

Ship Energy Efficiency Management Plan (SEEMP Part II)

Ship's Name:

Prepared by:

Approved by:

Issued by:

Revision:

Date:

1. Review and update log

Date/timeline	Updated parts	Developed by	Implemented by

2. Ship particulars

Name of ship	
IMO number	
Company	
Flag	
Year of delivery	
Ship type	
Gross tonnage	
NT	
DWT	
Attained EEDI (if applicable)	
Attained EEXI (if applicable)	
Ice class	

3. Record of revision of Fuel Oil Consumption Data Collection Plan

Date of revision	Revised Provision

4. Ship engines and other fuel oil consumers and fuel oil types used

	Fuel oil consumers	Type/Model	Power	Fuel oil types
1	Main engine			
2	Auxiliary engine			
3	Composite boiler			
4	Auxiliary boiler			
5	Inert gas generator			
6	Hydro power pack engine			
7				
8				
9				
10				

5. Emission factor

C_F is a non-dimensional conversion factor between fuel oil consumption and CO₂ emission in the 2018 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships (resolution MEPC.308(73)), as amended. The annual total amount of CO₂ is calculated by multiplying annual fuel oil consumption and C_F for the type of fuel.

Fuel oil Type	IMO emission factors (in tonnes of CO ₂ /tonner fuel)
Diesel/Gas oil (e.g. ISO 8217 grades DMX through DMB)	3.206
Light fuel oil (LFO) (e.g. ISO 8217 grades RMA through RMD)	3.151
Heavy fuel oil (HFO) (e.g. ISO 8217 grades RME through RMK)	3.114
Liquefied petroleum gas (LPG) (Propane)	3.000
Liquefied petroleum gas (LPG) (Butane)	3.030

Liquefied natural gas (LNG)	2.750
Methanol	1.375
Ethanol	1.913
Other fuel	

***Conversion factor CF**

If fuels are used that do not fall into one of the above categories, fuel supplier should provide a CF-factor for the respective product supported by documentary evidence. (e.g. some "hybrid fuels", "non-fossil fuels")

6. Method to measure fuel oil consumption

Fuel oil consumption should include all the fuel oil consumed on board including but not limited to the fuel oil consumed by the main engines, auxiliary engines, gas turbines, boilers and inert gas generator, for each type of fuel oil consumed, regardless of whether a ship is underway or not. Methods for collecting data on annual fuel oil consumption in metric tonnes include as below (in no particular order):

Method		Description
<input type="checkbox"/>	A	Method using bunker delivery notes (BDNs)
<input type="checkbox"/>	B	Method using flow meters
<input type="checkbox"/>	C-1	Method using fuel oil tank monitoring (indirect measurement)
<input type="checkbox"/>	C-2	Method using fuel oil tank monitoring (direct measurement)

(1) Method "A" : using bunker delivery notes(BDNs)

This method determines the annual total amount of fuel oil used based on BDNs, which are required for fuel oil for combustion purposes delivered to and used on board a ship in accordance with regulation 18 of MARPOL Annex VI. Annual fuel oil consumption (Q) would be calculated as follows.

$$Q = T_1 + R - S - T_2$$

Q = Annual fuel oil consumption

T₁ = Amount of remaining tank oil at the beginning of the year

R = Total amount of bunkering for calendar year

S = Total amount of fuel oil offloaded for calendar year

T₂ = Amount of remaining tank oil at the end of the year

Fuel oil tank readings should be carried out by appropriate methods such as automated systems (remote reading), soundings and dip tapes. The amount of any fuel oil loaded or offloaded should be based on the records of the ship's oil record book. Any supplemental data used for closing identified difference in bunker quantity should be supported with documentary evidence.

In case of a voyage that extends across the data reporting period, the tank reading should occur by tank monitoring at the ports of departure and arrival of the voyage and by statistical methods such as rolling average using voyage days. The Bunker Delivery Note (BDN) is to be included at least the following information in accordance with MAROL Annex VI Appendix 5.

- Name and IMO number of receiving ship
- Port of bunkering
- Date of commencement of delivery
- Name, address and telephone number of fuel oil supplier
- Delivered product name
- Quantity in metric tons
- Density at 15°C
- Sulfur content, %m/m

Based on the quantities in metric tons above, the total amount of oil supply and demand can be calculated annually.

(2) Method "B" : using flow meters

This method determines the annual total amount of fuel oil consumption by measuring fuel oil flows on board by using flow meters. Annual fuel oil consumption may be the sum of daily fuel oil consumption data of all relevant fuel oil consuming processes on board measured by flow meters. The flow meters applied to monitoring should be located so as to measure all fuel oil consumption on board and should be identified in this plan. In case of the breakdown of flow meters, manual tank readings or other alternative methods will be conducted instead. It should not be necessary to correct this fuel oil measurement method for sludge if the flow meter is installed after the daily tank as sludge will be removed from the fuel oil prior to the daily tank

Flow meters	Location	Type/Model	Fuel consumer	Fuel oil type	Calibration
1					

2					
3					
4					

<Information of flow meters>

	Fuel consumer	Fuel oil types	Method to measure
1			
2			
3			
4			

<In case for consumer not monitored with a flow meter>

(3) Method “C-1” : using fuel oil tank monitoring(indirect measurement)

This method determines the annual total consumption of fuel oil by measuring the remaining amount of the fuel oil tank through indirect reading using an automation systems (remote reading). The total annual consumption is calculated by summing up the measured daily fuel consumption. The measurement of the remaining amount of the tank is normally carried out daily and every time the ship is to receive or discharge fuel oil. A summary of the measurement data, including a record of the measured fuel consumption, shall be provided on board. When a fuel oil purifier is installed, the amount of sludge generated can be reduced from fuel oil consumption.

(4) Method “C-2” : using fuel oil tank monitoring(direct measurement)

This method determines the residual amount of the fuel oil tank and the total annual consumption of the fuel oil by directly measuring the tank using sounding or dip tapes. The total annual consumption is calculated by summing up the measured daily fuel consumption. The measurement of the remaining amount of the tank is normally carried out daily and every time the ship is to receive or discharge fuel oil. A summary of the measurement data, including a record of the measured fuel consumption, shall be provided on board. When a fuel oil-purifier is installed, the amount of sludge generated can be reduced from fuel oil consumption.

7. Method to measure distance travelled

Description

Data source is record in deck log book obtained from GPS or ECDIS or Paper chart.
Annual value of distance travelled, over ground, to be integrated from daily records in noon report

8. Method to measure hours underway

Description
Data source is record in deck log book. Annual value of hours underway to be integrated from daily records in noon report.

9. Procedure that will be used to report the data to the Administration

Description
All records need report to company via E-mail in due monthly/quarterly/semi-annually/annually. i) All data (Include elec. type and hard copy) shall keep for X years. ii) The data being record from each voyage start to finish. iii) Data records were kept in deck & engine computers. iv) The emission data shall make up & complete in each end of year, and submitted by RO (Recognized Organization)

10. Data quality

Description	
Data quality control measures: Internal reviews and validation of relevant data	In order to enable effective and efficient monitoring, reporting and verification of the information for the Regulation, companies should assess the quality of the information in the aggregated report before submitting the report to the verifiers. .1. Responsibility of Internal reviews and validation Company shall assign a person who has enough knowledge and experience on the ship data management as responsible person for internal review and validation (hereafter Internal Reviewer). .2. Contents of internal review and validation Internal Reviewer shall review whether the reported data is complying with Regulation and show a brief description identifying that the review and validation process includes a check on whether; - data is complete - comparison with data over previous years - comparison of fuel consumption reported with purchase

	<p>records</p> <ul style="list-style-type: none"> - comparison of factors obtained for fuel suppliers with international reference factors - and, criteria for rejecting data, if applicable
<p>Additional measures to be considered: Data gap</p>	<p>Data gap or abnormal data for FOC:</p> <ol style="list-style-type: none"> 1) At the time of every bunkering, to conduct the measurement of the amount of fuel oil tanks before and after bunkering, as cross-checks between bunkering quantity as provided by BDN and bunkering quantity indicated by on-board measurement, and record the necessary data and information in the engine logbook in accordance with Bunkering Procedure. 2) In case it was identified any differences in bunker quantity, it would be taken countermeasures by the measurement record of fuel consumption which has been done before and after bunkering. <p>Data gap or abnormal data for Distance travelled:</p> <p>In case where the distance travelled cannot be confirmed due to missing of the deck logbook etc., Internal Reviewer shall take countermeasures for deciding distance travelled by ECDIS or Paper Chart and etc. In certain circumstances, Internal Reviewer may calculate based on port departure time and port arrival time.</p> <p>Data gap or abnormal data for Hours underway:</p> <p>In case where the hours underway cannot be confirmed due to missing of deck logbook etc., Internal Reviewer should take countermeasures for deciding time spent at sea by ECDIS or Paper Chart. In certain circumstances Internal Reviewer may calculate based on port departure time and arrival time.</p>