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| Final Project Report  Scrubber Cleaner in Cargo Vessels | ABSTRACT  This study focuses on the scrubber technology for large marine engines with which ships can continue to use preferable cheap heavy fuel oil (HFO) without exceeding the emission control limits  Stevens, Gabriella & El-Banna, Salem  EME 801: Energy Markets, Policy & Regulation (Fall 2021) |

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# Executive Summary:

The changes in fuel emissions standards brought about by IMO 2020, had caused disruptions for all types of maritime business, including those in the international shipping industry. Initially, the implementation of IMO 2020 regulations caused massive supply chain shortages for high demand equipment, like exhaust scrubbers, which would have been able to render ships compliant without having to switch from heavy fuel oil (HFO). Alternatively, those that choose to transition to IMO compliant fuels had to account for higher fuel prices eating into their profits, as well as accept the risks which come from using fuels which are new to the market, and therefore could have unknown effects on ship performance. Now, in 2021, problems within the supply chain and fuel markets have subsided, and shipping companies are able to evaluate their options in a more stable environment.

In this analysis, two alternatives were considered for a hypothetical shipping company owning five post-panamax container ships: Invest in scrubbers which will allow for the vessel to continue to use crude oil or switch to IMO compliant low sulfur fuel. Our solution was to invest in exhaust scrubbers for all five vessels. This was because, despite the upfront investment in new capital, the shipping company saved more on operation and maintenance costs by using cheaper fuel. This was the case even when reduced shipping capacity, due to the large size of the scrubbers, and the addition of annual maintenance costs for the equipment was considered.

The analysis uses futures contract prices for 2021 up until 2031 in order to simulate the changes in the fuel market. However, when a sensitivity analysis was conducted on price changes for low sulfur and HFO, the scrubber investment continued to outperform changing fuel. As a result, it has been determined that in the current market, a company wanting to remain IMO compliant should invest in scrubbers rather than switch to a compliant alternative like low sulfur fuel.

# Introduction:

In the fall of 2018, the International Maritime Organization (IMO) issued a plan to cut down on sulfur emissions by capping the sulfur content in marine fuels to 0.5% effective starting January of 2020 (OPIS). Despite advanced warnings from the IMO and the history of marine pollution reforms dating back to the 1970s, the IMO MARPOL decision, also referred to as IMO 2020, marked one of the largest global initiatives to reduce pollution from commercial maritime activities (OPIS). While in the past, involvement in initiatives to reduce sulfur pollution was optional, participating members have been raising the cost of operations for those who refuse to comply (OPIS). Fines of up to $74,552 in the United States to potential prison time in Singapore for gross violations have forced international businesses to search for alternatives to high-sulfur heavy fuel oil. Two acceptable options, which arose from participating flag states, where: to install exhaust scrubbers in ships that prefer to use heavy fuel oil in order to limit sulfur oxide emissions or to switch to low sulfur or sulfur free fuel options which had been recently introduced to markets. Shortly after its announcement in 2018, IMO's Marine Environment Protection Committee amended their proposal to prevent ships without scrubbers from carrying non-compliant fuel for any purpose. Scrubbers and low sulfur fuel seem to be the preferred options since regulations took effect in 2020, however due to the varying needs of vessels and shipping companies, which can vary in size and travel needs, assessing a range of solutions, will be the key to meeting requirements without sacrificing profitability.

# Scrubber System:

The U-type scrubber or COUS Exhaust gas cleaning system in vessels which could service both open & closed loops & offer flexibility for customers. The Scrubber system selects sea water as the cleaning media for open loop and alkali solution for closed loop to clean the sulfuric component in the flue gas prior to atmosphere discharge.

Diagram

Description automatically generated

Figure 1: Scrubber System

A COUS open loop scrubber system includes the following component:

1- Sea water pump delivers sea water from suction to scrubber tower.

2- Water monitoring system: Two monitor units located in both sea water inlet & discharge outlet

respectively & continuously take readings according to the stipulated regulations.

3- COUS Scrubber Tower: To clean SO from the flue gas that contains spraying nozzles,

packing layers as well as a demister.

4- Gas monitoring system: Continuously measure SO & CO content of the flue gas after

scrubber as per stipulated regulations.

In a closed loop scrubber system process water is circulated through the system tank after COUS scrubber tower & small amounts of sea water is used for scrubbing will top this tank up and compensate for evaporation as well as bleed-off. Process water is then pumped back up to the scrubber tower by the circulating pump to complete each cycle after the plate cooler.

# Methods:

Because of the highly individualized needs of each company, it would be impossible to determine the best course of action for all shipping companies affected by IMO 2020. It is for that reason a specific hypothetical shipping business was developed for the purpose of our analysis. Said company operates on daily international trips carrying cargo, approximately twelve complete trips annually, with a total of five standard post-panamax ships. Post panamax-ships being a modern type of cargo ship meant for shipping containers, which does not transport through canals. We will use this information to assess the approximate carrying capacity and scrubber needs of the vessels to develop a more accurate picture of the needs of this company. In order to best assess what course of action should be taken, a complete financial analysis was done for both scenario one, for the installation of scrubbers into all vessels owned, and scenario two, for the conversion to low sulfur fuel. With this information, we will be able to understand how large capital investments and/or changes to operation costs will affect the profitability of the business as a whole. A sensitivity analysis was also conducted on the price sensitivities for fuel options used, heavy fuel oil and low sulfur fuel, in order to determine how unexpected changes to the oil market could impact the future of each decision.

# Financial Analysis:

# Assumptions:

Time/Value: For the purposes of calculation, it will be assumed that one round trip will take 30 days, or twelve trips annually; therefore, the annual capacity per vessel will be calculated as the carrying capacity of each ship times twelve trips per year.

Depreciation of assets not including scrubbers: it will be assumed that the age and condition of the boats are the same in the example with the scrubber installed as without.

Weight: Any difference in weight between the scrubber and the cargo which would take its place will not be factored into this estimation. This is due to the nature of the cargo being unknown and the weight of the average scrubber also being too general of an estimation. The result is that we will not factor in any difference in fuel burning for cargo ships with and without scrubbers.

The value of cargo: In order to ensure that unknowns are accounted for equally there are several assumptions that has been made in conducting the financial analysis. Firstly, in some cases containership spaces are subject to a spot price market, like the cost of oil, however these numbers tend to be opaque and can depend on the nature of the cargo. Because the nature of the cargo is uncertain at this point, it will be assumed that the revenue will not change due to the value of what is being hauled. In this case, the revenues will be determined by carrying capacity alone and not cargo value.

Tax Rate: According to Oxton law's most recent assessment of shipping ports, "the tax is levied at the rate of 4% on the gross U.S. source transportation income.  As a tax on gross income, there are no deductions, and the tax is payable even if there are no profits”. As such we will use a 4% tax rate for the purpose of this example and exclude any additional taxes which would be paid by the owners of the cargo (Oxton Law).

LSF Prices: Futures prices for both oil types may be different than what is used depending on the market, however in the case of LSF the futures contract prices stop at 2027 for this type of oil. It will be as.

## Vessels With Exhaust Scrubber Cleaner:

The first analysis which has been a popular option for shipping companies since the IMO 2020 decision was announced is the installation of scrubbers, like those described previously. The cost of scrubbers was calculated as $1,000,000 per ship including the installation and retrofitting, as well as the scrubber itself. The space required per scrubber can vary, however for the type of ship in this example it has been estimated at approximately 200 TEU per scrubber which would take away a total of 1000 TEU worth of carrying capacity and therefore average annual sales. By installing these, every ship will have the ability to operate and remain IMO compliant despite using cheaper high sulfur fuel. The estimations for HFO prices over the course of the next ten years is based on the futures contracts up to 2031.

With the high initial cost of scrubbers, as well as reduced carrying capacity per ship to make room for the scrubbers themselves, the company would operate at a profit of over $200 million USD starting from 2026, nine years after these initial changes were made. It is important to note that revenues are counted from year one, as installation will not require the ships to be out of commission for a long period of time, however in practice this would also reduce profits.

### General Information:

In this scenario, the exhaust scrubber cleaner is assumed to be installed in total five (5) cargo vessels with the following parameters:

Table 1: Scenario One - Vessel Information

|  |  |  |  |
| --- | --- | --- | --- |
|  | Per Ship | Total |  |
| Capital Cost (Scrubbers) | $1,000,000 | $5,000,000 |  |
| Annual discount rate | 5.4% | 5.4% |  |
| Decision Horizon (N) | 10 | 10 | *Years* |
| Annual Output | 90,600 | 453000 | *TEU* |
| Marginal Cost | $317,100 | $1,585,500 | *TEU* |
| Scrubber O&M | $10,000 | $50,000 | *per year* |
| Fixed O&M | $131,279,400 | $656,397,000 | *per year* |
| Tax Rate | 4% | 4% |  |

Table 2: Scenario One - Vessel Capacity & Fuel Consumption

|  |  |  |  |
| --- | --- | --- | --- |
|  | Per Ship | Total |  |
| Carrying capacity | 7,750 | 38750 | *TEU* |
| Space required per Scrubber | 200 | 1000 | *TEU* |
| Total Carrying capacity | 7,550 | 37750 | *TEU* |
| Fuel Consumption | 217 | 1085 | *Tons Per Day* |
| Annual Fuel Consumption | 79205 | 396025 | *Tons Per year* |

The annual output is calculated based on 30-day roundtrip duration. Therefore, the annual capacity for one vessel with scrubber system is (7,750 TEU – 200 TEU) x 12 Months = 90,600 TEU per year / Vessel.

The marginal cost assumed to be $3.5 per TEU where the fixed operation & manual cost are about $1449 per TEU.

The variable O&M cost are based on Heavy Crude Spot Price (provided in below table) multiplied by total fuel consumption.

Table 3: Scenario One - Projected Spot Price For HFO

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Spot Price Heavy Crude | $69.82 | $74.84 | $68.82 | $65.34 | $62.78 | $60.99 | $59.87 | $59.49 | $59.37 | $59.37 | $59.71 |

The sales price is assumed to be $2,000 per TEU. Taking into consideration the annual total capacity for 5 vessels which is equivalent to 90,600 TEU per vessel x 5 vessels = 453,000 TEU per year. The total annual sales will be calculated by multiplying $2,000 by the annual capacity of 453,000 TEU which will be equivalent to $906,000,000.

Some non-monetary costs which have not been included in the scrubber analysis include, the time taken to install a scrubber system on each ship, as well as time and investment required to ensure that the crew understands how to properly maintain them. There is also the environmental cost of disposing of “scrubber sludge” or wash water. When disposed of properly on land, there is still a great deal of sulfur, nitrates, heavy metals and other hazardous materials which require special facilities to properly; however, in many cases wash water may be unlawfully discharged into the ocean. Such discharges can increase acidity of the marine environment, kill local plant life, and be absorbed into animals, which will later be consumed by human beings. The proper disposal of sludge will also require a fee and routes will need to be planned to account for which ports allow disposal, which could potentially incur additional costs and time.

### P&L Statement:

In this section, The P&L for the first year (2021) will be described in brief based on the following table.

Table 4: Scenario One - P&L For 2021

|  |  |
| --- | --- |
|  | **Year** |
|  | 2021 |
| Construction Cost | $5,000,000 |
| Annual Operating Revenue | $906,000,000 |
| Annual Variable Operating Cost | $27,650,135 |
| Annual Fixed Operating Cost | $658,032,500 |
| *Annual Net Operating Revenue* | $220,317,365 |
| *Depreciation Expense* | $500,000 |
| *Taxable Net Income* | $219,817,365 |
| *Taxes* | $8,792,695 |
| *Income Net of Taxes* | $211,024,670 |

Looking at the table above, the total capital cost for scrubber system installation in all vessels is $5,000,000. The annual operating revenues based on the annual sales is (453,000 TEU x $2,000) = $906,000,000. The variable operating cost is based on the average fuel spot prices from table 3 and annual fuel consumption which is (217 ton per day x 365-day x 5 vessels x $69.82) = $27,650,465.50.

The annual fixed operating cost is the sum of marginal cost, scrubber maintenance & fixed O&M cost per TEU. In our scenario the marginal cost is $3.5 per TEU, scrubber maintenance is $10,000 per year / vessel and the fixed O&M is $1,449 per TEU. Therefore, annual fixed operational cost is [($3.5 x 90,600 TEU x 5 vessels) + ($1,449 x 90,600 TEU x 5 vessels)] + [annual scrubber maintenance $50,000] = $658,032,500.

From the above inputs, the annual net operating cost is the annual operating revenue – annual variable cost – annual fixed cost. This is shown as: $906,000,000 - $27,650,135 - $658,032,500 = $220,317,365.

The depreciation cost for 2021 is calculated based on the following table which is 10% of the capital cost of $5,000,000 which is $500,000.

The taxable income will be annual net operating cost – depreciation cost = $220,317,365 - $500,000 = $219,817,365.

With 4% tax rate, the total tax in 2021 will be calculated based on taxable income x 4% = $219,817,365 x 0.04 = $8,792,695. This will lead to a net income after tax to be $219,817,365 – $8,792,695= $211,024,670. By repeating the same calculations in all successor years with respect to average annual spot price in each year, we should be able to obtain the net annual income after tax for all 10 years.

### Cash Flow Statement:

The cash flow in this scenario is the sum of net operating revenue, capital cost (negative value for scrubber installation) and depreciation cost for scrubber system. The same will reflect the net increase of decrease in cash. Obviously, this scenario reflects a positive cash flow in all years.

In this scenario, the WACC was calculated considering the cost of scrubber will be 15% financed and 85% funded by shareholders. Based on the website for Cost of Capital by Sector (Shipbuilding & Marine), The cost of equity is 5.82%, cost of debt is 2.58% and the tax rate is 2.3%. Therefore, the calculated discount rate for scrubber system is 5.4%. The cash flow continuously shows an increase in net income for most years, due to the dropping in heavy fuel oil prices over the next decade (see appendix C). The Net Present Value is calculated from excel using NPV formula which is equal to $1,727,591,369.62.

## Vessels without Exhaust Scrubber Cleaner:

### 2.1- General Information:

In scenario two, the financial analysis examines the potential profit margins if shipping vessels switch to Very Low Sulfur Fuel, which complies with IMO 2020’s 0.5% sulfur cap. Because no installation is required, there are no initial costs; however, ships will have to purchase fuel at a significantly higher premium than before. They will also get the added benefits of maintaining their current level of revenues, because no deck space will have two be dedicated to scrubber equipment, and not having to concern themselves with depreciation on assets beyond the vessels themselves.

Table 5: Scenario Two - Vessel Information

|  |  |  |  |
| --- | --- | --- | --- |
|  | Per Ship | Total |  |
| Capital Cost (Scrubbers) | $0 | $0 |  |
| Annual discount rate | 5.4% | 5.4% |  |
| Decision Horizon (N) | 10 | 10 | *Years* |
| Annual Output | 93000 | 465000 | *TEU* |
| Marginal Cost | $325,500 | $1,627,500 | *TEU* |
| Fixed O&M | $134,757,000 | $673,785,000 | *Per Year* |
| Tax Rate [3] | 4% | 4% |  |

Table 6: Scenario Two - VESSEL Capacity & Fuel Consumption

|  |  |  |  |
| --- | --- | --- | --- |
|  | Per Ship | Total |  |
| Carrying capacity | 7,750 | 38750 | *TEU* |
| Total Carrying capacity | 7,750 | 38750 | *TEU* |
| Fuel Consumption [4] | 217 | 1085 | *Tons Per Day* |
| Annual Fuel Consumption | 79205 | 396025 | *Tons Per Year* |

The annual output is calculated based on 30-day roundtrip duration. Therefore, the annual capacity for one vessel is 7,750 TEU x 12 Months = 93,000 TEU per year / Vessel.

The marginal cost assumed to be $3.5 per TEU where the fixed operation & manual cost are about $1449 per TEU.

The variable O&M cost are based on Low Sulfur Content Fuel Spot Price (provided in below table) multiplied by total fuel consumption.

Table 7: Scenario Two - Projected Spot Price For Low Sulfur Content Fuel

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Spot Price LSF | $678.46 | $674.25 | $637.04 | $615.13 | $610.27 | $596.40 | $600.65 | $600.65 | $600.65 | $600.65 | $600.65 |

The sales price is assumed to be $2,000 per TEU. Taking into consideration the annual total capacity for 5 vessels which is equivalent to 93,000 TEU per vessel x 5 vessels = 465,000 TEU per year. The total annual sales will be calculated by multiplying $2,000 by the annual capacity of 465,000 TEU which will be equivalent to $930,000,000.

Additionally, as will the previous scenario, there are some non-monetary costs which have not been reflected in this analysis. One such example of a potential non-monetary cost is the added time it may take to find appropriate fuel, as Low Sulfur Fuel is not as readily available as heavy crude. Resultantly, shipping routes may need to take additional trips or detours specifically to find fueling stations with IMO compliant LSF; however, since its implementation in 2020 the number of stations offering LSF has been increasing. Additionally, because it is still a new product, not all brands LSFs are compatible. One key concern surrounding the use of Very Low Sulfur fuels is engine compatibility, a problem which has improved since the IMO’s official start in 2020 but has yet to be fully resolved. In a survey conducted across 60 quality disputes for VLSFO, Van Ameyde Marine, a consulting firm for marine cargo companies, has found that 50% were due to inconsistency/compatibility. One problem which has arisen from mixing different types of VLSF is inboard fires and explosions. This is because, after fuel is injected into the engine, it mixes with pressurized air and ignites. In some cases, certain fuels and fuel combinations will light more quickly than others which may overwhelm the bearings within the engine and may catch fire at worst or cause reduced performance at best. One way to reduce the chance of fire starting onboard is through the CCAI index, a ratio developed by Shell Oil in order to calculate the potential for ignition based on the aromatic content within the fuel. However, other concerns from improperly mixing oil, can include waxy deposits, sludge, and metallic sand building up within the engine, aloof which could increase the risk of engine failure and in some cases increased pollution if buildup is improperly discarded at sea.

### 2.2- P&L Statement:

In this section, The P&L for the first year (2021) will be described in brief based on the following table.

Table 8: Scenario Two - P&L For 2021

|  |  |
| --- | --- |
|  | **Year** |
|  | 2021 |
| Scrubber Cost | $0 |
| Annual Operating Revenue | $930,000,000 |
| Annual Variable Operating Cost | $268,686,461 |
| Annual Fixed Operating Cost | $675,412,500 |
| *Annual Net Operating Revenue* | ($14,098,961) |
| *Depreciation Expense* | - |
| *Taxable Net Income* | ($14,098,961) |
| *Taxes* | - |
| *Income Net of Taxes* | ($14,098,961) |

The annual operating revenues based on the annual sales is (465,000 TEU x $2,000) which equals $930,000,000. The variable operating cost is based on the average fuel spot prices from table 8 and annual fuel consumption which is (217 ton per day x 365-day x 5 vessels x $678.46) which equals $268,686,461.

The annual fixed operating cost is the sum of marginal cos and fixed O&M cost per TEU. In our scenario the marginal cost is $3.5 per TEU and the fixed O&M is $1,449 per TEU. Therefore, annual fixed operational cost is [($3.5 x 93,000 TEU x 5 vessels) + ($1,449 x 93,000 TEU x 5 vessels)] which equals $675,412,500.

From the above inputs, the annual net operating cost which equals annual operating revenue – annual variable cost minus annual fixed cost which is: $930,000,000 - $268,686,461 - $675,412,500 = -$14,098,961.

Since the annual net operating cost is negative, there will be no taxable income for. This will lead to a net income of -$14,098,961. By repeating the same calculations in all successor years with respect to average annual spot price in each year, we should be able to obtain the net annual income after tax for all 10 years.

### 2.3- Cash Flow Statement:

This scenario does not have capital and depreciation cost because there is no scrubber system installed. Therefore, the net increase or decrease cash flow is equal to net income from operation. Despite having a reduction in expense categories, converting to LSF is continuously outperformed by the previous scenario over the year decision horizon. Unlike Scenario 1, the first two years of the second cash flow are negative due to LSF futures prices being at their peak for the next decade (see Appendix B). As LSF prices steadily fall, the shipping company regains some it its profitability, however it remains at least $2,000,000 below the scrubber scenario every year. The Net Present Value is calculated from excel using NPV formula which is $58,393,411.10.

# Threshold Analysis: Oil Price volatility:

At the current time, one of the key reasons for installing scrubbers is directly due to the low price of HFO compared to LSF; however, changes to this current pricing could pose a significant issue for shipping companies who prefer one method over the other. Another sensitivity analysis was conducted to test how changes in the spot price for LSF and heavy fuel oil could potentially affect the profitability of investing in scrubbers. Because the price volatility varies for each fuel type, an analysis was conducted for both fuel types to see which fuel source has the biggest effect on the decision-making process. In this example, significant change in either fuel type could have a dramatic impact on the return on investment for scrubber systems.

In order to test the hypothetical investment against unforeseen changes and establish the max and min price thresholds to make each scenario viable, a threshold analysis was conducted. The purpose of this threshold analysis was to calculate the effect changes in the two fuel prices affected each scenario. In scenario one, installing scrubbers, the price was increased by a factor of 10% to assess changes to the net present value. Similarly, for scenario two which used low sulfur fuel and no capital investment, we assessed how much the price for LSF would have to decrease before this became a viable option.

As a result of this analysis, should either fuel type receives a failing result (i.e. the price of LSF becomes too low or the price of HFO becomes too high to outweigh the benefits from investing), then the shipping company will have to accept the financial losses.

Table 9: NPV Response To Fuel Price Changes

|  |  |  |
| --- | --- | --- |
| CHANGE IN FUEL PRICE | NPV WITH SCRUBBER | NPV WITHOUT SCRUBBER |
| 0% | $ 1,727,591,369.62 | $58,393,411.10 |
| 10% | $ 1,707,665,033.17 | $252,252,408.64 |
| 20% | $ 1,687,738,696.73 | $445,128,697.80 |
| 30% | $ 1,667,812,360.28 | $638,004,986.96 |
| 40% | $ 1,647,886,023.83 | $830,881,276.12 |
| 50% | $ 1,627,959,687.39 | $1,023,757,565.27 |
| 60% | $ 1,608,033,350.94 | $1,216,633,854.43 |
| 70% | $ 1,588,107,014.49 | $1,409,510,143.59 |
| 80% | $ 1,568,180,678.04 | $1,602,386,432.75 |
| 90% | $ 1,548,254,341.60 | $1,795,262,721.90 |

Figure 2: Threshold Analysis

In this analysis, it would take between an 80-90% increase of LSF prices and an 80-90% decrease of Heavy oil prices, for the profitability of each scenario to be equal regardless of which option was chosen. At all times the Net Present Value remained positive, however scrubbers remained significantly more profitable for most of the analysis. From this, it is understood that any future installation of scrubbers could withstand a 90% price increase if heavy oil, without significant financial loss.

# Conclusion:

The results of the financial and sensitivity analyses show that exhaust scrubbers are a worthwhile investment for this shipping company. In the cash flow analysis for both scenarios it is clear that, despite omitting the initial capital investment and depreciation expenses there is no short- or long-term benefits to using low sulfur fuel, as evidenced by the Net Increase/Decrease which remained consistently below scenario one (scrubbers/heavy fuel oil) throughout the entirety of the ten-year decision horizon. Finally, although oil product price remains the key variable which causes scrubber installation to be profitable, the price sensitivity itself is not enough of a deterrent for investing, due to the already wide price gap between LSF and HFO.

With the cost on non-compliance ranging from fines to potential incarceration, and an increase in industry self-policing through climate initiatives, present an incentive to reinvest in cleaner technology; however, as in all business, profitability remains paramount in the final decision-making process. Since the IMO guidelines were announced ion 2018, research and development for sulfur cleaning equipment and heavy fuel oil alternatives has dramatically increased and become more widely available to the point where either option can be implemented without jeopardizing profits. However, at this current time, paying the high upfront costs of exhaust scrubber installation is the best strategy for the next decade.

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# Appendix:

## Appendix A: Abbreviations

IMO International Maritime Organization

MARPOL International Convention for the Prevention of Pollution from Ships

HFO Heavy Fuel Oil

LSF Low Sulfur Fuel

OPIS Oil Price Information Service

TEU Twenty-Foot Equivalent Unit

LSF Low Sulfur Fuel

CCAI Index Calculated Carbon Aromaticity Index

## Appendix B: Heavy Fuel Oil Futures

|  |  |  |  |
| --- | --- | --- | --- |
| MONTH | LAST | MONTH | LAST |
| [Heavy Fuel Oil Jan 2021](https://www.wsj.com/market-data/quotes/futures/CLF22) | $52.2 | [Heavy Fuel Oil Jul 2026](https://www.wsj.com/market-data/quotes/futures/CLN26) | $60.89 |
| [Heavy Fuel Oil Feb 2021](https://www.wsj.com/market-data/quotes/futures/CLG22) | $61.5 | [Heavy Fuel Oil Aug 2026](https://www.wsj.com/market-data/quotes/futures/CLQ26) | $60.75 |
| [Heavy Fuel Oil Mar 2021](https://www.wsj.com/market-data/quotes/futures/CLH22) | $59.16 | [Heavy Fuel Oil Sep 2026](https://www.wsj.com/market-data/quotes/futures/CLU26) | $60.65 |
| [Heavy Fuel Oil Apr 2021](https://www.wsj.com/market-data/quotes/futures/CLJ22) | $63.58 | [Heavy Fuel Oil Oct 2026](https://www.wsj.com/market-data/quotes/futures/CLV26) | $60.57 |
| [Heavy Fuel Oil May 2021](https://www.wsj.com/market-data/quotes/futures/CLK22) | $66.32 | [Heavy Fuel Oil Nov 2026](https://www.wsj.com/market-data/quotes/futures/CLX26) | $60.5 |
| [Heavy Fuel Oil Jun 2021](https://www.wsj.com/market-data/quotes/futures/CLM22) | $73.47 | [Heavy Fuel Oil Dec 2026](https://www.wsj.com/market-data/quotes/futures/CLZ26) | $60.45 |
| [Heavy Fuel Oil Jul 2021](https://www.wsj.com/market-data/quotes/futures/CLN22) | $73.95 | [Heavy Fuel Oil Jan 2027](https://www.wsj.com/market-data/quotes/futures/CLF27) | $60.33 |
| [Heavy Fuel Oil Aug 2021](https://www.wsj.com/market-data/quotes/futures/CLQ22) | $68.5 | [Heavy Fuel Oil Feb 2027](https://www.wsj.com/market-data/quotes/futures/CLG27) | $60.2 |
| [Heavy Fuel Oil Sep 2021](https://www.wsj.com/market-data/quotes/futures/CLU22) | $73.03 | [Heavy Fuel Oil Mar 2027](https://www.wsj.com/market-data/quotes/futures/CLH27) | $60.09 |
| [Heavy Fuel Oil Oct 2021](https://www.wsj.com/market-data/quotes/futures/CLV22) | $83.57 | [Heavy Fuel Oil Apr 2027](https://www.wsj.com/market-data/quotes/futures/CLJ27) | $60.01 |
| [Heavy Fuel Oil Nov 2021](https://www.wsj.com/market-data/quotes/futures/CLX22) | $81.33 | [Heavy Fuel Oil May 2027](https://www.wsj.com/market-data/quotes/futures/CLK27) | $59.96 |
| [Heavy Fuel Oil Dec 2021](https://www.wsj.com/market-data/quotes/futures/CLZ21) | $81.22 | [Heavy Fuel Oil Jun 2027](https://www.wsj.com/market-data/quotes/futures/CLM27) | $59.92 |
| [Heavy Fuel Oil Jan 2022](https://www.wsj.com/market-data/quotes/futures/CLF22) | $80.06 | [Heavy Fuel Oil Jul 2027](https://www.wsj.com/market-data/quotes/futures/CLN27) | $59.83 |
| [Heavy Fuel Oil Feb 2022](https://www.wsj.com/market-data/quotes/futures/CLG22) | $78.71 | [Heavy Fuel Oil Aug 2027](https://www.wsj.com/market-data/quotes/futures/CLQ27) | $59.72 |
| [Heavy Fuel Oil Mar 2022](https://www.wsj.com/market-data/quotes/futures/CLH22) | $77.43 | [Heavy Fuel Oil Sep 2027](https://www.wsj.com/market-data/quotes/futures/CLU27) | $59.65 |
| [Heavy Fuel Oil Apr 2022](https://www.wsj.com/market-data/quotes/futures/CLJ22) | $76.36 | [Heavy Fuel Oil Oct 2027](https://www.wsj.com/market-data/quotes/futures/CLV27) | $59.61 |
| [Heavy Fuel Oil May 2022](https://www.wsj.com/market-data/quotes/futures/CLK22) | $75.67 | [Heavy Fuel Oil Nov 2027](https://www.wsj.com/market-data/quotes/futures/CLX27) | $59.58 |
| [Heavy Fuel Oil Jun 2022](https://www.wsj.com/market-data/quotes/futures/CLM22) | $74.54 | [Heavy Fuel Oil Dec 2027](https://www.wsj.com/market-data/quotes/futures/CLZ27) | $59.59 |
| [Heavy Fuel Oil Jul 2022](https://www.wsj.com/market-data/quotes/futures/CLN22) | $73.8 | [Heavy Fuel Oil Jan 2028](https://www.wsj.com/market-data/quotes/futures/CLF28) | $59.53 |
| [Heavy Fuel Oil Aug 2022](https://www.wsj.com/market-data/quotes/futures/CLQ22) | $73.27 | [Heavy Fuel Oil Feb 2028](https://www.wsj.com/market-data/quotes/futures/CLG28) | $59.56 |
| [Heavy Fuel Oil Sep 2022](https://www.wsj.com/market-data/quotes/futures/CLU22) | $72.72 | [Heavy Fuel Oil Mar 2028](https://www.wsj.com/market-data/quotes/futures/CLH28) | $59.51 |
| [Heavy Fuel Oil Oct 2022](https://www.wsj.com/market-data/quotes/futures/CLV22) | $72.32 | [Heavy Fuel Oil Apr 2028](https://www.wsj.com/market-data/quotes/futures/CLJ28) | $59.52 |
| MONTH | LAST | MONTH | LAST |
| [Heavy Fuel Oil Nov 2022](https://www.wsj.com/market-data/quotes/futures/CLX22) | $71.92 | [Heavy Fuel Oil May 2028](https://www.wsj.com/market-data/quotes/futures/CLK28) | $59.5 |
| [Heavy Fuel Oil Dec 2022](https://www.wsj.com/market-data/quotes/futures/CLZ22) | $71.3 | [Heavy Fuel Oil Jun 2028](https://www.wsj.com/market-data/quotes/futures/CLM28) | $59.46 |
| [Heavy Fuel Oil Jan 2023](https://www.wsj.com/market-data/quotes/futures/CLF23) | $70.75 | [Heavy Fuel Oil Jul 2028](https://www.wsj.com/market-data/quotes/futures/CLN28) | $59.52 |
| [Heavy Fuel Oil Feb 2023](https://www.wsj.com/market-data/quotes/futures/CLG23) | $70.38 | [Heavy Fuel Oil Aug 2028](https://www.wsj.com/market-data/quotes/futures/CLQ28) | $59.51 |
| [Heavy Fuel Oil Mar 2023](https://www.wsj.com/market-data/quotes/futures/CLH23) | $70.19 | [Heavy Fuel Oil Sep 2028](https://www.wsj.com/market-data/quotes/futures/CLU28) | $59.47 |
| [Heavy Fuel Oil Apr 2023](https://www.wsj.com/market-data/quotes/futures/CLJ23) | $69.56 | [Heavy Fuel Oil Oct 2028](https://www.wsj.com/market-data/quotes/futures/CLV28) | $59.46 |
| [Heavy Fuel Oil May 2023](https://www.wsj.com/market-data/quotes/futures/CLK23) | $69.23 | [Heavy Fuel Oil Nov 2028](https://www.wsj.com/market-data/quotes/futures/CLX28) | $59.44 |
| [Heavy Fuel Oil Jun 2023](https://www.wsj.com/market-data/quotes/futures/CLM23) | $68.83 | [Heavy Fuel Oil Dec 2028](https://www.wsj.com/market-data/quotes/futures/CLZ28) | $59.37 |
| [Heavy Fuel Oil Jul 2023](https://www.wsj.com/market-data/quotes/futures/CLN23) | $68.44 | [Heavy Fuel Oil Jan 2029](https://www.wsj.com/market-data/quotes/futures/CLF29) | $59.44 |
| [Heavy Fuel Oil Aug 2023](https://www.wsj.com/market-data/quotes/futures/CLQ23) | $68.38 | [Heavy Fuel Oil Feb 2029](https://www.wsj.com/market-data/quotes/futures/CLG29) | $59.43 |
| [Heavy Fuel Oil Sep 2023](https://www.wsj.com/market-data/quotes/futures/CLU23) | $67.99 | [Heavy Fuel Oil Mar 2029](https://www.wsj.com/market-data/quotes/futures/CLH29) | $59.47 |
| [Heavy Fuel Oil Oct 2023](https://www.wsj.com/market-data/quotes/futures/CLV23) | $67.73 | [Heavy Fuel Oil Apr 2029](https://www.wsj.com/market-data/quotes/futures/CLJ29) | $59.49 |
| [Heavy Fuel Oil Nov 2023](https://www.wsj.com/market-data/quotes/futures/CLX23) | $67.45 | [Heavy Fuel Oil May 2029](https://www.wsj.com/market-data/quotes/futures/CLK29) | $59.49 |
| [Heavy Fuel Oil Dec 2023](https://www.wsj.com/market-data/quotes/futures/CLZ23) | $66.94 | [Heavy Fuel Oil Jun 2029](https://www.wsj.com/market-data/quotes/futures/CLM29) | $59.32 |
| [Heavy Fuel Oil Jan 2024](https://www.wsj.com/market-data/quotes/futures/CLF24) | $66.67 | [Heavy Fuel Oil Jul 2029](https://www.wsj.com/market-data/quotes/futures/CLN29) | $59.34 |
| [Heavy Fuel Oil Feb 2024](https://www.wsj.com/market-data/quotes/futures/CLG24) | $66.57 | [Heavy Fuel Oil Aug 2029](https://www.wsj.com/market-data/quotes/futures/CLQ29) | $59.33 |
| [Heavy Fuel Oil Mar 2024](https://www.wsj.com/market-data/quotes/futures/CLH24) | $66.11 | [Heavy Fuel Oil Sep 2029](https://www.wsj.com/market-data/quotes/futures/CLU29) | $59.32 |
| [Heavy Fuel Oil Apr 2024](https://www.wsj.com/market-data/quotes/futures/CLJ24) | $65.98 | [Heavy Fuel Oil Oct 2029](https://www.wsj.com/market-data/quotes/futures/CLV29) | $59.3 |
| [Heavy Fuel Oil May 2024](https://www.wsj.com/market-data/quotes/futures/CLK24) | $65.73 | [Heavy Fuel Oil Nov 2029](https://www.wsj.com/market-data/quotes/futures/CLX29) | $59.27 |
| [Heavy Fuel Oil Jun 2024](https://www.wsj.com/market-data/quotes/futures/CLM24) | $65.5 | [Heavy Fuel Oil Dec 2029](https://www.wsj.com/market-data/quotes/futures/CLZ29) | $59.24 |
| [Heavy Fuel Oil Jul 2024](https://www.wsj.com/market-data/quotes/futures/CLN24) | $65.23 | [Heavy Fuel Oil Jan 2030](https://www.wsj.com/market-data/quotes/futures/CLF30) | $59.28 |
| [Heavy Fuel Oil Aug 2024](https://www.wsj.com/market-data/quotes/futures/CLQ24) | $64.96 | [Heavy Fuel Oil Feb 2030](https://www.wsj.com/market-data/quotes/futures/CLG30) | $59.31 |
| [Heavy Fuel Oil Sep 2024](https://www.wsj.com/market-data/quotes/futures/CLU24) | $64.6 | [Heavy Fuel Oil Mar 2030](https://www.wsj.com/market-data/quotes/futures/CLH30) | $59.31 |
| [Heavy Fuel Oil Oct 2024](https://www.wsj.com/market-data/quotes/futures/CLV24) | $64.51 | [Heavy Fuel Oil Apr 2030](https://www.wsj.com/market-data/quotes/futures/CLJ30) | $59.31 |
| [Heavy Fuel Oil Nov 2024](https://www.wsj.com/market-data/quotes/futures/CLX24) | $64.31 | [Heavy Fuel Oil May 2030](https://www.wsj.com/market-data/quotes/futures/CLK30) | $59.31 |
| [Heavy Fuel Oil Dec 2024](https://www.wsj.com/market-data/quotes/futures/CLZ24) | $63.92 | [Heavy Fuel Oil Jun 2030](https://www.wsj.com/market-data/quotes/futures/CLM30) | $59.32 |
| [Heavy Fuel Oil Jan 2025](https://www.wsj.com/market-data/quotes/futures/CLF25) | $63.9 | [Heavy Fuel Oil Jul 2030](https://www.wsj.com/market-data/quotes/futures/CLN30) | $59.36 |
| [Heavy Fuel Oil Feb 2025](https://www.wsj.com/market-data/quotes/futures/CLG25) | $63.66 | [Heavy Fuel Oil Aug 2030](https://www.wsj.com/market-data/quotes/futures/CLQ30) | $59.41 |
| [Heavy Fuel Oil Mar 2025](https://www.wsj.com/market-data/quotes/futures/CLH25) | $63.45 | [Heavy Fuel Oil Sep 2030](https://www.wsj.com/market-data/quotes/futures/CLU30) | $59.43 |
| [Heavy Fuel Oil Apr 2025](https://www.wsj.com/market-data/quotes/futures/CLJ25) | $63.26 | [Heavy Fuel Oil Oct 2030](https://www.wsj.com/market-data/quotes/futures/CLV30) | $59.46 |
| [Heavy Fuel Oil May 2025](https://www.wsj.com/market-data/quotes/futures/CLK25) | $63.1 | [Heavy Fuel Oil Nov 2030](https://www.wsj.com/market-data/quotes/futures/CLX30) | $59.48 |
| [Heavy Fuel Oil Jun 2025](https://www.wsj.com/market-data/quotes/futures/CLM25) | $62.59 | [Heavy Fuel Oil Dec 2030](https://www.wsj.com/market-data/quotes/futures/CLZ30) | $59.49 |
| [Heavy Fuel Oil Jul 2025](https://www.wsj.com/market-data/quotes/futures/CLN25) | $62.66 | [Heavy Fuel Oil Jan 2031](https://www.wsj.com/market-data/quotes/futures/CLF31) | $59.57 |
| [Heavy Fuel Oil Aug 2025](https://www.wsj.com/market-data/quotes/futures/CLQ25) | $62.48 | [Heavy Fuel Oil Feb 2031](https://www.wsj.com/market-data/quotes/futures/CLG31) | $59.65 |
| [Heavy Fuel Oil Sep 2025](https://www.wsj.com/market-data/quotes/futures/CLU25) | $62.31 | [Heavy Fuel Oil Mar 2031](https://www.wsj.com/market-data/quotes/futures/CLH31) | $59.71 |
| [Heavy Fuel Oil Oct 2025](https://www.wsj.com/market-data/quotes/futures/CLV25) | $62.14 | [Heavy Fuel Oil Apr 2031](https://www.wsj.com/market-data/quotes/futures/CLJ31) | $59.74 |
| [Heavy Fuel Oil Nov 2025](https://www.wsj.com/market-data/quotes/futures/CLX25) | $62 | [Heavy Fuel Oil May 2031](https://www.wsj.com/market-data/quotes/futures/CLK31) | $59.74 |
| [Heavy Fuel Oil Dec 2025](https://www.wsj.com/market-data/quotes/futures/CLZ25) | $61.77 | [Heavy Fuel Oil Jun 2031](https://www.wsj.com/market-data/quotes/futures/CLM31) | $59.69 |
| MONTH | LAST | MONTH | LAST |
| [Heavy Fuel Oil Jan 2026](https://www.wsj.com/market-data/quotes/futures/CLF26) | $61.7 | [Heavy Fuel Oil Jul 2031](https://www.wsj.com/market-data/quotes/futures/CLN31) | $59.7 |
| [Heavy Fuel Oil Feb 2026](https://www.wsj.com/market-data/quotes/futures/CLG26) | $61.53 | [Heavy Fuel Oil Aug 2031](https://www.wsj.com/market-data/quotes/futures/CLQ31) | $59.68 |
| [Heavy Fuel Oil Mar 2026](https://www.wsj.com/market-data/quotes/futures/CLH26) | $61.38 | [Heavy Fuel Oil Sep 2031](https://www.wsj.com/market-data/quotes/futures/CLU31) | $59.7 |
| [Heavy Fuel Oil Apr 2026](https://www.wsj.com/market-data/quotes/futures/CLJ26) | $61.24 | [Heavy Fuel Oil Oct 2031](https://www.wsj.com/market-data/quotes/futures/CLV31) | $59.75 |
| [Heavy Fuel Oil May 2026](https://www.wsj.com/market-data/quotes/futures/CLK26) | $61.14 | [Heavy Fuel Oil Nov 2031](https://www.wsj.com/market-data/quotes/futures/CLX31) | $59.84 |
| [Heavy Fuel Oil Jun 2026](https://www.wsj.com/market-data/quotes/futures/CLM26) | $61.04 | [Heavy Fuel Oil Dec 2031](https://www.wsj.com/market-data/quotes/futures/CLZ31) | $59.79 |

## Appendix C: Low Sulfur Fuel Oil Futures

|  |  |  |  |
| --- | --- | --- | --- |
| MONTH | LAST | MONTH | LAST |
| [Low Sulphur Gasoil Jan 2021](https://www.wsj.com/market-data/quotes/futures/UK/GASF22) | $699.25 | [Low Sulphur Gasoil Jul 2024](https://www.wsj.com/market-data/quotes/futures/UK/GASN24) | $614.75 |
| [Low Sulphur Gasoil Feb 2021](https://www.wsj.com/market-data/quotes/futures/UK/GASG22) | $693.75 | [Low Sulphur Gasoil Aug 2024](https://www.wsj.com/market-data/quotes/futures/UK/GASQ24) | $613 |
| [Low Sulphur Gasoil Mar 2021](https://www.wsj.com/market-data/quotes/futures/UK/GASH22) | $687.75 | [Low Sulphur Gasoil Sep 2024](https://www.wsj.com/market-data/quotes/futures/UK/GASU24) | $611.25 |
| [Low Sulphur Gasoil Apr 2021](https://www.wsj.com/market-data/quotes/futures/UK/GASJ22) | $683.75 | [Low Sulphur Gasoil Oct 2024](https://www.wsj.com/market-data/quotes/futures/UK/GASV24) | $609.5 |
| [Low Sulphur Gasoil May 2021](https://www.wsj.com/market-data/quotes/futures/UK/GASK22) | $675.75 | [Low Sulphur Gasoil Nov 2024](https://www.wsj.com/market-data/quotes/futures/UK/GASX24) | $607.75 |
| [Low Sulphur Gasoil Jun 2021](https://www.wsj.com/market-data/quotes/futures/UK/GASM22) | $670 | [Low Sulphur Gasoil Dec 2024](https://www.wsj.com/market-data/quotes/futures/UK/GASZ24) | $606 |
| [Low Sulphur Gasoil Jul 2021](https://www.wsj.com/market-data/quotes/futures/UK/GASN22) | $669.25 | [Low Sulphur Gasoil Jan 2025](https://www.wsj.com/market-data/quotes/futures/UK/GASF25) | $608 |
| [Low Sulphur Gasoil Aug 2021](https://www.wsj.com/market-data/quotes/futures/UK/GASQ22) | $667 | [Low Sulphur Gasoil Feb 2025](https://www.wsj.com/market-data/quotes/futures/UK/GASG25) | $610.5 |
| [Low Sulphur Gasoil Sep 2021](https://www.wsj.com/market-data/quotes/futures/UK/GASU22) | $664.5 | [Low Sulphur Gasoil Mar 2025](https://www.wsj.com/market-data/quotes/futures/UK/GASH25) | $612.75 |
| [Low Sulphur Gasoil Oct 2021](https://www.wsj.com/market-data/quotes/futures/UK/GASV22) | $664 | [Low Sulphur Gasoil Apr 2025](https://www.wsj.com/market-data/quotes/futures/UK/GASJ25) | $615 |
| [Low Sulphur Gasoil Nov 2021](https://www.wsj.com/market-data/quotes/futures/UK/GASX22) | $660.75 | [Low Sulphur Gasoil May 2025](https://www.wsj.com/market-data/quotes/futures/UK/GASK25) | $614.5 |
| [Low Sulphur Gasoil Dec 2021](https://www.wsj.com/market-data/quotes/futures/UK/GASZ21) | $705.75 | [Low Sulphur Gasoil Jun 2025](https://www.wsj.com/market-data/quotes/futures/UK/GASM25) | $614 |
| [Low Sulphur Gasoil Jan 2022](https://www.wsj.com/market-data/quotes/futures/UK/GASF22) | $699.25 | [Low Sulphur Gasoil Jul 2025](https://www.wsj.com/market-data/quotes/futures/UK/GASN25) | $613.5 |
| [Low Sulphur Gasoil Feb 2022](https://www.wsj.com/market-data/quotes/futures/UK/GASG22) | $693.75 | [Low Sulphur Gasoil Aug 2025](https://www.wsj.com/market-data/quotes/futures/UK/GASQ25) | $613.25 |
| [Low Sulphur Gasoil Mar 2022](https://www.wsj.com/market-data/quotes/futures/UK/GASH22) | $687.75 | [Low Sulphur Gasoil Sep 2025](https://www.wsj.com/market-data/quotes/futures/UK/GASU25) | $611.25 |
| [Low Sulphur Gasoil Apr 2022](https://www.wsj.com/market-data/quotes/futures/UK/GASJ22) | $683.75 | [Low Sulphur Gasoil Oct 2025](https://www.wsj.com/market-data/quotes/futures/UK/GASV25) | $608.75 |
| [Low Sulphur Gasoil May 2022](https://www.wsj.com/market-data/quotes/futures/UK/GASK22) | $675.75 | [Low Sulphur Gasoil Nov 2025](https://www.wsj.com/market-data/quotes/futures/UK/GASX25) | $604.75 |
| [Low Sulphur Gasoil Jun 2022](https://www.wsj.com/market-data/quotes/futures/UK/GASM22) | $670 | [Low Sulphur Gasoil Dec 2025](https://www.wsj.com/market-data/quotes/futures/UK/GASZ25) | $597 |
| [Low Sulphur Gasoil Jul 2022](https://www.wsj.com/market-data/quotes/futures/UK/GASN22) | $669.25 | [Low Sulphur Gasoil Jan 2026](https://www.wsj.com/market-data/quotes/futures/UK/GASF26) | $597.5 |
| [Low Sulphur Gasoil Aug 2022](https://www.wsj.com/market-data/quotes/futures/UK/GASQ22) | $667 | [Low Sulphur Gasoil Feb 2026](https://www.wsj.com/market-data/quotes/futures/UK/GASG26) | $597.5 |
| [Low Sulphur Gasoil Sep 2022](https://www.wsj.com/market-data/quotes/futures/UK/GASU22) | $664.5 | [Low Sulphur Gasoil Mar 2026](https://www.wsj.com/market-data/quotes/futures/UK/GASH26) | $597.5 |
| [Low Sulphur Gasoil Oct 2022](https://www.wsj.com/market-data/quotes/futures/UK/GASV22) | $664 | [Low Sulphur Gasoil Apr 2026](https://www.wsj.com/market-data/quotes/futures/UK/GASJ26) | $597.5 |
| [Low Sulphur Gasoil Nov 2022](https://www.wsj.com/market-data/quotes/futures/UK/GASX22) | $660.75 | [Low Sulphur Gasoil May 2026](https://www.wsj.com/market-data/quotes/futures/UK/GASK26) | $597.25 |
| [Low Sulphur Gasoil Dec 2022](https://www.wsj.com/market-data/quotes/futures/UK/GASZ22) | $655.25 | [Low Sulphur Gasoil Jun 2026](https://www.wsj.com/market-data/quotes/futures/UK/GASM26) | $596.5 |
| [Low Sulphur Gasoil Jan 2023](https://www.wsj.com/market-data/quotes/futures/UK/GASF23) | $651.5 | [Low Sulphur Gasoil Jul 2026](https://www.wsj.com/market-data/quotes/futures/UK/GASN26) | $596.25 |
| [Low Sulphur Gasoil Feb 2023](https://www.wsj.com/market-data/quotes/futures/UK/GASG23) | $648.75 | [Low Sulphur Gasoil Aug 2026](https://www.wsj.com/market-data/quotes/futures/UK/GASQ26) | $596 |
| [Low Sulphur Gasoil Mar 2023](https://www.wsj.com/market-data/quotes/futures/UK/GASH23) | $645.75 | [Low Sulphur Gasoil Sep 2026](https://www.wsj.com/market-data/quotes/futures/UK/GASU26) | $595.75 |
| [Low Sulphur Gasoil Apr 2023](https://www.wsj.com/market-data/quotes/futures/UK/GASJ23) | $642.25 | [Low Sulphur Gasoil Oct 2026](https://www.wsj.com/market-data/quotes/futures/UK/GASV26) | $595.5 |
| [Low Sulphur Gasoil May 2023](https://www.wsj.com/market-data/quotes/futures/UK/GASK23) | $639 | [Low Sulphur Gasoil Nov 2026](https://www.wsj.com/market-data/quotes/futures/UK/GASX26) | $595 |
| MONTH | LAST | MONTH | LAST |
| [Low Sulphur Gasoil Jun 2023](https://www.wsj.com/market-data/quotes/futures/UK/GASM23) | $635.75 | [Low Sulphur Gasoil Dec 2026](https://www.wsj.com/market-data/quotes/futures/UK/GASZ26) | $594.5 |
| [Low Sulphur Gasoil Jul 2023](https://www.wsj.com/market-data/quotes/futures/UK/GASN23) | $634 | [Low Sulphur Gasoil Jan 2027](https://www.wsj.com/market-data/quotes/futures/UK/GASF27) | $596 |
| [Low Sulphur Gasoil Aug 2023](https://www.wsj.com/market-data/quotes/futures/UK/GASQ23) | $632.5 | [Low Sulphur Gasoil Feb 2027](https://www.wsj.com/market-data/quotes/futures/UK/GASG27) | $597.25 |
| [Low Sulphur Gasoil Sep 2023](https://www.wsj.com/market-data/quotes/futures/UK/GASU23) | $631 | [Low Sulphur Gasoil Mar 2027](https://www.wsj.com/market-data/quotes/futures/UK/GASH27) | $598.5 |
| [Low Sulphur Gasoil Oct 2023](https://www.wsj.com/market-data/quotes/futures/UK/GASV23) | $630.5 | [Low Sulphur Gasoil Apr 2027](https://www.wsj.com/market-data/quotes/futures/UK/GASJ27) | $599.25 |
| [Low Sulphur Gasoil Nov 2023](https://www.wsj.com/market-data/quotes/futures/UK/GASX23) | $628 | [Low Sulphur Gasoil May 2027](https://www.wsj.com/market-data/quotes/futures/UK/GASK27) | $599.25 |
| [Low Sulphur Gasoil Dec 2023](https://www.wsj.com/market-data/quotes/futures/UK/GASZ23) | $625.5 | [Low Sulphur Gasoil Jun 2027](https://www.wsj.com/market-data/quotes/futures/UK/GASM27) | $599.25 |
| [Low Sulphur Gasoil Jan 2024](https://www.wsj.com/market-data/quotes/futures/UK/GASF24) | $623.25 | [Low Sulphur Gasoil Jul 2027](https://www.wsj.com/market-data/quotes/futures/UK/GASN27) | $600.75 |
| [Low Sulphur Gasoil Feb 2024](https://www.wsj.com/market-data/quotes/futures/UK/GASG24) | $622 | [Low Sulphur Gasoil Aug 2027](https://www.wsj.com/market-data/quotes/futures/UK/GASQ27) | $602.25 |
| [Low Sulphur Gasoil Mar 2024](https://www.wsj.com/market-data/quotes/futures/UK/GASH24) | $620.75 | [Low Sulphur Gasoil Sep 2027](https://www.wsj.com/market-data/quotes/futures/UK/GASU27) | $603.25 |
| [Low Sulphur Gasoil Apr 2024](https://www.wsj.com/market-data/quotes/futures/UK/GASJ24) | $619.25 | [Low Sulphur Gasoil Oct 2027](https://www.wsj.com/market-data/quotes/futures/UK/GASV27) | $604 |
| [Low Sulphur Gasoil May 2024](https://www.wsj.com/market-data/quotes/futures/UK/GASK24) | $617.75 | [Low Sulphur Gasoil Nov 2027](https://www.wsj.com/market-data/quotes/futures/UK/GASX27) | $604 |
| [Low Sulphur Gasoil Jun 2024](https://www.wsj.com/market-data/quotes/futures/UK/GASM24) | $616.25 | [Low Sulphur Gasoil Dec 2027](https://www.wsj.com/market-data/quotes/futures/UK/GASZ27) | $604 |