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Blinded by the Lights:

Finding Markets for U.S. Field and Plant Condensate



- The U.S. is now producing a surplus of light liquid hydrocarbons.
- These include field condensate produced at the wellhead and plant condensate or natural gasoline produced from rich gas.
- Demand for these liquids is declining at their traditional demand centers - refineries and petrochemical crackers.
- Demand for natural gasoline has been growing in Canada as a diluent to blend with heavy crude but current estimates of requirements may be reduced by recent market developments, including the recent collapse in crude oil prices.
- Refinery infrastructure investment to process more light hydrocarbon liquids as well as plans for stand-alone condensate splitters will increase domestic demand for field condensate.
- Evolving interpretation of the export regulations governing processed field condensate have increased export potential to meet Asian demand for feedstocks.
- Exports of light NGLs such as ethane and propane will compete for the same petrochemical feedstock market.
- If surplus supplies of light hydrocarbons are not absorbed by overseas markets then U.S. prices for these products will be under further downward pressure.

U.S. crude oil production surpassed the 9 MMb/d mark in November 2014 – the highest level since 1986 according to the Energy Information Administration (EIA). The boom in crude production has been primarily powered by growth in unconventional production in three shale basins, the Bakken in North Dakota, the Permian in West Texas and the Eagle Ford in South Texas. The crude being produced from these basins is mostly lighter as measured in API degrees gravity than traditional supplies from conventional production. In fact an increasing quantity of crude output is more correctly termed condensate – a very light liquid hydrocarbon with gravity typically over 50 degrees API. Although the EIA classifies condensate produced at the wellhead

(known as field or lease condensate) as crude oil, in fact it is usually recovered from the gas stream. Production of this field condensate in the U.S. has increased from about 450 Mb/d in 2009 to 1.2 MMb/d in 2014 and could increase to 1.8 MMb/d over the next 5 years depending on a number of factors, the most important of which is the price of crude oil. Over the past few weeks, field condensate prices have declined as much or more than crude oil prices.

Plant condensate or natural gasoline is very close in composition to field condensate, though is usually even lighter (70-80 degrees API). While field condensate is recovered from the gas stream at or close to the wellhead sometimes with the assistance of a stabilizer, plant condensate remains suspended in the gas stream until it reaches a gas processing plant where it is extracted as a natural gas liquid (NGL). Production of plant condensate has increased along with shale crude and condensate output, although on a smaller scale up by 160 Mb/d to 430 Mb/d between 2009 and the third quarter of 2014. Plant condensate output could increase to 600 Mb/d over the next 5 years.

Rising production of field and plant condensate in the U.S. now exceeds domestic demand for these light hydrocarbon liquids. Field condensate is primarily used as a refinery feedstock and has traditionally been blended into the crude stream. However, U.S. refiners are struggling to cope with higher volumes of field condensate that their refineries were not configured to process. New investments in light crude processing capacity and stand-alone condensate splitters will increase demand for condensate by 2016 but probably not enough to soak up expanding production. Demand for plant condensate or natural gasoline is traditionally driven by refinery requirements for gasoline blending and by steam crackers to produce petrochemicals. Petrochemical demand had declined precipitously in recent years as lower priced ethane and propane have replaced natural gasoline in that market. Similarly, refinery demand is expected to drop as the lighter slate of U.S. crude from shale reduces the need for additional natural gasoline and changing market trends have reduced gasoline consumption.

That leaves only one source of potential demand growth for both forms of condensate -- export markets. In fact, there are two such export markets. The first is as a diluent for blending with heavy Canadian bitumen crude to allow the latter to flow in pipelines. Natural gasoline is generally better suited for this purpose than field condensate and a significant portion of the U.S. surplus is expected to meet expanding Canadian demand. The second significant export market is feedstock for overseas petrochemical plants. Field condensate is usually more suited for this market than natural gasoline. Capacity at Asian petrochemical plants is expanding and could provide a significant source of demand.

However, there is a distinct possibility that Canadian demand for diluent could be lower than expected and that new Asian petrochemical crackers will use lighter NGLs such as ethane and propane instead of more condensate. If that turns out to be the case then it will leave both field and plant condensate surpluses in the U.S. searching for new markets to prevent prices from succumbing to significant downward pressure.

Recent developments in the crude oil and NGL markets exacerbate this possibility. First the recent crude price crash (prices of benchmark West Texas Intermediate have fallen by 44% since their most recent high in June to less than \$60/Bbl on December 11, 2014) could impact investment in new heavy crude oil production projects in Canada – reducing demand for condensate as diluent in the medium term. Second U.S. ethane oversupply has caused prices for that commodity to tumble in the past few months to a point where its BTU equivalent price is less than 70% of the price of natural gas at Henry Hub Louisiana (the U.S. benchmark hub). Like the crude price crash, the ethane price collapse is basically caused by a surplus of supply over demand. If historically low ethane prices continue over the medium term then it is more likely that construction of Asia steam crackers will be modified or built to use ethane as a feedstock rather

than heavier condensate range materials. That would result in even less demand for condensate exports.

Of course, lower crude oil and NGL prices will likely result in less U.S. drilling activity, which will decrease the production volume growth potential of those liquid hydrocarbons. How that development will offset the potential for declining demand will be a crucial factor for these markets over the next few years.

This report describes the extraction and production of both field and plant condensate. We provide actual and forecast production data as well as an explanation of their markets expected levels of demand over the next five years. We explain why both products are likely headed for a surplus in the domestic market and discuss possible export markets that could soak up that surplus. Finally we cover potential competition between field and plant condensate in export markets as well as the possibility that those export markets could fail to materialize.

Appendix A provides a description of the transportation routes to market of both field and plant condensate.

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