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Marine Biofuel: B10M & B20M



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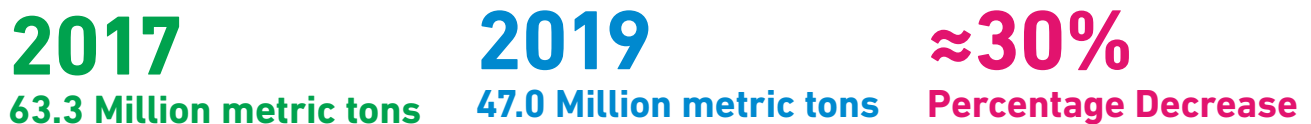
Current Marine Fuel Emissions

With an estimated 80% of goods moved around the world by sea, maritime transport has an important role in international trade. However, shipping emits high levels of carbon dioxide. A study by the International Maritime Organization (IMO) puts this at around 940 million tonnes of carbon annually. An equally serious cause for concern is the pollution caused by the high levels of sulphur in maritime fuels.

On 1st January 2020, IMO 2020 came into force, setting a new limit on the sulphur content in maritime fuel oil. The rule “limits the sulphur in the fuel oil used on board ships operating outside designated emission control areas to 0.50% m/m (mass by mass). It became compulsory following an amendment to Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL).”*

* <https://www.imo.org/en/MediaCentre/HotTopics/Pages/Sulphur-2020.aspx>

Reduction in Uniper's direct carbon emissions



Source: Uniper

Marine Biofuel: B10M & B20M



An Exciting New Fuel

To meet the need for clean, green renewable marine fuel, a partnership has been formed between two leaders in their fields: Uniper, the largest fuel oil producer of the Middle East, and the GCC's leading net zero biofuel producer, Neutral Fuels.

Together, the two companies have created an entirely new fuel – Marine Biofuel – which replaces conventional marine bunker fuels. Marine Biofuel enables the maritime industry to meet the IMO standard under their ISO8217:2010 RMG380 specification, cutting harmful carbon emissions and becoming part of the solution to climate change.

Marine Biofuels: B10M & B20M

The new Marine Biofuel is available in two blends: B10M and B20M. In simple terms, they are made by adding Neutral Fuels EN14214 FAME (Fatty Acid Methyl Ester) to Uniper's very low sulphur fuel oil (VLSFO).

- **B10M is 90% Uniper's very low sulphur fuel oil (VLSFO) blended with 10% Neutral Fuels EN14214 FAME.**
- **B20M is 80% Uniper's VLSFO blended with 20% Neutral Fuels EN14214 FAME.**

The benefits of marine biofuels are:

- No capital outlay
- No change to existing engines
- No need for aftermarket scrubbers
- No adjustments needed to engine lube oils



VLSFO Characteristics

Uniper's VLSFO is produced by blending its own low sulphur straight-run residue with low sulphur fuel oil from third party refineries. The result is a very stable, high viscosity fuel oil blend, which complies with the ISO8217:2010 specification for RGM380 marine fuel oil.

Biofuel Characteristics

Neutral Fuels has been producing international standards-compliant biofuel in the UAE since 2011. Its net zero biofuel is a clean, green renewable fuel, which immediately reduces engine carbon emissions to zero. Made exclusively from waste cooking oil, Neutral Fuels net zero biofuel is a commercially viable drop-in replacement for the harmful fossil fuel traditionally used in diesel engines. Neutral Fuels products are third-party tested to European Standard EN14214, American Standard ASTM D6751, UAE ESMA Standard for biodiesel UAE.S 5023:2018, and Indian standard IS15607-2016.



Uniper Strategic Sustainability Plan (SSP)

Commitments to climate action and security of supply

- Monitor and optimise the carbon intensity of Uniper's generation portfolio.
- Include decarbonisation activities as a focus area for innovation.
- Promote lower-carbon fuels for energy generation.

Source: Uniper

Marine Biofuel: B10M & B20M

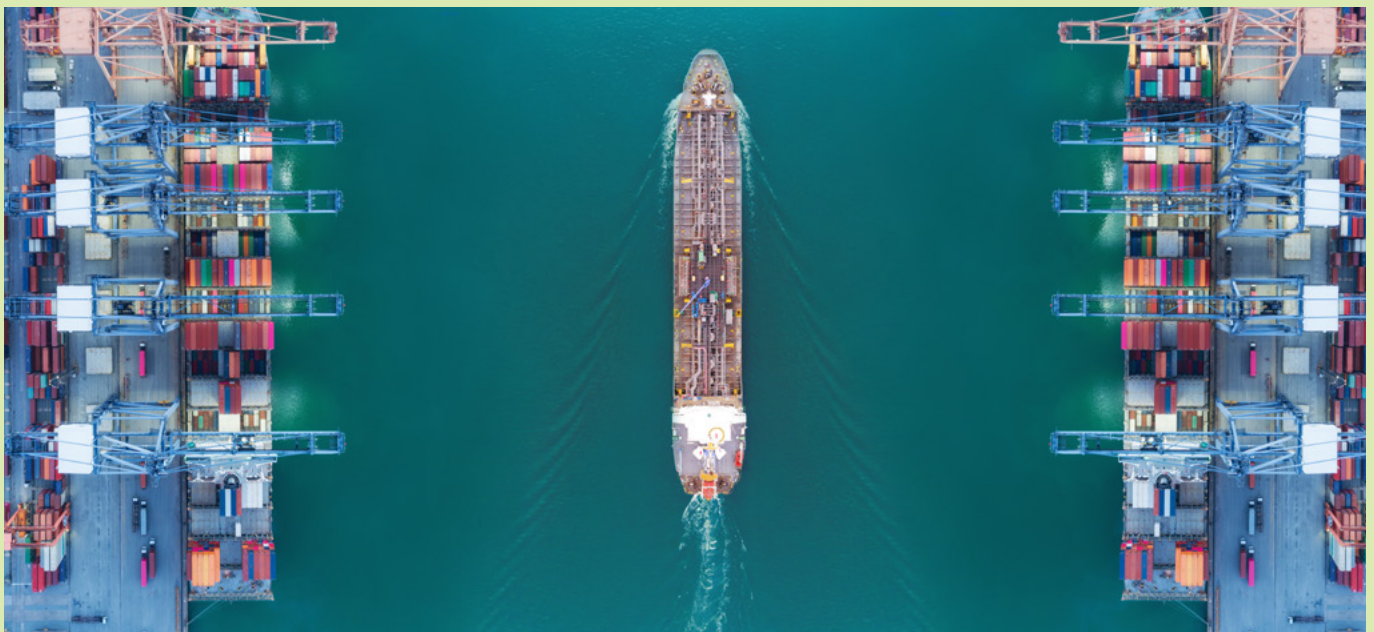
Emission Reductions

Carbon: Neutral Fuels EN14214 FAME reduces carbon (and other) emissions to net zero. All Neutral Fuels blends, such as B10M and B20M, reduce emissions proportionately.

Net zero fuel balances the carbon emissions created in the production of the product with the reduction of carbon emissions achieved to equal zero.

Other Gasses: Compared to fossil diesel, biofuel combustion significantly lowers the production of air pollutants. Biofuel is also almost free of sulphur with a content lower than 10 ppm, substantially reducing sulphur dioxide emissions.

ISCC Certified: Uniper's B10M and B20M have a Certificate of Sustainability issued by ISCC for the portion of EN14214 FAME in the blend. Uniper will issue a Proof of Sustainability (PoS) to its customers on every biofuel loading.

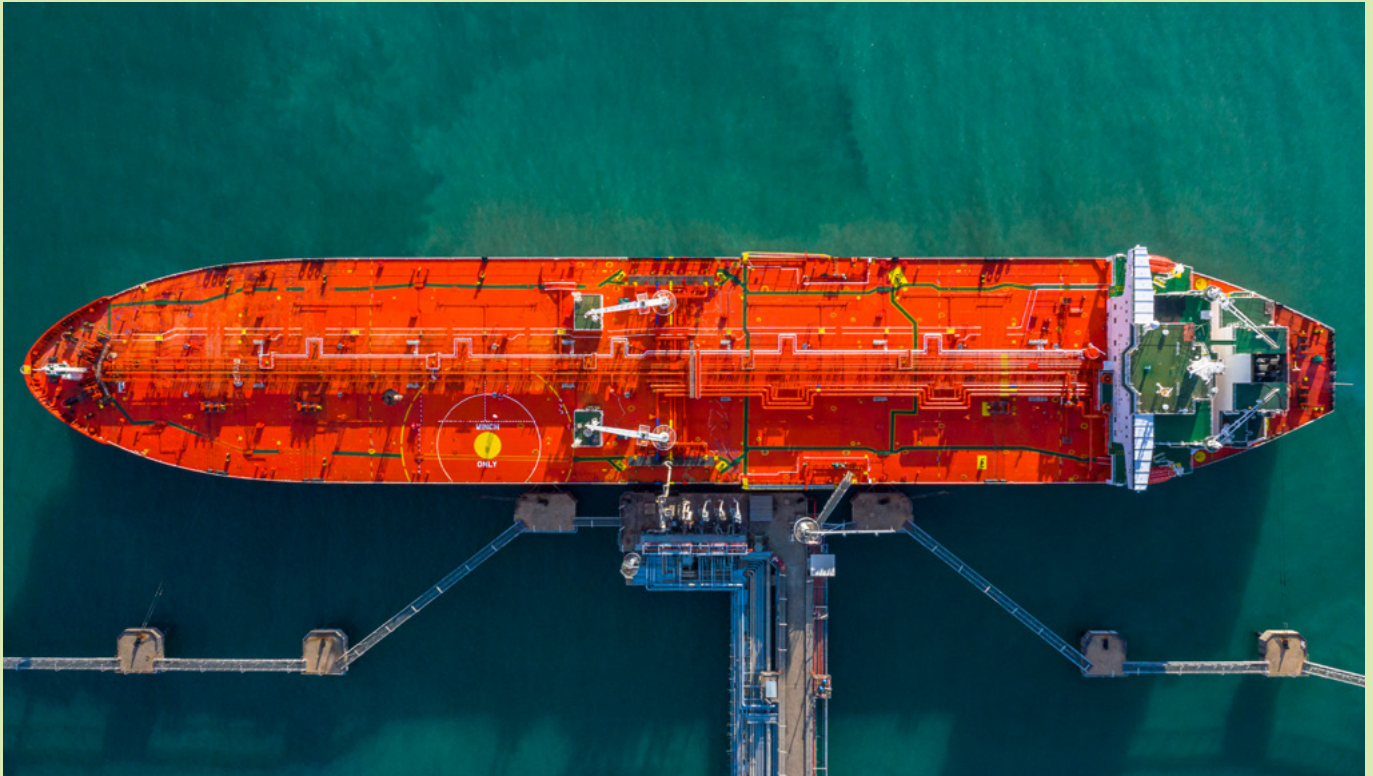


Uniper Strategic Sustainability Plan (SSP)

Targets for climate action and security of supply

- Achieve carbon neutrality for our power generation portfolio in Europe by 2035.
- Maintain a Group-wide carbon intensity threshold of 500g of CO₂ per kilowatt hour (on average) through 2020.
- Conduct, by 2022, at least 20 projects whose aims include decarbonisation.

Source: Uniper, Carbon neutrality in reference to Direct Scope emissions and Carbon intensity calculated on average from 2018 to 2020



Water Content

There is no need for shipowners and engine manufacturers to be concerned with oxidation and microbiological growths because:

- Neutral Fuels EN14214 FAME is produced and delivered to the tank with nearly zero-free water.
- Tanks are frequently monitored so that zero-free water is removed before it can settle.
- B10M and B20M are produced just prior to loading to the customer barge.

Acidity

Biofuel for blending does not have higher acidity compared to regular hydrocarbon diesel because:

- EN14214 FAME acidity complies with the EN14214 limit of a maximum of 0.5 mg KOH/g.
- When EN14214 FAME is blended with VLSFO, Uniper will guarantee a TAN of Max 2.5 mg KOH/g as required by ISO8217 RMG standard.

Heat Content

When compared to pure EN14214 FAME, B10M and B20M show a very similar calorific value of around 44 MJ/kg.



€2.7bn in total is being invested between now and the end of 2022, of which €1.2 billion is planned for new growth projects, some of which have already started.

Source: Uniper

Marine Biofuel: B10M & B20M

Typical qualities of B10M & B20M

Neutral Fuels and Uniper have run extensive tests on B10M and B20M in their lab in Fujairah, UAE, with the following results:

| Test | Method | Unit | Specifications | Result | | |
|----------------------------------|--------------|---------|----------------|--|-----------|-----------|
| | | | | EN14214 FAME | B10M | B20M |
| | | | | Marine Biofuels blends with VLSFO | | |
| Kinematic Viscosity @50°C | ISO 3104 | cSt | Max 380 | 4.036 | 114.8 | 76.2 |
| Density @ 15°C | EN ISO 12185 | kg/l | Max 0.9910 | 0.8823 | 0.923 | 0.9217 |
| Sulphur | EN ISO 8754 | % mass | Max 0.50 | 0.0007 | 0.485 | 0.485 |
| Flashpoint | DIN ISO 2719 | °C | Min 60.0 | 110 | - | - |
| Acid Number | ASTM D 664 | mgKOH/g | Max 2.5 | 0.47 | 1.44 | 1.24 |
| Total Sediment Potential | ISO 10307-2 | mass % | Max 0.10 | - | 0.01 | 0.01 |
| Micro Carbon Residue | EN ISO 10370 | mass % | Max 18.0 | 0.04 | 7.11 | 6.77 |
| Pour Point | ISO 3016 | °C | Max 30 | 3 | 24 | 18 |
| Water by Distillation | ISO 3733 | vol % | Max 0.50 | <0.05 | 0.1 | 0.1 |
| Ash Content | EN ISO 6245 | mass % | Max 0.10 | 0.002 | 0.022 | 0.021 |
| Metals by ICP | | | | | | |
| Vanadium | IP 501 | mg/kg | Max 350 | <1 | 19 | 19 |
| Sodium | | mg/kg | Max 100 | <1 | 14 | 14 |
| Aluminium + Silicon | | mg/kg | Max 60 | <15 (<2) | <15 (1+3) | <15 (1+3) |
| Zinc | | mg/kg | Max 15 | <1 | 1 | 1 |
| Phosphorous | | mg/kg | Max 15 | <1 | 1 | <1 |
| Calcium | | mg/kg | Max 30 | <1 | 30 | 27 |

*Fuel shall be considered to contain ULO when either one of the following conditions is met:
Calcium >30 and Zinc > 15 or Calcium >30 and Phosphorous >15

Additional Parameters

| Test | Method | Unit | Specifications | Result | | |
|----------------------------------|-------------|---------|----------------|-----------------------------------|--------|--------|
| | | | | EN14214 FAME | B10M | B20M |
| | | | | Marine Biofuels blends with VLSFO | | |
| CFPP | IP 309 | °C | Report | 1 | - | - |
| Cloud point | ASTM D 2500 | °C | Report | 2 | - | - |
| Cleanliness & Compatibility test | ASTM D 4740 | | | | | |
| Cleanliness rating | | | | 1 | - | - |
| Compatibility rating | | | | | - | 1 |
| Gross Heat of Combustion | ASTM D 4868 | MJ/kg | Report | 45.063 | 44.194 | 44.216 |
| Gross Heat of Combustion | ASTM240 | MJ/kg | Report | 39.666 | 43.557 | 43.456 |
| Water & Sediment | ASTM D 2709 | vol % | Max 0.05% | <0.05 | | |
| Water by Karlfisher | ASTM D 6304 | mg/kg | Max 500 | 174 | - | - |
| Acidity | ISO 660 | mgKOH/g | Max 0.50 | 0.44 | | |

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