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It's Not Supposed To Be That Way – Part 1:

What Happens to All That New NGL Infrastructure if Production Growth Slows?



- The crash in crude oil prices has had a significant impact on the natural gas liquids (NGL) market and could trigger several startling outcomes.
- Ethane supplies were expected to be plentiful and sufficient to meet the needs of the new steam crackers and export projects, but there may not be enough ethane in the right places to satisfy all the new demand.
- Ethane has been seen as the preferred feedstock for steam crackers over the long term, but as new ethane demand materializes, flexible steam crackers may realize better margins from naphtha, butane and even propane.
- Potential tightening of U.S. propane supplies and firming of U.S. propane prices, combined with softer international prices, may squeeze arbitrage opportunities in this sector.
- The degree to which crude oil prices continue to rebound will have significant effects on NGL production levels, ethane and propane prices, and the profitability of new U.S. steam crackers.

Five years ago, NGL production was projected to skyrocket as the shale revolution came to U.S. “wet” shale gas plays. That prediction came true—at least it has so far. In 2010, NGL production from gas processing started the year at just over 2.0 million barrels per day (MMb/d). By the end of 2014, volumes were above 3.0 MMb/d, an increase of 50% and more than the U.S. market could absorb. This glut of supply hitting the market was predicted to crush NGL prices, and it did. In September 2011 the price of ethane (the lightest and most common NGL) was 90 cents per gallon (cents/gal) and propane (the next-lightest NGL) was \$1.60/gal. A year later, ethane was at 30 cents/gal and propane was at 85 cents/gal. Prices have continued to fall. So far in 2015, ethane has averaged 18 cents/gal and propane 51 cents/gal; that represents an 80% decline in the ethane price and a 67% decline in the price of propane from their 2011 peaks. Over the past few weeks, the price of propane has dropped below 40 cents/gal.

The bounty of NGLs from shale was a windfall for the U.S. petrochemical industry, a business that had been written off as dead as recently as the mid-2000’s. Cheap NGL feedstocks

stimulated a renaissance of production and profitability, and drove a frenzy of new petchem plant capacity expansions unlike anything seen by that industry in decades. The premise was simple. Most of the rest of the world produces these petrochemicals from naphtha, an oil-based feedstock whose pricing is closely tied to that of crude oil. The thinking went that, with oil prices sky-high and NGL prices low, U.S. petchem plants would gain a significant feedstock cost advantage that would translate directly to high margins and big profits. And it did. Existing petchem plants that could run on inexpensive NGL feedstocks yielded astronomical returns. Inevitably that stimulated planning for investments in new facilities to do more of the same.

Starting in 2011 there was a barrage of announcements for the construction of new U.S. petchem plants designed specifically to use ethane as their feedstock. Today at least four of these plants are under construction, with several others under development. At the same time U.S. petchem firms were gearing up to use this low-cost ethane, that feedstock caught the eye of several international petchem companies. Although the high cost of shipping and storing ethane has historically inhibited its shipment overseas, the production and pricing outlooks for ethane appeared to justify the cost of building specialized ships and terminals to transport U.S. ethane to Europe and Asia. New terminals to export U.S. ethane from both the East Coast and Gulf Coast were announced, along with orders for new ships to move the ethane overseas. Much of this infrastructure is currently under construction.

The NGL-related infrastructure development frenzy goes beyond ethane. As noted, propane prices were falling sharply too, and the outlook for production growth implied that far more propane would be available than could be absorbed by the U.S. propane market, which is dominated by the low-growth residential/commercial fuel sector. The apparent solution to this imbalance was propane exports, involving new dock capacity, ships and overseas customers. Much of this development has already happened, with still more infrastructure under construction. Exports of propane have ramped up from just over 100 Mb/d in 2010 to more than 500 Mb/d in the fourth quarter of 2014 and even higher levels in the first half of 2015. The infrastructure to support even more propane exports will be available over the next year.

Most of this investment in infrastructure to use and export both ethane and propane was justified on three key assumptions:

1. U.S. NGL production would continue to grow.
2. U.S. NGL prices would remain low.
3. Crude oil—and naphtha—would continue to be expensive.

As of the spring of 2014, belief in these assumptions appeared to be completely rational. Then the world changed. Responding primarily to continued increases in U.S. crude oil production, crude prices dropped precipitously, down 50% from their October 2014 highs. NGL prices dropped in sympathy with crude oil, especially prices for normal butane, isobutane and natural gasoline (the three heaviest NGLs), which had held stronger while ethane and propane collapsed previously. Now butanes and natural gasoline prices were down sharply as well.

At that point, U.S. producers curtailed drilling activity, with the rig count falling from more than 1,900 in October 2014 to less than 860 by mid-June 2015. Production statistics for crude oil--and NGLs--flat-lined and a few basins experienced production declines--not enough to significantly influence the market, but enough to raise concerns regarding possible developments to come. These statistics warned that assumption #1 behind the decisions to invest in ethane- and propane-related projects could be subject to some doubt. The fact was that NGL production growth may well slow, if not start to decline.

If NGL production were to decline at the same time new petchem and export demand were coming online, then assumption #2 could be at risk: NGL prices, particularly those for ethane and propane, might not remain low relative to naphtha. Also, if crude oil prices were to remain soft, that would hold naphtha prices down, nullifying assumption #3. Such a scenario would call into question all of the infrastructure investments made on the basis of these assumptions.

This report examines the possibility that all three of the assumptions could be wrong, and the implications that follow from such a possibility. Due to the scope and importance of these potential developments, *It's Not Supposed To Be That Way* covers more ground than most of RBN's Drill Down reports. Consequently it is being provided in two parts. Part 1--this report--examines the background of NGL production growth, the challenges of infrastructure development decisions, the analytical framework used in this report, and a preview of our NGL price outlook under different crude oil price scenarios. Part 2 will provide our forecast for NGL prices, examine petrochemical feedstock switching capabilities and preferences, the implications of lower crude oil production for ethane supplies, further logistical complications for ethane (such as capacity constraints to move ethane supplies to the Gulf Coast), and implications of lower crude oil prices for propane, as well as provide conclusions.

Private Briefing

On Parts 1 and 2 Results from RBN's *It's Not Supposed To Be That Way* Study

In addition to this two part Drill Down report series, RBN is providing a private briefing service for organizations interested in the details of our analysis. These are two hour sessions held in your offices or RBN's Houston office that cover all of our findings in both Part 1 and Part 2, and are available *now*. For more information, please contact Paige Hambric, info@rbnenergy.com or (888) 613-8874.

This RBN Energy Drill-Down Report is available for individual subscription at rbnenergy.com as part of RBN's Backstage Pass premium content service.

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