IMO 2020 – Exploring the option of SOx scrubbers

The deadline for complying with the IMO 2020 sulphur requirements is fast approaching. Many shipowners have already made their decision as to how they will comply with the requirements and have mapped their route to SOx compliance. Others are still undecided, and unprepared, as to which of the available options they should select.

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There are four possible methods of compliance:

1. use VLSFO (very low Sulphur oil) or blends;
2. use distillates or MGO;
3. use LNG or other alternative fuels; or
4. install EGCS (exhaust gas cleaning systems) and continue using HSFO.

Prior to selection of a compliance option shipowners should undertake a proper assessment of the risks involved and should not only consider the cost element but also any other operational and safety issues. For example, in the case of compliant fuels some of the safety issues that need to be considered would be fuel oil stability, compatibility, combustionability, leakage and exposing fractures in pipes which are not apparent when using thicker HFO, whereas some of the operational **issues** are heating requirements, tank segregation, change in cylinder oil, changing certain engine parts and lower power output. Shipowners who have decided to use compliant fuels or distillates may wish to refer to the provisional guidance document prepared by International Chamber of Shipping. The use of scrubbers also carry certain uncertainties and owners would need to do a thorough risk assessment to understand the challenges they and their crew members are likely to face if this option is selected. Further information can be found in the OCIMF's Guide for implementation of Sulphur Oxide Exhaust Gas cleaning systems and other sources of information such as advisories of classification societies.

In this Insight article we will look at the last of the four available options: SOx scrubbers.

Recent reports indicate a surge in the number of vessels having scrubbers installed. The demand is such that some major manufactures are reporting long lead times for the installation of new scrubber units and shipowners are having to turn to other suppliers to ensure compliance by 1 January 2020.

Selecting a scrubber system

Whether SOx scrubbers are an attractive option or not depends on the price difference between high sulphur and low sulphur fuel oil.

Annex 1 of MEPC.259(68) outlines the IMO's requirements for complying with MARPOL Annex VI, regulations 14. Approval for the use of scrubbers can be based on either Scheme A or Scheme B. Scheme A involves installing a product with certified parameters and emission checks whilst Scheme B requires continuous measurements of emissions to demonstrate compliance.

Various factors need to be taken into consideration before selecting the most suitable scrubber system for a vessel. The installation and operating costs, structural compatibility including the space available for the system, the vessel's trading pattern, alkalinity of the water, and any requirements for additional substances such as caustic soda or magnesium oxide will determine the system which is most appropriate for the vessel.

There are four types of scrubber systems:

(a) open loop,

(b) fresh water closed loop,

(c) hybrid, or

(d) dry units.

The open loop system uses sea water. Among the limitations of this system, is the need to position the overboard discharge well away from the sea chests, as well as strict domestic wash water discharge regulations and operations in fresh and brackish waters. The closed loop system uses fresh water which requires dosing to scrub and the system requires a separate tank for collecting any residual waste. There could also be logistical problems in obtaining supplies of items such as caustic soda (an alkali) and arranging for the discharge of waste from the collection tank. A hybrid system, which offers maximum flexibility, is a combination of the open and closed loop.

Once the decision has been made which of the above systems to fit, shipowners must decide whether to fit a multi-inlet tower, which will handle the exhausts from all engines, or a single line tower, which will handle the exhaust from only one engine. Irrespective of the system selected, scrubbers require a lot of space. It will be necessary for the vessel to go into dry-dock to undertake certain tasks whereas for other tasks in-service installation can be carried out. Depending on the complexity of the scrubber system to be installed, it may be necessary to modify the funnel, engine casing and engine room.

Key operation and safety concerns

Owners or their managers may need to carry out an assessment of the vessel's current power and any additional power needed because the available power must be sufficient to run the various scrubber related installations such as feed water and circulation pumps, dosing units, exhaust fans and monitoring equipment. In addition, there must be sufficient power to counter the back pressure produced by the scrubber unit, which may be considerable, thereby, in theory, marginally increasing GHG emissions. Also, it must be verified that the back pressure limits are not exceeded else the NOx emissions may be adversely affected.

Wash water from scrubbers is highly corrosive and acidic, and the effects are aggravated by high temperatures of exhaust gasses. To tackle this, the industry has improved the materials and coatings for scrubber towers, internal piping, valves and the waste storage tanks. However, little can be done to improve the resistance to corrosion in the overboard distance piece which is located between the scrubber overboard discharge valve and ship shell plating, besides increased wall thickness, special coatings and ascertaining the condition of the distance piece through regular thickness measurements (which may be required by certain Classification societies too). Should the overboard distance piece require repairs, then underwater works can be carried out without affecting the vessel's schedule.

Another issue of some concern is the fact that vessels with open loop scrubbers may not be able to trade freely as some ports or states may prohibit the discharge of wash water in spite of the discharge meeting international standards (IMO resolution MEPC.259(68)). There are currently only a handful of states with strict scrubber wash water discharge regulations in place but other states could introduce similar rules in the future. Hybrid or closed loop systems may therefore appear to be better options for vessels trading in these areas. One issue which may then arise is where to discharge the contents of the holding tank as many states do not yet have shore reception facilities in place for this type of waste, or where these are available, they may come at a cost.

Scrubbers, being a mechanical device, can break down or malfunction for a variety of reasons. For example, vessels can experience problems associated with loss of sea water supply or poor inflow due to clogged sea chests, mechanical failure of pumps, pipe leakages, all of which may lead to the scrubber system shutting down. Should this happen, owners would need to notify both the flag and port states immediately. This will be perceived as a temporary non-compliance and the vessel would not be in immediate breach of the regulations, and provisions of MARPOL Annex VI regulation 3.1.2 would apply. The vessel would, however, be expected to change over to compliant fuel immediately, but if this is not available, the vessel must carry out repairs at next port or use bunker compliant fuel. The Exhaust Gas Cleaning Systems Association (EGCSA) has produced a useful diagram detailing the interaction with the port state in such situations.

Difficulty in repairing scrubber units whilst the vessel is located in remote regions should be anticipated. Due diligence and preparedness would require owners and managers to revisit their critical spares list, and in consultation with the manufacturer, add those items which are most likely to break down, including the continuous emissions monitoring system. It is worth mentioning that when selecting scrubber supplier after sales service is an important element. In that regard, manufacturer's service networks, market reputation and financial standing should form part of the selection process. Similar kind of due diligence would have to be exercised in selection of CEMS (Continuous Emission Monitoring System) supplier too.

It is important that the crew is given training in not only operating the scrubber unit, handling sensitive control and monitoring systems and carrying out maintenance, but also safe handling of the chemicals used and scrubber waste. Safety Management procedures may have to be updated accordingly.

Conclusion

Despite the high capital expenditure involved, scrubbers seem to be the favoured solution for many owners as this does away with the uncertainties involved in obtaining compliant fuel. We havein certain cases, seen that charterers would be willing to share the initial investment costs to secure a better long term charter deal.

Whichever route an owner selects on the road to compliance with IMO 2020, the final selection should only be made following a proper study and full knowledge of the pros and cons of each option. This can be achieved through dialogue with manufacturers, technical experts, charterers, bunker suppliers, and classification societies.