Trends in Fuel & Cargo types

Low Sulphur Fuel Oils – Implications for impacts and monitoring

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Premiam 5th Bi-annual Conference – Interspill 2022

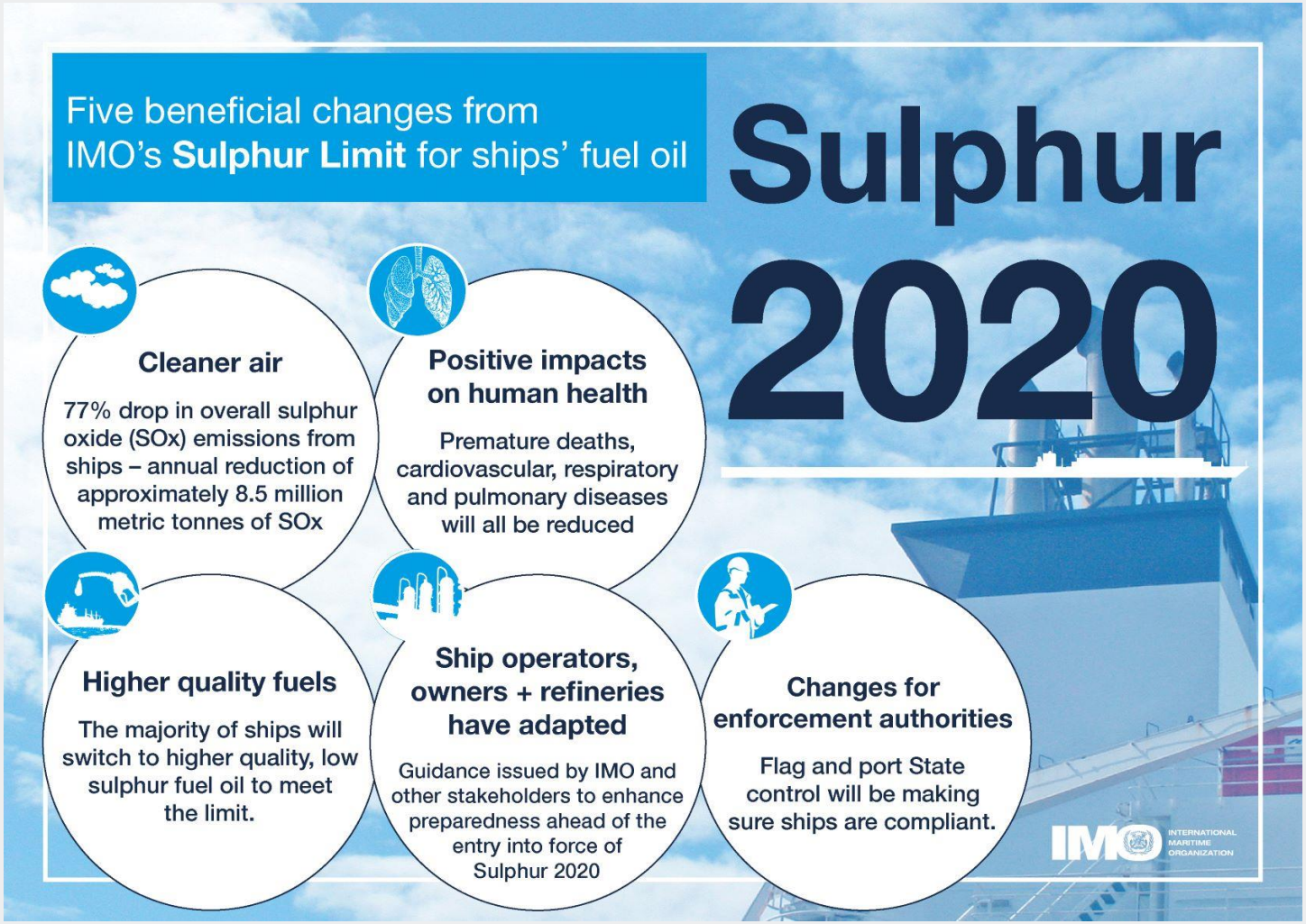
INTERNATIONAL MARITIME ORGANIZATION

IMO 2020 – cutting Sulphur Oxide emissions

From 1st January, 2020 limit for Sulphur In fuel oil used on board ships reduced to 0.5% mass by mass (m/m)

- Reduced from previous limit (outside of designated emission control areas) of 3.5% m/m
- Limit Set out in MARPOL Annex VI (regulation 14)
- Monitoring and enforcement falls to Governments and national Authorities of Member States that are parties to Annex VI

IMO 2020 – cutting Sulphur Oxide emissions



Achieving Sulphur Oxide reductions

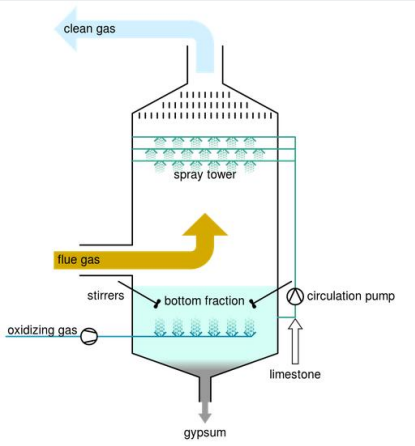
Several ways for ships to apply:

i. Use a compliant fuel oil with a sulphur content that does not exceed 0.5%

- ULSFO – Ultra Low Sulphur Fuel Oils (S ≤ 0.1% m/m)
- VLSFO – Very Low Sulphur Fuel Oils (S ≤ 0.5% m/m)

ii. Use of abatement technology (“scrubbers”, despite regulations being expressed in terms of Sulphur levels in fuels, deems ships compliant)

iii. Use of Alternative Fuels (e.g. LNG, methanol)



Potential Implications for Impacts

SL ROSS SINTEF

OC2020 A-050 Open

Report

Characterization of Low Sulfur Fuel Oils (LSFO) – A new generation of marine fuel oils

Weathering, dispersibility, WAF and toxicity, and ignitability / in-situ burning

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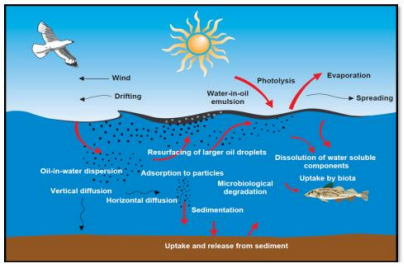


SINTEF Ocean AS

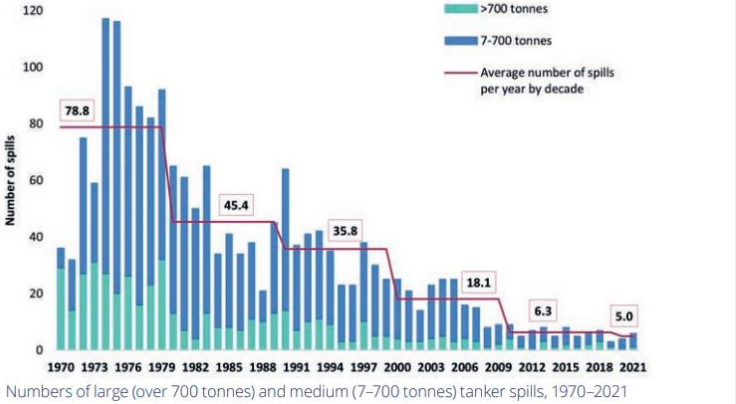
2020-07-10

Potential Implications for Impacts

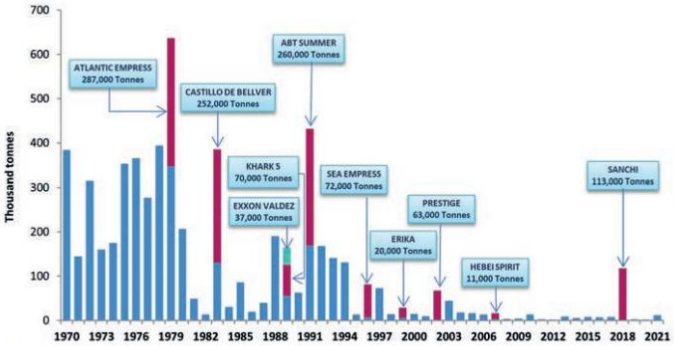
For (3) samples of VLSFO and ULSFO (SINTEF, 2020)

- Very low evaporative loss - 5-8%
- A range of pour points but still high: 3-24˚ C
- High viscosities at both 2 ˚ C and 13 ˚ C
    - Dispersant effectiveness was observed to be minimal
- Differences in asphaltene and wax contents but all above the 0.5% generally accepted to indicate a propensity to form a stable emulsion
    - Emulsifications observed in all 3 but water uptake slow
    - Once formed emulsions were stable
    - Emulsification breakers effectiveness were observed was “limited”
- High persistence on sea surface
- All observed to be ignitable (when not emulsified) but due to low volatility, require prolonged time to be heated by an ignitor

Potential Implications for Impacts



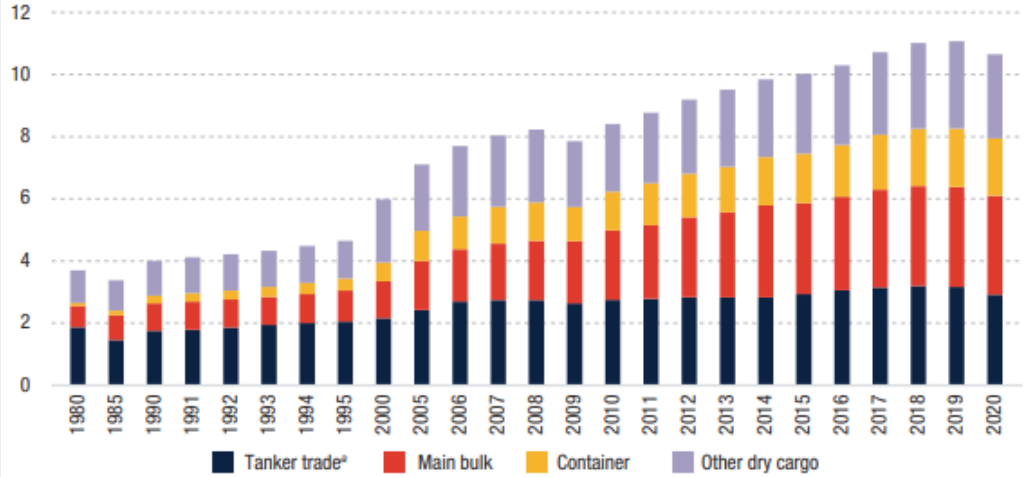
Numbers of large (over 700 tonnes) and medium (7–700 tonnes) tanker spills, 1970–2021



Quantities of oil spilt 7 tonnes and over (rounded to nearest thousand) from tanker incidents, 1970–2021

ITOPF, 2022

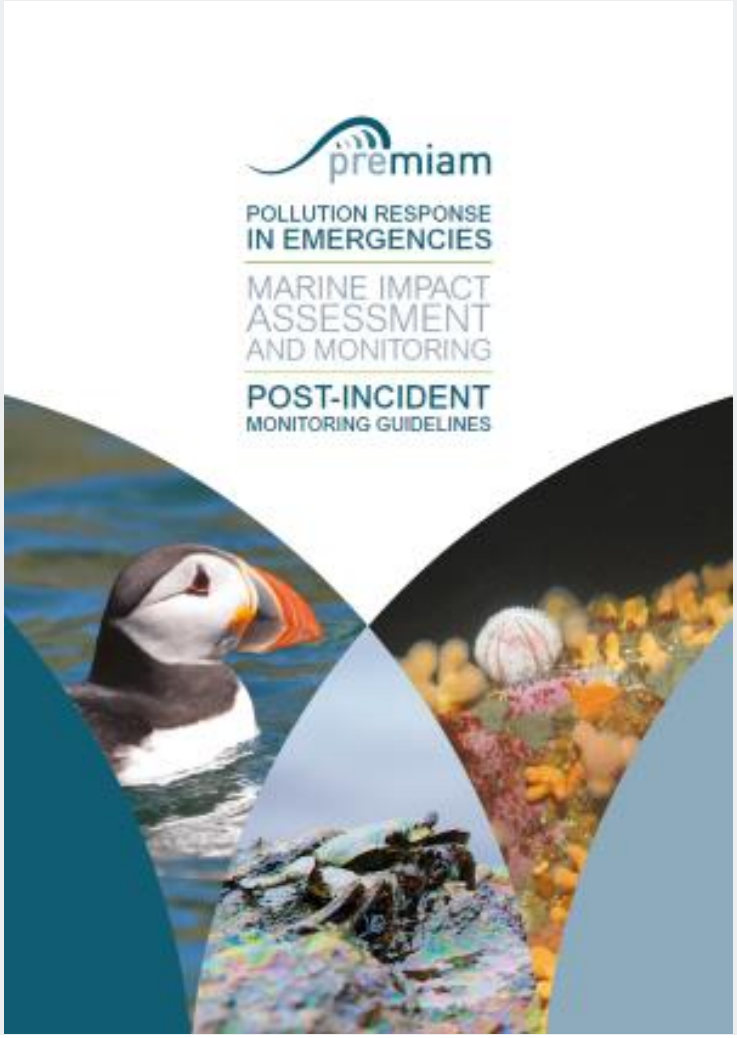
International maritime trade by cargo type, selected years
(millions of tons loaded)



Source: UNCTAD *Review of Maritime Transport*, various issues. For 2006–2020, the breakdown by cargo type is based on Clarksons Research, *Shipping Review and Outlook*, Spring 2021 and *Seaborne Trade Monitor*, various issues.

The Importance of Environmental Monitoring

- Allows us to ascertain the risks and impacts to the human food chain, the marine ecosystem and commercial marine resources
- Gathers data necessary to establish the effectiveness of the response operations and any subsequent actions taken to mitigate impacts or promote recovery
- Why, where, when, what and how we need to monitor?



Implications for Monitoring

If shoreline impacts may be more likely, it will be even more crucial to establish a monitoring programme promptly and, in a cost effective manner.

A monitoring programme should consider physicochemical properties of the spilled, substance (density, solubility, volatility, ability to bind to particles, persistence and reactivity), inherent toxicity to both wildlife (including aspects such as smothering and bio-accumulative capacity) and humans, and the likely movement of the material, whether as a coherent slick, a plume or in solution, in relation to the resources threatened - unlikely to be largely different on the macro scale to other fuel oils.

Pre-identification of expertise and resources to conduct analysis will be crucial.

Avoidance of causing harm through monitoring activities – sensitive resources.

Caveat: Categorisation

Fuels are blends:

- Must meet ISO 8217 specifications to be commercially viable
- Previously generally classifications such as:
  - IFO180
  - IFO380
  - Marine Diesel Oil (MDO)
  - Marine Gas Oil (MGO)

More often referred to now as VLSFO or ULSFO – umbrella terms, there is still a range of characteristics within these

Summary

Since 2020 we have entered an era of low(er) Sulphur fuels in marine shipping

This has and will have environmental and health benefits

Although decreasing, oil spills do occur and shipping (and ship sizes) continue to increase meaning that spills will happen

Physiochemical characteristics on tested products show that traditional response techniques may not be effective meaning shoreline impact *may* be more likely and therefore the need for an environmental monitoring programme that can be implemented quickly and efficiently is crucial

However, “Low Sulphur Fuels” is an umbrella term and even the two sub-categories (VLSFO and ULSFO) may have different properties between products so more data (and potentially characterization) is needed for responders to understand what they are responding to

Thank you.

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