



**Taking you further, faster and cleaner**

**The Greentech company providing  
next generation, natural solutions, for immediate  
progression towards carbon neutrality**



**RemNOx Ltd  
Marine**

**RemNOx is an authorised Brand and Distributor for all SulNOx Group Plc products**

# Who is SulNOx Group Plc?

SulNOx is a Greentech company which specialises in providing responsible solutions towards decarbonisation of liquid hydrocarbon fuels. Our patented fuel emulsifier and conditioners reduce the production of harmful, environmentally damaging emissions whilst also offering significant cost savings.

SulNOx Group Plc is a UK Public Limited Company, formed in 2012, trading on the pan-European Apex segment of the AQSE (Aquis Stock Exchange) growth market.

# What sets us apart?

SulNOx products are made from sustainable, biodegradable ingredients, that make fuels burn cleanly and more efficiently. A combination of mechanisms to emulsify water, increase lubricity and add oxygen availability to fuel and cleaning actions, make SulNOx products both unique and immediately effective.

SulNOx products disperse water present in fuel tanks and fuel itself. Our stable emulsions improve combustion and eliminate the growth medium for "Diesel Bug". Typical, 'traditional' fuel additives merely add cetane points, invalidating warranties, masking poor combustion and neither improving fuel economy nor reducing emissions.



"Our mission is to provide immediate and tangible progression towards carbon neutrality for hydrocarbon fuel users – saving them money whilst saving the planet"

Currently, fossil-based fuels make up more than 98% of total marine fuel requirements. Low and zero-carbon fuels will only make up less than 3% of shipping's total energy consumption by 2030 and roughly one third by 2050, significantly short of the net-zero target.

# Industry Challenges:

The shipping industry is key to the global economy, transporting 90% of traded goods. The maritime sector will rely on hydrocarbon liquid fuels for decades given uncertainties around the viability of alternative low/zero carbon fuels, vessels and infrastructure. As a result, unacceptable levels of greenhouse gas and particulate matter emissions and ancillary marine pollution will remain a planetary threat.

Urgent and immediate action is vital for progress towards climate goals and measures to increase fuel efficiencies must be brought to the forefront of every fleet.

# SulNOx Capabilities:

Reduced Fuel Consumption  
MGO / MDO  
ULSFO / VLSFO  
HFO

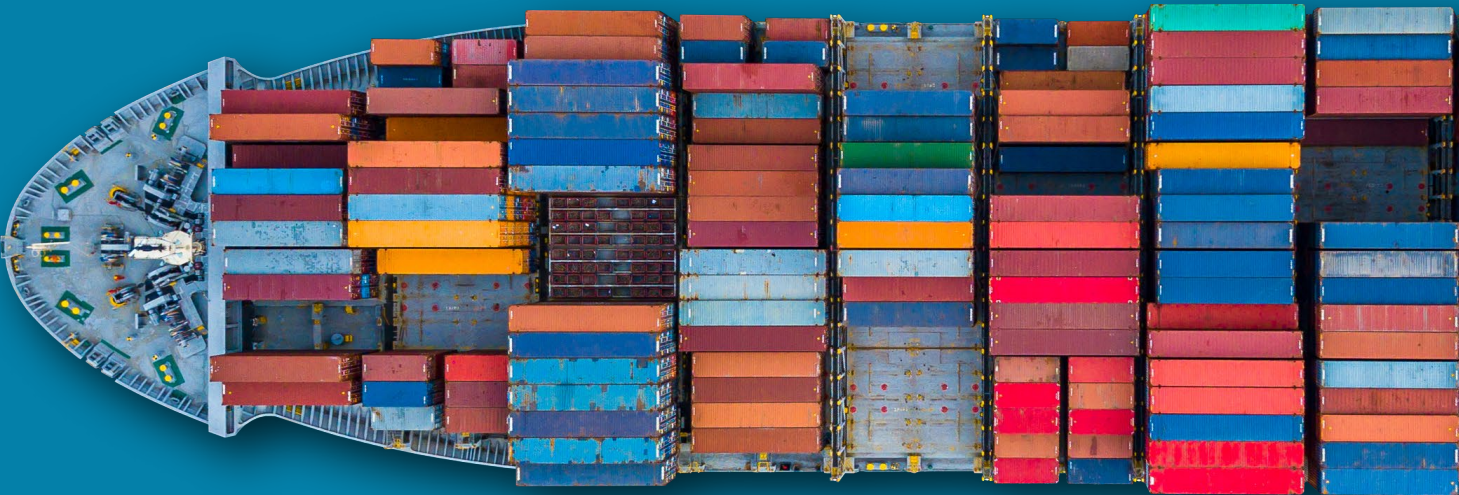
Engine Efficiency  
Improved Power  
Improved Torque  
Reduced Temperatures

Oil Reclamation  
Ship Slops  
Crude Oil  
Lubricant Oil

Reduced Emissions  
Greenhouse Gases  
Visible Black Soot  
PM2.5 and PM10

Eradication of Diesel Bug  
Removes Free Water  
Retains Fuel Quality  
Adds Stability

Improved Lubricity  
Reduced Friction  
Improved Performance  
Reduced Maintenance Costs



"Action must be taken now, and real progress must be made within this decade ...the potential for higher energy efficiency in the global fleet remains large."

Maersk Mc-Kinney Moller Centre for Zero Carbon



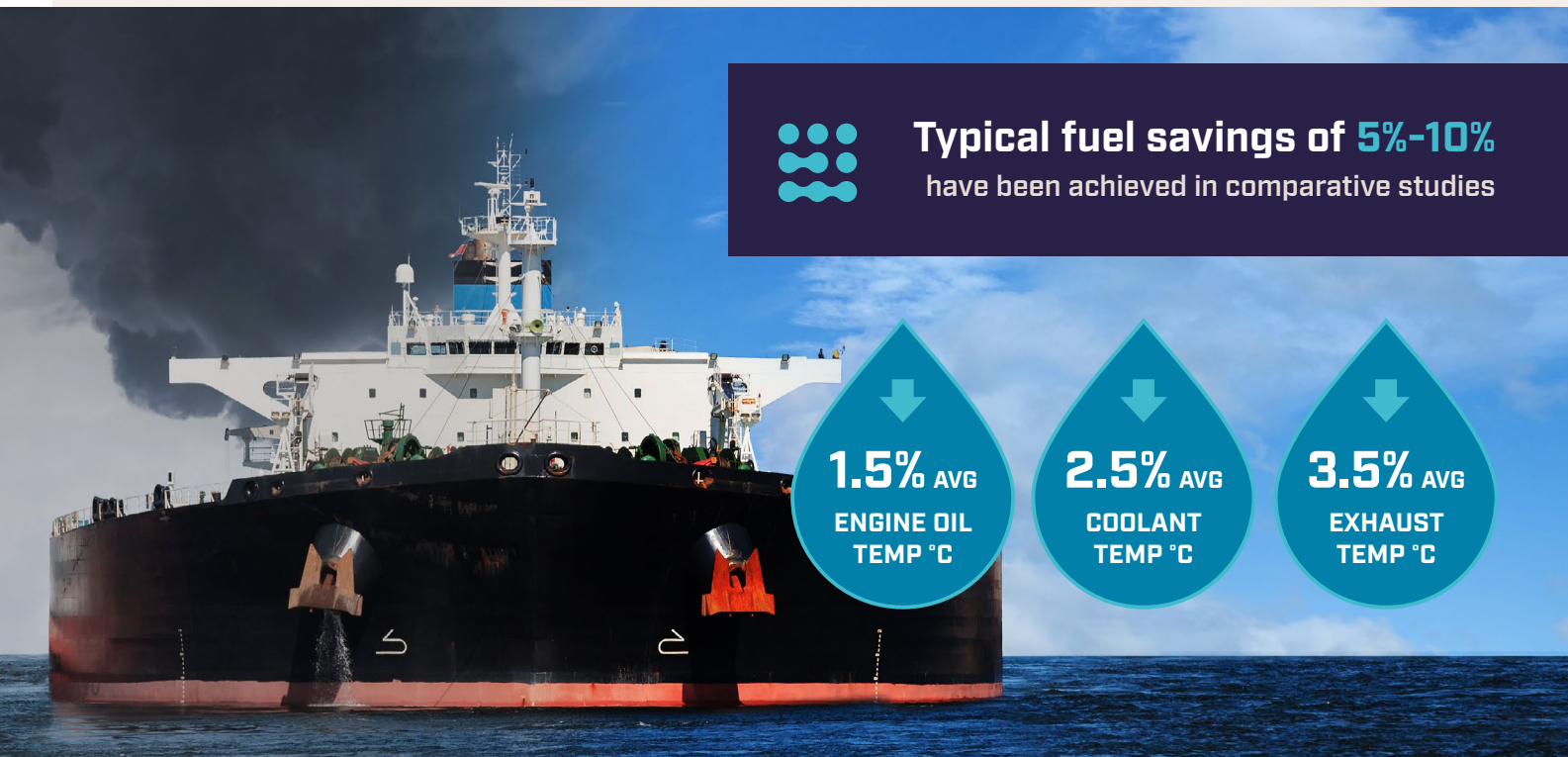
# Case Study: Vessel Evaluation - MGO/MDO

Comparable data sets from bollard pull tests\* monitoring a CAT 18-cylinder engine on a large Bureau Veritas classed vessel.

Data was collected to establish baseline readings of the vessel, in terms of power and torque produced per litre of fuel consumed, under normal operating conditions, and then with the addition of SulNOxEco™ Fuel Conditioner for comparison.

### Details of the evaluation:

- Measurements were based on four throttle settings, 25/50/75/100%. These settings directly control the flow of fuel, with a higher % meaning more fuel is fed to the engine. Whilst this makes direct comparisons of total consumption impossible, the output of the engine per litre of fuel consumed at each % throttle setting gives an ideal proxy.
- Outputs monitored were engine power, torque and temperatures. In a real-world scenario (i.e. not a bollard pull) these outputs directly relate to the speed and time taken to travel from point A to point B in a vessel.
- If the vessel is producing more KW power and Nm Torque when using SulNOx with the same fuel flow (as determined by the throttle setting), then it follows that in practice throttle setting can be lowered, and thus fuel flow rate also lowered, to achieve the same power as pre-SulNOx use, at a correspondingly reduced fuel consumption.

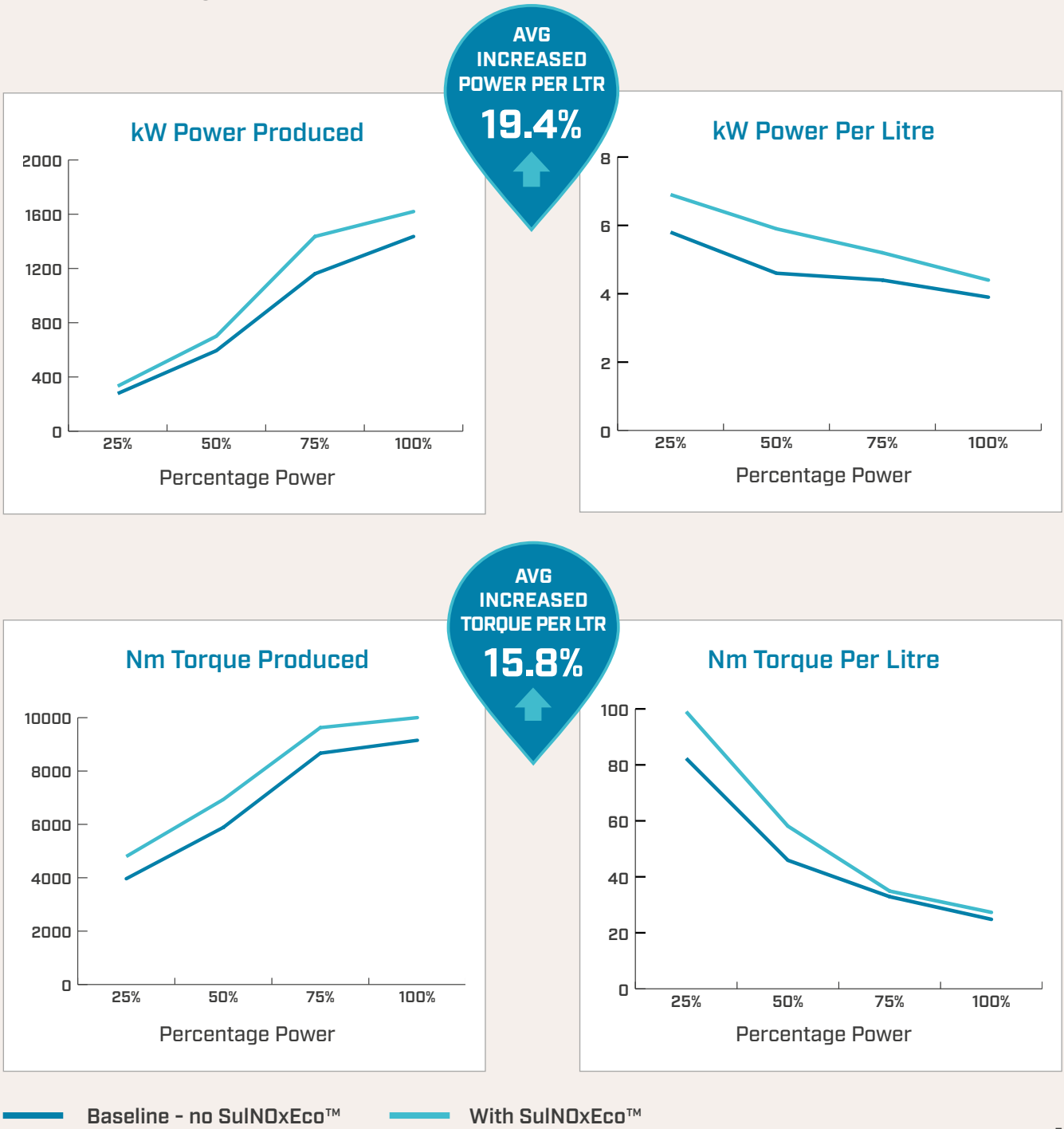


\*Bollard pull is a conventional measure of the pulling (or towing) power of a watercraft. It is defined as the force (in tonnes force, or kilonewtons (kN)) exerted by a vessel under full power, on a shore-mounted bollard through a tow-line, commonly measured in a practical test (but sometimes simulated) under test conditions that include calm water, no tide, level trim, and sufficient depth and side clearance for a free propeller stream.

# Test Results: Dramatically improved engine efficiency

The results demonstrate that using SulNOxEco™ Fuel Conditioner provides significantly better engine running with lower exhaust, oil and coolant temperatures, meaning reduced emissions, whilst producing more power and torque output.

The increases in power and torque produced per litre of fuel is clear and consistent at different throttle percentages. It is possible that there is some clipping of the torque data from 75% to 100% power settings, with the meter reaching what appears to be its max 10,000 Nm reading.



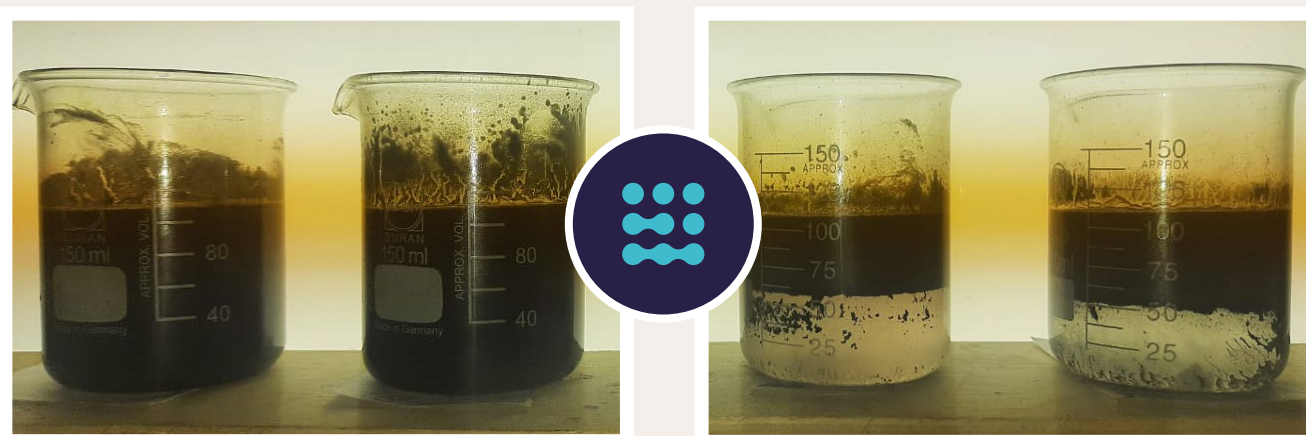
## **Oil Reclamation: Turning costly waste into enhanced profitable fuels**

Ship operations including tank cleaning, purifying fuels and use of ballast water produce industrial waste oil and water emulsions, commonly referred to as "ship slops". These are predominantly composed of water (c. 70%) and liquid hydrocarbon products, including Heavy Fuel Oil (HFO) and cargo waste e.g. Crude Oil (c. 30%).

Existing processes to "demulsify" this waste by separating the oil and water are time consuming, leaving up to 20% water in the reclaimed oil resulting in a limited market for the product. In addition, the remaining oily water remains a form of ships slops waste.

At the height of the HFO market, ships slops were being sold to heavy industry, which now favours purer oil products, further reducing the market for ship slops and leading to an alarming build-up of ships slops in ports.

SulNOx has an improved process for the separation of the oil from this waste. Our process takes the harmful oil and water waste and purifies it within a matter of hours. Reclaimed oils using our process show as little as 1.5% moisture content in independent testing by Bureau Veritas, whilst gaining lubricity and remaining stable. The dramatically lower water content improves value and saleability from its increased number of uses. The remaining water layer is also far easier and cleaner to dispose of in an ethical and environmentally sustainable manner.



Ship slops consisting of c. 70% water and 30% HFO pre-SulNOx process

Post-SulNOx process, taking only hours: Enhanced, valuable HFO & cleaner water

More  
valuable oil  
reclaimed  
in less time



Stable  
product with  
enhanced  
lubricity



Less water  
content  
and cleaner  
waste water

## **Reduced Emissions: The first step to net zero**

SulNOx significantly reduces emissions by making hydrocarbon fuels burn more efficiently.

In independent tests, SulNOx has proven to reduce toxic emissions (↓~30%) and improve air quality (PM2.5 ↓60+% / PM10 ↓50+%), offering an immediate and tangible step towards carbon neutrality.

### **Diesel Bug: Helping solve the issues of inactive vessels**

Over time, stored fuel can suffer from an accumulation of sediments, bacteria, fungi and problems like Diesel Bug. This may lead to costly remedial measures, waste and engine damage, particularly amongst vessels that are less frequently used such as leisure boats, yachts and naval vessels.

Diesel Bug occurs when a build up of water in fuel through condensation and other means separates out from the fuel, allowing a growth medium to form Diesel Bug. Increasing use of bio-content in fuel magnifies the problem due to the hygroscopic nature – encouraging further separation. SulNOxEco™ Diesel Conditioner helps eliminate this problem by dispersing the troublesome water in fuel therefore removing the environment for microbial growth and Diesel Bug, whilst enhancing fuel quality and adding stability.

## **HFO Emulsification: Reduced emissions, reduced costs**

SulNOx has shown to significantly improve the burn profile of HFO with added water and ultrasonic technology to enhance the mixing, reducing both emissions and Particulate Matter (PM) production.

Berol® 6446, plus ultrasonic technology, emulsifies up to 18% additional water throughout the HFO. Berol® 6446 allows the formation of a new, long-term stable and homogenous emulsion that can be used directly as a cleaner burning, lower viscosity alternative to current HFOs with numerous benefits including reduced combustion temperatures and increased lubricity, resulting in optimised combustion.

## Warranty and Compatibility

Manufactured by Nouryon BV, RemNOX Fuel Conditioners are verified by Bureau Veritas to be compatible with all diesel and gasoline type fuels and certified to comply with, and not alter, their specification. Using RemNOX Fuel Conditioners will not void engine warranty as they remain fully compliant to recommended engine manufacturer standards.



Nouryon



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SulNOx is a member of the UK & Ireland Fuel Distributors Association

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