30^ Annual Coordinating Meeting of Entity Stockholders

"The new fuel in compliance with the IMO 2020 global sulphur cap"

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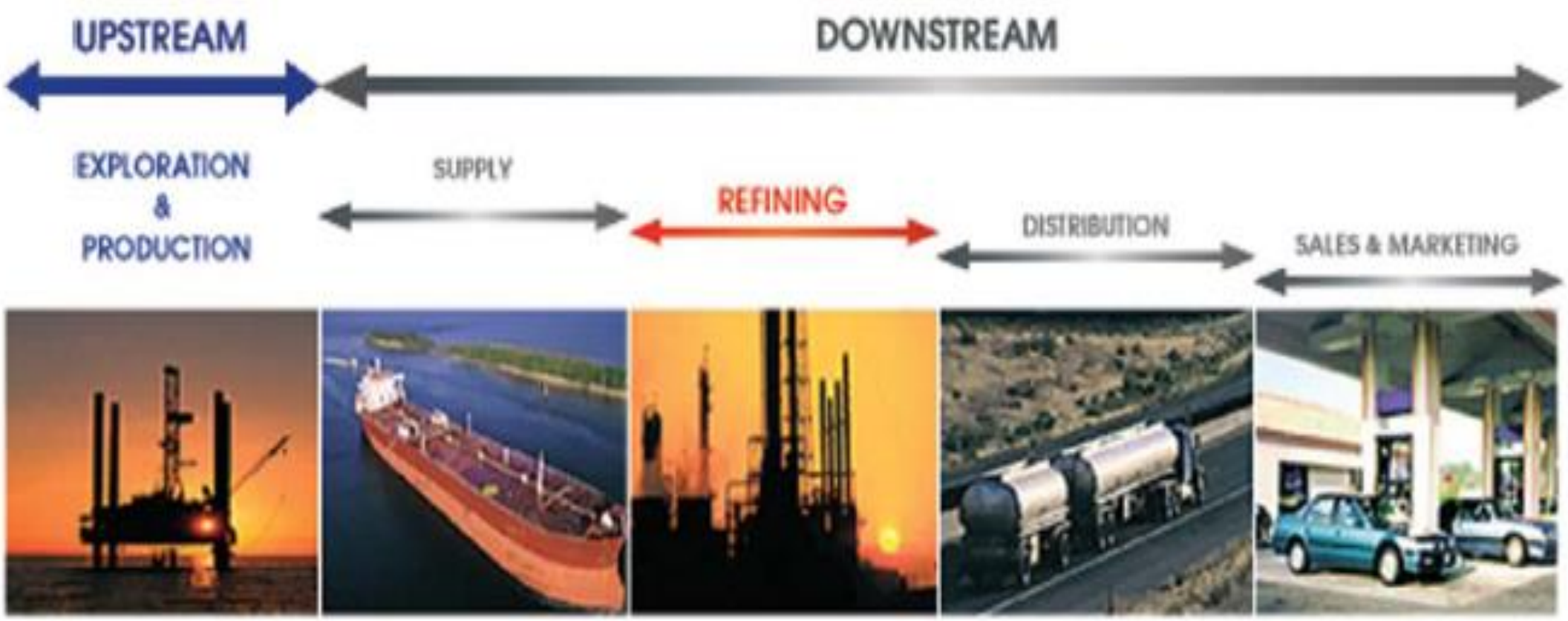
unione petrolifera

Unione Petrolifera – Italian Oil Industry Association



Italian refining system

2011-Cremona
Transformed into an integrated supply hub

2012-Roma
Transformed into an integrated supply hub

2013- Porto Marghera
Transformed in «Green Refinery»

2014-Mantova
Transformed into an integrated supply hub

2018-Gela
Transformed in Green Refinery

Logistic infrastructures – Main depots and terminals

- Depots and terminals of petroleum products (including lubricants) and bio, both fiscal and commercial, with a capacity above 3000 m^3 (Unione Petrolifera members only)
- Many others depots and terminals are owned by non member companies

New IMO bunker fuel 0,5% max. sulphur content

- **Refining industry approach:**
  - **The refining industry will supply the IMO bunker with a number of alternatives - Marine diesel, heavy distillates, residual fuel oil**
  - **Each refinery will make available the fuel on the basis of its present configuration**
  - **No new plants are planned by 2020, specifically designed for these fuels**

Evolution of World bunker fuels demand

- **Based on the latest news on scrubber installations and LNG development, the 2020 world bunker fuels market can be estimated as follow:**

Marine bunker fuels	2017	2020
Marine diesel MGO 0,1 % sulphur	40 – 50 Mton	40 - 50 Mton
Marine diesel MGO > 0,1 % sulphur	30 – 40 Mton	-
LNG	6 – 8 Mton	10 - 15 Mton
Bunker IFO 380/IFO 180 3,5% sulphur	150 - 160 Mton	60 - 80 Mton (partially scrubbed)
Bunker IMO 0,5% sulphur	-	150 - 200 Mton

Italian marine fuels market

- The Italian marine bunker market in 2018 was about 3.2 million tons, of which around 470,000 tons were distillates

- The most relevant ports in this market are Genoa, Livorno, Civitavecchia, Naples, Augusta, Venice and Trieste.

- Till 2020 this bunker market configuration will not change

New IMO bunker fuel 0,5% max. sulphur content – Italian situation

- **Our 2020 forecast sees the bunker consumption grow to 3.3 Mton.**
- **Ships equipped with scrubbers or powered by LNG will continue to be marginal**
- **Therefore large quantities of bunker fuel with 0.5% sulfur will have to be made available in all national ports next year**

Marine bunker fuels *(kton)*	2018	2020	2025	2030
Marine diesel and Bunker 0,5% sulphur	474	2960	2950	3050
Bunker 3,5% sulphur	2.708	300	500	500
LNG	-	-	200	400
TOTAL	3.182	3.260	3.650	3.950

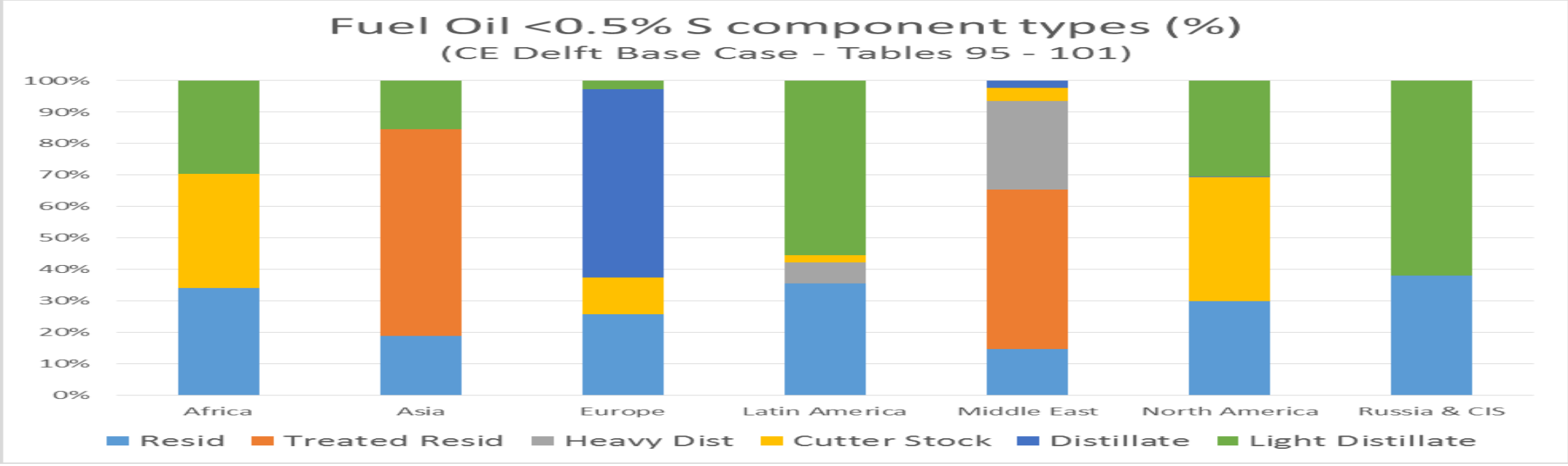
Logistics implications

- **Based on the IMO decision, the switch from high sulfur to low sulfur will have to take place overnight. All operators will prepare themselves adequately but the implications both in terms of logistics and distribution will be considerable**

- **The simultaneous presence of three products (0.1%, 0.5% and 3.5%) will impose additional investments in logistics both to accommodate all three products in coastal deposits and to ensure the import/export operations**

Quality problems to address on IMO bunker fuels

- CE Delft study found there wouldn't be shortages of IMO bunker fuels globally
- Anyway, fuel formulations projected by CE Delft vary widely across World Regions
- This could lead to the following issues:
  - Wide variation in fuel pre-heat temperature prior to injection when using fuel deliveries with varying viscosities
  - Risk of incompatibility - In many cases it would not be advisable for ships to commingle fuels from different regions

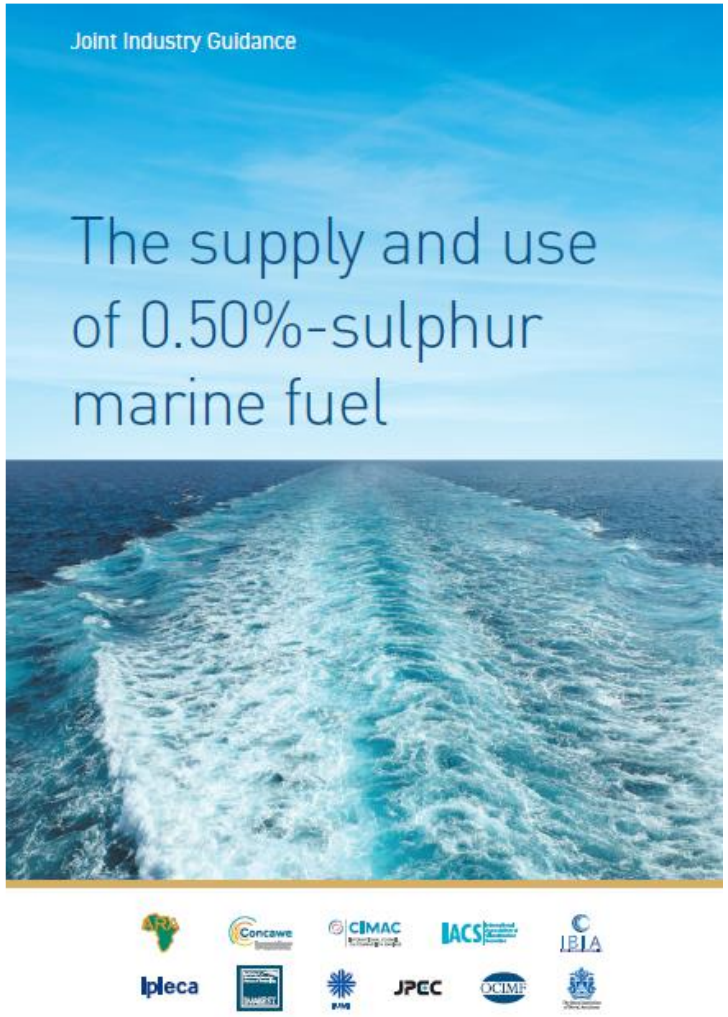


The ISO activities on IMO bunker fuel specifications

- ISO TC28 SC4 WG6 is in charge to develop the new ISO 8217 Specification on IMO bunker fuel
- Due the time constraint to adopt a new ISO 8217, WG6 agreed to develop a PAS (Publicly Available Specification – ISO PAS 23263) to provide with a quality reference by 2020. The PAS has been approved by ISO in July and will be published in September this year
- ISO PAS 23263 shall be used in conjunction with ISO 8217:2017 which covers marine fuel oils delivered to the market today including 0.10 % S fuel oils, higher S fuel oils, as well as 0.50 % S fuel oils. The PAS will not introduce new specifications nor an additional table for 0.50 % S fuels.
- The PAS will provide general considerations that apply to all 0.50 % S fuels, including S content and flash point, and technical aspects on kinematic viscosity, cold flow properties, ignition characteristics, catalyst fines, and stability that might apply to specific fuels.

Joint Industry Project – Guidance on the technical and safety implications of the new 0.50% S fuels

- **Section 1: Guidance on fuel characteristics and properties**
- This section underlines the importance to understand the characteristics of the fuel as supplied. Information is provided on the potential variability of max. 0.50%-sulphur fuels and on key fuel properties: cold flow properties, stability, viscosity, acid number, flashpoint, ignition quality and catalyst fines.
- **Section 2: Guidance on the supply of max. 0.50%-sulphur fuels**
- Describes the need for fuel suppliers to have in place a robust Quality Management System to control the quality of the blend stocks used
- **Section 3: Guidance on the storage, handling and safe use of 0.50% S fuels**
- This section provides information on potential fuel-related safety and operational issues, and measures they can take to prevent and mitigate such issues. Provides also guidance on unacceptable fuels, off specification fuels and non-compliant fuels



Potential issues in IMO 2020 bunker fuel stockholding

- When the 0.50%-sulphur marine fuels will be included in the emergency oil stocks some measures are recommended to prevent future issue
- A complete fuel quality characterization is required, in particular for the most variable characteristics of the proposed bunkers, such as viscosity, density, pour point and micro carbon residue (MCR). These information are essential when the bunker delivered will be mixed with another fuel
- The main issue is in fact compatibility and two fuels that have widely differing characteristics of viscosity, density, pour point or MCR, would suggest that they are less likely to be compatible. Fuels that have generally similar characteristics are more likely to be compatible.
- This characteristic assessment does not replace the need to carry out a physical compatibility test at the expected commingling ratio, before mixing.

Potential issues in IMO 2020 bunker fuel stockholding - best practice

- **Do:**
  - **Avoid mixing bunker fuels: if possible, receive new fuels into empty tank(s)**
  - **Carry out the spot test first on the proposed mixture if you arrive in port without an empty tank to load into; if that fails, take advice and/or confirm with the TSP test to confirm whether there are potential issues if products are mixed.**
  - **Purchase fuels with similar viscosities and densities where possible**

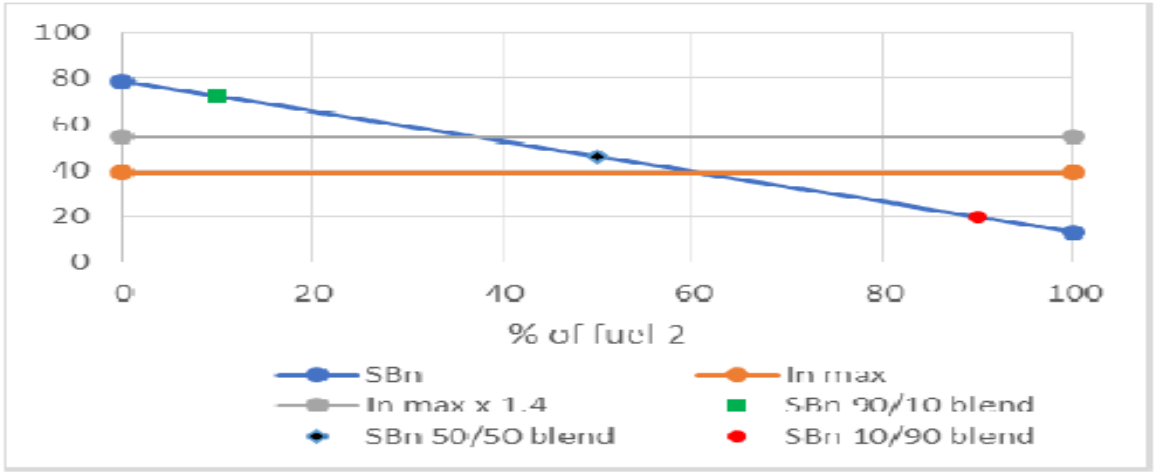
- **Do not:**
  - **Mix a residual fuel oil with a marine diesel oil (MDO) or marine gas oil (MGO).**
  - **Mix fuels with greatly dissimilar viscosity, densities, MCR or pour point; dissimilar characteristics may provide an early indication of possible incompatibility.**

The IMO bunker fuel stability/compatibility

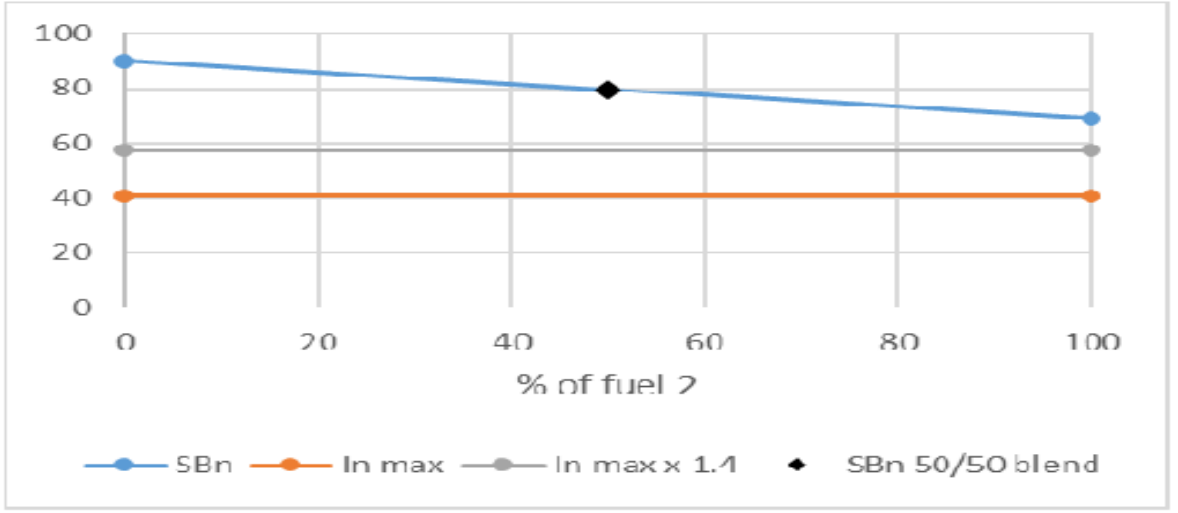
- To address the potential risk of incompatibility when commingling fuels having varying blend formulation, the ISO working group conducted a test program to investigate which test methods can provide further and consistent information on the stability and potential instability of fuels or mixtures of fuels.
- The following test methods can be used to evaluate stability and compatibility of fuels:
  - ASTM D7157 (S-value - Rofa Analyzer)
  - ASTM D7112 (P-value - Porla Analyzer)
  - ASTM D7060 (FRmax and Po - Zematra Analyzer)
- These test methods allow the determination of parameters that relate to the stability of the asphaltenes in the fuels and the ability of the fuel oil matrix to keep the asphaltenes in solution.

The IMO bunker fuel stability/compatibility

Fuel	SBn	In
1	79	39
2	13	24
Blend (1/2) Ratio e.g. 10/90	SBn(mix)= (0,10 x 79) + (0,90 x 13)= 20	In(max)= 39



Fuel	SBn	In
1	90	41
2	69	17
Blend (1/2) Ratio e.g. 50/50	SBn(mix)= (0,50 x 90) + (0,50 x 69)= 80	In(max)= 41



The IMO bunker fuel stability/compatibility

- The existing spot test and total sediment tests remain the first tests to do to obtain information on the stability and compatibility of fuels.
- More detailed information on the use of test methods related to stability and compatibility will be included in a CIMAC guideline document entitled:
- "General guidance in marine fuel handling in connection to stability and compatibility".
- The guidance will be relevant to all fuel grades and will also describe tests that can be used to check stability and compatibility and the limitations of those tests
- The revision of ISO 8217:2017 will be initiated after publication of the PAS and will consider the information included in the PAS and feedback from the industry on the use of 0.50 % S fuels.

Thank you and Questions??

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