

SOME INVENTORY REQUIRED?

PREVIEW | FundamentalEdge Report | September 2018

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FundamentalEdge
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Key Takeaways

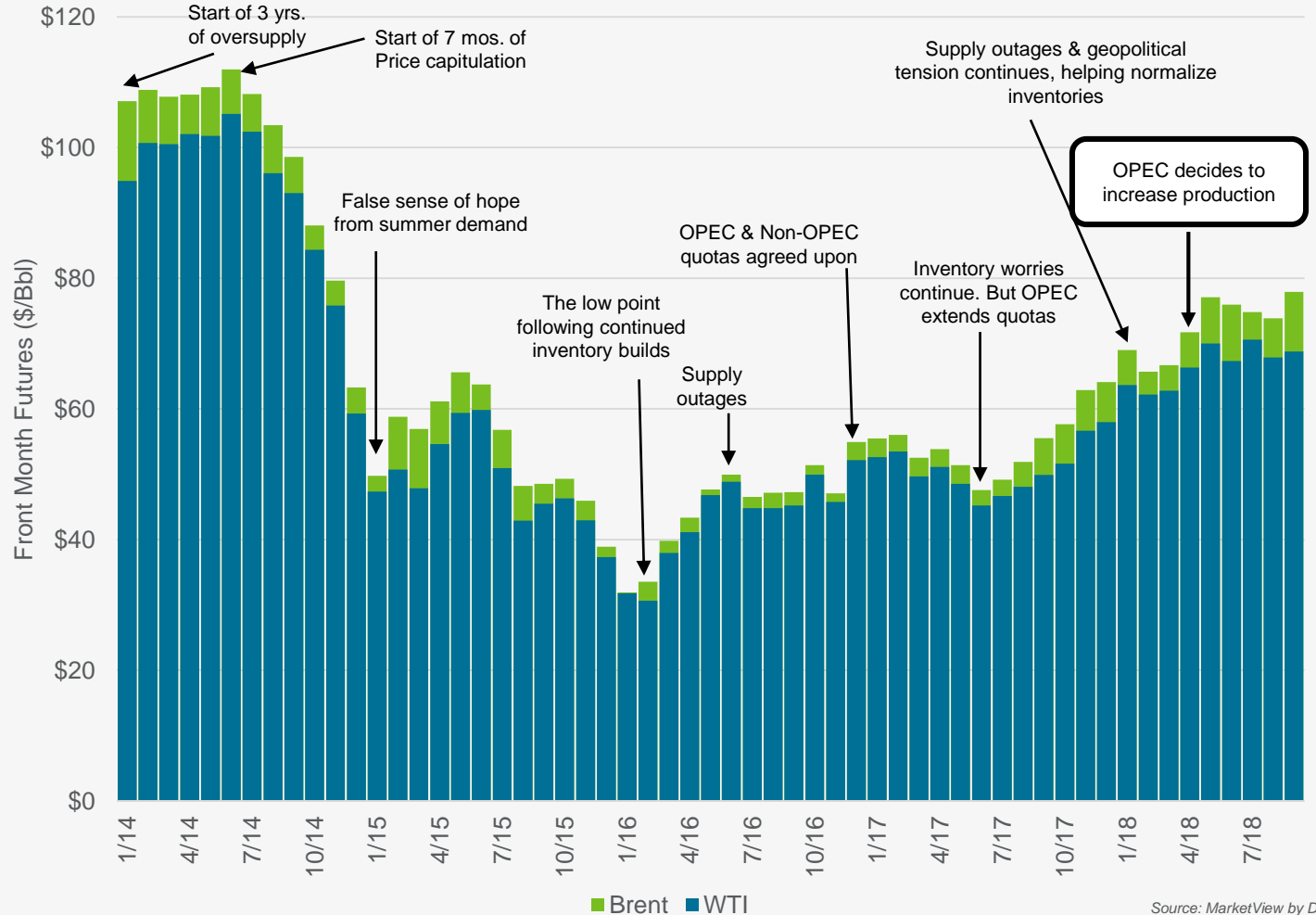
- ***Some Inventory Required?*** is the winter installment of Drillinginfo's Fundamental Edge Series. This market outlook service presents our current view of the oil, natural gas and NGL markets and where they are headed over the next five years.
- The crude oil oversupply that started three years ago and led to the price capitulation down to lows near \$30/Bbl in January 2016 has been curbed thanks to OPEC's supply cuts and, in particular, the spiraling downward trajectory of Venezuelan production. However, as the additional production brought is back by OPEC and growing US production continues to keep a lid on price gains, the Iranian sanctions and the situation on the ground in Venezuela continue to keep the bulls in the market.
- Despite record high production of natural gas, storage inventories will end the injection season at record lows. While large increases in overall US production has mitigated the need for large inventories, peak winter days will still require a call on storage. As such, expect prices to climb as we end injection season at inventory levels that are too low given persistent growth in YoY demand. DI expects gas prices to increase above levels currently being traded in the forward market for the winter. Increased volatility and additional upside risk is expected if winter temperatures are colder than normal. Longer term, gas production is expected to increase to meet expected demand growth with natural gas prices trading between \$2.60-\$2.75 per MMBtu.
- Infrastructure changes are driving volatility in NGL prices. Fractionation constraints along the coast, especially in Mont Belvieu, and increasingly shrinking capacity in LA and NM are driving ethane prices higher to meet export demand and new petrochemical demand (demonstrated by Exxon's new Baytown steam cracker). As new fractionation capacity increases, it opens up doors for increased exports. The LPG is expected hit the water on the coast, and MLPs like Orbit are announcing projects to handle the export demand, with Enterprise Products Partners not far behind.
- E&P companies continue to focus on returning cash to shareholders, funding capital within cash flow, and reducing leverage. Increased prices brings increased activity, and the industry now battles cost inflation increases, labor shortages, and infrastructure constraints. Permian differentials have some producers contemplating a slow down but so far, production climbs higher. Oilfield Services companies are calling their outlook "outstanding" and expect "2019 is going to be humming" – almost none report negative effects of constraints in the Permian. We continue to watch as efficiencies make up for the "living within cash flow" strategies, and will look out for producers' ability to withstand increasing unit costs in an increasingly positive price environment.

Crude Oil Prices: 2014-18 Drivers

Crude oil prices have recovered from the lows and have held in a range over the last three months.

The oversupply that started three years ago and led to the price capitulation down to lows near \$30/Bbl in January 2016 has been curbed thanks to OPEC's supply cuts and, in particular, the spiraling downward trajectory of Venezuelan production. The Venezuelan production declines have taken OPEC compliance to extremely high levels (170%+), and OPEC has decided to increase production to get back to 100% compliance. As the additional production brought back by OPEC and growing US production continues to keep a lid on price gains, the Iranian sanctions and the situation on the ground in Venezuela continue to keep the bulls in the market.

CHART 1
Global Supply and Demand Outlook

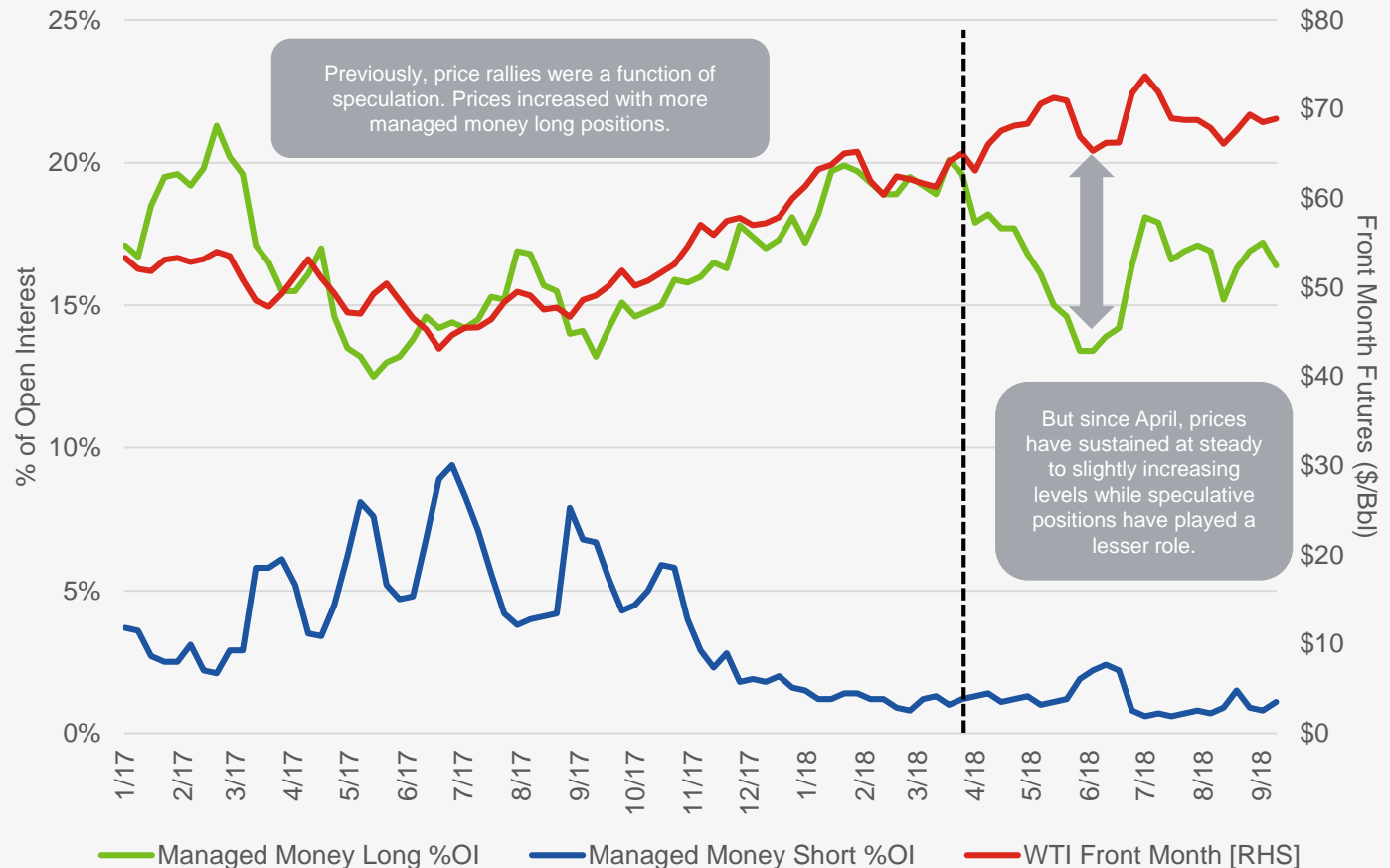


Source: MarketView by DI

Paradigm Shift From Speculative Rallies

In recent times, prices have been largely influenced by speculative trading by the managed money sector. Prices started their ascent through a rally led by speculative long positions. However, in April 2018, when the speculative longs liquidated a large portion of their positions, prices did not move along with their trend. This was due to the fact that the global supply and demand were largely balanced and inventories had been somewhat normalized. The fundamentals were looking good again.

CHART 2
Managed Money Position and Crude Oil Prices



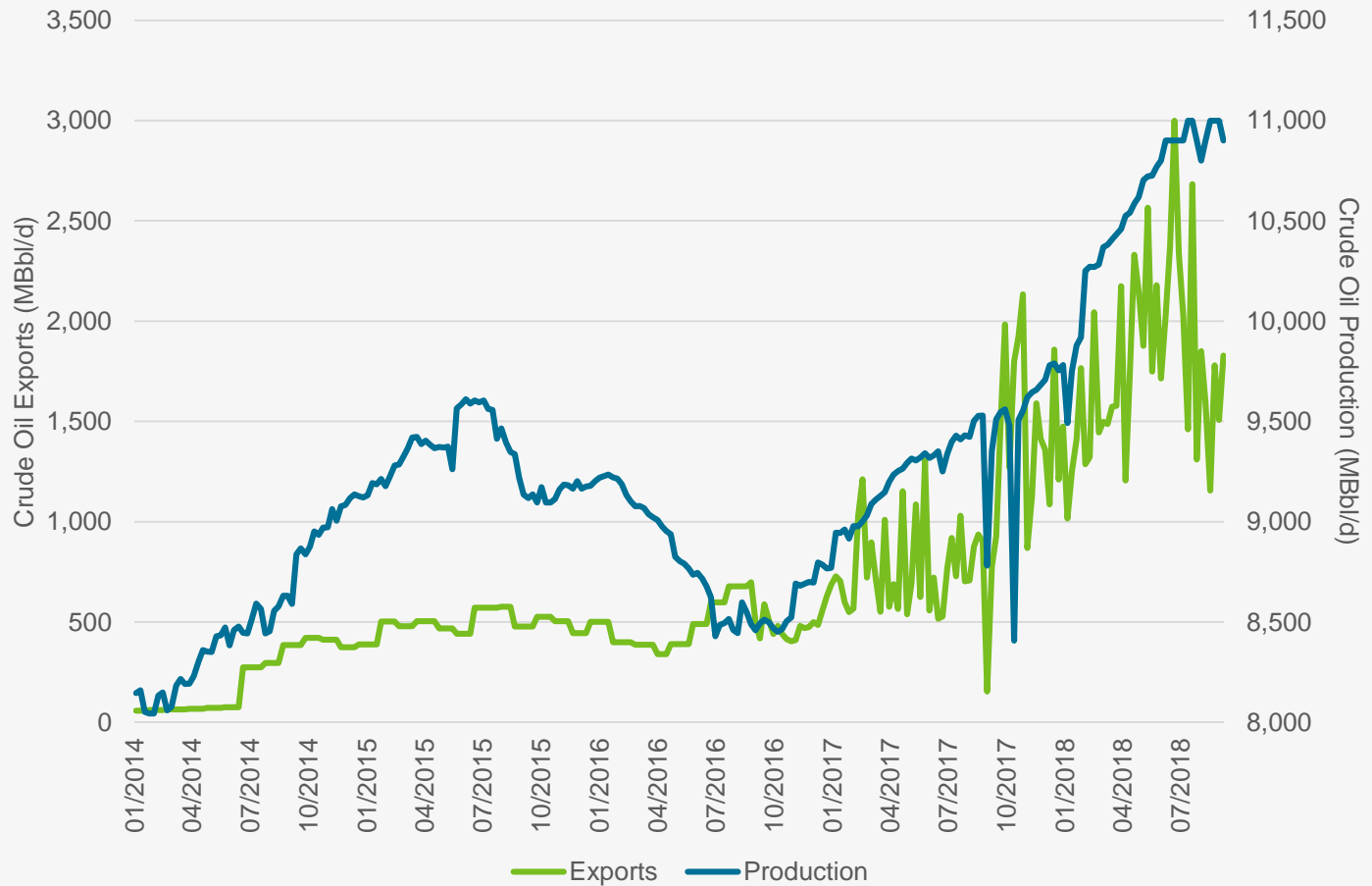
Source: MarketView by DI

US Oil Exports: Weekly Volumes

Moving forward, every additional barrel of crude oil produced in the US will need to make its way to the water to get exported. This has been the trend since late 2016 when the US surpassed 8.5 MMBbl/d of production. Since, the growth in exported volumes has grown together with the growth in domestic production.

According to the weekly data, the maximum volume exported in a one week span was 3 MMBbl/d. This level is the theoretical working limit to date for crude oil exports. However, these volumes haven't been sustained for a long period of time.

CHART 11
US Oil Production and Exports



Source: EIA

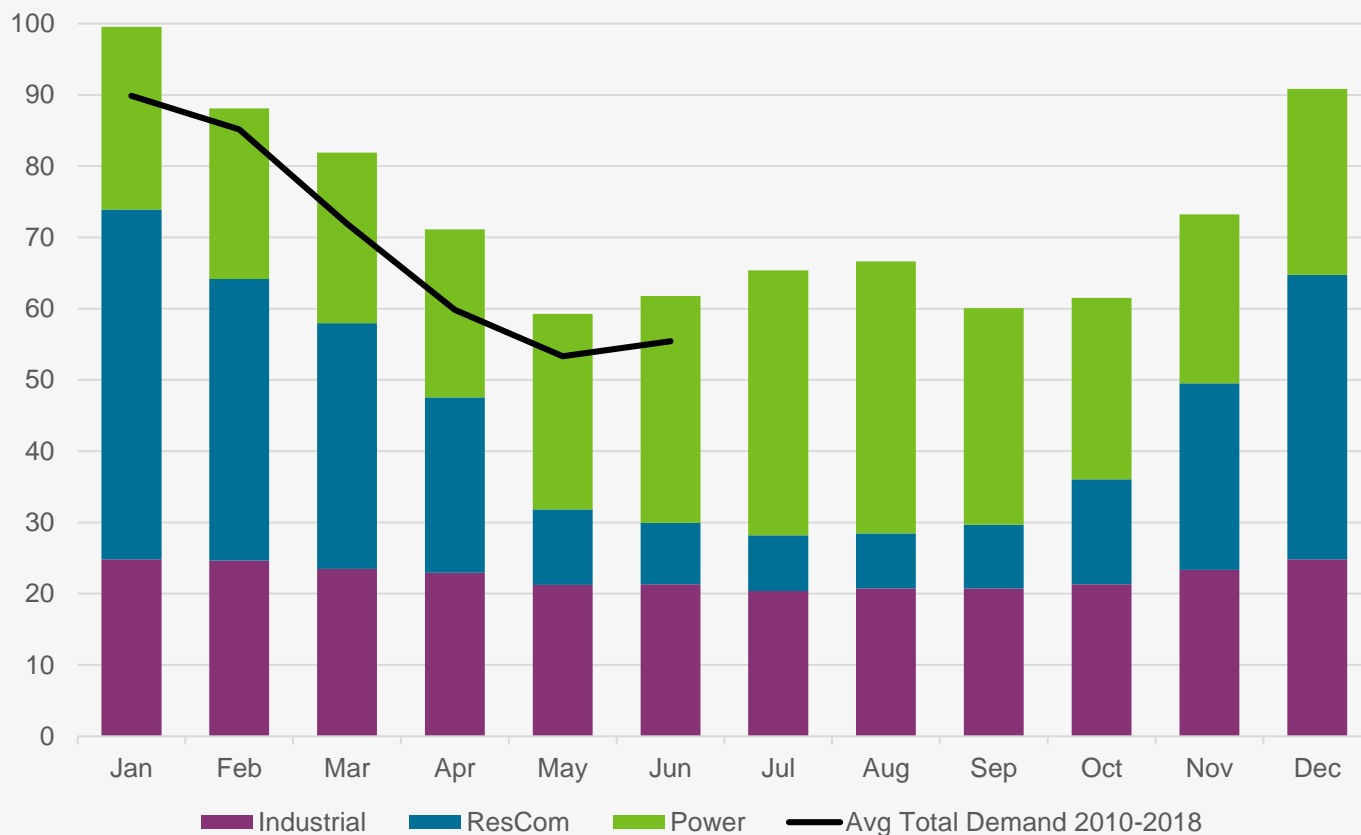
2018 Gas Demand: Higher Than Normal To-Date

Domestic natural gas demand (Industrial, ResCom, and Power) is expected to average 73.28 Bcf/d this year. This forecast assumes \$2.85 average Henry Hub settlement price, and 10-year average weather for June–December.

Domestic natural gas demand for 2019 is expected to climb slightly. DI forecasts 2019 domestic demand to average 73.89 Bcf/d.

CHART 29

2018 Domestic Natural Gas Demand by Sector



Source: DI Analysis, EIA

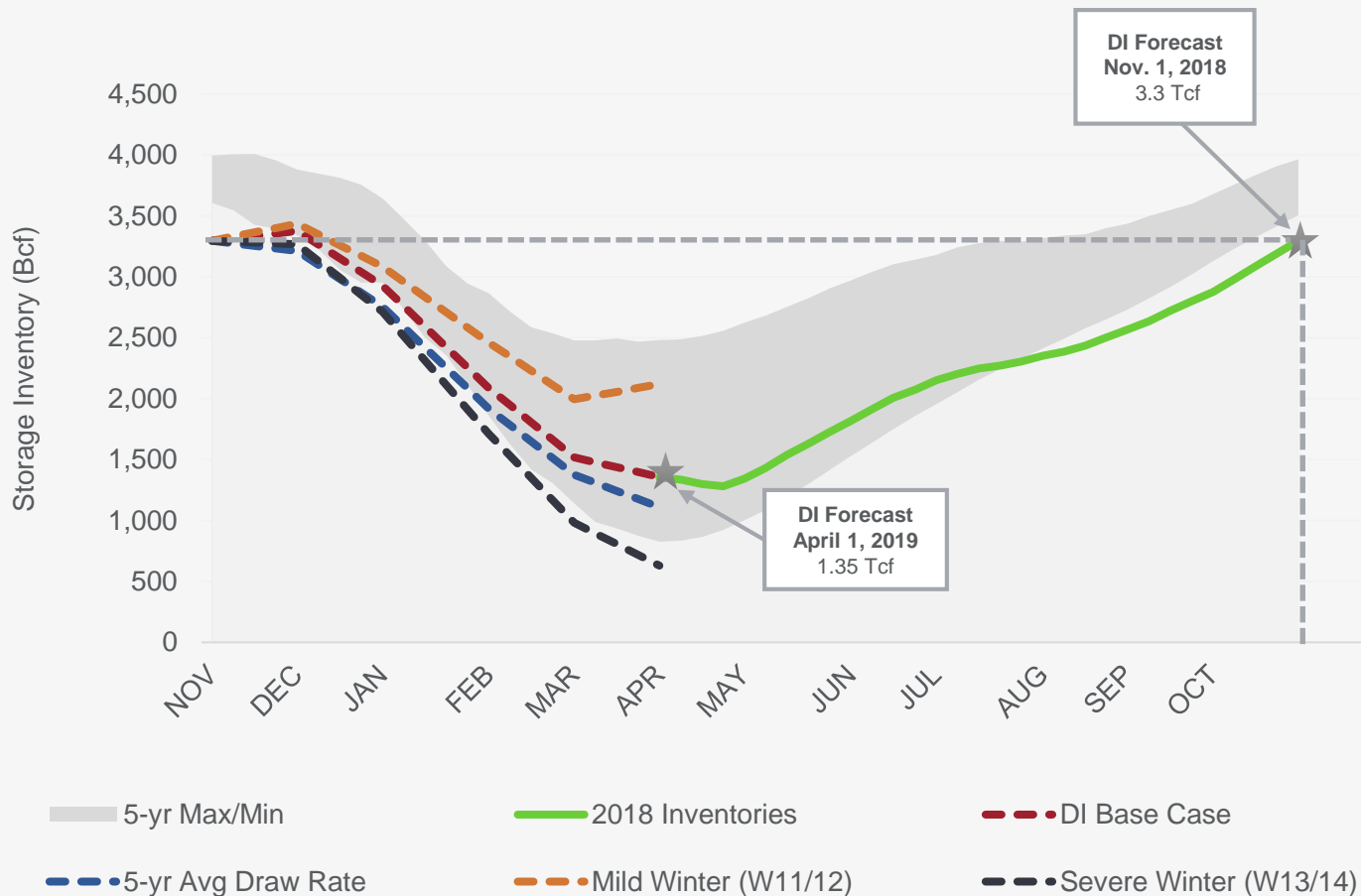
Storage Inventories Forecast

DI expects gas storage inventories by November 1, 2018, to reach 3.3 Tcf, assuming normal weather. This level represents a record low since 2010.

Production growth, along with end of injection season cooling temperatures, plays a key role in the end of injection season inventory. Cooler weather and production growth support higher injections for the remainder of the injection season.

With the record low inventory this year, the severity of the winter will play a significant role in the level the 2019 injection season starts. If there is severe weather, we could see a record low total inventory by the end of Winter 18/19.

CHART 35
Storage Inventories End-of-Summer Projections



Source: EIA, DI Analytics

Ethane

We mentioned in our last quarter's long term update that ethane prices have been higher than they have been in the past 4 years. Now, ethane is at its highest level in 10 years, topping out at 61 cents just recently.

As ethane demand growth continues in 2018, the spread between Mont Belvieu and Henry Hub has increased a sixfold on a MMBtu basis since May alone. Current ethane prices make it economic for producers to recover more ethane from the gas stream and optimize netbacks. That increased recovery has also caused some infrastructure constraints, as fractionation and pipeline capacity limit the amount many producers can recover. See the graphic for the historical relationship between ethane and natural gas prices.

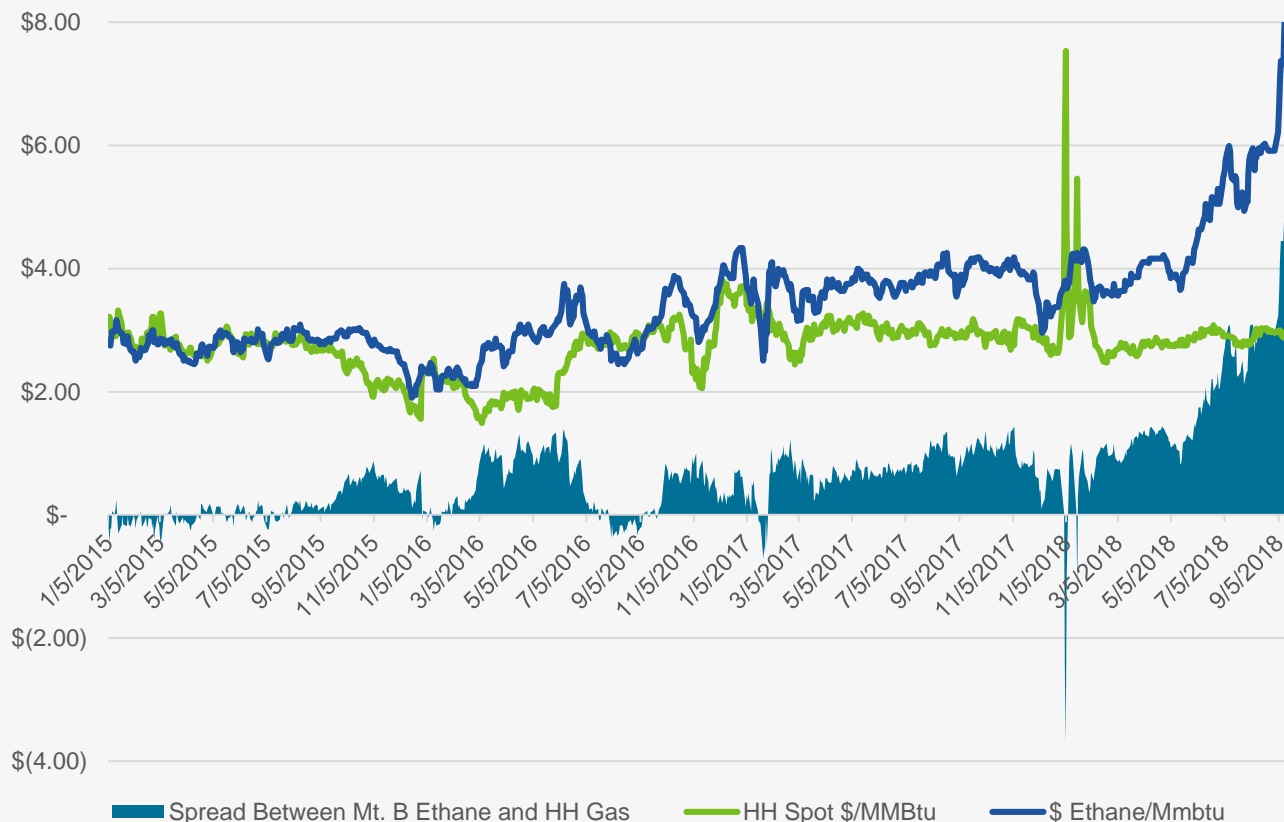
Because the value of ethane is twice that of natural gas and surpasses de-ethanization and transportation fees, it is expected that producers are starting to signal to their midstream providers to recover more ethane to receive a higher netback – a value higher than if they rejected the produced ethane and sold it as methane in the gas stream.

Due to the fractionation constraints in the market, ethane recovery and production has a ceiling, however. Ethane rejection actually increases in maxed out capacity situations in order to make room for heavier liquids.

We will likely see continued volatility as infrastructure constraints and exports continue to shake up the ethane market, but narrowing ethylene and export margins could provide a ceiling around current prices.

CHART 39

Ethane Value Relative to Henry Hub (\$/MMBtu)



Source: EIA, Platts Prices

Five-Year Ethane and LPG Export Outlook

Ethane export capacity is expected to plateau over the next three years, with some incremental exports after Mariner East 2 and 2x begin service. Energy Transfer and Satellite Petrochemical recently announced a joint venture to construct an export terminal to deliver ethane to Satellite for consumption at their cracking facilities in China.

Energy Transfer calls Marcus Hook “The Future Mont Belvieu of the North.” LPG exports are expected to increase out of the facility with the in-service of the Mariner East projects, although the facility has truck and rail loading facilities, so if domestic prices are better than international, flows will optimize towards truck and rail rather than export. Although most of the volumes intend to be exported, there are about 35 railcar spots, which means about 21 MBbls/d could stay domestic in addition to trucking volumes.

Enterprise announced the expansion of EHT by 175 MBbl/d. The company is confident that with over a million barrels a day of new fracs announced through 2020, there will be ample LPG on the coast that will have to clear.

Pembina Pipeline Corporation is also building a 25 MBbl/d export facility in British Columbia called Price Rupert, expected to be in service mid-2020.

CHART 40
Ethane Exports and Future Capacity

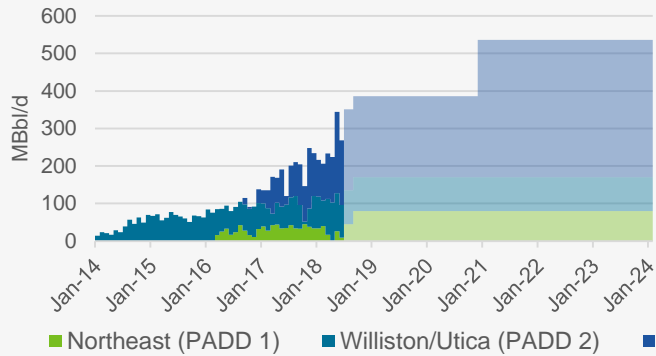


CHART 41
LPG Exports & Future Capacity

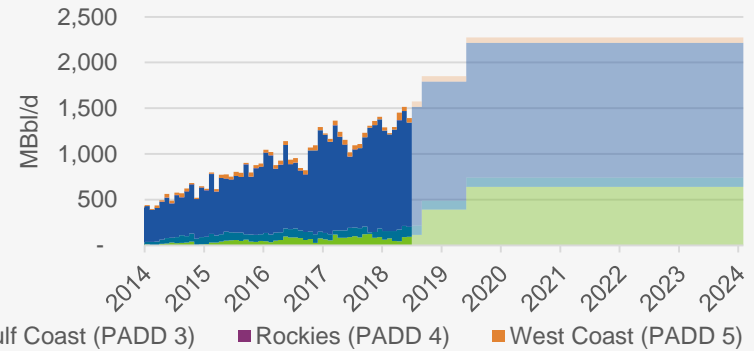


TABLE 8
Key Export Pipelines or Facilities

Export Infrastructure	Operator/Owner	Location	Product	In Service
Mariner West	ETP/Sunoco	Ohio to Canada	Ethane	In Service
Vantage Pipeline	Pembina Prairie Facilities	North Dakota to Canada	Ethane	In Service
Marcus Hook	ETP/Sunoco	Philadelphia to Europe	Ethane + LPG	In Service
Enterprise Hydrocarbons Terminal	Enterprise	Houston Ship Channel	Ethane + LPG	In Service (Expansion in 2H'19)
Morgan's Point	Enterprise	Texas to Europe, India, Brazil etc.	Ethane	In Service
UTOPIA	Kinder Morgan	Ohio to Ontario, Canada	Ethane	In Service
Nederland Marine Terminal	Sunoco/Lonestar	Nederland, TX	LPG	In Service
Freeport Terminal	Phillips 66	Freeport, TX	LPG	In Service
Orbit Gulf Coast	ETP and Satellite Petrochemical	Gulf Coast to China	Ethane	End of 2020

Source: EIA, DI research and estimates

Permian Differentials

Permian infrastructure constraints, takeaway capacity issues, and trucking and driver shortage is driving the hot topic of the industry.

Comparative to last quarter, the near-term forward differentials are less extreme than they were this past June.

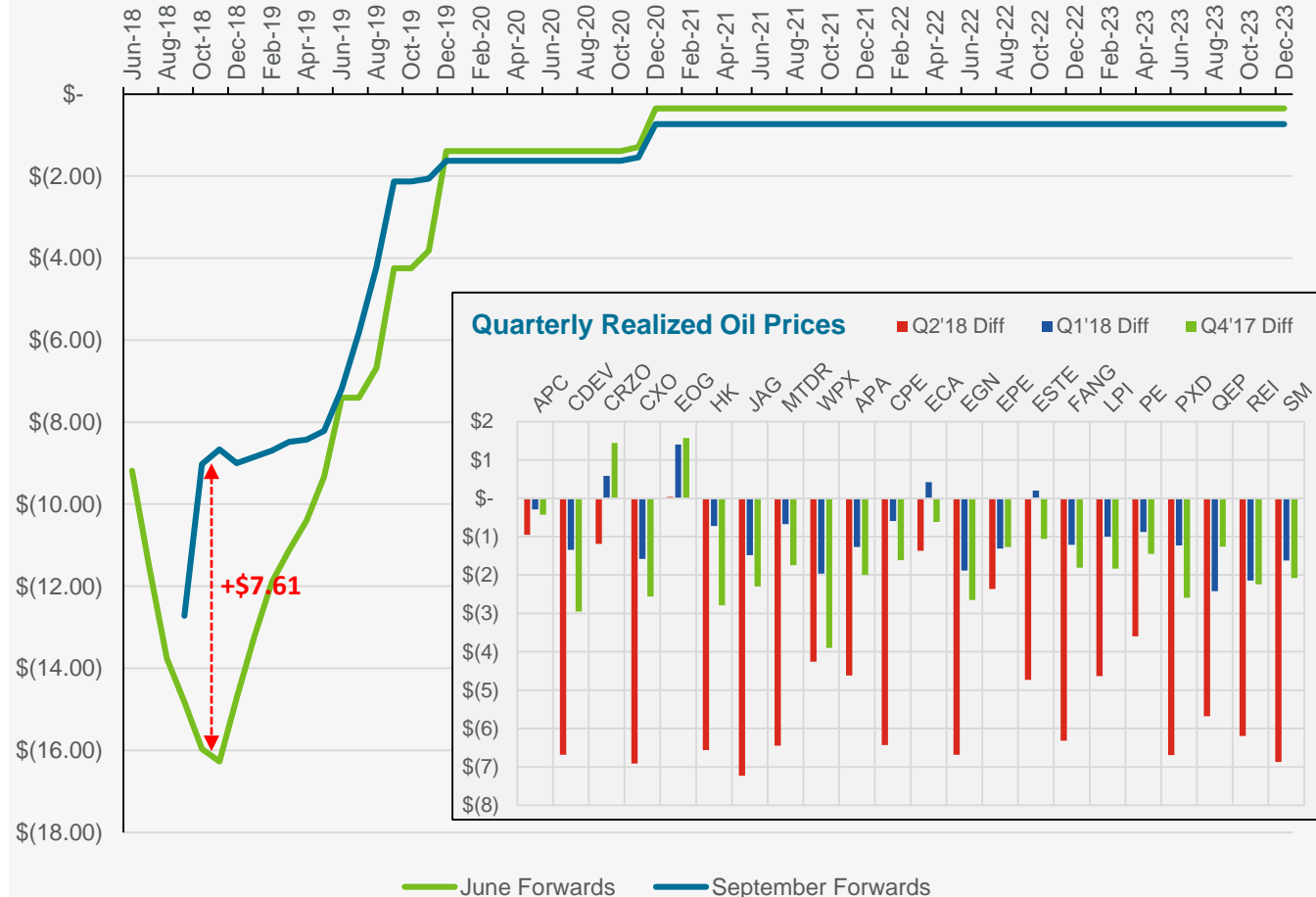
Operators that chose to lock in Midland/Cushing differential October through December hedges in mid-June vs mid-September are receiving about a \$7.00/Bbl discount to June differentials.

Operators are battling the logistics issues and by optimizing their portfolios. Takeaway capacity constraints, however, should not include blanket statements due to the flexibility involved.

In the realized price world, operators without transportation are still receiving \$3-\$7 differentials. There are times, for example, that it would cost you more if you wanted to truck a barrel at a specified time, but if you can wait 24-48 hours, or have flexibility around exchanges, it will be a lot cheaper.

CHART 43

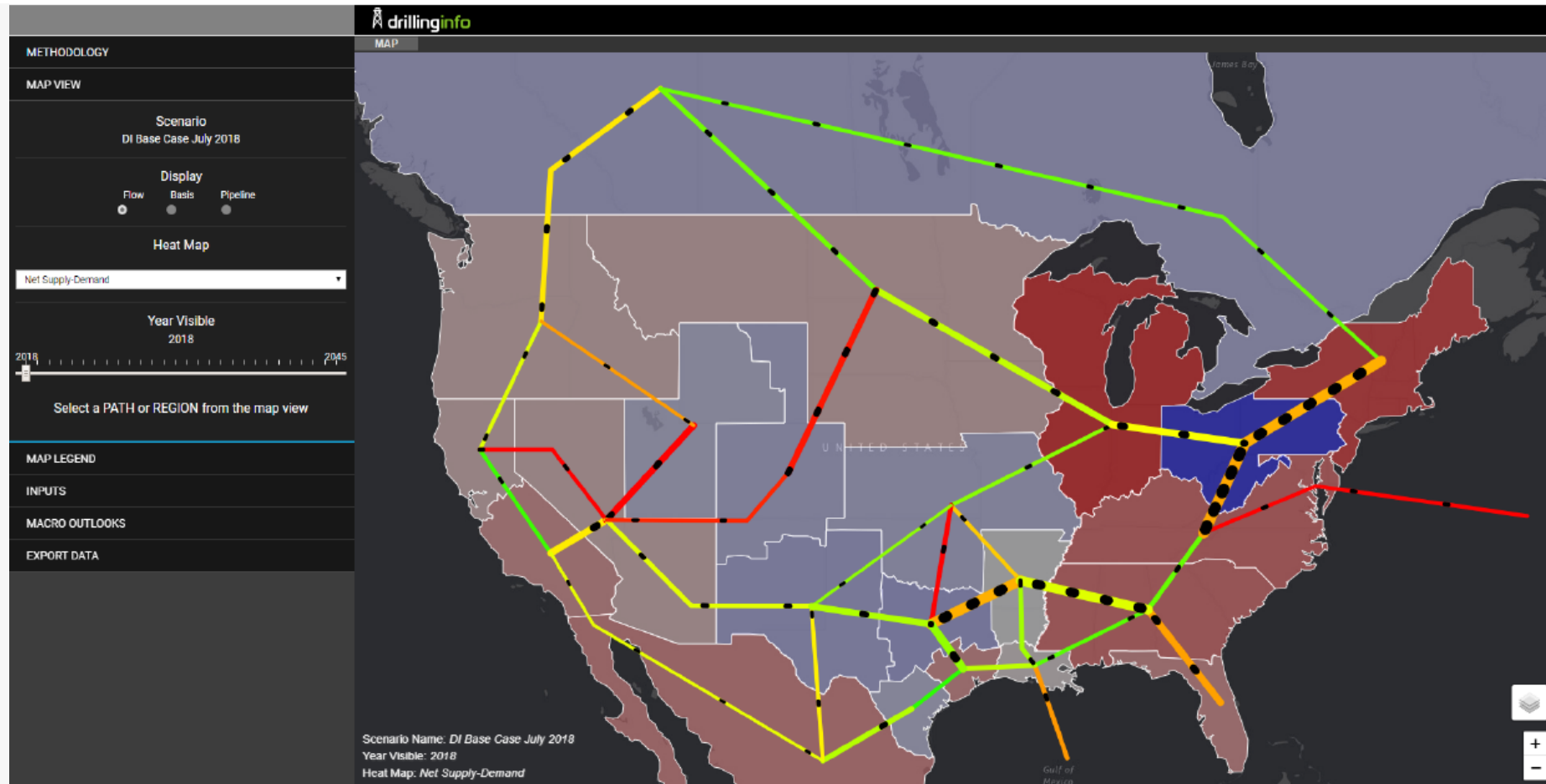
Midland Vs. WTI Futures Quotes (\$/Bbl)



As of 9/21/2018. Source: EIA, Factset

What is OptiFlo Gas?

DI OptiFlo Gas takes advantage of Drillinginfo's strength in supply and demand forecasting and incorporates GAMS optimization technology to create an optimization modeling solution allowing corporate developers, commercial investors, and gas traders to forecast on an annual basis over a 25-year horizon to ensure the most profitable, long-term investments are made.



DI OptiFlo Gas - Features and Benefits

TABLE 9

DI OptiFlo Gas - Features and Benefits

Feature	Benefit
25-year forward-looking results set	✓ Forecast and model long-term natural gas flow and changes
General Algebraic Modeling System (GAMS)	✓ Perform complex, large-scale, linear, nonlinear, and mixed-integer optimization modeling
Interface with DI Procast	✓ Enhances the output of DI Procast
Demand Forecasts by sector and region	✓ The only DI product where this specific dataset is accessible
Interactive interface	✓ Full transparency and control of model inputs
Interregional flow display	✓ Drill down to see individual pipeline capacities, variable transport rates, and modeled gas flow
Customizable	✓ Ability to override Drillinginfo presets and run models with customized inputs

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Thank you!

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