

CRUDE QUALITY MATTERS: A BRIEF UPDATE

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Crude Quality Issues

Forecasts of large growth in US tight oil production for years to come are unrealistic. The demand side will limit tight oil growth because of crude quality:

- Mismatch between the quality of crude produced in the US and refineries' capabilities world-wide, including all expected growth in coming years
- Mismatch between products' yields from US tight oil and products demanded in the future.
- Refiners do not like light-heavy blends compared to actual crudes.

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Most of the Increase in Non-OPEC Production is from Unconventional

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• Extra heavy depends on tight oil

Most of US Tight Oil Production Additions were Light Crude & Condensates



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Most of Production Additions in Texas were Light Crude & Condensates



Source: EOA, 2019 and EIA 2019

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Crude Quality Matters: Import Replacement of Same Quality: Light Sweet



Crude Quality Matters: Imports are Heavier



Source: EIA, 2019 and EOA, 2019

Blending Light With Heavy is A Problem

Comparison of Yields of Blended Crude with Original Crude of the Same API



Source: Statoil, 2018, Repsol, 2018, and EOA, 2019 * Advanced and complex refinery

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Global Refineries Produce More Middle of the Barrel Products than the U.S.



Source: IEA, 2018, EIA, 2018, and EOA, 2019

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Crude Quality Matters to Future Demand

If most growth in production is condensates from tight oil, it cannot produce enough diesel and kerosene to meet the predicted demand



Source: IEA, 2018 and EOA, 2019

Comments on Medium Term

Looking at global refinery expansion in the next five years:

- Only about 30% of new refining capacity can take light crude, which is equal to less than 25% of expected growth in US shale oil production! Where will the 75%+ of shale go?
- If shale production is growing by more than growth in global demand, where will the additional production go? Where will the heavier oil come from to cover the remaining 70%?
- Some countries are building their own refineries to utilize their own crude. Where will U.S. shale go?

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