

CII (Carbon Intensity Indicator)

Marine GHG Certification Department
June, 2023

IMO Operational Measures (2012-)



SEEMP Part I:

Ships of 400GT and above

IMO Data Collection System (2019-)



IMO DCS & SEEMP Part II:

Ships of 5,000GT and above

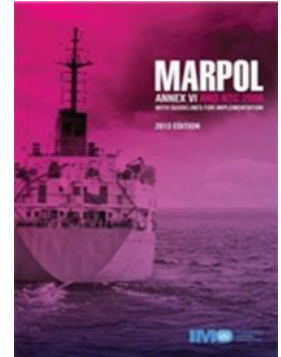
CII rating (2023-)

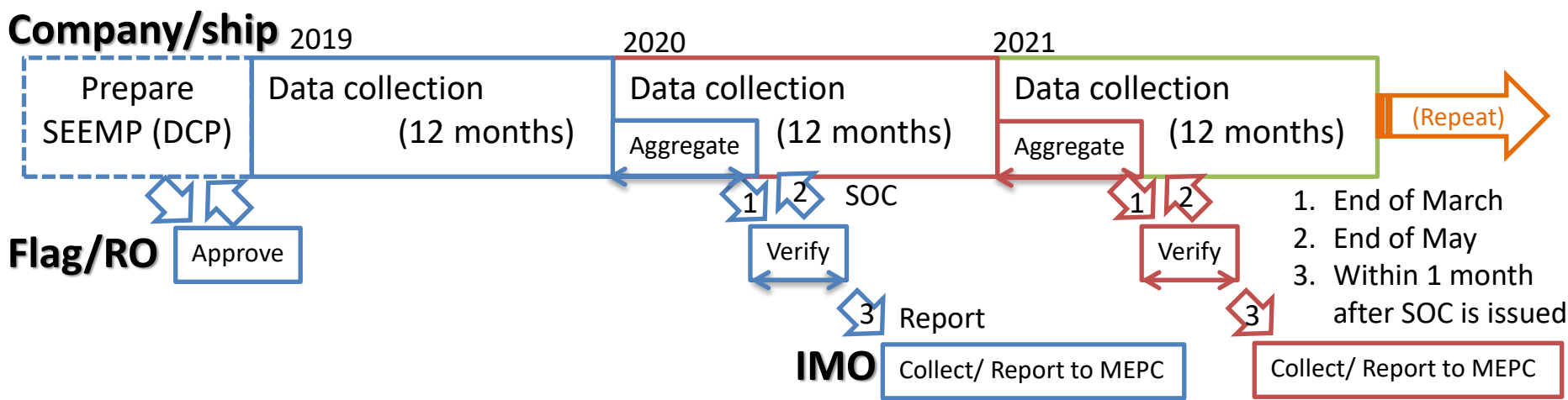
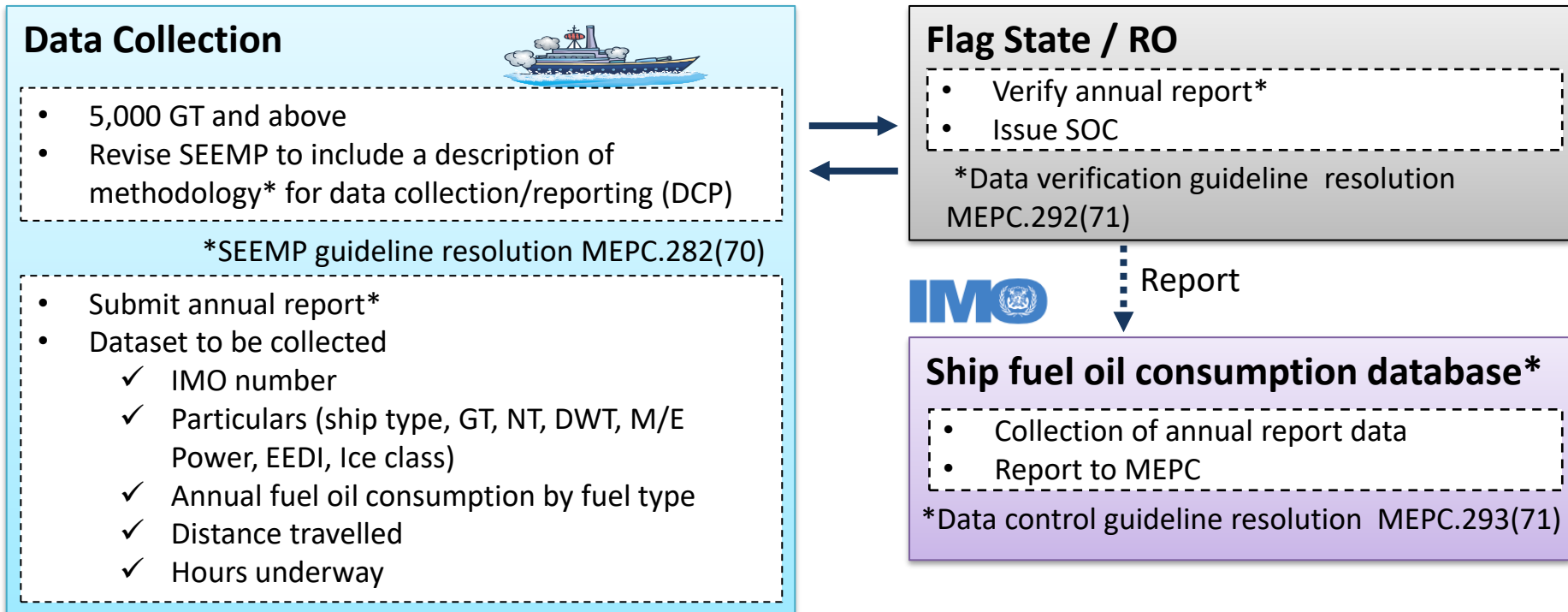


CII & SEEMP Part III:

Ships of 5,000GT and above, EEDI/EEXI-applied ship types (BC, Tanker, etc.)

- **Application:** Ships of 5,000GT and above, engaged in international voyages
- **Reporting period:** calendar year(1 January – 31 December)
- **Requirements:**
 1. Revisions of SEEMP to add the Ship Fuel Oil Consumption Data Collection Plan (DCP) which includes a description of the methodology for data collecting and the reporting processes
 2. **Data collection on board from 2019**
 3. Reporting the collected data to the Administration or RO.
 4. Verification of the reporting data by the Administration or RO.
 5. Retaining the Statement of Compliance issued by Administration or RO onboard, and keeping the relevant data





CII Rating (5,000 GT and above / EEDI-applied ship types)

- Rating each vessel by CII from 2023 IMO DCS consumption data (CII Guideline, G1) , then first verification will be carried out in 2024
- Attained CII will be calculated in accordance with calculation guideline (G1) based on IMODCS fuel reporting data and on Correction Factors and Voyage Adjustment Guidelines (G5)
- CII and “A” – “E” rating will be added on SOC of IMO-DCS in accordance with Reference Line (G2), Reduction Factor (G3) and Rating guideline (G4)
- Low-rated vessels (“E” or “D” on 3 consecutive years) should develop a plan of corrective actions and the plan should be approved by the Administration or RO

Form of Statement of Compliance – Fuel Oil Consumption Reporting and Operational Carbon Intensity rating

STATEMENT OF COMPLIANCE – FUEL OIL CONSUMPTION REPORTING AND OPERATIONAL CARBON INTENSITY RATING

Issued under the provisions of the Protocol of 1997, as amended, to amend the International Convention for the Prevention of Pollution by Ships, 1973, as modified by the Protocol of 1978 related thereto (hereinafter referred to as “the Convention”) under the authority of the Government of:

.....
(full designation of the Party)

by.....
(full designation of the competent person or organization authorized under the provisions of the Convention)

Particulars of ship⁷

Name of ship.....

Distinctive number or letters.....

IMO Number⁸.....

Port of registry.....

Gross tonnage.....

Deadweight.....

Type of ship.....

THIS IS TO DECLARE:

1 That the ship has submitted to this Administration the data required by regulation 22A of Annex VI of the Convention, covering ship operations from (dd/mm/yyyy) through (dd/mm/yyyy); and

2 The data was collected and reported in accordance with the methodology and processes set out in the ship’s SEEMP that was in effect over the period from (dd/mm/yyyy) through (dd/mm/yyyy);

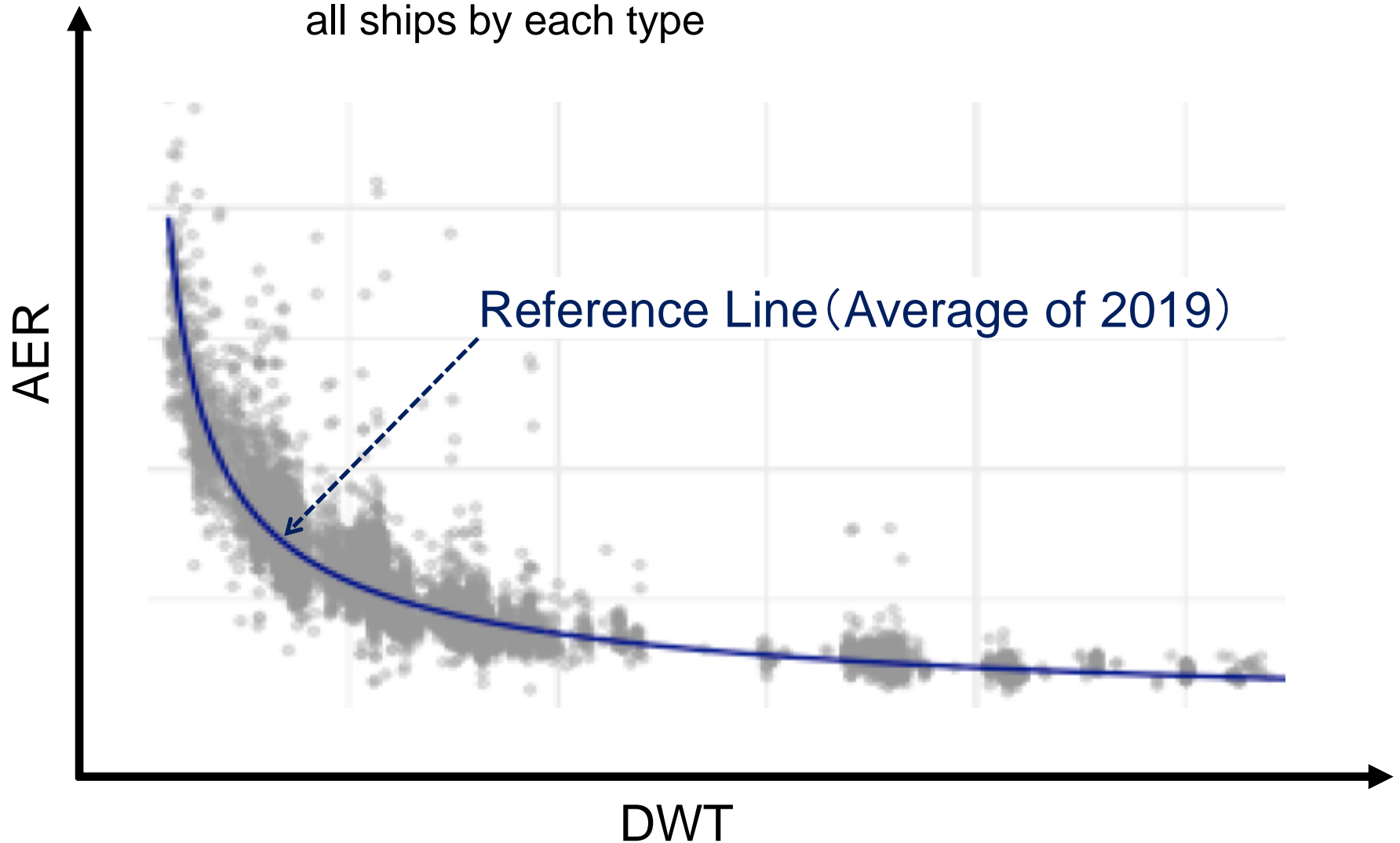
3 **The attained annual operational CII of the ship from (dd/mm/yyyy) through (dd/mm/yyyy) was:.....**

4 **The operational carbon intensity of the ship in this period is rated as**.....

Ship types	Calculation method	Note
Bulk carriers, Tankers, Container ships, Gas carriers, LNG carriers, General cargo ships, Refrigerated cargo carrier, Combination carriers	$\frac{CO_2 \text{ Emission}}{Deadweight \times Distance sailed}$	Deadweight: Corresponding to Maximum Summer load draft = the value on IEE Cert supplement
cruise passenger ships, Ro-ro cargo ships (vehicle carriers), Ro-ro cargo ships, Ro-ro passenger ships	$\frac{CO_2 \text{ Emission}}{Gross Tonnage \times Distance sailed}$	

Point : Correction Factors and Voyage Adjustment Guidelines (G5) can be taken in consideration for calculation

Report data of 2019 IMO DCS fuel reporting of all ships by each type



$$CII_{ref} = a \text{ Capacity}^{-c}$$

Ship type		capacity	a	c
Bulk Carrier	DWT ≥ 279,000	279,000	4745	0.622
	DWT < 279,000	DWT	4745	0.622
Gas Carrier	DWT ≥ 65,000	DWT	14405E+7	2.071
	DWT < 65,000	DWT	8104	0.639
Tanker		DWT	5247	0.610
Container ship		DWT	1984	0.489
General cargo ship	DWT ≥ 20,000	DWT	31948	0.792
	DWT < 20,000	DWT	588	0.3885
Refrigerated cargo carrier		DWT	4600	0.557
Combination carrier		DWT	5119	0.622
LNG Carrier	DWT ≥ 100,000	DWT	9.827	0
	100,000 > DWT ≥ 65,000	DWT	14479E+10	2.673
	DWT < 65,000	65,000	14479E+10	2.673
Ro-ro cargo ship (VC)	GT ≥ 57,700	57,700	3627	0.590
	57,700 > GT ≥ 30,000	GT	3627	0.590
	GT < 30,000	GT	330	0.329
Ro-ro cargo ship		GT	1967	0.485
Ro-ro passenger ship	Ro-ro passenger ship	GT	2023	0.460
	High-speed craft	GT	4196	0.460
Cruise passenger ship		GT	930	0.383

$$\text{Required CII} = \frac{100 - Z}{100} \text{CII}_{Ref}$$

Table 1: Reduction factor (Z%) for the CII relative to the 2019 reference line

Year Reduction factor relative to 2019

Year	Reduction Factor (Z)
2023	5%
2024	7%
2025	9%
2026	11%
2027	**
2028	**
2029	**
2030	**

Reduction factor Z will be starting from 5% in 2023 and 2% will be added yearly

**Z factors for the years of 2027 to 2030 to be further strengthened and developed taking into account the review of the short-term measure.

CII Reference Line (G2)

Reduction factor, % (G3)

Required CII (G3)

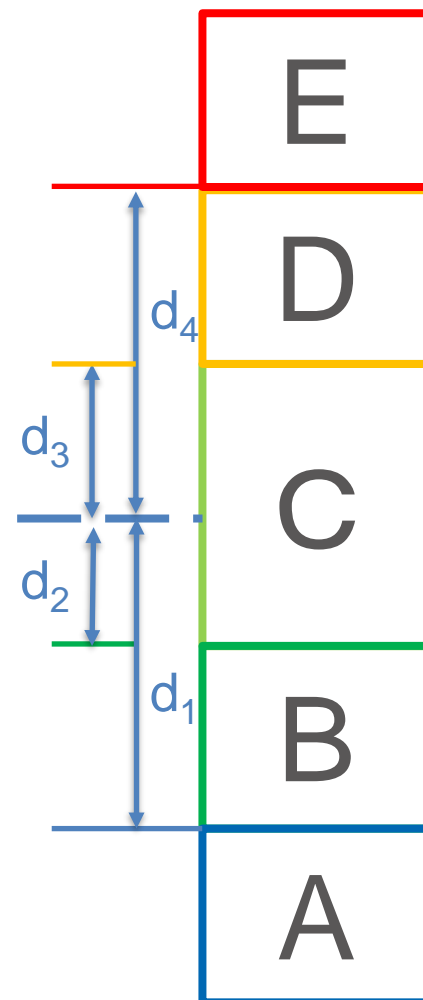
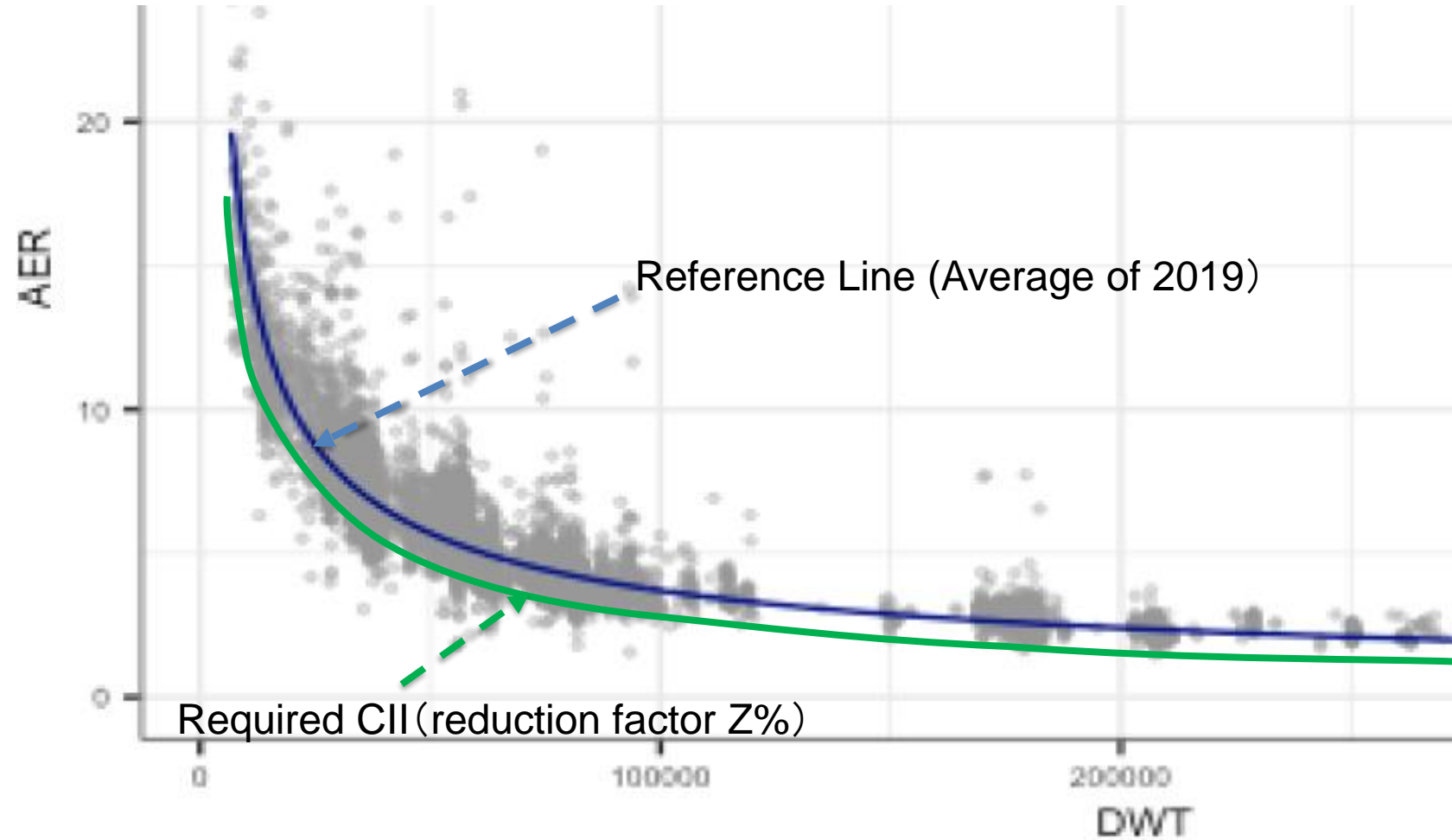


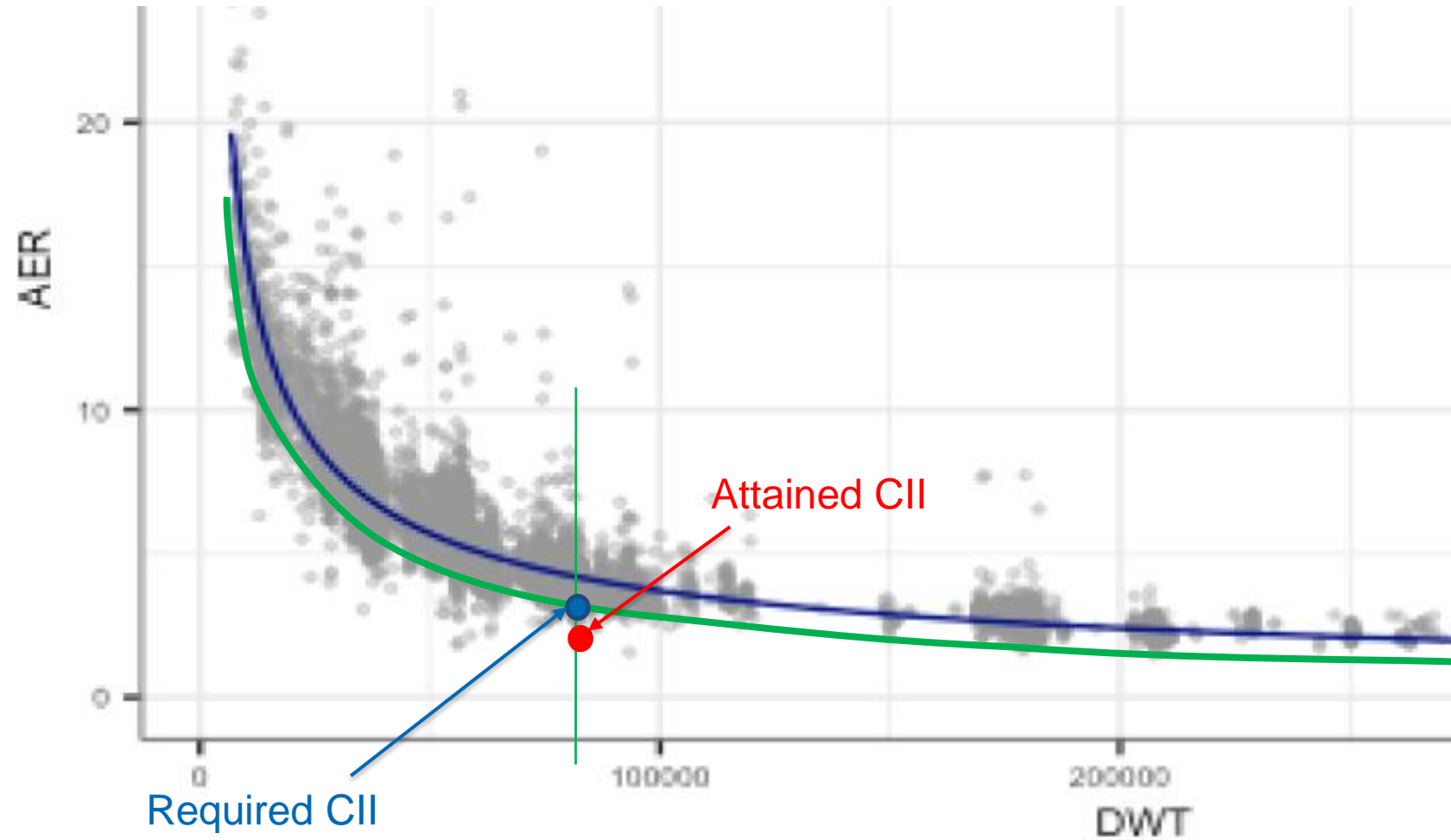
Table 1: dd vectors for determining the rating boundaries of ship types

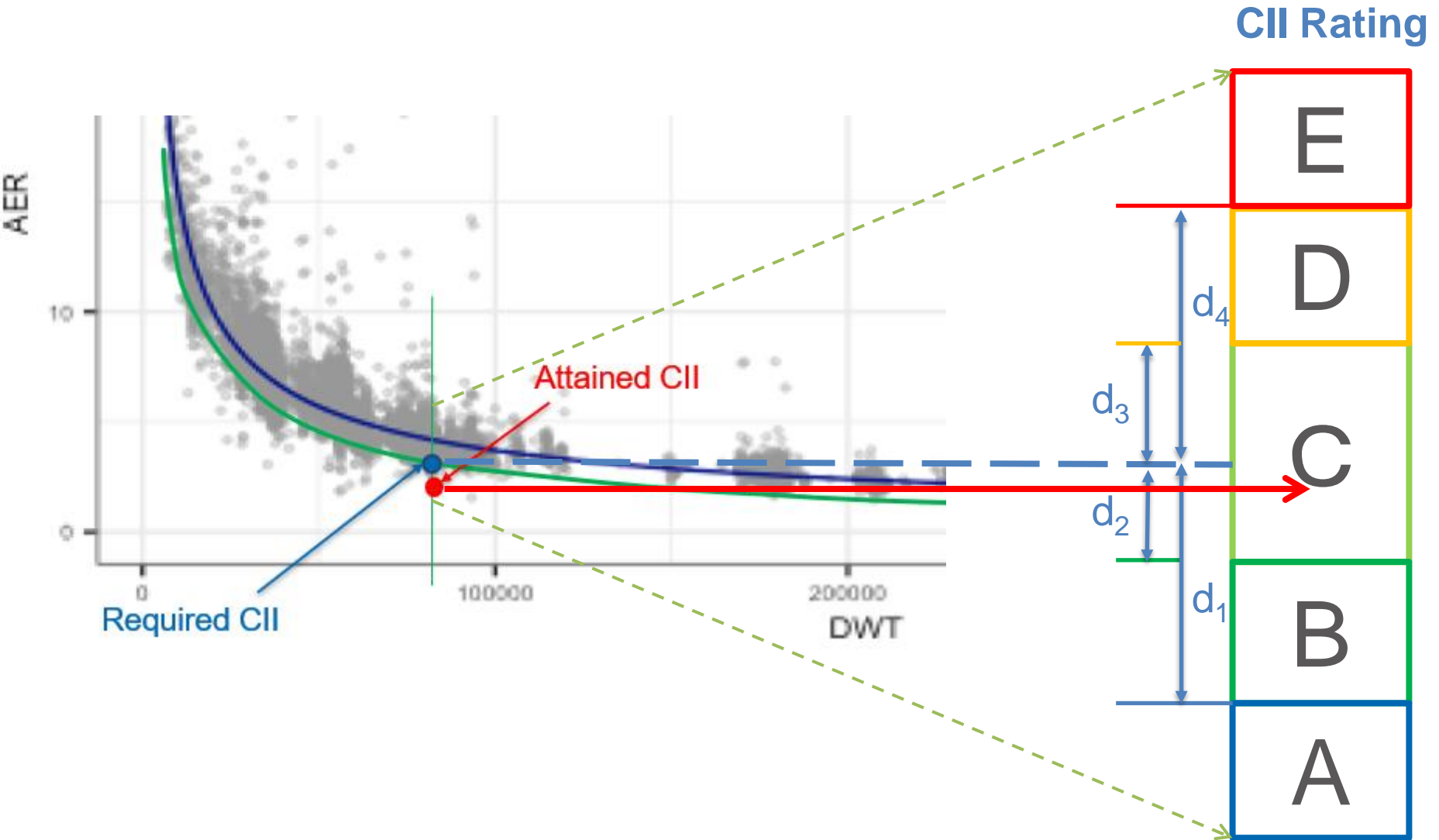
Ship type	d1	d2	d3	d4
Bulk Carrier	0.86	0.94	1.06	1.18
Gas Carrier >=65,000DWT	0.81	0.91	1.12	1.44
<65,000DWT	0.85	0.95	1.06	1.25
Tanker	0.82	0.93	1.08	1.28
Container ship	0.83	0.94	1.07	1.19
General cargo ship	0.83	0.94	1.06	1.19
Refrigerated cargo carrier	0.78	0.91	1.07	1.20
Combination carrier	0.87	0.96	1.06	1.14
LNG Carrier >= 100,000DWT	0.89	0.98	1.06	1.13
<100000DWT	0.78	0.92	1.10	1.37
Ro-ro cargo ship (VC)	0.86	0.94	1.06	1.16
Ro-ro cargo ship	0.76	0.89	1.08	1.27
Ro-ro passenger ship	0.76	0.92	1.14	1.30
Cruise passenger ship	0.87	0.95	1.06	1.16

Report data of 2019 IMODCS fuel reporting



Report data of 2019 IMODCS fuel reporting





Items	
Ship type	Bulk Carrier
Deadweight	62,000
Gross tonnage	33,000
Distance Travelled (NM)	60,045
CO2 emissions (ton)	17,477
Attained CII (G1)	4.687
a (G2)	4.745
c (G2)	0.622
CII ref (G2)	4.959
Required CII (G3, 2023)	4.711
Attained CII / Required CII	0.99
Rating (2023)	C

Data source from IMO-DCS fuel reporting (starting from emission of 2023)

$$\begin{aligned} \text{Attained CII (g/ton mile)} \\ &= \frac{17477 \text{ (ton)}}{62000 \times 60045 \text{ (ton mile)}} \times 10^6 = 4.687 \end{aligned}$$

$$\text{CII ref} = 4745 \times 62000^{-0.622} = 4.959$$

Rating (on 2023 reduction factor)

$$\text{Required CII} = 4.959 \times \frac{100-5}{100} = 4.711 \text{ (2023)}$$

$$\frac{\text{Attained CII}}{\text{Required CII}} = 0.99 < d2 \text{ (1.06)}$$

Items	
Ship type	Bulk Carrier
Deadweight	62,000
Gross tonnage	33,000
Distance Travelled (NM)	60,045
CO2 emissions (ton)	17,447
Attained CII (G1)	4.687
a (G2)	4,745
c (G2)	0.622
CII ref (G2)	4.959

If the vessel keeps its emission score same, the rating will be slightly worse year by year



Reporting Year	Reduction factor (%)	Required CII	Rating
2023	5	4.711	C
2024	7	4.612	C
2025	9	4.512	C
2026	11	4.413	D

$$\text{Attained CII} = \frac{\sum_j C_{Fj} \cdot \left\{ FC_j - \left(FC_{voyage, j} + TF_j + (0.75 - 0.03y_i) \cdot (FC_{electrical, j} + FC_{boiler, j} + FC_{others, j}) \right) \right\}}{f_i \cdot f_m \cdot f_c \cdot f_{iVSE} \cdot Capacity \cdot (D_t - D_x)}$$

1. Correction factors

The various correction factors for specific type of ships are defined.

It is necessary to update reporting template when following is applicable;

Shuttle Tanker/STS voyages on Tanker - Correction for dynamic positioning and cargo pump

Tanker - Correction for cargo heating, cargo pump

LNG carrier - Correction for cargo cooling and reliquefaction

Ship carrying Refrigerated Containers - Correction for Refrigerated Containers

It is not necessary to update reporting template (calculation only) for the following;

Ice class ship - Cargo capacity correction

Chemical tanker - Cargo capacity correction

Self-unloading bulk carriers - Cargo capacity correction

$$\text{Attained CII} = \frac{\sum_j C_{Fj} \cdot \left\{ FC_j - \left(FC_{\text{voyage},j} + TF_j + (0.75 - 0.03y_i) \cdot (FC_{\text{electrical},j} + FC_{\text{boiler},j} + FC_{\text{others},j}) \right) \right\}}{f_i \cdot f_m \cdot f_c \cdot f_{iVSE} \cdot \text{Capacity} \cdot (D_t - D_x)}$$

2. Voyage exclusion

The parameter D_x , distance travelled and $FC_{\text{voyage},j}$, the total mass of consumed fuel, may be deducted from the calculation of the attained CII in case the ship encounters one of the following situations:

- scenarios specified in regulation 3.1 of MARPOL Annex VI, which may endanger safe navigation of a ship;
- sailing in ice conditions, which means sailing of an ice-classed ship in a sea area within the ice edge

SHIP OPERATIONAL CARBON INTENSITY PLAN (PART III OF THE SEEMP)				
1 Review and update log				
Date/timeline	Updated parts	Developed by	Implemented by	
<1 st time>	Newly developed	Technical Dept	C/E	
<2 nd time>				
Etc.				
2 Required CII over the next 3 years, attained CII and rating over three consecutive years				
Name of the ship	NK Bulker	IMO number	9999999	
Company	NK Shipping	Attained CII method	AER	
Flag	Japan	Ship type	Bulk carrier	
Gross tonnage	40,000	DWT	55,000	
Year	Required CII	Attained CII (before any correction factors)	Attained CII	Rating (A, B, C, D or E):
<year -1>				
<year -2>				
<year -3>				
	Required CII			
<year>:2023	5.08			
<year + 1>	4.97			
<year + 2>	4.86			
3 Calculation methodology of the ship's attained annual CII, including required data and how to obtain these data as far as not addressed in Part II				

Contents of SEEMP Part III

1. Review and update Log
2. Ship specification and CII
3. Calculation method
4. Three years implementation plan
5. Self-evaluation and improvement
6. Plan of corrective actions (if applicable)

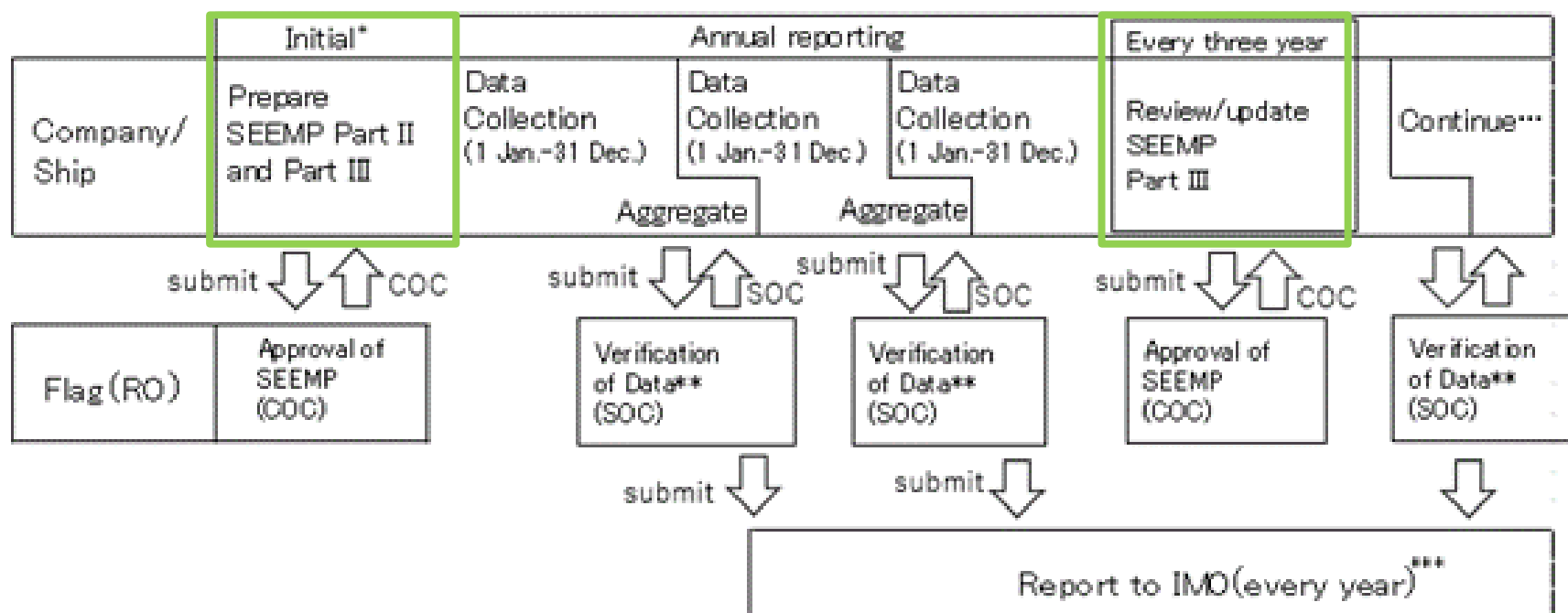
*SEEMP Part III is to be updated every three years.

ClassNK simplified the preparation process for industry by web-based preparation interface in ClassNK MRV Portal with minimal input and fleet wise submission.

List of measures to be considered and implemented

Measure			Impact on CII	
Slow Steaming			High	
Time and method of implementation and responsible personnel			Impediments and contingency measures	
Milestone	Due	Responsible	Impediment	Contingencies
Voyage	Each milestone	Master	Business demand	Delay of voyage
Measure			Impact on CII	
Optimum Use of Generator			Low	
Time and method of implementation and responsible personnel			Impediments and contingency measures	
Milestone	Due	Responsible	Impediment	Contingencies
Voyage	Each milestone	Master	frequent cargo operation	nil
Measure			Impact on CII	

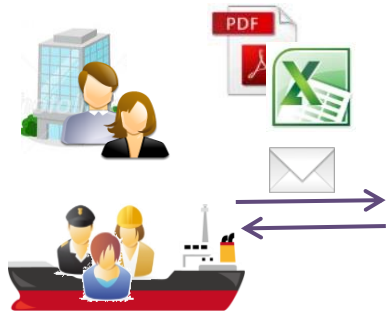
Basic workflow of the IMO-DCS and CII



*"Initial" means the case when a ship newly prepares SEEMP Part II and Part III, such as new building ships or management company changes of existing ships.

**In case a CII is rated as "E" or "D" for consecutive three years, SEEMP Part III including corrective action plan is to be approved.

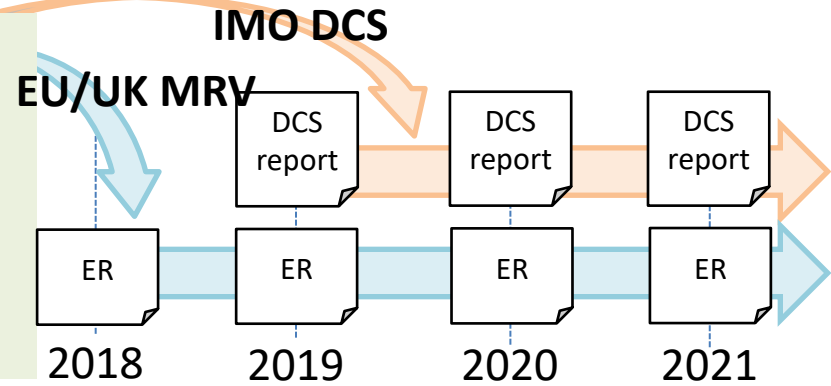
***Under the flag authorization, NK submits verified data to IMO, or the flag Administration does it.



ClassNK MRV Portal

- FOC
- Cargo
- Distance
- Time
-

Ship DC Database



- Store the report data (FOC/Distance/Hours/Etc..) from ship or ablog system and edit them on the web service
- Create/Submit annual report (EUMRV/IMODCS)
- SEEMP application/approval

Port	Cargo	Distance and time	Fuel				
MP.V							
Confirmed Save							
Organization Name							
Distance	2176.0 nm (4030.0km)	Time Spent at sea	167.00 h				
Distance(AIS)	2581.4nm 84.3%	Time Spent at sea (AIS)	202.0h 82.7%				
Ratio of distance (AIS) in the whole reporting period distance							
Place	Rep.Time(UTC)	Lat./Long.	Distance (nm)	Time	Ave. RPM	Ave. Output (kw)	Sea State (BF)
Departure	2021/02/10 23:18	118N,10410.2E	N.A.	N.A.			
SOSP	2021/02/10 23:18						
Noon	2021/02/11 04:00	143.8N,10443.2E	14	1			
Noon	2021/02/12 04:00	546.2N,10746.2E	316	24			
Noon	2021/02/13 04:00	930N,11058.8E	295	24			
Noon	2021/02/14 04:00	1343.2N,11437.8E	331	24			
Noon	2021/02/15 04:00	1748N,11818E	323	24			
Noon	2021/02/17 03:00	2540.2N,12458.8E	305	23			
Noon	2021/02/18 03:00	2904.2N,12840.8E	287	24			
Noon	2021/02/19 02:00	3251N,13215E	305	23			
EOSP	2021/02/19 02:00						
Other event	2021/02/19 02:00						
Arrival	2021/02/19 10:48	3404.8N,13252.2E					
Adjustment Distance/Time from arrival to berth							
			0	0			

PANAMA MARITIME AUTHORITY
DIRECTORATE GENERAL OF MERCHANT MARINE

STATEMENT OF COMPLIANCE - FUEL OIL CONSUMPTION REPORTING

Issued under the provisions of the Protocol of 1997, as amended, to amend the International Convention for the Prevention of Pollution by Ships, 1973, as modified by the Protocol of 1978 related thereto (hereinafter referred to as "the Convention") under the authority of the Government of:

THE REPUBLIC OF PANAMA

Particulars of ship

Name of ship: HDDW
Distinctive number or letters: HDDW
IMO Number: 9309999
Port of Registry: PANAMA
Gross Tonnage: 160068

THIS IS TO DECLARE:

- That the ship has submitted to this Administration the data required by Regulation 22A of Annex VI of the Convention, covering ship operations from January 1, 2021 through April 28, 2021; and
- The data was collected and reported in accordance with the methodology and processes set out in the ship's SEEMP that was in effect over the period from January 1, 2021 through April 28, 2021.

This Statement of Compliance is valid until: May 31, 2023

Issued at: Tokyo, Japan
Date: June 1, 2021

R.O.: NKK
SOC: 10067

- **What is necessary if the rating is E or D in three consecutive years?**

Regulation Requirement: Corrective action plan should be submitted/approved

- **But how can we actually improve the rating?**

$$\text{Attained CII} = \frac{\text{CO2 Emission}}{\text{Deadweight(or GT)} \times \text{Distance sailed}} \text{ (g/(ton} \cdot \text{mile))}$$

Method	Cost	Effect	Note
Alternative Fuel	High	High	Big Investment is necessary
Low friction Paint, ESD (Improvement of hardware)	High	Depends on the ship	Preliminary examination is important
Voyage Optimization (Improvement of operation)	Low	Depends on the ship	Preliminary examination is important
Slow Steaming (or fleet optimization)	Low	Middle	Possibility of further slow steaming

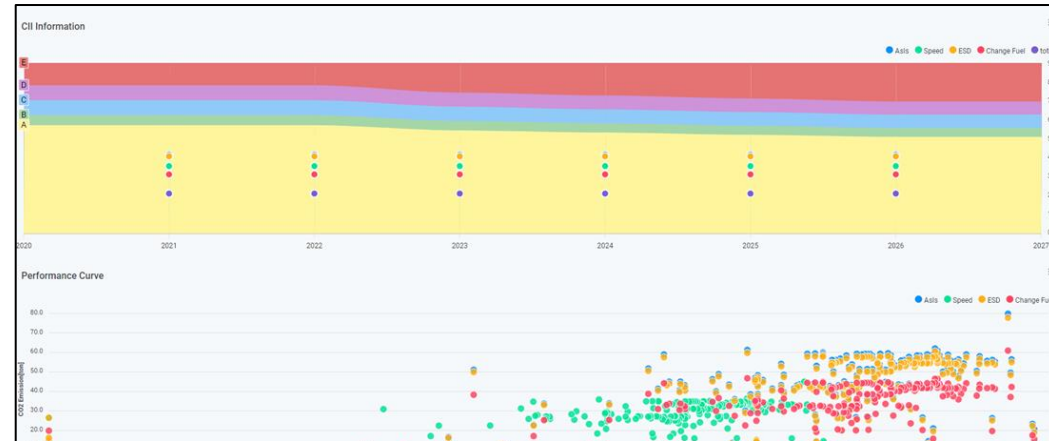
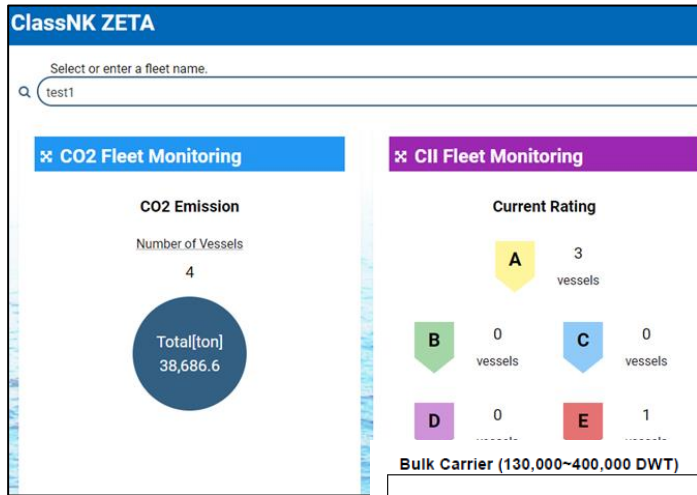
Analysis of the monitoring result and estimation of cost effectiveness are important

ClassNK ZETA (Zero Emission Transition Accelerator)- NEW RELEASE

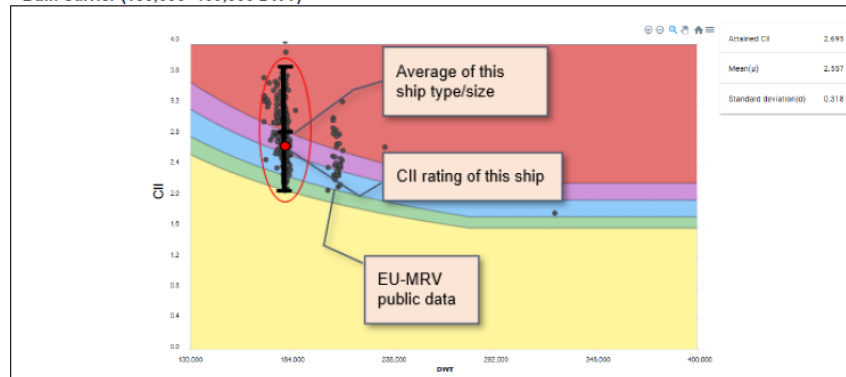
- **Links to the ClassNK MRV Portal** and Fuel consumption database of ships
- **Simulation features** available to realize how CO2 emissions and CII ratings changes with energy saving measures
- **Integrated data management platform** that can be used for reporting based on global frameworks such as the Poseidon Principles and the Sea Cargo Charter(Under Development)



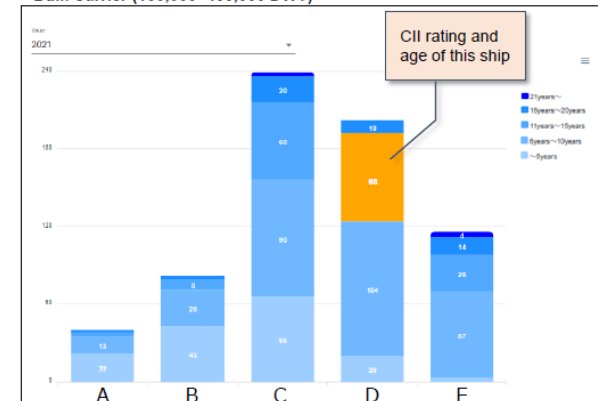
- Grasp fleet CII and CO2 emission easily
- Simulation based on monitoring data if the vessel applied slow steaming, ESD or alternative fuels.
- CII benchmark



Bulk Carrier (130,000~400,000 DWT)



Bulk Carrier (130,000~400,000 DWT)



- SEEMP, IMO-DCS, CII information
- CII calculation excel sheet is available on ClassNK website
- We will update the website when further updates are made by IMO

CII calculation sheet

A	B	C
CII Calculation		
*Please input blue cells		
		ClassNK Version 0.1 June 2021
Ship Particular	IMO Number	1111111
	Ship Name	NK LNG
	Ship Type	Gas carrier
	Deadweight	54823
Fuel Consumption (ton)	Gross Tonnage	48122
	Diesel/Gas Oil	631
	LFO	0
	HFO	7987
	LPG(Propane)	
	LPG(Butane)	
	LNG	
	Methanol	
	Ethanol	
Distance Travelled (nm)		79536
CO2 Emission		26895
Attained CII		6.17
CII ref		7.61
Rating Year		2023
Required CII		7.23
Attained CII / Required CII		0.853
CII Rating		B

IMODCS / SEEMP information

The screenshot shows the ClassNK website interface. At the top, there are language options (English, 日本語, 简体中文, 繁體中文, 한국어, Deutsch) and a search bar. The main navigation menu includes HOME, AboutNK, Products & Services, Certification Services, Information Services, and Research. The current page is titled 'IMODCS and SEEMP' under the 'Statutory Services' category. The page content includes an 'Introduction' section explaining the amendments to MARPOL Annex VI and the requirements for ships of 5,000 gross tonnage and above. A sidebar on the left lists various services and rules.

<https://www.classnk.or.jp/hp/en/activities/statutory/seemp/index.html>

Contact

Marine GHG Certification Department
ClassNK

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TEL: +81-3-5226-3025

