

Clean Fuels IMO 2020

Introduction

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IMO 2020 overview

- **IMO 2020 is a milestone for SOx limits under MARPOL VI**
 - Sets cleaner fuel limits and alternative compliance options
 - Defines compliance burden for vessel/fleet operator
 - Provides linkages for inspection/enforcement (Port State/Flag State)
- **Cleaner marine fuels benefits health, environment, industry**
 - Reduces community exposure to air pollution
 - Fewer premature deaths, less asthma, lower medical costs
 - Less acidifying particles deposition on ecosystems (unless scrubber)
 - Promotes innovation and energy conservation
- **Operational implications for fuel suppliers, vessels, fleets**
 - Fuel supply changes, prices change, new (déjà vu) operational practices

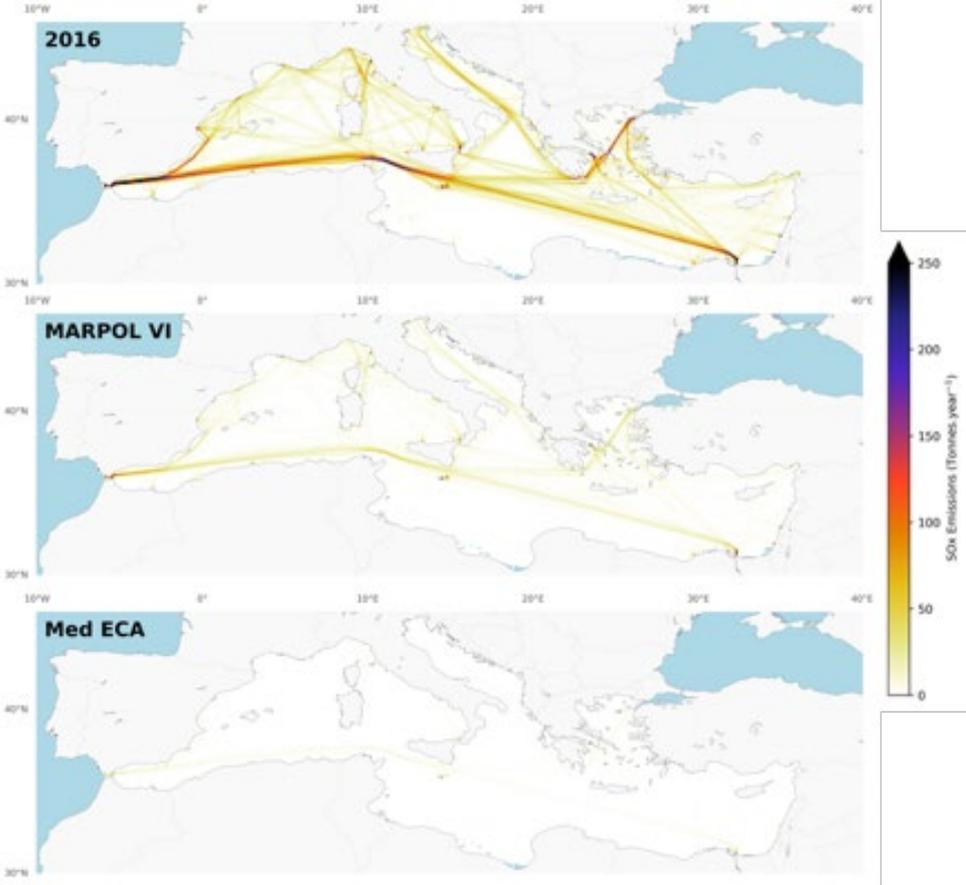
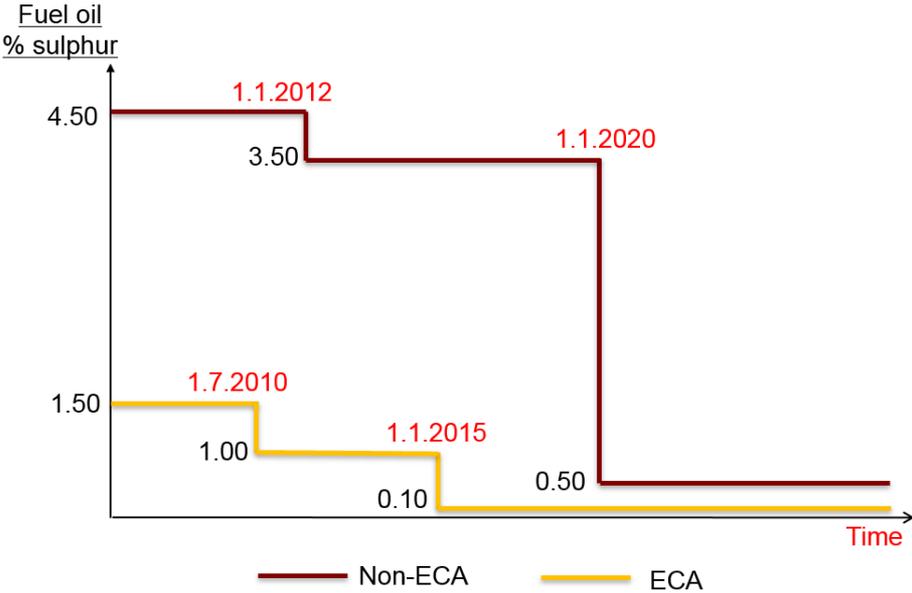
IMO 2020 in context

- MARPOL (and BWM) Conventions include MARPOL VI
- MARPOL VI requirements address air emissions
 - Ozone depleting substances (ODS) – Regulation 12
 - NOx (Regulation 13) and SOx (Regulation 14)
 - **IMO 2020 is a milestone for SOx limits**
 - VOCs (Regulation 15)
 - Fuel Availability (Regulation 18)
 - Alternative Compliance Allowed
 - Underway (scrubbers)
 - Dockside in port (shore power)
 - Vessel records for compliance; Port State Control offers enforcement

IMO 2020 is a MARPOL VI provision from before 2009

- Clean fuels transition in 2020 may be challenging, but no surprise

Regulation 14 SOx Fuel Limits



Regulation 14 SOx Fuel Limits

Exhaust Gas Cleaning
Systems alternative
compliance

Consideration of delay to
2025 thoroughly considered,
commitment to 2020 agreed

Compliance verified through
Bunker Delivery Note, engine
operations logs, onboard
inspection and fuel sampling

Global Fuel Sulphur Limits

- 3.50 per cent from 1 January 2012
- 0.50 per cent from 1 January 2020

In SECAs Fuel Sulphur Limits

- 1.00 per cent from 1 March 2010
- 0.10 per cent from 1 January 2015

In Polar (Arctic) and without scrubber:

- HFO carriage ban

Enforcing IMO 2020: SOx & Port State

- Compliance

- SOx initial inspection, clear grounds, more detailed inspections, and detainable deficiencies
- Fuel oil sampling (including “Guidelines for on-board sampling for the verification of the sulphur content of the fuel oil used on board ships”)
- Sampling for PSC and fuel oil analysis aspects

- Enforcement

- Fuel (non) availability and procedures
- Exhaust gas sniffing equipment and remote sensing on sulphur
- Legal basis penalties (UNCLOS and MARPOL)
- Enforcement on fuel suppliers

- States may set more stringent domestic regulation

- IMO ratified ECAs (Baltic, North Sea, North America, more considered)
- Domestic ECA in china

MEPC.181(59): What resolution says

Port States: require vessels provide compliance credentials

- International Air Pollution Prevention Certificate (IAPP Certificate)
- Engine International Air Pollution Prevention Certificate (EIAPP Certificate)
- Bunker delivery note inspection and verification by port State
- Written procedures covering fuel oil change (regulation VI/14.6)
- Approved documentation for SO_x EGCSs (regulation VI/4)
- Fuel Oil Non-availability Disclosure (FOND)

Other Port State MARPOL VI compliance-inspection credentials

- Technical File (paragraph 2.3.4 of the NO_x Technical Code) for each engine
- Documentation for method used for demonstrating NO_x compliance
- Approved Method File (regulation VI/13.7)
- Shipboard incinerator type approval certificate
- Ozone Depleting Substances Record Book (regulation VI/12.6)
- VOC Management Plan (regulation VI/15.6)

Health, Environment Part of Total Benefits

Total Benefits

= Value of avoided impacts + Value of new opportunities



Value of avoided impacts

= Avoided Mortality ($\$V_{Mortality}$)

+ Avoided Morbidity ($\$V_{Illness\ and\ Care}$)

+ Avoided Deposition Damages ($\$V_{Acidification}$)

+ Improved Visibility ($\$V_{Haze}$) + etc.

Often Uncounted: Value of innovation and adaptive action

Benefit: Avoided Mortality



Benefits: Less Childhood Asthma

<http://www.shippingcandeliver.com/ncomm.html>



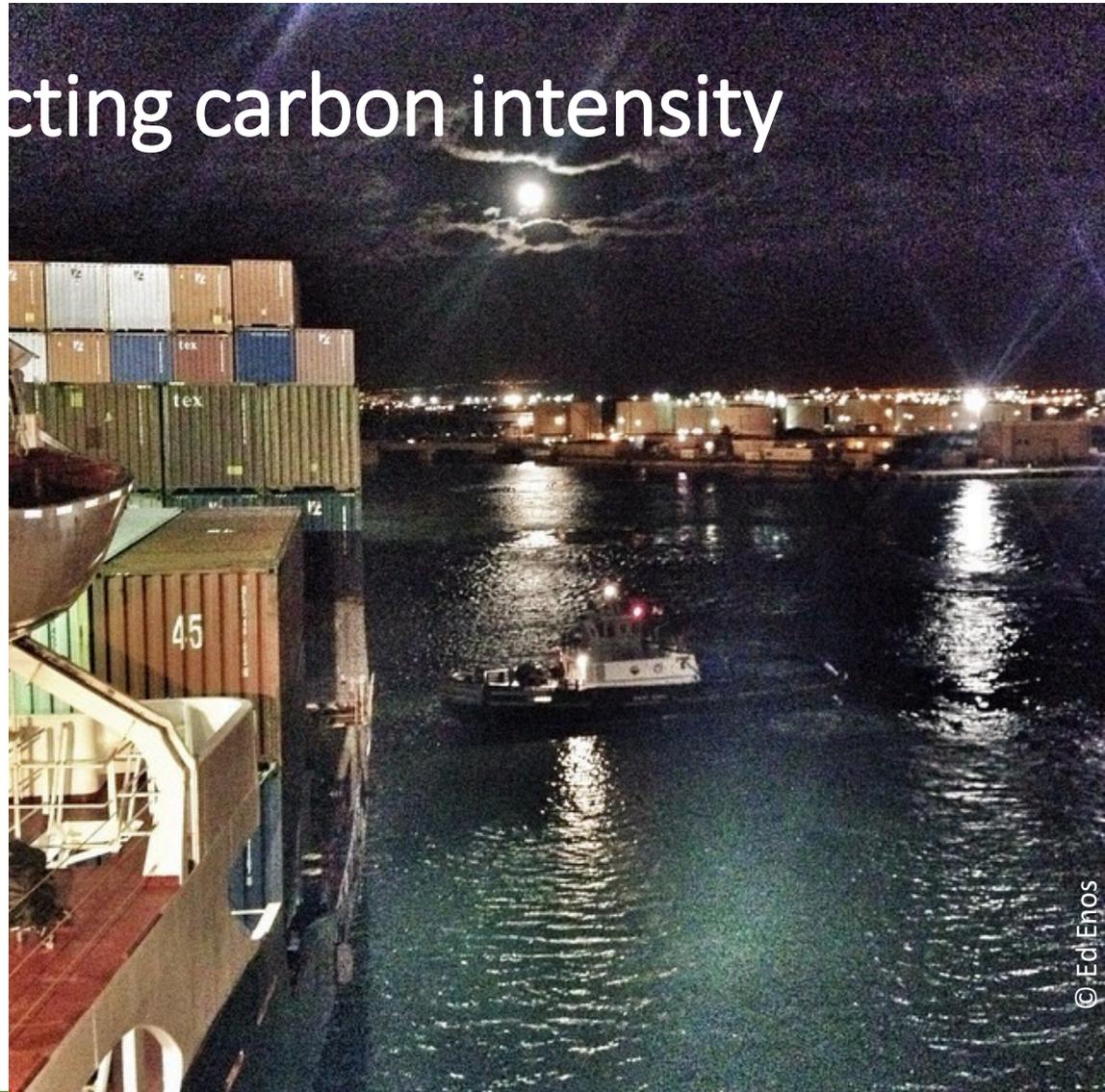
Shipping can deliver IMO 2020 and more

1. IMO 2020 means cleaner, *more expensive* fuels
2. Energy outlook expects low-carbon, expensive fuels
3. Innovation responds: Technologies, Fuels, and Behavior

Implications for supply chain, infrastructure, fleets, operations?

Three levers affecting carbon intensity

1. Technology:
 - improved efficiency
2. Fuel:
 - Low-carbon fossil
 - Renewables
 - Nuclear
3. Behavior:
 - Cargo space utilization
 - Speed (vessel, cargo)
 - Fleet recapitalization
 - Trade patterns
 - Demand for shipping



What is happening to supply chain now?

- **Container shipments have grown by 290% since 2000**
- **Vessel overcapacity, “right-steaming”**
- **Supply chain is more intermodal**
- **Distribution Centers now twice the size from a decade ago**
- **Alternative ports are on the rise**



Thank you

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IMO 2020 and Beyond: Implications for Shippers

Coalition for Responsible Transportation

August 18, 2019





IMO 2020 - Considerations for Shippers

- IMO 2020 is highly significant, but only one step in a long process of emission reduction regulation development
- Today, compliance options are limited
- Compliance costs are extensive, but can be minimized
- Impact on Diesel costs for land transport should be expected
- IMO GHG Ambitions are more significant – Be Prepared

Shippers can have influence, but must be engaged



IMO 2020 Significance

- Major step forward for cleaner air – Big win for Port Communities
- Major transformation for shipping industry – Should not be underestimated
- Vessels operating in US waters already complying since January 2016
- Global regulation - even playing field for carriers if enforced
 - Carriers operating in US shipping trades are fully expected to comply
 - Enforcement concerns exist
- Driving Carriers to find compliant solutions and competitive advantage
- Slow steaming, recycling of less efficient ships expected to continue.



Limited Compliance Options Available Today

- Continued Use of HFO with Exhaust Gas Cleaning Systems (Scrubbers)
 - Aimed only at reduction of SO_x and PM emissions
 - Does not address NO_x emissions
 - Additional CAPEX required – Carriers are betting on a low HFO price
 - Will not address future GHG regulations
- Switch to MGO and VLSFO
 - Requires refining industry to build out supply capacity
 - Carriers are concerned with VLSFO supply, availability and quality
 - Expensive fuel drives a higher OPEX for Carrier
 - Will not address future GHG regulations
- Switch to LNG
 - Primarily for Newly built vessels
 - CAPEX costs are significant, but offset by reduced operating cost
 - Addresses SO_x, NO_x and PM regulations
 - Takes a step forward towards future GHG regulations



Compliance costs are extensive, but can be minimized

- Estimated \$50 to \$60 billion per annum fuel cost increase for the shipping industry
- Globally, container lines account for about 22% of marine fuel consumption
- Container lines face an estimated \$12 billion increased fuel cost per annum
- Early estimated cost impact for US bound containers \$150 to \$200 per TEU
- Based on recent reports, BAF charges could be significantly higher depending on the trade lane
- Estimating final cost impact is difficult and highly dependent on a range of factors from refining and supply availability to the carrier's choice of compliance



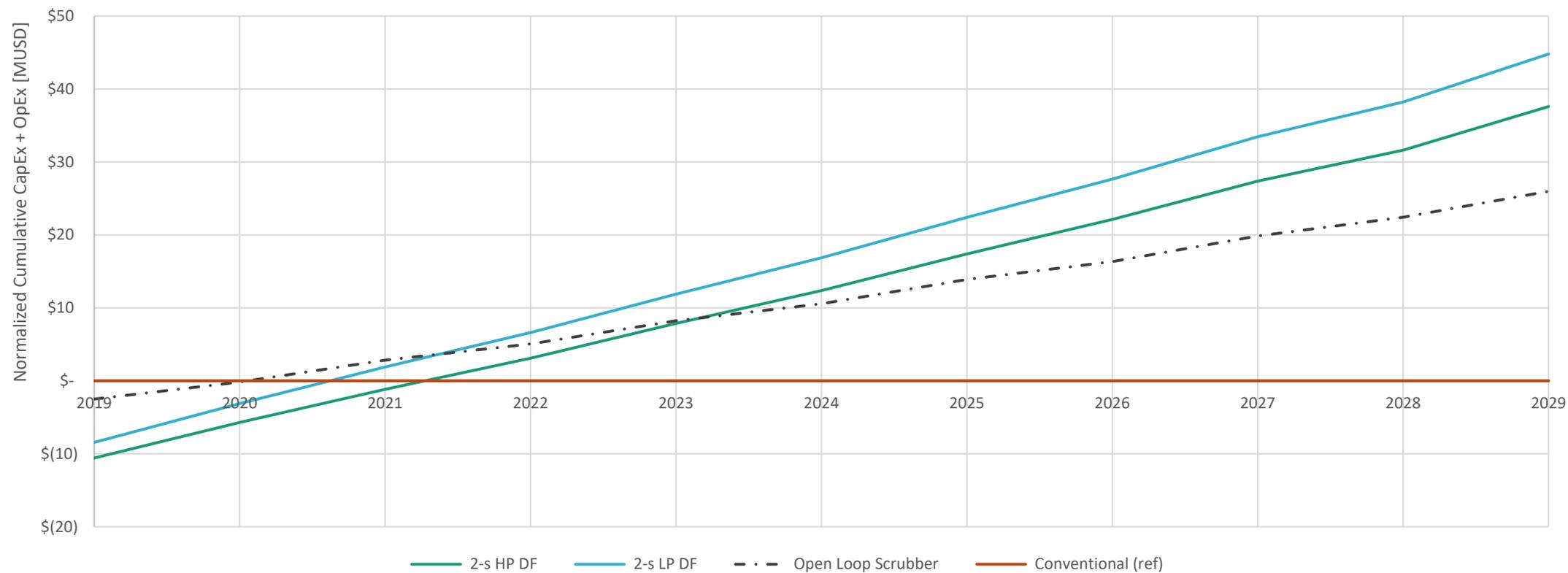
Compliance costs are extensive, but can be minimized

- Majority of the costs are ultimately going to be borne by shippers and consumers.
- Shippers can influence the compliant choices being made by carriers and their cost implications but must:
 - *Better understand the IMO regulations and regulatory process*
 - *Learn the cost consequences of each compliant option – which offers the most value and minimizes total costs?*
 - *What environmental benefit does each option deliver – How does that fit into my sustainability objectives? Is there a value one can attach to the option?*
- Shippers should encourage carriers to invest in compliant options that provide the best value proposition, especially for future vessel orders



A Comparison of Compliant Fuel Options

BaU

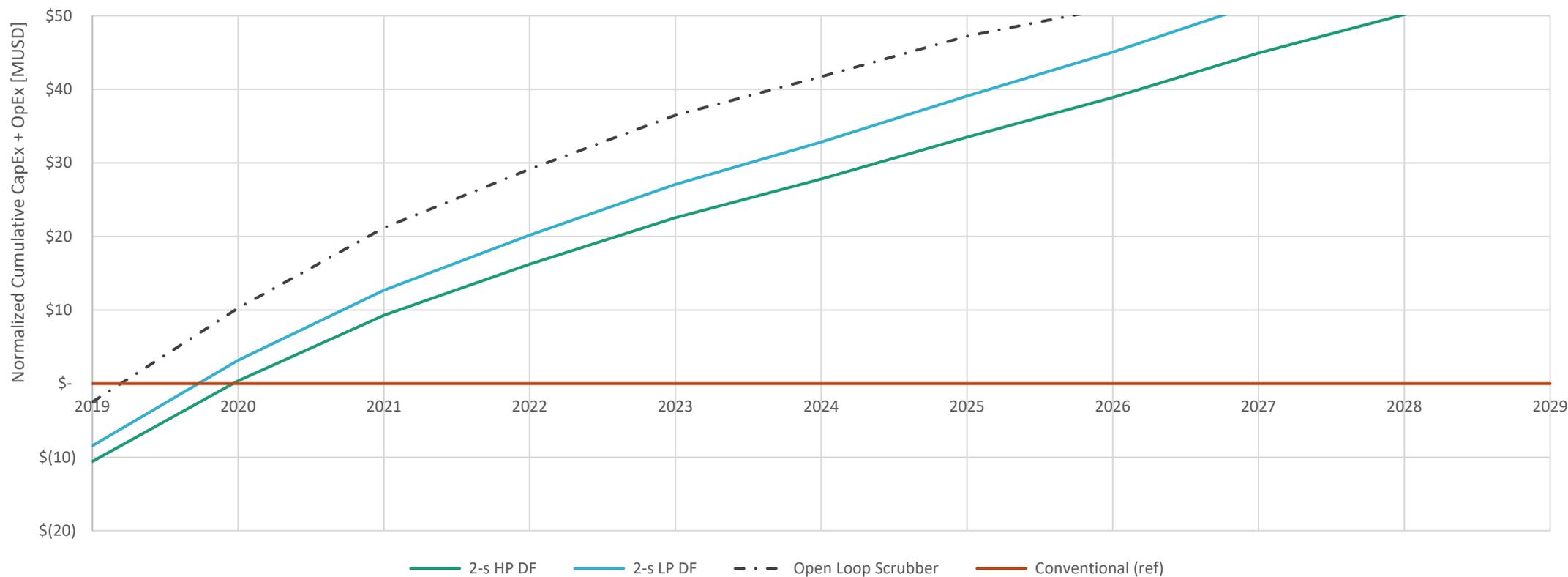


Source: Opsiana Study, July, 2019



A Comparison of Compliant Fuel Options

Stranded Fuels





Diesel Price Impact

- Early IEA estimates showed an impact of 20 to 30% on diesel prices which were subsequently adjusted downward
- With most shipping lines choosing low sulfur compliant fuel, the demand could be greater than anticipated.
 - MGO and VLSFO demand could spike higher
 - Impact will be felt on Diesel supply
- Forecasting the impact is complicated and difficult, but shippers and land transport providers should expect to see higher diesel fuel costs



IMO GHG Ambitions – *Be Prepared*

- Ambitions – based on 2008 benchmark year
 - 2030 – 40% Efficiency Improvement Target
 - 2050 – 50% Aggregate GHG Emission Reduction
 - 2050 – 70 % Efficiency Improvement Target
- Shipping Industry expected to Grow through most of this period
- Technical feasibility to meet 2030 seems likely
- 2050 ambition attainment uncertain - much more study required

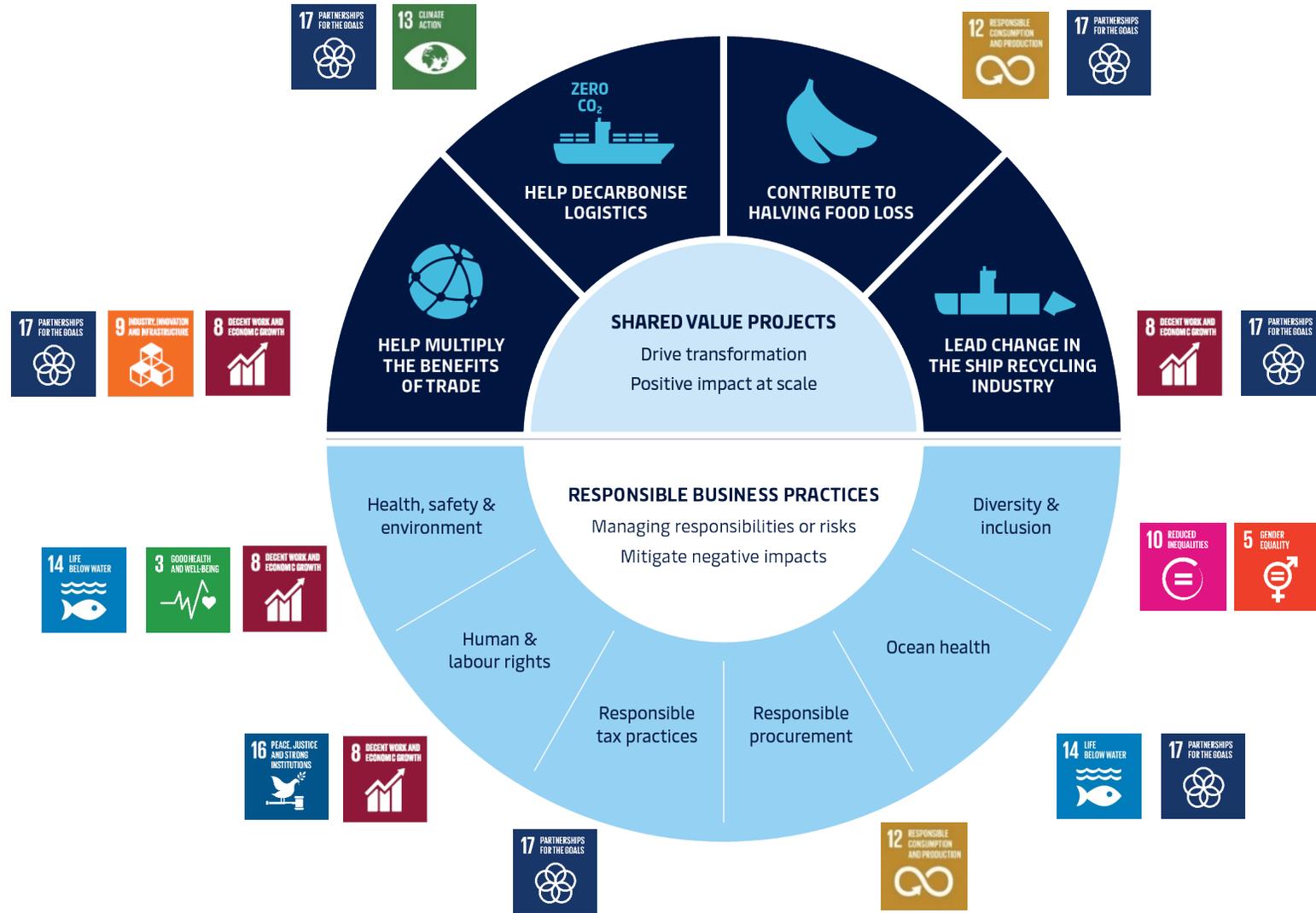
IMO 2020 REGULATIONS

The Vessel Operator's Perspective

Lee Kindberg



Our sustainability strategy



Working towards carbon-neutral shipping

Shipping is responsible for

2 –
3%

of global emissions

“ We have begun a journey towards having net-zero CO₂ emissions from our own operations by 2050. This is an important ambition and one we can only deliver on in collaboration with many other stakeholders.”



Søren Skou, CEO of A.P. Møller - Mærsk A/S

Our targets

ZERO

Net emissions from our own operations by **2050**

60%

Relative reduction by 2030 (compared to 2008)

2018 performance

41%

Relative reduction YTD (compared to 2008)

Innovation is critical to future success

We are continuously working on new solutions to improve our environmental and safety performance

SMART CARGO SECURING

Utilise most recent experience and methods to develop an improved and safer cargo securing system which may be a combination of cell guides, alternative lashing patterns, higher lashing bridges, and means of distributing lashing forces better

SITUATIONAL AWARENESS

Use cameras and sensors for enhanced situational awareness.
Aim is to improve navigator's ability to maneuver the vessel and enable augmented control and remote pilotage

AIR LUBRICATION

Explore benefits of air lubrication for newbuild container vessels, the aim is to improve energy efficiency

ALTERNATIVE FUELS

Assessing low emission fuels, including gas, for 2020 compliance and beyond

ELECTRIC PROPULSION

Assess the technical and economic feasibility of using electric propulsion on large container vessels to enable increased reliability, improved maneuverability, fuel efficiency and to future proof vessels.

FLEXIBLE POWER PLANT

Explore flexible power plant concept, aim is to optimise power production efficiency

AERODYNAMICS

Explore aerodynamic optimisation of the vessel to reduce resistance and fuel consumption

CONNECTIVITY

Explore and create a vessel nervous system enabling people, assets and sensors to exchange relevant information across boundaries in a smart and intelligent way

AUGMENTED CONTROL

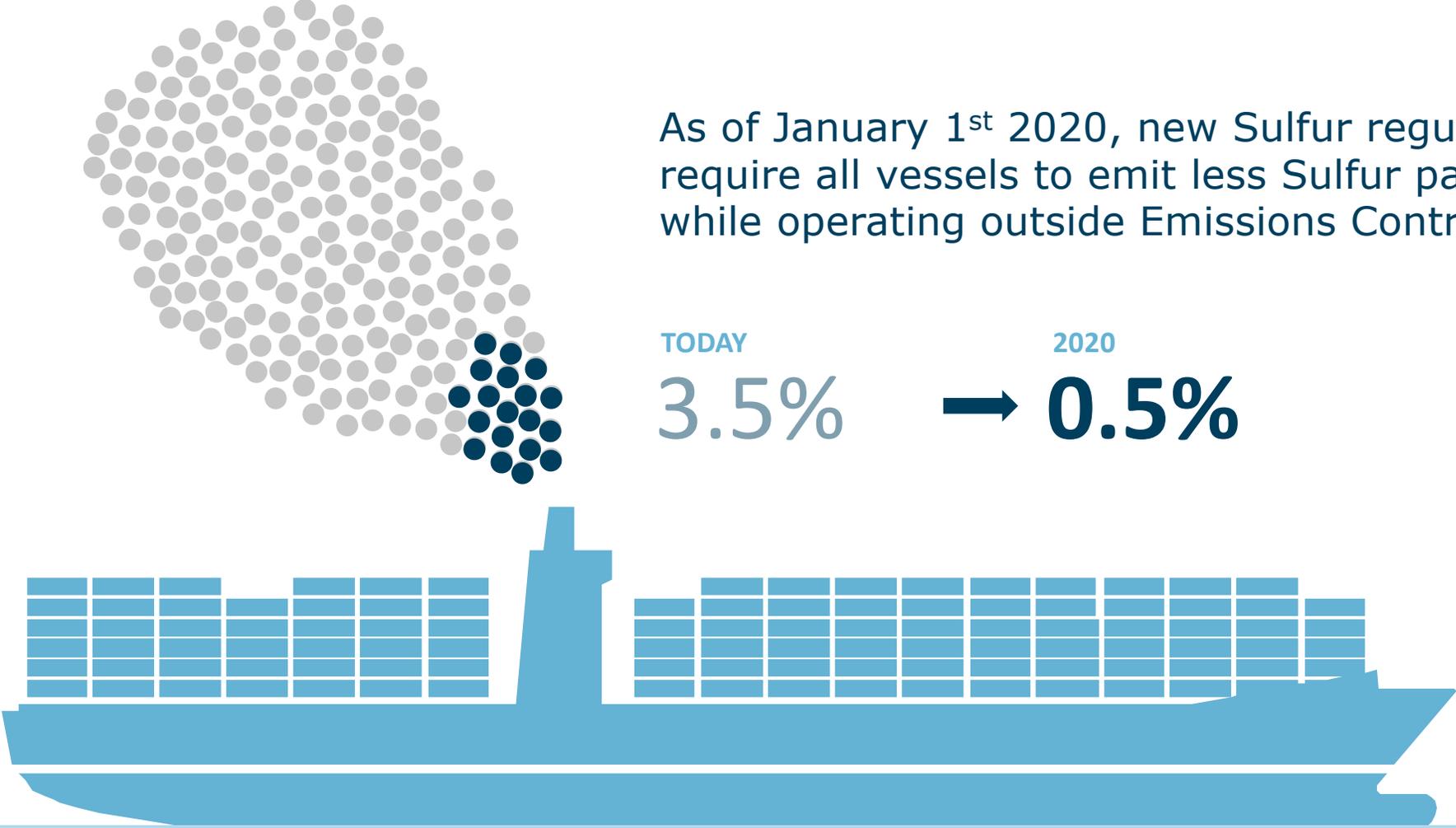
Develop screen-based navigation control centre.
Aim is to improve safety and increase capacity by softening line of sight restrictions

REMOTE PILOTAGE

Develop pilotage from shore.
Aim is to improve safety and operational efficiency



IMO 2020 Regulations



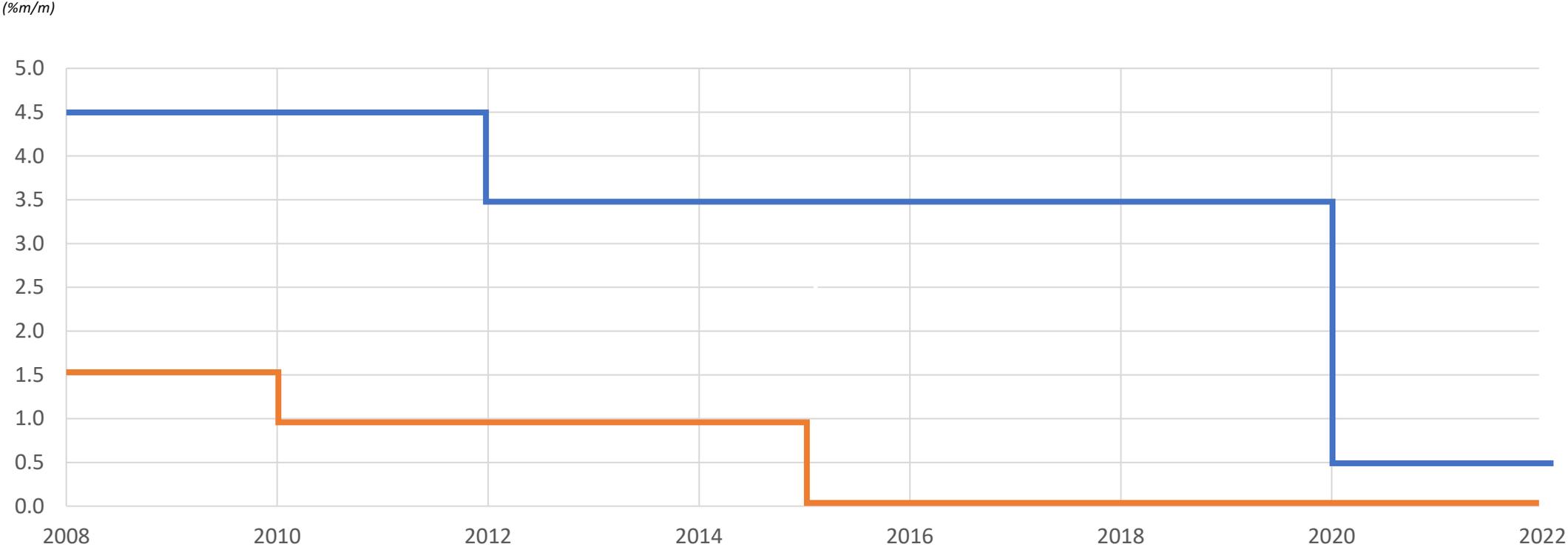
As of January 1st 2020, new Sulfur regulations will require all vessels to emit less Sulfur particles while operating outside Emissions Control Areas.

TODAY 3.5% → 2020 0.5%

The IMO 2020 sulphur regulation is part of IMO's long-term plan to reduce sulphur emissions.

A GAME CHANGER IN SHIPPING

Global ECA



The IMO 2020 regulations provide benefits immediately and for generations to come.



- **Major health & environmental benefits**
- **Reduced risk of respiratory diseases**
- **Reduced risk of acid rain**

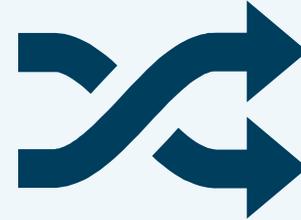
How will shipping companies comply?



1 Use fuel with
0.50% Sulphur



2 Install scrubbers
(exhaust gas cleaning
systems) onboard



3 Use LNG

What does this mean for container shipping?



Vast Majority

of the global fleet will
comply by using 0.5% fuel by
2020



+ 15 billion

Rise in cost for container
shipping industry



+2 billion

Extra fuel costs for Maersk

What are we doing to prepare?

Maersk is looking into all possible and available options to comply with the 2020 sulphur cap, that is **low sulphur fuels, LNG, and scrubbers**



Various initiatives are being taken to **secure the right compliant fuels** at the best possible price



To enable customers to plan for 2020, Maersk has introduced a **simple, predictable surcharge (BAF)** to recover the extra costs



Investments have been made in **scrubbers** for a limited number of vessels



Implementation planning

- Planning Goals:
 - Have vessels be empty of 3.5%S fuel at the changeover date and have sufficient 0.5%S fuel on board to reach the next main bunker port after 1 January 2020.
 - Have sourcing well established to deliver compliant fuel in all ports necessary to source the current known schedules.
 - Schedule dry dockings for scrubber installations to avoid service disruptions.
 - Commence internal communications and training April 2019
- Sourcing
 - Two fuel sourcing partnerships announced as of March 2019: Rotterdam and NJ
 - BP and Exxon/Mobile have announced global availability and locations for 2020-compliant fuels
 - ECAs still require 0.1%S fuels and California still requires distillate fuels.



The Trident Alliance supports robust enforcement

A coalition of ship owners and operators advocating that enforcement of the regulation is key to secure an industry level playing field and unlock the environmental and health benefits

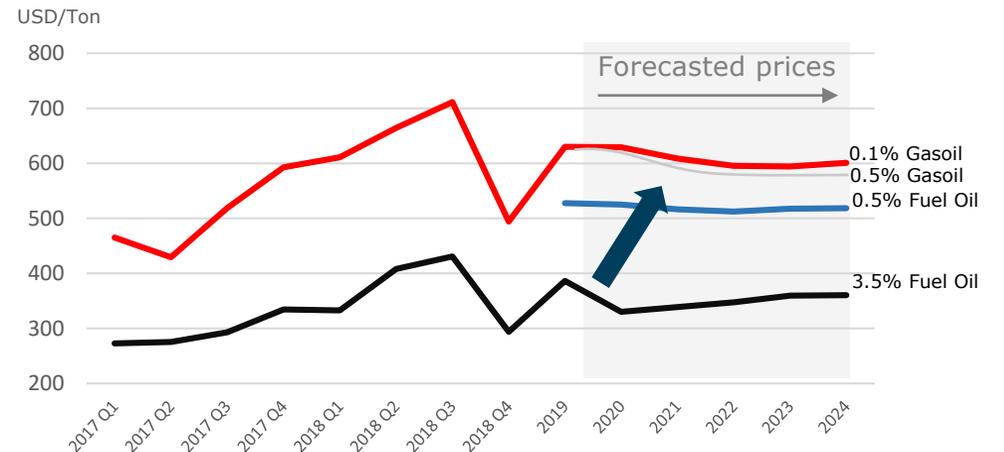


Meeting the IMO 2020 sulphur requirements means a significant increase in fuel costs.

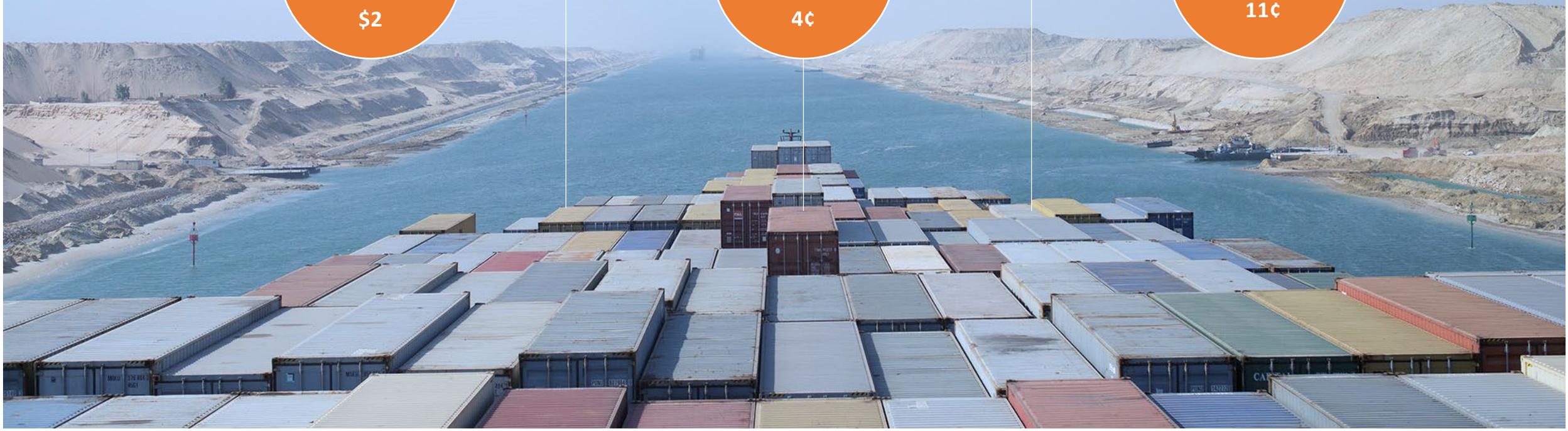
- The fuels that comply with IMO 2020 regulations (max. 0.5% S) are significantly more expensive than the current standard fuel (3.5% S)
- The supply of compliant fuels will be sufficient.
- Industry will use a mix of compliant fuels (0.1% gas oil, 0.5% S gas oil, 0.5% fuel oil) with different properties and different price points
- While forward curves for the fuel prices are illustrated flat here, we do expect increased price volatility and greater geographic fuel price fluctuations

Historic and forward prices

0.1% gasoil, 0.5% gasoil/0.5% fuel oil proxy** & 3.5% fuel oil



Container shipping remains the most cost efficient mode of transportation.



THANK YOU

