



One Integrated Solution
connecting traditional, maritime service domains

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Digital Ship Conference, Bergen.
Bergen | November 21st 2023





NAVTOR

Agenda:

- 1) $1 + 1 + 1 = \text{ONE (!)}$ What are the benefits with a Cross Domain Solution?
- 2) “ONE” to utilize AI for Safe and Efficient Navigation?
 - The **DYNAPORT Project**: Using ML / AI in JITA (Just in Time Arrival)
 - The **GASS-project** (prop.): Detailed Predictions of Fuel Consumption by Digital Twin



NAVTOR and Voyager Worldwide to Merge in Landmark Industry Combination

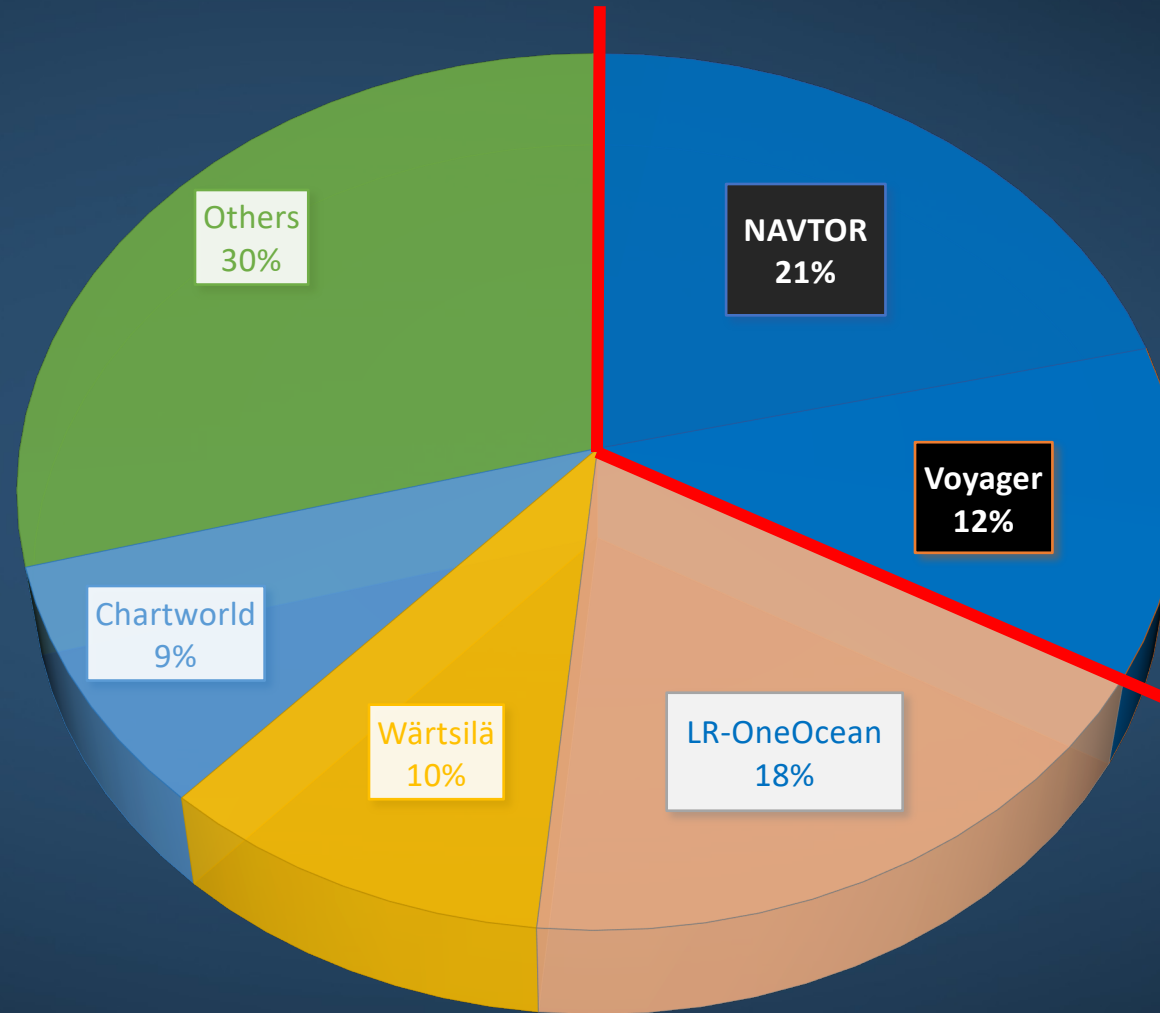
Merger Will Create Global Market Leader in Maritime Technology Industry

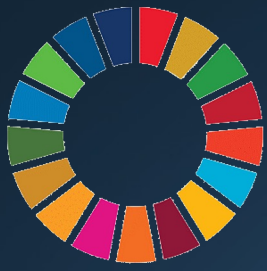


November 9, 2023



Marketshare: e-Navigation, ENC is 21% + 12% = 33%





NAVTOR's main Contributions to Sustainable Shipping



e-Nav / Safe navigation

Efficient navigation
Performance + Optimization



**Sustainable
Shipping**

ONE Integrated and Agile Solution

Sustainable shipping, combining SAFE and EFFICIENT Navigation

Fundament is e-
Navigation

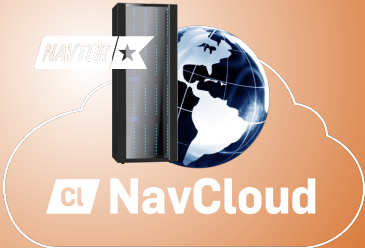
DATA
HARVESTING
by
Partners



St NavStation
ONBOARD UI



Bx NavBox
EDGE



Cl NavCloud

Monitoring &
Advisory
Services



Fv NavFleet
ONSHORE UI

VERIFIER
by
Partners

IMO DCS
EU/MRV
ETS
SDG
REPORT
SLF*

On Board

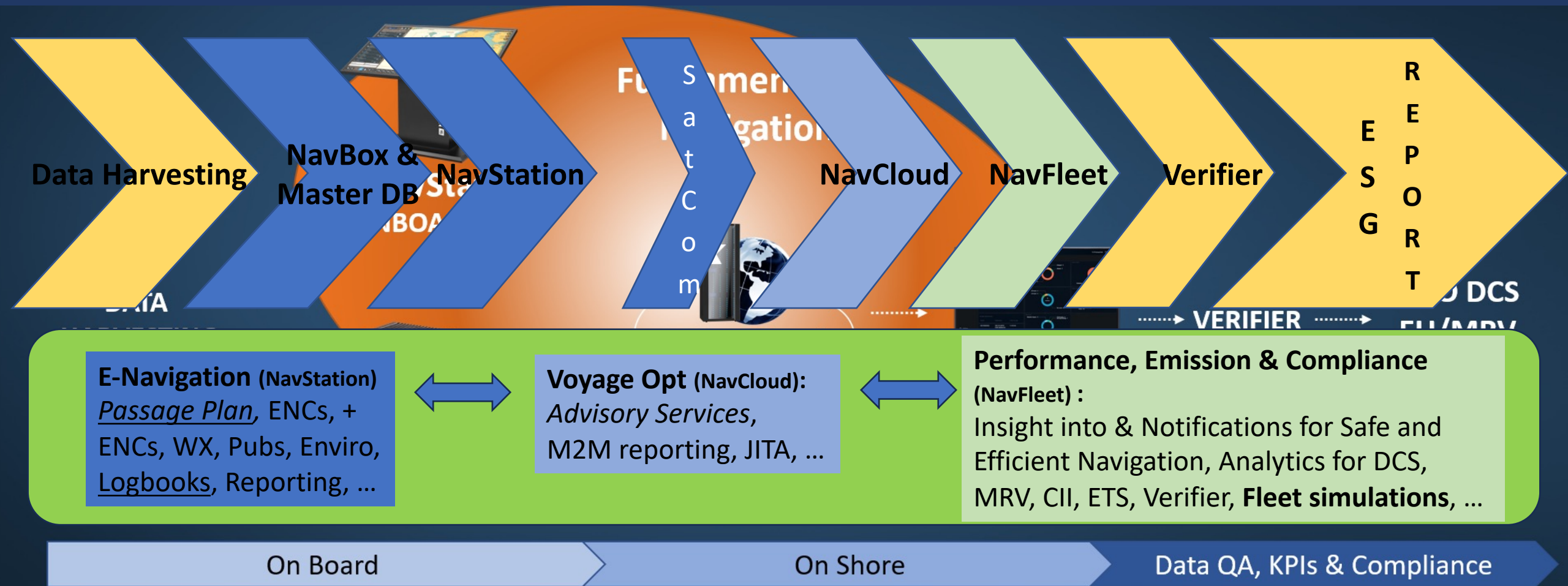
On Shore

Data QA, KPIs & Compliance

*Sustainability-Linked Finance



“ONE”: a Production Line for Sustainable Compliance



ONE Integrated and Cross Service Domain Solution



E-Navigation (NavStation)
Master-DB, Passage Plan, Pubs, Enviro, Logbooks, Reporting, ...

DNV
 Technical and Regulatory News
 No.27/2023

Mediterranean SOx ECA, and heavy fuel oil ban in the Arctic

Relevant for ship owners and managers as well as flag states.

Two new MARPOL regulations dictating fuel properties are due to take effect in 2024 and 2025. This includes the

Performance, Compliance (NavFleet):
 Monitoring, Insight and Notifications for **Safe & Efficient Navigation**, Analytic EUAs (prognosis & status), Fleet- and Fleet simulations, ...

1

+1

+1

=

ONE

NavFleet v1.8 (v1.9: ETA Dec 19th 2024..)

NavFleet **NEW RELEASE!**

Voyage and Vessel Monitoring - Increase your situational awareness:

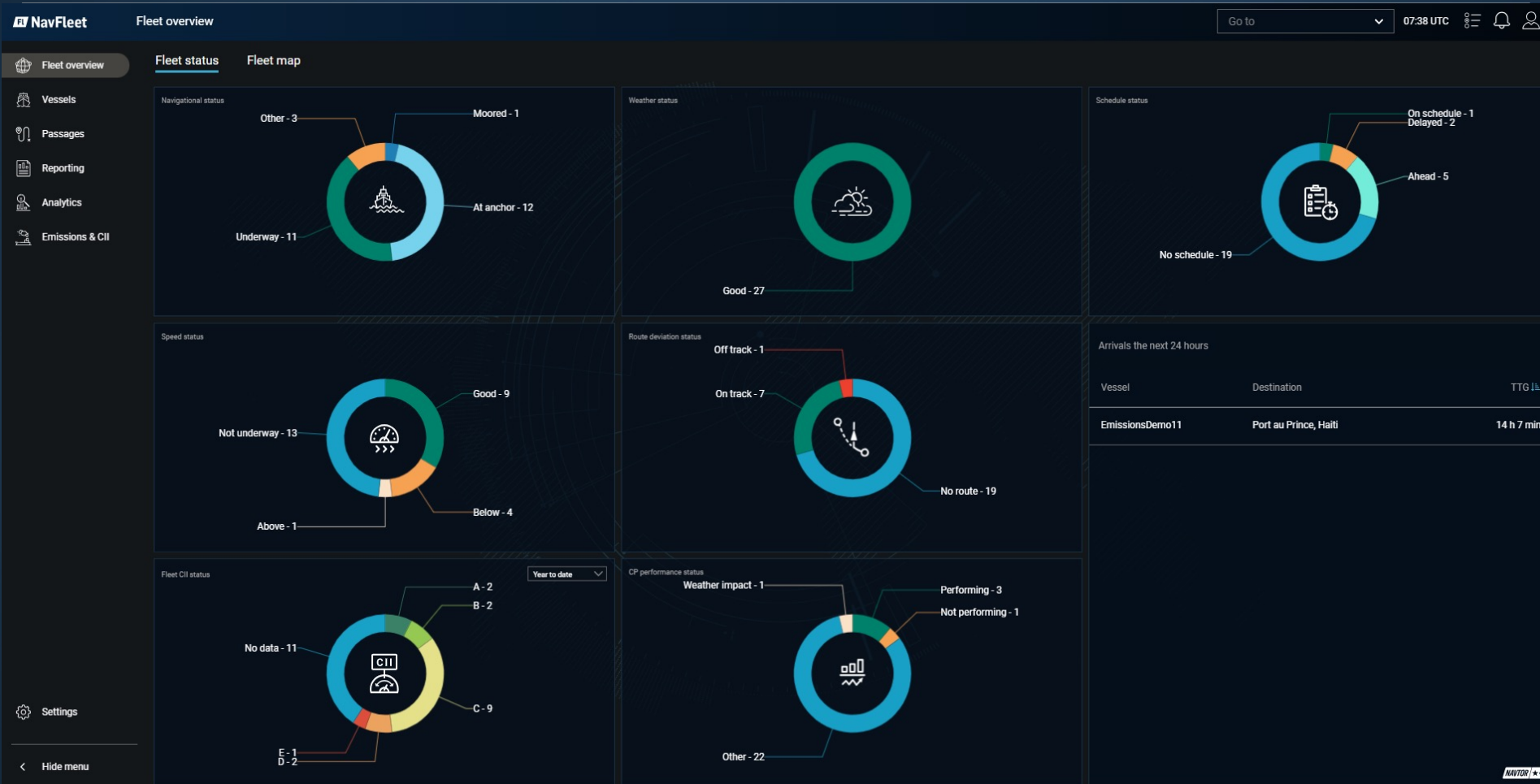
Reduce costs, improve insights, enhance safety and minimize emissions

MONITORING: Monitoring of Safe and Efficient Navigation for Vessel, Voyage and Fleet, including Notification service.

PERFORMANCE: Fulfilling all Regulatory Requirements, give insight in KPIs (DCS, MRV, CII, ETS,..) and enable Emission Simulator for Vessel and Fleet.



Voyage and Vessel Monitoring



Fleet Overview Dashboard

- Instant overview of current voyage and vessel related status

NavFleet 1.8

Emission & CII module

NavFleet Emissions & CII / [Dropdown] Go to [Dropdown] 07:28 UTC [Icons]

Fleet overview Overview Emissions Period: Year to date Show trends Compare with... Export

General KPIs

Metric	Value	Change
CII Rating	B	
CII (gCO ₂ / (DWT x NM))	6.23	+ 4.4%
AER (gCO ₂ / (MT x NM))	6.85	+ 20.3%
EEOI (gCO ₂ / (MT x NM))	17.3	+ 0.6%
Accumulated & Average Emissions - CO ₂ (MT)	12 913	+ 13.5%
SO _x (MT)	19.8	+ 13.7%
NO _x (MT)	262	+ 13.6%
PM (MT)	17.9	+ 13.5%
Methane (MT)	201	+ 1186.8%

Reported status: CII, AER, EEOI

Show: Reported status Idle periods Perf. events Attained CII Target CII

Activities breakdown

- At sea: 52%
- At port: 32%
- Anchored: 9%
- Maneuvering: 8%
- Total idling: 40%

Total distance: 49283 NM (+ 13.2)

Emissions: CO₂, SO_x, NO_x, PM, Methane

Conditions: Cons., Speed, BF, Draught

Average conditions

Consumption	42.2 MT/24h	+ 13.2
Speed	12.2 knt	+ 13.2
BF	5	+ 13.2
Draught	6.2 m	+ 13.2

Hide menu

The dashboard features three main time-series charts: 1) Reported status: A stacked area chart showing vessel status (At sea, At port, Anchored, Maneuvering, Total idling) and CII performance against a target line. A tooltip for Sunday, Jun 4, 14:00 shows CII: 6.22 gCO₂ / (DWT x NM). 2) Emissions: A line chart showing CO₂ emissions (MT) over time. A tooltip for Sunday, Jun 4, 14:00 shows CO₂: 99.07 MT. 3) Conditions: A line chart showing Consumption (MT), Speed (knt), BF, and Draught (m) over time. A tooltip for Sunday, Jun 4, 14:00 shows Cons.: 30.90 MT and BF: 5.00.

NavFleet 1.8

Vessel Emission Comparison

NavFleet
Go to
07:36 UTC

- Fleet overview
- Vessels
- Passages
- Ports
- Reporting
- Analytics
- Emissions & CII

Overview
Vessel Emissions
Emissions Simulator
Compliance Reports

← Emissions comparison
Period: Year to date
5 vessels ▼
Export

General KPIs						
CII Rating		C	C	C	B	B
CII	gCO ₂ / (DWT x NM)	7.40	6.70	6.57	6.00	6.23
AER	gCO ₂ / (MT x NM)	8.27	7.00	6.86	6.67	6.85
EEOI	gCO ₂ / (MT x NM)	19.5	16.6	14.7	16.5	17.3
EEDI EEXI		0.00	0.00	0.00	0.00	0.00
Emissions						
CO ₂	MT	5 931	11 042	11 595	12 074	12 913
SO _x	MT	9.07	119	143	18.5	19.8
NO _x	MT	120	285	311	245	262
PM	MT	8.20	31.8	36.4	16.7	17.9
Methane	MT	92.5	135	184	63.3	201
Alt. fuels	%	0.00	0.00	0.00	0.00	0.00
Conditions						
Speed	knt	10.6	11.7	13.1	13.3	13.5
Distance	NM	15 503	31 360	32 695	38 640	40 251
Idling	%	70.6	46.2	48.8	40.5	40.4
Laden	%	52.6	69.9	65.8	65.6	54.5
BF		4.20	4.30	4.10	3.90	3.90
Vessel info						
DWT	t	46 228	50 332	51 662	46 817	46 814
GT	t	29 234	29 708	29 433	29 242	29 242
LOA	m	183	183	183	183	183
Vessel class		Aker46kCPP		Hyundai 51k	Aker46k	Aker46k
Build year		2009	2019	2010	2007	2007

NavFleet 1.8

Emission Simulator

New

NavFleet
Emissions & CII

Go to
00:23 UTC

- Fleet overview
- Vessels
- Voyages
- Performance
- Emissions & CII
- Settings
- Hide menu

Overview
Vessels Emissions
Emissions Simulator
Compliance Reports

Save
Edit scenario

All vessels

- MS Kemfjord Mike
- MS Bergen Explorer
- MS Hovden Explorer

Overview
Detailed CII Rating
Prediction parameters

CII Forecast

Year	E	D	C	B	A
2023*	4	3	1	2	3
2024	5	2	1	2	3
2025	4	1	2	6	0
2026	4	7	2	0	0

Forecast and Fleet Alignment

CO2 Emissions

Year	Total emissions
2023*	~5000
2024	~2800
2025	~3200
2026	~3200

Other Emissions

Year	SOx (MT)	NOx (MT)
2023*	~8.5	~3.5
2024	~4.5	~2.0
2025	~5.5	~2.0
2026	~5.5	~2.0

*YTO + prediction for remainder of year

NavFleet 1.8

Emission Simulator

New

The screenshot displays the NavFleet Emissions & CII simulator interface. The main navigation menu on the left includes Fleet overview, Vessels, Voyages, Performance, Emissions & CII (selected), and Settings. The top navigation bar shows 'Emissions & CII' with sub-tabs for Overview, Vessels Emissions, Emissions Simulator (selected), and Compliance Reports. The 'Emissions Simulator' sub-tab has further options: Overview, Detailed CII Rating, and Prediction parameters. A 'Save scenario' dialog box is open in the center, with the following content:

Save scenario

Name of scenario

Decreased speed 0.5 kn

Cancel Save

The background interface shows a 'CII Forecast' chart with a line graph showing CII Rating (A) from 2023* to 2026. Below it is a 'CO2 Emissions' bar chart showing Total emissions, SOx (MT), and NOx (MT) from 2023* to 2026. A 'Forecast and Fleet Alignment' chart is also visible on the right. The bottom right corner of the interface includes a note: '*YTD + prediction for remainder of year'.

NavFleet 1.9 (ETA end of 2023) :

EU Allowance (EUA) – incl.

- EUA Voyage Estimator
- EUA Voyage Statement

Vessel name IMO 12345

Voyage details

Distance 0 NM

Voyage between DOAES and DEIAM

Include idle time 2 hrs 2 min

Vessel details

Draught 5.2 m

Avg. speed 12.8 kn (Economic speed)

Extra consumption

EU ETS calculation

EUA price 55.337212105253364 EUR

Description

For vessel MS BERGEN EXPLORER, addressed to Mr.Hjøllø. Voyage number 1242. Estimated on 16 Nov 2023.

SUMMARY

EUAs **110**

Cost **9482 EUR**

Expected CII **4.32** 0.1%

Total distance **2415 NM**

Total consumption **188.55 MT**

Total duration **200**

General

Total distance 2415

Distance in ECA 917

Total duration 200

Sailing time 100

Idling time 100

Past 12 months CII **C** 1.1

YTD CII **C** 1.1

Consumption

	Total	2024 Phase-in	EUAs	Cost
Total	2415			
Main engine	123.42	40%	110	EUR 9482
Auxiliary engine	59.72	0%	0	EUR 0
AB	0.21	0%	0	EUR 0
Outside ECA	116.95			
Inside ECA	71.59			

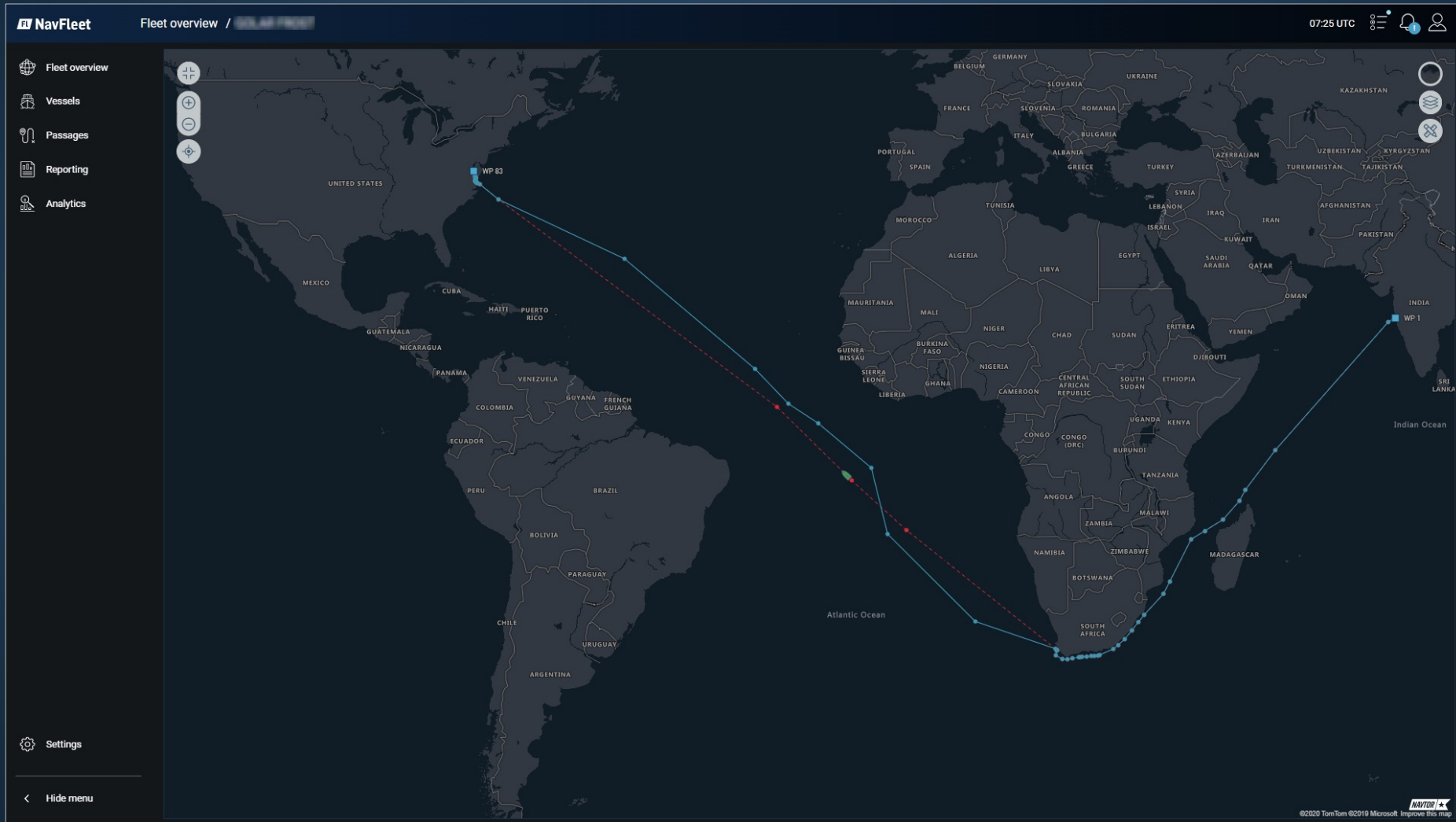
Emissions & ETS

EU ETS type --

Type of emissions	Total	Intra-EU	2024 Phase-in	EUAs	Cost
Co2	593.7 MT	50% 286.3 MT	40% 110.6 MT	110	EUR 9482
Methane	12.7 MT	0% 0 MT	0% 0 MT	0	EUR 0
Nox	3.7 MT	0% 0 MT	0% 0 MT	0	EUR 0
Total	610.1 MT			110	EUR 9482



Monitor active ECDIS route and compare with active Passage Plan



Passage Monitoring

- Monitored route from ECDIS* (red dotted line) is automatically displayed in NavFleet for easy comparison with approved passage plan (blue line)
- If the ECDIS route is changed on board it will also be updated automatically in NavFleet

**Automatic route exchange available with current ECDIS systems::*

JRC JAN-72/92xx MFD ECDIS Series

Furuno FMD-32/33xx ECDIS Series



NavFleet 1.9 (ETA end of 2023): ENC tiles in NavFleet

New



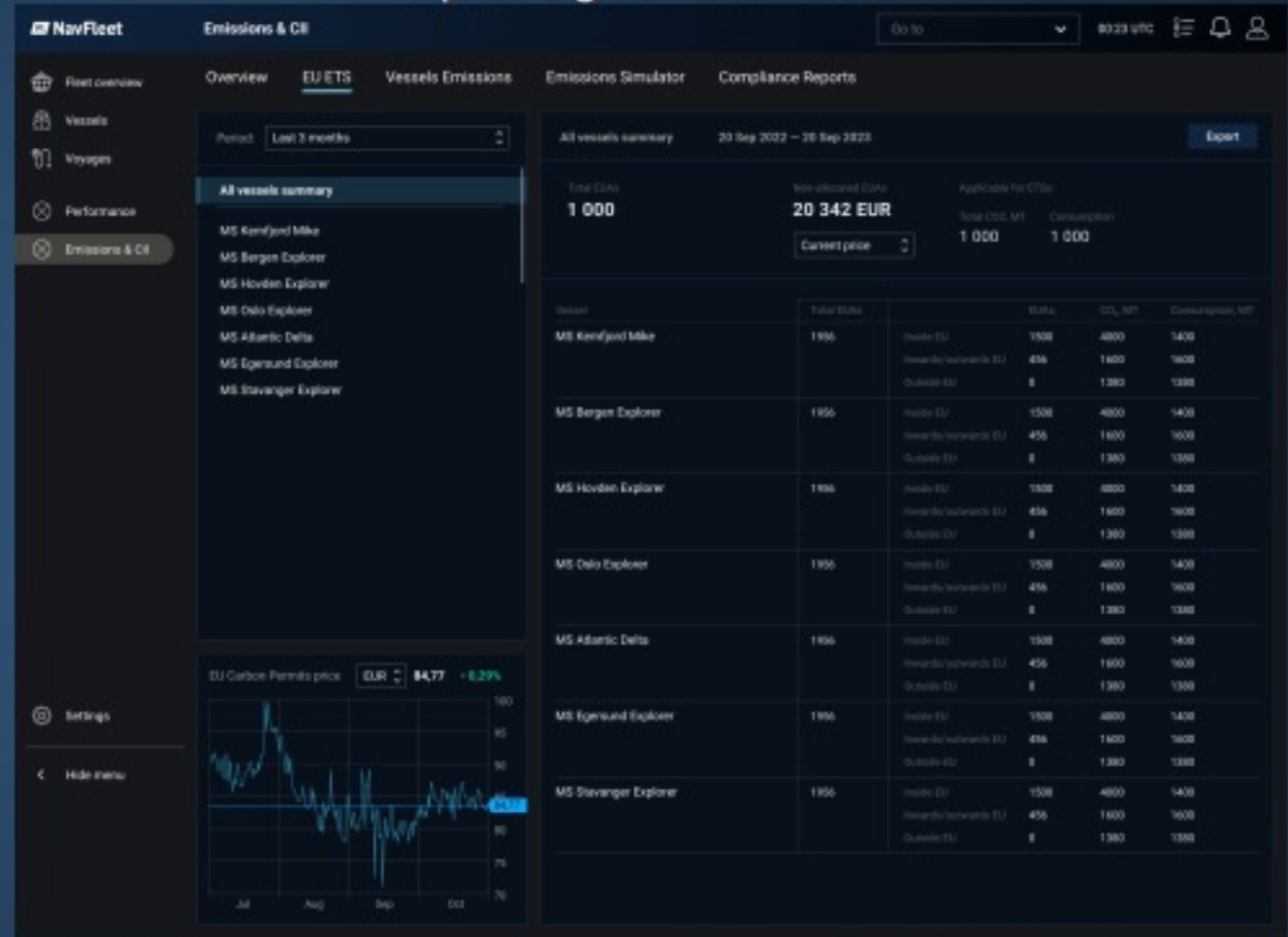
NavFleet 1.9 (ETA end of 2023): ENC tiles in NavFleet

New

Next release will contain:

- EU ETS Dashboard
- ENC Layer
- XTD Limit Visualization
- Tsunami Warning
- Environmental Layer
- Fuel Metrics in Emission and CII

Upcoming EU ETS Solution



Digital Ship
CONFERENCE BERGEN
GRIEGHALLEN, BERGEN
21st November 2023

Is the “Digital Ship”
sailing today...?





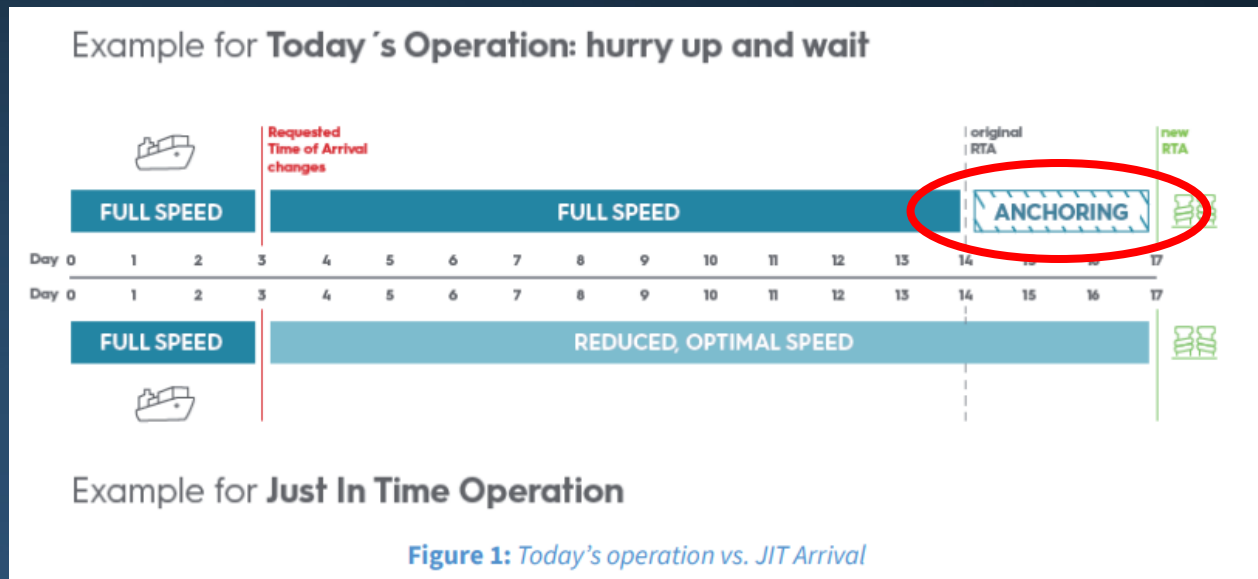
Some problems takes a long time to solve..

Father and Mother In-law waiting 1-2 weeks in anchorage area outside Recife, Brazil in 1963.. Exactly same today.

NAVTOR's ongoing R&D efforts aiming to support JITA by combining our

“One Integrated Solutions”

+ ML/AI/Digital Twin




The concept of JIT Arrival of ships allows for ships to optimize their speed during the voyage in order to arrive at the Pilot Boarding Place (PBP) when the availability of Berth, Fairway, Pilot and Nautical services are ensured.

CHALLENGES today:

- 1) Optimization of the port call business process
- 2) Iteration of JITA by a common reporting standard ("ISO 28005")


NAVTOR contributes to EFFICIENT Navigation by preparing vessels to facilitate JIT Arrival

Shortcuts



Show charts


Publications




Admiralty Total Tide



Admiralty Digital List of Lights



Admiralty Digital List of Radio Signals Vol 2



Admiralty Digital List of Radio Signals Vol 6



Admiralty Digital List of Radio Signals Vol 1,3,4,5




Admiralty e-Nautical Publications




e-Publications Reader

Planning



Passage planning




User Layers

Weather



Weather overlay




Weather time series



OSR

Operational




Reporting



Manoeuvring Assistant


Services




Automatic Identification System



NavArea navigation warnings




Environmental Regulations




Ports


System



User manual



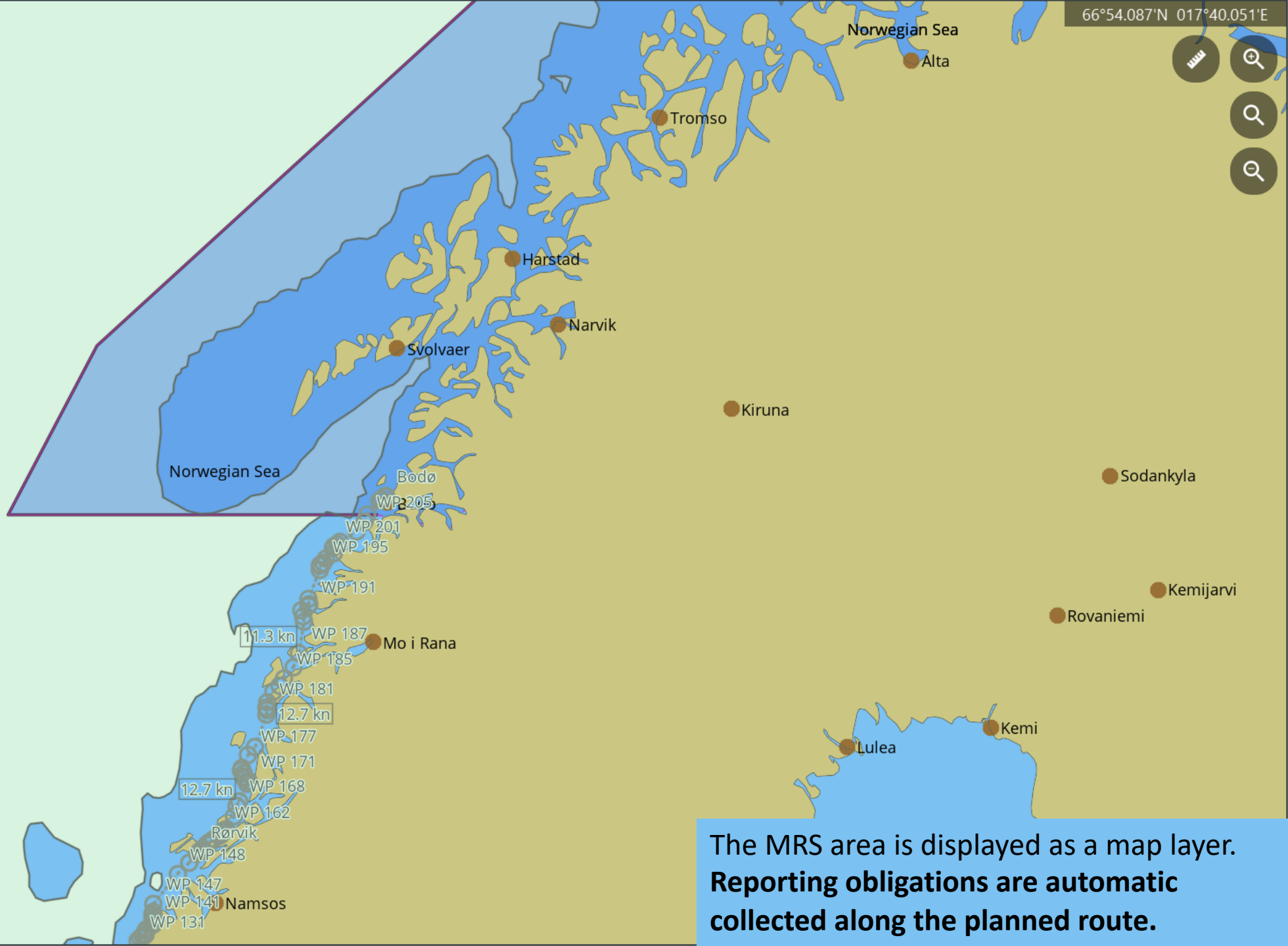
Status



Configure



The onboard NavStation Desktop with the “Reporting” feature



The MRS area is displayed as a map layer. Reporting obligations are automatic collected along the planned route.



MRS reporting

AMVER reporting

MRS reporting

Default values

POLARLYS_Bergen-Bodø

Collect reporting obligations

MRS reports: BARENTS SRS

ID	Value	Description
E	Course: 021.1°	True course. A 3-digit group
F	Speed: 0.0kn	Speed in knots and tenths of knots. A 3-digit group
H	Date and time entering MRS: 20.03.2022 11:10 UTC Latitude entering MRS: 67°10.000'N Longitude entering MRS: 014°03.300'E	Date, time and point of entry into system. Entry time expressed as in (B) and entry position expressed as in (C) or (D)
I	Destination port: Bodo Destination port code: NOBOO Destination ETA: 20.03.2022 12:05 UTC	
O	Present static draught: 5.1m	

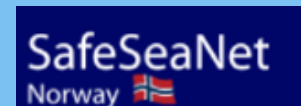
- Edit
- Refresh
- Print
- Send

Reporting requirements for the BARENTS MRS are **automatic populated and presented.**

The report is populated based on:

- *Vessel static data*
- *Voyage related data*
- *Sensor data*

When completed, sent to the MRS via the Norwegian Maritime Single Window:



OVERVIEW (244)

SHOW FILTER

+ NEW SHIP REPORT

- 17.03.22
 - POLARLYS 171941UTC MAR 2022 BarentsSRS • Advance
 - BERGEN S... 171714UTC MAR 2022 BarentsSRS • Advance
 - BERGEN S... 171558UTC MAR 2022 BarentsSRS • Advance
 - CLEAN HO... 171521UTC MAR 2022 BarentsSRS • Current
 - BERGEN S... 171446UTC MAR 2022 BarentsSRS • Current
- 14.03.22
 - BERGEN S... 141002UTC MAR 2022 BarentsSRS • Current
 - BERGEN S... 141002UTC MAR 2022 BarentsSRS • Current
 - BERGEN S... 141002UTC MAR 2022 BarentsSRS • Current
- 11.03.22
 - PEGASOS 110010UTC MAR 2022 BarentsSRS • Completed
- 10.03.22
 - BORIS DAV... 102133UTC MAR 2022 BarentsSRS • Current
- 18.02.22
 - OLYMPIYS... 180455UTC FEB 2022 BarentsSRS • Current
 - DOGAN 180015UTC FEB 2022 BarentsSRS • Advance

Ship Report: POLARLYS / → Bodø

MAIL REPORT EDIT REPORT

🕒 17.03.22 21:47

Ship Report System: BarentsSRS Class: NE - North East Lane Status: Advance

- A Name: POLARLYS - Callsign: LHYG - IMO Number: 9107796 - MMSI Number: 259322000
- B Date/time of Ship Report: 171941UTC MAR 2022 🗓️
- C Latitude: 60°32.58N - Longitude: 004°56.46E
- E Course: 341°
- F Speed: 0.00 kts
- G Last Port:
- H Entry Date/Time: 201010UTC MAR 2022 🗓️ - Position: - Latitude: 67°10.00N - Longitude: 014°03.41E
- I Next Port: Bodø - NOBOO - ETA at Next Port: 201105UTC MAR 2022 🗓️
- O Current Draught: 5.1 m
- P IMO Cargo Type: - Description: Unknown IMO cargo type code
- Q Defects/Limitations: Navigation: OK
- T Vessel Representative: Email:noreply@kystverket.no, Inmarsat:, Iridium:+47 99999999, MobilePhone:+47 99999999, Telephone:+47 99999999, Preferred communication:Email
- U IMO Type: Unknown - DWT: 1150 - GT: 11341 - Year Built: 1996
- W No. Persons on Board: 368
- X Other Relevant Information:

VOYAGE SUMMARY 🗒️ VIEW DETAILS →

📍 POLARLYS
LHYG Unknown

VOYAGE - UNKNOWN STATUS ⚙️ END VOYAGE



🚩			
123.0 m	19.5 m	11 341.0	5.1 m
LOA	BEAM	GT	DRAUGHT
15.3 kts	354.0°	Under way using engi...	
SOG	COG	NAV. STATUS	

+ NEW REMARK

Finally, the Report is presented in the real VTS Operator Station



My main aim here today is to focus on how crucial **COLLABORATION** is for **DIGITALIZATION** of the shipping industry to achieve **UN Sustainability goals** ...and the related financial and efficiency benefits for Shipping

Two projects where NAVTOR has demonstrated **Real Automatic Ship-Shore reporting by ISO Standards:**

- 1) **MRS Reporting** in **SESAME** (Proj. lead Kongsberg NC)
- 2) **Cyber Security** in **CySIMS** (Proj. Lead: SINTEF Ocean)

Workshop on ship-shore digital information exchanges and the use of international standards

At BIMCO HQ, Denmark



The goal of DYNAPORT is to develop new optimization and coordination tools for ports and ships that both **reduce the ship's fuel consumption** and **increases port efficiency** with at least 10%.

The tools will be built on information sharing **through internationally accepted protocol standards** and communication systems.

But less time for catching Sharks...

NVT will focus on:

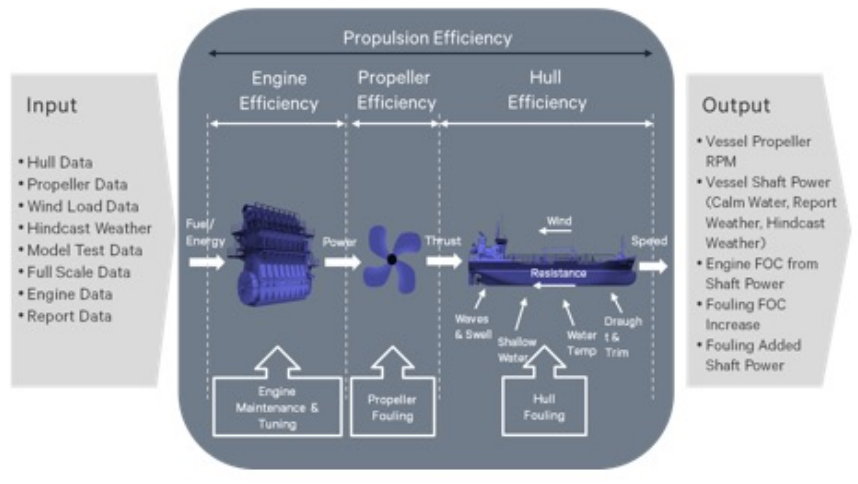
- 1) Utilizing IMO mandatory machine2maschine MSW reporting (ISO28005).
- 2) **Just In Time Arrival (JITA) to Port -> Terminal**
- 3) Optimization of Ship Voyage/Weather Optimization and Port Call



PRODUCT = Platform + Service

Illustration of ship modelling per today and factors influencing performance

Overview of Propulsion Model



Data-driven approach to shipping decarbonization

- GASS directly targets the inefficient use of energy onboard ships due to non-optimized voyage planning and execution.
- GASS will apply **Machine Learning (ML) algorithms & Digital twin (DT)** technology to provide the maritime sector with solutions that will **monitor, analyze and optimize voyage performance** to reduce fuel consumption.

The Digital Ships are sailing today!

NAVTOR as the largest provider has ~20%
of SOLAS fleet → 9250 vessels (Aug 2023)

**However, Port infrastructure is not ready to
unlock the benefit of Digitalization**

The Digital Ships are sailing today!

NAVTOR as the largest provider has ~~~20%~~30% of SOLAS fleet → ~~9250~~18500 vessels (~~Nov 8th~~–Nov 21st 2023)

However, Port infrastructure is not ready to unlock the benefit of Digitalization

Leading actors in the Shipping industry are urgently required to COOPERATE to meet common goals for DECARBONIZATION!

THANK YOU

