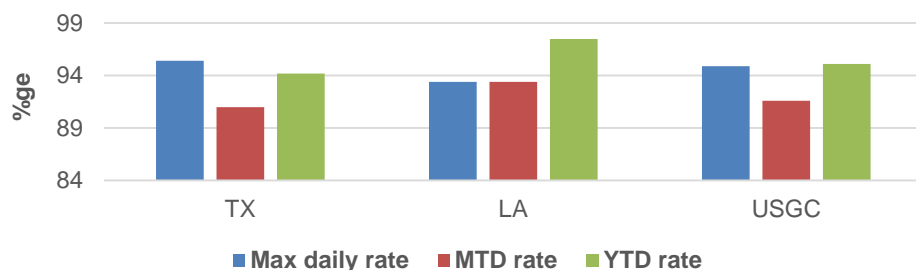


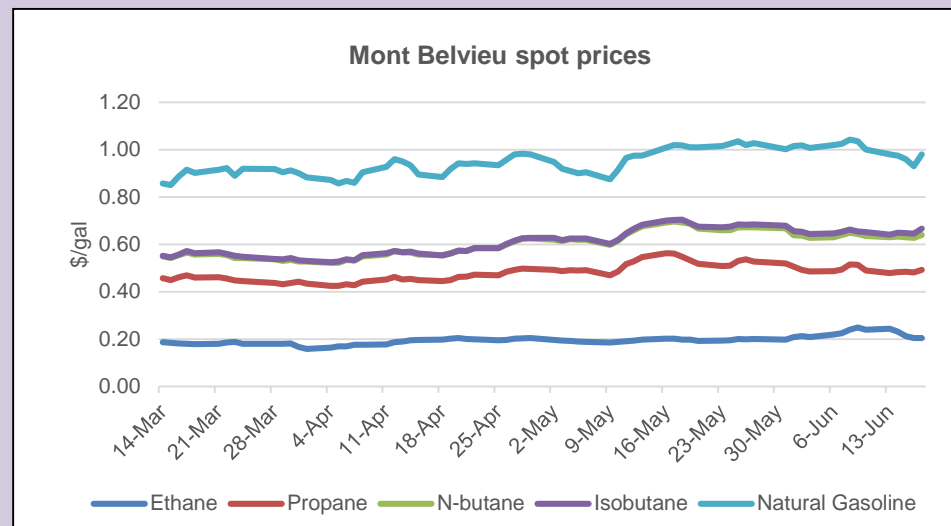
### SUMMARY

- **NGL prices proved to be a mixed bag this week** as crude faltered on the US Fed's decision to leave interest rates unchanged and jitters over the UK's upcoming vote on whether it should exit the European Union. Natural gas marched higher on increased cooling demand and speculators' net length in the market. **Conway natural gasoline was the week's biggest loser** as players sought to close the gap between the Midcontinent and Gulf Coast markets, while **Gulf Coast isobutane saw the largest gains** as markets thinned out.
- **Purity ethane** ended the week down 3.5 cpg, trading in a range of 19.75-24.75 cpg, shrugging off gas gains as the foreign player that had been aggressively buying ethane over the past few weeks for export later this year exited the market. Ethane's drop in ethylene cash cost competitiveness (see *Cash Costs*, page 2) also resulted in lower demand.
- **LST propane** concluded the week 0.25 cpg above last Friday and traded between 46.375-49.875 cpg. A smaller-than-expected build in propane/propylene inventories, increased petchems cracking and an uptick in exports provided bullish support during the week.
- **Normal butane** rose 0.375 cpg during the week with trades booked between 61.25-65.375 cpg. **Isobutane** picked up 1.375 cpg with activity seen in a range of 63.625-68 cpg. Isobutane saw especially light trading during the week, which led to its premium over butane widening to 2.625 cpg by Friday compared to 1.625 cpg the prior week.
- **Natural gasoline** was 2 cpg weaker with deals done between 92.75-99.75 cpg as the purity product aped WTI crude's 2.6 cpg equivalent decrease. **Conway natural gasoline** saw a larger tumble of 5.5 cpg by the end of the week due to a sell-off as players closed the Conway-Gulf Coast premium to 2 cpg Friday, compared to 5.5 cpg the prior week.
- In operations news, **Westlake's Calvert City** olefins unit experienced an operating issue that began in early June. The company was resolving the issue at the 450 million lb/yr ethylene plant and was expected to resume normal operating rates soon. **Eastman** began restarting its **HCC-3 olefins unit at Longview** at the end of the week. The unit shut Apr 18 for planned maintenance. **Overall operating rates for Gulf-area steam crackers were around 95% this week, compared with 90-91% in May (see below).**

Gulf Coast steam cracker operating rates



### PRICE SNAPSHOT



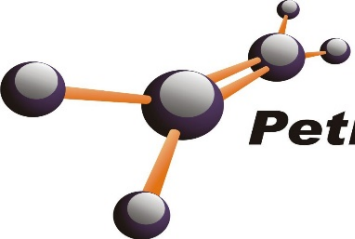
	Friday	Change	MTD
<b>MT BELVIEU NON-LST (US GULF)</b>			
Ethane	0.20500	-0.03500	0.22337
E/P mix	0.20000	-0.02625	0.21788
Propane *LST	0.49250	0.00250	0.49288
Propane *EPC	0.48500	0.00375	0.48423
N-butane	0.64000	0.00375	0.63567
Isobutane	0.66625	0.01375	0.65183
Natural gasoline	0.98000	-0.02000	0.99904

#### CONWAY (MIDCONTINENT)

E/P mix	0.16500	-0.03125	0.18452
Propane	0.46500	0.00875	0.46144
Natural gasoline	1.00000	-0.05500	1.03558

#### TARGA

Ethane	0.20500	-0.02250	0.22067
Propane	0.49250	0.00125	0.49135



## WEEK IN REVIEW

### NATURAL GAS

Natural gas futures continued to rise, settling Friday at \$2.623/mmBtu compared to \$2.556/mmBtu the previous week. Warmer-than-average temperatures spurred utility demand and speculators remained net long in the market.

### RAW NGLs

Values weakened 10.1-24.5 cents/mmBtu (0.7-1.6 cpg) as the prices of the most dominant NGLs in typical regional barrels fell.

### FRAC SPREADS

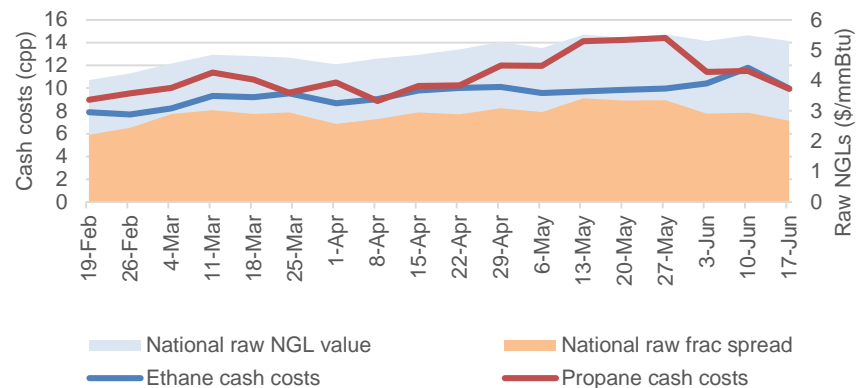
Regional frac spreads narrowed 18.7-31.1 cents/mmBtu (1.9-2.8 cpg) as most NGL prices gave up ground, while natural gas basis forward markets made gains. The Eagle Ford saw the biggest tumble because of the relatively larger amounts of ethane contained in its regional barrel; that purity product was one of the week's biggest losers.

### ETHYLENE CASH COSTS

Propane became the cheapest feedstock in terms of its ethylene cash cost. Its discount to ethane, however, was negligible, making both NGLs attractive to olefins producers. Margins were relatively steady as ethylene finished the week weaker at 25.5 cpg.

#### NAT GAS RATIOS

NG-WTI	18.29	NG - Brent	18.75
NG - Ethane	12.80	NG - Propane	5.33
NG - Ethylene	10.29	NG - PGP	8.50
NG - HDPE	5.70	NG - PP	6.56



### RAW NGL VALUES

	\$/mmBtu	Change	\$/gal	Change
National	5.303	-0.190	0.528	-0.012
Eagle Ford	4.746	-0.245	0.420	-0.016
Permian	5.341	-0.181	0.499	-0.013
DJ Basin	5.790	-0.101	0.558	-0.007
Marcellus	5.145	-0.180	0.478	-0.012

\*Raw NGL Values comprises Mt Belvieu prices for purity NGL products that are weighted by the composition of an NGL barrel (excluding transportation & fractionation, assumes ethane rejection).

### FRAC SPREADS

	\$/mmBtu	Change	\$/gal	Change
National	2.680	-0.257	0.165	-0.022
Eagle Ford	2.164	-0.311	0.063	-0.025
Permian	2.813	-0.295	0.149	-0.028
DJ Basin	3.391	-0.187	0.226	-0.019
Marcellus	3.365	-0.233	0.226	-0.020

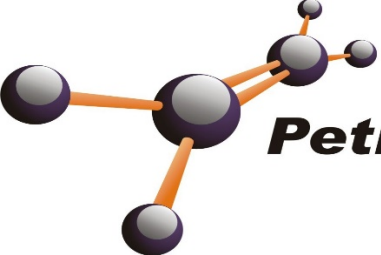
\*Frac spreads are the differentials between the raw NGL values to regional gas prices. For the full methodology of the Raw NGL Values and Frac Spreads, click [here](#).

### ETHYLENE CASH COSTS

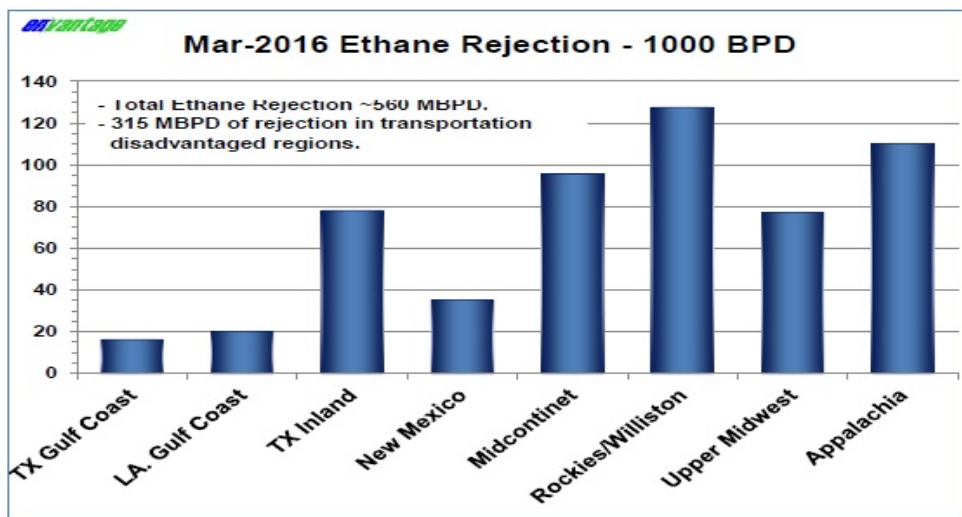
	cents/lb	Change	MTD Avg
Ethane	9.959	-1.842	10.929
Propane	9.945	-1.567	10.602
N-Butane	10.298	-0.293	10.717
Natural Gasoline	17.997	-4.752	21.636

IMPLIED VS. ACTUAL COMMODITY PRICES						
	CRUDE (\$/bbl)	NATGAS (\$/mmBtu)	ETHANE (\$/gal)	ETHYLENE (\$/lb)	LLDPE (\$/lb)	HDPE BM (\$/lb)
CRUDE (\$/bbl)	47.98000	8.23550	0.54766	0.23111	0.38805	0.34262
NATGAS (\$/mmBtu)	15.28160	2.62300	0.17443	0.07361	0.22582	0.19772
ETHANE (\$/gal)	17.95985	3.08271	0.20500	0.08651	0.23911	0.20959
ETHYLENE (\$/lb)	52.93910	9.08670	0.60427	0.25500	0.41265	0.36460
LLDPE (\$/lb)	73.56852	12.62762	0.83974	0.35437	0.49500	0.45602
HDPE BM (\$/lb)	76.71282	13.16732	0.87563	0.36951	0.51060	0.46000

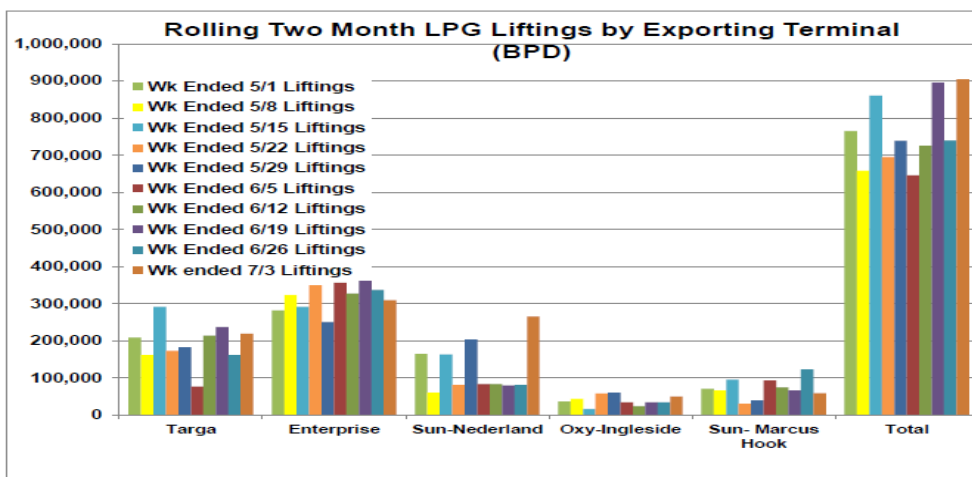
\*Prices in yellow are actual Friday closing prices. For each highlighted price, the implied prices of other commodities based on that Friday settlement follows horizontally across the grid.



## ENVANTAGE SUPPLY/ DEMAND DATA



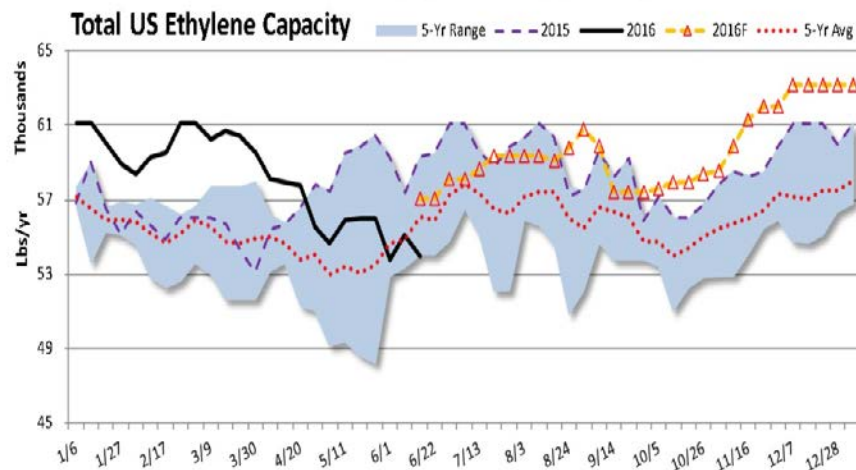
EnVantage estimates ethane rejection at around 560,000 b/d for March. With the recent increase in frac spreads, ethane rejection could have dropped further to around 500,000 b/d.



EnVantage estimates that LPG exports increased by 496,000 b/d for the week ended Jun 10 to 1.274 million b/d, of which some 85% (1.083 million b/d) were propane exports. Departures out of Targa and Enterprise were up this week.

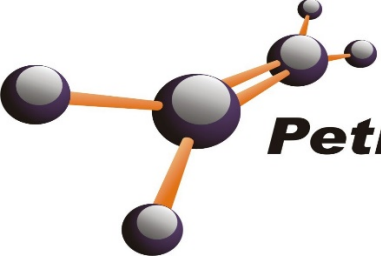
## OPERATIONS

### IIR NGLs Live IIR Energy Weekly Ethylene Outlook



- **Flint Hills Resources** remains offline at its 1.45 billion lb/yr propane dehydrogenation (PDH) unit located at the Houston plant while they continue compressor repairs. The plant was shut down on June 1. Current expectations are to restart the unit on June 20.
- **LyondellBasell** successfully restarted its 2.6 billion lb/yr QE1 ethylene unit located at the La Porte, TX, plant over the weekend of June 11-12. The unit was forced offline on June 3 due to a power failure and rain into difficulties while restarting the unit on June 8, which caused the unit to come back offline.
- **Eastman Chemical** is wrapping up planned maintenance at its 300 million lb/yr HCC 3 ethylene unit located at the Longview, TX, plant. The unit was brought offline on April 12.

Email [iirteam@iirenergy.com](mailto:iirteam@iirenergy.com) for more information on IIR NGLs Live

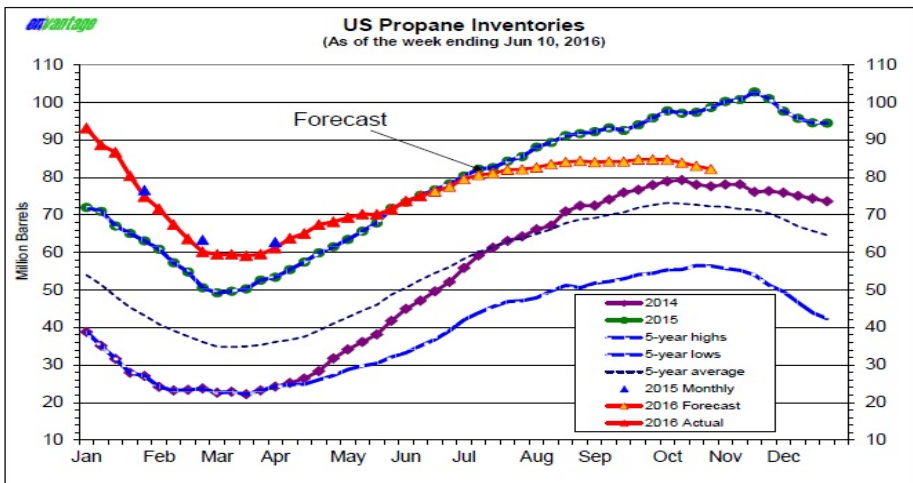


## ENVANTAGE FORECAST

## PCW FORWARD CURVE

Estimation of Ethane Balances as of June 15, 2016												
	Actual					Forecast						
	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD
C2 Extraction Delivered to the Market	1158	1218	1210	1159	1148	1277	1280	1290	1310	1285	1275	1250
Refinery C2 Sold in Open Mkt (EIA)	6	6	6	5	3	4	5	5	5	5	5	5
Total EIA C2 Production	1164	1224	1216	1164	1151	1281	1285	1295	1315	1290	1280	1255
Ethane Fractionated to Make HD-2 Propane for Export	20	20	20	30	30	25	20	20	20	20	20	20
Estimated Internal Refinery C2 Production	35	35	40	45	45	40	40	40	40	40	40	40
Total Estimated Ethane Production	1219	1279	1276	1239	1226	1346	1345	1355	1375	1350	1340	1315
Exports	68	66	64	84	76	85	100	105	110	110	110	110
Ethane Supplies Available to US Crackers	1151	1213	1212	1155	1150	1261	1245	1250	1265	1240	1230	1205
Ethane Cracking to Produce Ethylene	1100	1185	1170	1170	1180	1190	1150	1115	1190	1225	1275	1175
Other Ethane Demand (Blending into HD-5 Propane)	15	20	15	10	10	10	10	15	10	10	10	10
Total Ethane Demand	1115	1205	1185	1180	1190	1200	1160	1130	1200	1235	1285	1185
Surplus (Deficit) C2	36	8	27	(25)	(40)	61	85	120	65	5	(55)	20
Implied Monthly Change (MM Bbls)	1.12	0.24	0.84	(0.78)	(1.16)	1.77	2.55	3.72	1.95	0.16	(1.71)	0.60
Actual EIA Inventory Change (MM Bbls)	1.18	0.15	0.73	(0.42)	(0.29)	1.93	NA	NA	NA	NA	NA	NA
Actual EIA Inventory Level (MM Bbls)	30.49	30.65	31.38	30.96	30.67	32.60	35.15	38.87	40.82	40.97	39.27	39.87
Unaccounted for Ethane or Balancing Item	2	(3)	2	12	30	5	0	0	0	0	0	0

EnVantage forecasts that ethane stocks will increase through July to 41 million barrels due to planned and unplanned ethylene outages and fairly high ethane frac spreads on the Gulf Coast that should encourage ethane extraction. EnVantage expects ethane frac spreads to go to zero sometime in July due to extremely high ethane inventories. From July to September, EnVantage expects ethane inventories to marginally drop and be just below 40 million barrels by the end of September.

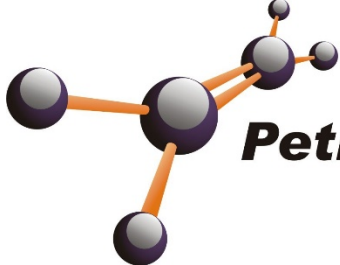


Actual propane stocks for the week ending Jun 10 increased 1.30 million barrels to 75 million barrels, 0.29 million barrels below year-ago levels and 22.3 million barrels above the five-year average for this time of year. EnVantage had expected inventories to increase 1.58 million barrels on the week. By the end of October, propane inventories should be at much lower levels than 2015 but above 2014 levels.

Spreads for all purity products for 3Q and 4Q remained in contango with premiums holding fairly steady at 1.5 2.625 cpg. Ethane's curve was in contango through Apr 2018.

	Ethane	Propane	N-Butane	Natural Gasoline
Jun-16	0.20500	0.49250	0.64000	0.98000
Jul-16	0.22125	0.51375	0.64625	0.99500
Aug-16	0.23250	0.52750	0.65625	1.01000
Sep-16	0.24375	0.54125	0.66750	1.02250
Oct-16	0.25125	0.54875	0.67625	1.02875
Nov-16	0.25875	0.55500	0.68250	1.03375
Dec-16	0.26625	0.56125	0.68875	1.03875
Jan-17	0.27375	0.56875	0.69625	1.04250
Feb-17	0.27625	0.56250	0.68375	1.04125
Mar-17	0.27875	0.53375	0.65250	1.04125
Apr-17	0.27875	0.51500	0.64125	1.03625
May-17	0.28125	0.51375	0.63625	1.03125
Jun-17	0.28375	0.51625	0.63875	1.03000
Jul-17	0.28750	0.52000	0.64250	1.02875
Aug-17	0.29125	0.52625	0.64875	1.03000
Sep-17	0.29875	0.53250	0.66125	1.03750
Oct-17	0.30250	0.53875	0.66750	1.03875
Nov-17	0.30625	0.54500	0.67250	1.04000
Dec-17	0.31000	0.55125	0.67750	1.04125
Jan-18	0.31250	0.55750	0.68375	1.05000
Feb-18	0.31250	0.55125	0.67375	1.05000
Mar-18	0.31250	0.52250	0.64875	1.04875
Apr-18	0.31125	0.50750	0.63625	1.04750
May-18	0.31125	0.50500	0.63250	1.04750
Jun-18	0.31125	0.50625	0.63375	1.04750
3Q 2016	0.23250	0.52750	0.65667	1.00917
4Q 2016	0.25875	0.55500	0.68250	1.03375
Cal 2016	0.23982	0.53429	0.66536	1.01554
1Q 2017	0.27625	0.55500	0.67750	1.04167
2Q 2017	0.28125	0.51500	0.63875	1.03250
3Q 2017	0.29250	0.52625	0.65083	1.03208
4Q 2017	0.30625	0.54500	0.67250	1.04000
Cal 2017	0.28906	0.53531	0.65990	1.03656
1Q 2018	0.31250	0.54375	0.66875	1.04958





## NEWS

### Propane/propylene inventories see smaller increase, natgas stocks up 69 Bcf

US propane/propylene inventories rose 1.1 million barrels to 78.351 million barrels for the week ending Jun 10, according to EIA data. Analysts were expecting a build of 1.5-1.8 million barrels. Refineries operated at 90.2% of operable capacity, down from 90.9% the prior week. Natural gas storage stocks rose 69 Bcf to 3,041 Bcf, higher than expectations of a 63-65 Bcf injection. Stocks are 633 Bcf higher than last year and 704 Bcf above the five-year average.

### Lotte Chemical, Axiall break ground on JV ethane cracker in Lake Charles

Lotte Chemical and Axiall on Tuesday broke ground on their joint-venture ethane cracker in Lake Charles. The \$1.9 billion cracker will have a capacity of 1 million mt/yr (2.2 billion lb/yr) and its output will be shared by the two companies. The cracker is expected to be fully operational in 2019. Axiall will use its portion of the ethylene output to make vinyl chloride monomer, while Lotte Chemical will make monoethylene glycol at a new \$1.1 billion plant to be located next to the cracker. This MEG plant is said to be the largest in the US with a capacity of 700,000 mt/yr (1.54 billion lb/yr). Lotte plans to export the bulk of MEG produced at the new plant. Axiall last week was bought by Westlake Chemical for \$3.8 billion.

### Westlake's Calvert City ethylene unit resolving operations issue

Westlake Chemical's Calvert City ethylene unit has experienced an operational issue, which is currently being resolved. Normal rates are expected to be resumed shortly. The cracker has a production capacity of 450 million lb/yr. It is set to undergo a 100 million lb/yr expansion in the first half of next year.

### Canadian propane inventories up 29.3% in June: NEB data

Canadian propane underground inventories rose 29.3% to around 5.08 million barrels in June compared to the prior month, NEB data showed. Western Canadian levels increased nearly 18% to 2.457 million barrels in June, about 2.4 million barrels below the year-ago level. Eastern Canadian stockpiles were up about 42% at 2.627 million barrels, increasing 778,000 barrels from May and down 570,000 barrels from the year-ago period, the data showed.

### Eastman restarting HCC-3 ethylene unit at Longview

Eastman Chemical is restarting its HCC-3 ethylene unit at Longview as of Friday morning. The 310 million lb/yr unit had been shut since April 18 for planned maintenance. It represents 0.49% of total US ethylene capacity.

Get the latest news on NGLs and petrochemicals every day at [PetroChemWire.com](http://PetroChemWire.com).

### NGLs WEEK

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## NGL FOCUS

### Cracker build out continues to see changes as companies sort out capital priorities

The last few weeks have seen some significant decisions being made that affect the massive petrochemical infrastructural build out in the US.

**Shell will build its 3 billion lb/yr ethane cracker in Pennsylvania** with output now only expected early in the next decade. **Sasol** said it was slowing down the timeline of its olefins and derivatives units coming online in Lake Charles due to volatile commodity prices. **Axiall and Lotte Chemical broke ground on their joint-venture ethane cracker** in Lake Charles just days after Axiall agreed to be bought out by Westlake Chemical. Finally, West Virginia state officials announced that **Odebrecht had pulled out from its planned ethylene unit with Braskem in West Virginia**. Odebrecht has been mired in a years-long probe by the Brazilian federal police and has seen several of its key executives jailed.

Even with these changes, **about 25 billion lb/yr of new ethylene production could still come online by 2021, a nearly 42% increase above current levels. Ethane demand could increase as much as 53% from current levels as these new units will favor the lightest NGL as the primary feedstock.**

COMPANY	WHERE	WHEN	NOTES	B lbs/yr
ExxonMobil	TX	1Q 2017	under construction	3.300
Oxy/Mexchem	TX	1Q 2017	under construction	1.000
ChevronPhillips	TX	Mid-2017	under construction	3.300
Dow	LA	2Q 2017	on schedule	3.300
Formosa	TX	2017	under construction	3.307
Indorama Ventures	LA	end 2017	brownfield	1.000
Sasol	LA	2019	under construction	3.000
Axiall/Lotte Chem	LA	late 2018/ early '19	under construction	2.200
Appalachian Resins	OH	2019	CANCELLED	0.508
Total	TX	2019	conducting FEED	2.200
PTTGC/ Marubeni	OH	2020	FID in early 2017	0.500
Odebrecht/Braskem	WV	TBD	Odebrecht exits plan	TBD
Shintech	LA	1H 2018	under construction	1.102
Formosa	LA	2020	FID expected mid-2016	2.4
Shell	PA	2021		3.000
<b>TOTAL PROPOSED NEW ETHYLENE CAPACITY = 30.117</b>				