The Changing U.S. Refining Landscape
COVID-19 and Beyond

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Disclaimer

Forward looking projections are the opinions of Turner, Mason & Co. These projections do NOT reflect the large variability among industry participants nor the unique market conditions facing individual facilities. Each company is expected to make individual decisions on how it may respond to those unique market conditions.
What Determines Refining Prospects?

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<td>Improved cost management</td>
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<th>Regulatory Environment</th>
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<td>Both regional and national regulations</td>
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<td>Can impact demand, supply and costs; affect investment options</td>
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<td>Ability to shape legislation/rulemaking</td>
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<td>Wise decision making in investment/compliance strategies</td>
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Agenda

• The COVID Demand Cliff and Recovery

• Impacts on Crude Slate and Quality

• Other Issues Impacting Refiners
COVID-19/Reopening Assumptions

• COVID-19 lockdown measures have already been largely removed and we expect further easement of restrictions in both the U.S. and abroad over the coming weeks and months

• Regional variation in reopening timing, but activity resuming before formal relaxation and differences are a matter of weeks, not months, in most cases

• Limited impacts from a “Second Wave” – Multiple countries in Europe have already indicated they would NOT lockdown again, even if a second wave occurs

• We expect a post-COVID recession with significant demand impacts through at least 2022, through demand recovers rapidly from extremely depressed levels of April and May 2020

• Gasoline demand will recover most rapidly

• Jet demand will be a laggard – could take years to fully recover, but bounce back from unsustainable lows has already begun

• Diesel demand growth between gasoline and jet – impacted by slow economic growth and most at risk from a recession
Global Demand for All Petroleum Products

Short-Term Global Demand Outlook

“V”-shaped recovery

But, right side of the “V” is below the left side, with 2021 demand ~1 MMBPD below that in 2019

Historical Data Source: EIA, BP, OPEC, IEA, JODI TM&C Estimates
Short Term U.S. Outlook

2019 average refinery utilization = 90.6%
2020 average refinery utilization = ~81%
2021 average refinery utilization = ~88%

Slow reopening in Latin America

April/May refinery utilization < 70%
Late Summer/Fall refinery utilization = ~85%
Current refinery utilization in mid-70's% (73% latest EIA weekly estimate)

Historical Data Source: EIA
Jet fuel recovery slower and hard to predict; expect bounce off current lows as flight activity resumes over the summer. Late Summer/Fall demand remains down about 30% YoY.

Historical Data Source: EIA, TSA
Jet Demand Recovery Quicker than Post-9/11

But jet fuel demand does not pass 2000 levels until 2019 due to efficiency gains.

RPM Pass 2000 levels by 2004

Efficiency gains have stalled since 2012 due to slowing gains in fuel economy and stagnation of load factor at ~80-85

Source: EIA and Federal Reserve
Global Demand Outlook

Global Demand Outlook Comparison

Post-2025 demand outlook is minimally impacted

Source: BP, EIA, OPEC, IEA
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Crude Supply/Quality Dynamics

• Heavy crude production trends shift – widens heavy discount post 2020
  – Canadian crude production growth will slow, but absolute decline (barring short term shut-ins) are unlikely. Growth will accelerate in the second half of the decade. Reliance on rail likely to be low due to delayed growth and improved pipeline outlook.
  – Venezuelan production bottoming out/rebound will happen but timing very uncertain.
  – Growth in other areas – Neutral Zone, Iraq, Saudi Arabia; OPEC++ cuts expected to be eased considerably by late 2020 or early 2021
  – Mexico/other LA production declines likely due to low price environment; “above ground” issues
  – IMO creates large pool of excess resid feedstock, supplemented by increase in medium & heavy sour supply from Middle East

• Light crude supply to decrease short term; return to slower growth beginning in 2H 2021
  – Declines in U.S. LTO production; bottoming in early 2021, though outlook remains below pre-COVID forecast through 2030
  – Accelerated declines in North Sea and other mature fields with Johann Sverdrup Ph 1 already ramped up; Ph 2 coming 2022 or 2023
  – Guyana Liza production ramp likely slower than originally anticipated
  – Significant “above ground” uncertainties remain in key areas (Libya, Nigeria, others)

• Growth in problem/opportunity crudes likely to slow in the short term due to low prices

• Current low upstream investment could lead to price spike if demand returns more quickly than anticipated
Venezuela, Mexico, & Canada Heavy Crude Production

Heavy Crude Production by Region

Source: BP, PEMEX, NEB, TM&C Estimates
Western Canadian Supply & Takeaway Capacity

Less dependence on crude by rail going forward

Gap between supply and pipeline capacity = implied crude by rail

Temporary Shut-Ins due to COVID Lockdowns

Slower production growth later in the decade due to decreased investment today

Source: CAPP, NEB, TM&C Estimates
Heavy crude supply growth to come primarily from Iraq, Saudi Arabia (incl. Neutral Zone), Canada, and, eventually, Venezuela, though timing there remains particularly uncertain.
U.S. Crude Oil Production Outlook

U.S. crude production expected to resume growth trajectory in 2021 as demand recovers

Historical Data Source: EIA
PADD III Crude Imports by Gravity

**2010**
Total Imports = 5.4 MMBPD  
Avg Gravity = 27.6  
43% < 24 API; 53% >28 API

**2019**
Total Imports = 2.3 MMBPD  
Avg Gravity = 21.9  
79% <24 API; 14% >28 API

Source: EIA & TM&C Estimates
PADD 3 Refinery Crude Runs by Source

- Domestic Crude
- Canadian Imports
- Latin American Imports
- Long Haul Imports

EIA, TM&C Estimates
Regional U.S. Crude Slate Drivers (2021+)

- **Crude Diet Changes Will be Regionally Diverse**
  - PADD I – Continue to be limited by capabilities, logistics and economics
    - Predominantly light imports; possibility of further capacity rationalization, lower crude by rail
  - PADD II/IV – Maximize heavy crude due to IMO and LTO declines
    - Heavy crude processing additions limited to low cost debottlenecks
  - PADD V – Continued declines in Local & Alaska production, increasing LatAm and Mideast Crude imports; Transmountain expansion would provide improved heavy crude supply
    - Possibility of rationalization

- **USGC Crude Slate Most Impacted by Developments**
  - IMO rules will change crude values; effect to become more pronounced as demand recovers; Lower LTO production will exacerbate effect
  - Amount and source of heavy crude will be determined by processing capability, heavy crude production, and logistics from source
    - Latin American production outlook very uncertain – likely to continue decline; Venezuela recovery likely sometime later in the decade, though timing is very uncertain
    - Canadian crude production growth to slow, resume in second half of decade
    - More Mideast Sours to flow to USGC as demand recovers and OPEC++ cuts relaxed
Evolving U.S. Refinery Crude Slates

API Gravity (Left Axis)  Sulfur (wt. %) (Right Axis)

Historical Data Source: EIA
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Future Challenges

• Market Issues
  – Growing dependency on export markets
  – Market saturation in traditional markets; will have to extend reach to markets where U.S. has fewer advantages/more competition
  – Risk of global refining capacity overbuilding
    • Importing countries – Asia/LatAm/Africa and exporting countries - ME/India/Russia

• Demand Growth and Threat of “Peak Demand”
  – Lingering COVID-19 and/or recession impacts
  – Competition from alternatives
    • Direct substitutes – biofuels/CNG/LNG/CTL/GTL
    • Move to Electrical Vehicles (EV’s)

• Regulations
  – Stifle demand/increase costs/limit access/distort markets
  – Increased regulation in other regions can advantage U.S. refiners
    • Tighter fuel specifications in developing countries provide opportunities
    • IMO LS Bunker rules (2020) will be a substantial boost
USGC Increasing Dependence on Exports

In 2019:
- 20% of PADD 3 Gasoline was Exported
- 36% of PADD 3 Middle Distillates were Exported

Source: EIA, BP & TM&C Estimates
LatAm Market Approaching Saturation?

<table>
<thead>
<tr>
<th>Year</th>
<th>U.S. Exports to Latin America, MBPD</th>
<th>% of Total LA Consumption Supplied by U.S.</th>
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<tbody>
<tr>
<td>2010</td>
<td>1,000</td>
<td>20%</td>
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<tr>
<td>2011</td>
<td>1,200</td>
<td>25%</td>
</tr>
<tr>
<td>2012</td>
<td>1,500</td>
<td>30%</td>
</tr>
<tr>
<td>2013</td>
<td>1,800</td>
<td>35%</td>
</tr>
<tr>
<td>2014</td>
<td>2,000</td>
<td>40%</td>
</tr>
<tr>
<td>2015</td>
<td>2,200</td>
<td>45%</td>
</tr>
<tr>
<td>2016</td>
<td>2,400</td>
<td>50%</td>
</tr>
<tr>
<td>2017</td>
<td>2,600</td>
<td>55%</td>
</tr>
<tr>
<td>2018</td>
<td>2,800</td>
<td>60%</td>
</tr>
<tr>
<td>2019</td>
<td>3,000</td>
<td>65%</td>
</tr>
</tbody>
</table>

- 31% gasoline supplied by US
- 37% of distillate supplied by US

Source: EIA, BP & TM&C Estimates
Latin American Projects – The Next 5 Years

Exxon Beaumont
250 MBPD -2022

Limetree Bay
Restart
St. Croix, VI
200 MBPD -2020?

Isla/Curacao Restart
300+ MBPD -?

Trinidad Restart
175 MBPD -?

Dos Bocas, Tabasco
Greenfield Refinery
340 MBPD -2025+

Campeche/Veracruz?
300 MBPD -2025+

Nicaragua
300 MBPD -2025+

Manabi, Ecuador
300 MBPD -2025+

Talara, Peru
33 MBPD -2022

COMPERJ, Brazil
180 MBPD -Canceled

Campana, Argentina
30 MBPD -2020

Projected Refined Product Supply vs. Demand Growth – 2019 to 2025

Total Surplus (Deficit) in MBPD:
(Assuming no change in utilization)

(100) (540) 460 (180)

Mexico Other LA U.S. Total

Probable Announced Projected Demand Growth

Prospects potentially negatively impacted by COVID

Source: Various
Global Demand Growth

2018 to 2025 Global Growth by Product (MBPD)

<table>
<thead>
<tr>
<th></th>
<th>Gasoline</th>
<th>Distillates</th>
<th>Other</th>
<th>Total</th>
<th>Annual %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>3,129</td>
<td>3,696</td>
<td>3,285</td>
<td>10,110</td>
<td>1.2%</td>
</tr>
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</table>

Growth continues to be supplied by US refineries
West Africa is potential New Frontier for U.S.
Most growth to come from petrochemical feedstocks – LPG/NGLs

*Average Annual Growth

Source: EIA, BP & TM&C Estimates
African Refined Product Supply/Demand

Growing demand for product imports in Africa thus far has been primarily met by European and Mid East Refiners.

Source: BP & TM&C Estimates
Current exports to Africa still an order of magnitude below those to Latin America – provides room for growth, particularly if European refinery closures re-accelerate.

Source: EIA
Global Crude Capacity Additions 2020-2024\(^{(1)}\)

- Global product demand increase\(^{(2)}\)
  - About 1.1 Million BPD excess capacity growth

Source: TM&C Estimates

(1) Adjusted for projected utilization of 88%
(2) Adjusted for non-petroleum fuels
Final Thoughts

• **COVID-19 Is Not a “Game Changer” by Itself**
  – Strong demand recovery to continue; ultimate pace negatively impacted by recession
  – COVID-19 accelerated some long-term demand destruction trends, but slowed others
  – Investment delays/project cancellations may mitigate supply/demand imbalance
  – Increased potential for crude price “spike” due to supply destruction
  – Refining margins dependent on relative growth of demand vs. return of off-line capacity
  – LTO production growth to be delayed, replaced primarily with Middle East production, widening the light-heavy differential post-2020
  – Slower growth in LTO and W. Canada will decrease crude-by-rail and increase PADD III reliance on waterborne imports
  – Narrower regional differentials will decrease supply cost advantages for inland refiners

• **Long-Term Trends Remain Intact**
  – Post-2023 price, supply, and demand outlooks remain little changed
  – Foreign refiners, particularly in Latin America and Africa, likely to see continued struggles
  – Latin American market may be approaching saturation; West Africa to become important destination for incremental U.S. refined product exports within the next decade
  – Global peak oil demand not likely before 2040 due primarily to economic growth in developing countries
  – Heavy/light crude differentials highly dependent on developments in Venezuela, Mexico and Canada – with Venezuela the biggest “wild card”

• **Increased government propensity for overreaching regulation and the urge to apply the COVID example to Climate Change or other “existential” fears.**
  – COVID experience might decrease this but dependent on how public opinion is affected
Presenters

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