IMO 2020 Overview

Lucian Pugliaresi
Max Pyziur
July 31, 2019

EPA
Washington, DC
IMO 2020…

• Overview

• Compliance Options
  – Economic Challenges of Using Scrubbers and LNG

• What Are Global Markets Indicating Now: 🚨 Alarm 🚨 or 🌞 Aloofness ☀️?

• Policy Guidance: It’s All About Feedstock Costs
IMO 2020 - Overview

Purpose: Reduce sulfur content of maritime fuels from 3.5% to 0.5%

• to protect human health
• to protect the global environment
• Adopted October 10, 2008
• Confirmed: October 26, 2016
• Beginning date of enforcement: January 1, 2020
Global Bunker Oil Demand vs Emissions

Analysis Based on IMO Data via EuroNav
IMO 2020 - Context

Current consumption of Bunker fuels

- Total Demand of 5.6 MBD, of which:
  - 3.8 MBD is high-sulfur fuels
  - 1.9 MBD various types of low-sulfur distillates
  - 0.15 MBD of LNG
Projection of consumption of post-IMO 2020

Potential Displacement of HSFO with Other Fuels

- LNG
- Distillates
- Distillate For Blending
- LSFO
- HSFO

3.8 MBD of high-sulfur fuels to be removed

Analysis Based on Various Sources

© Copyright 2019 Energy Policy Research Foundation, Inc. 1031 31st Street, NW Washington, DC 20007 • 202.944.3339 • eprinc.org
IMO 2020 - Context
Number of Maritime Vessels: over 90,000

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of vessels</th>
<th>DWT (million)</th>
<th>% of total DWT</th>
<th>Average DWT/Vessel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Tankers</td>
<td>10,152</td>
<td>535</td>
<td>28</td>
<td>52,685</td>
</tr>
<tr>
<td>Bulk Carriers</td>
<td>10,884</td>
<td>797</td>
<td>43</td>
<td>73,188</td>
</tr>
<tr>
<td>General Cargo</td>
<td>19,601</td>
<td>75</td>
<td>4</td>
<td>3,817</td>
</tr>
<tr>
<td>Container ships</td>
<td>5,154</td>
<td>246</td>
<td>13</td>
<td>47,654</td>
</tr>
<tr>
<td>Other</td>
<td>47,370</td>
<td>210</td>
<td>12</td>
<td>4,433</td>
</tr>
<tr>
<td>Total</td>
<td>93,161</td>
<td>1,862</td>
<td>100</td>
<td>19,985</td>
</tr>
</tbody>
</table>

Analysis based on UNCTAD Data and EPRINC
## IMO 2020 - Context
### Location & Bunker Fuel Sales of major ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Region</th>
<th>Volumes (mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>Asia</td>
<td>42.4</td>
</tr>
<tr>
<td>Fujairah, UAE</td>
<td>Middle East</td>
<td>24.0</td>
</tr>
<tr>
<td>Rotterdam, Netherlands</td>
<td>Europe</td>
<td>10.6</td>
</tr>
<tr>
<td>Hong Kong, China</td>
<td>Asia</td>
<td>7.4</td>
</tr>
<tr>
<td>Antwerp, Belgium</td>
<td>Europe</td>
<td>6.5</td>
</tr>
<tr>
<td>Busan, Korea</td>
<td>Asia</td>
<td>4.6</td>
</tr>
<tr>
<td>Gibraltar</td>
<td>Europe</td>
<td>4.3</td>
</tr>
<tr>
<td>Panama</td>
<td>Americas</td>
<td>3.5</td>
</tr>
<tr>
<td>Algeciras, Spain</td>
<td>Europe</td>
<td>2.9</td>
</tr>
<tr>
<td>Long Beach-LA, US</td>
<td>Americas</td>
<td>2.6</td>
</tr>
</tbody>
</table>

*Analysis Based on Ship & Bunker & OIES Data*
Emission Control Areas are in place...

The global maritime regulatory environment is changing

Emission Control Areas

© DNV GL, 2016-06-01

- Existing, IMO
- EU Sulphur Directive
- Existing, regional
- Possible future
... but ECAs Were A Hill Compared To The IMO 2020 Cliff...
IMO 2020
Compliance Options
IMO 2020 - Context
Options for compliance

• use low-sulfur fuel oil (LSFO)
• use combinations of middle distillate blends
  – both about 30 to 50 % above high-sulfur fuel
• install scrubbers ($4.5, but sometimes as high as $10 million per vessel)
• convert to LNG-fueled systems ($8 - $12 million per vessel)
IMO 2020 - Context

Compliance Scenarios

• most vessels will convert to low-sulfur fuels, thereby incurring higher fuel costs

• Scrubbers: IMO expects 3,600 scrubber-equipped vessels in 2020; Market consultancies expect 1,500 to 2,000, but will increase to 8,000 by 2030

• LNG: about 600 by 2020 with LNG bunker consumption rising to 7% of total bunker demand in 2030
Case Study: Scrubbers aren’t for everyone …

The higher the Spread, the faster the payback.

- $30-$40 spread will offer ~1 year payback.

Analysis Based on EuroNav Data

© Copyright 2019 Energy Policy Research Foundation, Inc. 1031 31st Street, NW Washington, DC 20007 • 202.944.3339 • eprinc.org
... But the Spread is not cooperating ...
Case Study: LNG isn’t for everyone either...

- High retrofit costs
- Limited LNG Capacity/Infrastructure
- Larger Fuel Tanks and added LNG Fittings
IMO 2020
Some Current Market Indicators
... Distillate Markets are in Mild Contango ...
... and Money Managers COTS have moved to the short side ...
... U.S. Distillate Inventories have trended lower, but now are rebounding ...
... But U.S. Distillate Exports are Climbing...
... and are mostly going to Latin America...
... and some to Europe ...
... and European & Med Mkts continue to increase North-of-Suez deliveries ...
Policy Guidance

It’s all about feedstock costs
Product prices are tightly correlated to feedstocks (the descriptive view)…

![Crude Oil vs Distillate: 04/14/2004 to 07/19/2019](image)

Analysis based on EIA Data
Product prices are correlated to feedstocks (statistical correlation view)...

Correlation Coefficient = 0.729
Strong Positive Correlation!
Product prices are correlated to feedstocks (simple regression view)...

Adjusted R² == About ~53% of the variability in distillate prices is explained by crude oil price changes

DW Statistic between 1.5 & 2.5 means regression error terms are generally uncorrelated

Simple Regression of Percentage Returns of Distillate Against WTI Crude
Adj R² = 0.5316 ; slope = 0.6714 ; Durbin-Watson Statistic = 2.188
Alternative Policy Concepts

• EBP – Experience Building Phase
  – Small group of flag states & shipping groups to test IMO 2020 implementation

• “Pragmatic Enforcement” == “Leniency Period”

• Tap Northeast Home Heating Oil Reserve
• Tap Strategic Petroleum Reserve

• Assorted:
  – Temporary Jones Act Waivers, Uni/multi-lateral lax enforcement, etc.
Thank you!

Questions?