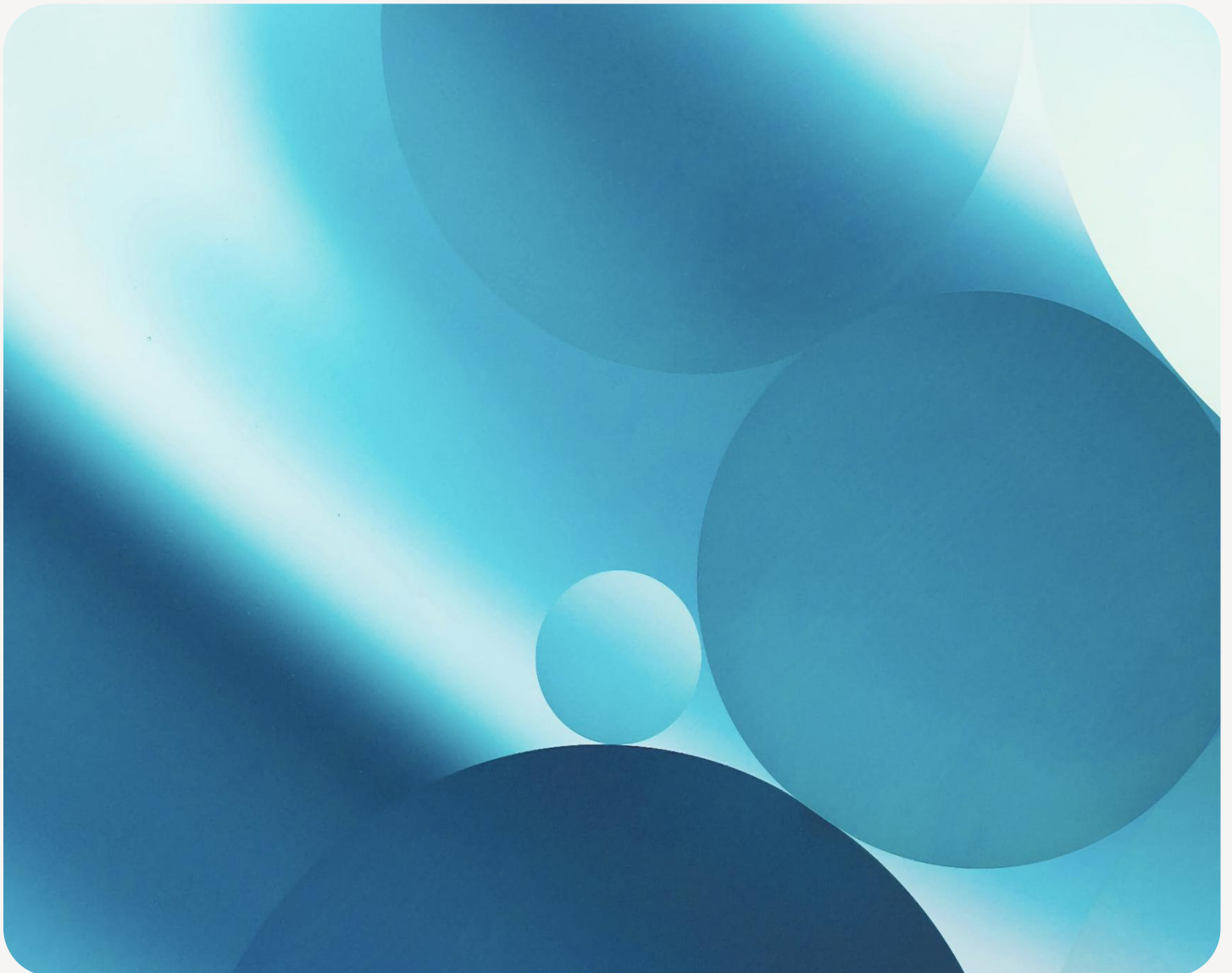


Sulnox Eco™ Fuel Conditioner Marine FAQ



Introduction

This document is designed to answer “Frequently Asked Questions” (FAQs) regarding the Sulnox Eco™ Fuel Conditioner (Sulnox Eco™), with a focus on the product composition, application and benefits within the marine sector.

To navigate through the FAQs, please refer to the table of contents below.

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01 Product Composition & Compatibility

Q1: Is Sulnox Eco™ biodegradable?

A1: The MSDS/SDS prepared by the manufacturer, Nouryon, states that Sulnox Eco™ is readily biodegradable.

Q2: What is the product's shelf life?

A2: The shelf life of Sulnox Eco™ as stated by the manufacturer, Nouryon, is 3 years.

Q3: Will Sulnox Eco™ work with biofuels? Which type - 1st generation (with what content) or 2nd generation like HVO?

A3: Yes, Sulnox Eco™ is compatible with biofuels and will improve combustion. The benefits are more pronounced with first generation biofuels as they are less clean when combusting due to FAME (fatty acid methyl ester) content which is absent in second generation fuels like HVO (hydrogenated vegetable oil).

Q4: Does Sulnox Eco™ work with methanol or ammonia?

A4: No. Sulnox Eco™ is for traditional fossil fuels only, it is not designed to work with alternative fuels.

Q5: Will Sulnox Eco™ help stabilise water in my fuel?

A5: Sulnox Eco™ will help stabilise free water in traditional fuels by lifting and dispersing it throughout the fuel. This encourages the secondary atomisation effect, therefore enabling cleaner, improved combustion.

Q6: Will Sulnox Eco™ work efficiently with dual gas engines, both with LNG, LPG or Ammonia?

A6: Dual fuel engines are using MGO or LSMGO as a pilot fuel, when the engines are operating on gas mode, which estimates a consumption of less than 5% of the total consumption. In theory it would not affect the engine operation but is not expected to give any additional benefits, like it does with the fossil fuel grades.

Q7: Is the product safe to transport / what are the relevant codes?

A7: Yes. The description supplied by Nouryon for Sulnox Eco™ is HS code 340 290 1090 "Other - Soap, organic surface-active agents, washing preparations, lubricating preparations". The MSDS/SDS should always be supplied in conjunction with these codes which has further details from the manufacturer, Nouryon, regarding any hazards. The product is non-hazardous and non-dangerous good, and Sulnox Eco™ is regularly shipped via air as well as land and sea.

Q8: Is Sulnox Eco™ corrosive?

A8: The MSDS/SDS prepared by the manufacturer Nouryon states that Sulnox Eco™ Conditioner is non-corrosive.

02 Product Application

Q9: What is the dosage rate for Sulnox Eco™?

A9: The dosage rate is 1 Litre to 2,000 Litres, which in practice is 0.5 Litres per 1MT of bunker fuel being received.

Q10: Does Sulnox Eco™ require the presence of water to work?

A10: No. When using Sulnox Eco™ the presence of water is not a requirement. Sulnox Eco™ was especially formulated to work even without the presence of any water content in the fuel.

Q11: Is Sulnox Eco™ still effective if water content in the fuel has already been removed via onboard purifiers, gravity drains and other onboard equipment prior to entering combustion? Does Sulnox keep the water emulsified in the fuel?

A11: Since the existing legislation allows a maximum of 0.3% of water content within marine fuels, this is not something that can be 100% tackled by the onboard facilities installed for fuel treatment and preparation for consumption, such as purifiers. Sulnox Eco™ has the ability to emulsify any remaining percentage of water that will still remain within the fuel, even on the latest stages prior injection and combustion. With the product's characteristics and ability to achieve secondary atomization, a high-level of combustion is achievable which maximises energy utilization resulting in to increased fuel efficiency relative to the operating requirements of the engine.

Q12: What happens if the use of Sulnox Eco™ is discontinued? Will the fuel consumption improvements experienced be lost?

A12: Yes. Customers using Sulnox Eco™ in both land vehicles and ships have seen consumption improvements drop off over a relatively short time period discontinuing the usage of Sulnox Eco™. You will also start to see carbon and deposits beginning to build up again.

Q13: What are the consequences of accidentally overdosing the Sulnox Eco™? Will the engine be harmed?

A13: No harm will come to your engine. The formulation of the Sulnox Eco™ means it will pass through the engine and cleanly combust whilst giving your engine an extra dose of detergents, even if overdosed.

Q14: What are the recommended application methods for different fuels?

A14: The dosage and practical application methodology are addressed in the [Sulnox Evaluation Protocol Document](#) which has been developed in conjunction with vessel owners/operators to ensure that the requirements for different vessels, engines and fuels are covered. The Protocol Document for each evaluation is always discussed and modified, as needed, to suit the individual owner/manager, technical department, crew and vessel.

Q15: Does Sulnox Eco™ require special mixing into the fuel?

A15: No, the product mixes readily with all lighter types of fuel at ambient temperatures. It is sufficient to add the conditioner to the receiving tank at the time of bunkering at the correct ratio. Best practice is to add the correct amount of Sulnox Eco™ first, then commence bunkering to take advantage of the agitation in dispersing the Sulnox Eco™. For use with HSFO and heavier types of fuel, it is advantageous to add Sulnox Eco™ when the fuel has already been heated and the viscosity has reduced to aid dispersion throughout the fuel. There are also pneumatic pumping systems available, which are fully ATEX certified; this semi-automatically adds Sulnox Eco™ into the fuel in the feed pipework as the fuel is being transferred to the receiving tank.

Q16: Does Sulnox Eco™ work with 2 stroke or 4 stroke engines?

A16: Both. Sulnox Eco™ is equally suitable for both 2 stroke and 4 stroke engines and we have multiple successful results from both.

Q17: Can Sulnox Eco™ be used if other additives are already in use?

A17: Yes. Sulnox Eco™ can be used in conjunction with other additives. If the existing additive in use is focused on fuel efficiency, lubricity enhancement or emissions reduction which is what Sulnox Eco™ mainly excels at, then just one product can be used. Where the existing additive in use tackles different areas, it can be used in conjunction with Sulnox Eco™. We suggest checking with the Sulnox team first to ensure that the most suitable product(s) to your fleet is(are) used.

03 Fuel Efficiency & Savings

Q18: Will using Sulnox Eco™ improve my fuel consumption?

A18: Feedback from commercial fleet customers running a range of marine vessels using Sulnox Eco™, in a carefully monitored environment, indicate average consumption improvement by c. 5%+ across various vessel and fuel types. You can refer to the [‘Marfin Management’ case study](#) which describes a product application on a Bulk Carrier using VLSFO achieving a fuel efficiency of 6.4% and the [‘Offshore Support Vessels’ case study](#) that shows how significant fuel economies (c.15%) have been achieved on offshore support vessels using MGO. Ongoing evaluations with HSFO and biofuels have also reported good indicative initial results on fuel economy.

Q19: Will Sulnox Eco™ assist on reducing scavenging space debris, mostly on 2-Stroke diesel engines?

A19: As Sulnox Eco™ is able to assist with water emulsification and improved combustion, it will definitely have a positive impact. Chief Engineers on vessels where Sulnox Eco™ has been implemented have reported that it successfully assists with scavenging space debris, especially after the first 30-40 days of Sulnox Eco™ being in use on several fuel grades, such as “ABCD”, “EFGH”, “IJKL”, etc.

Q20: What is the breakdown of the savings achieved over time as a percentage? i.e. better combustion, reduced friction (lubrication and cleaning effect).

A20: You will see a small economy improvement within the first month of use as the immediate combustion improvements effects are realised. This may be around 2% but can often be difficult to identify when fluctuations in consumption often vary much more than this. Over months two and three of conditioning with Sulnox Eco™, further gains will be achieved as the engine is conditioned and decarbonised. This will make up the remainder of your fuel savings. Please be aware that this will vary as engines, vehicles and fuel types also vary, as does the degree to which they are serviced and maintained. You can refer to the report [‘Engine Parts Before and After’](#) which demonstrates (with photos) the cleaning effect of Sulnox Eco™.

Q21: How can I indicatively estimate savings for my fleet?

A21: You can use the Sulnox high-level [Savings Calculator](#) to estimate the annual indicative savings and CO₂ reductions, as well as return on investment, that can be anticipated from the use of Sulnox Eco™ for an individual vessel and an entire fleet.

Q22: What load level will yield the best fuel savings?

A22: This will vary based on engine size and type (2 stroke or 4 stroke). Higher savings are expected with higher loads.

04 Emissions & Particulate Matter Reductions

Q23: Does Sulnox Eco™ reduce greenhouse gas (GHG) emissions and particulate matter (PM) output, including smoke and soot? If yes, how?

A23: The Sulnox Eco™ unique formula does help reduce GHG emissions and PM output, including smoke and soot. Various studies undertaken with independent emissions monitoring and testing organizations prove the product's significant effect on the reduction of GHG emissions and PM output. These reductions arise from different mechanisms:

Nitrogen Oxides (NOx) – the secondary atomisation effect that the unique formula of the product promotes is principally the mechanism which lowers peak combustion temperatures which, in turn, reduces the production of NOx.

Carbon Monoxide (CO) – the oxygen availability to the fuel (both directly from Sulnox Eco™ formula and the secondary atomisation effect) reduces CO which is oxidised to CO₂.

Carbon Dioxide (CO₂) – when Sulnox Eco™ is used, often an initial minor increase in CO₂ emissions occur. This is because the product promotes oxidation of unwanted carbon deposits in the engine. Over time, this drops and levels out. As fuel economy improves, consumption lowers, and the overall CO₂ emissions drop.

Sulphur Oxides (SOx) – the cleaner combustion that the product offers, reduces SOx. This is contingent on how much sulphur is in the fuel.

Particulate Matter (PM) – the better oxygen availability to the fuel that the product offers, reduces PM output. Rather than generating wasteful, hazardous PM emissions, these are converted into useful energy through complete combustion. As a result, smoke and soot are reduced.

You can refer to the [Superyacht Yalla](#) and the [River Advice](#) emissions testing reports, along with the latest [Generator Study](#), for more information about the GHG emissions and PM reductions recorded. You can also refer to the report '[Engine Parts Before and After](#)' which demonstrates (with photos) the cleaning effect of Sulnox Eco™.

Q24: How much CO₂ is associated with the combustion of Sulnox Eco™ Conditioner?

A24: At a recommended dosage rate of 1:2000 in VLSFO fuel, approximately 2.05 kg CO₂ will be emitted per tonne of fuel treated.

At a recommended dosage rate of 1:2000 in diesel type fuels, 0.5ml of Sulnox Eco™ will emit approximately 1.3 grams CO₂ per litre of diesel (equals 0.0013 kg CO₂).

05 Regulatory Compliance

Q25: Can Sulnox Eco™ support my efforts in improving my vessels' CII ratings?

A25: Yes. The fuel efficiency Sulnox Eco™ offers can improve a vessel's attained CII value and potentially upgrade the vessel's CII rating, e.g., from a D to a C. The [Sulnox CII Upgrade Calculator](#) is available to showcase the CII improvement that Sulnox Eco™ can offer, along with the potential CO₂ reductions, in the present and coming years, where the required CII values are becoming stricter. You can refer to the [Users' Guide to the CII Upgrade Calculator](#) for guidance.

Q26: Can Sulnox Eco™ help with my EU allowances exposure?

A26: Yes. The reduction in CO₂ output that Sulnox Eco™ offers through improved combustion and fuel efficiency, lowers the cost burden of purchasing emissions allowances. The [Sulnox CII Upgrade Calculator](#) demonstrates how Sulnox Eco™ can reduce your EUA exposure in the present and coming years, given the increasing EU ETS requirements over time.

Q27: Will Sulnox Eco™ still be relevant when FuelEU Maritime comes into force?

A27: Yes, as Sulnox Eco™ can be used with traditional fuels with varying degrees of bio content, such as B20, B30 and above.

06 Third Party Approvals

Q28: Does fuel conditioned with Sulnox Eco™ remain within specification?

A28: Yes, Independent Certification agencies Lloyds Register and VPS certified that marine fuels, remained within the ISO8217 specification, following conditioning with Sulnox Eco™. The relevant [Lloyds Register](#) and [VPS](#) reports are available.

Q29: What are the Original Equipment Manufacturers' (OEM) approach to Letters of No Objection (LONO)?

A29: For marine engines, manufacturers simply no longer provide LONOs. This practice stopped over a decade ago. Ship owners can approach their engine manufacturer directly to ask for approval to use Sulnox Eco™. The OEMs have indicated that as long as the fuel is in ISO8217 specification, then they have no objection. The fact that Sulnox Eco™ does not take the fuel out of the ISO8217 specification (as per independent [Lloyds Register](#) and [VPS](#) studies) means that no problems will be encountered and no harm done by using Sulnox Eco™.

Q30: Does conditioning fuel with Sulnox Eco™ improve the lubricity of the fuel?

A30: Yes, VPS have conducted tests and concluded that Sulnox Eco™ improved lubricity of the fuel by more than 17% (as per the [VPS study report](#)).

Q31: Are you insured in case of engine damage?

A31: Yes, we have an insurance policy in place to the value of £5 million. No claim has ever been made.

07 Mechanical Aspects

Q32: How does Sulnox Eco™ stop the carbon build up on pistons?

A32: Sulnox Eco™ gradually exfoliates and cleans carbon deposits thanks to its detergency properties. The reduction of particulate matter production, by Sulnox Eco™ aiding the fuel to burn more completely, then prevents the build-up of carbon reoccurring. You can refer to the report [‘Engine Parts Before and After’](#) which demonstrates (with photos) the cleaning effect of Sulnox Eco™.

Q33: Does Sulnox Eco™ help with sludge, wax, etc., both from the point of prevention as well as eliminating?

A33: Sulnox Eco™ was not designed to primarily deal with sludge build ups and wax. Its primary purpose is the reduction of emissions and fuel savings. If you are using a specific product to deal with your sludge issues, then we advise that you continue to use this.

Your fleet savings start here.

For further information, contact:

Ben.Richardson@sulnoxgroup.com

Sophie.Eleftheriou@sulnoxgroup.com

Stuart.Hall@sulnoxgroup.com