Undercurrents in Shale

Steep decline rates require constant drilling and well completions to maintain output levels

➢ In 2018, about $38 billion was spent on drilling to offset decline, roughly 90% of active rigs.

➢ With current productivity and decline rates, about 7,500 new wells a year, at an average cost of $7 million per well held constant, this represents roughly $53 billion per annum to maintain production at current levels.

Shale producers have made Progress living within their means,

➢ When WTI prices were above $65 (first half 2018), many producers outspent cash flow significantly. In first half 2019, with WTI averaging only $57 per barrel, half of the companies still achieved cash flow neutrality and others “over-spent” by a smaller margin.

➢ Increasing investor scrutiny has pressured producers to cut costs and reduce capex and will continue to.

Cash Flow to Capex 1H 2019

Cash Flow to Capex 1H 2018

above red line, companies are spending within cash flow

below red line, companies are spending more than they receive in net revenue

source: SEC filings, ESAI estimates
Where and How Much Demand for Crude Oil

New Refining Capacity for Medium and Heavy Crude

- Weak Product Demand Limits Growth in Refinery Throughput
- Strong Asia & Middle East Capacity Growth
- New Capacity Favors Heavier Crudes
- Leaves Little Room for Others, Forcing Europe Rationalization
- Light Competes for Existing Capacity
Strong growth in Middle East and Asian refinery throughput, driven by new capacity, leaves little room for demand at refineries in other regions in a demand constrained environment.

North American refiner demand is constrained by already high utilization rates, and preference for medium and heavy crude.

Declining local demand and a less sophisticated refining sector will force Europe to cut runs or rationalize capacity.
➢ 9 million b/d of new distillation capacity is planned by 2024
➢ More than half of new capacity would be in Middle East or Asia
➢ This does not include expected rationalization
New Capacity & Rationalization Favors Medium & Heavy Crudes

Global Crude Demand Change By Quality 2019 - 2024

- Light: 493
- Medium: 1,392
- Heavy: 1,044
- Condensate: 627
- X-Heavy: 217

Much of new Asia capacity configured for medium/heavy crudes with ties to Middle East supply

European demand for light expected to decline with throughput
➢ Shale will have to compete for space in less sophisticated refineries

➢ Only a small portion of the global market prefers light sweet crude, primarily in Asia and Europe

➢ U.S. light sweet exports will have to be priced competitively with medium crudes to make inroads at more sophisticated refineries

➢ U.S.-China trade war brings into question the appetite of Chinese refiners well-suited to U.S. crude
Questions