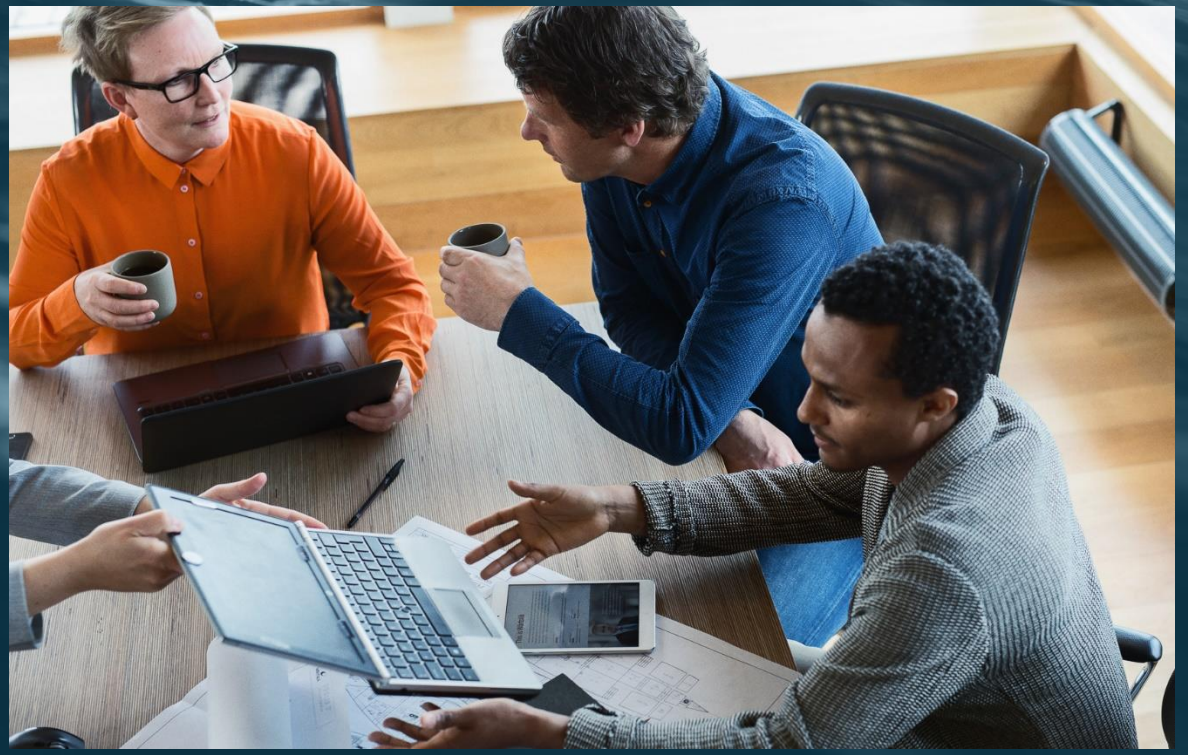
# How digital services are helping our customers operate more efficiently

## OPERIM

Operational Performance Improvement and Monitoring

**Director of Digital Offering Gas Solutions, *Nicholas Martin* MBA MIET BEng (Hons)**

Digital solutions have enabled us to work with our customer to review data from multiple voyages leading to significant potential savings




# What are our customers telling us ?

“Looking for efficiency and reduction of Operating Costs”

- Maintenance
- Fuel
- Staff

“Environmental compliance and reduction of Emissions”

- Sustainability
- Carbon footprint

## Why are operational cost savings challenging?

- The plants are situated on ships or in faraway places, and an inherent lack of transparency preventing the customer organisations from identifying saving potentials
- Crews operate unaware of how their daily decisions impact commercial and environmental performance.
- While the plants generate data from hundreds of sensors, the data is seldomly used for anything but local process control and alarms.

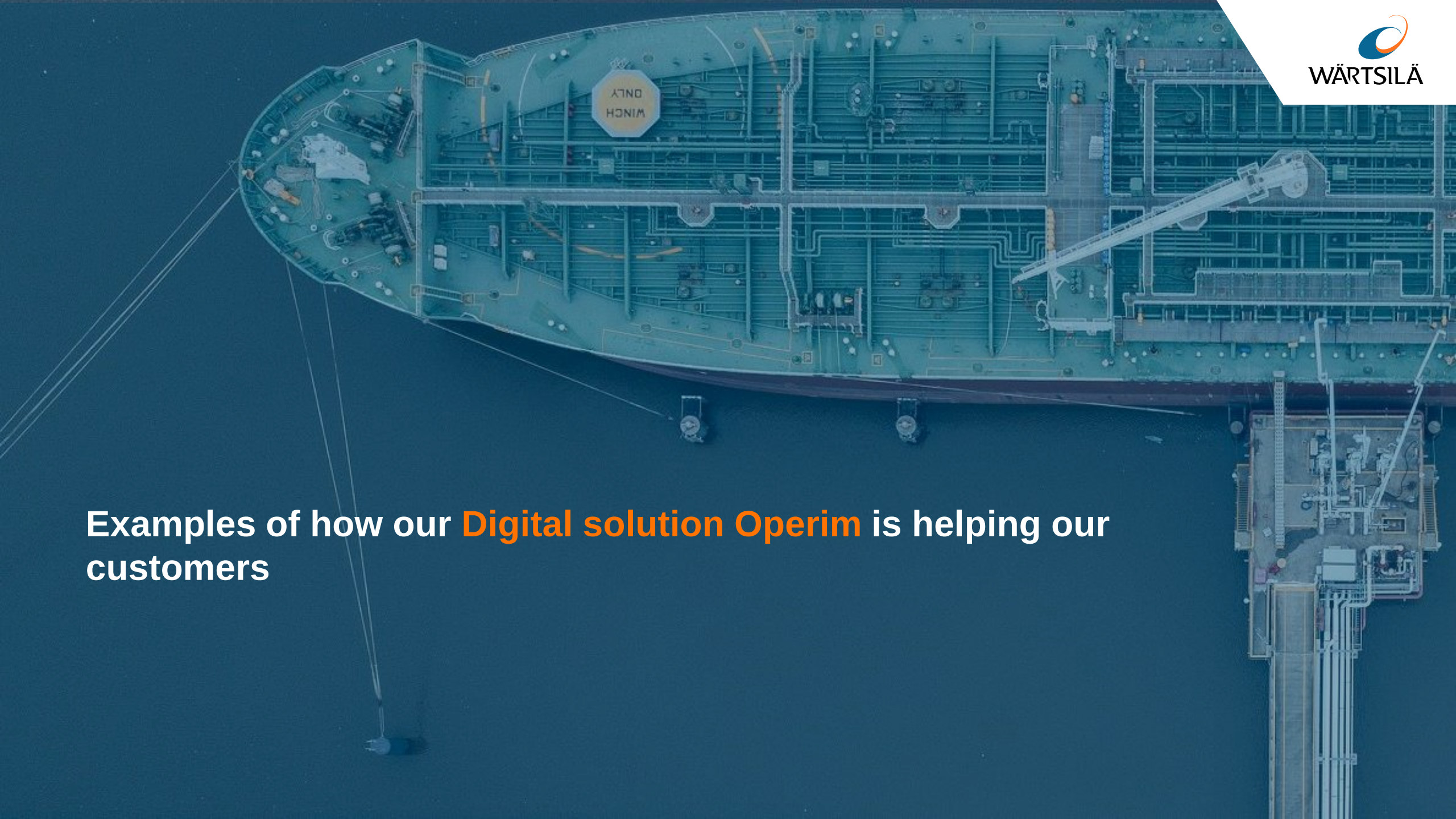
# Where are the opportunities for operational savings?

**Onboard LPG and ethylene carriers the cargo handling systems are often the highest power consumers onboard**

**Optimizing the operation** of this equipment brings direct reduction to:

- Auxiliary fuel spending
- Running hours on compressors and generators
- Carbon footprint

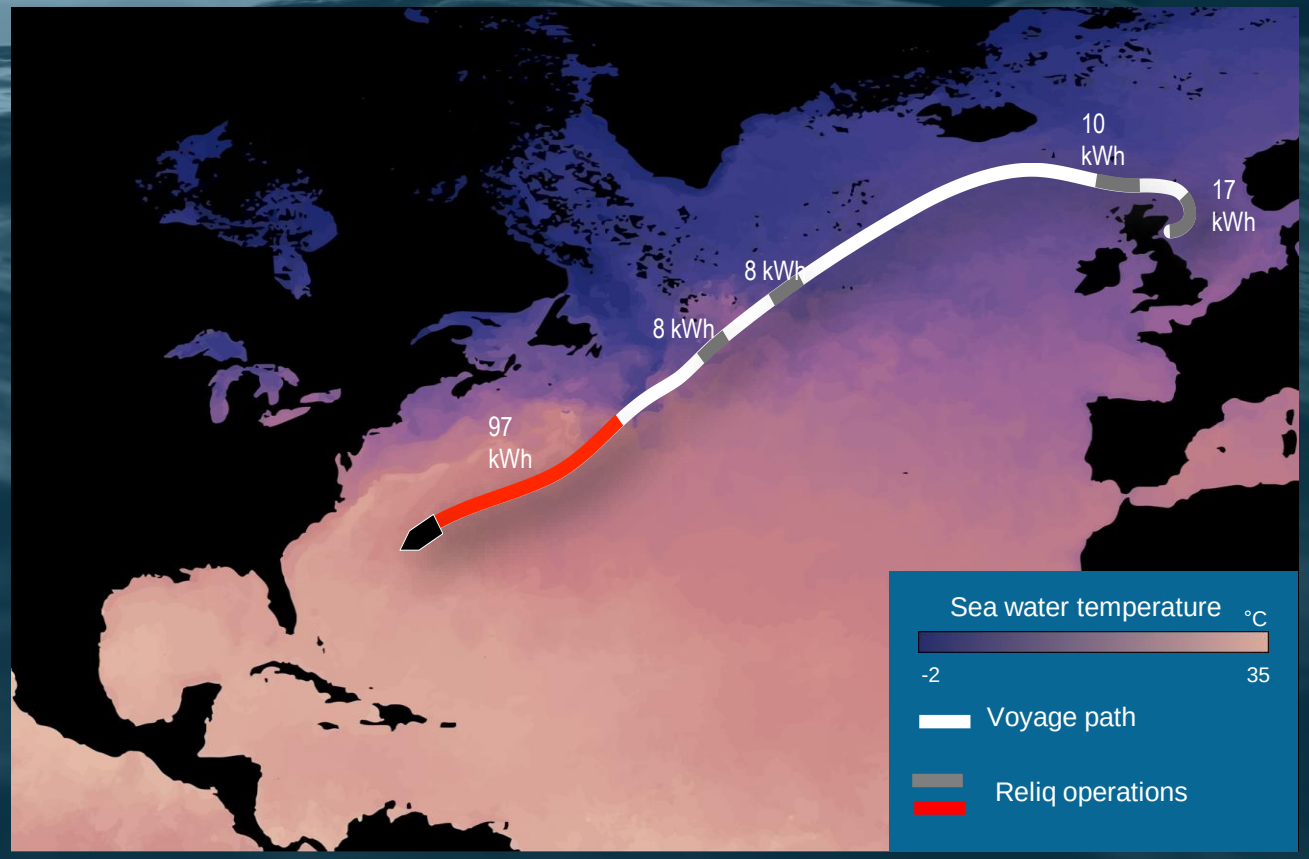
- With **indirect gains** on a reduction of the maintenance cost for not only the Cargo handling plants but also the **Auxiliary engines** due to the reduction in running hours **from reduced energy demands**.




# Examples of how our Digital solution Operim is helping our customers

# EXAMPLE CASE 1: HOW TRANSPARENCY ENABLES OPERATIONAL SAVING

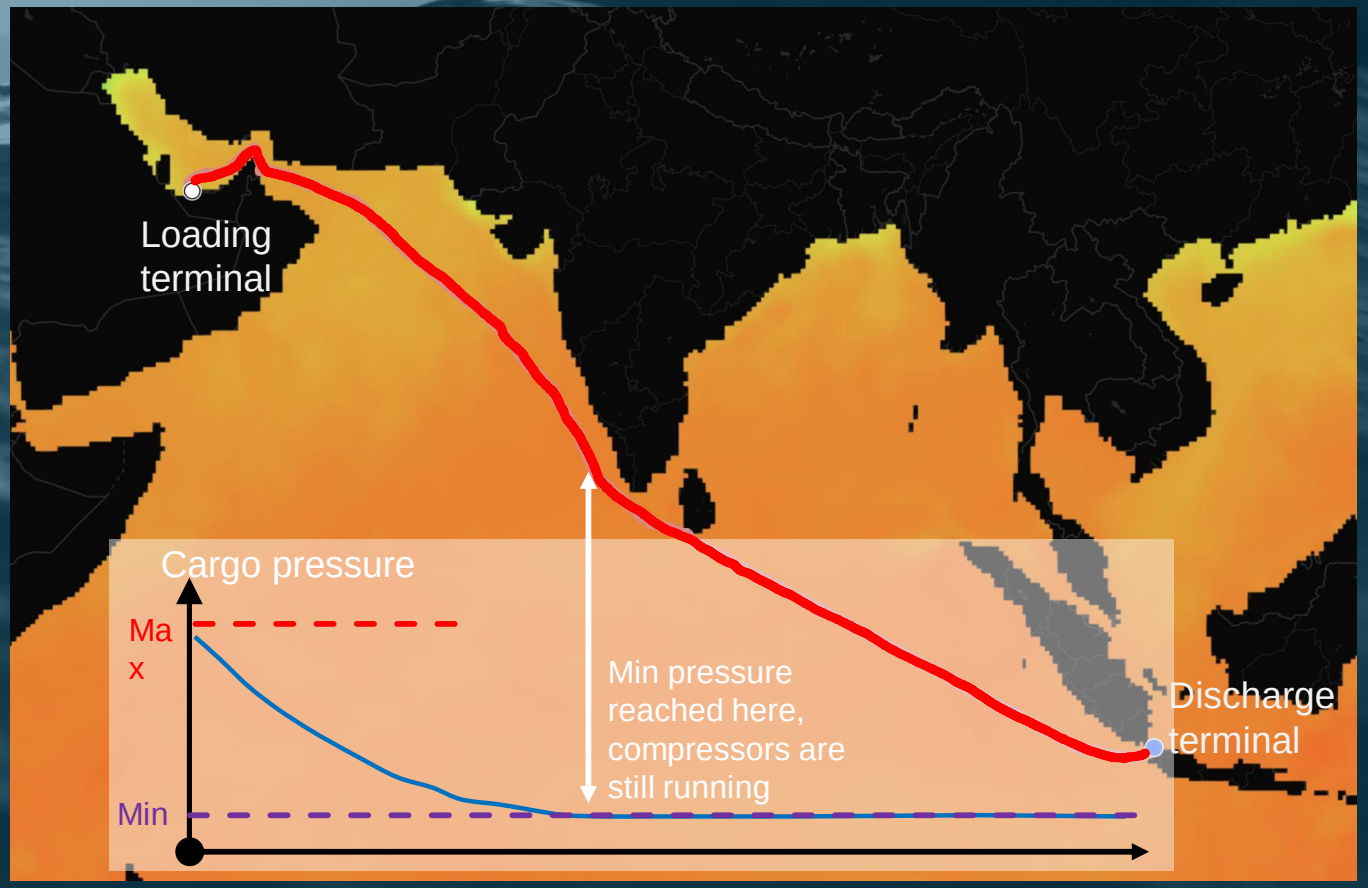
- **OPERIM voyage reports** provide the **transparency** of the vessel operations
- This report shows a vessel started an **inefficient cool-down operation** when entering warmer waters, due to allowing the the build up of pressure and temperature in cargo tanks
- Through the use of Operim, the **operational data and environmental data** can be **presented in context**, providing the insights for improvements to the operation planning enabling more informed decisions for when to initiate cool-down
- Through these insights **Significant savings** were later achieved by initiating the cooling of the cargo well before entering the warmer waters.




*Operim Voyage report illustration*

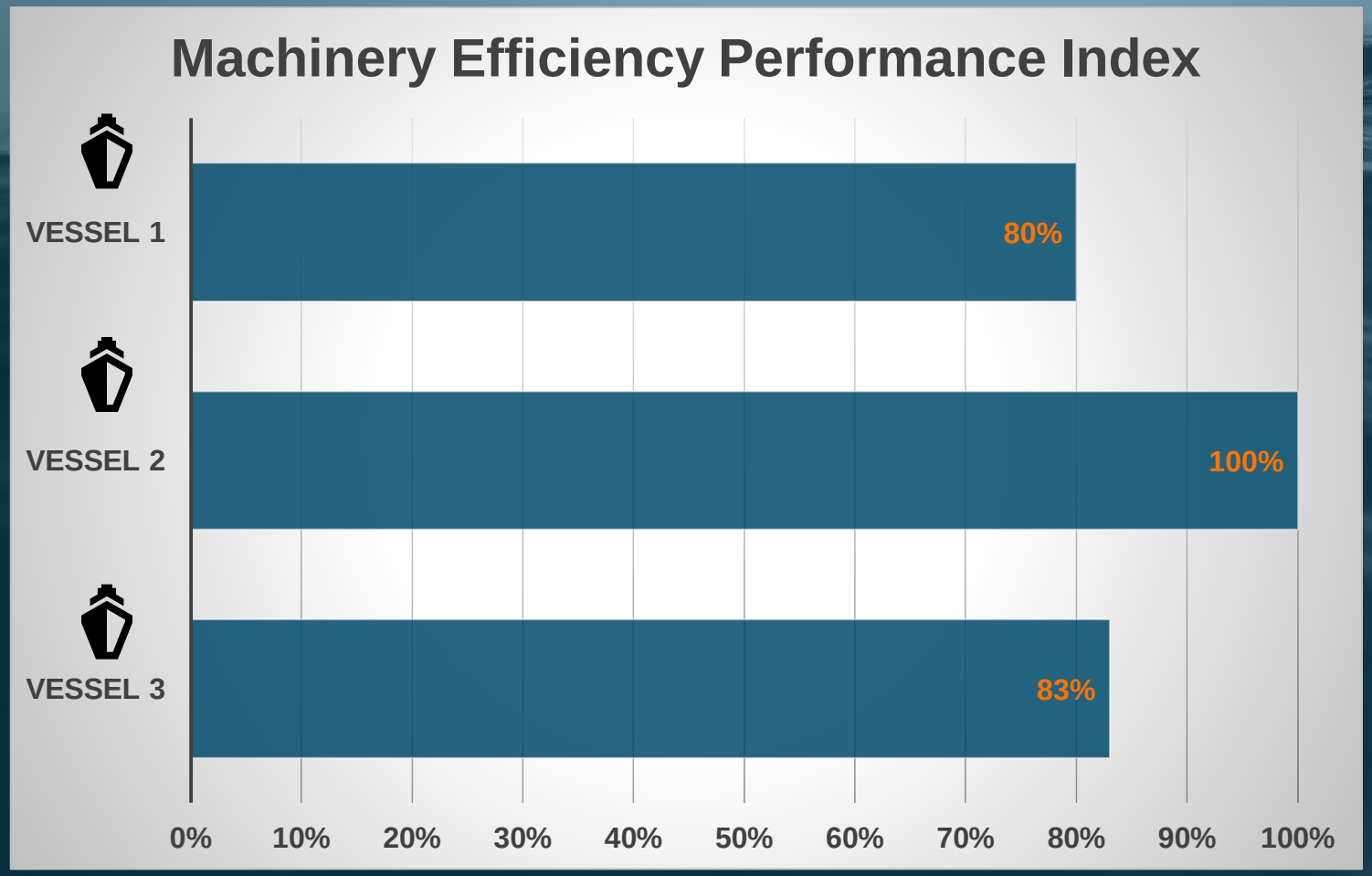
# EXAMPLE CASE 2: TRANSPARENCY ALSO BRINGS REDUCTION IN RUNNING HOURS AND FUEL

- The **contextual visualisation from OPERIM** shows a vessel in a laden voyage that obtained optimal tank pressure and temperature for the cargo mid way in the voyage
- The vessel continued to run the cargo handling systems continuously after optimal cargo management was achieved **wasting fuel and incurring longer running hours for nearly 50% of the voyage**
- This insight from **Operim** was later used to improve operations **resulting in significant energy and operational savings**




*Operim Voyage report illustration*

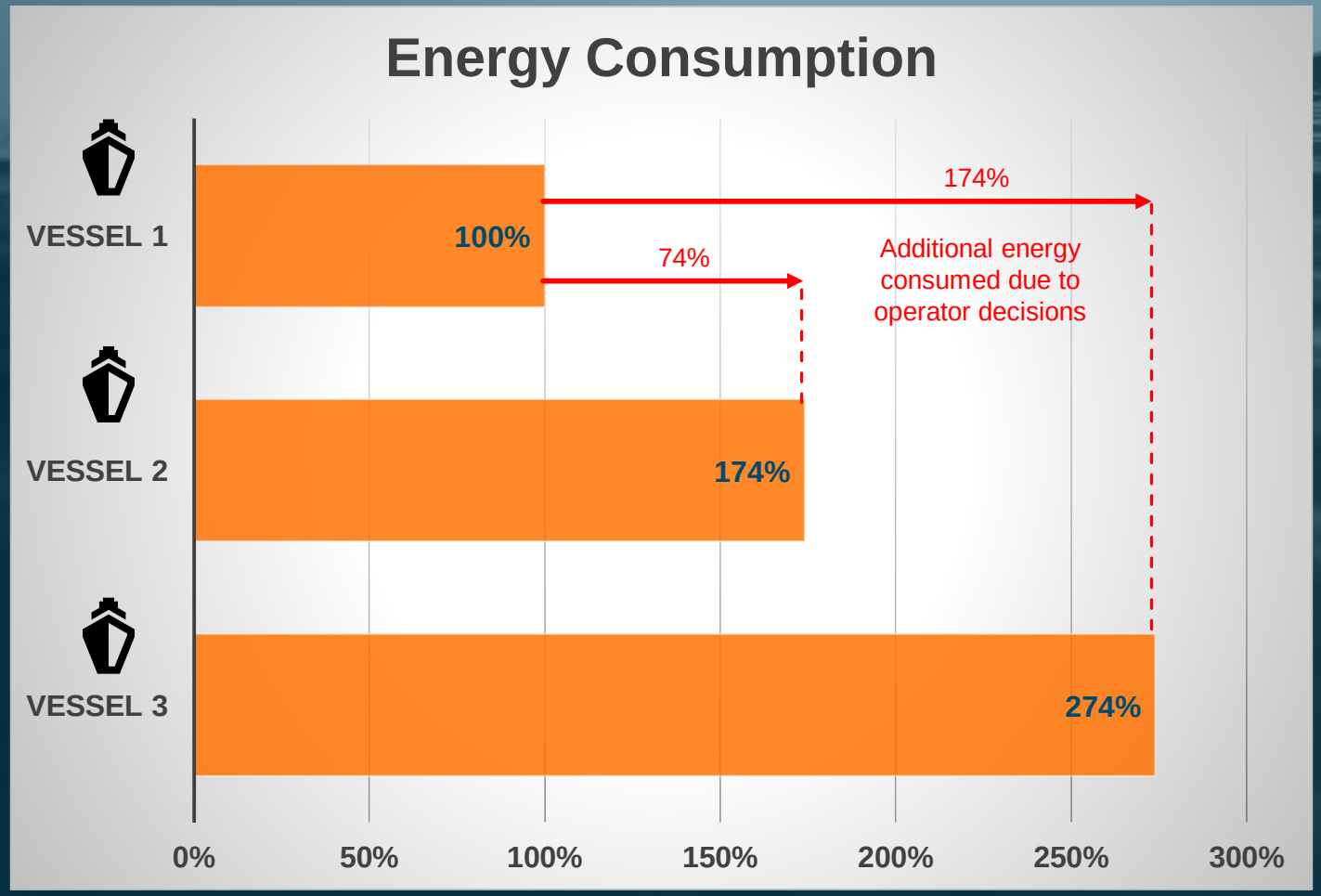
# EXAMPLE CASE 3: THE IMPACT OF CREWS OPERATIONAL DECISIONS ON ENERGY EFFICIENCY




*Relative comparison of EPI between vessels*

- The chart shows the machinery efficiency performance index calculated by Operim for 3 vessels that were carrying the same type of cargo on the same route at approximately the same time of year
- **Through Comparison of data** we can see that vessel 2 has the best **efficiency performance index** with vessel 1 and 3 about 20% less efficient

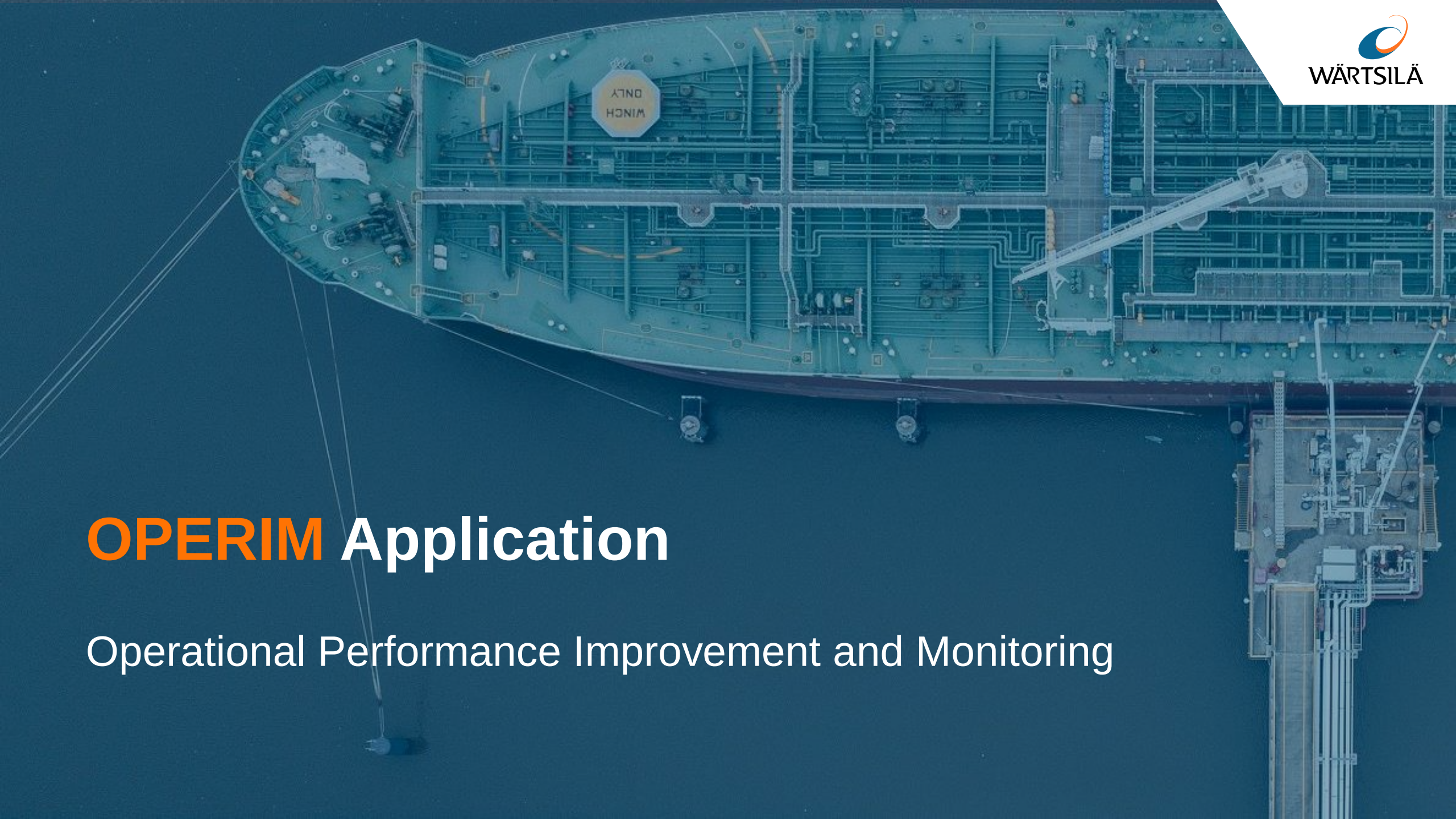
# EXAMPLE CASE 3: THE IMPACT OF CREWS OPERATIONAL DECISIONS ON ENERGY EFFICIENCY




*Relative comparison of Energy consumption between vessels*

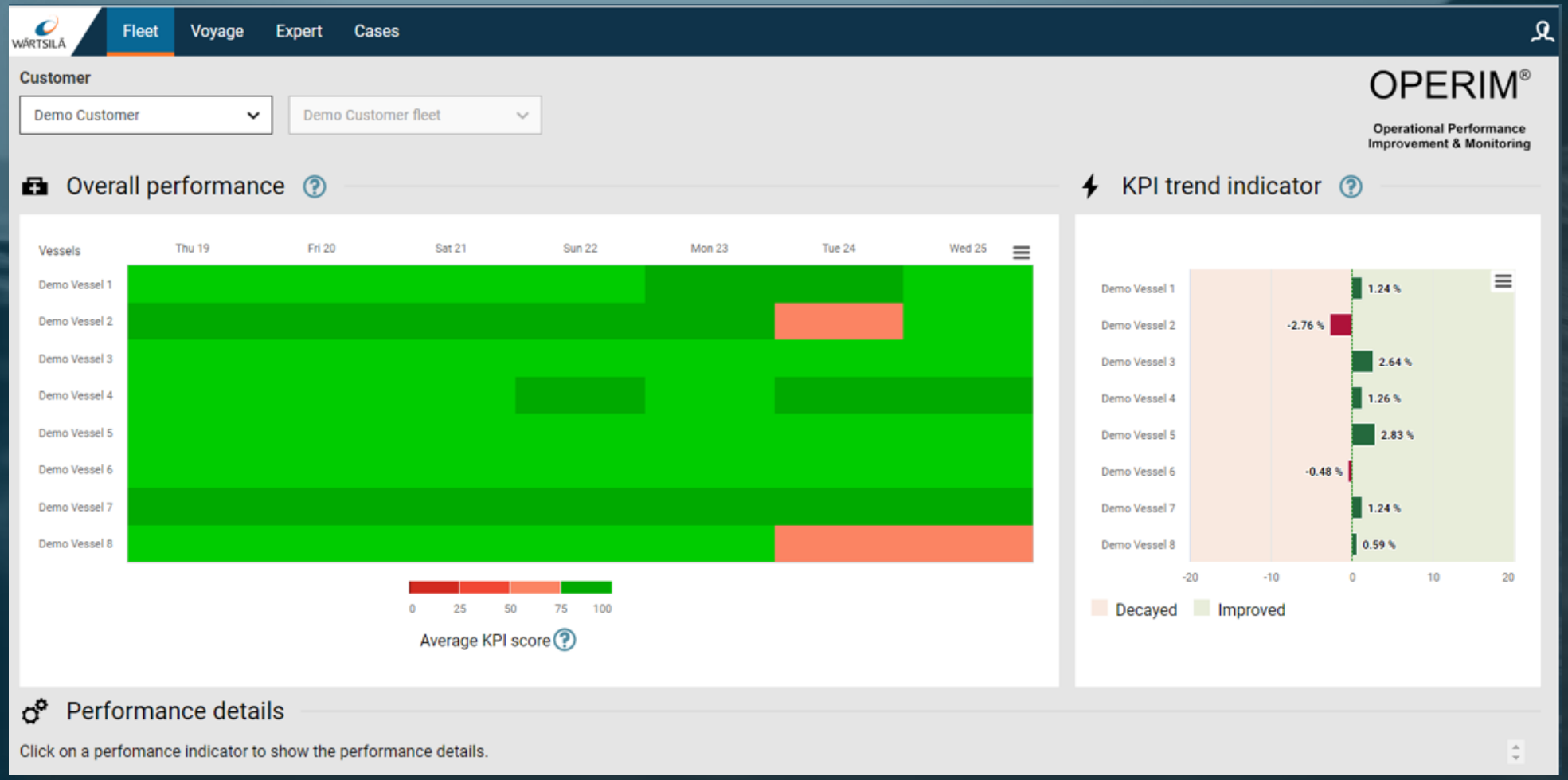
- However analysis of the **energy consumption** of the **reliquefication units** for the same three different vessels provides a different perspective.
- Vessel 3 was spending almost **3 times the energy for cooling the cargo compared to vessel 1**
- The better machinery efficiency performance index of Vessel 2 was overshadowed by **non-optimal operations/decisions made by the crew**
- Operim provides the insight that Vessel 1 crew made the best operational decisions regarding when and for how long to cool the cargo

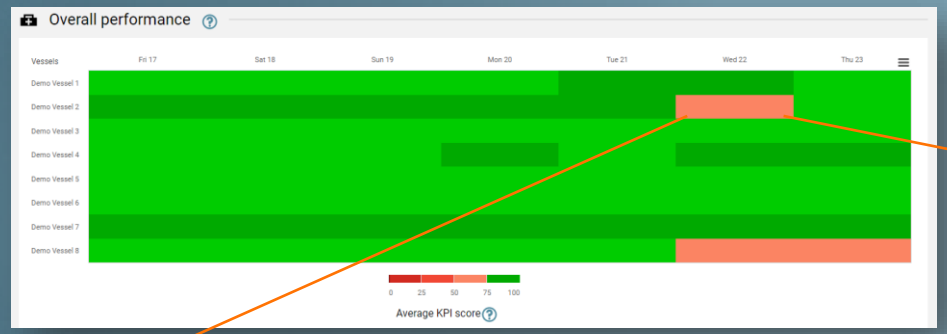
➢ The **learnings from Vessel 1 Crews operational decisions was adopted** by Vessel 2 and 3 resulting in a **significant performance improvement for the fleet**




# OPERIM Application

## Operational Performance Improvement and Monitoring


WÄRTSILÄ
Fleet
Voyage
Expert
Cases
Customer
Demo Customer
Demo Customer fleet
OPERIM®
Operational Performance Improvement & Monitoring
Overall performance
KPI trend indicator
Vessels
Thu 19
Fri 20
Sat 21
Sun 22
Mon 23
Tue 24
Wed 25
Demo Vessel 1
Demo Vessel 2
Demo Vessel 3
Demo Vessel 4
Demo Vessel 5
Demo Vessel 6
Demo Vessel 7
Demo Vessel 8
0
25
50
75
100
Average KPI score
1.24 %
-2.76 %
2.64 %
1.26 %
2.83 %
-0.48 %
1.24 %
0.59 %
-20
-10
0
10
20
Decayed
Improved
Performance details
Click on a perfomance indicator to show the performance details.

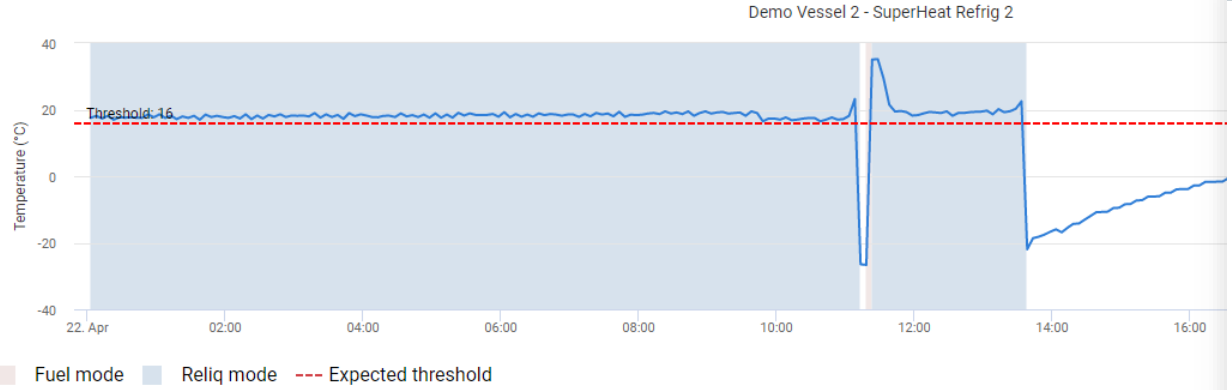


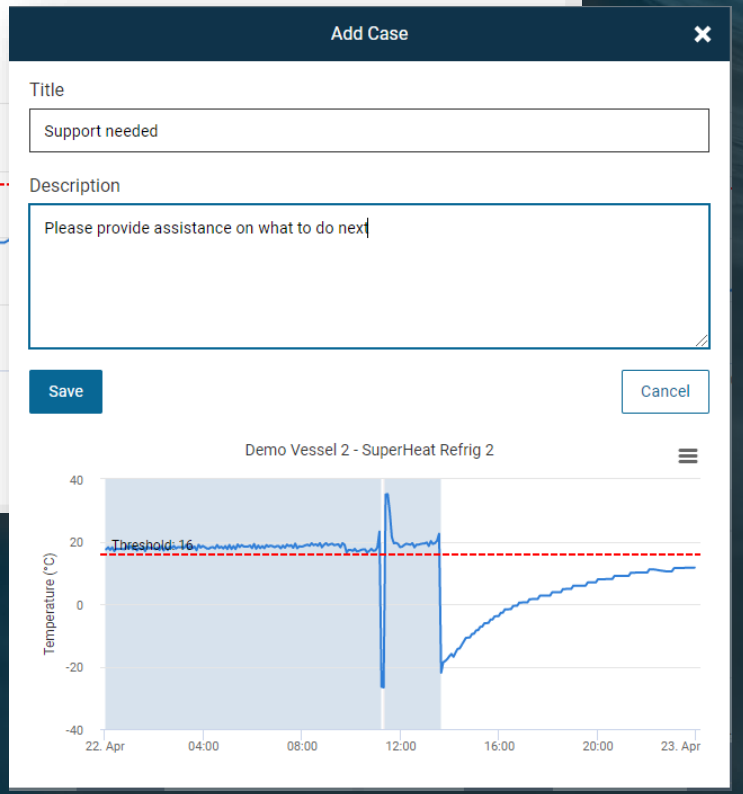

## Performance details - Demo Vessel 2 (Wed 22)

### KPI's

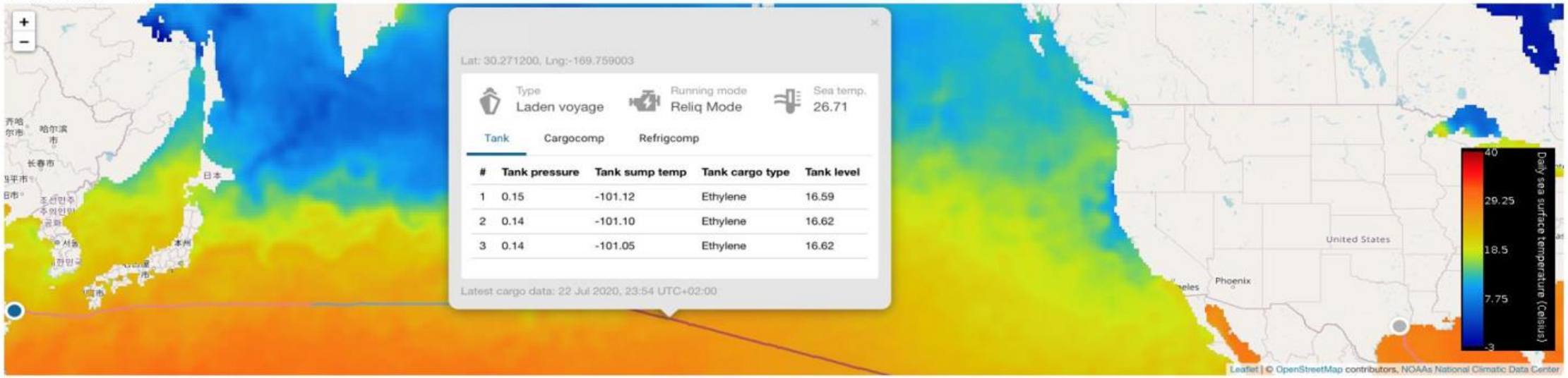
- Common Glycol Return Temp
- RLQ1_Pressure Loss ST1/ST2
- RLQ1_Pressure Ratio Stage 01
- RLQ1_Pressure Ratio Stage 02
- RLQ1_Pressure Ratio Stage 03
- RLQ2_Pressure Loss ST1/ST2
- RLQ2_Pressure Ratio Stage 01
- RLQ2_Pressure Ratio Stage 02
- RLQ2_Pressure Ratio Stage 03
- SuperHeat Refrig 1
- SuperHeat Refrig 2

### Details



VOYAGE DETAILS · 2020-07-02 14:45:00




**COOLDOWN OPERATION**

From: 13 Jul, 20:05 UTC to 25 Jul, 00:45 UTC
Average Sea Temp. Inlet for the period: 26.5 °C

**Cargo Compressor**

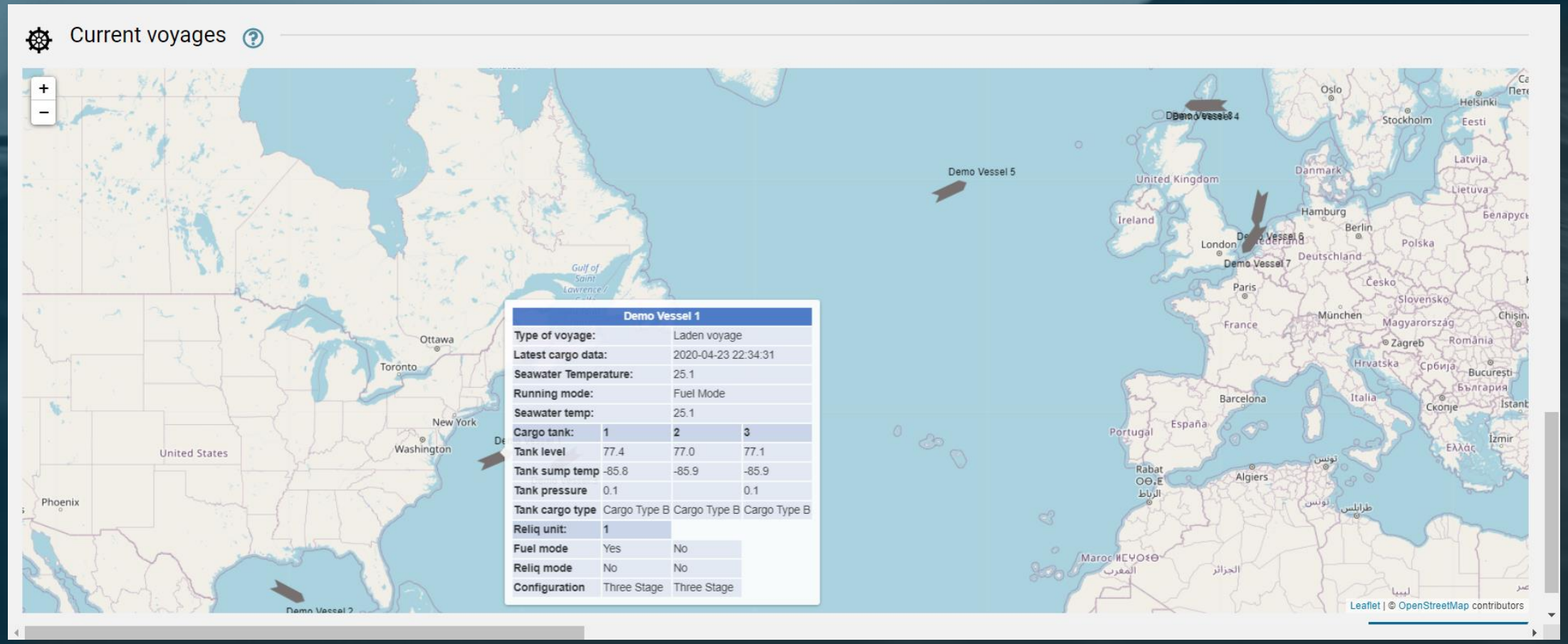
| Unit | Reliq 1 | Reliq 2 | Total |
|---|---|---|---|
| Running hours | 268.5 | 96.55 | 365.1 |
| Energy consumption | 55.8 | 19 | 74.8 |

**Refrigeration Compressor**

| Unit | Refrig 1 | Refrig 2 | Total |
|---|---|---|---|
| Running hours | 268.25 | 97 | 365.3 |
| Energy consumption | 87.7 | 30.9 | 118.6 |

**Cargo Tank**

| Tank | Pressure (barg) (start/end) | Temperature °C (start/end) | Tank Level (m) (start/end) |
|---|---|---|---|
| 1 | 0.7 / 0.1 | -95.1 / -102.4 | 16.6 / 16.6 |
| 2 | 0.7 / 0.1 | -95.1 / -102.3 | 16.6 / 16.6 |
| 3 | 0.7 / 0.1 | -95.1 / -102.3 | 16.6 / 16.6 |


Current voyages
Demo Vessel 1
Type of voyage: Laden voyage
Latest cargo data: 2020-04-23 22:34:31
Seawater Temperature: 25.1
Running mode: Fuel Mode
Seawater temp: 25.1
Cargo tank: 1 2 3
Tank level 77.4 77.0 77.1
Tank sump temp -85.8 -85.9 -85.9
Tank pressure 0.1 0.1
Tank cargo type Cargo Type B Cargo Type B Cargo Type B
Reliq unit: 1
Fuel mode Yes No
Reliq mode No No
Configuration Three Stage Three Stage
Demo Vessel 5
Demo Vessel 6
Demo Vessel 7
Demo Vessel 2
Ottawa
Toronto
New York
Washington
United States
Phoenix
Gulf of Saint Lawrence
Oslo
Helsinki
Stockholm
Eesti
Latvija
Lietuva
Danmark
United Kingdom
Ireland
Hamburg
Berlin
Polska
Deutschland
London
Paris
France
Česko
Slovensko
München
Magyarország
Zagreb
Hrvatska
Srbija
Bucureşti
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España
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Ελλάς
İzmir
Rabat
Algiers
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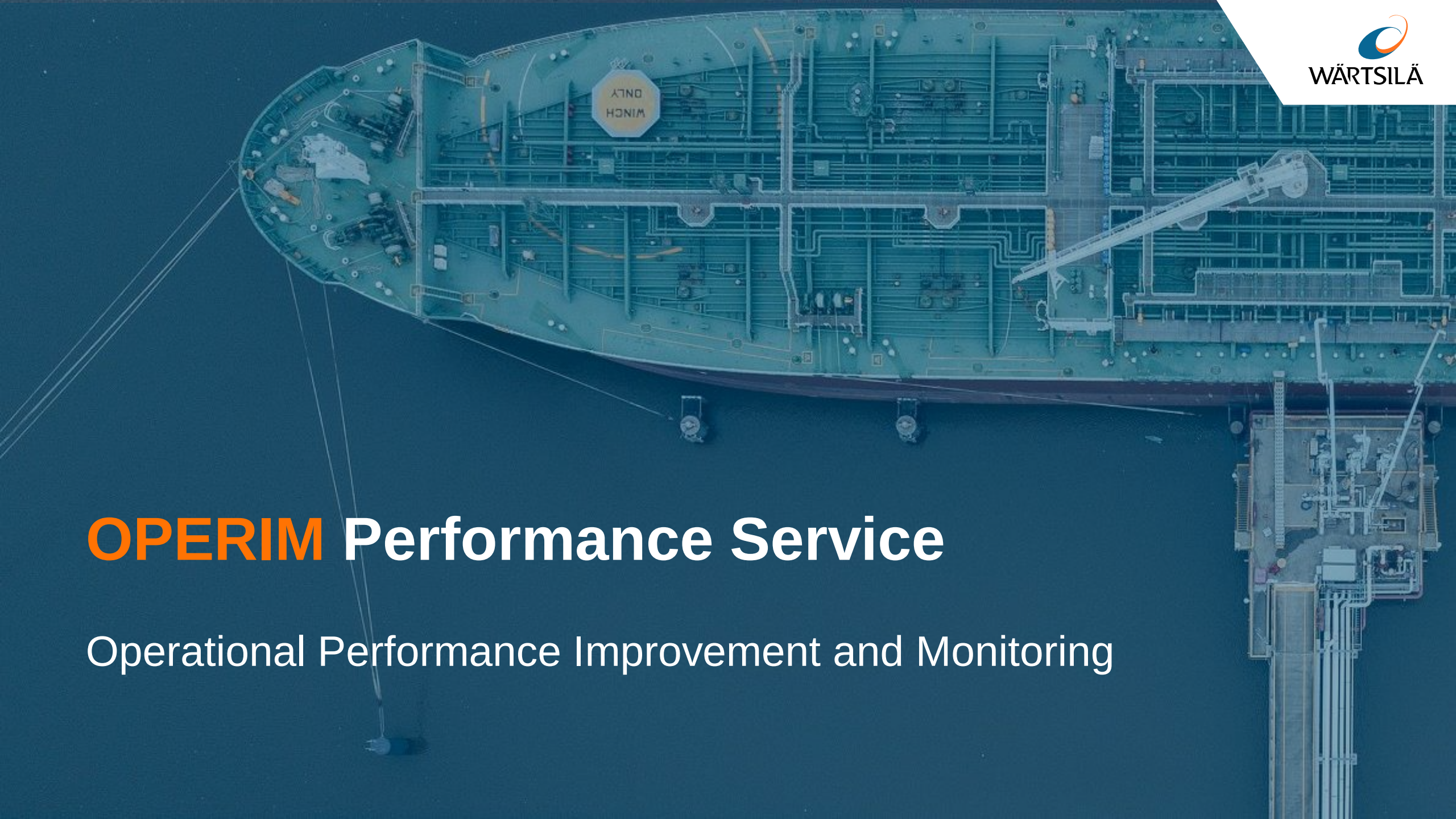



# OPERIM Performance Service

## Operational Performance Improvement and Monitoring

# OPERIM PERFORMANCE SERVICE

## Improvements

*Collaborative operational development*

Chat

**Digital Collaboration tool support**

Expert Support

**Regular data and insight reviews by Wärtsilä experts**

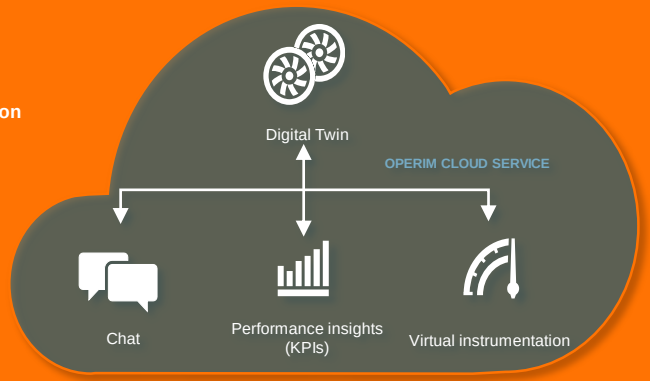
Data Review Meetings

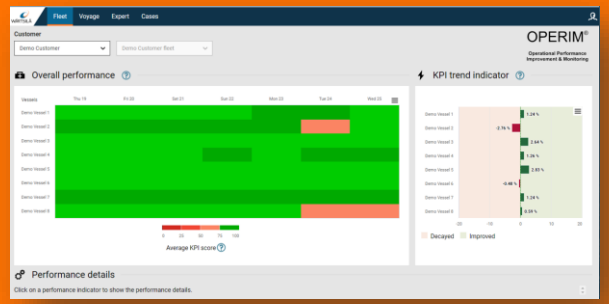
**Meetings with fleet management to present findings and improvement actions.**

## Insights

*Insightful dashboards and KPI indicators*

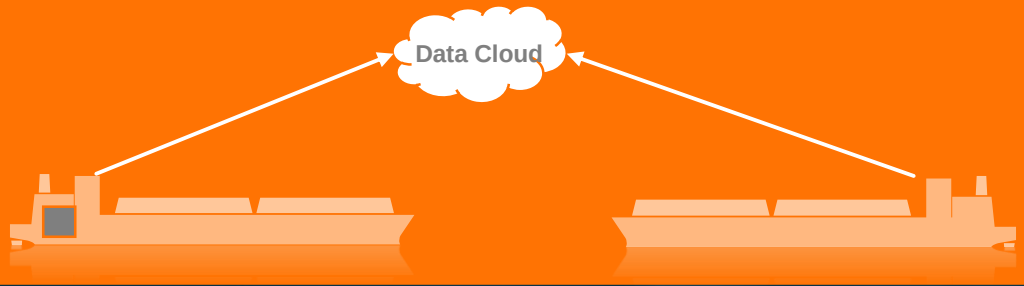
Cloud Application Access




## Data

*Flexible solutions for data acquisition and monitoring*



# TYPICAL SAVING POTENTIAL FROM OPERIM PERFORMANCE SERVICE

**Operational Savings ~ 20%** ***[reduction in running hours]***

**Fuel Cost ~ 300k USD**

**Fuel Volume ~ 1k Metric Tons**

**Co2 Emissions ~ 3k Metric Tons**

***Average figures based on a fleet of 10 vessels in a 12 month period for the Cargo handling system***

# FORGET ABOUT OPTIMISATION – WITH OPERIM IT'S ALWAYS ON

Read more at www.wartsila.com