

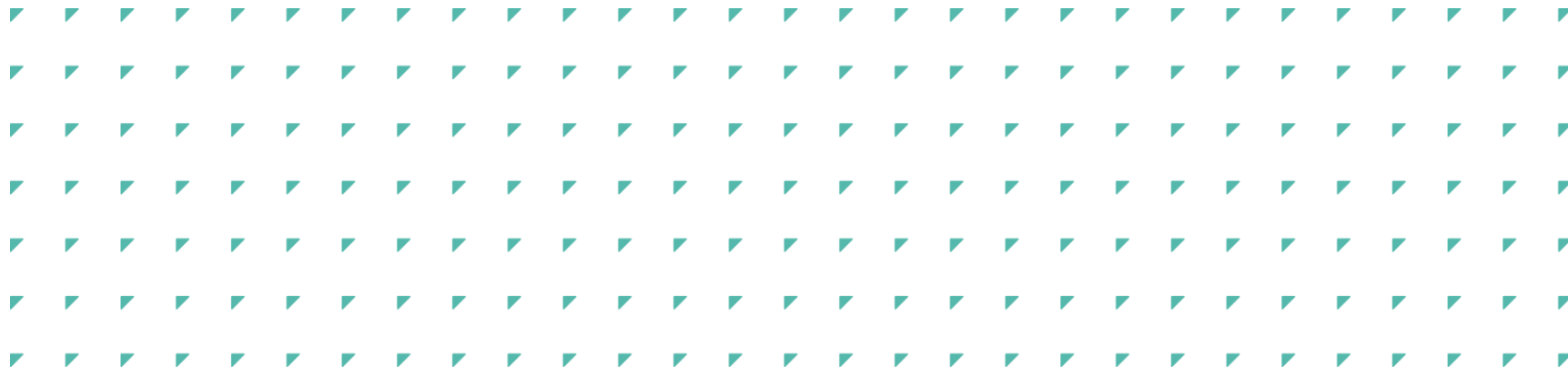


Grupo
Bensaude

GREEN SHIPPING PT – PORTUGUESE FLAG WORKSHOP

Biodiesel Blending Solution

lisboa, 4 de maio de 2023





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Topics:

- The diesel electric propulsion
- The ENERMULSION by Tecnoveritas
- The certification
- The price of CO₂

Green Shipping PT Propulsion 1

CONCEPT #3 – E ESD & DFE+

Engines

3x 8L20 Genset – 1536 kW @ 50Hz

1x 4L20 Genset – 768 kW @ 50 Hz

Shore connection

Energy Storage System

565 kWh

Peak shaving, spinning reserve and avoids black out

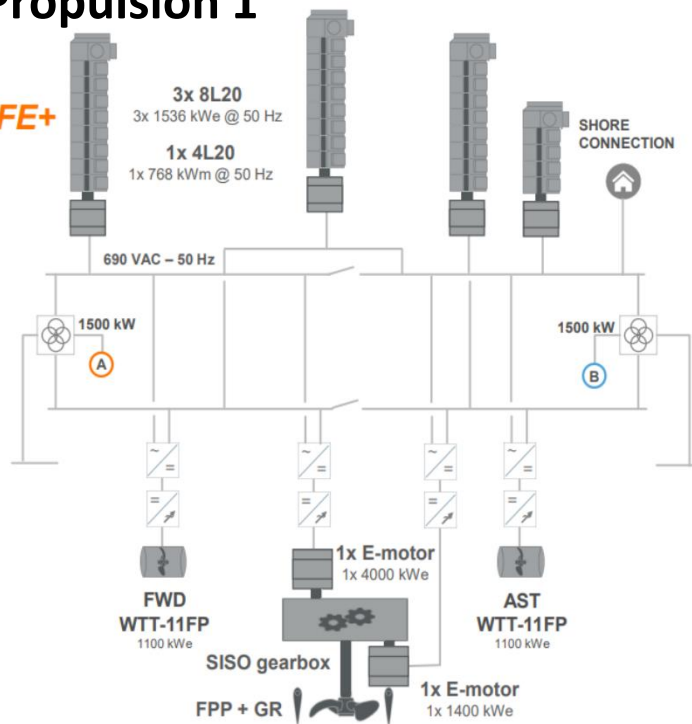
Propulsion

1x e-motor 3200 kW

1x e-motor 1000 kW

SISO gearbox

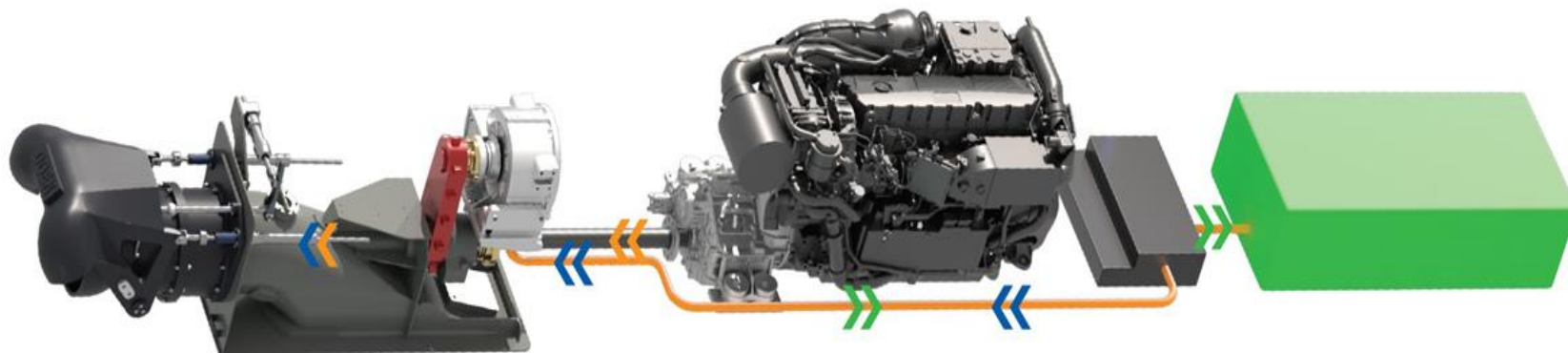
1x FPP + GR + EnergoProFin



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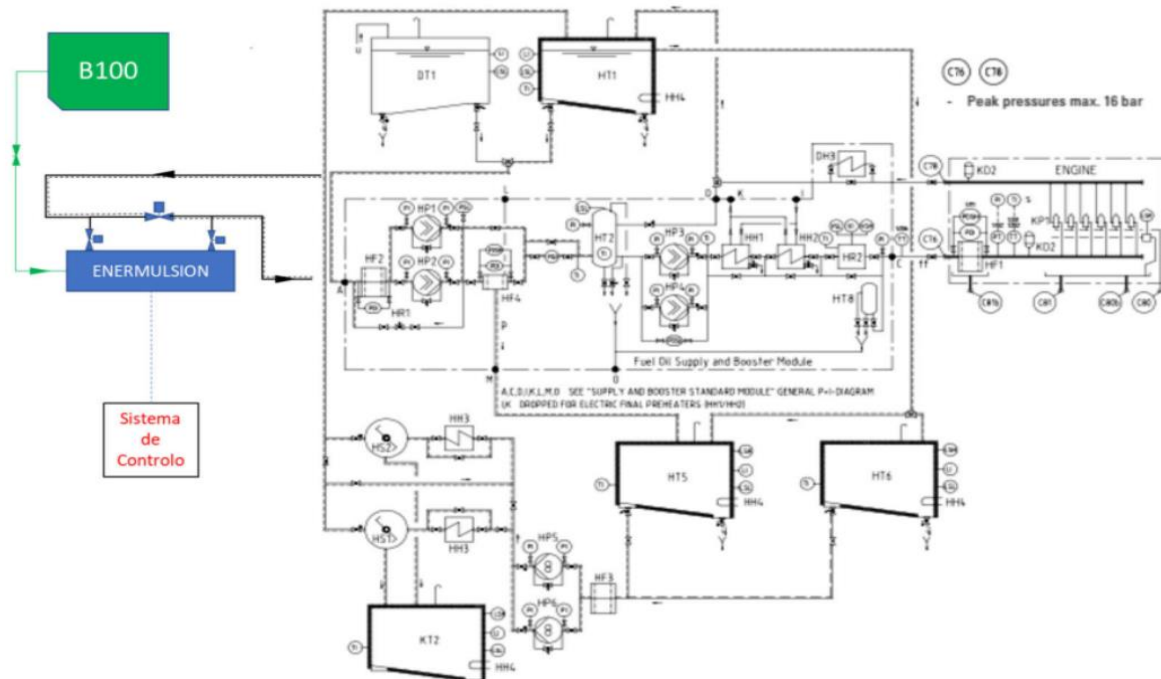
Propulsion 2

《 Diesel Only 《 Electric Only 《 Diesel + Electric (Boost Mode) 《 Regeneration (PTO Mode)



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Blending B100 + HFO





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In-Line Blending of B100 + HFO

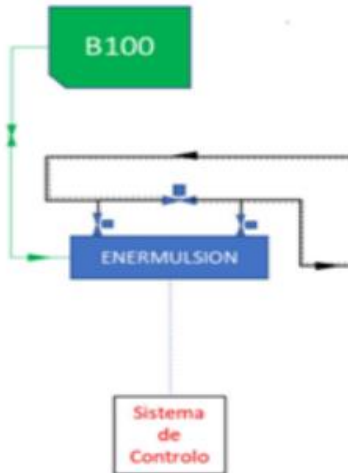
MEPC.1/Circ.875/Add.1

GUIDANCE ON BEST PRACTICE FOR FUEL OIL SUPPLIERS FOR ASSURING THE QUALITY OF FUEL OIL DELIVERED TO SHIPS

5.1 Blending should, in principle, only take place in shore tanks in order to ensure the end product is homogeneous. The quality of the resultant blends should be tested and confirmed prior to delivery to ship.

It is obvious that the requirements can't be met if the blending will be done just before the consumption point, **BUT as this is a Pilot Project supported by the Portuguese Flag, there is possibility of testing!!!**

MAK: We have no objection using HFO (acc ISO8217) and B100 (EN14214) and also any mixtures of these with regard to calorific value, viscosity, lubricity, etc. as specified in named standards.





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Expectation due to tests carried out by Tecnoveritas:

- The blending fits the specification ISO 8217 for a RM, for marine engines.
- The incorporation up 50% by mass of biofuel, is possible.
- It is expected a decrease in specific consumption, due to a lower viscosity and therefore better atomisation and
- It is expected, a reduction of Particulate Matter, NO_x and CO₂ emissions.

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About biofuels:

- The “new” biofuel must be approved by Portuguese Authority and Class.
- The use of biofuels or biofuel blends can be a way to comply with the new regulations.
- The good biofuels are produced from renewable feedstocks and contain very low or no sulphur.
- In the EU, biomass streams come mainly from agriculture and forestry.
- Nowadays, the production of biofuel is primarily based on biomass from crops. However, this source is of limited potential, due to sustainability concerns on using food-based crops as fuel.
- Biomass from waste, such as forestry residues, lignocellulosic crops, agricultural residues, and manure are seen as more sustainable options.
- Converting those types of biomass streams into biofuels requires more advanced processes.

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Evolution € CO₂ - 2021 e 2022

The analysed fuel blend, complies in general with the specifications of ISO 8217, for marine fuel.

Acceptability intervals are met for different grades of marine fuel oil, with the exception of RMA 10, in which the maximum density limit at 15°C and viscosity at 50°C slightly exceeded;

The quality of ignition is improved (lower in CCAI) and the lower and upper calorific value increased significantly;

therefore

It is expected a decrease in Specific Fuel Oil Consumption also, given the lower the kinematic viscosity and, consequently better atomization of the blend;

It is expected, therefore, the reduction of PM (particle), NO_x and CO₂ emissions, resulting in a better overall performance of the engine that burns this composition.

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Owner accounting:

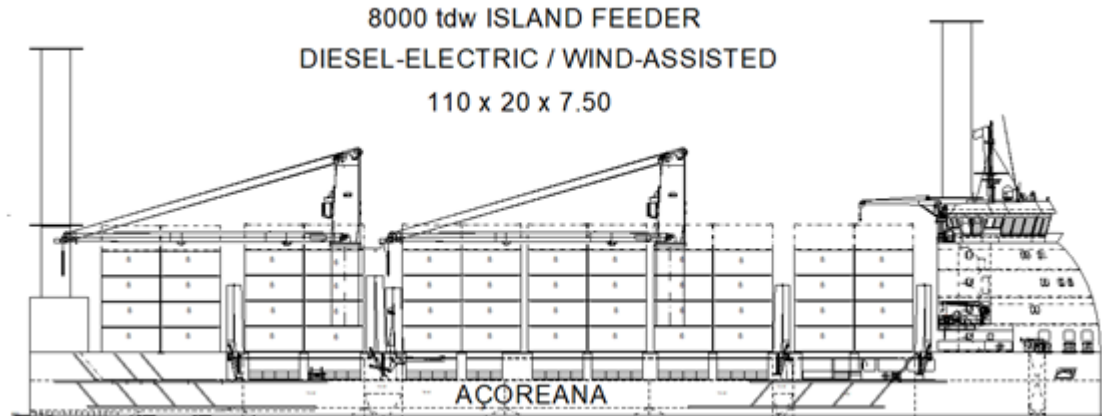
- Price of licences of CO₂ emissions, estimated 80€/MT/CO₂;
- Price of biodiesel: 1.200€/MT;
- Price of fuel 0,5%S: 450€/MT
- Blending;
- Price of ENERMULSION[®] project: about 340 000€ + *certification*.
- Sensivity analysis according to European Trading Scheme costs of 80€/t CO₂ and 100€/t CO₂ by assuming an annual consumption of HFO of 4 000 t/year

will result in the emissions of 12 640 tCO₂/year, therefore having a corresponding

CO₂ cost per year of : 1 011 200€/year and 1 264 000€/year respectively.

Simples Payback: 0.336 years or 0.26 years respectively.

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Final remarks:

- A new era is on the rise.
- Cooperation with each other and share information about biofuels is recommended.
- Certification of the ENERMULSION^R
- Always the ratio price biofuel versus CO₂.
- We hope that this initiative will bring knowledge, partnerships and common understanding.



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Thank You!

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