SEA-Mate® Blending-on-Board: Lubrication Flexibility & Optimization

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Blending-on-Board

Wide range of vessel types and engines sizes

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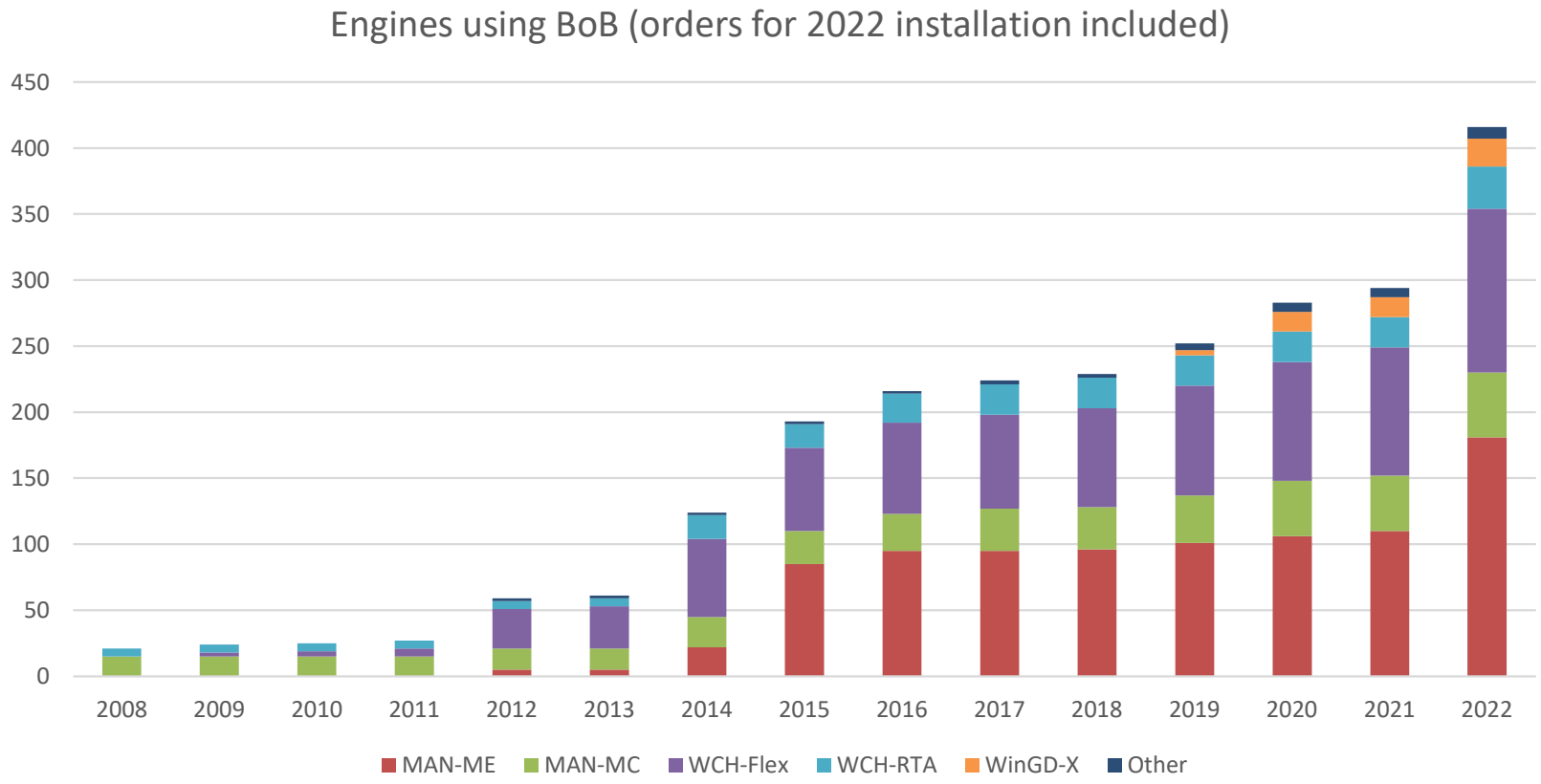
Blending-on-Board is used on all of the common engine types today



MAN-ME: 80+ of these engines have Mk8 or higher Mk number.

The oldest engine using a blender is a GFCA55 powerplant built 1982 and the most modern are X62, X92, G80 etc

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Engines using Blenders today

- S42MC
- UEC45
- S46ME
- S50ME
- S50MC
- L50MC
- S60MC
- S60ME
- RT-Flex-58
- RTA62U
- X62
- S70ME
- S80ME
- RT-Flex82
- RT-Flex84
- K80MC
- K90MC
- K90ME
- S90ME
- X92
- RT-Flex96
- RTA96
- K98ME

Photo from the manufacturing facility in Poland

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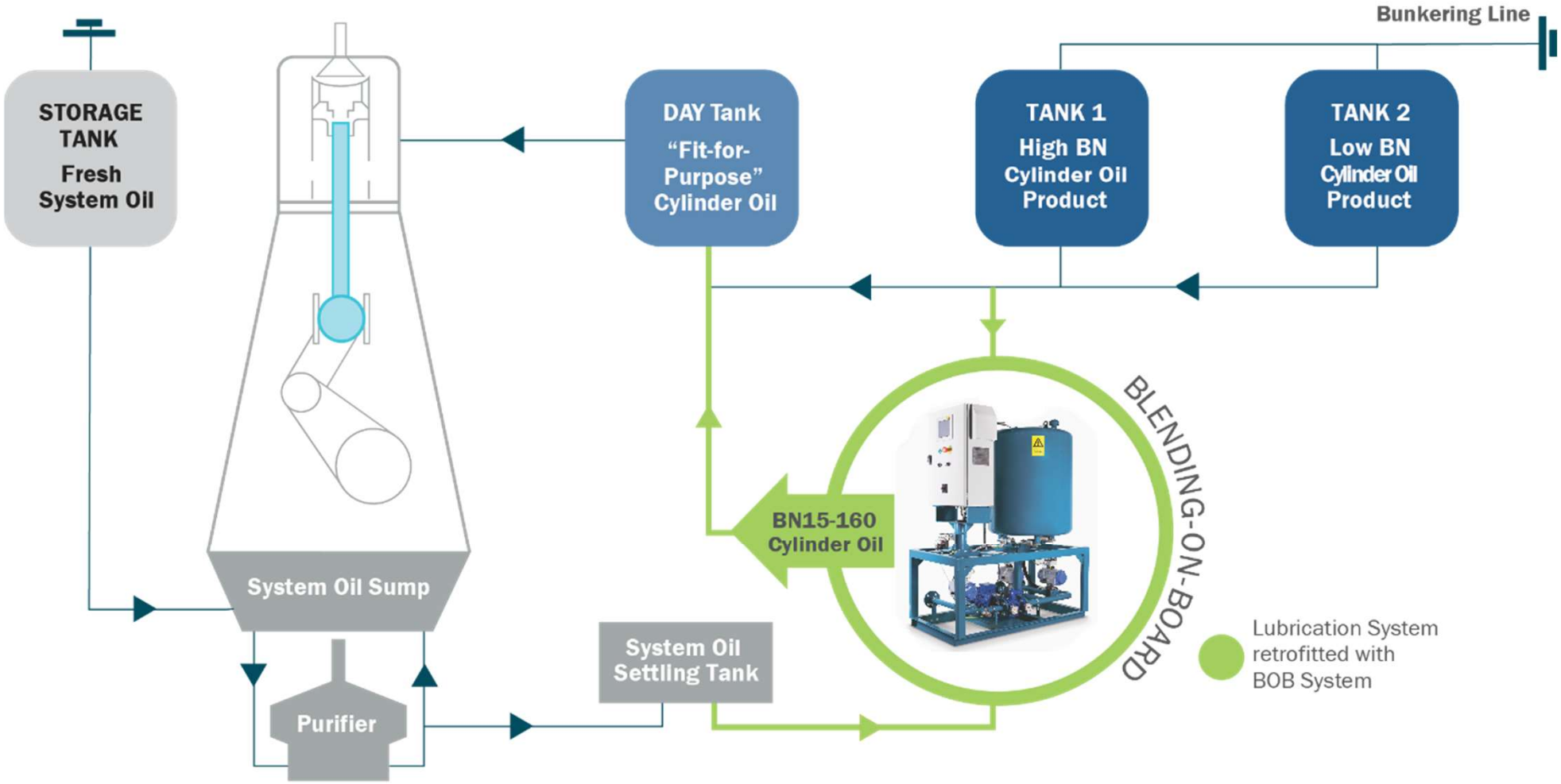
Blending-on-Board setup



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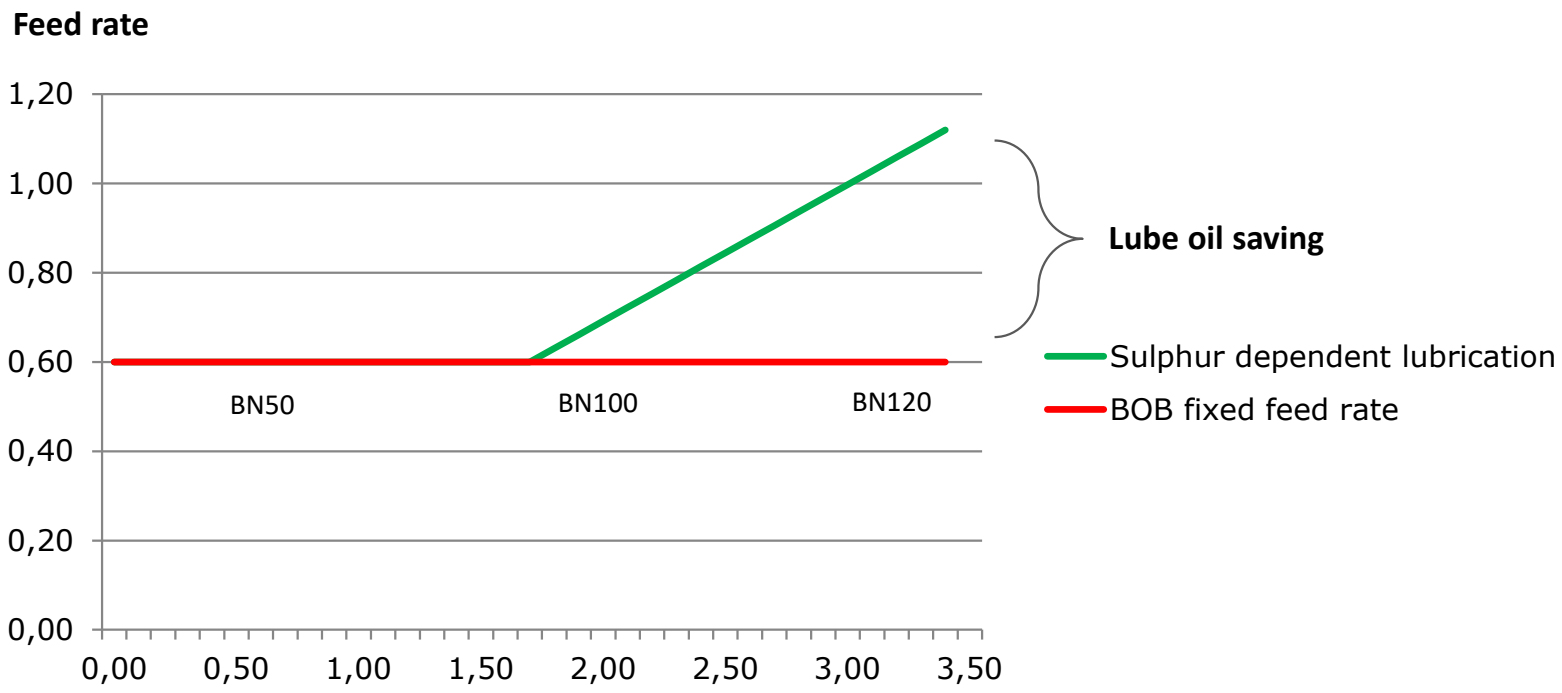
Blending-on-Board

- Scrubber vessels

When using high Sulphur fuels we can change the BN and not the feedrate this way using less cylinder oil.
A higher BN oil is more efficient as the concentration of additives in the oil is higher, increasing the feedrate with lower BN leads to faster refreshment of the oil film in the cylinder but it newer gets higher than the BN of the oil injected and a lot of the extra oil is scraped up into the combustion chamber or down into the scavenging air belt.

This is particularly important in engines that are prone to high corrosive wear!



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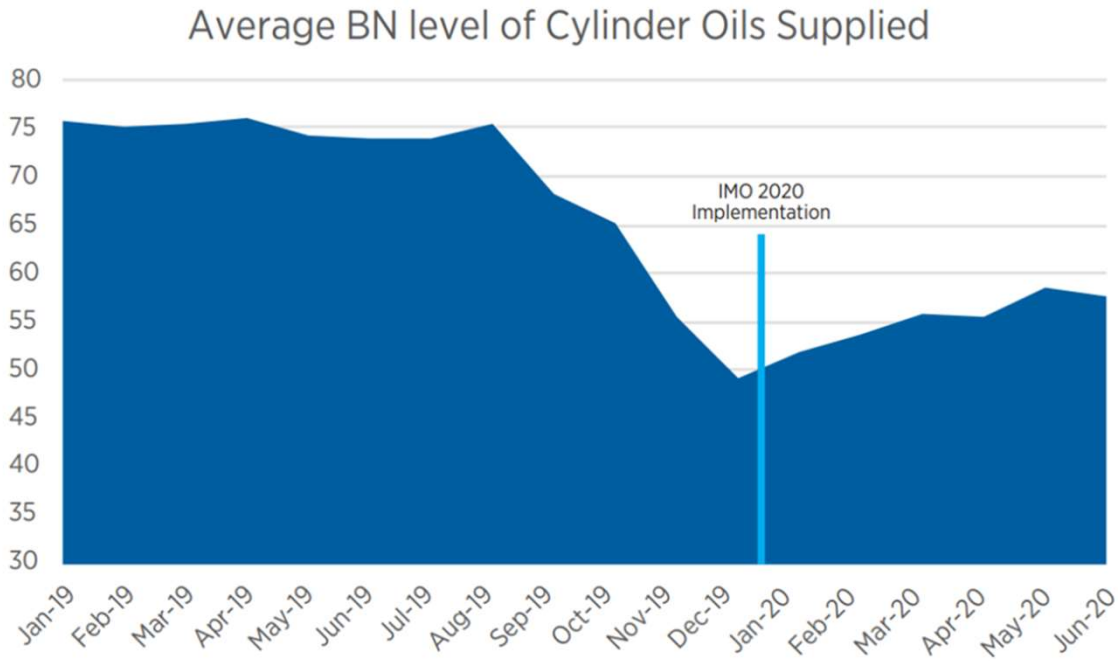
2020 compliant fuel – what cylinder oil to use?

Before 2020, BN40 was considered the correct CO to be used for 2020 compliant fuel.

Now, the average BN of the cylinder oils delivered are increasing, with indication that BN55 is probably much closer to the ideal BN with the new fuels.



VLSFO, ECA and scrubber operation data included. Chevron Marine Lubricants, 2020.

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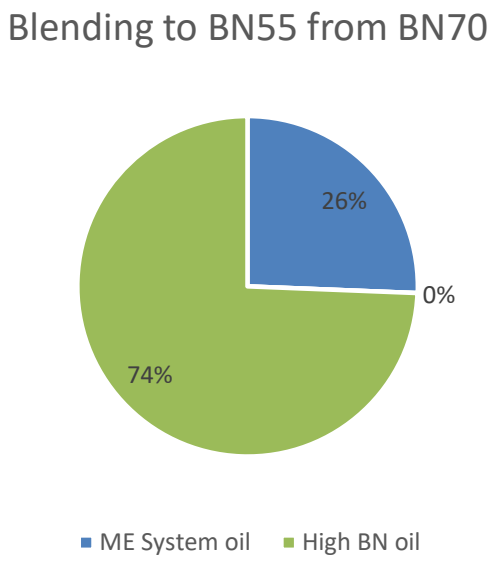
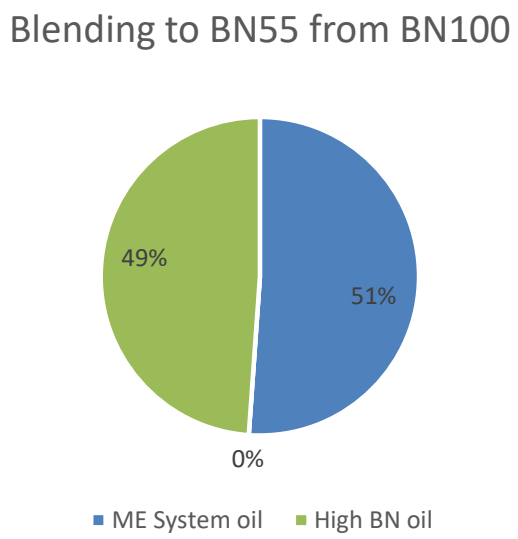
BOB and compliant fuel

We see the vessels blending for compliant fuel getting good cylinder conditions with BN50-60. It can be blended from BN70 and/or BN100

This is a cost effective and simple solution using products that are available in many ports.





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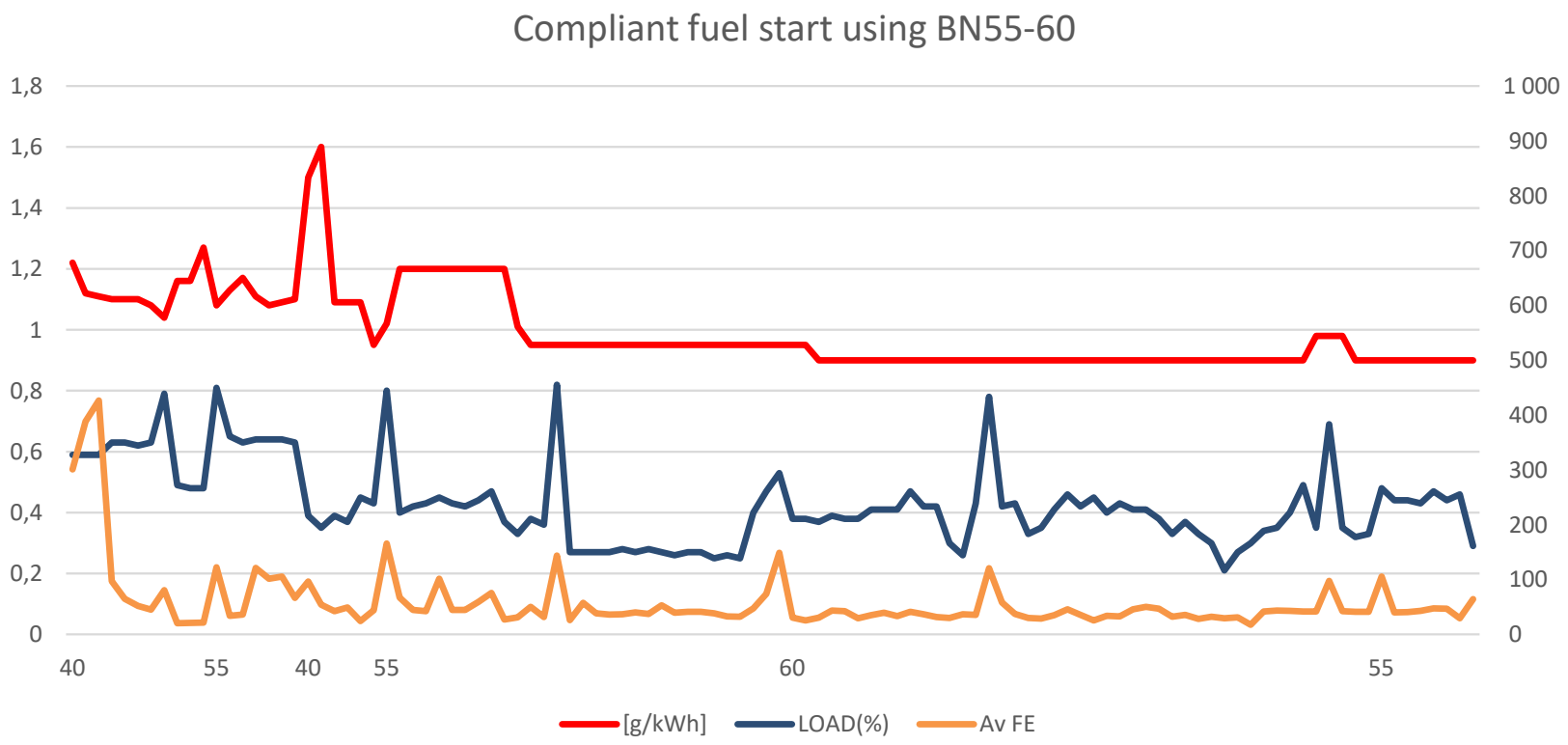
Using BoB with compliant fuel

Tanker starting to use BoB with compliant fuel from start of 2020, first finishing the BN40 left onboard and then blending to BN55-60 seeing lower feedrate and lower wear rate.



Left axis: g/kWh and % load
Right axis: PPM scrape down Fe
X-Axis: Cylinder oil BN

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Simple installation

Crew on board

- Installation & piping
  - System oil
  - High BN oil
  - Aux Eng oil (optional)
  - Air
  - Electricity
  - Supply to service tank

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- Pre-survey & pipe diagram
- Commissioning
  - SEA-Mate start-up
  - Crew Training
  - Reporting procedures

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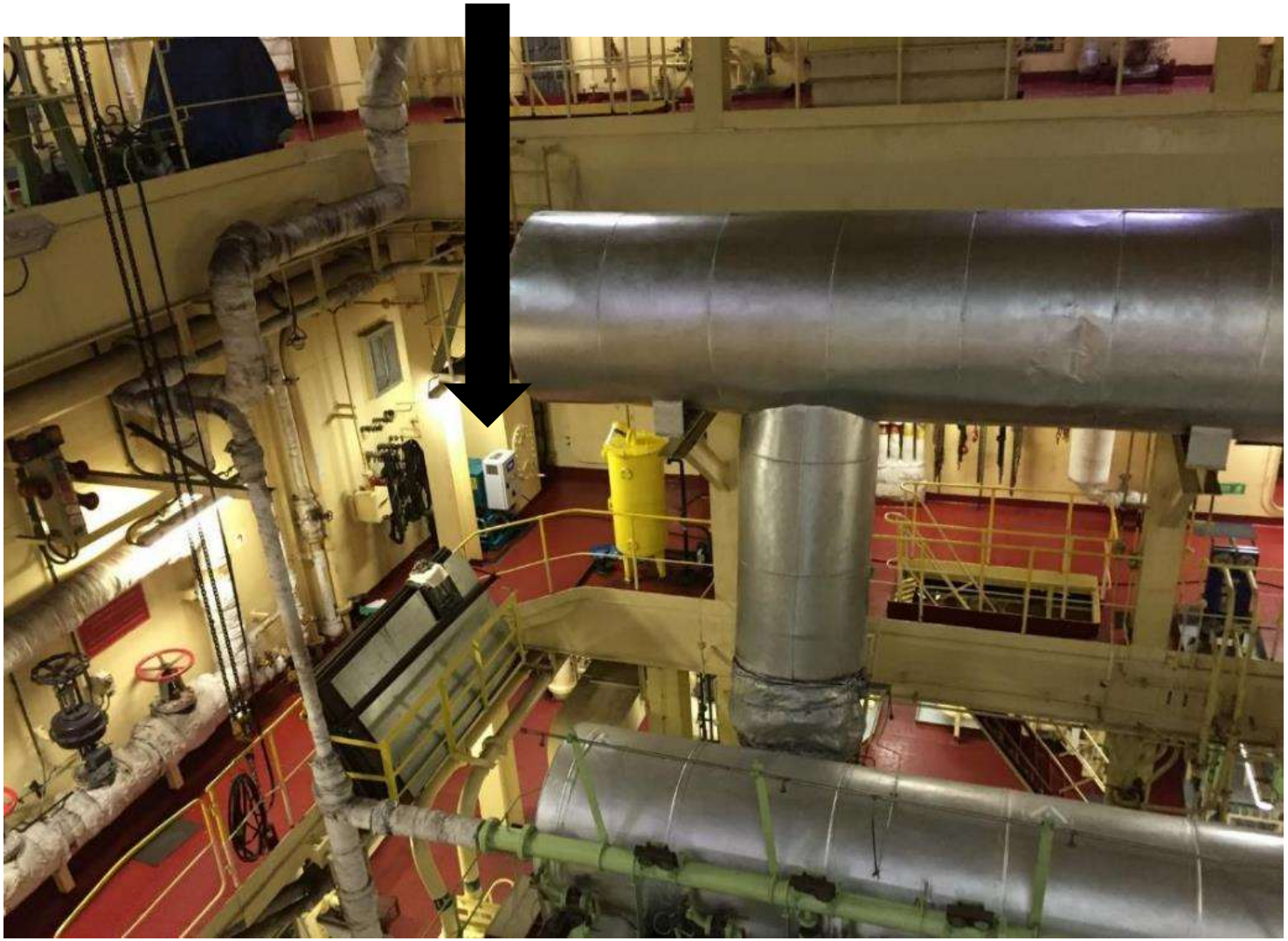
Small footprint

The B500 and B1000Mk2 have the same physical size and are suitable for engines up to 70 bore size



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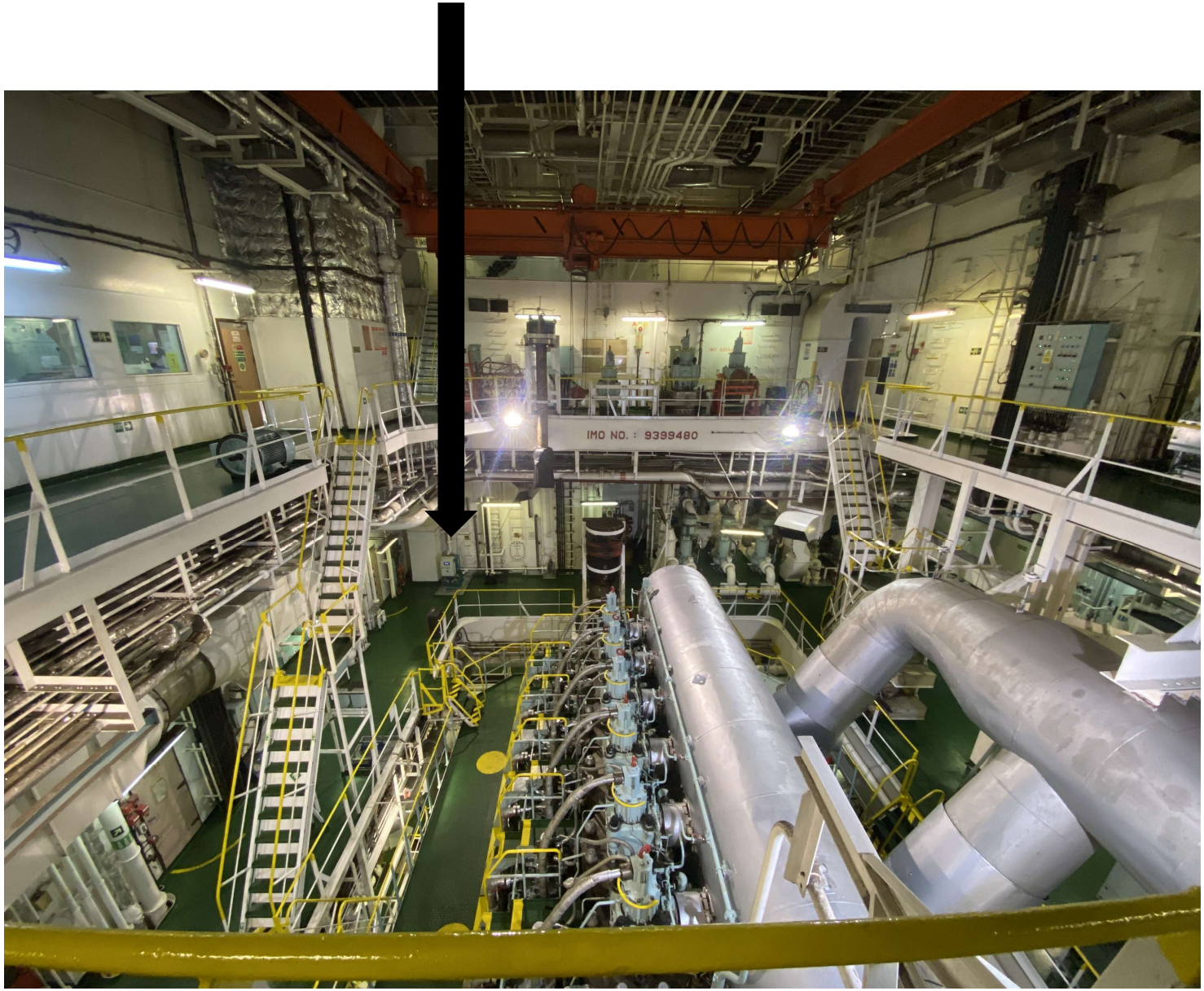
B500Mk2 - Suezmax tanker



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VLCC BOB installations

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Blending-on-Board B500 installation

Installation on LPG vessel with 50ME engine

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Blending-on-Board older version

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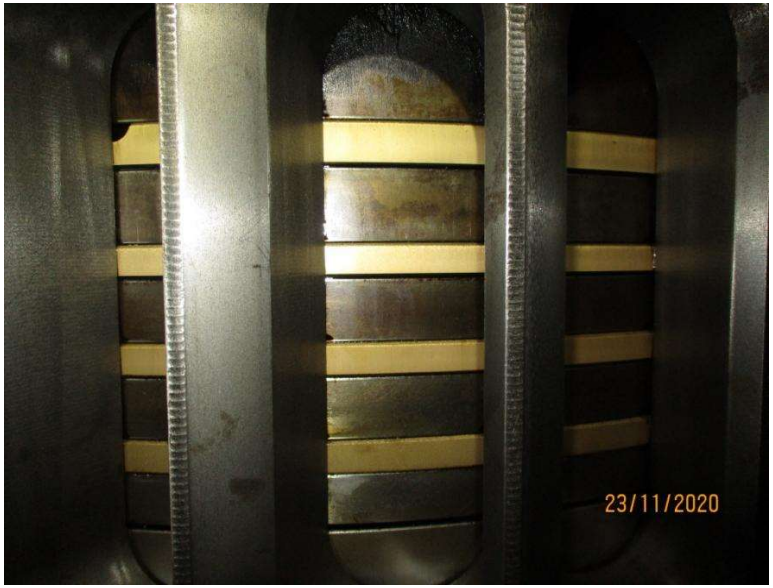
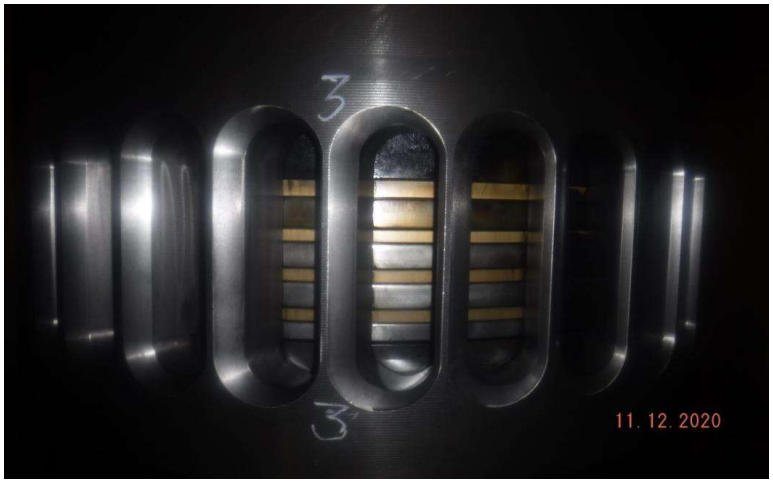
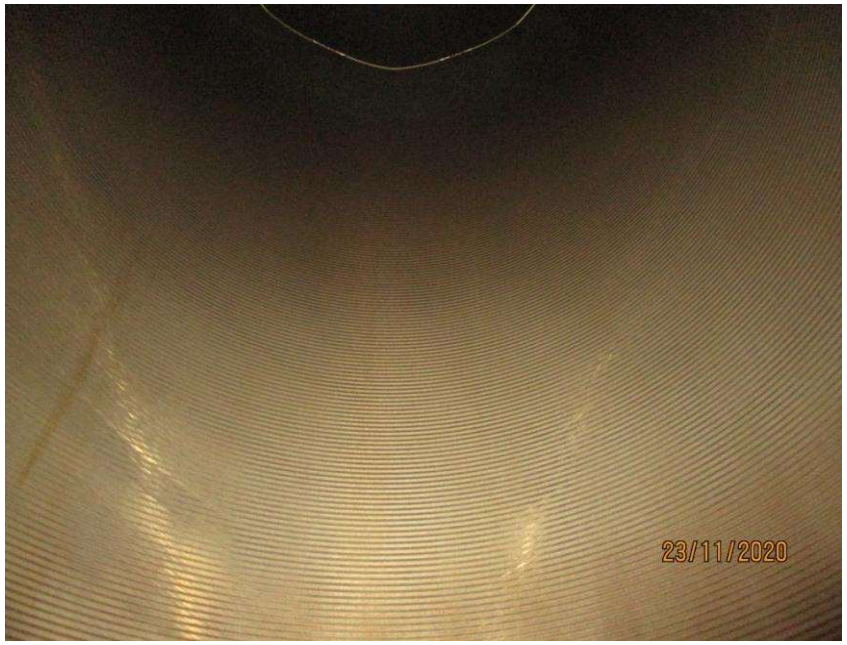
Cylinder condition with blended cylinder oil

S80MC engine





- Clean ringlands and all ring moving freely
- The vessel is operating on compliant fuel and blending to BN55



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Cylinder condition with blended cylinder oil

X62 Engine

- This engine is now at 10.000 hours and the wear on the ring coating and liner minima, it is difficult to get an accurate measurement due to the low wear rates so far.
- All of the ringlands clean with minimal deposits on the piston crown.
- The vessel is operating on compliant fuel and blending to BN60

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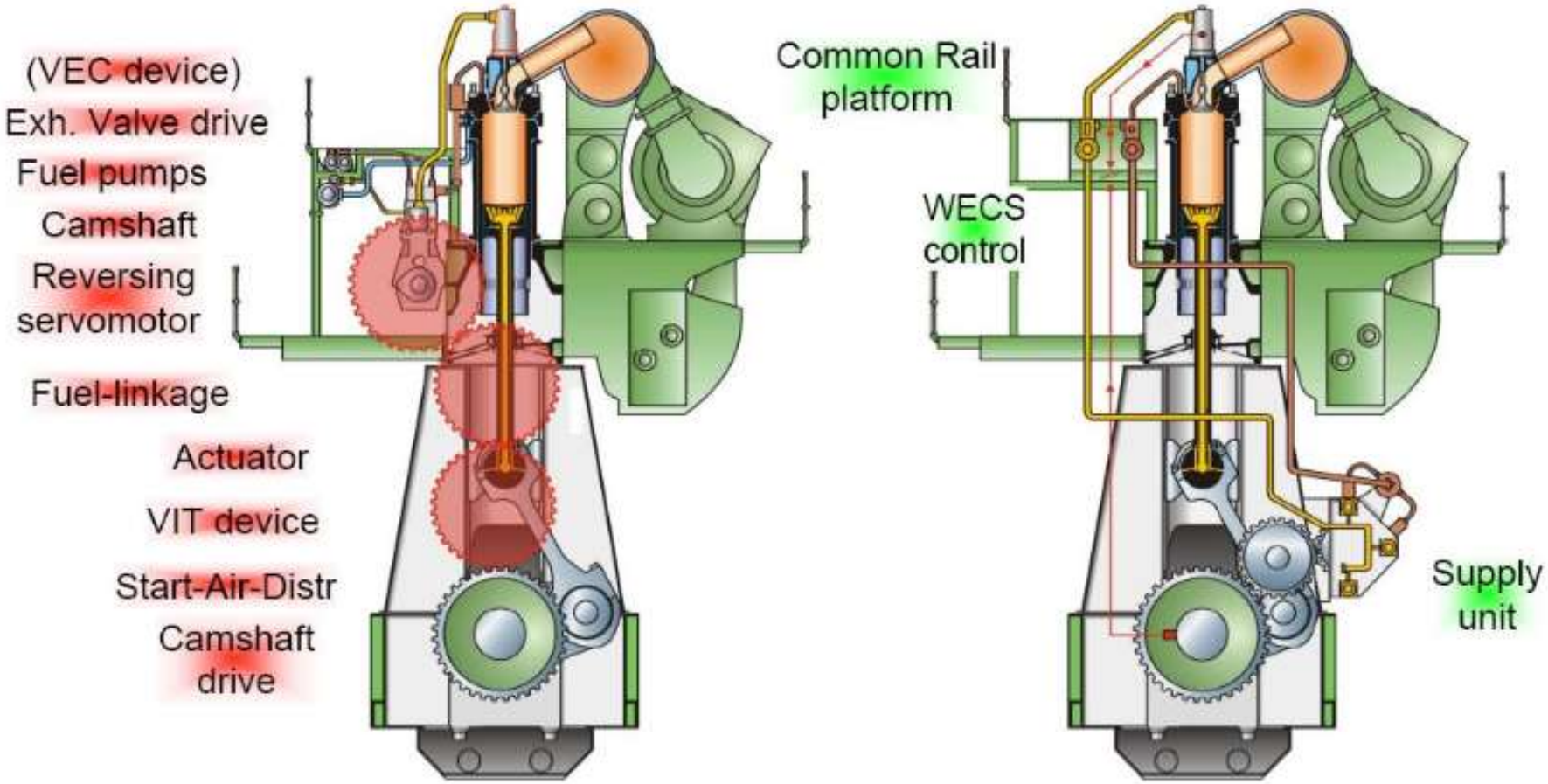
Blending-on-Board benefits in ME/Flex engines

Systemoil is not just a lubricant, it is also used for hydraulics in the engines



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S80 Engine built 2010 – <2 years of blending

Engine cleanliness with BOB

MAN 10K90MC
Build: 1998
BOB installed 2008
Still original liners
Pictures taken 2021

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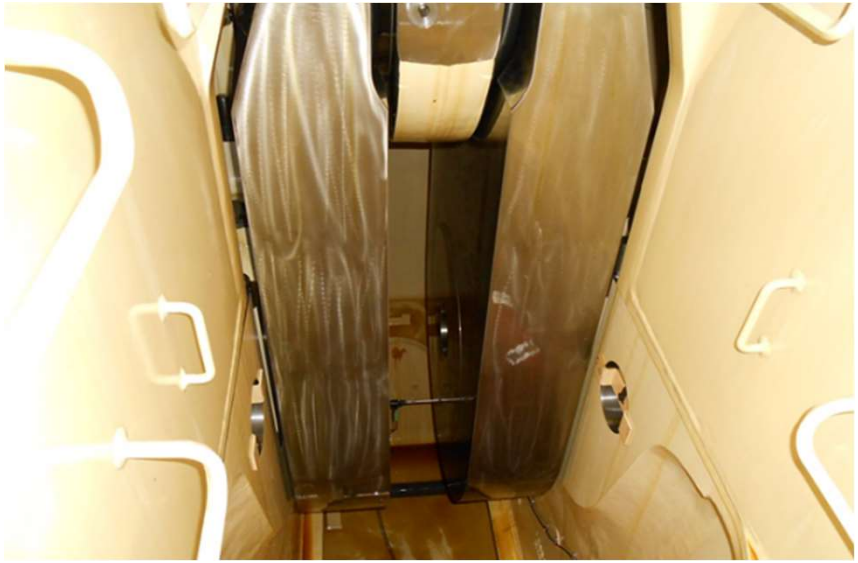
Crank case – X62 (BOB installed since new)



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Energy savings with SEA-Mate®

Klaveness Sustainability report 2020

As a results of continuously refreshing the in-use system oil Klaveness have implemented main engine filters to replace the purifiers. To expand the energy saving they have also installed filters for auxiliary engines.

Estimated fuel oil savings of 0,5 % by changing from purifiers to filters.

Decarbonization initiatives 2020

KCC has during 2020 considerably speeded up the process of evaluating, testing and implementing new fuel saving initiatives.

1) Technical upgrades

Focus has so far been on initiatives to minimize marine growth on the underwater hull of our vessels to reduce hull friction resistance, but also other fuel efficiency measures have been tested.

Initiative	Potential/ reduction in fuel consumption	Description	Expected further roll-out
Silicone based antifouling	3-5%	Applied on two vessels docked during second half of 2020. Prevent biofouling on underwater hull	Expected to be applied on all four vessels drydocking in 2021
Propeller boss cap fins	1-2%	Tested on three CABU Mark I vessels. A fuel saving device installed on the propeller hub	Expected to be installed on three other CABU Mark I vessels at the latest during next docking in 2022
Ultrasonic propeller protection system	0.5-1%	Tested on two vessels. Prevent biofouling growth on the propeller	Expected to be installed in the entire fleet in 2021
Green oil lube filters	0.5%	Green oil lube filters for the main and auxiliary engines. Reduce energy consumption	Expected to be installed on the entire fleet in 2021
Semi-autonomous hull cleaning robot	2-3%	Under testing on one vessel Gently brushes the hull to prevent biofilm growth during transit	Subject to satisfactory final testing, the semi-autono-mous hull cleaning robot is expected to be installed on all KCC vessels

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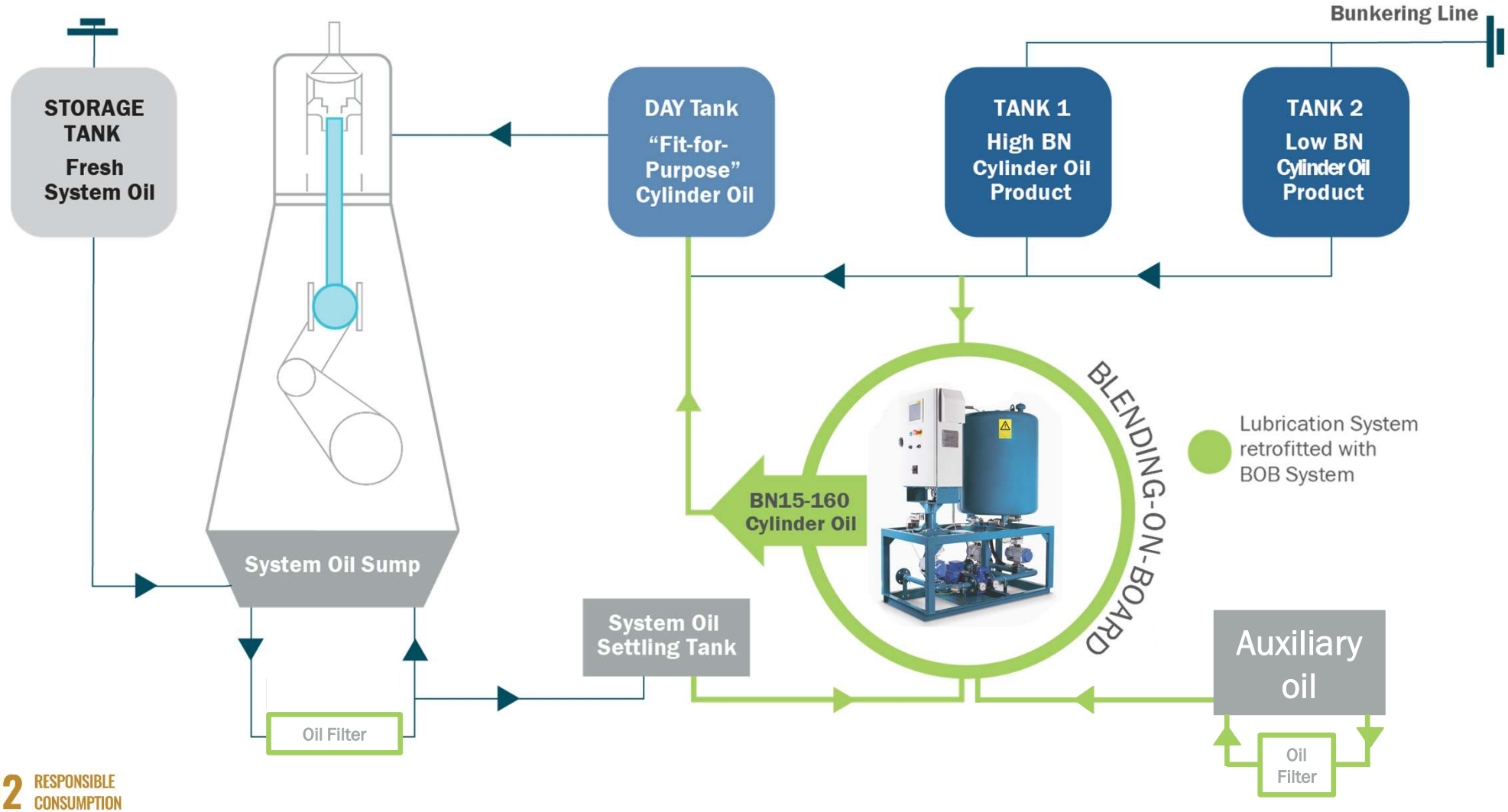
The Blending-on-Board setup

(Including Auxiliary engine oil)



12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Maximize the use of the lubrication oils onboard !

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References

400+ engines operating with SEA-Mate® systems

Bertling

BERGEBULK

COSCO

MAERSK TANKERS

MAERSK LINE

FRONTLINE

Hapag-Lloyd

WALLEM
ESTd 1903

TORM

THE BARBADOS LIGHT & POWER COMPANY LIMITED

EVERGAS

BSM

CLIPPER

Knutsen OAS Shipping

MASTERBULK

Thank you for your attention!

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