"IMO 2020" is a global regulation by the International Maritime Organization (IMO), requiring a reduction from 3.5% to 0.5% sulfur content in bunker fuel in the open oceans beginning January 1, 2020.

- Emission Control Areas (ECAs), located near coastal areas in around the U.S., Canada, and Northern Europe already impose a more stringent 0.1% sulfur cap.
The IMO 2020 Conundrum

What are the options?

Shippers

- Buy compliant fuel such as marine gasoil (MGO) or very low sulfur fuel oil (VLSFO)
- Install scrubbers to keep running High Sulfur Bunker (HSB)
- Switch to alternative fuel, such as LNG

Refiners

- Full-Conversion
  - Business as usual
  - Profit from margin uplift

- Sweet Cracking
  - Blend existing residual fuel oil (if marginally close to 0.5%) with low sulfur distillate
  - Produce low/lower sulfur bunker fuel through adjustments in crude slate

- Sour Cracking
  - Continue to produce High Sulfur Fuel Oil (HSFO) for ships with scrubbers or for feedstock to other refineries
  - Produce low/lower sulfur bunker fuel through adjustments in crude slate
  - Invest in upgrading capacity

Decisions are being made based on views of forward economics (pricing, capital availability, supply/demand dynamics)
Futures Market Expectation of Relative Value

IMO 2020 Begins

BRENT CRUDE PRICE

HSFO begins slide

3.5% FUEL OIL

Fuel value can be lower

Scrubbers may bring value back up

Baker & O’Brien Estimates of Potential 2020 Compliance

- **Non-Compliance or Compliance through Waivers**: 3.2 MMB/d
- **Scrubbers**: 0.7 MMB/d
- **Blending**: 0.7 MMB/d
- **Refinery Upgrades**: 0.2 MMB/d
- **Crude Slate Shifts**: 0.6 MMB/d
- **Energy Density**: 0.2 MMB/d
- **Increased Refinery Throughput**: 0.5 MMB/d
- **Overall compliance**: 3.4 MMB/d
Possible Refineries’ Sulfur Optimization

IMO 2020 DRIVING FORCES
- 0.5% fuel oil production will be challenging for low complexity refineries in Europe
- Sweet crude will likely displace sour crude in lower complexity refineries in Europe
- Backhaul freight will lower cost for sour crude and resid to complex refineries in the U.S.
**PRICES**
- HSFO prices (max 3.5% sulfur) will drop relative to crude oil
- Price spreads between low sulfur and high sulfur crude oils will increase
- Low sulfur distillate pricing will increase relative to HSFO

**REFINERS**
- Producers of HSFO may adjust crude slate (short term) or make capital investments (long term)
- Sophisticated residual fuel upgraders will benefit
- Refiners will maximize distillate yield and potentially cut rates to FCC units as LSVGO moves into bunker market

**SHIPS**
- Low sulfur bunker prices will approach LSVGO cracking value
- Ship owners without scrubbers will pay premium prices for fuel
Dallas Headquaters
12001 N. Central Expressway
Suite 1200
Dallas, TX 75243
Phone: 1-214-368-7626
Fax: 1-214-368-0190

Houston Office
1333 West Loop South
Suite 1350
Houston, TX 77027
Phone: 1-832-358-1453
Fax: 1-832-358-1498

London Office
146 Fleet Street
Suite 2
London EC4A 2BU
Phone: 44-20-7373-0925

www.bakerobrien.com