

燃費実績の格付け制度 (Carbon Intensity Indicator: CII) の概要及び対応

一般財団法人 日本海事協会
GHG部 DCS部門
2021年10月

1. EEXI

技術アプローチ

2. SEEMP更新

運航アプローチ

3. CII 格付け

CII: Carbon Intensity Indicator

MEPC75において運航アプローチに関わる提案(3種)
→MEPC76にてSEEMP更新とCIIが採択された。



SEEMP強化(定期的審査)
(船主国、フィンランド、日本)



燃費格付け
(中国)



運航速度規制/FOC limitation
(EU, 環境団体, 島しょ国)

より厳格

CII格付け(5,000GT以上 / EEDI適用船種)

- 適用日: 2023年の燃料消費量等データの認証から格付け開始(認証は2024年実施)
- 各船をCII指標ガイドラインに基づきCII計算値を算出
- CII基準値ガイドライン、削減率ガイドライン、閾値ガイドラインに基づき、各船のCII値及び“A” – “E”の格付けを行い、CII計算値と格付けをIMO DCSのSOC上へ追記する。
- 低格付け船(“E”又は3年連続”D”)の場合、改善計画を作成し、旗国もしくはROの承認を取得する。(ペナルティは無し)

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

.....

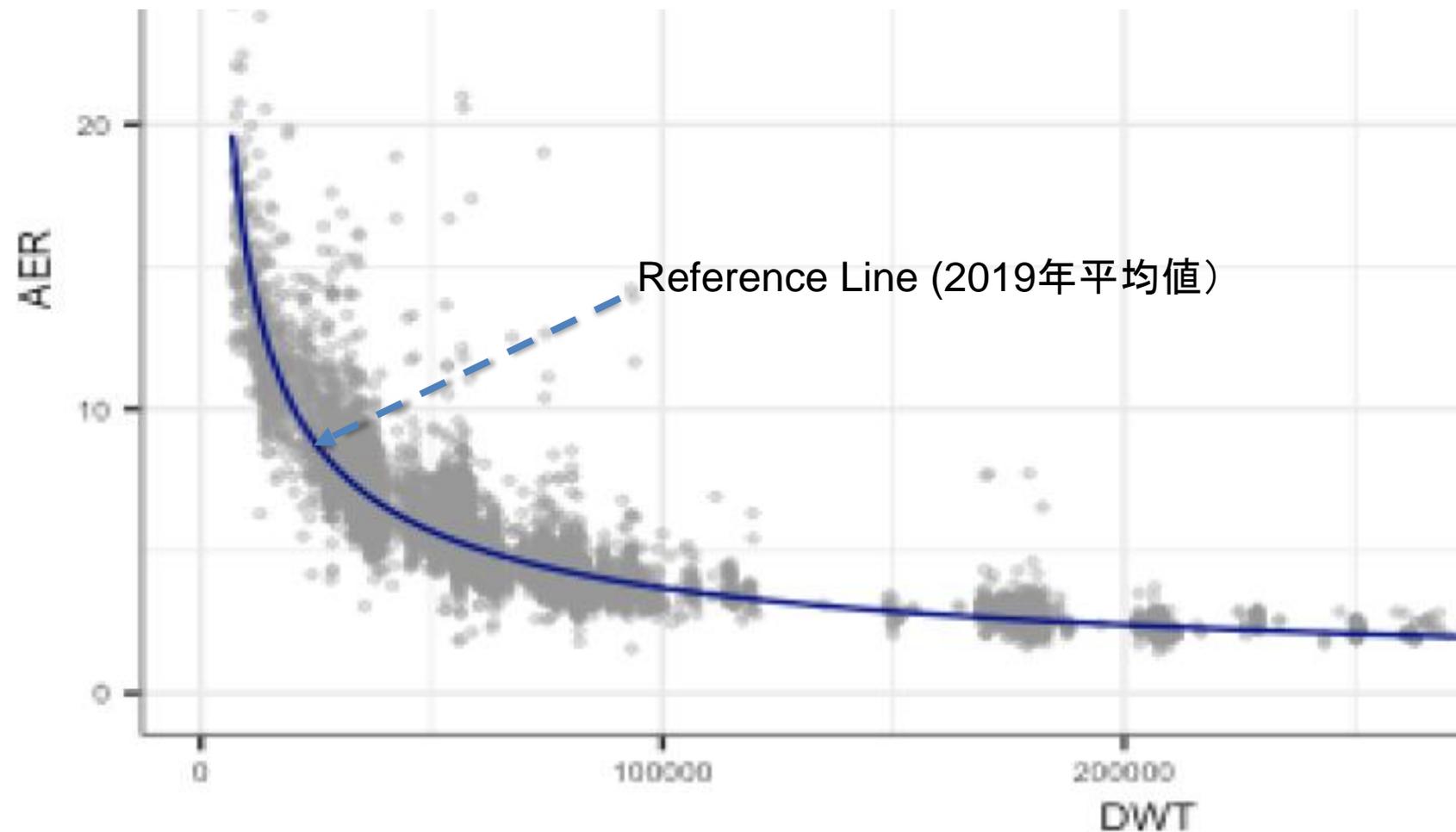
7

1. 各船のCII 計算値 (Attained CII)を算出

船型	計算方法	備考
ばら積み貨物船, タンカー, コンテナ船, ガス船(LPG/CNG), LNG船 RoRo貨物船, 一般貨物船, リーファー, 兼用船	$\frac{\text{CO2 排出量}}{\text{DWT} \times \text{航海距離}}$	Deadweight: 夏期最大満載喫水 = IEE証書supplementの値
クルーズ船 自動車運搬船 RO-PAXフェリー	$\frac{\text{CO2排出量}}{\text{総トン数} \times \text{航海距離}}$	

Point: IMODCSで収集済みデータのみで計算可能(追加作業無し)

2019年IMODCSレポートデータ



CII リファレンスライン (2/2)

$CII_{ref} = a \text{ Capacity}^c$ **Point:** 船種及びDeadweight(もしくはGT)のみで決定

船種		積載量	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	0.389
Refrigerated cargo carrier		DWT	4600	0.557
Combination carrier		DWT	40853	0.812
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	5739	0.631
Ro-ro cargo ship		DWT	10952	0.637
Ro-ro passenger ship		GT	7540	0.587
Cruise passenger ship		GT	930	0.383

$$CII_{\text{基準値}} = \frac{100 - Z}{100} CII_{\text{Ref}}$$

表: 削減率 (Z%)は2019年における船種ごとのCII平均値(リファレンスライン)からの削減率を示す

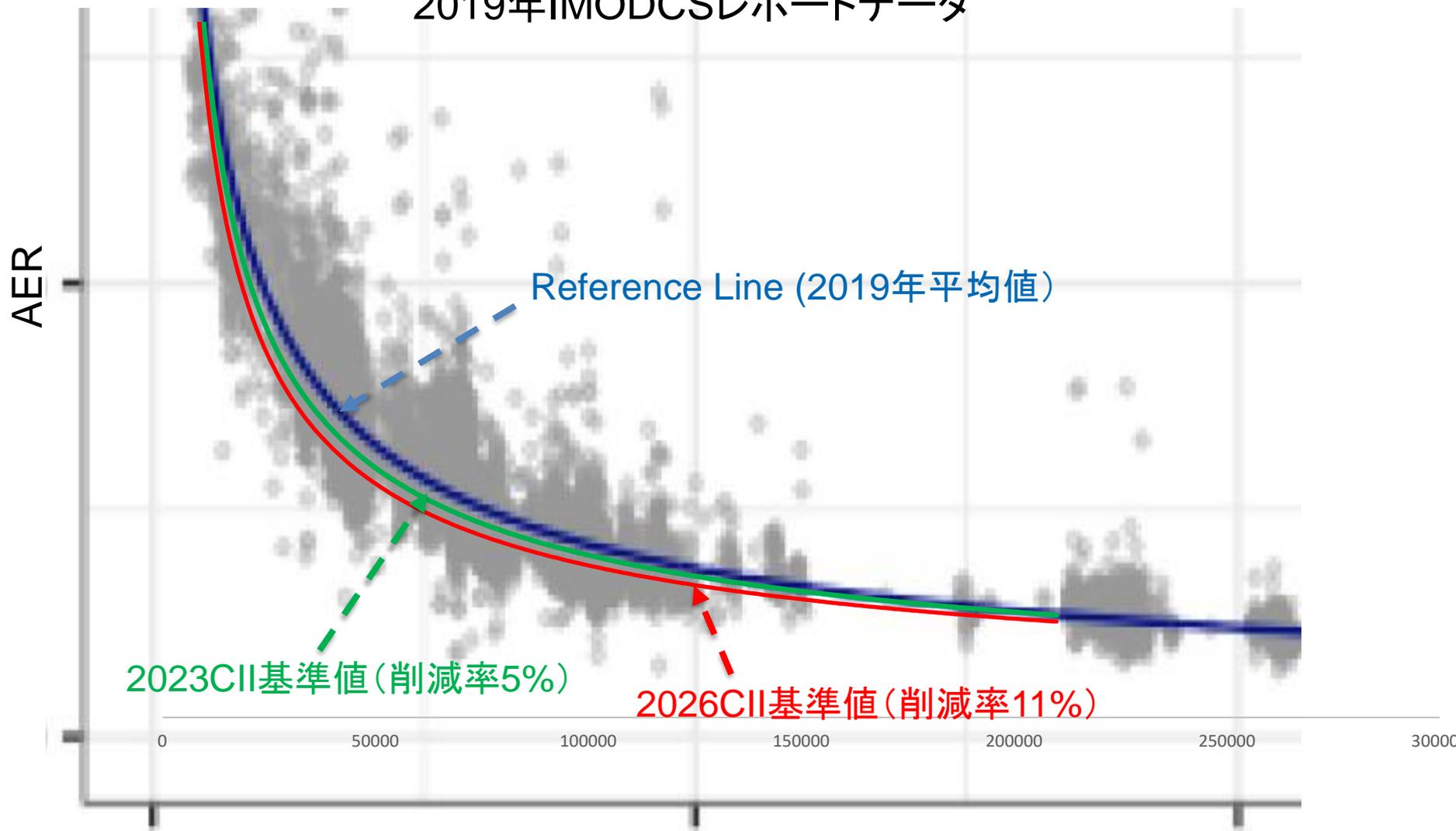
2019年に比較した年ごとの削減率

年	削減率(Z)
2023	5%
2024	7%
2025	9%
2026	11%
2027	**
2028	**
2029	**
2030	**

削減率Zは2023年より適用開始され、毎年2%ずつ加算される。

2027-2030年の削減率Zは短期対策のレビューを考慮し、更に強化される見込み

2019年IMODCSレポートデータ



CII リファレンスライン

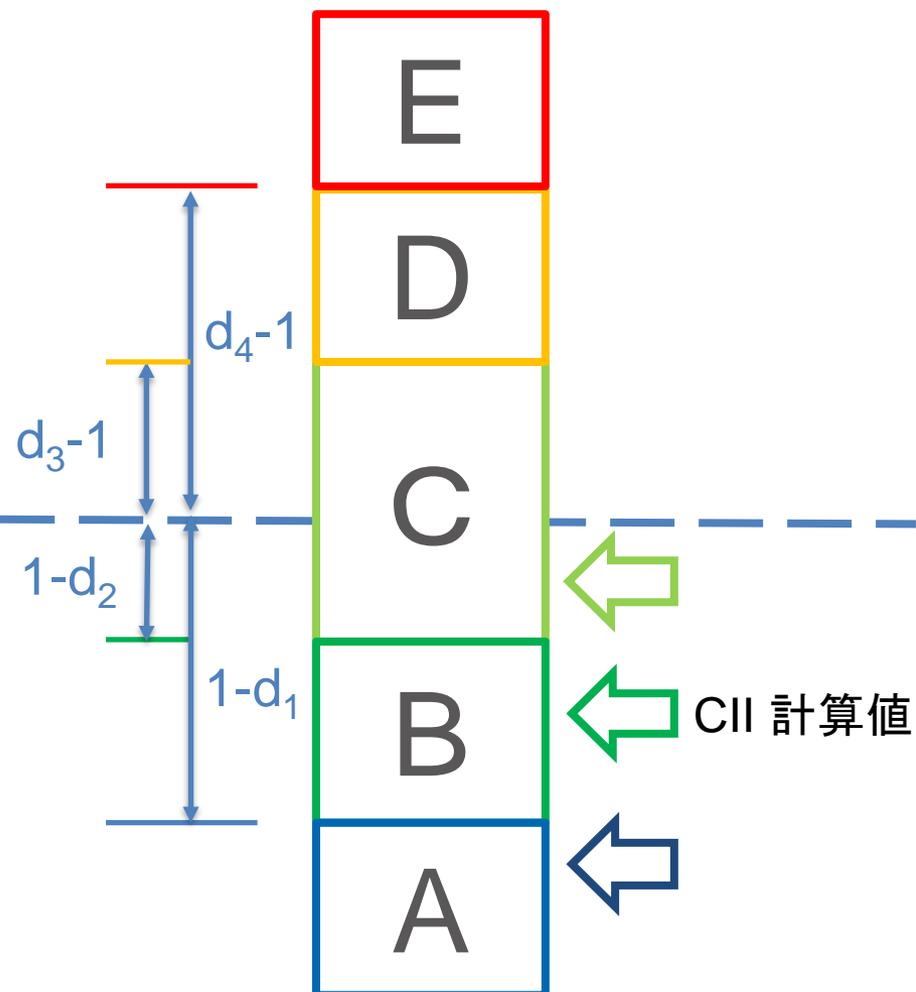
削減率, Z%

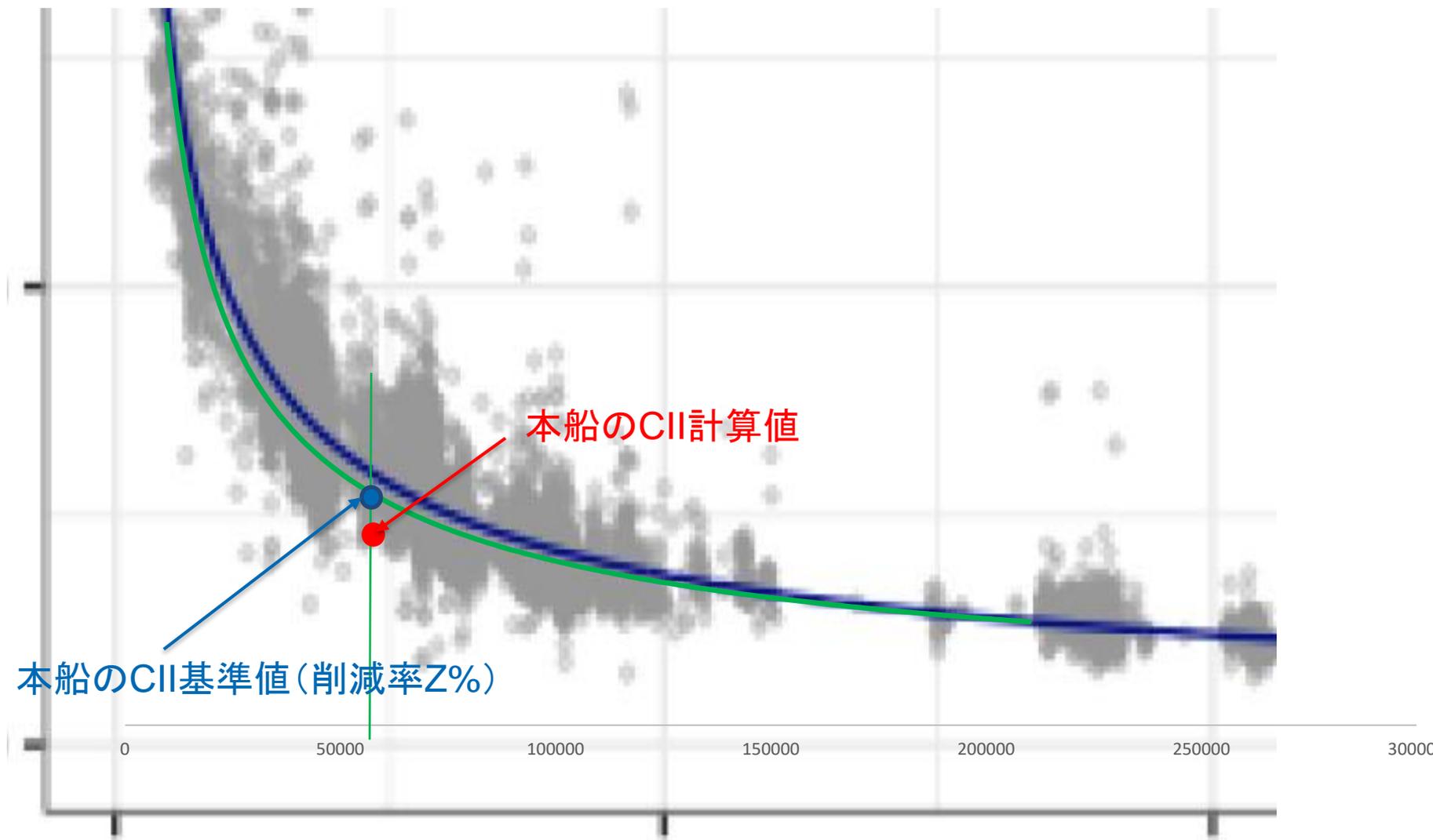
CII 基準値

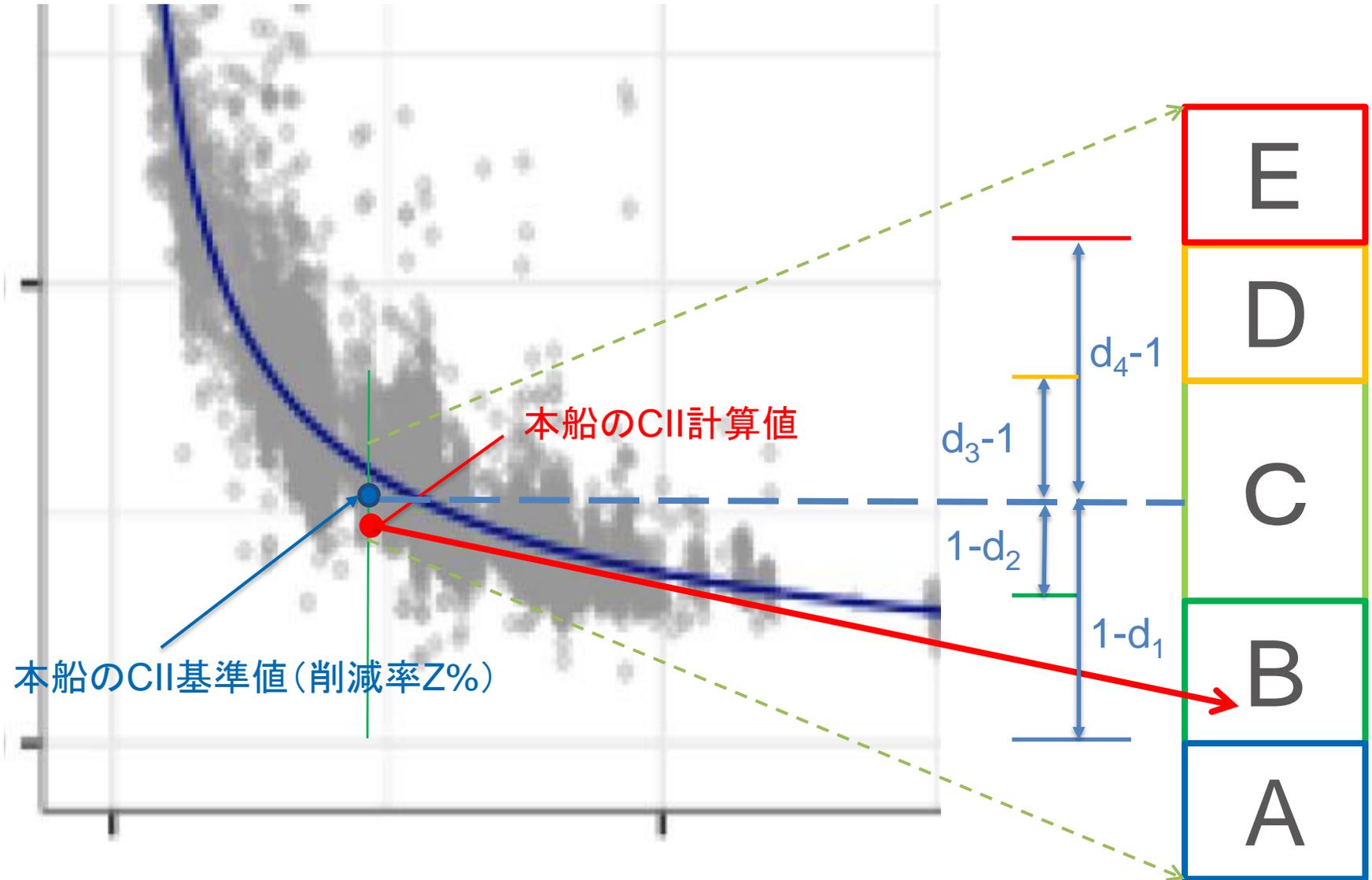
船種ごとのレーティング閾値

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
	<65,000DWT	0.85	0.95	1.06
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
	<100000DWT	0.78	0.92	1.10
Ro-ro cargo ship (VC)	0.86	0.94	1.06	1.16
Ro-ro cargo ship	0.66	0.9	1.11	1.37
Ro-ro passenger ship	0.72	0.90	1.12	1.41
Cruise passenger ship	0.87	0.95	1.06	1.16

CII レーティング







項目	
船種	Bulk Carrier
Deadweight	62,000
Gross tonnage	33,255
航海距離 (NM)	60,045
CO2排出量 (ton)	17,447
Attained CII (G1)	4.69
a (G2)	4,745
c (G2)	0.622
CII ref (G2)	4.96
Required CII (G3, 2023)	4.71
Attained CII / Required CII	0.99
格付け (2023)	C

データはIMO DCS燃費報告より
(2023年より開始)

格付け (2023年の削減率)

$$\begin{aligned} \text{Attained CII (g/ton mile)} \\ &= \frac{17447 \text{ (ton)}}{62000 \times 60045 \text{ (ton mile)}} \times 10^6 = 4.69 \end{aligned}$$

$$\text{CII ref} = 4745 \times 62000^{-0.622} = 4.96$$

$$\text{CII基準値} = 4.96 \times \frac{100-5}{100} = 4.71 \text{ (2023)}$$

$$\frac{\text{CII計算値}}{\text{CII基準値}} = 0.99 < d3 \text{ (1.06)}$$

項目	
船種	Bulk Carrier
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a (G2)	4,745
c (G2)	0.622
CII ref (G2)	4.96

本船の排出スコアが同様の場合、格付けは年ごとに悪化する

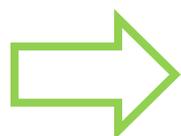


報告年度	削減率 (%)	Required CII	格付け
2023	5	4.71	C
2024	7	4.61	C
2025	9	4.51	C
2026	11	4.41	D

以下については通信部会（CG）で更なる検討；

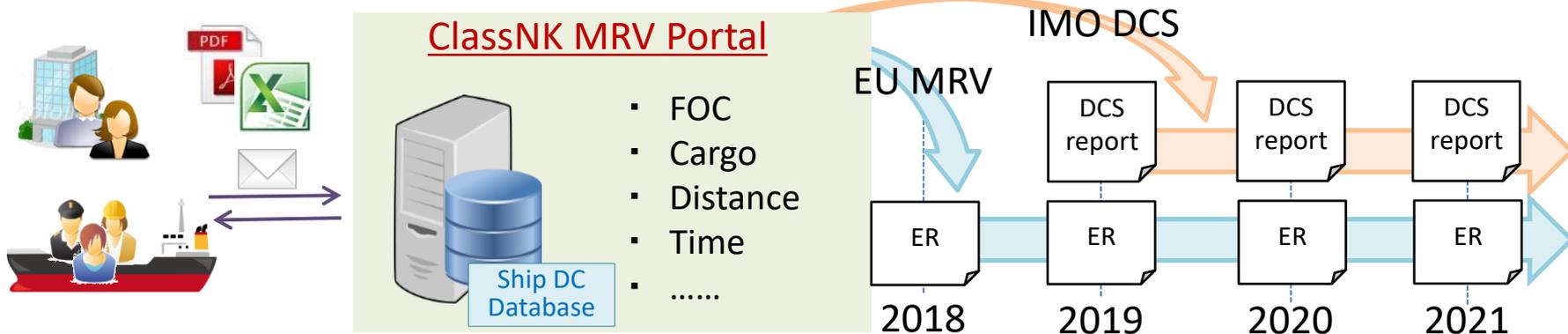
1. CII計算時の修正係数及び航海の除外要件
 - 冷蔵コンテナ、ヒーティングコイルの使用電力分など
 - 氷海中航行、レスキュー活動など
2. SEEMP見直し（手順・書式）
 - 定期的審査の手順
 - CII関連の記載内容

※ 2022年中に承認取得が必要



関連情報については、ClassNKテクニカルインフォメーションなどにて随時お知らせします

ClassNK MRV PortalのCII対応について



- IMODCS及びEUMRV認証のために、本船や第3者ソフトから燃料使用量等のデータを送信し、Web上で管理
- 年間レポート(EUMRV ER及びIMODCS Annual report)の作成提出
- NKによる認証取得

Port	Cargo	Distance and time	Fuel				
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: **1**

Distinctive number or letters: **HDDW**

IMO Number: **9099999**

Port of Registry: **PANAMA**

Gross Tonnage: **160068**

THIS IS TO DECLARE:

1. That the ship has submitted to this Administration the data required by Regulation 23A of Annex VI of the Convention, covering ship operations from **January 1, 2021** through **April 28, 2021**; 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 **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**

(Signature of duly authorized official issuing the Confirmation)

R.O.: **NKK**
SOC: **10067**

- CII格付けがIMO DCS年間報告書へ追加される。
- データ報告や認証における追加作業は基本的に発生しない。

IMO DCS年間報告書

Reporting period	
Start date	2020/02/13
End date	2020/12/31
Ship Particulars	
Name of ship *	
IMO No. *	
Company *	
FLAG / PORT *	Singapore / Singapore
Distinctive number or letters * (Call sign / Official Number)	5VJ000 / 401901
Ship type *	Gas Carrier
Gross tonnage *	48122
Net tonnage *	14437
Deadweight *	54823
EEDI (gCO ₂ /t.nm) *	5.85
Ice class (if applicable)	
Power output (rated power)(kW)	Main Power Propulsion * 13000
	Auxiliary Engine(s) * 4110
	(Please input the total output of all the Auxiliary Engines. e.g.
Consumption Data	
	Actual reported value
Distance Travelled (nm)	79536
Hours underway (h)	5281
	Diesel/Gas Oil (Cf:3.206)
	631
	LFO (Cf:3.151)
	0
	HFO (Cf:3.114)
	7987
	LPG(Propane) (Cf:3.000)
Fuel oil consumption (t)	
	LPG(Butane) (Cf:3.030)
	LNG (Cf:2.750)
	Methanol (Cf:1.375)
	Ethanol (Cf:1.913)
Method used to measure fuel oil consumption	method using Bunker Fuel Oil Tank Monitoring

CII結果



CII	
Attained CII	6.17
Required CII	7.23
CII格付け(2023)	B



改善計画 (格付け“E”又は3年連続“D”)

- 実施する改善処置を一覧(最適航路, Just in time, プロペラクリーニング, etc.)から選択
- 自動的に改善計画の書面を作成



条約上の要求事項はこれで満足

- CII格付け推定機能を実装中

Ship: NK Bulker
Year: 2018 Exclude Submitted voyage Search

各船の航海データ

Showing records per page: 50
1 - 4 / 4

Error Mark	V.No.	Departure		Arrival	
		Dep.Time(UTC)	Port	Arr.Time(UTC)	Port
<input checked="" type="checkbox"/>	80	2018/08/09 13:42	El dekkeila	2018/08/11 20:12	2018/08/17 03:52 GREEK
<input checked="" type="checkbox"/>	81	2018/08/17 03:52	GREEK	2018/08/27 13:54	2018/08/30 23:18 Schiedam
<input checked="" type="checkbox"/>	81	2018/08/30 23:18	Schiedam	2018/08/31 12:42	2018/09/25 14:24 Calais
<input checked="" type="checkbox"/>	82	2018/09/25 14:24	Calais		2018/10/20 18:12



CII格付け評価

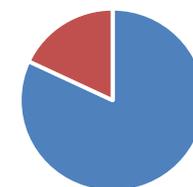


必要に応じ、格付け見込みを容易に確認可能

- 配下船データの見える化

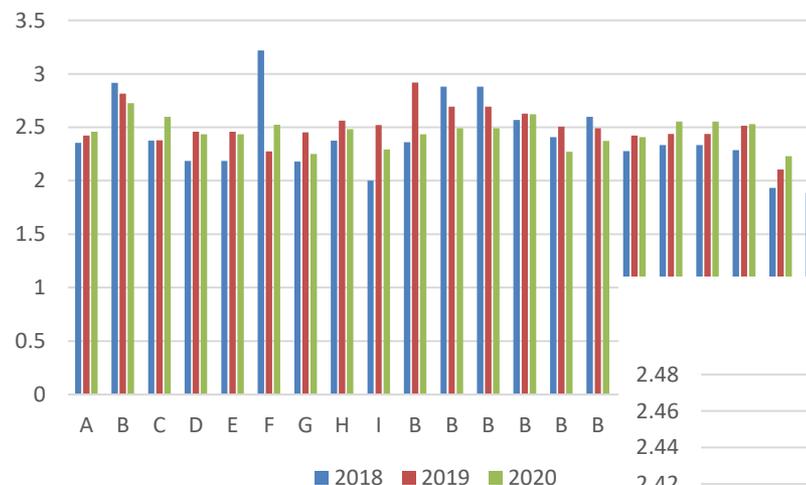
船舶	Attained CII (Required CII) 2019	Attained CII (Required CII) 2020	Attained CII (Required CII) 2021	Attained CII (Required CII) 2022
NK Bulker	3.47 (3.22)	3.52 (3.15)	3.43 (3.09)	3.22 (3.05)
NK Maru	...			
...	...			
...	...			
...	...			
...	...			
...	...			
...	...			

FOC breakdown (all fleet)

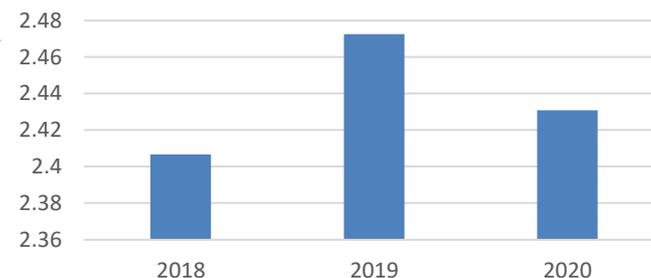


■ At sea ■ In port

Attained CII (All fleet)



fleet CII Average



管理全船のCII結果や関係データを確認可能
更なる分析のためにデータをダウンロード可

- CIIのレーティングがE(もしくは3年連続D)の場合？

規則要求:改善計画の提出・承認→ClassNK MRV Portalで作成

- 実際にAttained CIIを下げるには？

$$\text{Attained CII} = \frac{\text{Fuel Consumption} \times \text{Carbon factor}}{\text{Deadweight(or GT)} \times \text{Distance sailed}} \text{ (g/(ton} \cdot \text{mile))}$$

手段	コスト	効果	備考
代替燃料	高	高	先行投資費用大 インフラ次第か？
低摩擦塗料や省エネデバイス (ハードウェアの改善)	中	低 個船次第	改善の余地があるか事前検討が重要
ウェザールーティン, Just in time等	低	低 個船次第	改善の余地があるか事前検討が重要
減速運航	低	中	現状から更なる減速が可能か？

運航結果の分析と費用対効果の検討が重要。

• ClassNK MRV PortalでのCII分析

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

• 解析Items

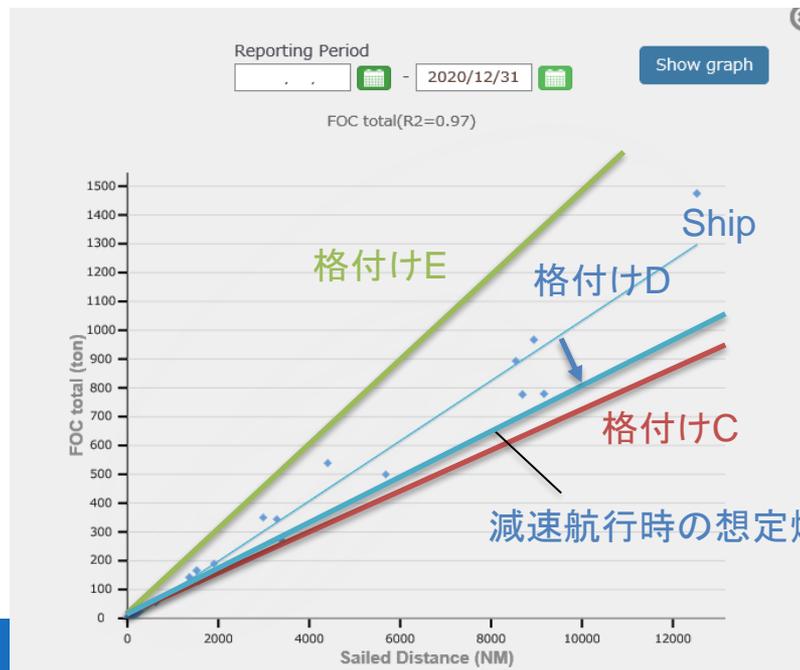
- At sea / In portのFOC内訳・評価
- 稼働率の評価
- 外乱影響(波・風)の割合を概算
- 減速時の改善効果の試算



- どの程度改善する必要があるか？
- 最適運航の追求によりレーティング向上の余地があるか？
- ハードの改善まで必要か？
- どの程度の減速航行でレーティングが向上可能か？



- ClassNK MRV Portalの新機能で見える化
- 船社殿の意思決定を支援



- ClassNK MRV Portalの更新までの一時的な対応として、CII計算シート(excel)をウェブサイトに公開
- IMO情報の更新に応じ、SEEMP改訂に関わるサポート情報を提供

CII計算シート

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
	Gross Tonnage	48122
Fuel Consumption (ton)	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

IMO DCS / SEEMP情報

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Products & Services

- Classification Services
- Web Service Portal
- International Activities
 - Common Structural Rules for Bulk Carriers and Oil Tankers(CSR BC & OT)
 - Common Structural Rules for Bulk Carriers (CSR-BC)
 - Common Structural Rules for Double Hull Oil Tankers (CSR-OT)
- ClassNK Archive Center
- Statutory Services

Statutory Services

IMO DCS and SEEMP

Introduction

Amendments to MARPOL Annex VI that makes the data collection system for fuel oil consumption of ships mandatory were adopted at 70th session of the Marine Environment Protection Committee (MEPC 70) held in October 2016, and has already entered into force from 1 March 2018 (IMO Resolution MEPC.278(70)). According to this regulation, for ships of 5,000 gross tonnage and above engaged in international voyage, the data collecting and reporting will be required from the 2019 calendar year. ClassNK will conduct the relevant document review and issuance of the statement of compliance subject to the authorization from Administration.

This page provides information for the preparation and submission of the SEEMP (Data Collection Plan) for verification as well as Data Collection, aggregation and reporting for fuel oil consumption and also the general explanations of the requirements on data collection system (hereafter IMO DCS) and the relevant procedures for its implementation.

1. Application

IMO DCS applies to ships of 5,000 gross tonnage and above, for which the Ship Energy Efficiency Management Plan (SEEMP) is required to be retained on board. (It is not applied to ships not propelled by mechanical means, and platforms including FPSOs, FSUs and drilling rigs, regardless of their propulsion.)

2. Requirements of IMO DCS and implementation schedule

The following requirements are applied.

1) Review of the revised SEEMP by the Administration or Recognized Organization (RO), issuance of Confirmation of

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

お問い合わせ窓口

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GHG部 DCS部門

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