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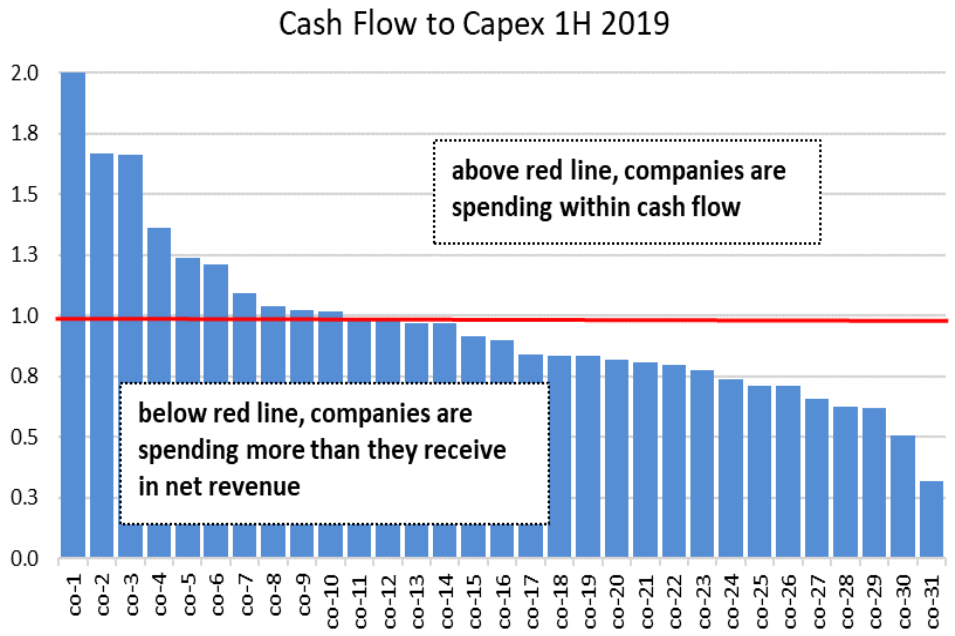
Undercurrents in Shale

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

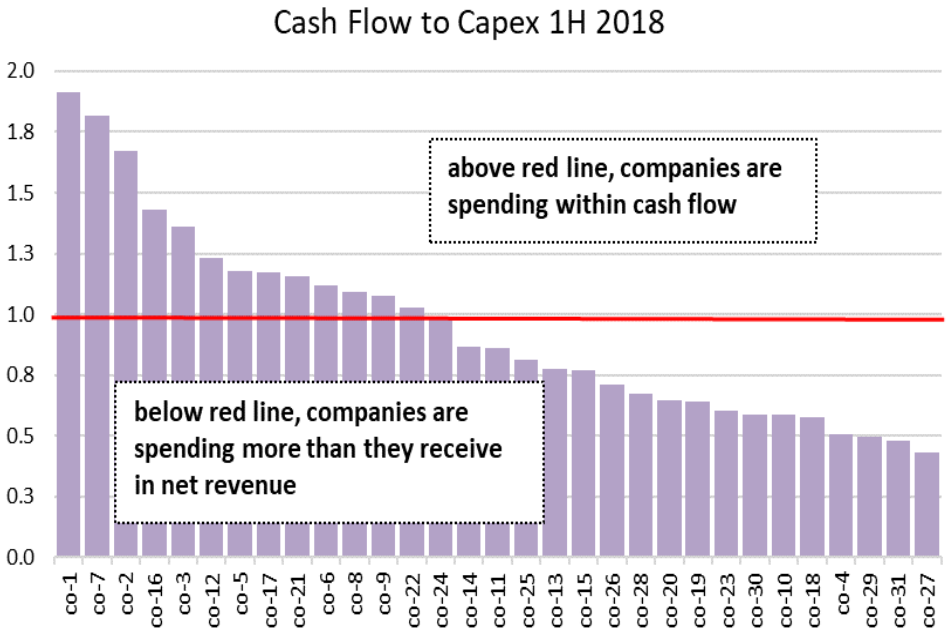
- In 2018, about $38 billion was spent on drilling to offset decline, roughly 90% of active rigs
- With current productivity and decline rates, about 7,500 new wells a year, at an average cost of $7 million per well held constant, this represents roughly $53 billion per annum to maintain production at 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.



source: SEC filings, ESAI estimates



source: SEC filings, ESAI estimates

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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

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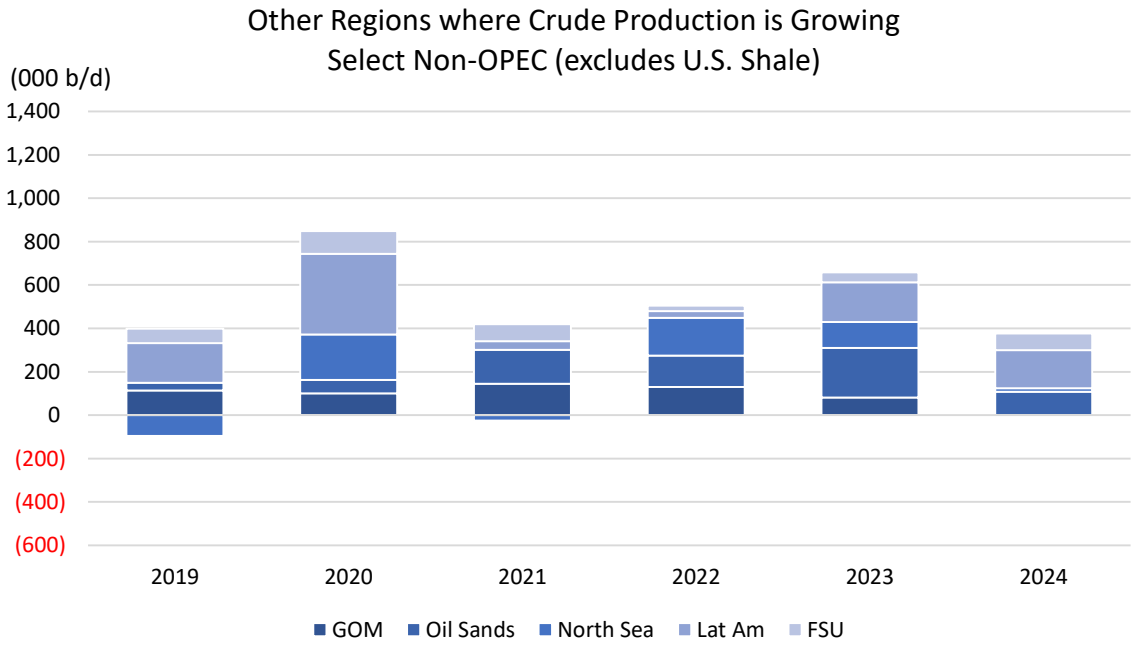
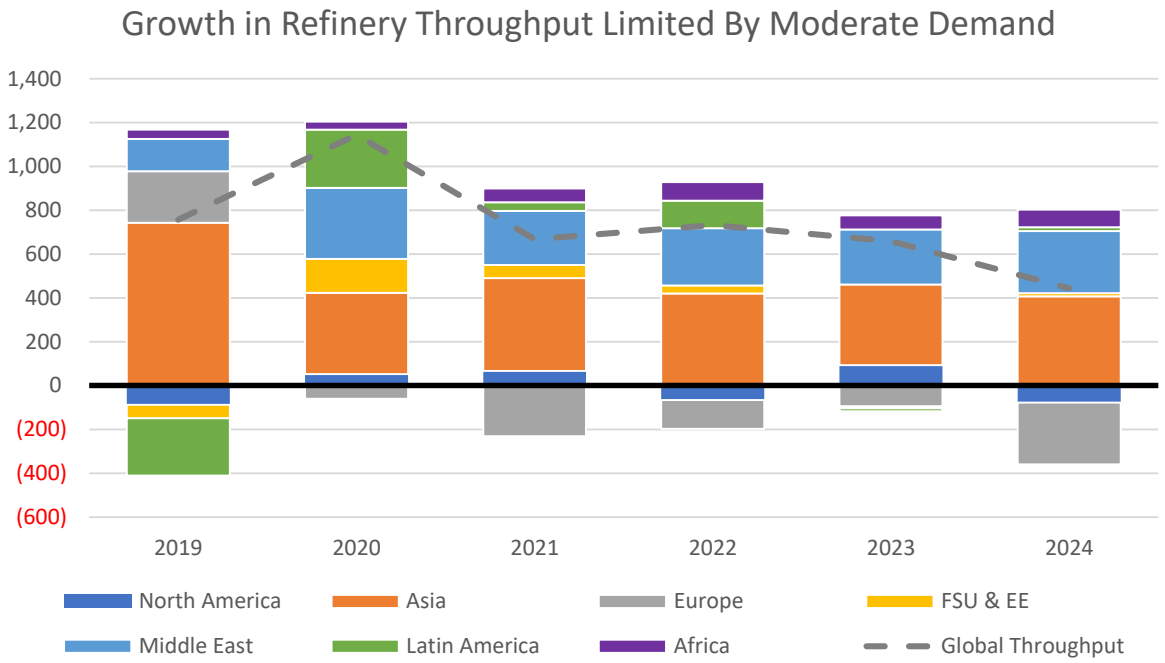
Shale is Not the Only Crude Looking for a Home





- 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.

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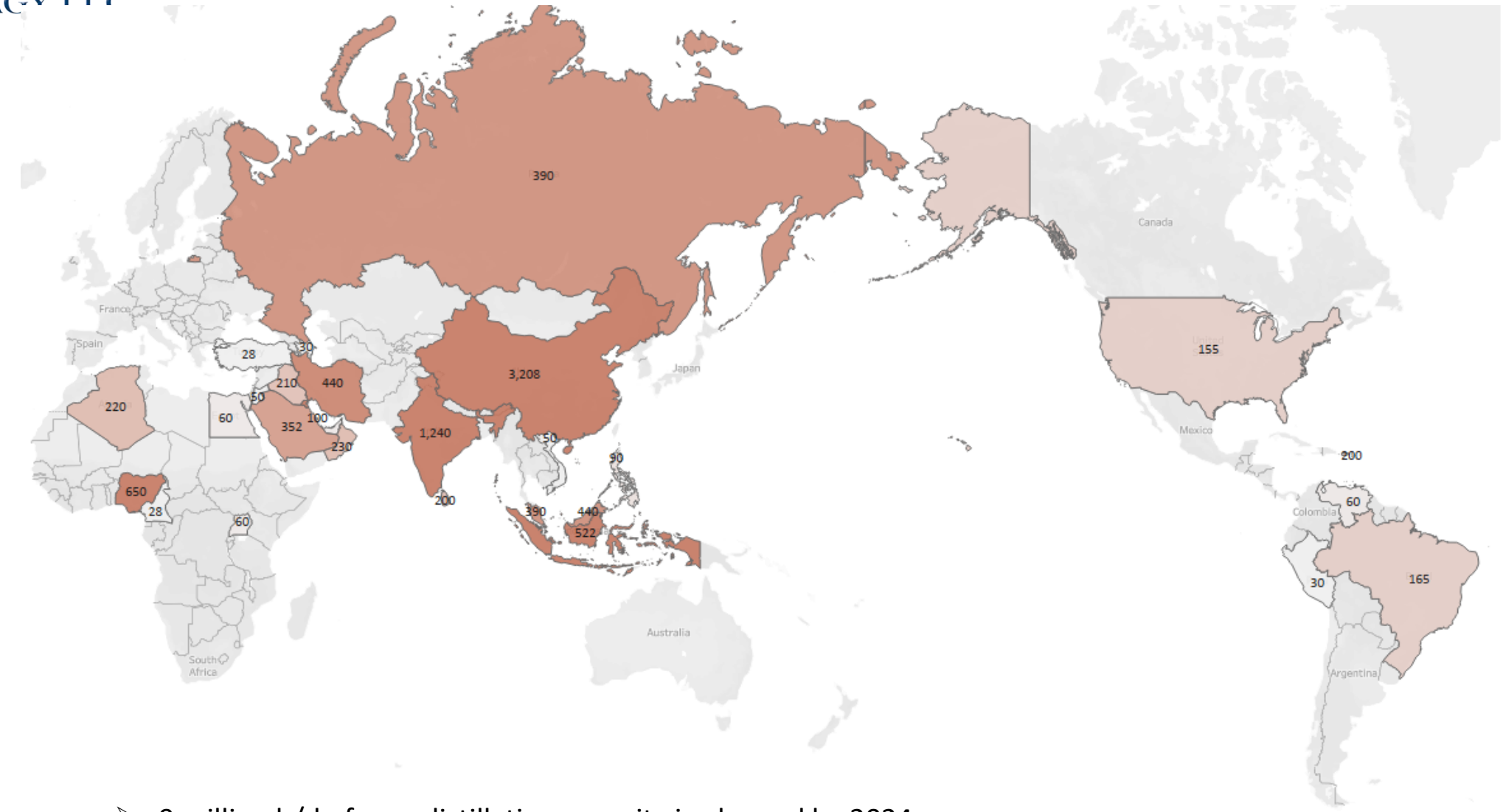
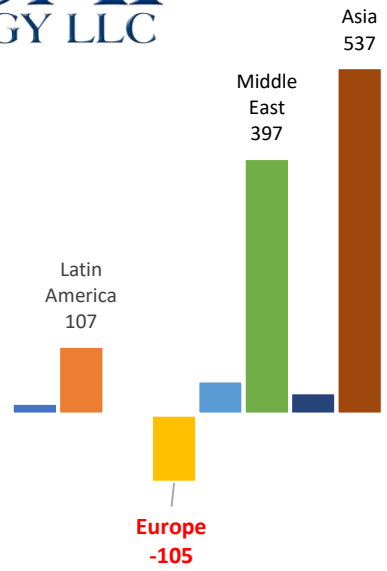
Substantial Growth in East of Suez Refining Capacity

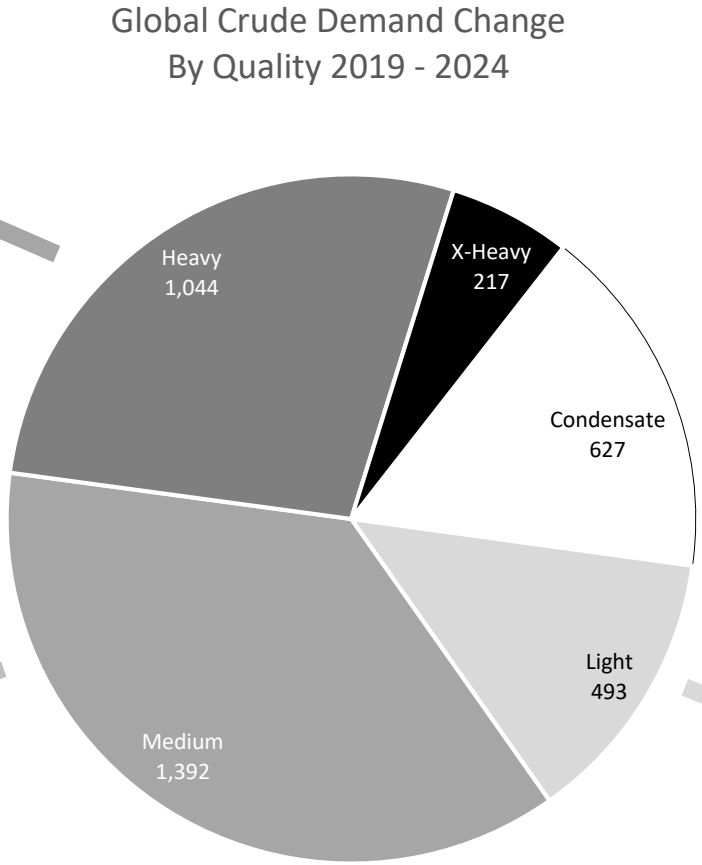


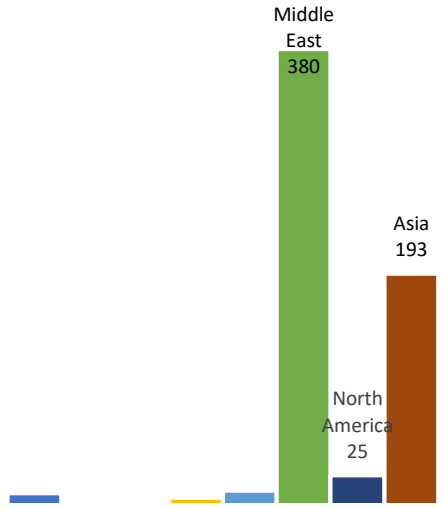
- 9 million b/d of new distillation capacity is planned by 2024
- More than half of new capacity would be in Middle East or Asia
- This does not include expected rationalization

New Capacity & Rationalization Favors Medium & Heavy Crudes

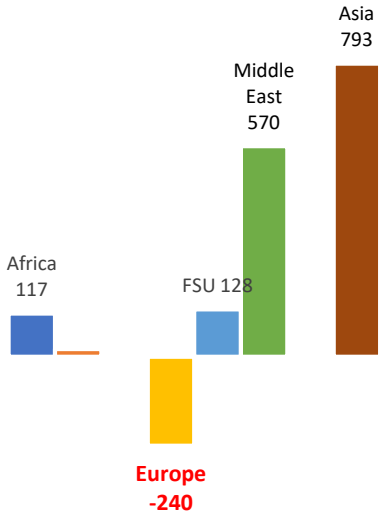


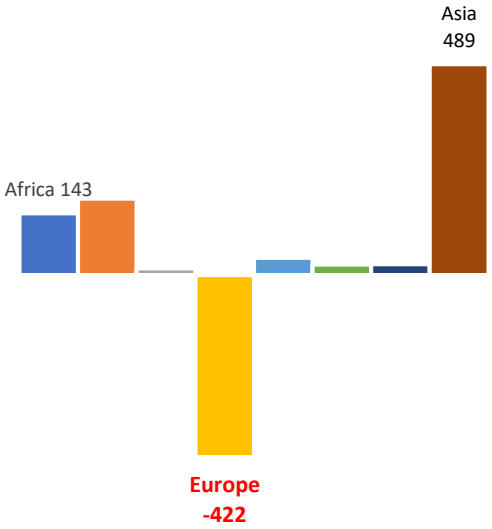
Much of new Asia capacity configured for medium/heavy crudes with ties to Middle East supply





European demand for light expected to decline with throughput





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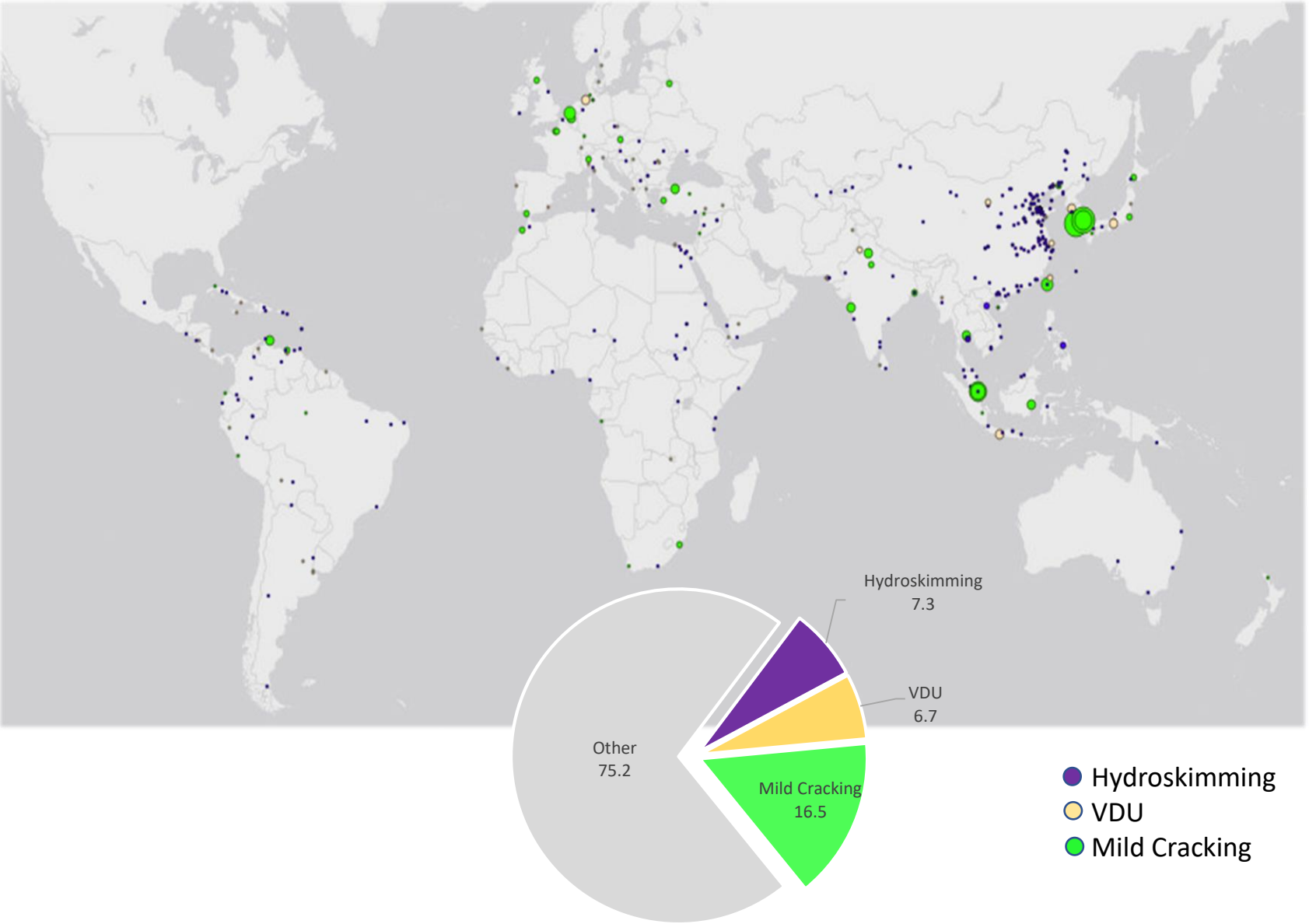
U.S. Shale Exports Will Likely Target Existing Refineries

- 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



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Questions