LEAN MARINE

How much fuel saving could your vessel get through operational excellence?

Fuel Management Optimization

Who We Are

We are maritime experts with a passion for innovation and an urge for making a difference.

We make it happen!

What we have made happen

More than

40

Satisfied Clients

More than

175

Vessels Contracted for our FuelOpt

162

Million kg of CO_2 saved per year

Operate the ship efficiently

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Planning


Route planning


Weather routing


Speed optimization


Historical best practice

Execution


Manual control


Real time decision support


Captain's "foot on the gas pedal"

Post Voyage


Performance monitoring


Data analysis


Reporting

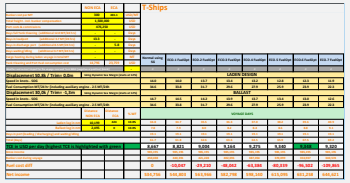

FuelOpt


Fleet Analytics

Planning

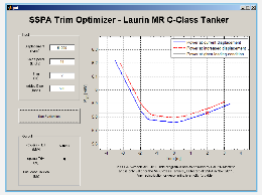
Route planning

Advanced routing taking weather, currents, shallow water effects etc. into account to find the optimal route. Historical data helps yield substantial savings



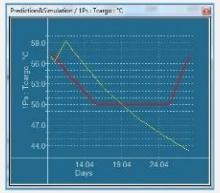
Speed optimization

Speed is optimized for each voyage basis operational parameters, fuel cost, earnings and forecasted market. The goal is to boost earnings, and save fuel



Trim optimization

Optimal trim to save fuel is often missed and can be a low hanging fruit if there is information to optimize towards



Cargo heating/cooling optimization

Planning departure and arrival heat requirements reduces unnecessary fuel spending

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Example

Using optimized speed on an MR-tanker increased earnings by almost 1,000 USD/day

Return on investment: Instant

Executing

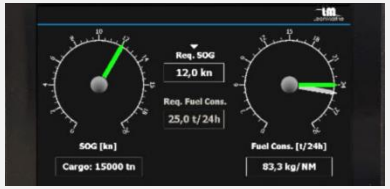
Navigation

Following the planned route and following best practice

Optimized autopilot settings and slow turns to minimize resistance

Optimized speed

Following advised speed and aiming to reduce variations in shaft power



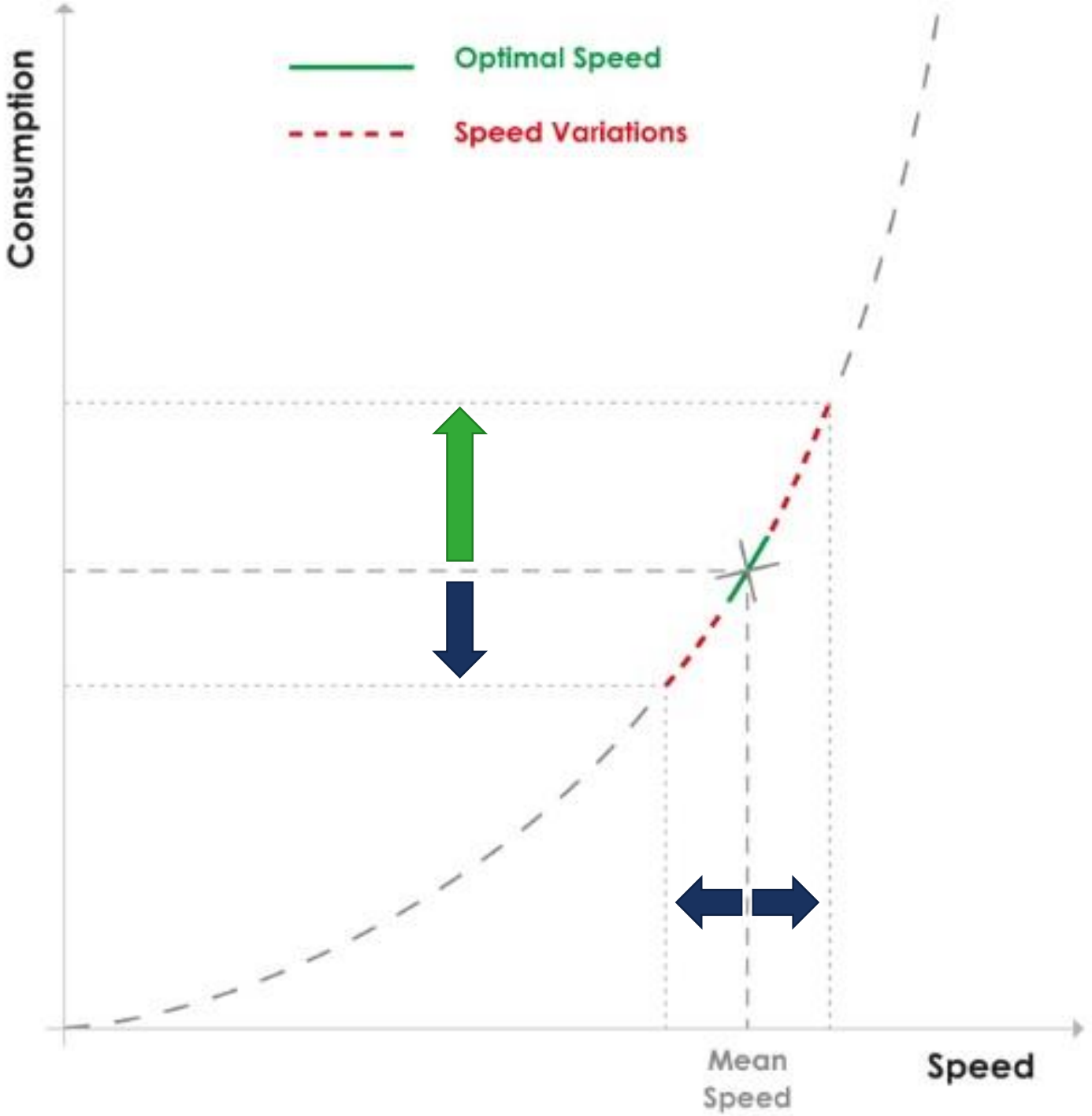
Optimizing propulsion

Keeping engine, and propeller running in optimal conditions to save fuel

Adapt to outcome and changing conditions

Continuous data collection and logging gives decision support

Direct speed & consumption management to avoid surprises



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Fixed Pitch Propeller or Controllable Pitch Propeller

The faster you go, the more expensive it gets… fast!

THE TARGET

STEADY AND PREDICTABLE SHAFT POWER

Case Study 1

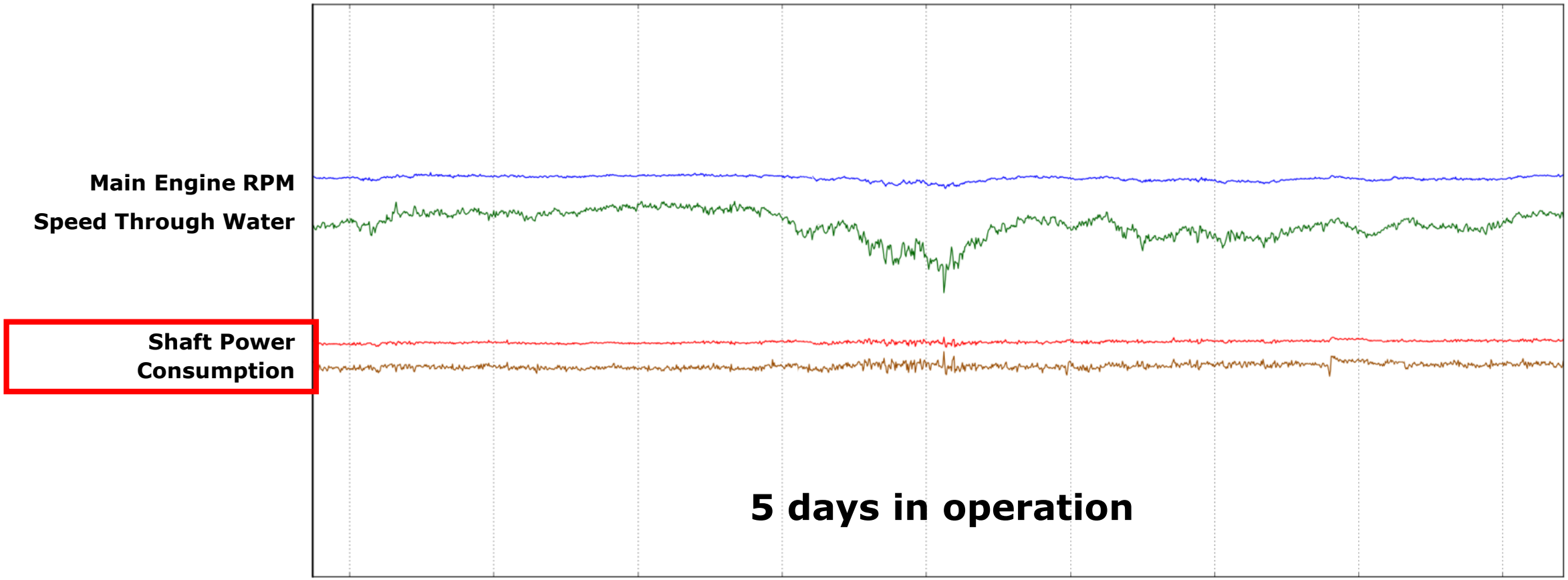
Vessel type:	Bulk Carrier
Size:	200 000 dwt
Propulsion:	~11 000 kW propulsion power Single Fixed Pitch Propeller
Type of trade:	Worldwide – Pacific to Atlantic voyages of **+50 days**
Type of sailing conditions:	25% of sailing time the surrounding conditions affect the vessel creating power variations

Mode 1 – without shaft power control

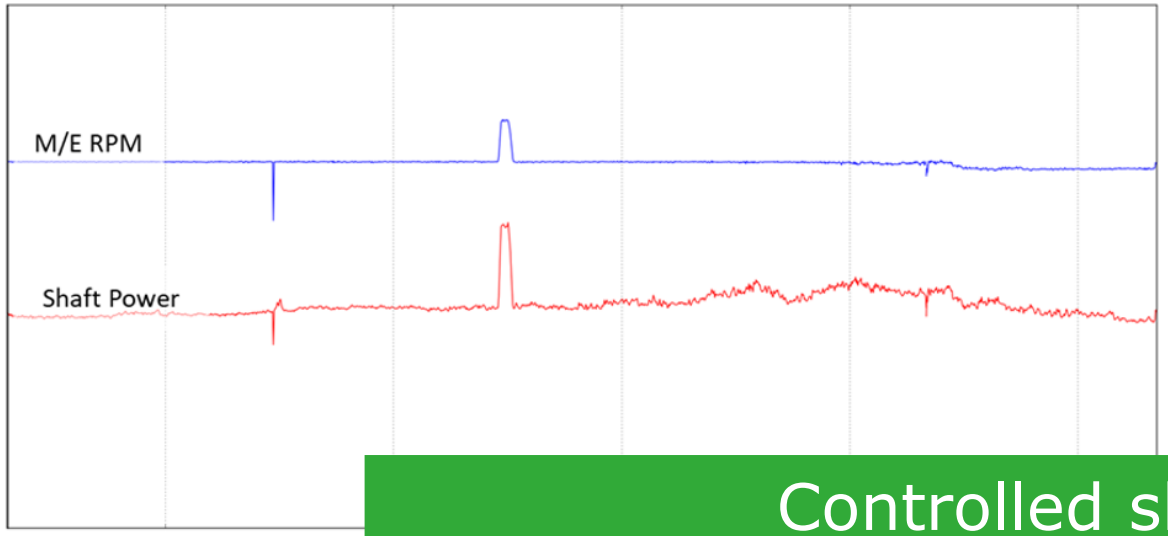
Mode 2 – with shaft power control FuelOpt

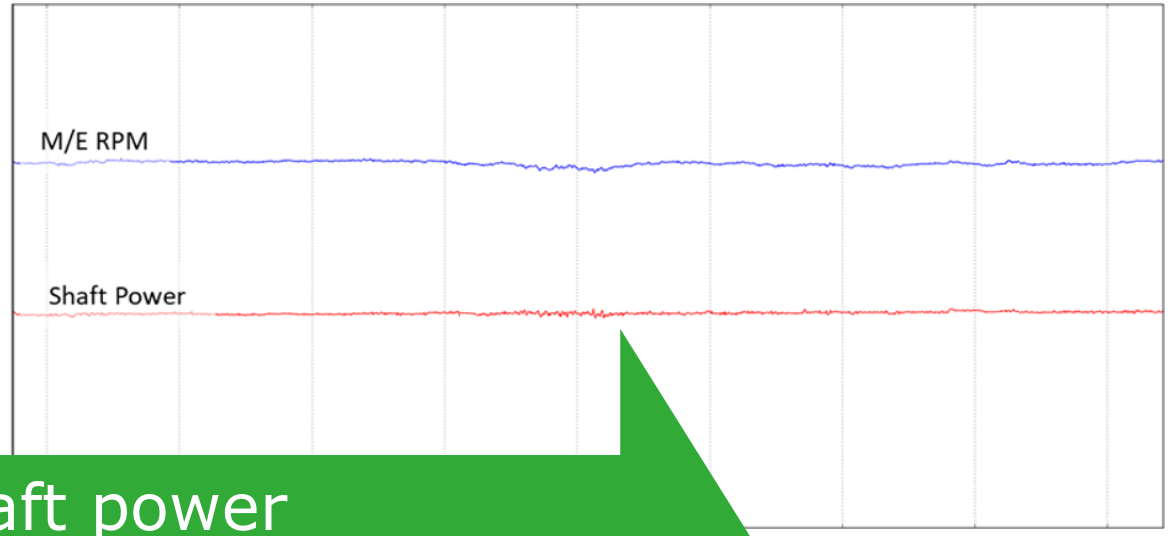
Vessel operation without shaft power control

Vessel operation with shaft power control



Results with FuelOpt





Controlled shaft power
=
Controlled fuel consumption

Results

Avg. consumption:

35 tons/24h

Annual fuel savings:

225 tons of fuel

= 700 000 kg CO_2

Case Study 2

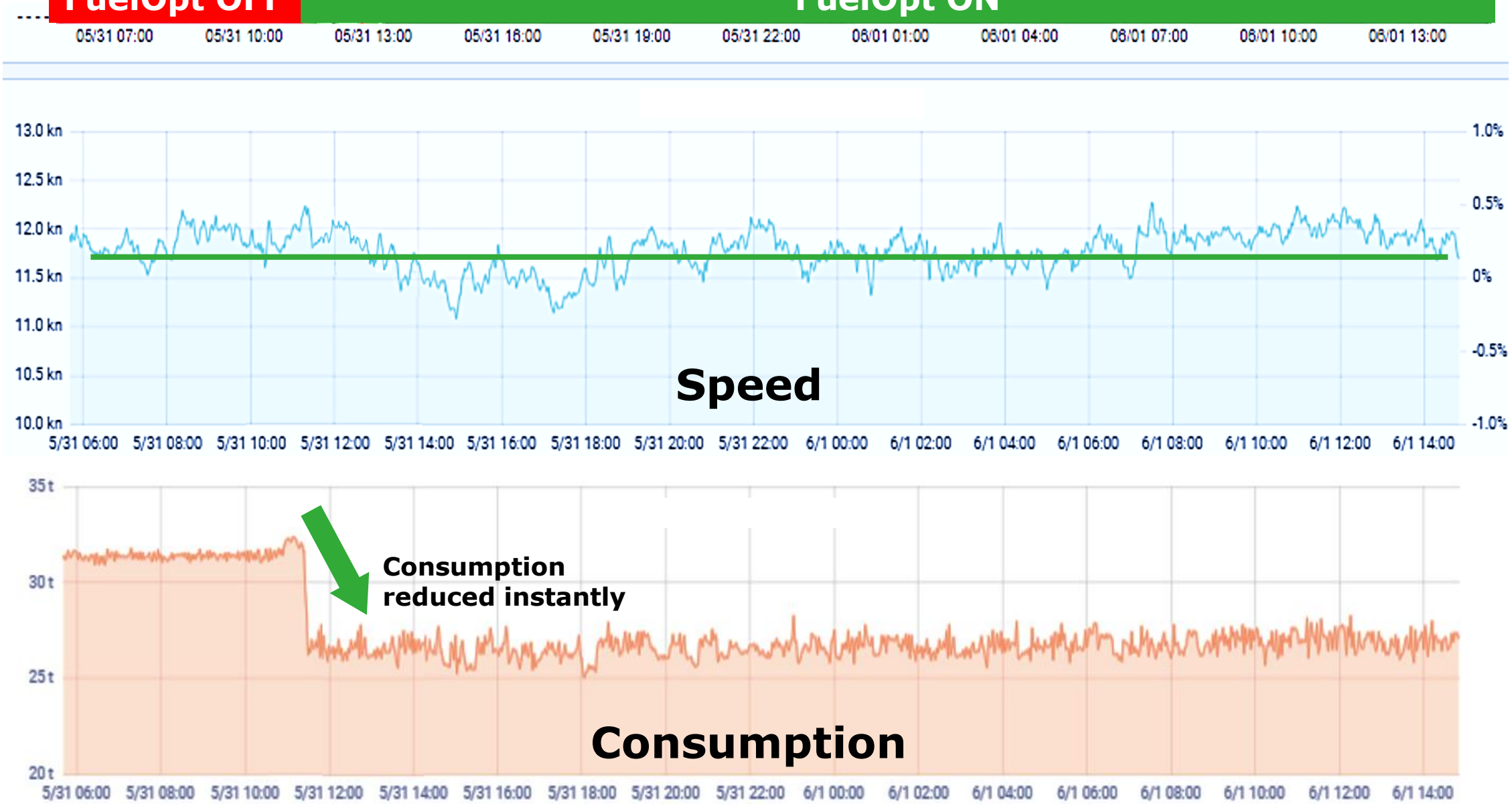
Vessel type:	Chemical/Product Carrier
Size:	50 000 dwt
Propulsion:	Controllable Pitch Propeller
Propulsion machinery:	~11 000 kW propulsive power
Type of trade:	Worldwide – Pacific to Atlantic, voyages of **200+ days**
Type of sailing condition:	25% of sailing time the surrounding conditions affect the vessel creating power variations

Mode 1 – without shaft power control

Mode 2 – with shaft power control FuelOpt

FuelOpt OFF

FuelOpt ON



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Results

Avg. fuel savings:

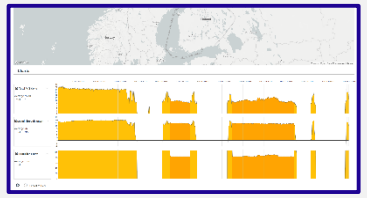
3 tons / 24 h

Annual fuel savings:

600+ tons of fuel

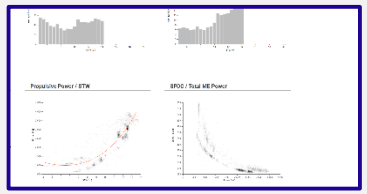
= 1 820 000 kg CO_2

Post voyage



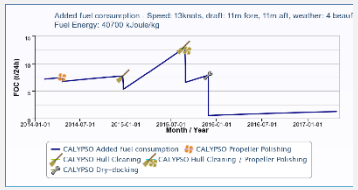
Performance monitoring

Mass flow meters, and higher-grade logs installed to improve measurements



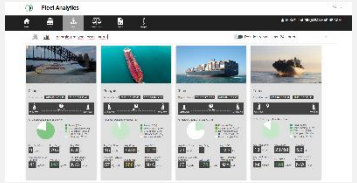
Analyze and compare voyages

Compare vessels to evaluate different operational procedures and find best practices



Analyze vessel condition

Decision support for hull or propeller cleaning. Engine performance monitoring.



Reporting

Useful information and automated reporting reduces and simplifies administration onboard and ashore

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Equip the ship for efficient operations

Examples of fuel saving measures

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Speed optimization:	20 - 30%
Hull condition	5 - 25%
Propeller pitch optimization	5 - 20%
Waste heat recovery	10%
Power management	4 - 8%
Weather routing	3 - 8%
Optimized autopilot	5%
Trim optimization	5%
Improved bulbous bow	4 - 15%
Propeller improvements	2 - 4%
Boiler consumption reduction	3%
Energy saving lighting	1%
Variable speed pumps & fans	< 2%

Typical savings of 1 - 10%


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Typical measurement error 5-10%
If you can measure it,
you can manage it

How much data do you need?

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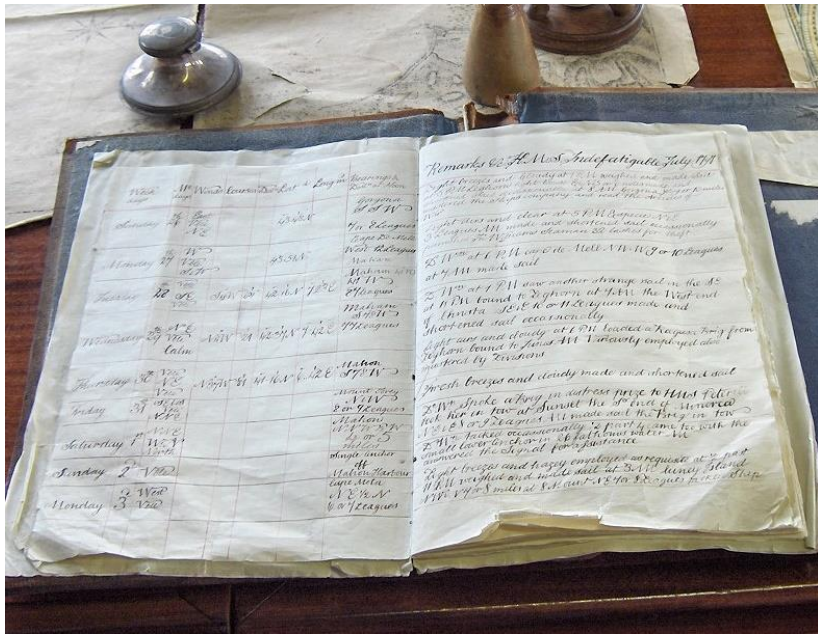
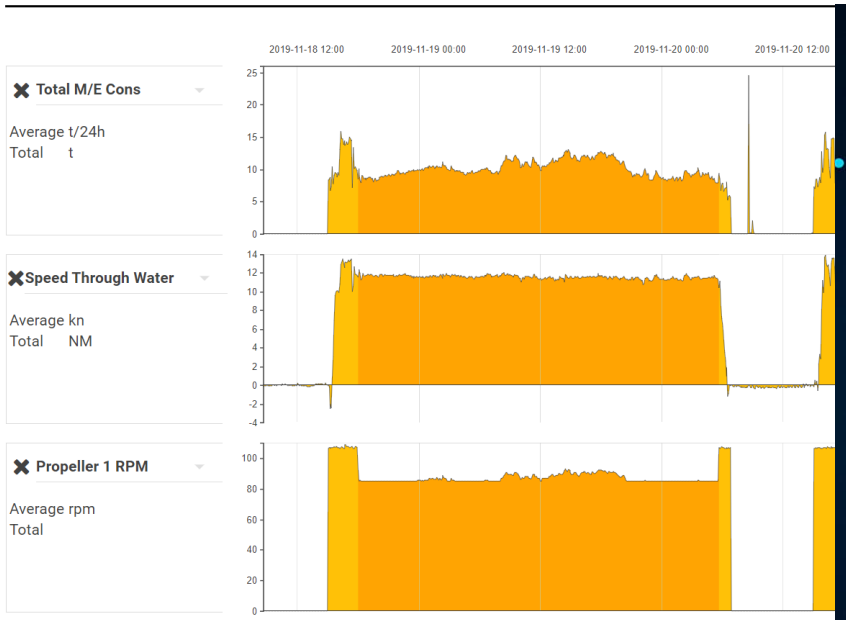
Some data



Manual collection, error prone

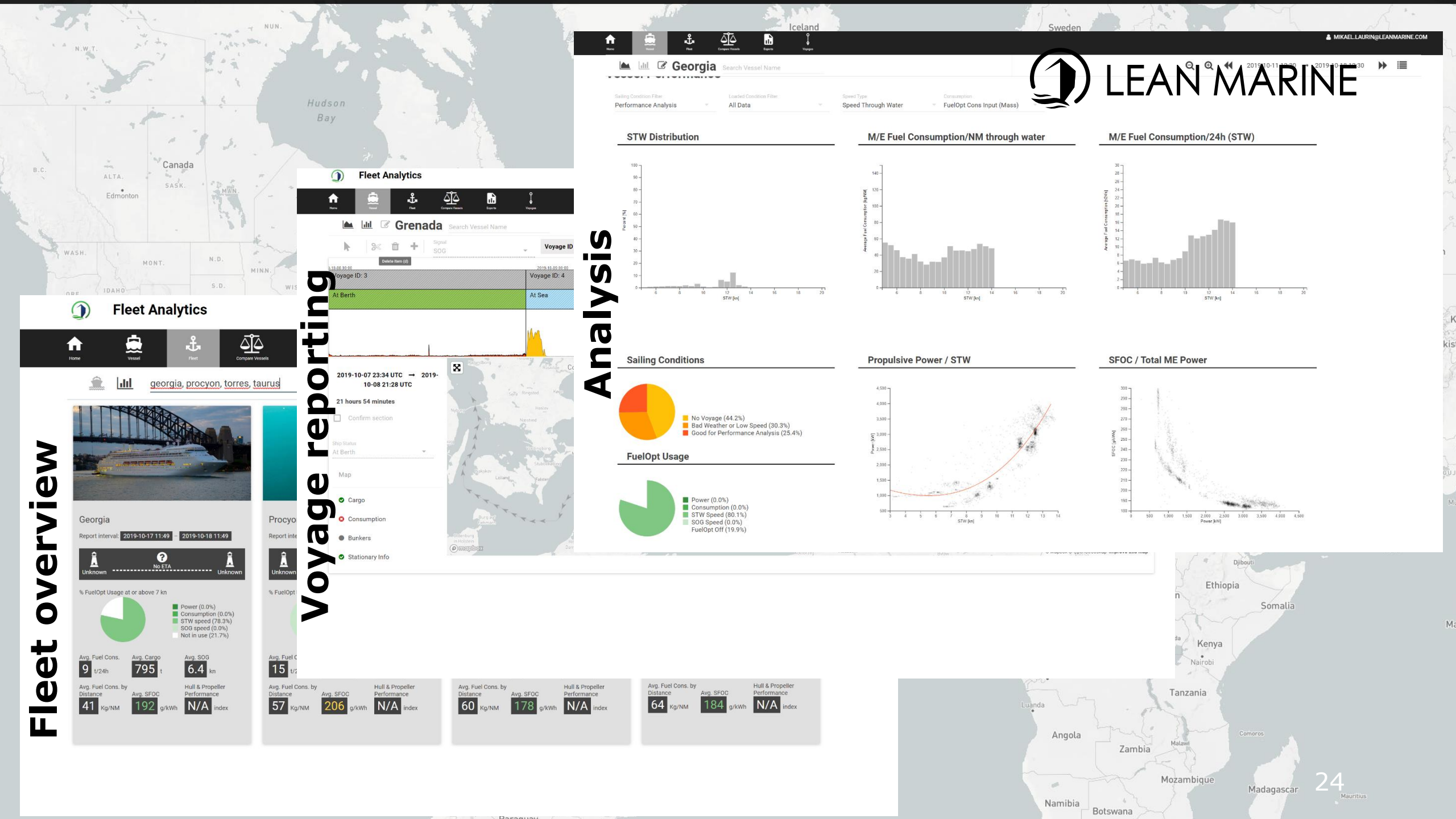
Automated data



Enables analysis and creating best practices

Big data

Enables AI & Deep Learning


Fleet overview
Fleet Analytics
Home
Vessel
Fleet
Compare Vessels
georgia, procyon, torres, taurus
Georgia
Report interval: 2019-10-17 11:49 - 2019-10-18 11:49
Unknown
No ETA
Unknown
% FuelOpt Usage at or above 7 kn
Power (0.0%)
Consumption (0.0%)
STW speed (78.3%)
SOG speed (0.0%)
Not in use (21.7%)
Avg. Fuel Cons. 9 t/24h
Avg. Cargo 795 t
Avg. SOG 6.4 kn
Avg. Fuel Cons. by Distance 41 Kg/NM
Avg. SFOC 192 g/kWh
Hull & Propeller Performance N/A index
Procyo
Unknown
15
Avg. Fuel Cons. by Distance 57 Kg/NM
Avg. SFOC 206 g/kWh
Hull & Propeller Performance N/A index
Avg. Fuel Cons. by Distance 60 Kg/NM
Avg. SFOC 178 g/kWh
Hull & Propeller Performance N/A index
Avg. Fuel Cons. by Distance 64 Kg/NM
Avg. SFOC 184 g/kWh
Hull & Propeller Performance N/A index
Voyage reporting
Fleet Analytics
Grenada
Search Vessel Name
Voyage ID
Voyage ID: 3
Voyage ID: 4
At Berth
At Sea
2019-10-07 23:34 UTC → 2019-10-08 21:28 UTC
21 hours 54 minutes
Confirm section
Ship Status
At Berth
Map
Cargo
Consumption
Bunkers
Stationary Info
Analysis
MIKAEL.LAURIN@LEANMARINE.COM
Georgia
Search Vessel Name
Performance Analysis
All Data
Speed Through Water
FuelOpt Cons Input (Mass)
STW Distribution
M/E Fuel Consumption/NM through water
M/E Fuel Consumption/24h (STW)
Sailing Conditions
No Voyage (44.2%)
Bad Weather or Low Speed (30.3%)
Good for Performance Analysis (25.4%)
Propulsive Power / STW
SFOC / Total ME Power
FuelOpt Usage
Power (0.0%)
Consumption (0.0%)
STW Speed (80.1%)
SOG Speed (0.0%)
FuelOpt Off (19.9%)
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Iceland
Sweden
Hudson Bay
Canada
Edmonton
Ethiopia
Somalia
Kenya
Nairobi
Tanzania
Angola
Zambia
Mozambique
Madagascar
Namibia
Botswana
Comoros
Mauritius

Fleet overview

for performance management at fleet level

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Fleet Analytics

v2.13.1

Home | Vessel | Fleet | Compare Vessels | Exports | Voyages

MIKAEL.LAURIN@LEANMARINE.COM

georgia, procyon, torres, taurus

Position View

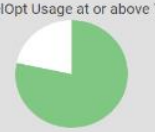
Last 24 Hours

Georgia

Report interval: 2019-10-17 11:49 – 2019-10-18 11:49

Unknown — No ETA — Unknown

% FuelOpt Usage at or above 7 kn



Power (0.0%)
Consumption (0.0%)
STW speed (78.3%)
SOG speed (0.0%)
Not in use (21.7%)

Avg. Fuel Cons.	Avg. Cargo	Avg. SOG
9 t/24h	795 t	6.4 kn

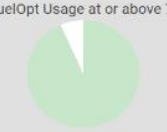
Avg. Fuel Cons. by Distance	Avg. SFOC	Hull & Propeller Performance
41 Kg/NM	192 g/kWh	N/A index

Procyon

Report interval: 2019-10-17 12:01 – 2019-10-18 12:00

Unknown — No ETA — Unknown

% FuelOpt Usage at or above 7 kn



Power (0.0%)
Consumption (0.0%)
STW speed (0.0%)
SOG speed (93.4%)
Not in use (6.6%)

Avg. Fuel Cons.	Avg. Cargo	Avg. SOG
15 t/24h	9430 t	10.2 kn

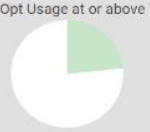
Avg. Fuel Cons. by Distance	Avg. SFOC	Hull & Propeller Performance
57 Kg/NM	206 g/kWh	N/A index

Taurus

Report interval: 2019-10-17 11:27 – 2019-10-18 11:27

Unknown — No ETA — Unknown

% FuelOpt Usage at or above 7 kn



Power (0.0%)
Consumption (0.0%)
STW speed (0.0%)
SOG speed (23.2%)
Not in use (76.8%)

Avg. Fuel Cons.	Avg. Cargo	Avg. SOG
21 t/24h	0 t	12.3 kn

Avg. Fuel Cons. by Distance	Avg. SFOC	Hull & Propeller Performance
60 Kg/NM	178 g/kWh	N/A index

Torres

Report interval: 2019-10-17 11:38 – 2019-10-18 11:38

Unknown — Kolding

% FuelOpt Usage at or above 7 kn

Power (0.0%)
Consumption (0.0%)
STW speed (0.0%)
SOG speed (85.3%)
Not in use (14.7%)

Avg. Fuel Cons.	Avg. Cargo	Avg. SOG
13 t/24h	23760 t	5.9 kn

Avg. Fuel Cons. by Distance	Avg. SFOC	Hull & Propeller Performance
64 Kg/NM	184 g/kWh	N/A index

Reporting

Automated & simplified Voyage and MRV reporting

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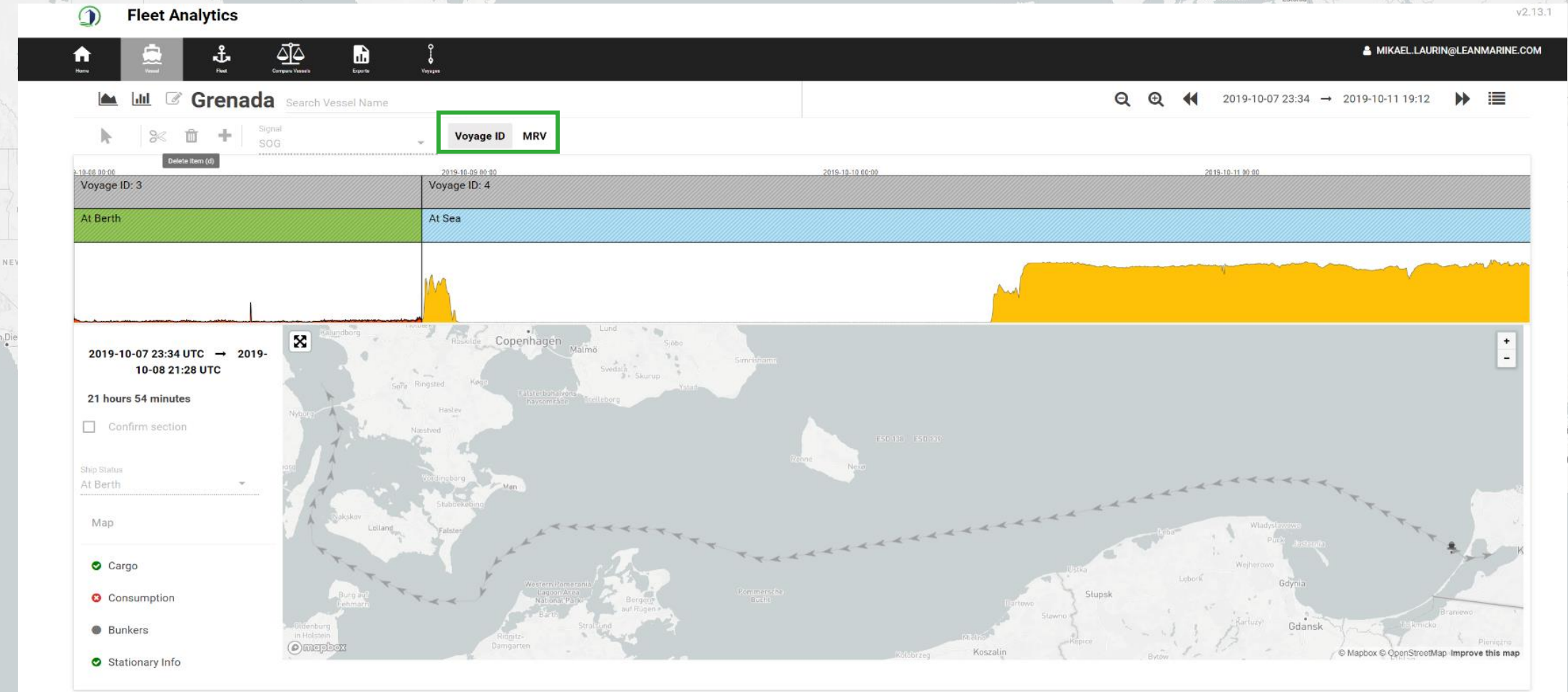

Analysis

Comparison possibility at vessel and fleet level

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Georgia

Search Vessel Name

2019-10-11 12:30 → 2019-10-18 12:30

Filtering options

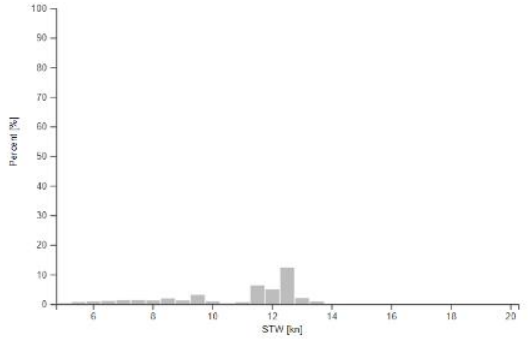
- All data
- FuelOpt ON
- FuelOpt OFF

Sailing Condition Filter: Performance Analysis

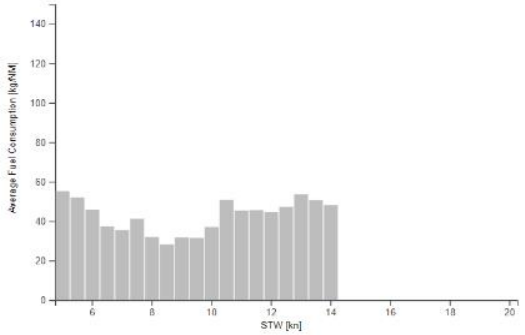
Speed Type: Speed Through Water

Consumption: FuelOpt Cons Input (Mass)

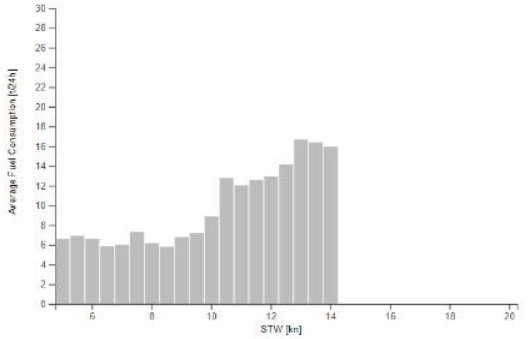
STW Distribution



M/E Fuel Consumption/NM through water

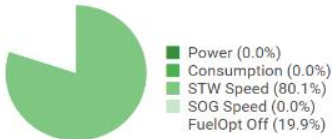


M/E Fuel Consumption/24h (STW)

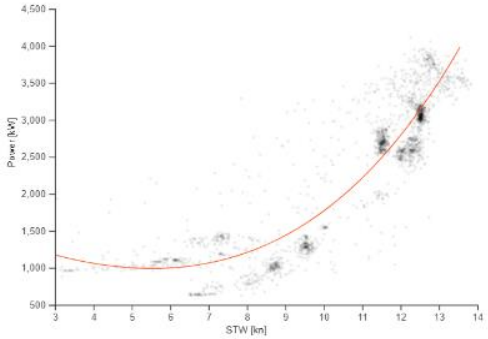


Sailing Conditions

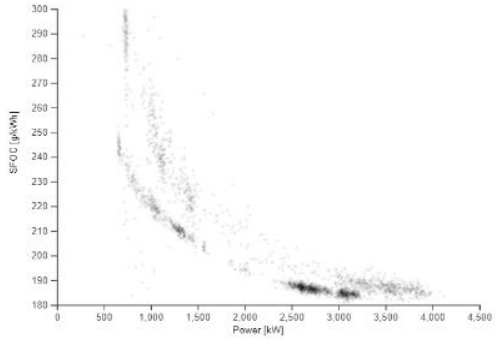
FuelOpt Usage



Propulsive Power / STW



SFOC / Total ME Power



Operate the ship efficiently

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Planning

- Route planning
- Weather routing
- Speed optimization
- Historical best practice

Execution

- Manual control
- Real time decision support
- Captain's "foot on the gas pedal"

FuelOpt

Post Voyage

- Performance monitoring
- Data analysis
- Reporting

Fleet Analytics


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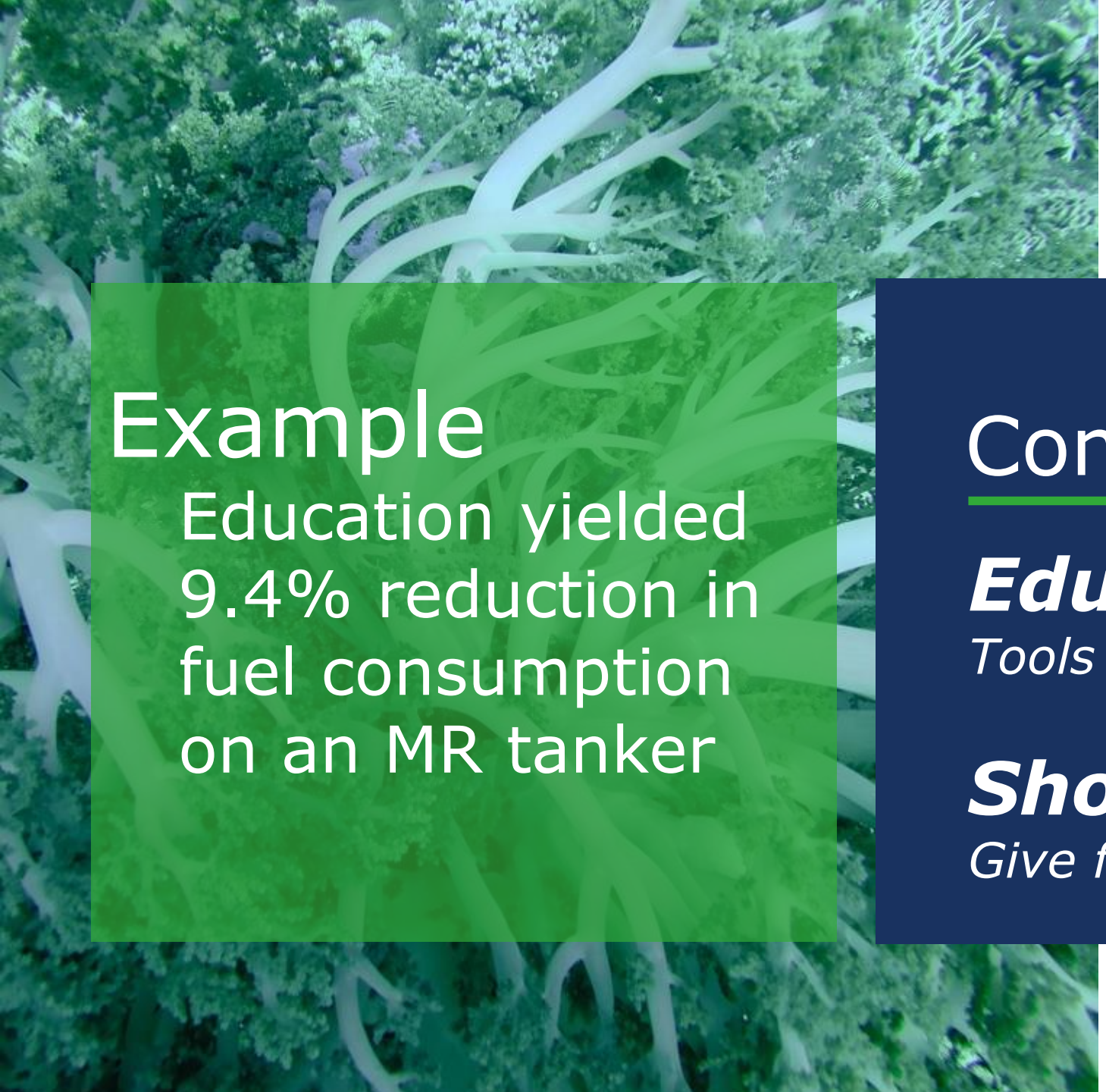
If you can measure it,
you can manage it
Now manage it!



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Example

Education yielded 9.4% reduction in fuel consumption on an MR tanker

Company culture

Educate

Tools are useless if not used right

Show the results

Give feedback on the effects

Change the culture now

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- Don’t wait for regulation and external pressure
- Many investments have short return on investment
- This matters because…
  - **Efficiency helps the planet**
  - **Efficiency helps the company**
  - **Efficiency helps you**

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Our planet can't wait

SAVE FUEL
LOWER CO_2 EMISSIONS

Thank you

www.leanmarine.com