



INTERTANKO

USE OF MDO BY SHIPS PART OF A HOLISTIC APPROACH

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WHAT DID INTERTANKO SUGGEST

- 1. Include one Fuel Oil specification in Annex VI**
- 2. Simplify monitoring of compliance**
- 3. Switch to MDO with a 2-tiered global S cap program:**
 - a. Tier I - 1.00% S content**
 - b. Tier II - for new engines, 0.50% S content**
- 4. Removal of SECA provisions**



REASONS FOR SWITCH TO MDO

- **Type/quality of fuel is the KEY to control all exhaust gas emissions from ships**
- **MDO applies to ALL existing engines**
- **With no other measure, immediate significant reductions on SO_x, PM emissions and measurable reduction of NO_x emissions**
- **Facilitates further NO_x reductions by in-engine modifications for IMO's Tier II & III**
- **MDO provides a much better platform for reducing air pollution from ships**



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WHAT INTERTANKO DID NOT SUGGEST

- *INTERTANKO did **NOT** suggest to remove provisions for use of technologies.*
- *INTERTANKO believes innovation is required for more efficient in-engine clean exhaust gas systems than some of the current proposed after treatment systems*
- *Delivery of HFO means waste disposal and it works against emission reductions*



WHAT'S IN IT FOR SHIP OPERATORS

- **Engines designed for use of low S MDO will tolerate further emission reductions**
- **Further emission reductions function of:**
 - **fuel quality**
 - **in-engine exhaust cleaning systems**
- **Fuel specification = Ships would not need to take responsibility of compliance of fuels they order as per Annex VI**



WHAT'S IN IT FOR SHIP OPERATORS

- **Solid platform of requirements**
- **Long term and significant reduction of air emissions from ships**
- **Long term and a predictable regulatory regime**
- **Prevents fragmented regulations**
- **A global standard for at sea, coastal and at berth operations (no SECAs)**



- **ENVIRONMENTAL:**
 - Lower fuel consumption from ALL ships
 - Reduces CO₂ emissions from ALL ships
 - No heating and pre-treatment of bunkers = further reduction of CO₂ emissions from ALL ships
 - Eliminates fuel generated waste = further reduction of CO₂ emissions from ALL ships
 - No heavy metals and PAH in MDO – no need to clean up and dispose hazardous PMs
 - Use of in-engine solutions for further exhaust gas cleaning = no further additional waste & no need of further waste disposal
 - Potential bunker spills significantly less harmful



MDO - ADDITIONAL BENEFITS

- **SAFETY:**
 - Less incidents with engine breakdowns caused by poorer quality fuels
 - No need of complex fuel change-over operations
 - No risk of incompatibility of blended fuels
 - Safer working environment for crews
 - Ships used to change to MDO in harbour/confined waters for one reason only: **SAFETY**



MDO AVAILABILITY

- 31 new refineries (0.9 mt/day)
- 93 refinery expansions (0.925 mt/day)
- 33% of it yields into "MDO type" =
108 mt/year & 111 mt/year respectively
- Total of **218 mt/year** > 150-200 mt /year
expected to be needed
- IEA forecasted the same rise (14%) over
the end-2005 capacity (i.e. 660 m tons)
- **No CO₂ to be accounted for**



MDO AVAILABILITY

- **ADO mixed with 10% bio-component = more of existing capacity for MDO**
- **efficiency of conversion**
- **2005 average utilisation of refinery capacity:**
 - **World wide - 86.3%**
 - **EU - 92.4%**
 - **Asia-Paific - 91.5% and**
 - **North America - 89.4%**



AVAILABILITY - SCRUBBERS

- **How many scrubbers are needed:**
 - 10,000 ships = 40,000 scrubbers
 - 20,000 ships = 80,000 scrubbers
- **When would scrubbers and installations for all sizes of engines be available?**
- **How fast can a large number be manufactured and delivered?**
- **Duration of a phase-in period for scrubber installation**
- **Manufacturing & operating scrubbers would result in high CO₂ emissions**



AVAILABILITY - SCRUBBERS

- **ASSUMPTIONS:**
 - 4 scrubbers/ship
 - time to retrofit – at least 30 days/ship
 - 100 shipyards (ships over 30,000 dwt)
- **RETROFIT (1 ship/shipyard every day):**
 - for 10,000 ships: 8+ years
 - for 15,000 ships: 12.5 years
- **RETROFIT (2 ships/shipyard every day):**
 - for 10,000 ships: 4 years
 - for 15,000 ships: 6+ years



MDO - COSTS IMPACT

- **USD 200/t premium for MDO**
- **Total price USD 40 bill**
- **Tankers use 30% of fuels = USD 12 bill**
- **Tankers transport over 3 bill tons of oil and oil products/year**
- **Increased cost = USD 4/t or 0.4 US cents/liter (0.3 Euro cents/liter)**
- **Or**
 - **0.3% of the retail price of gasoline in Europe**
 - **0.16% of the retail price of gasoline in US**



COST ASSESSMENT- TECHNOLOGIES

ASSUMPTIONS (based on Fairplay database)

- Fleet size: 46,340 ships
- Average main engine size: 5.6 MW
- Three auxiliaries: 750 kW/each
- Main engine usage: 300 days/year
- Auxiliary usage: 365 days/year

CAPITAL COST ONLY

- Scrubber main engine: \$46 billions
- Scrubber aux. (3): \$39 billions
- SCR main engine: \$13 billions
- SCR aux. (3): \$5 billions

TOTAL \$103 billions

TOTAL (37% of fleet to install) \$38 billions

Alternative: COSTS FOR REFINERIES \$38 billions*



COST ASSESSMENT IMPACT

- **Oil industry can provide MDO for ALL ships at a cost equivalent to retrofit 37% of the current fleet**
- **Increase in # of SECAs and sea areas under SECA would demand more ships to have the flexibility to trade with low S fuels**
- **From and environmental point of view, the cost impact justifies a global solution**



COSTS ESTIMATED ON A SCR

- Urea consumption $\approx 25 \text{ l} / \text{MWh}^*$
- NOx reduction $\geq 90\%$ @ $\leq 2 \text{ g/kWh}^*$
- Investment costs 40,000-60,000 USD / MW*
- Running costs (urea) $\approx 3.75 \text{ USD} / \text{MWh}^*$
- Maintenance costs $\approx 0.9 \text{ USD} / \text{MWh}^*$

- For a 20 MW onboard installed power, the costs will be

• Investment	800,000 - 1,200,000 USD	
• Running costs	1800 USD/day	
	for 50 days/year	90,000 USD/year
• Maintenance	432 USD/day	21,600 USD/year
• TOTAL		111,600 USD/year

* Data provided by WÄRTSILÄ for Sulzer 6RTA52U with SCR system



OPERATIONAL & OTHER COSTS

- **Estimate capital cost for complete set of scrubbers to be retrofitted on medium & large ships at USD 8 - 10 mill**
- **Any redundancy for the main engine?**
- **Provided there would be a shortage of scrubbers, what would be their price?**
- **The operational costs is not known**
- **Cost of waste disposal comes in addition**
- **Important to discuss all these costs instead of focus on the MDO price only**



USE OF MDO - CONCLUSIONS

- **Significant step for emission reductions**
- **Long term/predictable regulatory regime**
- **Simpler monitoring & control procedures**
- **Safer & simpler ship operations**
- **technical modifications simpler than retrofitting after treatment equipment**
- **Facilitates innovative in-engine solutions**
- **Better work environment for crews**



USE OF MDO - CONCLUSIONS

- **New production and refinery expansion indicate capacity to for additional MDO**
- **Not easy & not cheap but realistic & feasible**
- **Other alternatives - equivalent costly**
- **Ship operators would have lower liability to demonstrate compliance**
- **Low S MDO = Ships aligned with other means of transportation**



USE OF MDO - CONCLUSIONS

- **MDO is the right step for a HOLISTIC set of measures that provide significant emission reductions from ships in both near and long term future**
- **IMO issues environmental regulations for ships and not for shore waste**
- **Who should decide whether ships should be the means of disposal for refinery waste. Who should decided this waste be disposed at sea? If delivered back to shore, why not to do it so in the first place?**



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USE OF MDO - CONCLUSIONS



"The use of vegetable oils for engine fuels may seem insignificant today. But such oils may become in course of time as important as petroleum and the coal tar products of the present time."

Rudolf Diesel (early 1900s)

Source: Wikipedia

INTERTANKO: *Better to first deal with the cause of a problem than to concentrate on the effects only!*



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