat Gas Futures Open Interest

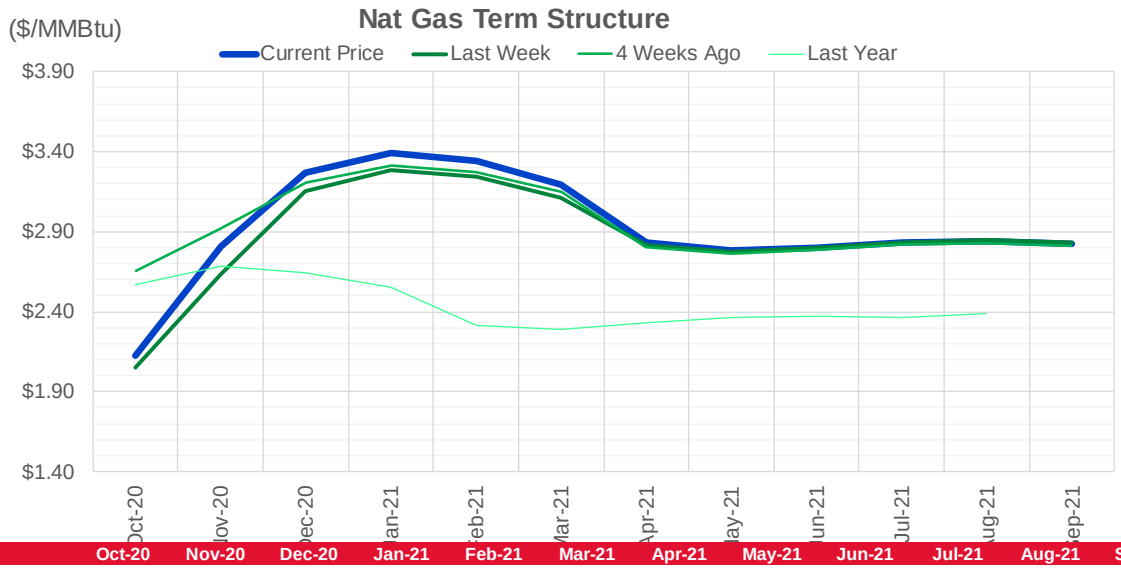
CME, ICE and Nasdaq Combined

CME Henry Hub Futures (10,000 MMBtu)				ICE Henry Hub Futures Contract Equivalent (10,000 MM			
	Current	Prior	Daily Change	FOR JUNE 26	Current	Prior	Daily Change
OCT 20	13565	20304	-6739	OCT 20	72427	73817	-1390
NOV 20	286024	290923	-4899	NOV 20	82662	83553	-890.75
DEC 20	137085	138272	-1187	DEC 20	77303	77259	44
JAN 21	144402	146920	-2518	JAN 21	87568	87906	-337.25
FEB 21	60070	59001	1069	FEB 21	60617	59893	724.5
MAR 21	120284	120703	-419	MAR 21	79610	80236	-626
APR 21	80429	80945	-516	APR 21	64669	65507	-837.75
MAY 21	47798	44677	3121	MAY 21	57457	56741	715.75
JUN 21	31065	29699	1366	JUN 21	52718	52377	341.25
JUL 21	20111	20380	-269	JUL 21	55179	54898	280.25
AUG 21	25181	24591	590	AUG 21	55268	54610	657.5
SEP 21	32442	31593	849	SEP 21	51856	51486	370.25
OCT 21	75916	75003	913	OCT 21	77884	77294	590
NOV 21	28332	28185	147	NOV 21	44641	44451	189.25
DEC 21	25171	25329	-158	DEC 21	44267	43889	378
JAN 22	25732	26556	-824	JAN 22	37756	37481	275.5
FEB 22	14452	14225	227	FEB 22	32438	32387	50.5
MAR 22	18881	18984	-103	MAR 22	34595	34534	61
APR 22	23081	23050	31	APR 22	35673	35502	171
MAY 22	6818	6821	-3	MAY 22	25480	25310	169.75
JUN 22	3857	3856	1	JUN 22	24103	23922	180.5
JUL 22	3392	3303	89	JUL 22	25520	25333	187.25
AUG 22	2264	2181	83	AUG 22	24452	24260	192.5
SEP 22	2188	2151	37	SEP 22	23455	23264	190.25
OCT 22	3555	3521	34	OCT 22	25388	25136	252
NOV 22	2662	2662	0	NOV 22	22891	22772	118.5
DEC 22	2820	2670	150	DEC 22	25004	24837	166.75
JAN 23	2822	2812	10	JAN 23	12665	12647	18.5
FEB 23	885	875	10	FEB 23	12062	12038	24
MAR 23	911	911	0	MAR 23	12143	12015	128.75

Source: CME, ICE



Market Report



	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21
Current Price	**$2.127**	**$2.807**	**$3.271**	**$3.392**	**$3.340**	**$3.191**	**$2.836**	**$2.782**	**$2.799**	**$2.830**	**$2.841**	**$2.823**
Last Week	$2.048	$2.633	$3.154	$3.285	$3.242	$3.116	$2.813	$2.771	$2.798	$2.834	$2.845	$2.833
vs. Last Week	$0.079	$0.174	$0.117	$0.107	$0.098	$0.075	$0.023	$0.011	$0.001	-$0.004	-$0.004	-$0.010
4 Weeks Ago	$2.657	$2.916	$3.208	$3.316	$3.271	$3.146	$2.807	$2.761	$2.786	$2.818	$2.826	$2.813
vs. 4 Weeks Ago	-$0.530	-$0.109	$0.063	$0.076	$0.069	$0.045	$0.029	$0.021	$0.013	$0.012	$0.015	$0.010
Last Year	$2.404	$2.565	$2.681	$2.646	$2.552	$2.312	$2.289	$2.326	$2.366	$2.374	$2.359	$2.388
vs. Last Year	-$0.277	$0.242	$0.590	$0.746	$0.788	$0.879	$0.547	$0.456	$0.433	$0.456	$0.482	$0.435

	Units	Current Price	vs. Last Week	vs. 4 Weeks Ago	vs. Last Year
NatGas Jan/Apr	$/MMBtu	-0.56	-0.084	-0.047	-0.130
NatGas Mar/Apr	$/MMBtu	-0.355	-0.052	-0.694	-0.622
NatGas Oct/Nov	$/MMBtu	0.68	0.095	0.421	0.614
NatGas Oct/Jan	$/MMBtu	1.27	0.028	0.606	0.918
WTI Crude	$/Bbl	40.06	-1.050	-2.910	-15.850
Brent Crude	$/Bbl	41.80	-1.350	-3.250	-20.110
Fuel Oil, NY Harbour 1%	$/Bbl	98.03	0.000	0.000	0.000
Heating Oil	cents/Gallon	112.53	-3.370	-9.090	-81.630
Propane, Mt. Bel	cents/Gallon	0.49	-0.004	-0.013	0.043
Ethane, Mt. Bel	cents/Gallon	0.20	0.002	-0.041	-0.012
Coal, PRB	$/MTon	12.30	0.000	0.000	0.100
Coal, ILB	$/MTon	31.05	0.000	0.000	-4.500

Source: CME, Bloomberg

Baker Hughes Rig Counts

Oil rigs increased by 4 each this week, while natural gas rigs increased by 2. The weekly changes for the major basins are listed below.

Rotary Rig Count

9/25/2020

Baker Hughes

U.S. Breakout Information	This Week	+/-	Last Week	+/-	Year Ago
Oil	183	4	179	-530	713
Gas	75	2	73	-71	146
Miscellaneous	3	0	3	2	1
Directional	21	-2	23	-36	57
Horizontal	224	9	215	-528	752
Vertical	16	-1	17	-35	51
Canada Breakout	**This Week**	**+/-**	**Last Week**	**+/-**	**Year Ago**
Oil	33	3	30	-55	88
Gas	38	4	34	-1	39
Major Basin Variances	**This Week**	**+/-**	**Last Week**	**+/-**	**Year Ago**
Ardmore Woodford	0	0	0	-2	2
Arkoma Woodford	1	0	1	-2	3
Barnett	0	0	0	-4	4
Cana Woodford	6	0	6	-32	38
DJ-Niobrara	4	0	4	-18	22
Eagle Ford	12	3	9	-50	62
Granite Wash	1	0	1	-1	2
Haynesville	36	0	36	-14	50
Marcellus	26	1	25	-24	50
Mississippian	0	0	0	-2	2
Permian	125	2	123	-289	414
Utica	6	1	5	-6	12
Williston	10	0	10	-43	53