THE DARK SIDE OF THE BOOM

PREVIEW | FundamentalEdge Report | April 2020
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Introduction and Key Takeaways

• **The Dark Side of The Boom** is the 2Q2020 installment of the Enverus FundamentalEdge 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.

• **Crude oil** markets are under unprecedented pressure as efforts to control the spread of novel coronavirus send the global economy into reverse gear. What started out as a rout caused by a standoff between Saudi Arabia and Russia turned into a deep selloff as refiners began to see consumer demand for their products disintegrate. To keep inventories of gasoline and jet fuel from getting out of hand, refiners have opted to cut throughputs. This has placed intense downward pressure on prompt barrels and has pushed prices in the field into single digits in some locations. Still, there are more petroleum liquids sloshing around in the world than there is storage capacity to contain it. Although we can expect all tight oil operations to grind to a halt in the coming weeks, there simply isn’t enough time for the tight oil patch to go into base decline. Shut-ins are coming, and they are likely to be big.

• The oversupplied oil market will keep crude prices low, depressing **natural gas** production. Enverus expects dry gas production to decline by over 6 Bcf/d by December 2020 compared to 2019. This will cause the gas market to go from being long during the summer months to being very short by the winter 2020-21. A sharp increase in natural gas prices is needed to incentivize natural gas production growth from gas directed plays, namely Marcellus, Utica and Haynesville. Enverus forecasts prices will exceed $4/MMBtu and could reach $4.50/MMBtu as early as the coming winter. Longer term, natural gas prices are expected to average $2.80/MMBtu; this level allows gas production growth to meet expected demand gains.

• **Natural Gas Liquids** production is expected to decline in the next year as crude oil prices are expected to remain low. This will prompt a number of basins to have excess pipeline takeaway capacity to flow to fractionation hubs. Fractionation capacity has been running tight for over a year, and a number of projects are slated to hit the market in 2020 and 2021. However, as production is expected to decline as these projects come online, these fractionation projects will have trouble finding the volumes to run at capacity. Crude oil prices are expected to rebound in 2022 through 2025, helping natural gas liquids production to rebound off of the decline.

• Earnings season was just starting to wrap up as oil prices turned dark red. Operators likely had just finished up their late nights running their models to perfect 2020 capital plans, which consisted of not-so-meaningful reductions on the oil side while gas players were bringing spend averages down. After the crash, Parsley and Diamondback were the first to trash initial plans, followed by over half of our coverage dropping a combined $21+ billion worth of capex, with over 160 rigs and 60 crews hitting the yard. Eyes have been on hedges, capital savings, and production decline rates to gain an understanding of which E&Ps will be weathering this storm as near-term maturities and maxed out credit facilities have some operators backed against a wall.
CRUDE OIL
The failure of OPEC+ to reach an agreement on temporary production cuts for the second quarter kicked off a full-blown war for market share amongst erstwhile partners Saudi Arabia and Russia.

Given its 2.35 MMBbl/d of current spare production capacity, Saudi Arabia has sought to undercut and displace Russia in its key export markets in Europe and Asia by sharply lowering Official Selling Prices (OSPs), in some cases by as much as $8/Bbl.

With the OPEC+ agreement effectively null and void, other OPEC members (such as the UAE and Iraq) have also sought to retain and/or capture market share by reducing their OSPs.

The increase in supply could not have come at a worse possible time. Efforts to limit the worldwide spread of novel coronavirus and mitigate its worst impacts have sent the global economy into reverse gear, hammering demand for petroleum liquids.

Under these conditions, the prospect of WTI returning to its prior trading range of $55-60/Bbl is very distant. Even with the lower OSPs, some Saudi Aramco customers have reportedly sought to defer cargos or reduce nominations for April loaders.

Enverus’ base case average WTI price forecast for 2020 has been revised down to $23/Bbl, but this includes several months below $15/Bbl. Our forecast for 2021 envisages an average WTI price of $32/Bbl, with prices reaching $45/Bbl by early 2022.
Enverus’ base case for global demand growth in 2020 has been revised to show a year-on-year contraction of approximately 4.6 MMBbl/d. This is a stark reversal of fortune compared to our January issue of the FundamentalEdge, which anticipated annual average growth of just over 1.2 MMBbl/d this year.

Demand destruction is heaviest in the first half of the year, averaging 6.9 MMBbl/d below the same period in 2019. The recovery in the second half of the year is little consolation. Global demand in the second half of 2020 is currently expected to be 2.2 MMBbl/d below the same period in 2019.

Meanwhile, global petroleum liquids supply is set to increase by just over 0.7 MMBbl/d in 2020 compared to 2019. The bulk of the increase is expected to hit physical markets in the second quarter (up nearly 2.0 MMBbl/d vs. Q2 2019) as Saudi Arabia and other OPEC producers ramp up output.

As inventories approach capacity, prompt prices near the wellhead are anticipated to come under intense pressure. High-cost sources of supply will be forced to shut in and new tight oil investments will be deferred, pushing US production into immediate base decline.
Potential Shut-Ins: Lower 48

Although shut-ins are a challenge to predict, volumes at risk of shut-in can be identified. As prices in the field drop below variable OpEx, operators will weigh the costs and benefits of keeping the wells in production, including the potential for permanent loss of capacity.

Note: Well-level production as last reported (November 2019-February 2020).
US Rig Count: Declines Accelerate in March

The rig count in the United States has been steadily falling since late 2018, but daily declines accelerated in mid-March.

March began with 845 rigs operating in the US. As of March 25th, that number had dropped to 762.

The Permian basin, the powerhouse of US crude oil production, has seen the most declines month-to-date, with 34 rigs laid down so far.

Rigs in the Rocky Mountains region have also fallen sharply, down 12 so far. The Powder River basin has lost 7 rigs, while the number of rigs in the Denver-Julesburg and Green River Overthrust have fallen by 3 and 2 respectively.

Areas encompassing the Eagle Ford shale play are also down considerably, down 11 rigs since the start of the month.

No part of the United States has been spared from the declines, and Enverus expects daily rig counts to continue to drop as operators rein in capital expenditures.

Source: Enverus Rig Analytics
Natural Gas
Gas Breakevens Sensitivity to Crude Oil Prices

Natural gas breakevens under $5/MMBtu at different WTI prices. Note how almost all associated gas goes away when WTI prices drop to $35 levels.

HH Breakeven ($/MMBtu) @ 20% MARR & $55.00/MMBtu

HH Breakeven ($/MMBtu) @ 20% MARR & $35.00/MMBtu

Source: Enverus ProdCast
Impact of Crude Oil Prices on Natural Gas Production

This chart illustrates the impact of crude oil prices to dry natural gas production.

If gas and oil prices remain at the levels seen today, HH at $2/MMBtu and WTI @$25/Bbl, dry gas production will see a decline of 34 Bcf/d by December 2025 compared to December 2019.

Even at $45 and $2, gas production can still see a drop of 14 Bcf/d, which will still leave the gas market short.

Source: Enverus ProdCast
Natural Gas Demand Needs Higher Gas Production Volumes Even After Considering Potential Impact of Covid19

Domestic gas demand (ResCom, Industrial, Power) is expected to average 74.1 Bcf/d this year compared to 77.3 Bcf/d last year.

Our standard forecast has been adjusted downwards to account for the impact of covid-19. Since it is difficult to forecast the effects of this unique situation, the 2008-09 downturn was used as a proxy.

- Industrial demand declined 7.3% YoY during the 2008 downturn. We apply this rate starting in March of this year through November.
- Electricity demand declined 4.5% between 2007 and 2009 but the expected decline in power burn did not quite materialize as lower gas prices pushed gas generation higher in the priority stack. Similarly, we expect 30.4 Bcf/d power demand this year compared to 31.0 Bcf/d last year.
- ResCom was stable during the last downturn and is expected to average 22.1 Bcf/d this year assuming 10-yr avg weather starting in spring.

Demand is expected to slightly increase to 74.3 Bcf/d next year as higher gas prices reduce power demand. Domestic demand is forecasted to return to its normal trajectory at 77.8 Bcf/d in 2022 growing to 80.5 Bcf/d in 2025.

Base Case 5-Year Forecast

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<td>2025</td>
<td>23.3</td>
<td>25.6</td>
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Source: Enverus analysis based on EIA
Storage Overhang Expected to Be Depleted by the End of the Year

Natural gas inventories will help supply the natural gas market this year while production declines due to the loss of associated gas.

Currently, inventories are 292 Bcf above the 5-year average as a result of production gains outpacing demand in 2019. During the 4th quarter of 2019, dry gas production peaked. However, winter demand was relatively mild.

Enverus sees a high risk on inventories ending the injection season at significantly above-average levels. This is due to demand losses caused by covid-19 more than offsetting production declines. However, by the start of the withdrawal season (Nov. 1), production levels will be low (~90 Bcf/d), causing storage inventories to decline rapidly as demand normalizes and peak (winter) demand season starts. Enverus therefore expects prices to quickly respond by increasing next winter and into 2021 to levels north of $4.00/MMBtu.

End-of-Summer Inventory Projections

Source: EIA, Enverus analysis
March 2020 – Preliminary Impact of Covid19 and Low-Price Environment
LNG Exports

LNG sendout observed in pipeline data has seen a decrease in March from the peak at end of January. Sabine announced that 2 cargos were cancelled due to the loss of demand in China. Additionally, weather conditions, specifically fog has caused delays at the terminals in the Gulf Coast as well as the unstable economic conditions.

In March to-date (1-27), pipeline sendout averaged 8.3 Bcf/d, down 0.4 Bcf/d from January and February levels.
Marcellus and Utica Gas Production

The Marcellus and Utica peaked during the 4th quarter of 2019. Since, production has been decreasing.

As of March 27th, the production sample in the region is already down 0.5 Bcf/d compared to the first of the month.

Dry Gas Production: Daily Pipeline Sample (last 12 months)
Forecasting Power Load Demand Destruction in Time of Coronavirus
Forecasting Power Load Demand Destruction in Time of Coronavirus

THE CHALLENGE

• When Coronavirus power load demand destruction started to show up in our daily ISO load forecasts, Enverus power analysts had to quickly tackle a new set of realities.
• Just like businesses all over the world, we were faced with never-before-seen scenarios as a result of the nationwide shutdowns. Our machine learning-based forecasting tools have never learned the demand dynamics at play.
• First, a primer on our typical standard operating procedure: our forecasts look at actual temperature and power demand data from previous days and the previous weeks and it learns as it’s going along. The models were built to respond to load growth or anything that may be happening in the market.
• This presented a minor challenge. The model was suddenly forced to predict demand in a scenario for which it had no historical data to compute.

THE SOLUTION

• We launched a new model – one that knows what the temperatures were for the load over the last year since February 2020 and back a year – and that’s it. That’s all it knows about how temperatures are related to load. It doesn’t know anything that’s been happening over the last month.
• Here is the very first look at the results of our study – just a few days in since launch. Now that we are running those two load forecasts in parallel, you will be able to see the difference between the two loads, and you can identify the level of demand destruction.
Electric Reliability Council of Texas (ERCOT)

We have measured little to no demand destruction due to coronavirus and governments implementing policies to reduce the virus in ERCOT. However, we are starting to detect some demand destruction over the last couple of days. When comparing similar temperatures pre-covid-19, we are detecting 1-3% demand destruction.

Source: Enverus PRT
In NYISO, it's a different story. We have detected demand destruction starting early last week. When comparing similar temperatures pre-coronavirus we are detecting 10-15% demand destruction.
NGLs
NGL production is expected to take a fall in the coming years, but how much of a decline we will see largely relies on crude and natural gas prices.

While both higher crude prices and natural gas prices individually lead to higher NGL production, a combination of higher prices in both commodities will yield the highest levels of production.

The Enverus base case for NGL production shows drastic declines in 2020 and the first half of 2021. However, with the expectation that prices will rebound between $45/Bbl and $60/Bbl WTI from 2022 to 2025, Y-grade production is expected to recover from the dip and ultimately grow from 12/2019 to 12/2025.

Source: Enverus ProdCast
With the White Cliffs conversion and the Elk Creek pipeline hitting the market in late 2019, the front range Rockies got much needed takeaway capacity to Conway. However, a bulk of the volume increase from the Rockies was expected to come from the Bakken with Elk Creek coming online. As crude prices have taken a plunge in the last month and aren’t expected to recover at least in the near term, the pipelines out of the Bakken will not run full and will deliver less volume into the front range Rockies. All the volume that flows from the Bakken to the front range, as well as all of the production in the front range, flows to Conway to be fractionated. If the volume out of these basins is too much for Conway, the Y-grade continues to flow south to Mont Belvieu.

**Notes:**
(1) Bakken to Rockies volume through 9/2019 is the value published by the FERC for Bakken NGL. The volume reported in 3Q2019 is carried forward through 12/2019.
(2) Bakken to Rockies production from 1/2020 forward is Bakken production less fractionation capacity in the Williston basin.
(3) Outbound pipeline capacity includes Overland Pass, DCP Wattenberg, Front Range, Elk Creek, and White Cliffs.
Shin Oak and Grand Prix relieved the pipeline bottleneck as they ramped up throughout 2019. Production increases were seen in the Permian in late 2019 with these pipeline expansions, as well as Gulf Coast Express hitting the market, helping get additional gas volumes out of the basin.

EPIC recently brought to service its crude pipeline and is converting its Y-grade line back to NGL service, which was used as an interim crude service pipeline. This is expected to be online in 2Q2020.

Seminole Red, originally thought to be converted back to NGL service from crude service, is not guaranteed to be converted. Rather, Enterprise has mentioned they have the right to switch the service back to Y-grade service based on market conditions.

Despite all these pipeline projects, the Permian is no different than the Bakken and Rockies. There will be plenty of outbound pipeline capacity as production is expected to decline in the basin near term.
Q4 2019 OPERATOR UPDATE
Q4’19 Earning Calls Key Takeaways/Trends

Learnings from earnings season have become less meaningful as most capex plans will be revised next quarter.

• Until early March, it was beginning to look like a year of not-so-meaningful reductions in capex with flat to growing production. Fast forward to today, and many plans announced during earnings season are now out the window. After oil prices crashed, 32 of the 60+ producers we track have released amended capital and operational plans, currently totaling over $21B of capital wiped off the table. Despite many capex plans being thrown in the trash, here were some other themes from Q4’19 earnings:

  • The sentiment was low during earnings season, even at $50 WTI, which now seems like luxury compared with today’s prices. Analysts were raising an overarching issue of US shale – high declining production profiles, the skew toward gas later in wells’ lives, volatile prices, and expensive operations. Small changes like haircutting capex, reducing cycle times, and modifying completion techniques will go only so far in helping the industry and accelerating the path to free cash flow.

  • Much of the negative sentiment was focused on gas. “Gas prices in the US are below breakeven levels, and gassy basins will likely bear the brunt of activity reductions in 2020,” Halliburton stated in their call. Now, tides have turned and gas players like Cabot are some of the best market performers in the industry.

  • Other comments from Halliburton included: “US Drilling and completions activity may be biased lower due to the consolidation and restricted access to capital. The US shale industry is facing its biggest test since the 2015 downturn. [Fourth quarter] customer activity declined across all basins in North America land… and completed stages had the largest drop we have seen in recent history.” HAL’s OFS peer, Schlumberger, was also feeling the activity reduction, as they reduced their fleet capacity by 30%, and is now deploying only 50% of available fleet capacity (a number likely much lower today).

  • Impairments were rampant. With the decrease in strip prices and the corresponding decrease in activity, many operators were forced to impair reserves. Chevron, for example, had a $6.5B impairment to their Appalachia assets.

  • Exxon was ahead of the game in slashing Permian growth guidance, which may have been a tipping point for others if the coronavirus was the only thing sabotaging prices.

  • Lastly, this year appeared to be steering toward being the year of ESG. Operators were finally taking much larger strides toward Environmental, Social, and Governance policies. Majors like Repsol and BP are announcing net neutrality plans, while large independents like Diamondback and Pioneer are tying compensation to environmental and safety metrics like flaring, recycled water, and safety incident rates - and almost every other operator that has reported this year has added ESG-related commentary in their press release this quarter if they had not previously. With backs up against balance sheets, this will likely take a back seat until volatility settles.
Capex Reductions Since Crash

A total of ~$21B in capex will be taken off the table from these operators in 2020, with a ~33% reduction on average from initial plans.

Source: Public Filings, Enverus Research. OVV is estimated from Q2 reductions. CVX, BP, and RDS includes international and downstream, with BP unofficial. Oxy released a second reduction on March 25.
Production Declines

August ‘19 to August ‘20 will showcase an average of ~44% decline in production across these operators.

Average Oil Decline - 44.8%

Average Gas Decline – 43.6%
Hedges Duration…2021 Falls Off A Cliff

Oil hedges only help weather the storm in the short term. Based on aggregated total volume hedged, if prices stay low into 2021, many are unhedged.

Oil-Hedge Volume and Price by Month

Source: Enverus Operator Intelligence. Chart reflects the cumulative hedge position among the 72 public US E&P companies under coverage per latest company disclosures. "Hedge prices" are converted to WTI or Henry Hub terms using basis assumptions.
This is a preview of the full report. If you are interested in learning more, please contact your MarketView account manager or businessdevelopment@drillinginfo.com, and for immediate help: 1 (800) 282-4245

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