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BREAKING NEWS REPORTS

ANALYTICS
Agenda

IMO 2020

Global Economy
Fuel Supply
Compliance
IMO 2020 – What is it?

- Global agreement to cut sulfur emissions by ships
- Implementation set for January 1, 2020
- Oil industry and shippers awaiting final bunker specifications
- Impact felt by all transportation sectors
Chronology Of Bunker Fuel Sulfur Cap

IMO Sulfur Limit (%S)

- Global cap
- ECA zone cap

- 3.5% (Jan 2012)
- 1.5%
- 1.0% (July 2010)
- 0.1% (Jan 2015)
- 0.5% (Jan 1 2020)

Year:
- 2000
- 2005
- 2010
- 2015
- 2020
- 2025

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About 175 countries along with the EU have ratified IMO 2020. Some ex-FSU, African countries & Laos have not ratified.

China to introduce 0.5% S bunker fuel along its entire coast line on January 1, 2019.

Mining companies have inked term deals with Chinese refiner to supply IMO 2020 compliant fuel in 2019.
IMO 2020

- Impact on Global Economy
  - Bunker fuel prices expected to rise by 50% (2017 as base year)
  - Meeting 2020 goal would cost an estimated $1 trillion
  - Fuel price increases would be passed on
  - Likely to have inflationary pressures

Source: Platts Analytics
Refining Capacity: Top 10

USA: 18.1 '000 B/D
China: 15.5 '000 B/D
Russia: 6.58 '000 B/D
India: 4.6 '000 B/D
Japan: 3.5 '000 B/D
S.Korea: 3.3 '000 B/D
S.Arabia: 2.9 '000 B/D
Brazil: 2.2 '000 B/D
Germany: 2.1 '000 B/D
Iran: 1.6 '000 B/D
China’s Expansions

Source: Platts; Companies

- Hengli Petrochemical 400,000 b/d (Q1 2019)
- Zhejiang Petrochemical Phase One 400,000 b/d (Q2 2019) Phase Two 400,000 b/d (After 2020)
- Huabei Petrochemical (PetroChina) +100,000 b/d (Q2 2018)
- Zhanjiang (Sinopec) 200,000 b/d (Q3 2019)
- Quanzhou (Sinochem) +60,000 b/d (2020)
- Hainan (Sinopec) +76,000 b/d

- Designed to process Saudi, Iraqi, and Brazilian crudes
- First 1 mil bbl Marlim cargo arrived early July 2018.
- Another Marlim cargo of the same size to arrive this year.

- CDU 1 of Phase 1 designed to process Saudi and Iranian crudes
- CDU 2 of Phase 1 designed to process Brazilian and Iranian crudes
Indian Expansions

- IOC’s Paradip refinery +100,000 b/d (After 2020)
- HPCL’s Barmer refinery 180,000 b/d (2023?)
- Reliance’s Jamnagar refinery +700,000 b/d (2030?)
- IOC’s Panipat refinery +200,000 b/d (2024?)
- IOC’s Gujarat refinery +86,000 b/d (2023?)
- IOC’s Paradip refinery +100,000 b/d (After 2020)
- HPCL’s Vizag refinery +134,000 b/d (2020?)

- IOC, HPCL, BPCL’s West Coast refinery 1.2 million b/d (2022?)

- All existing refineries in India run at 100% or higher rates
- No significant increase in crude intake possible until expansion projects complete
- Any growth in domestic product demand to decrease export availability

• Fierce opposition against land acquisition by farmers likely to delay project
• Preliminary partnership with Aramco and ADNOC, likely to be 25% stake each

Source: Platts; Companies
VIETNAM: JV **Nghi Son**
200kb/d (May 2018)
- Main crude supply from KPC
- Operations to ramp up from end-2018

SOUTH KOREA: **Hyundai Oilbank**
Daesan
+90,000 b/d (2018)

MALAYSIA: JV **RAPID**
300kb/d (Q2 2019)
- Aramco to supply 50% crude

INDONESIA: **Pertamina Tuban**
300kb/d (After 2024)
- Sharply lower rupiah hurts Indonesia's oil purchasing power
- Indonesia to make most of domestic crude

INDONESIA: **Pertamina Balikpapan**
+100kb/d (After 2021)

INDONESIA: **Pertamina Cilacap**
+52kb/d (After 2023)

VIETNAM: JV **Nghi Son**
200kb/d (May 2018)
Middle East Expansions

- Jazan, 400 kb/d, Aramco, Q1 2019
- Duqm, 230 kb/d, Oman Oil/KPI, late 2020
- Al Zour, 615 kb/d, KNPC, 2020
- Sitra, +93 kb/d, BAPCO, 2021
- PGS Phase II, 120 kb/d, NIORDC, 2018
- Fujairah, 186 kb/d, IPIC JV, 2023
- Sohar, +82 kb/d, ORPIC, 2017
- Ras Laffan, 146 kb/d, QP/Total, 2016
- Satorp, +40 kb/d, Aramco/Total, 2020
- Abadan, +38 kb/d, NIORDC, 2020
- Karbala, 130 kb/d, INOC/ORA, 2022
- Al Zour, 615 kb/d, KNPC, 2020
- Jazan, 400 kb/d, Aramco, Q1 2019
- Ras Laffan, 146 kb/d, QP/Total, 2016
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**Latin America**

### Major Latam Refiners Crude Runs (‘000 B/D)

<table>
<thead>
<tr>
<th>Country</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>197</td>
<td>196</td>
</tr>
<tr>
<td>Venezuela</td>
<td>452</td>
<td>260</td>
</tr>
<tr>
<td>Argentina</td>
<td>500</td>
<td>453</td>
</tr>
<tr>
<td>Brazil</td>
<td>1742</td>
<td>1807</td>
</tr>
<tr>
<td>Mexico</td>
<td>767</td>
<td>665</td>
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</tbody>
</table>

### Diesel Yield

<table>
<thead>
<tr>
<th>Country</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>39.5</td>
<td>39</td>
</tr>
<tr>
<td>Venezuela</td>
<td>29</td>
<td>28.5</td>
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<tr>
<td>Argentina</td>
<td>41</td>
<td>43</td>
</tr>
<tr>
<td>Brazil</td>
<td>41.8</td>
<td>43</td>
</tr>
<tr>
<td>Mexico</td>
<td>19.9</td>
<td>19.4</td>
</tr>
</tbody>
</table>
IMO 2020: Middle Distillate Rises Again

THE IMO 2020 BUNKER FUEL SPEC CHANGES WILL FORCE 3 MMB/D OF HSFO TO SWITCH TO LSFO AND DISTILLATES

Global Bunker Demand, MMB/D

Assumes global shift implemented in 2020 with minimal cheating/lags

Source: Platts Analytics
Global Bunkers to Morph Into Varied Complex

Source: Platts Analytics
Status of HSFO After 2020

• Plunge in HSFO values would pump up demand from other sectors

• Rebounds as more scrubbers are installed

• Higher demand for straight-run HSFO from refiners & blenders

• ECA states already have blend formula for 0.1% - implications
• Lower HSFO value incentivizes use of scrubbers
• Shippers demand for FO is about 35-40%
• Demand from refiners to rise as HSFO prices plunge
• Rebounds as more scrubbers are installed
• Scrubbers mostly for vessels less than 10 years & new builds
• Scrubbers installed/on order rose from 200+ to 800 (Sep’17 to Jul’18)
• By 2020 : 1600 scrubbers to be installed: 43 needed/month
• Vessel capacity may decline by 7-10% of capacity
• MGO/LSFO fuel choice for 10-15 year old ships
IMO 2020: Impact On Gasoline Yields

Gasoline output could be affected by spike in diesel demand

<table>
<thead>
<tr>
<th>Unit</th>
<th>Action</th>
<th>Purpose</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCC</td>
<td>Cracking severity change</td>
<td>Maximising distillates yield</td>
<td>Lowers gasoline component yield</td>
</tr>
<tr>
<td>FCC</td>
<td>Reduced Runs</td>
<td>Diverting VGO to bunker pool</td>
<td>Lowers gasoline component production</td>
</tr>
<tr>
<td>Reformer</td>
<td>Reduced Runs</td>
<td>Bigger distillates cut from CDU</td>
<td>Lowers gasoline component production</td>
</tr>
</tbody>
</table>

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Global shift towards ULSD – 2018

West Coast of Africa to compete with bunker market for gasoil

Source: Stratas Advisors, S&P Global Platts
Impact of IMO 2020: Kerosene

- Global kerosene/jet production averages about 7% of product yield
- Higher diesel margins may lead refiners to adjust Kerosene/Jet fuel production to increase diesel yield
- Resulting in lower kerosene/jet output
Diesel-Brent & WTI Crack

Heating Oil vs NYMEX WTI Crack

Heating Oil vs Brent Crack

ICE 10 ppm Gasoil-Brent Crack

Source: ICE
Singapore 10 ppm Diesel Crack

S/B

- Spore 10 ppm crack to Brent
- Spore 10 ppm crack to Dubai

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Impact on Crude Oils

• Sulfur reductions in transport fuels – augment increased demand for Super Heavy, Heavy & Medium & sweet crudes

• Demand from bunker market expected to emerge in addition to refiner demand

• Some low TAN medium & heavy sweet crudes could end up in bunker market with very little blending

• Brazil stands to benefit from higher demand for its medium/heavy sweet crudes
The forward curve does show a wider Brent-Dubai spread, but this spread begins to narrow after Q1 2020 as refinery configurations are commissioned.

Maya’s discount to WTI is expected to fall to -$15/b as compared to -$5/b in 2018.
Some 85% of bunker fuel is consumed by 25% of all ships in the market – there about 80,000 ships

These 20-25% of ships are owned by big companies who are expected to be more compliant

Presence of non-compliant fuel on board ships

Insurance coverage - non compliant ships may lose coverage

Enforcement by leading bunker fuel hubs

Source: Various Analysts
Platts To Assess 0.5% Bunker Fuels: Jan 2019

Platts to launch new 0.5% sulfur residual fuel assessments from January 2019 in Singapore, Fujairah, Rotterdam, Houston.

Platts to launch bunker assessments for the new grade in July 2019 across global ports.

Platts to retain all existing high sulfur marine fuel, cargo and barge assessments during and after 2020.

Platts to move all marine assessments to ISO 2010 from January 2019.
Platts Analytics: Update to IMO 2020

MAKING WAVES
THE FINAL COUNTDOWN TO IMO 2020

April 2018
Rick Jeswick
Gary Greenstein
Ken Bogden
Chris Midgley

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Conclusion

- Chances of deferring Jan 1, 2020 implementation date very slim
- Enforcement proposals expected to be finalized by end 2018
- Compliance expected to be about 85%
- Industry wants clarity on specifications, minimum viscosity
- Insufficient capacity to meet hike in diesel demand
- China takes lead in implementing 0.5% S bunker fuel requirement
- 2020 change estimated cost at or more than $1 trillion
Gracias

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