

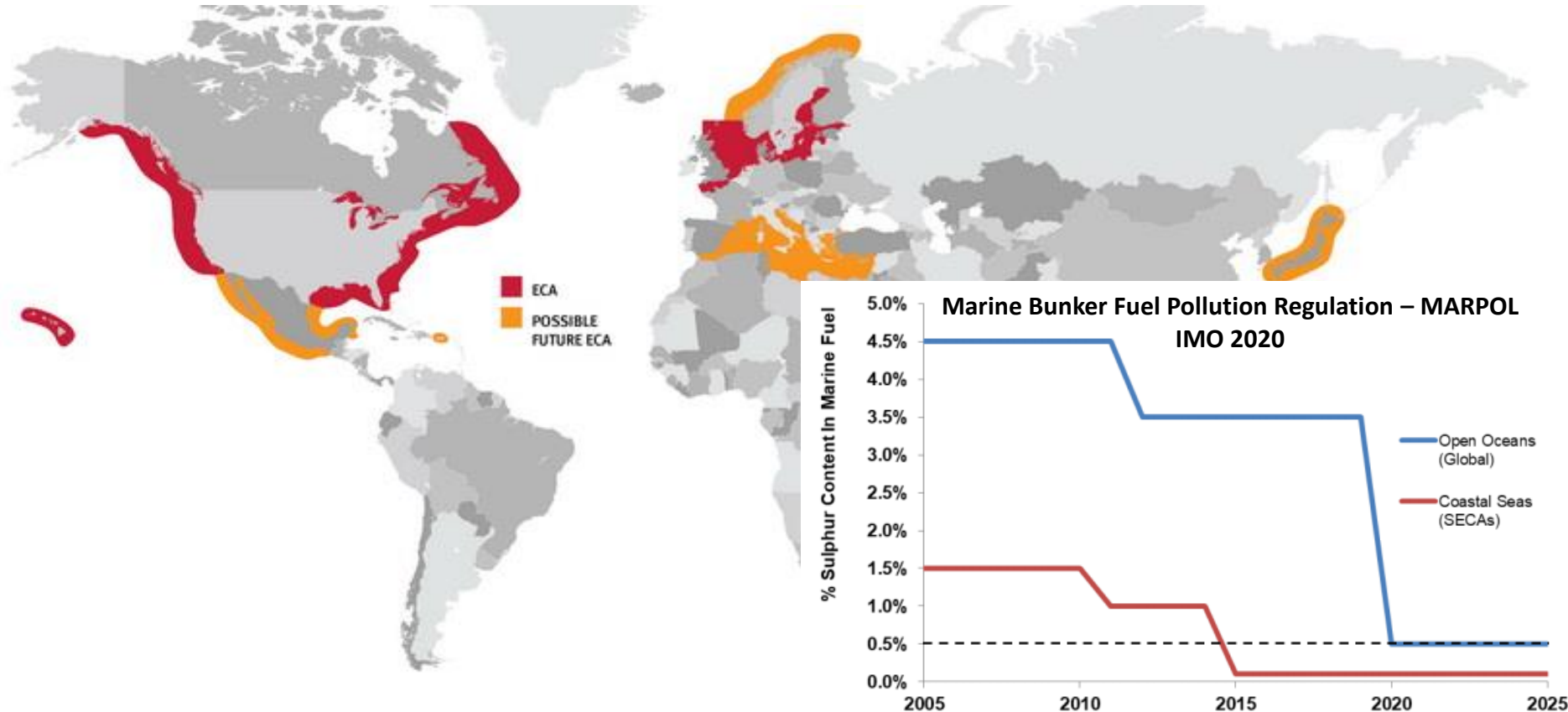


IMO 2020 Overview

February 20, 2019

What is IMO 2020?

- "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



Map Source: DuPont

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

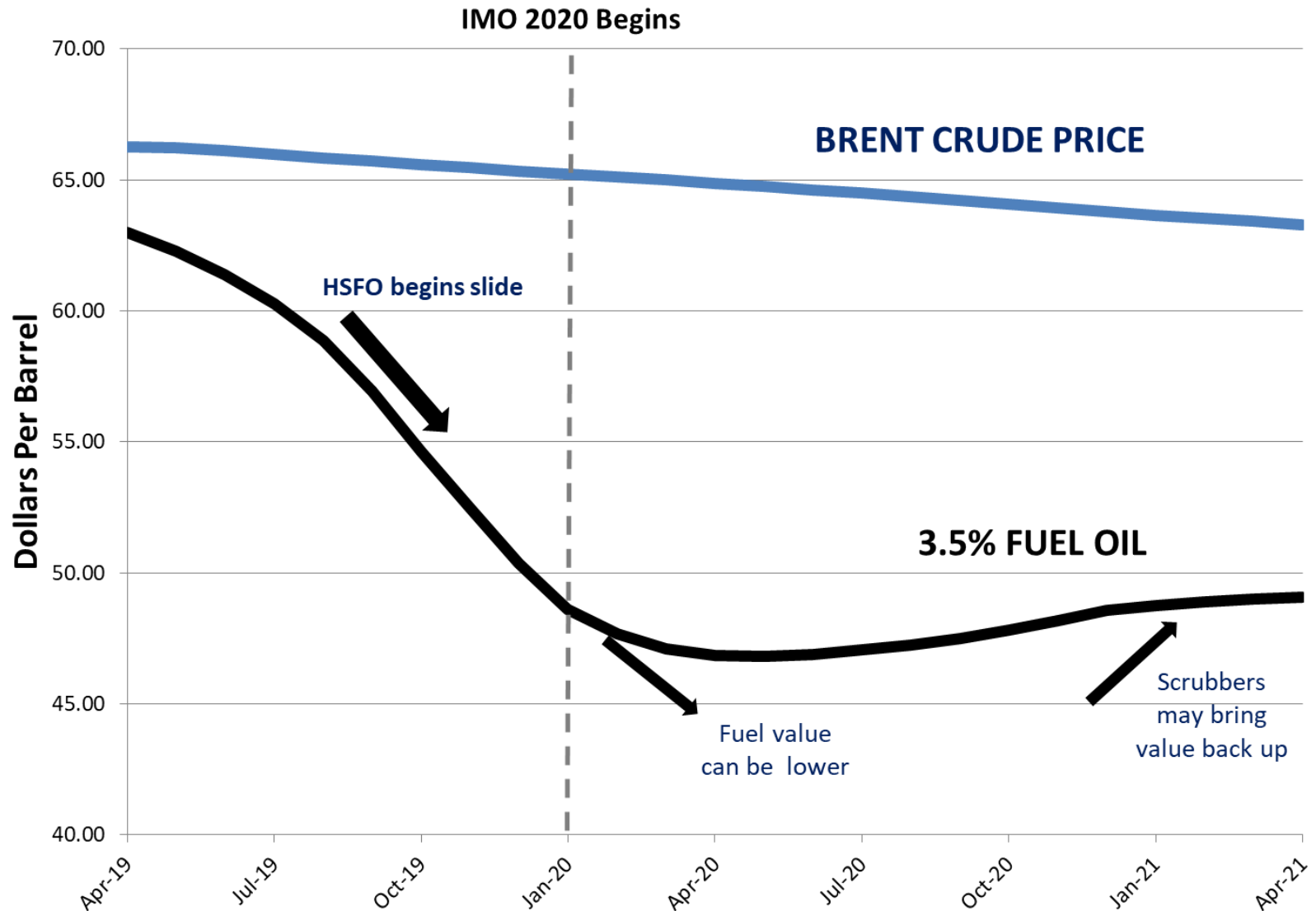
- ✓ Blend existing residual fuel oil (if marginally close to 0.5%) with low sulfur distillate
- ✓ Produce low/lower sulfur bunker fuel through adjustments in crude slate

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

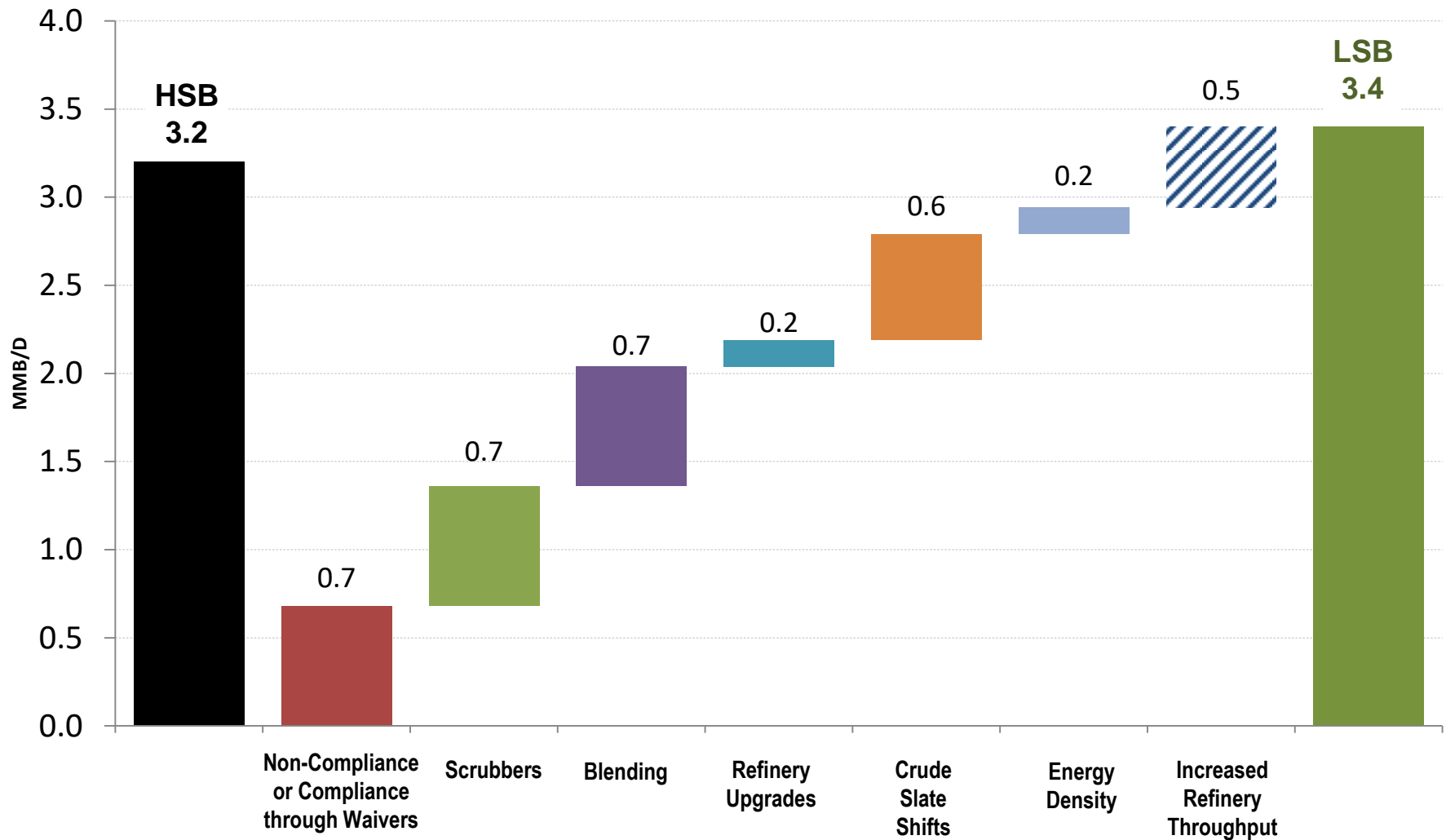
**Decisions are being made based on views of forward economics
(pricing, capital availability, supply/demand dynamics)**

Futures Market Expectation of Relative Value

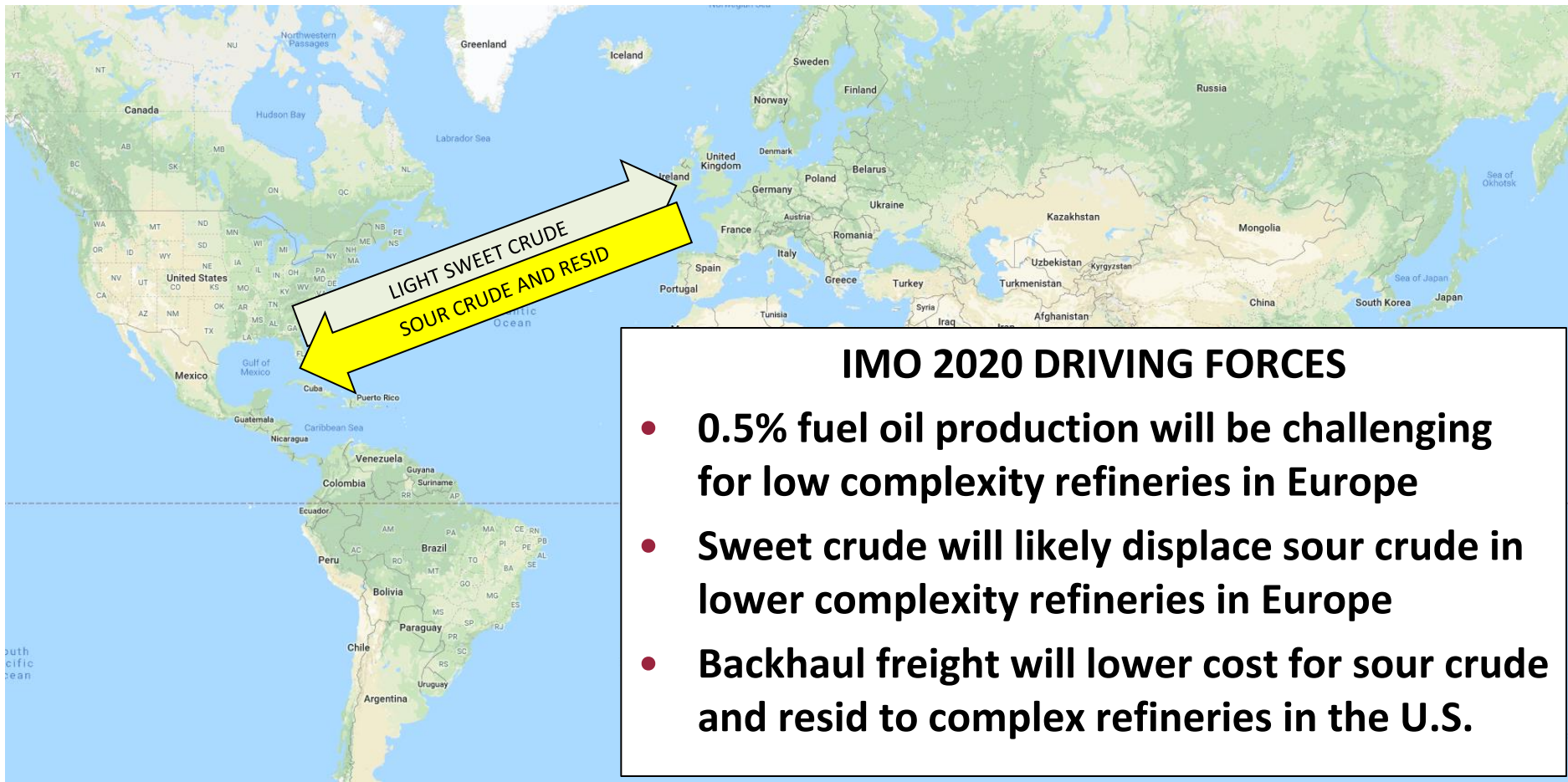


SOURCE: CME Group and Baker & O'Brien Analysis.

Baker & O'Brien Estimates of Potential 2020 Compliance



Possible Refineries' Sulfur Optimization



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



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