Knowledge grows

Yara Marine Technologies

Vessel Optimization Solutions

Current product portfolio

SOx scrubber

FuelOpt

Fleet Analytics

Route Pilot AI

WindWings

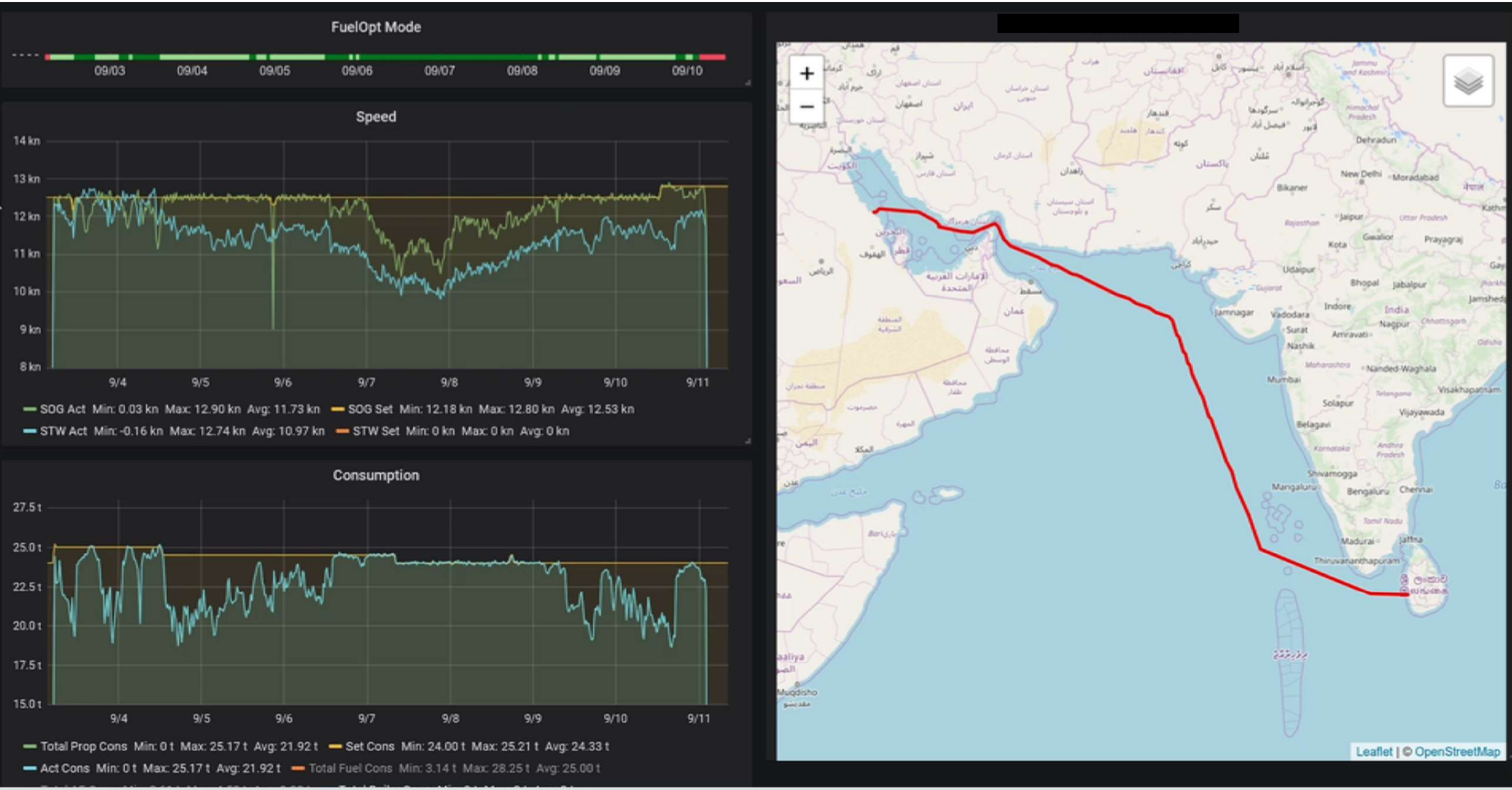
Shore Power

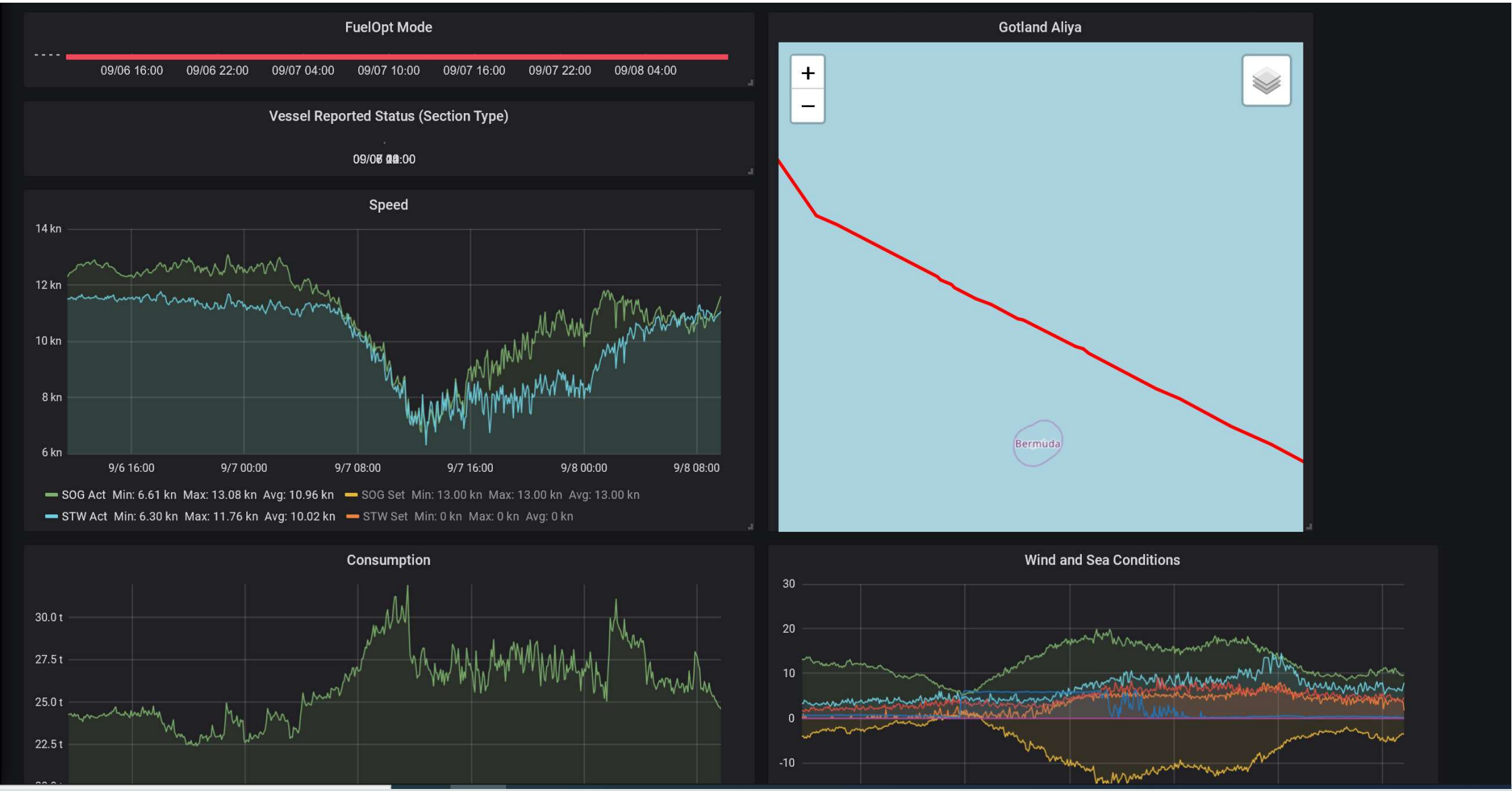
Lifecycle Services

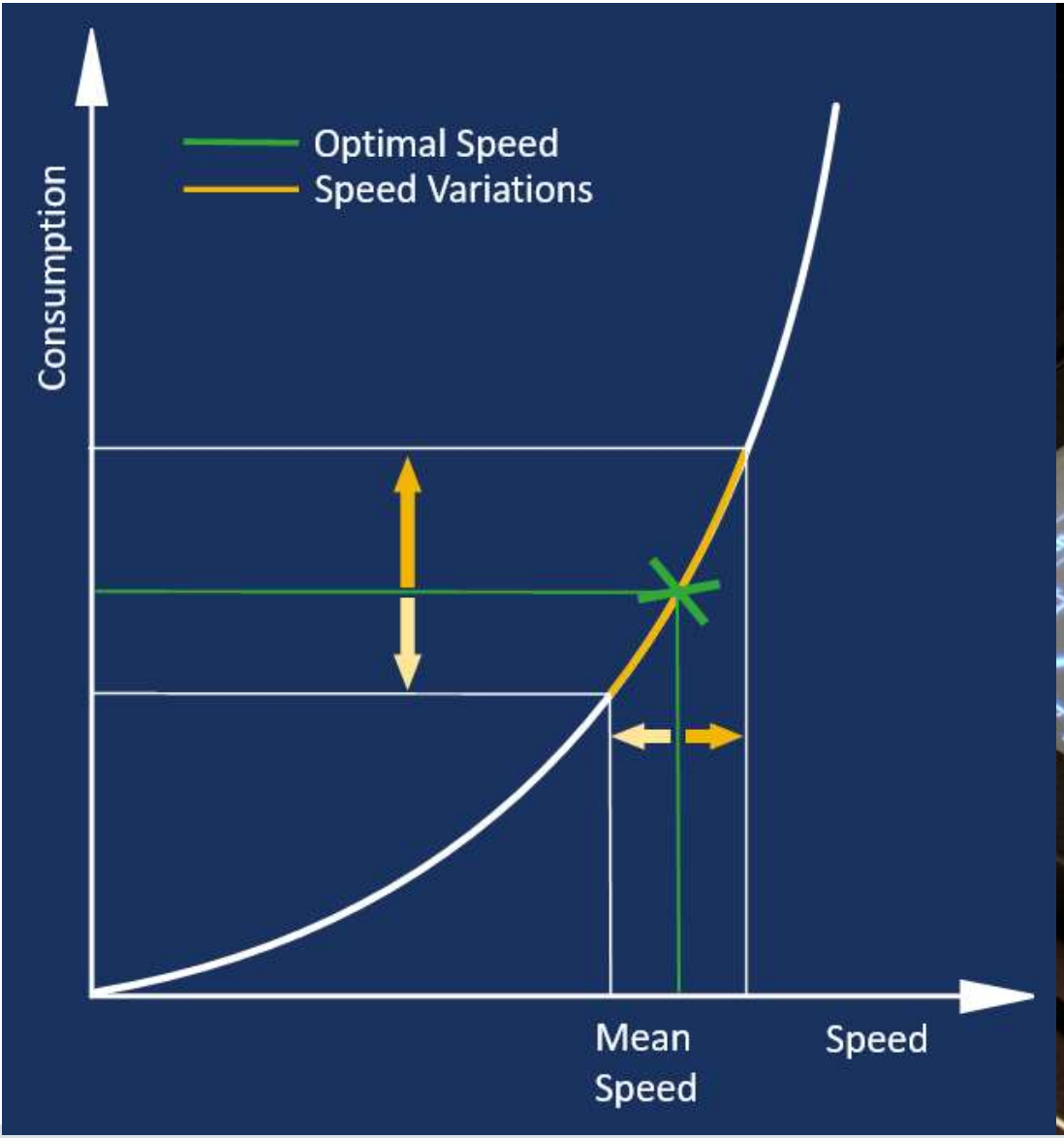
Fleet
Analytics
FuelOpt

Addon system

- FuelOpt comes as an **addon system**, sending orders to the propulsion control system, the same way the lever (and the hand of the captain) would. It does not **bypass of any existing equipment on board or of the safety associated.**
- The FuelOpt system provides bridge crew with **full control on power, fuel consumption, speed or a combination thereof.**
- It **reduces fuel consumption by controlling the propulsion** and ensuring that propulsive power is optimized in changing environmental conditions based on direct commands from the bridge.


FuelOpt Mode
09/03
09/04
09/05
09/06
09/07
09/08
09/09
09/10
Speed
14 kn
13 kn
12 kn
11 kn
10 kn
9 kn
8 kn
9/4
9/5
9/6
9/7
9/8
9/9
9/10
9/11
SOG Act Min: 0.03 kn Max: 12.90 kn Avg: 11.73 kn
SOG Set Min: 12.18 kn Max: 12.80 kn Avg: 12.53 kn
STW Act Min: -0.16 kn Max: 12.74 kn Avg: 10.97 kn
STW Set Min: 0 kn Max: 0 kn Avg: 0 kn
Consumption
27.5 t
25.0 t
22.5 t
20.0 t
17.5 t
15.0 t
9/4
9/5
9/6
9/7
9/8
9/9
9/10
9/11
Total Prop Cons Min: 0 t Max: 25.17 t Avg: 21.92 t
Set Cons Min: 24.00 t Max: 25.21 t Avg: 24.33 t
Act Cons Min: 0 t Max: 25.17 t Avg: 21.92 t
Total Fuel Cons Min: 3.14 t Max: 28.25 t Avg: 25.00 t
Dehradun
New Delhi
Moradabad
Bikaner
Jaipur
Kota
Gwalior
Prayagraj
Udaipur
Bhopal
Jabalpur
Indore
Jamnagar
Vadodara
Surat
Nagpur
Amravati
Nashik
Nanded-Waghala
Mumbai
Solapur
Vijayawada
Belagavi
Shivamogga
Mangaluru
Bengaluru
Chennai
Madurai
Jaffna
Thiruvananthapuram
Muqdisho
Leaflet | © OpenStreetMap


FuelOpt Mode
09/06 16:00
09/06 22:00
09/07 04:00
09/07 10:00
09/07 16:00
09/07 22:00
09/08 04:00
Vessel Reported Status (Section Type)
Speed
14 kn
12 kn
10 kn
8 kn
6 kn
9/6 16:00
9/7 00:00
9/7 08:00
9/7 16:00
9/8 00:00
9/8 08:00
SOG Act Min: 6.61 kn Max: 13.08 kn Avg: 10.96 kn
SOG Set Min: 13.00 kn Max: 13.00 kn Avg: 13.00 kn
STW Act Min: 6.30 kn Max: 11.76 kn Avg: 10.02 kn
STW Set Min: 0 kn Max: 0 kn Avg: 0 kn
Gotland Aliya
Bermuda
Consumption
30.0 t
27.5 t
25.0 t
22.5 t
Wind and Sea Conditions
30
20
10
0
-10


Optimal Speed
Speed Variations
Consumption
Mean
Speed
Speed

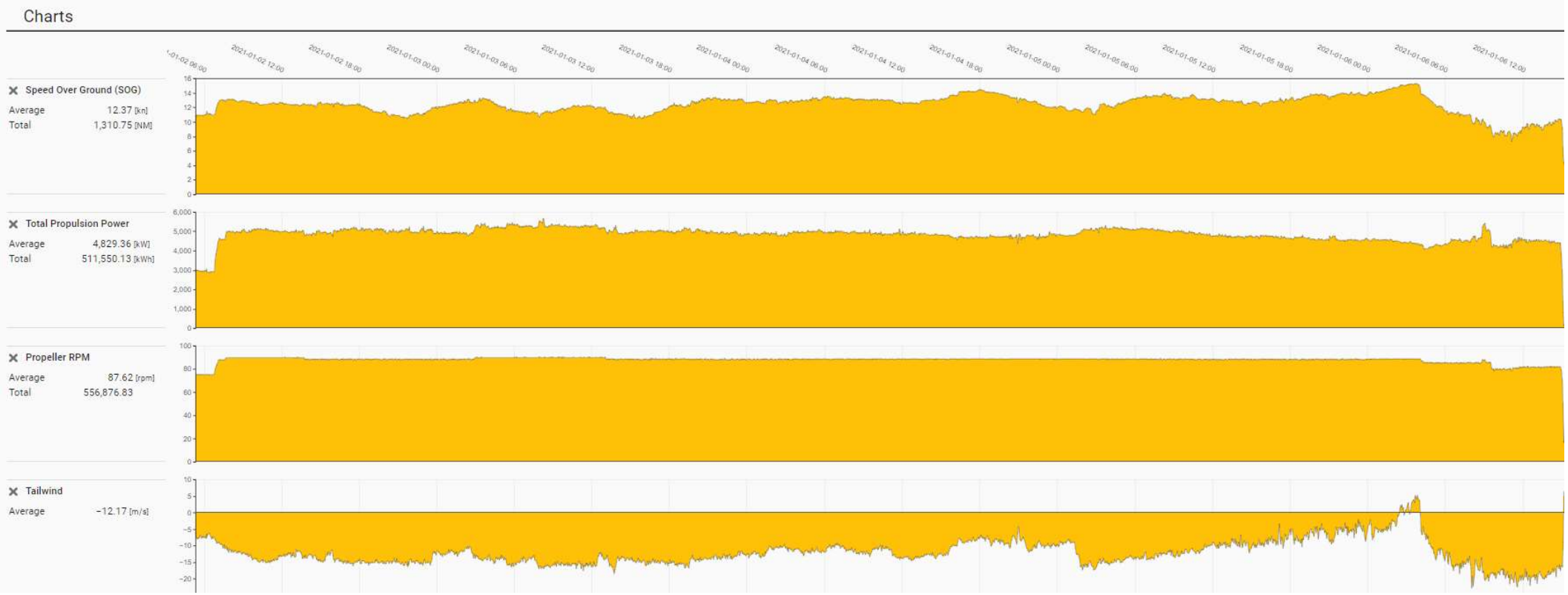
ON
READY
OFF
SPEED
SETPOINT

Changing the philosophy of operating a vessel

Case study on one single voyage

Operating on constant power instead of constant RPM would decrease the overall fuel consumption of a vessel.

Vessel Type	Tanker
Size	50 000 dwt
Propulsion	~7 200 kW propulsion power Single Fixed Pitch Propeller
Voyage	Hongkong – Dalian, 4d
Method	Simulation with digital twin modelling



- During this voyage, the vessel experienced varying weather conditions with an average headwind of 12 m/s.
- The propeller RPM was held more or less constant throughout the voyage.
- The average SOG was 12,37 kn and the average shaft power was 4 829 kW.

Running on constant power enables more efficient vessel operations

Results:

Average shaft power with FuelOpt disengaged	4 829 kW
Constant shaft power with FuelOpt engaged	4 520 kW
Difference	309 kW

Conclusion:

For this specific voyage the vessel would consume **6,4%** less fuel if operating on constant power by using FuelOpt instead of running on constant RPM.

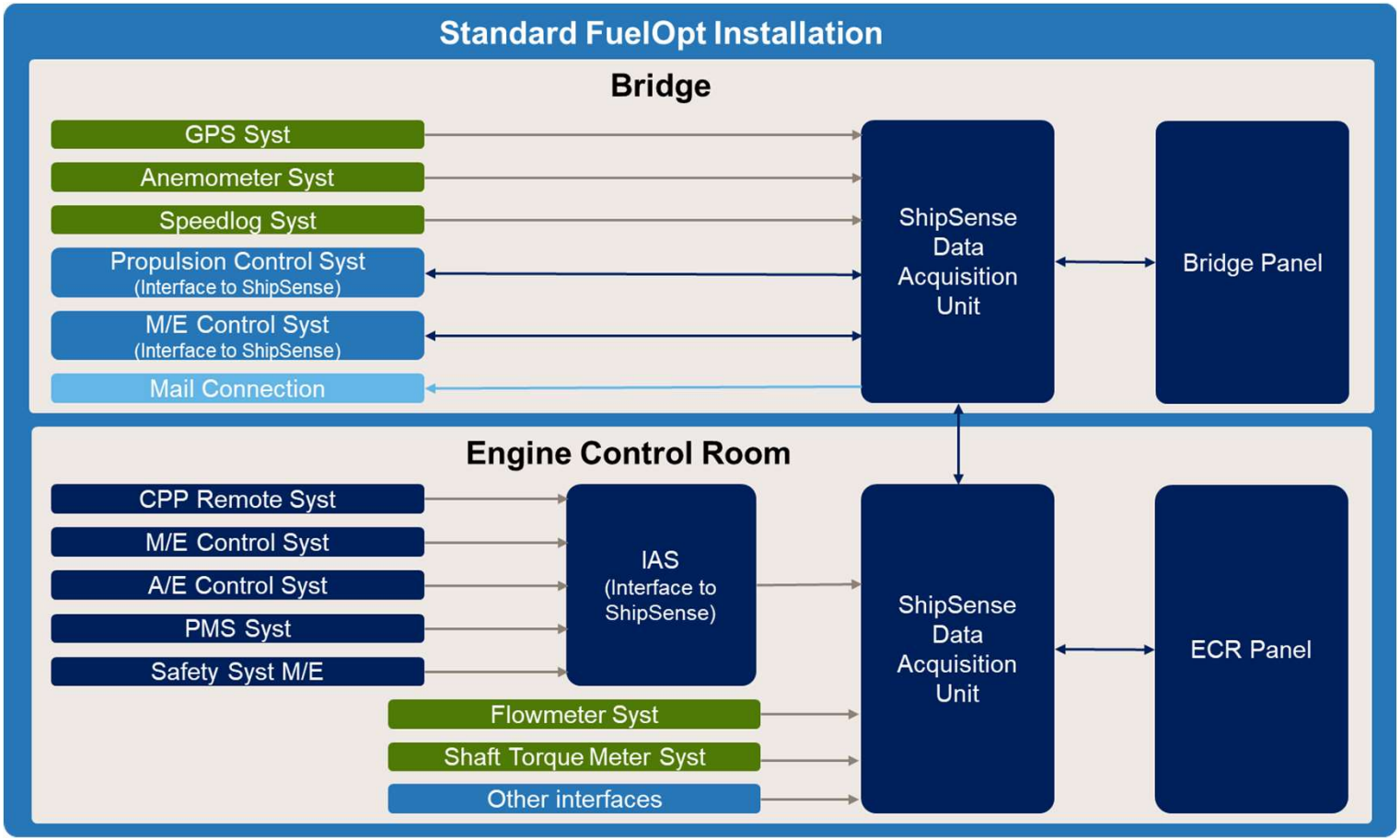
Departure	2021-01-02 05:21Z
Est. Arrival	2021-01-06 15:13Z
Total Distance	1306.78 nmi
Total Work	478573.55 kWh
Average Weather Factor	-1.939 knots
Avg. Speed over Ground	12.40 knots
Planning Power	4519.92 kW

Mass flowmeter

Shaft power meter

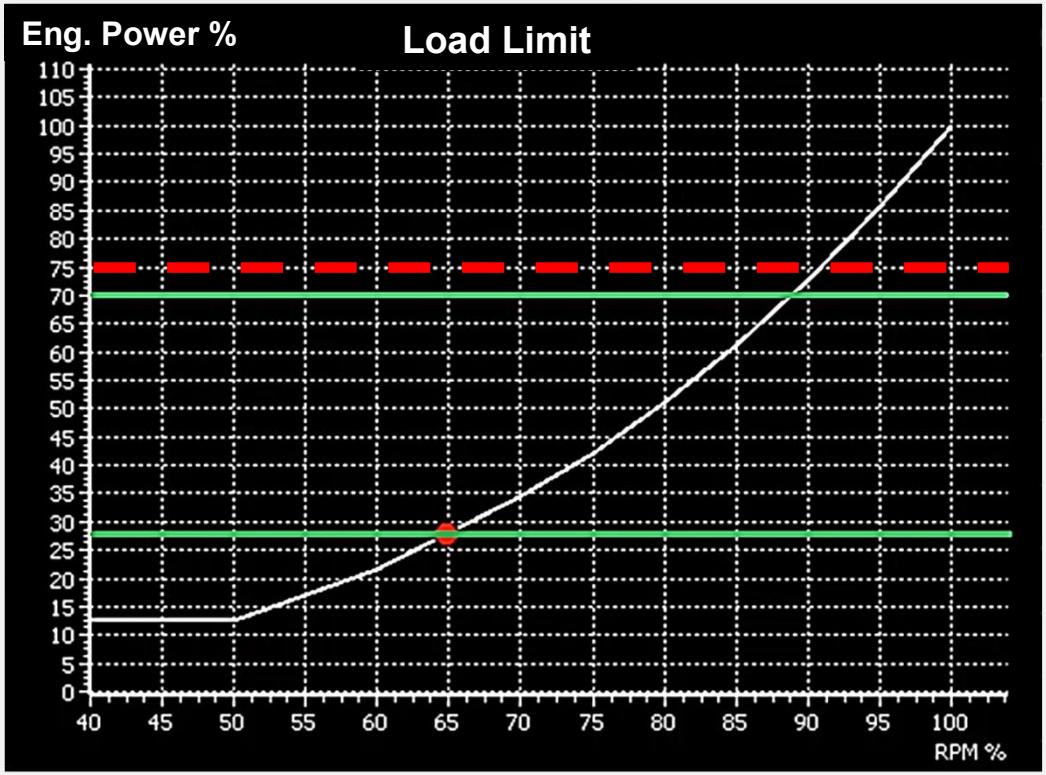
Brief overview of FuelOpt installation

Gather signals from different sensors on the vessel in order to translate vessel signals in order to communicate with propulsion control system and send RPM and pitch demand signals to the installed propulsion control system.

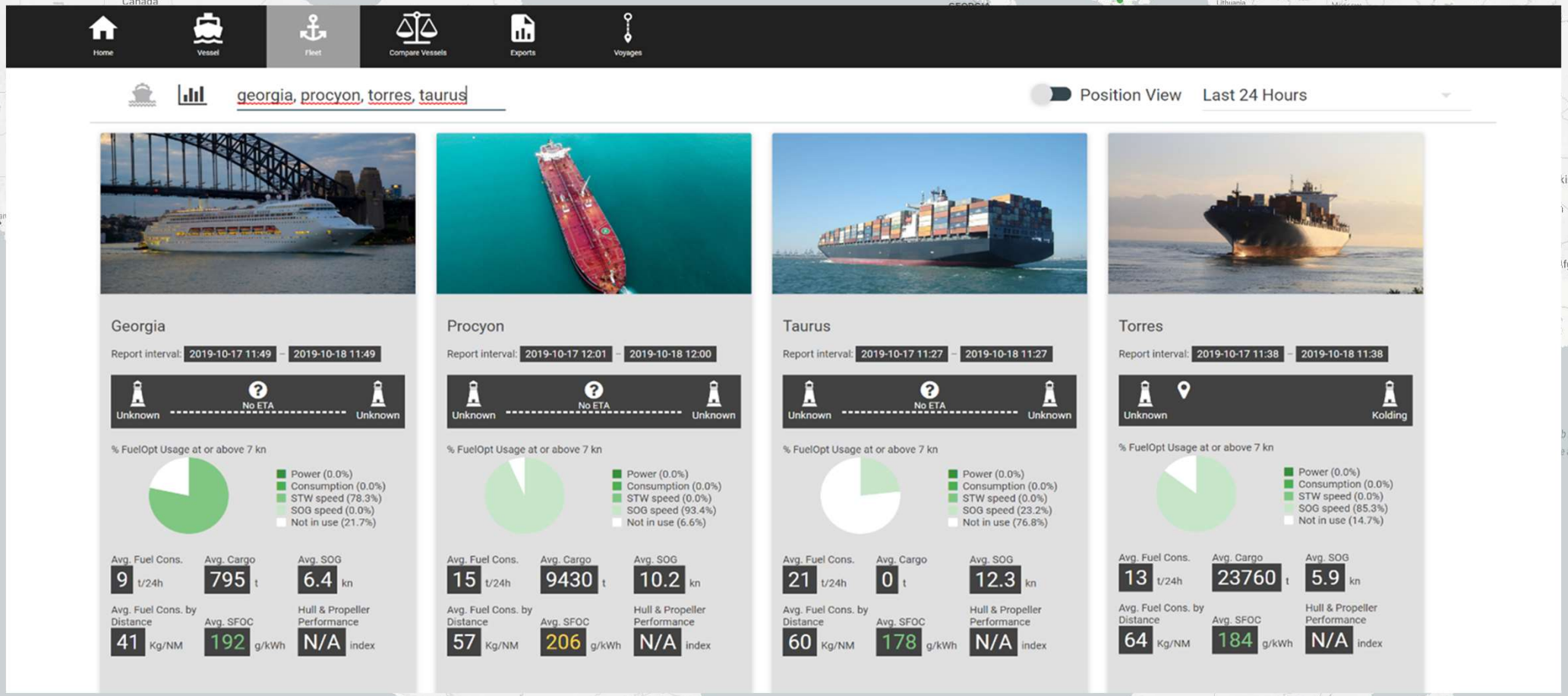


FuelOpt and Shaft Power Limitation (ShaPoLi) to meet EEXI requirements

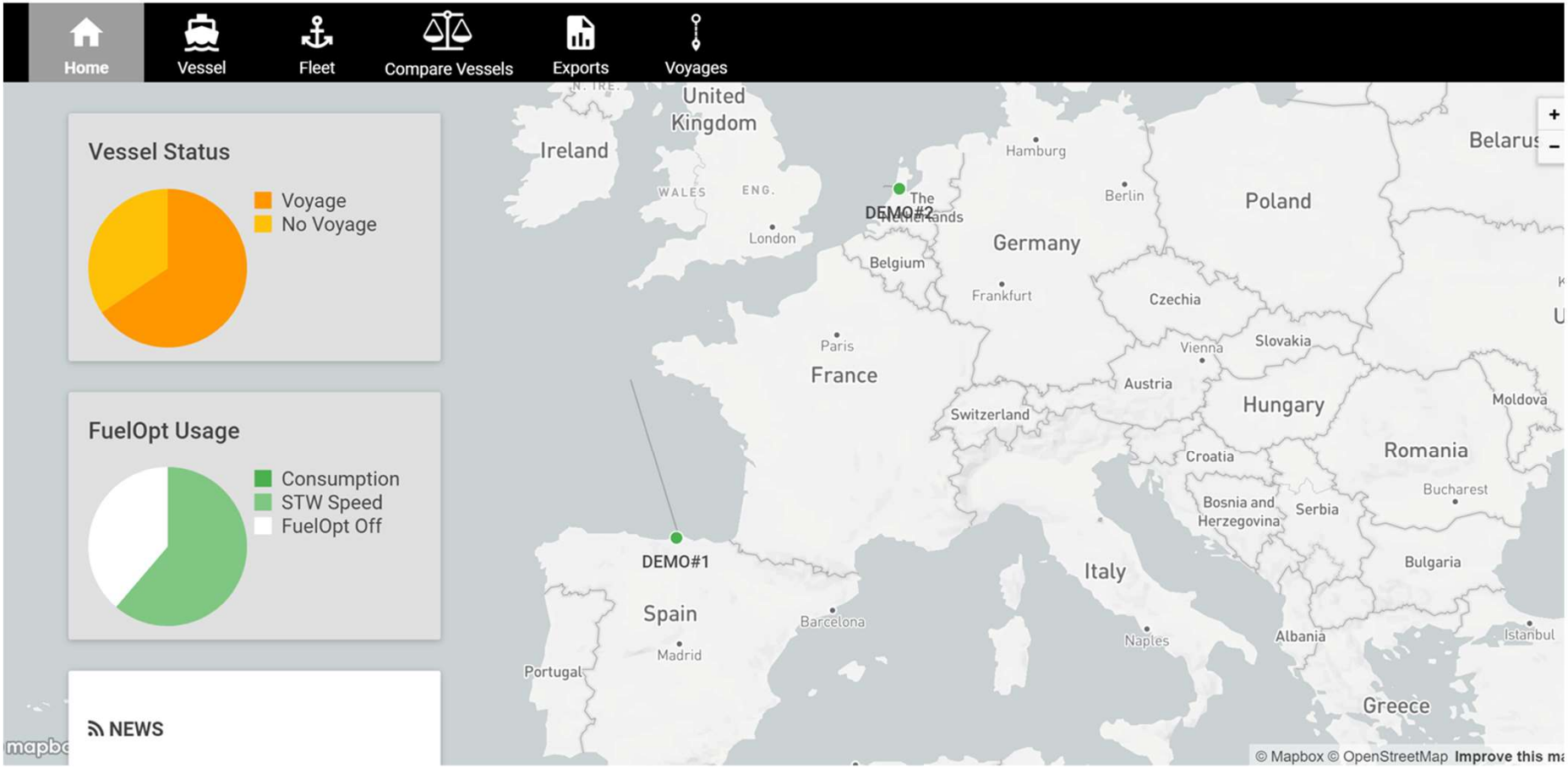
- Through ShaPoLi with FuelOpt, a vessel power output is ensured regardless of the changing energy content level of the fuel used.
- The system enables this by simply setting an upper limit to shaft power output:
  - without any modification to existing machinery,
  - without compromising safety in emergency situations that require full engine power.
- Additionally, the FuelOpt system can be easily adapted to fuel related vessel upgrades.



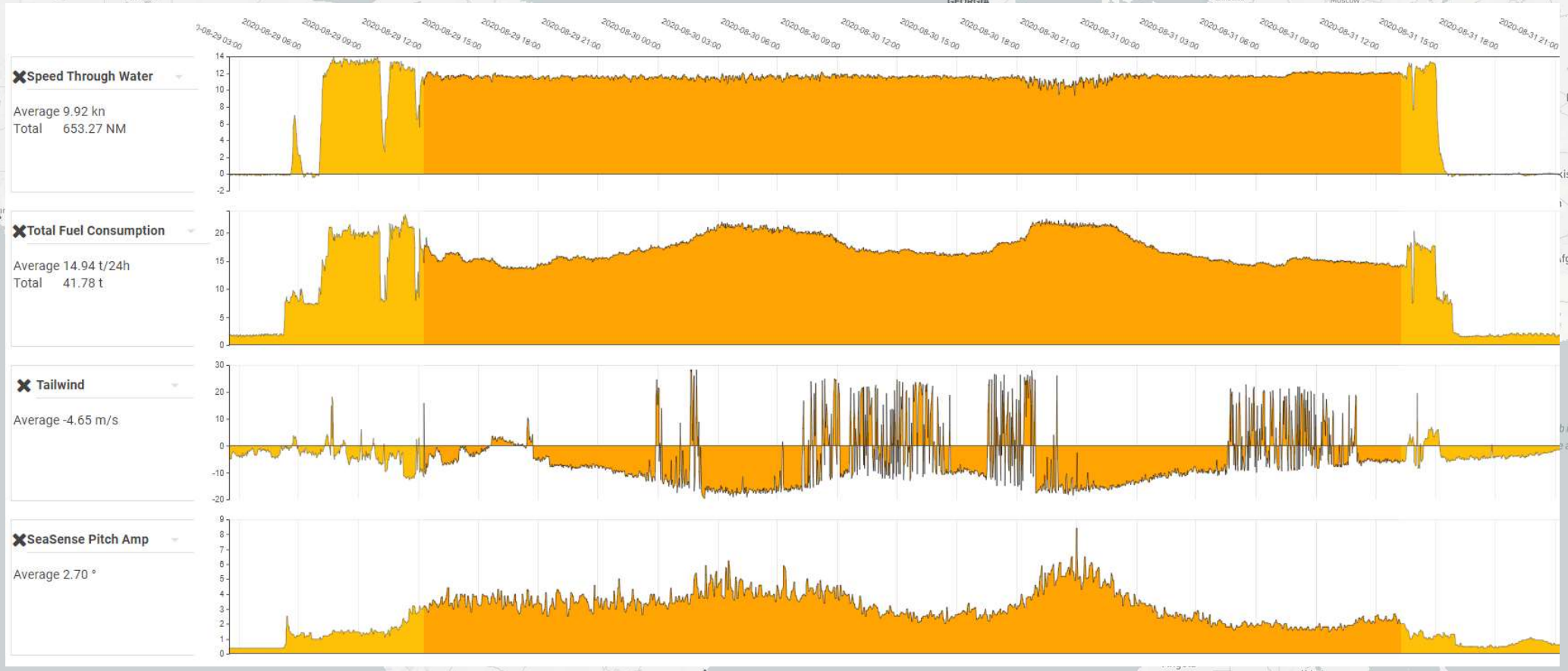
Fleet Analytics



Fleet Analytics



Analysis


Speed Through Water
Average 9.92 kn
Total 653.27 NM
Total Fuel Consumption
Average 14.94 t/24h
Total 41.78 t
Tailwind
Average -4.65 m/s
SeaSense Pitch Amp
Average 2.70 °

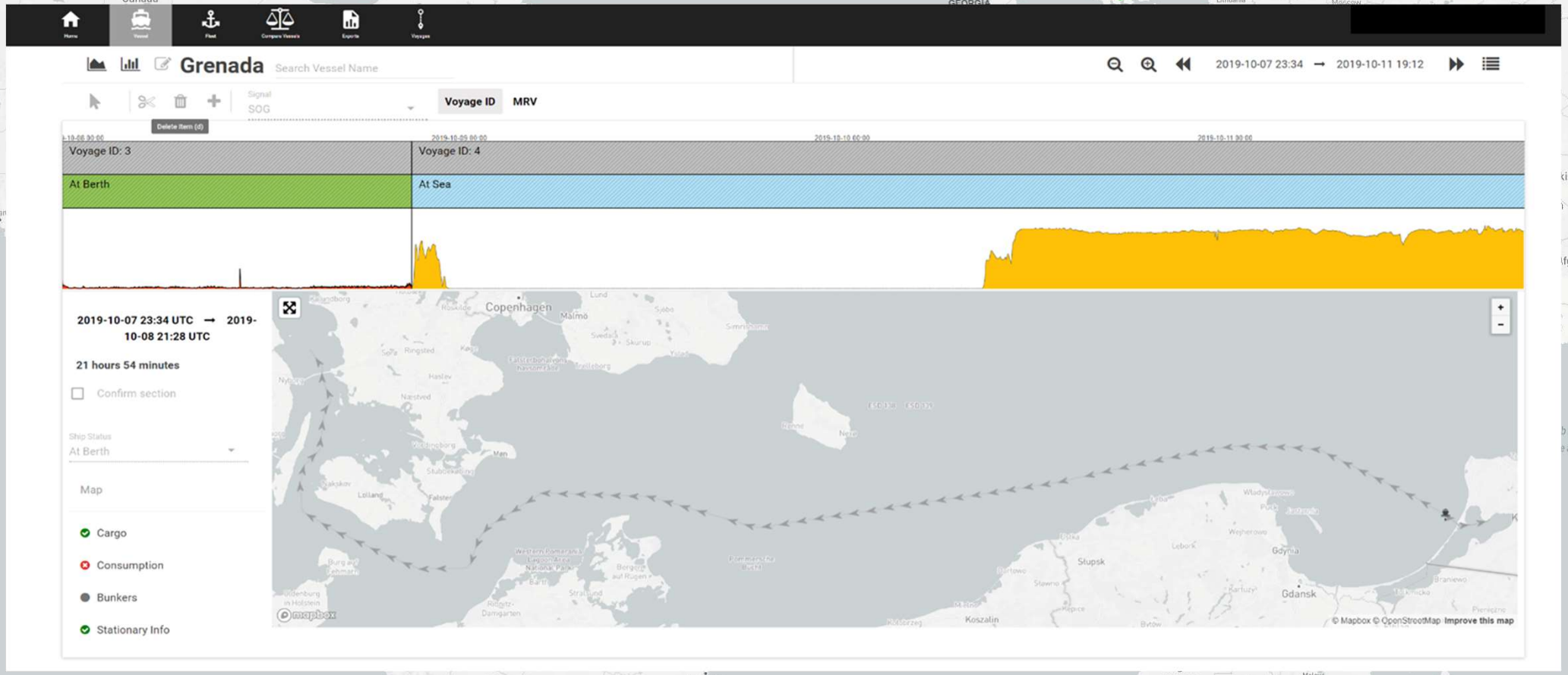
Analysis

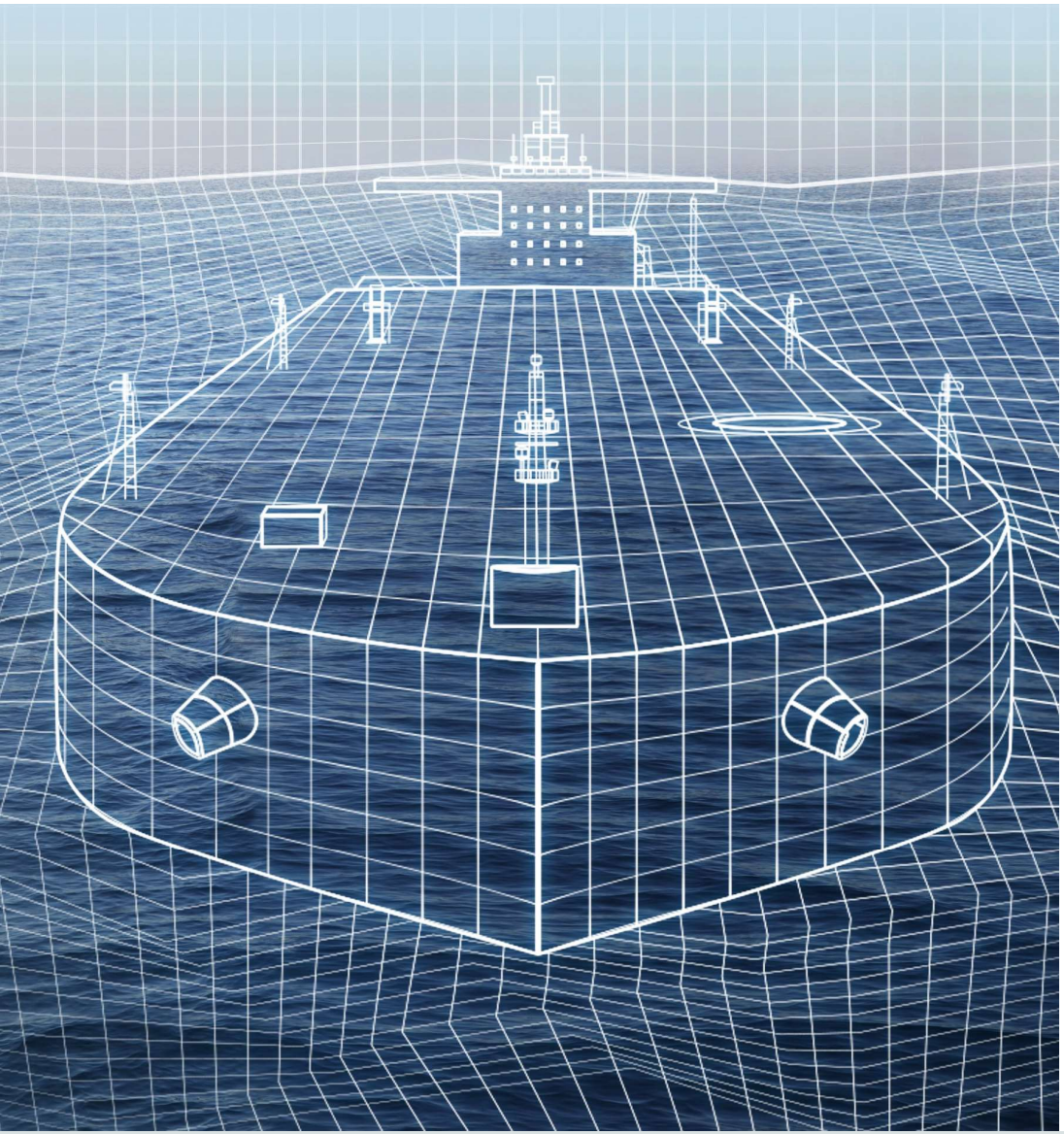
Comparison possibility at vessel and fleet level

Analysis

Comparison possibility at vessel and fleet level

Reporting
Automated & simplified Voyage and MRV reporting





Route Pilot AI

- Route Pilot AI is an AI-powered ship operation support system to achieve the most energy-efficient voyage.
- Once the AI system is trained with a vessel's operational data, the system creates a digital twin of this specific vessel that is used for calculating the optimal operational parameters for an upcoming voyage considering the predicted voyage conditions.
- The users can access to Route Pilot AI through Fleet Analytics and link it to FuelOpt for executing voyages with maximum efficiency