Choosing a System: Cost Considerations

When choosing a scrubber system, there are a number of factors which should be taken into consideration. The capital expenditure (CAPEX) for the unit itself as well as varying operational expenditures (OPEX) can significantly affect the total cost and value of the unit to the ship owner.

The value of a scrubber and its potential to ensure compliance with an economic advantage is influenced by an array of variables. Therefore, the following factors

should be taken into consideration for each scrubber application:

• The initial cost of the scrubbing unit, including the raw material costs and the labour costs associated with installation (CAPEX).

• The price of fuel and the differential between low-sulphur fuel (LSF) and heavy fuel oil (HFO).

• Operational profile of the ship.

• Maintenance and repair including:

- The type of fuel used as it will affect the maintenance of

components such as the pipes;

- The replacement of components.

• Crew training.

• Costs associated with documentation, e.g. if the scrubber fails to function correctly then documentation will need to be provided to prove that noncompliance

was due to a technical fault.

• Uncertainty and sensitivity factors – some factors cannot be predicted or controlled, such as future fuel prices, inflation, regulatory uncertainty regarding Emission Control Areas (ECAs) and the influence this will have on the quantity of LSF or HFO consumed. The baseline or ship route can be altered in order to reduce voyage length but there is a high uncertainty regarding the impact this will have on scrubbers and their life-cycle cost.

• The return on investment (ROI) which is directly related to the price differential between HFO and LSF.

• The downtime of the ship during installation.

• The disposal of the unit once its lifetime comes to an end.

• Current ship design, including existing freshwater capacity, ship design layout, tank arrangement and available space.

CAPEX COSTS EXAMINED

The cost of scrubber units mainly depends on the type of scrubber, the size of the ship and its engine size, and the required size of the scrubber.

Table 12 shows estimated costs for scrubber equipment for two different ship types and differing operational patterns.

RETURN ON INVESTMENT

The ROI for scrubber systems is principally dependent on current fuel prices, particularly the difference in price between LSF and HFO. It also depends on the time period that the ship will operate in an ECA.

When considering ROI, it is essential to consider the quantity of HFO burned when operating a scrubber versus the cost of fuel switching from HFO to LSF (distillates) when entering or leaving ECAs. Scrubber systems may not always be economically viable if the CAPEX and OPEX costs are larger than the cost of switching to LSF. The following figures provide estimates on scrubber ROI for varying fuel price and ECA operation scenarios.

As explained previously, fuel price differential and operational time in an ECA are the key driving forces behind the scrubber’s economic viability.

Figure 18 shows that for a US $350 fuel price differential and 50% ECA operational time, the payback is approximately six years. Where the fuel price differential is low (less than US $200), even with 100% ECA operational time, the payback is at least seven years, highlighting the critical role fuel prices play in determining whether abatement technology is an economically viable long-term solution for compliance.