# The 2020 Fuel Challenge

## Update IMO ISO ARA Fuel++

November 2018

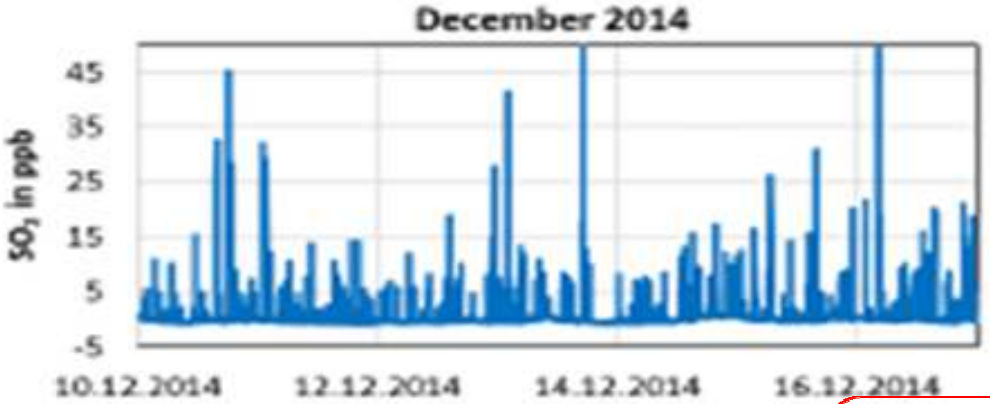
Timothy Wilson CEng CMarEng MIMarEST

Lloyd's Register

# Does it make any difference?

## Up River to Hamburg 2014- 2015 - experience

**Figure 1.** Location of the measurement station on the northern bank of the river Elbe, near Hamburg harbour. On the right: picture of instrument box. Map source: OpenStreetMap.

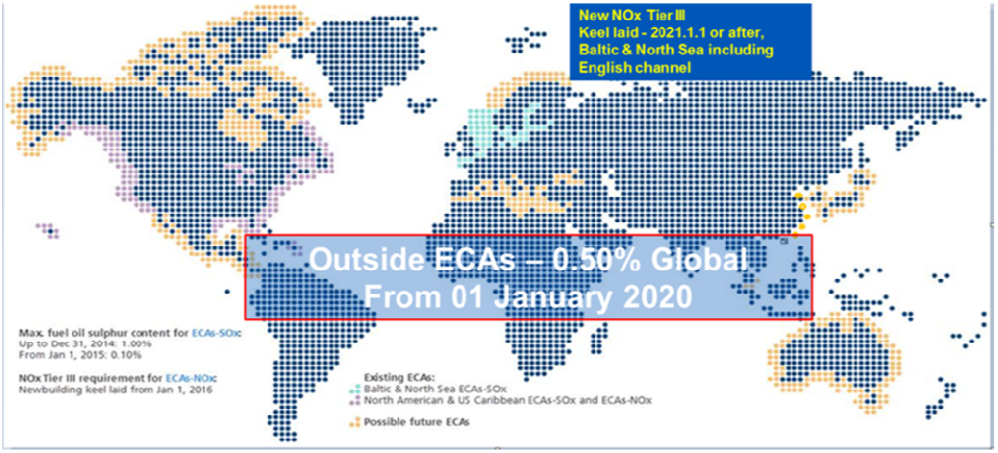


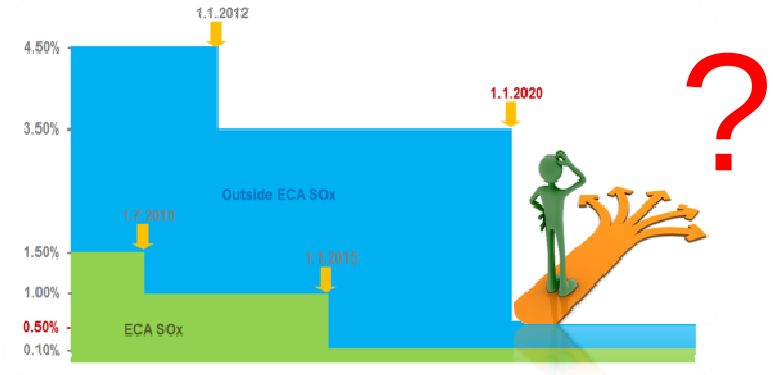

2014/215 Significant SO2 ppm drop in Germany

Health – Respiratory - Death

Global Warming

# IMO Legislation status – it is fixed….



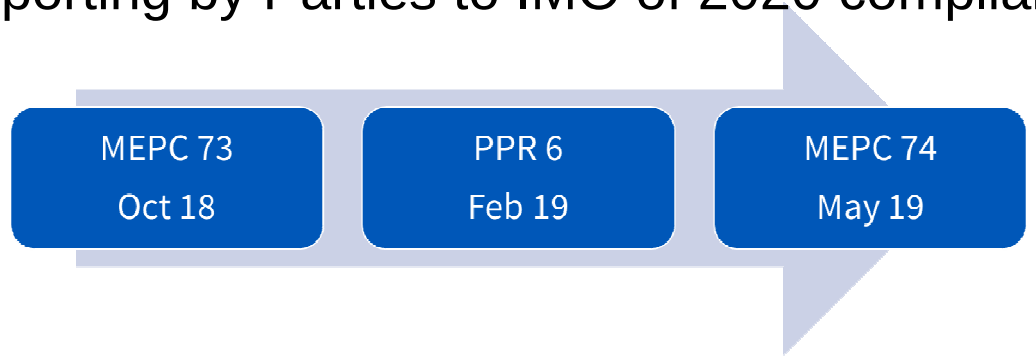

**1 January 2020 is the start date** for max 0.50% Outside an ECA
Regulation 14.1.3 of MARPOL Annex VI -

- (Sept '18)Speaking at a conference in Singapore Edmund Hughes, the head of air pollution and energy efficiency at the IMO, said "I can categorically say there will not be a delay…a delay to the regulation would damage the IMO's reputation and credibility as a rule-making body for international shipping."

"We cannot under estimate the scale of the change. It is profound and one of the biggest in living memory. " Quote from ExxonMobil:

# Enforcement Preparations and Guidelines

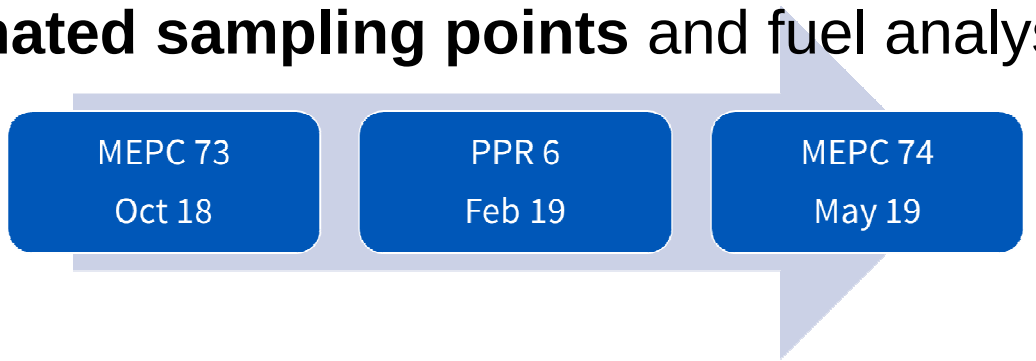
- **Ban** on the carriage of non-compliant fuel as a fuel – adopted MEPC 73 ( 01 March 2020)
- **Ship Implementation Plan recommendation – guidance**
- **Matters Relating to Fuel SAFETY Reg 18 – now going to MSC100**
- Best Practices for Fuel oil Suppliers finalised
- Follows on from [Best Practices for fuel oil purchasers ( MEPC CIRC 875)]
- Early reporting by Parties to IMO of 2020 compliant fuels availability (MEPC Circ 880)




INTERNATIONAL MARITIME ORGANIZATION

# Enforcement Preparations and Guidelines 2019

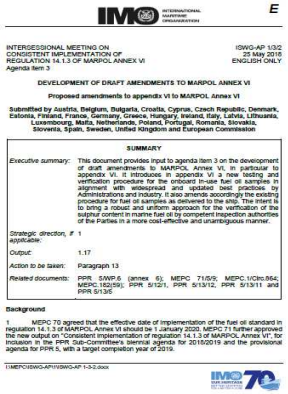
- **IMO Guidelines** under development for consistent implementation
  - Amendment to Sulphur Verification Appendix VI – align sulphur result with ISO 4259
- **FONAR** (Fuel Oil Non-Availability Report) Template and guidance (PPR6)
- **PSC guidelines** (Resolution MEPC.181(59)) to the 2009 amendments
- **Consistent implementation** of enforcement to be discussed further
- **Designated sampling points** and fuel analysis methodologies ( 2021?)




INTERNATIONAL MARITIME ORGANIZATION

# Sulphur Content Verification - amending Appendix VI

## Basis for Amendments



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INTERSESSIONAL MEETING ON CONSISTENT IMPLEMENTATION OF REGULATION 14.1.3 OF MARPOL ANNEX VI
Agenda item 3

ISWG-AP 1/3/2
25 May 2018
ENGLISH ONLY

**DEVELOPMENT OF DRAFT AMENDMENTS TO MARPOL ANNEX VI**

**Proposed amendments to appendix VI to MARPOL Annex VI**

**Submitted by Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom and European Commission**

**SUMMARY**

*Executive summary:* This document provides input to agenda item 3 on the development of draft amendments to MARPOL Annex VI, in particular to appendix VI. It introduces in appendix VI a new testing and verification procedure for the onboard in-use fuel oil samples in alignment with widespread and updated best practices by Administrations and industry. It also amends accordingly the existing procedure for fuel oil samples as delivered to the ship. The intent is to bring a robust and uniform approach for the verification of the sulphur content in marine fuel oil by competent inspection authorities of the Parties in a more cost-effective and unambiguous manner.

*Strategic direction, if applicable:* 1

*Output:* 1.17

*Action to be taken:* Paragraph 13

*Related documents:* PPR 5/WP.5 (annex 5); MEPC 71/5/9; MEPC.1/Circ.864; MSRC.1/Circ.1638; PPR 5/12/1, PPR 5/13/12, PPR 5/13/11 and PPR 5/13/5

**Background**

1 MEPC 70 agreed that the effective date of implementation of the fuel oil standard in regulation 14.1.3 of MARPOL Annex VI should be 1 January 2020. MEPC 71 further approved the new output on "Consistent implementation of regulation 14.1.3 of MARPOL Annex VI", for inclusion in the PPR Sub-Committee's biennial agenda for 2018/2019 and the provisional agenda for PPR 5, with a target completion year of 2019.

I:\MEPC\ISWG-AP\1\ISWG-AP 1-3-2.docx

- Consistent and uniform approach aligning with best industry practice
- Include: ‘onboard samples’ and ‘as-delivered’ <u>( 2 MARPOL samples)</u>
- Complexity of Two Stage approach:.
- Application of IS0 4259 precision approach

## Outcome

- Single stage approach
- Single accredited lab
- Clarity in the application of 95% Confidence test margin for all on-board samples and -
- delivered MARPOL samples
- Reporting to two decimal points
- Sulphur Directive covers same

# MARPOL ‘as delivered’ and ‘on-board samples’

**Table 1: Summary of Part 1 [MARPOL] [delivered] fuel oil sample Procedure**

| On the basis of Appendix V test method | | |
|---|---|---|
| Applicable limit % m/m: V | Result 2.5.1: X ≤ V | Result 2.5.2: V < X |
| 0.10 | Met the requirement | Not met requirement |
| 0.50 | | |
| | Result "X" reported to 2 decimal places | |

‘As delivered’

**Final outcome PPR6 Feb ‘19**
**For adoption MEPC 74 May ‘19**

‘On-board in-use’

**Table 2: Summary of [in-use] [onboard] fuel oil sample procedure[11]**

| On the basis of Appendix V test method | | | | |
|---|---|---|---|---|
| Applicable limit %m/m: V | Test margin value: W | Result 2.5.1: $S_{ave} \leq V$ | Result 2.5.2: $V < S_{ave} \leq W$ | Result 2.5.3: $S_{ave} > W$ |
| 0.10 | 0.11 | Met the requirement | Met the requirement | Not met requirement |
| 0.50 | 0.53 | | | |
| | | Result "$S_{ave}$" reported to 2 decimal places | | |

2.6 The results obtained from this verification procedure are final. "

# Specific fuel quality concerns

**Fuel stability and flash point**

**Supplier**

**Fuel compatibility**

**Ship**

**Cold flow properties**

**Viscosity and Density**

"With care in SUPPLIER blending and pro-active fuel management these risks can be mitigated
We do it with today's blended fuels "

# Responding  Industry standards / guidance

- **ISO TC28/SC4/WG6** is developing of **PAS 23263** (Publically Available Specification) –

  ***Quality - ISO 8217:2017 provides coverage*** *for all marine distillate and residual fuel oils, the change in sulphur content does not alter this fact,*

  *however some formulations may have characteristics which are unfamiliar to some ship operators but still meeting the technical requirements stipulated in ISO 8217.*

- **ISO and CIMAC working groups will be issuing  further specific guidance** on how best to order and manage  0.50% Fuels.  See: **www.cimac.com** for guidance documents

- **OCIMF & IPIECA  leading JIP** - ***Joint industry guidance on managing potential safety and operational issues related to the supply and use of 0.50% max Sulphur fuels'***

International Organization for Standardization

CIMAC
THE INTERNATIONAL COUNCIL ON COMBUSTION ENGINES

# ISO/TC28/SC4/WG6 (ISO 8217 - International marine fuel standard)

- Working group comprised of all key stakeholders of bunker industry
- IMO sought ISO (WG6) expertise on fuel quality and implementation
- Currently, PAS 23263 being developed
- WG's main focus is to address 2020 concerns such as stability and computability …..

**2nd edition ISO 8217:1996**
- Catfines and Stability

**3rd edition:2005**
- Grades, ULO, Reduced water

**4th edition:2010**
- Future fuels, distillates, H2S, catfines

**5th Edition:2012**
- H2S enhanced testing

**6th Edition:2017**
- FAME, BTL, GTL, HVO …+synthetic fuels

**7th Ed:2022/23**

**PAS by Mid - 2019**

International Organization for Standardization

# ISO/TC28/SC4/WG6 is continuing the development of PAS 23263

- "**Considerations for fuel suppliers and users regarding marine fuel quality in view of the implementation of a global maximum 0.50 % S in 2020**".
- The **PAS2326** will address considerations that may apply to marine fuels in view of the implementation of maximum 0.50 % S in 2020 and **shall be used in conjunction with ISO 8217.**
- **Test program to investigate whether test methods** --used by refiners for marine fuel stability testing, can provide additional information on the stability and potential instability of different fuel formulations and blends
- Recognising however that compatibility between different fuels cannot be universally guaranteed by any supplier.

International Organization for Standardization

# CIMAC (WG7 – Marine fuels)

- An expert group, works closely with the ISO Marine fuels (WG6)
- Objective - Produce practical marine fuel guidelines for the industry
- More active sub-groups
  - **‘on how to order fuels’ i.e. new blends and formulations**
  - Stability and compatibility of fuels
  - Ignition and combustion performance of fuels
  - Outcome of the Houston Incidents

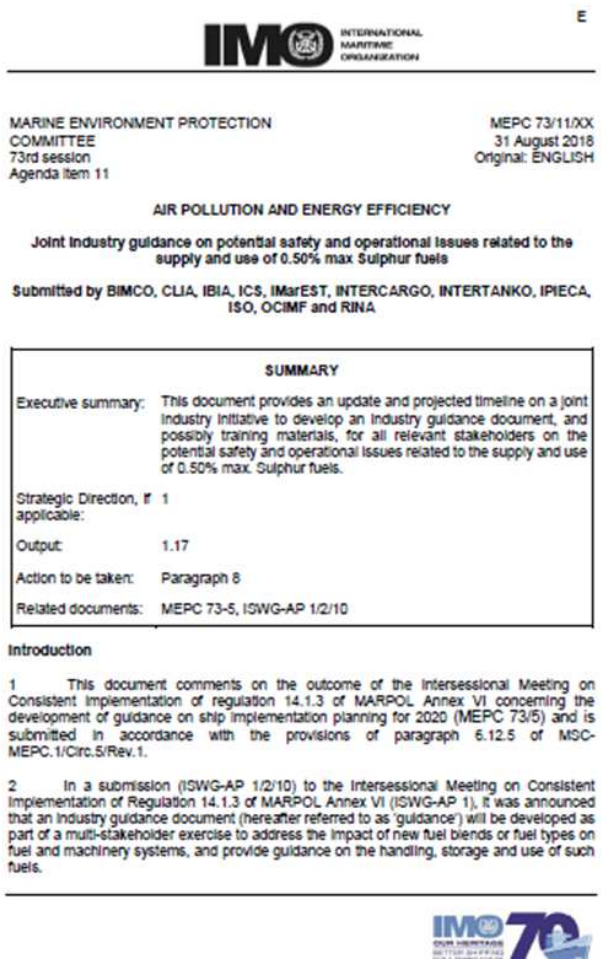
www.cimac.org

CIMAC
THE INTERNATIONAL COUNCIL ON COMBUSTION ENGINES

# OCIMF IPIECA JIP submission MEPC 73/5/17

***'Joint industry guidance on potential safety and operational issues related to the supply and use of 0.50% max Sulphur fuels '***

- Expectations and responsibilities on fuel suppliers and users
- Guidance on fuel characteristics and properties:
- Guidance on the supply of existing and new 0.50% max.
- Guidance on the storage, handling and usage of existing and new 0.50% max. Sulphur fuels:



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IMO INTERNATIONAL MARITIME ORGANIZATION

MARINE ENVIRONMENT PROTECTION COMMITTEE
73rd session
Agenda item 11

MEPC 73/11/XX
31 August 2018
Original: ENGLISH

AIR POLLUTION AND ENERGY EFFICIENCY

Joint industry guidance on potential safety and operational issues related to the supply and use of 0.50% max Sulphur fuels

Submitted by BIMCO, CLIA, IBIA, ICS, IMarEST, INTERCARGO, INTERTANKO, IPIECA, ISO, OCIMF and RINA

SUMMARY

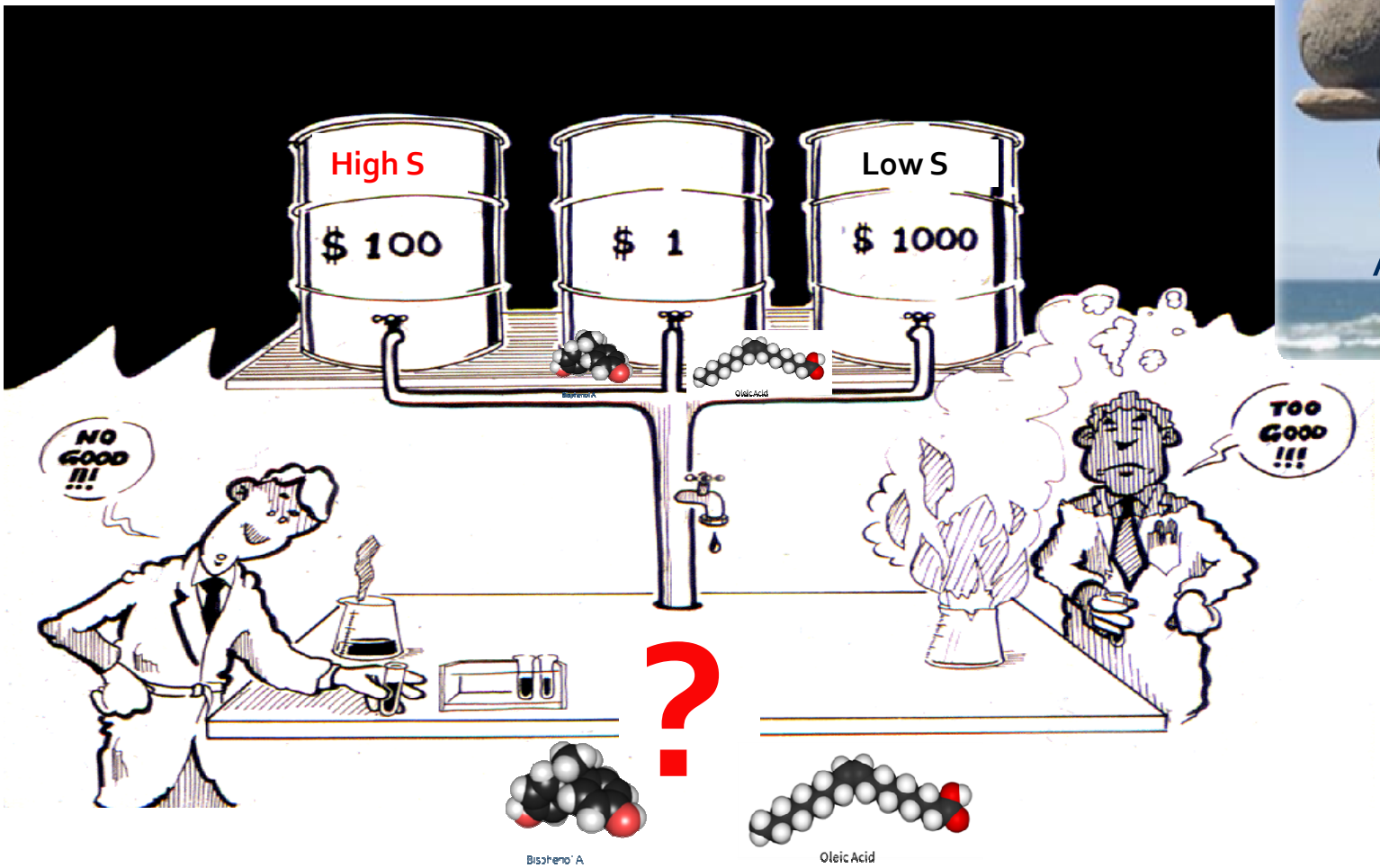
| | |
|---|---|
| Executive summary: | This document provides an update and projected timeline on a joint industry initiative to develop an industry guidance document, and possibly training materials, for all relevant stakeholders on the potential safety and operational issues related to the supply and use of 0.50% max. Sulphur fuels. |
| Strategic Direction, if applicable: | 1 |
| Output: | 1.17 |
| Action to be taken: | Paragraph 8 |
| Related documents: | MEPC 73-5, ISWG-AP 1/2/10 |

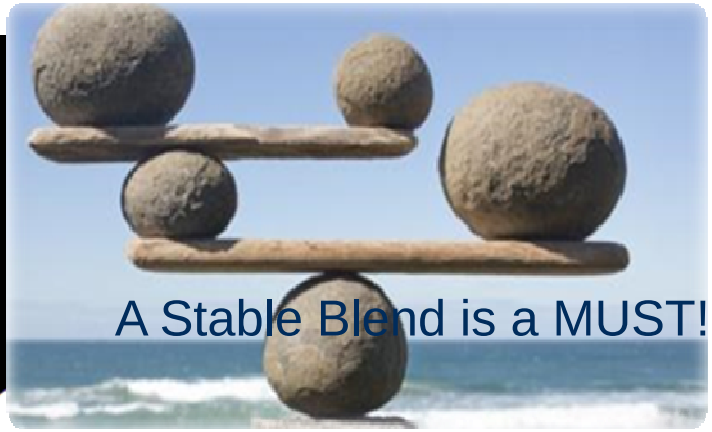
Introduction

1 This document comments on the outcome of the Intersessional Meeting on Consistent implementation of regulation 14.1.3 of MARPOL Annex VI concerning the development of guidance on ship implementation planning for 2020 (MEPC 73/5) and is submitted in accordance with the provisions of paragraph 6.12.5 of MSC-MEPC.1/Circ.5/Rev.1.

2 In a submission (ISWG-AP 1/2/10) to the Intersessional Meeting on Consistent implementation of Regulation 14.1.3 of MARPOL Annex VI (ISWG-AP 1), it was announced that an industry guidance document (hereafter referred to as 'guidance') will be developed as part of a multi-stakeholder exercise to address the impact of new fuel blends or fuel types on fuel and machinery systems, and provide guidance on the handling, storage and use of such fuels.

# What are you blending? – Transparency is Key



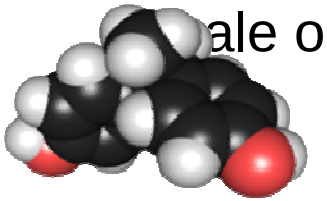

**ISO 8217+ SOLAS**

**Transparency on operational parameters**

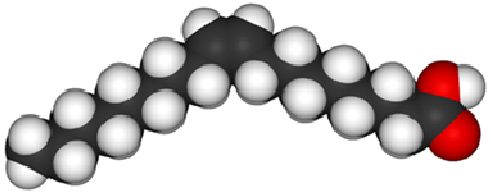
Sulphur is the blending target ….. Don't forget the other parameters?

# Deleterious Material Ingress

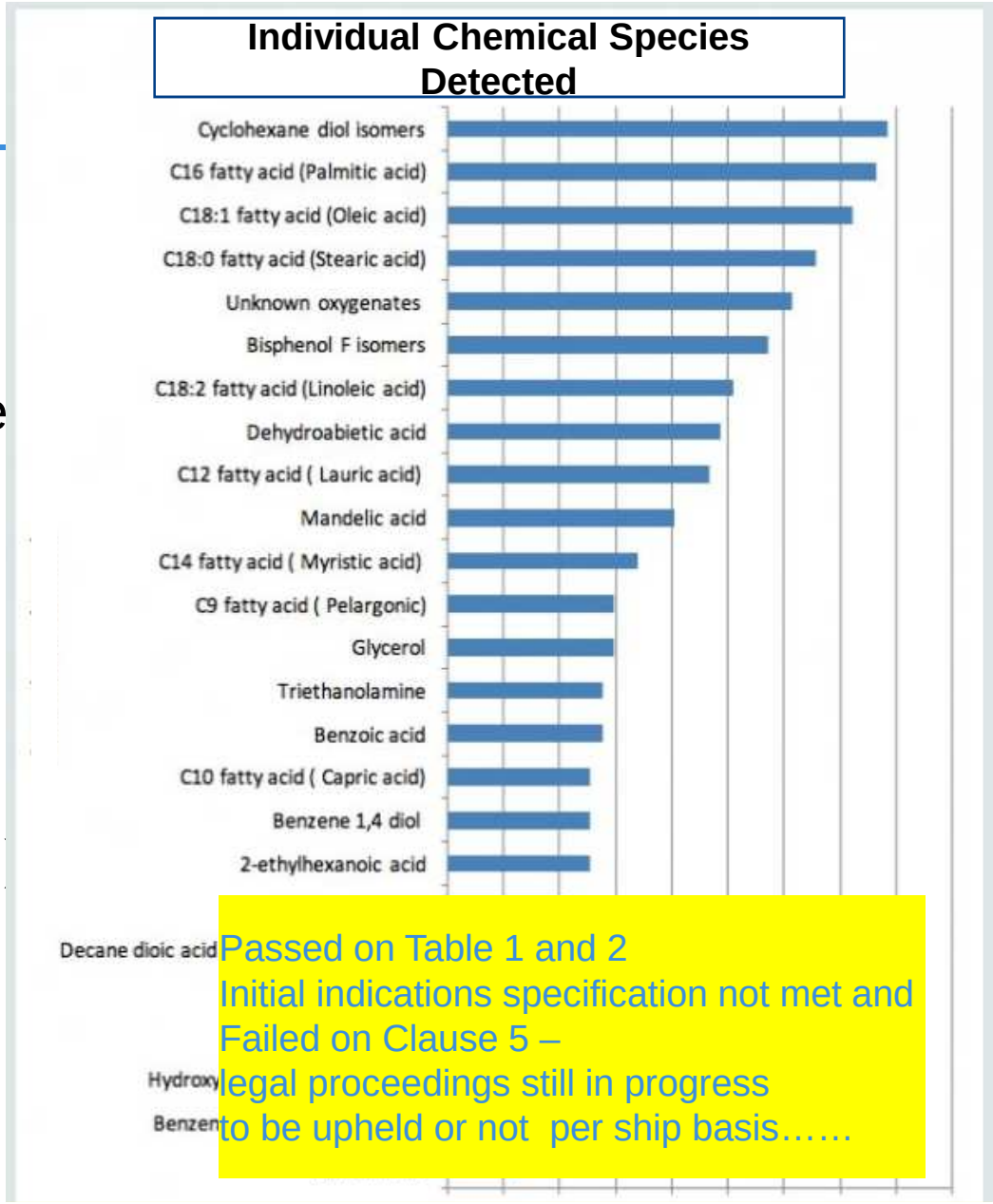
- US GULF : 62 cases, 27 confirmed damages
- Panama : 19 cases, 15 confirmed damage
- Singapore : 13 cases , 5 confirmed problematic fuels
- Main chemical groups : Fatty acids, Phenolic compounds, Resin acids ( tall Oil ale oil (main



Bisphenol A
Lloyd's Register

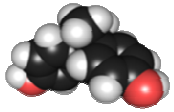


Oleic Acid

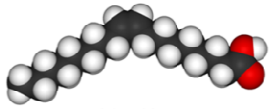



Passed on Table 1 and 2
Initial indications specification not met and Failed on Clause 5 –
legal proceedings still in progress
to be upheld or not per ship basis……

# Suppliers responsibilities



Bisphenol A



Oleic Acid

Supplier must **meet the ISO 8217 specification and SOLAS**

**Major Oil** suppliers working on 0.50 S % m/m meeting ISO 8217

**Suppliers must** ensure blend stocks are acceptable – Meet ISO 8217 Table +Clause 5

**Request** - supplier to **provide transparency** about fuel key characteristics – request cold flow temperatures, viscosity, density

***ISO 8217 Annex B ……..a refinery, fuel terminal or any other supply facility, including supply barges and truck deliveries, should have in place adequate quality assurance and management of change procedures to ensure that the resultant fuel is compliant with the requirements of Clause 5'.***

# ARA International Fuel Quality Forum ToR)

1) Defining the supply chain and the risks to fuel quality control within that supply chain.

2) Defining what good quality and fit for purpose marine fuel oil means,

4) To develop best practice approach to ensure the quality of fuel oil supplied to a ship meets the ship ordering specifications based on the experiences in the ARA region.

5) To develop best practices for managing future fuels taking into consideration the envisaged impact of the global sulphur cap in 2020 on the range of fuel formulations that are likely to be offered to the marine industry.

6) To explore a potential licensing and/or quality system assurance mechanism in order to improve and safe guard the standards of bunker fuel quality in the ARA region.

7) To share the outcomes of abovementioned in international fora like IMO MEPC and the EU European Sustainable Shipping Forum (ESSF).

Netherlands , Belgium, Germany – related ports

– KVNR VDR, IBIA, RBSA, barge/supply, inspection and consultants -

ROYAL ASSOCIATION OF NETHERLANDS SHIPOWNERS

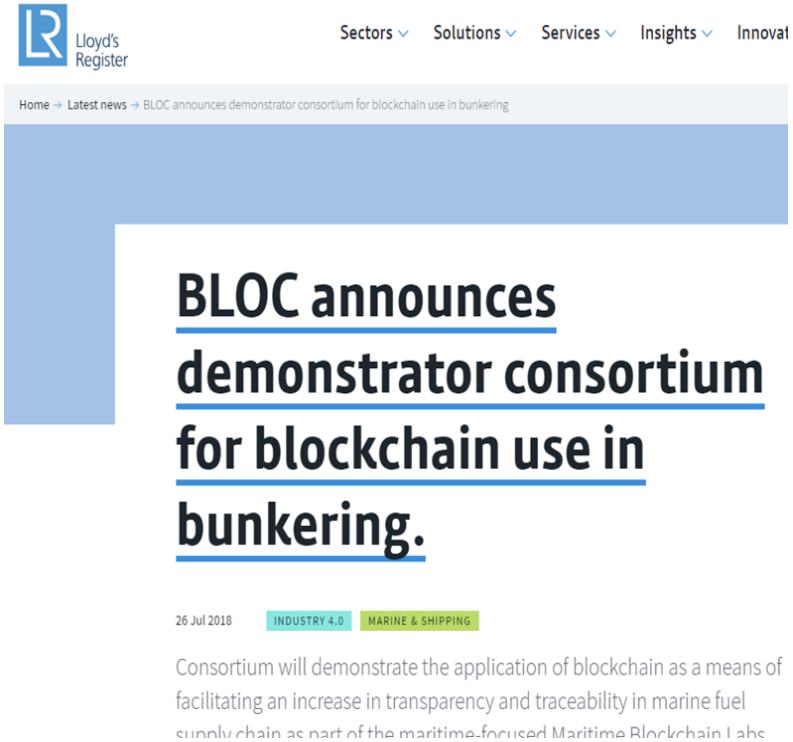
# ARA bunker licencing scheme

- ‘Licence to operate’ for bunker suppliers ARA region (first R’dam and A’dam, Antwerp will follow)
- ARA fuel quality forum meeting on 14 November will discuss the first draft further (there’s currently only a Dutch version, but translation on-going.)
- Quality as well as quantity is adressed in the draft proposal for a bunker licencing scheme
- Call for calibrated and yearly certified Mass Flow Meters on board of bunker barges
- More transparency within the fuel oil bunker chain is supported by bunker industry in the NL
- Audits will be done by the port authorities

# Next Steps Quality Assurance! – Focus on the supply chain integrity!

## Developments in response to fuel safety issues

- IMO's 'Consistent implementation guide' points to greater expectations from suppliers
- New work output on supplier licencing control by Administrations –Rotterdam developing licencing scheme on supply chain and encouraging others to do same
- LR is working with various industry stakeholders –
- Ship
  - Consider charter party bunker purchase contract
  - Open dialogue with suppliers and traders
  - Procurement from reliable suppliers


Lloyd's Register

Sectors Solutions Services Insights Innovat

Home → Latest news → BLOC announces demonstrator consortium for blockchain use in bunkering

**BLOC announces demonstrator consortium for blockchain use in bunkering.**

26 Jul 2018 INDUSTRY 4.0 MARINE & SHIPPING

Consortium will demonstrate the application of blockchain as a means of facilitating an increase in transparency and traceability in marine fuel supply chain as part of the maritime-focused Maritime Blockchain Labs

## Table 2 — Residual marine fuels

| Characteristics | | Unit | Limit | Category ISO-F- | | | | | | | | | | | Test method(s) and references |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | RMA | RMB | RMD | RME | RMG | | | | RMK | | | |
| | | | | 10 | 30 | 80 | 180 | 180 | 380 | 500 | 700 | 380 | 500 | 700 | |
| Kinematic viscosity at 50 °C | | $mm^2/s$[a] | Max | 10,00 | 30,00 | 80,00 | 180,0 | 180,0 | 380,0 | 500,0 | 700,0 | 380,0 | 500,0 | 700,0 | ISO 3104 |
| Density at 15 °C | | $kg/m^3$ | Max | 920,0 | 960,0 | 975,0 | 991,0 | 991,0 | | | | 1010,0 | | | ISO 3675 or ISO 12185; see 6.1 |
| CCAI | | | Max | 850 | 860 | 860 | 860 | 870 | | | | 870 | | | See 6.2 |
| Sulfur[b] | | mass % | Max | Statutory requirements | | | | | | | | | | | ISO 8754 or ISO 14596 or ASTM D4294; see 6.3 |
| Flash point | | °C | Min | 60,0 | 60,0 | 60,0 | 60,0 | 60,0 | | | | 60,0 | | | ISO 2719; see 6.4 |
| Hydrogen sulfide | | mg/kg | Max | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | | | | 2,00 | | | IP 570; see 6.5 |
| Acid number[c] | | mg KOH/g | Max | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | | | | 2,5 | | | ASTM D664; see 6.6 |
| Total sediment – Aged | | mass % | Max | 0,10 | 0,10 | 0,10 | 0,10 | 0,10 | | | | 0,10 | | | ISO 10307-2; see 6.9 |
| Carbon residue – Micro method | | mass % | Max | 2,50 | 10,00 | 14,00 | 15,00 | 18,00 | | | | 20,00 | | | ISO 10370 |
| Pour point (upper)[d] | winter | °C | Max | 0 | 0 | 30 | 30 | 30 | | | | 30 | | | ISO 3016 |
| | summer | °C | Max | 6 | 6 | 30 | 30 | 30 | | | | 30 | | | |
| Water | | volume % | Max | 0,30 | 0,50 | 0,50 | 0,50 | 0,50 | | | | 0,50 | | | ISO 3733 |
| Ash | | mass % | Max | 0,040 | 0,070 | 0,070 | 0,070 | 0,100 | | | | 0,150 | | | ISO 6245 |
| Vanadium | | mg/kg | Max | 50 | 150 | 150 | 150 | 350 | | | | 450 | | | IP 501, IP 470 or ISO 14597; see 6.14 |

[a] 1 $mm^2/s$ = 1 cSt.

[b] The purchaser shall define the maximum sulfur content in accordance with relevant statutory limitations. See Introduction.

[c] See Annex E.

[d] The purchaser should confirm that this pour point is suitable for the ship's intended area of operation.

Table 2 *(continued)*

| Characteristics | Unit | Limit | Category ISO-F- | | | | | | | | | | | Test method(s) and references |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | RMA | RMB | RMD | RME | RMG | | | | RMK | | | |
| | | | 10 | 30 | 80 | 180 | 180 | 380 | 500 | 700 | 380 | 500 | 700 | |
| Sodium | mg/kg | Max | 50 | 100 | 100 | 50 | 100 | | | | 100 | | | IP 501, IP 470; see 6.15 |
| Aluminium plus silicon | mg/kg | Max | 25 | 40 | 40 | 50 | 60 | | | | 60 | | | IP 501, IP 470 or ISO 10478; see 6.16 |
| Used lubricating oil (ULO): Calcium and zinc or Calcium and phosphorus | mg/kg | | Calcium >30 and zinc >15 or Calcium >30 and phosphorus >15 | | | | | | | | | | | IP 501 or IP 470, IP 500; see 6.17 |

[a] 1 $mm^2/s$ = 1 cSt.

[b] The purchaser shall define the maximum sulfur content in accordance with relevant statutory limitations. See Introduction.

[c] See Annex E.

[d] The purchaser should confirm that this pour point is suitable for the ship's intended area of operation.

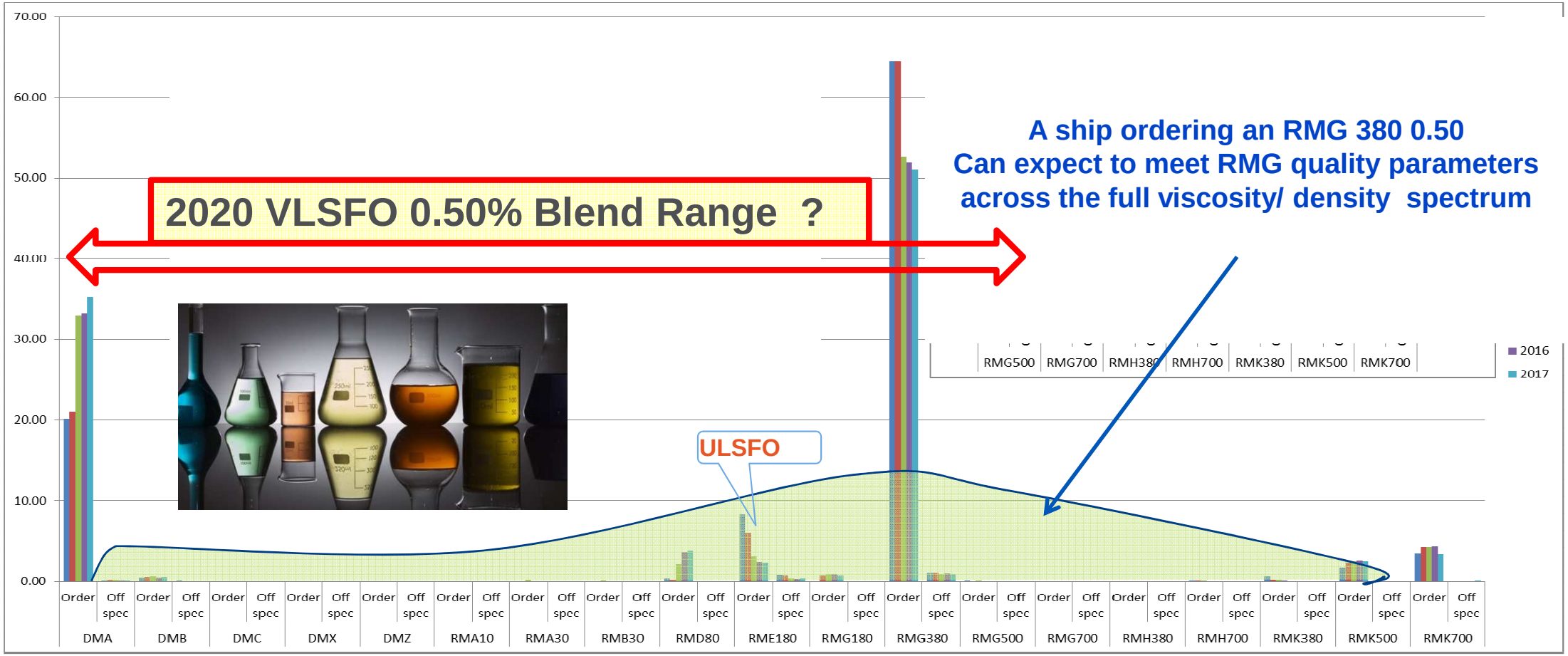
# Where are we?

## Information by 3 Q 2019

1. ISO PAS 23263 for 0.50% fuel + compatibility
2. CIMAC – How to Order 0.50% fuels ++
3. IMO Consistent Implementation Guide
4. OCIMF IPIECA JIP –
5. IMO Best Practice guidelines
6. Industry Associations to members
7. Oil suppliers revealing their products
8. Crew awareness learning
9. Dialogue with your stakeholders
10. Others ++
11. **Your SHIP IMPLEMENTATION PLAN**

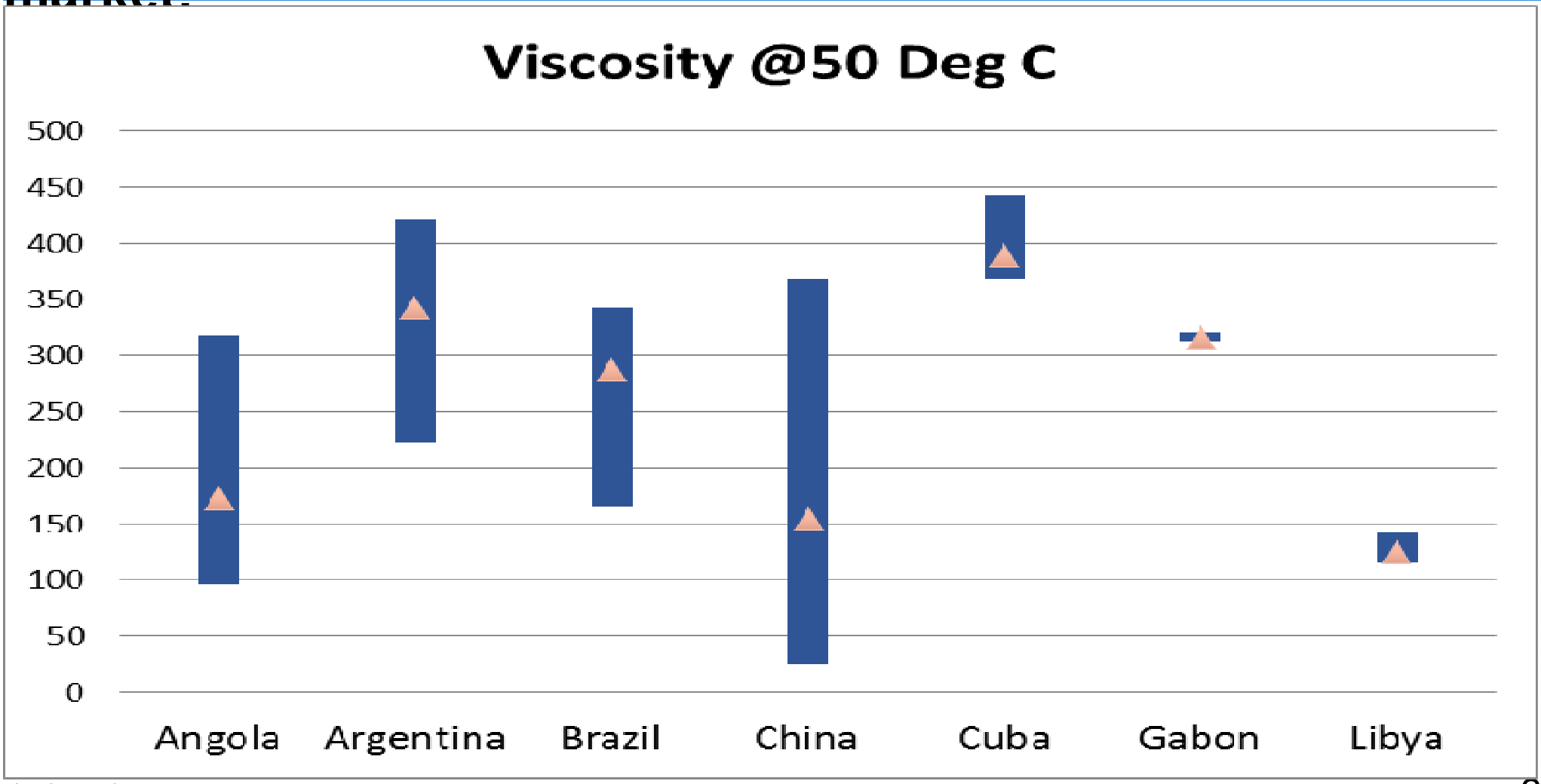
**Plan** ----------2018---------- > **Prepare** ---------2019--------- > **Implement** 2020---------- >

# Wide variability of 0.50% formulations - for 0.50%

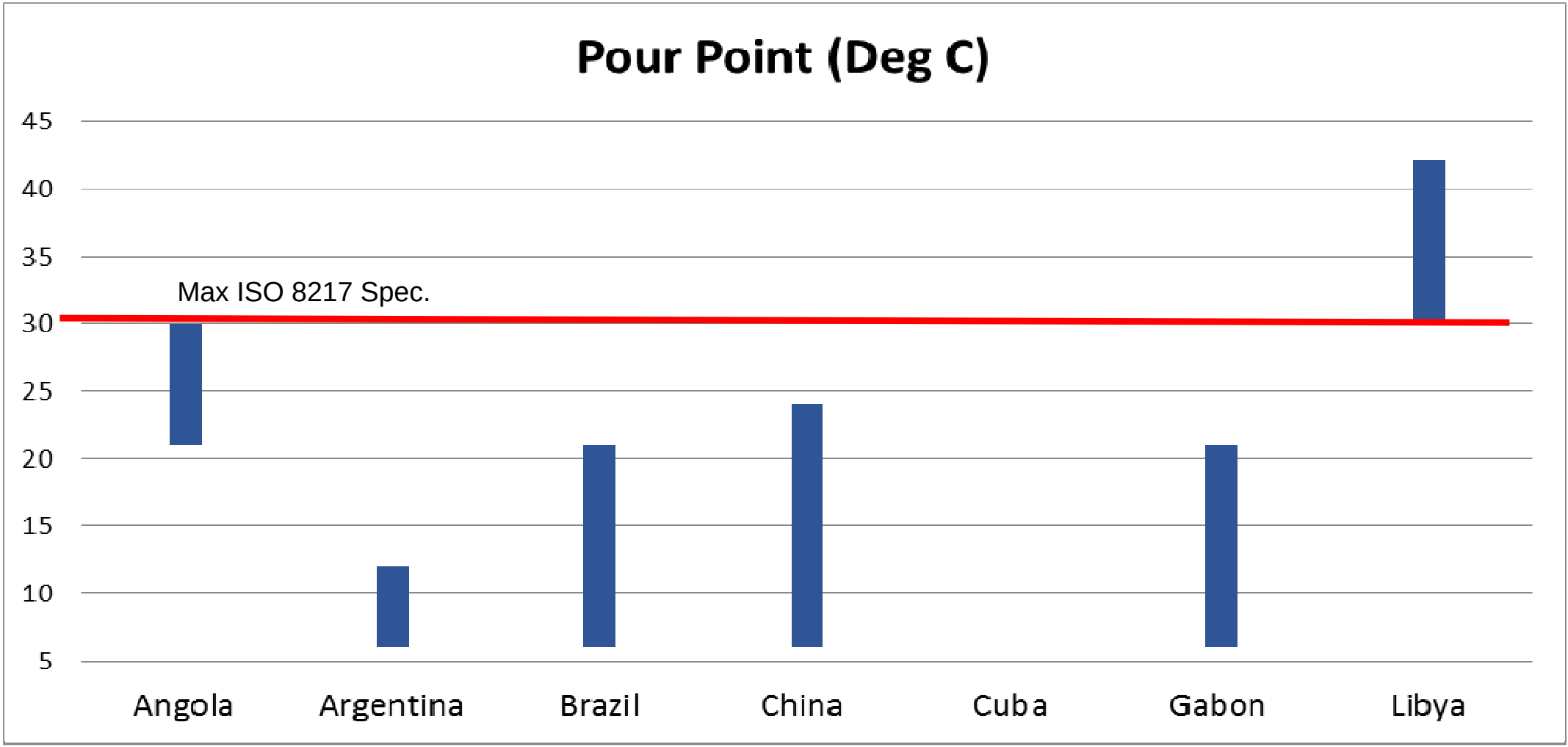



% Bunker Samples on global samples received (LR FOBAS)

# FOBAS 2018 0.10~0.50% residual fuels- already on the market!



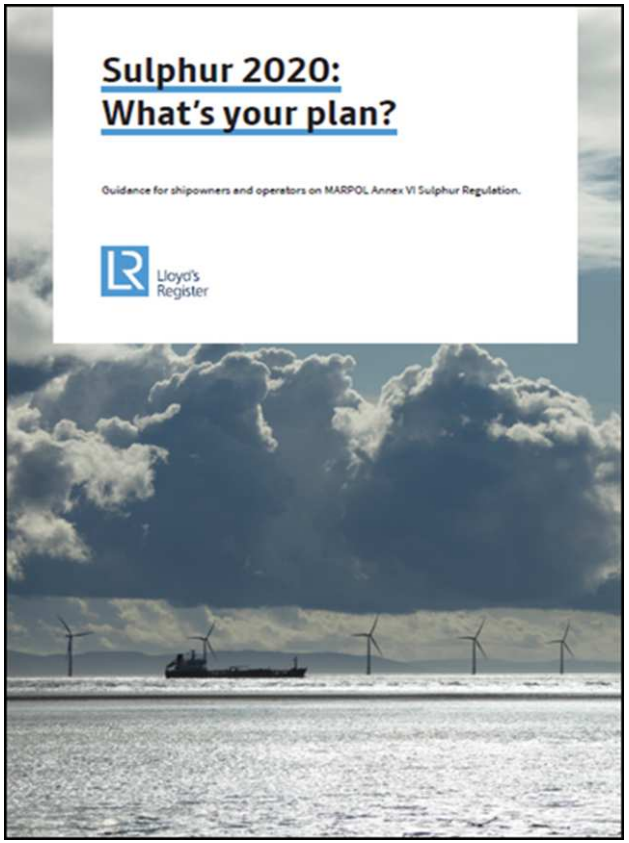
# FOBAS 2018 0.10~0.50% residual fuels



# Adapting to a New Environment

"Change is not always well received and to take onboard – complex decisions to adapt to –

"timely planning, preparation and engagement between stakeholders and proactive fuel management will be crucial to making it happen."



# 2020 Reg 14.1.3 0.50% -

"The challenges posed by the 2020 fuel change are not to be underestimated; timely planning, preparation and engagement between stakeholders and proactive fuel management will be crucial to making it happen." *TSW*

# Thank you

Timothy Wilson

Principal Consultant Engineer

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Email: timothy.wilson@lr.org

Lloyd's Register