Quadrise

Energy Decarbonisation



SUSTAINABILITY REPORT 2022

FOREWORD

MESSAGE FROM THE CHAIRMAN

I am very proud to present Quadrise's inaugural Sustainability Report. It is now time for Quadrise to stop "hiding our light under a bushel", and in this report we clearly set out the benefits that our company can offer to a world increasingly focused on emissions reductions and cost savings.

Quadrise is ready to play a key role in the transition to a net-zero carbon future. Our proven and patented MSAR® and bioMSAR™ technologies offer immediate emissions and cost reductions with drop-in solutions that leverage existing infrastructure. Whilst this does not in any way reduce the need to phase out fossil fuels, our technology enables an immediate reduction in emissions.

During 2022, we have seen energy security and fuel costs rise to the top of the policy agenda for governments and businesses alike. The need for solutions such as ours has never been more vital.

Our response is to double down on execution of our key projects in order to clearly demonstrate the environmental and economic advantages of our technology, whilst repositioning ourselves squarely in the decarbonisation space, ensuring that we are in the best position to attract both potential customers and investors.

In this report, we set out our current position in ESG and our proposed direction of travel. For a small company, we have big ambitions including a net-zero fuel and a net-zero carbon footprint by 2030, that will position us for continued growth. Our positive societal impact is outlined, as well as our best-in-practice corporate governance. For Quadrise, good ESG makes good business sense.



Andy Morrison
Chair of the Board

TABLE OF CONTENTS

Message from the Chair	2
About Quadrise	3
Our Markets & Customers	4
Our Technology Solutions	5-7
Streamlined Energy & Carbon Reporting	8
Our Net-Zero Ambitions	9-10
Alignment to UN SDG	11
Supporting Employees & Local Communities	12
Management & Oversight	13





ABOUT **QUADRISE**

OUR COMPANY

AIM quoted Quadrise (QFI) is an energy technology provider whose solutions enable production of cheaper, cleaner, simpler and safer alternatives to fuel oil and biofuels, proven in real world applications. Our MSAR® and bioMSAR™ transition fuels allow clients in the marine, power, refining and industrial sectors to reduce carbon emissions by up to 20% whilst also saving costs.

Founded in 2006, Quadrise has worked alongside global technology partner Nouryon to develop our patented oil-in-water emulsion fuels and prove their effectiveness across a range of applications. Our team of specialists have over 70 years combined experience in the emulsion fuel sector, managing our projects at major refineries, power plants and on marine vessels worldwide. Our low cost technology is available for immediate deployment, can be installed in under 12 months and runs on existing fuel oil / biofuel infrastructure, with minimal capital expenditure required.

Quadrise is committed to a net-zero future and is aiming to deliver a commercially-competitive net-zero emulsion fuel by 2030, whilst also reducing our company footprint to net-zero by 2030.

OUR PURPOSE

Delivering innovative energy solutions for a cleaner planet.

OUR VALUES

Drive.
Expertise.
Integrity.

OUR MISSION

To be the leading emulsion-based energy solutions provider to benefit the environment and create value for our stakeholders.

MESSAGE FROM OUR CEO



The imperative for global energy decarbonisation has accelerated, and our clients need to adapt quickly to this and other world events that have increased fuel costs and security of supply concerns. Our innovative fuel and biofuel solutions offer clients key opportunities to reduce energy costs and greenhouse gas emissions today to advance the energy transition.

The Quadrise team is committed to deliver our energy decarbonisation solutions, including a net-zero product by 2030 and we will innovate and collaborate to achieve this.



Jason Miles
Chief Executive Officer

OUR **MARKETS & CUSTOMERS**

Quadrise's MSAR® and bioMSAR™ products are proven in a wide range of applications and sectors, within a global fuel oil market of 386 million tonnes a year. We are proud to be partnering with world-leading companies to deploy our proven technology in commercial applications.

MARINE & SHIPPING

The shipping industry contributes 940 million tonnes of carbon dioxide each year; 2.5% of global carbon dioxide. The International Maritime Organisation has set a target to halve emissions by 2050. bioMSAR™ helps marine operators to reduce carbon dioxide by up to 20% compared to fuel oil.

ENERGY & HEAVY INDUSTRY

Energy use in the heavy industry sector contributes almost a quarter of the world's carbon dioxide emissions. Switching from fuel oil to MSAR® and bioMSAR™ to generate heat and power allows industrial clients to reduce their carbon emissions whilst saving fuel costs.

DOWNSTREAM REFINING

Quadrise's technology enables refiners to economically and rapidly free-up the valuable distillates traditionally used in fuel oil production. These can then be sold at market value, increasing refinery margins, with lower emission MSAR® and bioMSAR™ sold in place of fuel oil.

UPSTREAM PRODUCTION

Quadrise's MSAR® and bioMSAR™ technology can be used to generate energy for the extraction of crude oil, reducing its carbon intensity, with MSAR® and bioMSAR™ manufactured on-site for commercial supply.

MSC Shipmanagement is delighted to be working with the Quadrise team, as together we have an important enabling role in the marine energy transition towards a net zero carbon future and reducing our own vessel emissions.

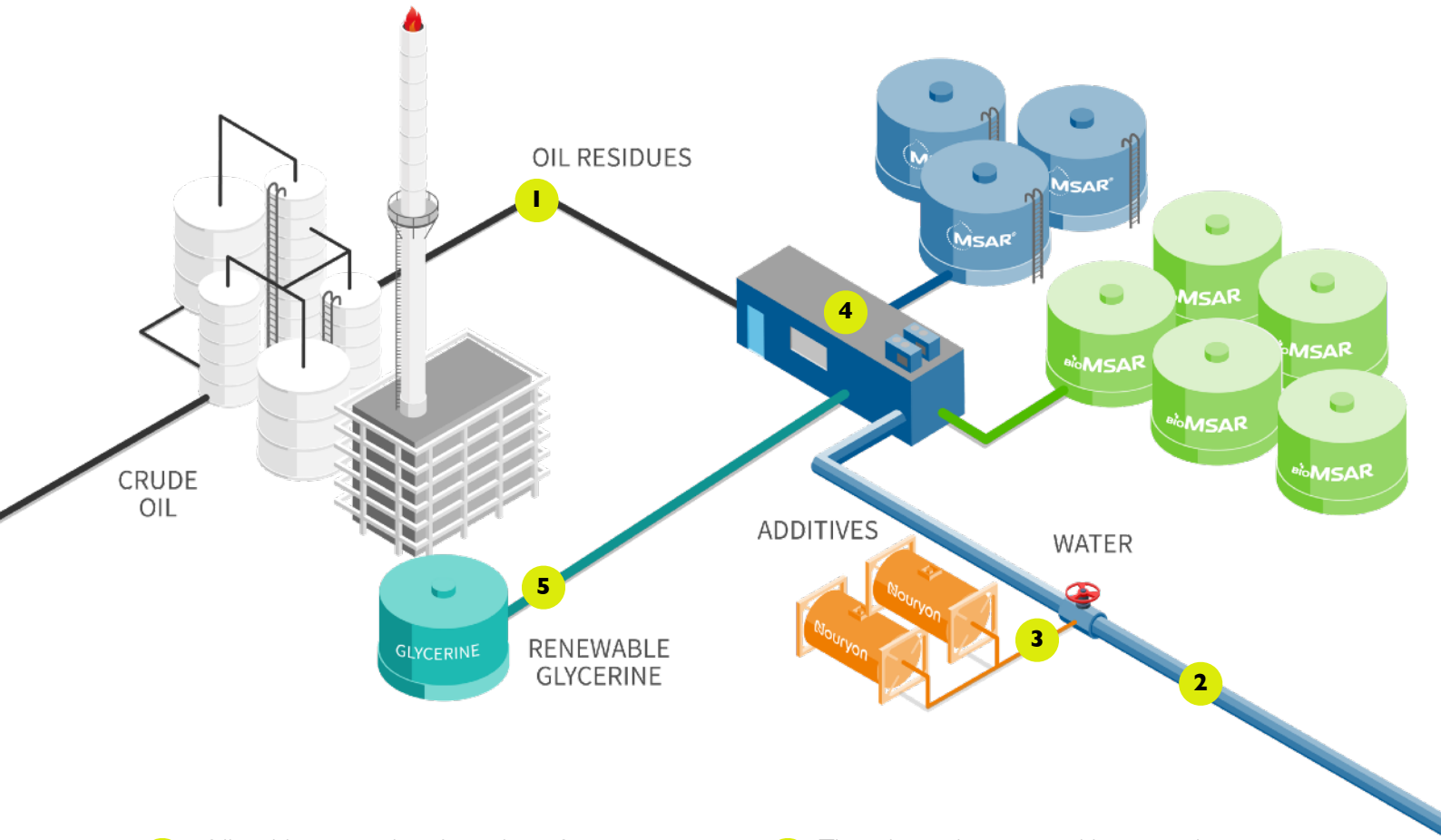
Prabhat Jha
Group MD & CEO, MSC Shipmanagement
27 July 2022



OUR TECHNOLOGY SOLUTIONS

FLEXIBLE PRODUCTION, RAPIDLY DEPLOYED

Quadrise's modular technology can be installed in under 12 months and is compatible with existing fuel oil and biofuel infrastructure, resulting in a low cost solution. The simple production process is as follows:



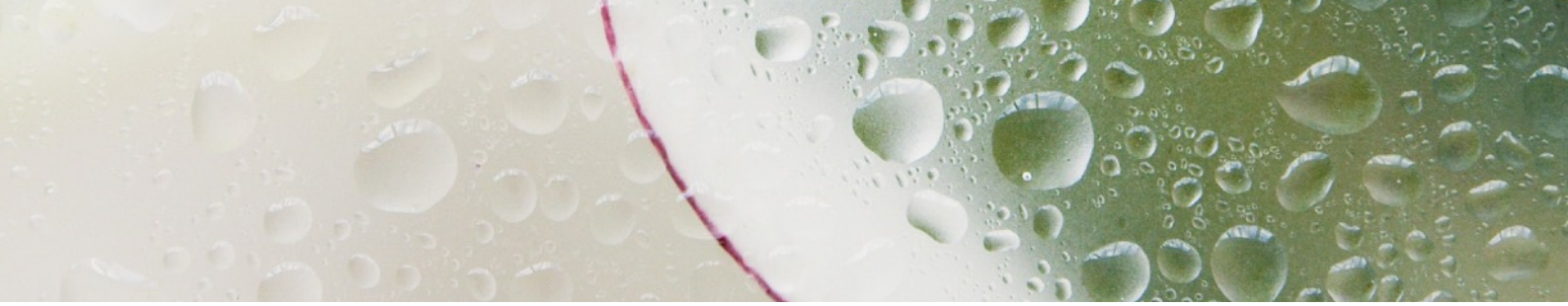
1 Oil residues are taken from the refinery or heavy oil production and cooled to under 200°C to achieve the required viscosity.

2 Water, which can be derived from several utility or waste-water sources is added to the residue.

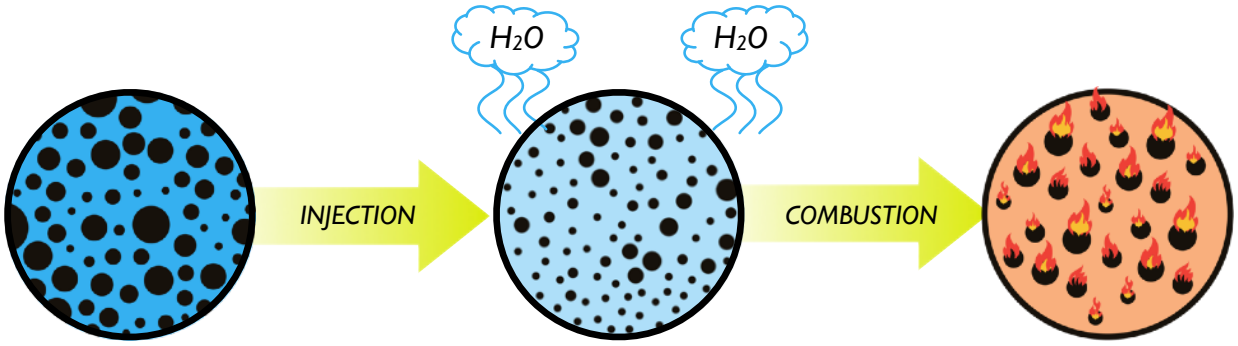
3 Special additives provided by our long term chemical technology partner Nouryon are included in the water phase to stabilise the emulsion for long-term storage and transport, and to promote complete combustion.

4 The mixture is processed in a proprietary emulsion module to produce a highly-stable oil-in-water emulsion with enhanced fuel properties.

5 Glycerine can be added to produce bioMSAR™ as an alternative to MSAR® for further carbon dioxide savings. bioMSAR™ and MSAR® can be made interchangeably and are compatible with each other.



COMBUSTION OF MSAR® AND bioMSAR™



The water phase carries tiny atomised oil droplets, 5-10 microns which are invisible to the human eye.

The water evaporates, dispersing the oil droplets to sub-micron sizes.

Nano droplets combust completely, providing near-perfect energy conversion.

HOW IT'S CLEANER

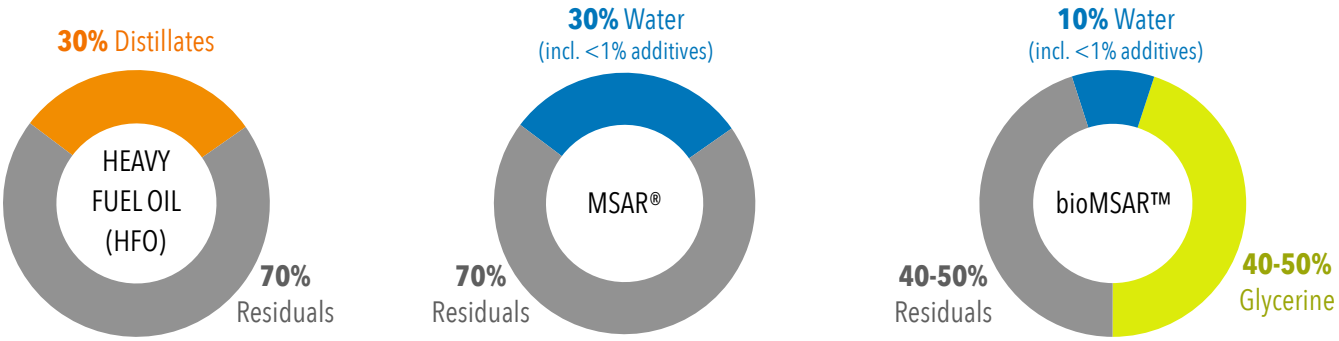
Both MSAR® and bioMSAR™ are water-based fuels. With bioMSAR™, some of the fossil content is replaced with renewable glycerine. The superfine dispersion of fuel in the water phase leads to complete combustion. All of the fuel is converted to energy at lower temperature, reducing losses. NOx emissions are reduced by up to 45%*, with no visible black soot.

MSAR® delivers up to 9%* reduction in carbon dioxide, and bioMSAR™ up to 25%.

HOW IT'S CHEAPER

MSAR® technology replaces high-value distillates with lower-cost water (even waste water) and <1% of additives, thereby improving a refinery's conversion of a barrel of oil into premium-value products by 10-20%. Compared to fuel oil, MSAR® delivers a savings over 10%.

bioMSAR™ takes this one step further, displacing some of the fossil fuel with renewable glycerine. Compared with biofuel, bioMSAR™ delivers a saving over 10%.



* Based on Wärtsila 2-stroke Flex 96C-B slow speed diesel engine



HOW IT'S SIMPLER

Quadrise's technology is modular and can be integrated for production in under 12 months, without incurring significant capital expenditure which differentiates Quadrise's technology from alternative upgrading solutions.

Both MSAR® and bioMSAR™ use existing HFO logistics infrastructure, hence are 'drop-in' solutions. They are compatible with each other, and with products from different refineries.

HOW IT'S SAFER

Both MSAR® and bioMSAR™ are extremely stable, with storage and handling possible at much lower temperatures than HFO.

As emulsion fuels, MSAR® and bioMSAR™ both readily disperse in water in the unlikely event of a spill; a characteristic which is different to conventional HFO or biofuels.

TRANSITION FUELS IN MARINE SECTOR	CO_2 SAVINGS VS HFO	SAFETY RISKS	RELATIVE COST PER UNIT ENERGY (EU BASIS)	AVAILABILITY	STORAGE & HANDLING PER UNIT ENERGY, VS HFO STORAGE
Quadrise bioMSAR™ Stable synthetic biofuel using proven MSAR® technology.	20-25%	LOWEST	MEDIUM	MEDIUM	1.3X
Quadrise MSAR® Stable synthetic fuel using proven MSAR® technology.	5-10%	LOWEST	LOWEST	MEDIUM	1.2X
LNG Primarily methane natural gas cooled to -160°C to a liquid form for transport & storage.	10-20%	HIGHEST (EXPLOSIVE)	HIGHEST Based on 2022 LNG in NW Europe	LOW	1.8X New cryogenic systems below -160°C
FAME blends Biodiesel created from vegetable oil or animal fats, blended with fuel oil.	10-25%	HAZARDOUS	HIGH	HIGH Competes with land transport sector	1.05 - 1.1X

WHY GLYCERINE?

Glycerine is a bio-degradable, non-toxic liquid that is colourless, odourless, water soluble, non-flammable and non-volatile. It burns almost pollutant-free and is virtually CO_2-neutral. It also has excellent lubricity.

Glycerine is generally obtained from plant and animal sources. It is a renewable raw material that is a waste product in the production of biodiesel, fatty acids and alcohols.



SECR

STREAMLINED ENERGY & CARBON REPORTING

Between September and October 2022, Quadrise commissioned EcoAct, an international advisory consultancy, to assess our Scope 1 & 2 carbon footprint and conduct a materiality assessment for Scope 3, as part of our journey to reduce our emissions across our entire value chain.

As a company whose purpose is to enable a more sustainable future, understanding our own impact on the environment and formulating a roadmap to reduce our impact, for which we hold ourselves accountable, is a responsible action and fully aligned with our mission and strategy.

STREAMLINED ENERGY & CARBON REPORTING *Disclosure for the period July 2021 - June 2022*	UK & OFFSHORE
Total energy consumption used to calculate emissions in kWh	**37,896**
Emissions from combustion of gas (Scope 1)	**2 tCO_2e***
Emissions from purchased electricity (Scope 2, location-based)	**6 tCO_2e***
Total gross tCO_2e based on above	**8 tCO_2e***
Intensity ratio: Gross tCO_2e / FTE**	**0.84**

OUR METHODOLOGY

This is the first year that Quadrise is voluntarily reporting on our energy use and associated carbon emissions in line with the Companies (Directors' Report) and Limited Liabilities Partnerships (Energy and Carbon Report) Regulations 2018 (the 2019 regulations). The emission data is calculated using the operational control reporting boundary and in accordance with the requirements of:

1. **'Greenhouse Gas (GHG) Protocol Corporate Accounting and Reporting Standard'** (revised version) (WRI & WBCSD, 2001); and

2. **'Environmental reporting guidelines: Including Streamlined Energy and Carbon Reporting and Greenhouse Gas Reporting'** (DEFRA & BEIS, 2019) Quadrise has applied the appropriate emission factors (BEIS 2021/22) provided by the UK Government for company greenhouse gas reporting. Actual data was obtained and estimations based on industry benchmarks have been applied to fill data gaps, where necessary.

In order to express the business' annual emissions in relation to a quantifiable factor, Quadrise has chosen to report tCO_2e/FTE. As the organisation develops, the intensity ratio will be revisited in future reporting years and updated to a different measure, if appropriate.

* tCO_2e = Tonnes of carbon dioxide equivalent
** FTE = Full Time Employees

ecoact



OUR **NET-ZERO AMBITIONS:** SCOPE 1 & 2 EMISSIONS

AVOID, REDUCE, COMPENSATE

Quadrise's commitment begins with reducing our own direct and indirect (Scope 1 & 2) emissions. As a small company with very low emissions of 8 tonnes of CO_2, it would have been easy to offset our entire footprint immediately. However, we do not believe this to be a meaningful action that drives real innovation, efficiency or behavioural change. Instead, we will be focusing on **avoiding** emissions, **reducing** unavoidable emissions, and only then finally **compensating** residual emissions with verified carbon offsets.

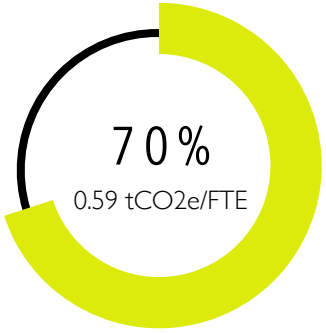
Our goal is to be a net-zero company by 2030. We have also put in place a near-term goal in 2025 to reduce our carbon intensity by 30% from a baseline of 0.84 tonnes CO_2e/FTE to ensure a bias for action.

We expect our footprint will grow as our activities ramp up and our workforce increases. We may adapt our measure of carbon intensity as appropriate and relevant for our strategy, but our direction of travel remains the same: to be a net-zero company by the end of this decade.



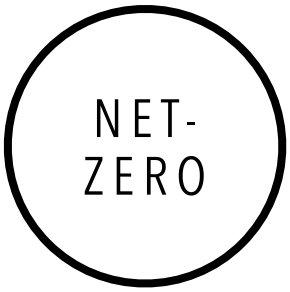
2022 BASELINE FOR SCOPE 1 & 2

- Scope 1 & 2 carbon footprint assessment.
- Voluntary disclosure. Inaugural Sustainability Report.
- Quadrise's own premises already utilise smart meters for tracking electricity use.



2025 GOAL OF **30%** REDUCTION

- Company policies on operations and procurement reflect the importance of avoiding and reducing CO_2 emissions in a cost effective way.
- 50% of electricity consumed will be from renewable sources directly, or certified through REGOs (Renewable Energy Guarantees of Origin).



2030 GOAL OF **NET-ZERO**

- Residual emissions will be offset through the purchase of verified carbon credits if required.

OUR **NET-ZERO AMBITIONS:** NET-ZERO FUEL

CONTINUOUS IMPROVEMENT & INNOVATION

As a company built upon innovation and closely connected to the sectors we serve, Quadrise has set a goal to create a net-zero fuel that is cost competitive by 2030.

MSAR®

MSAR®, our oil-in-water emulsion technology has been tested with leading players across multiple sectors, and proven to deliver up to 9% CO_2 reduction compared to conventional HFO.

bioMSAR

In 2021, we developed bioMSAR™, building on our original MSAR® technology to incorporate renewable glycerine, delivering up to 25% CO_2 reduction compared to marine fuel oil.

bioMSAR ZERO

Net-zero fuels already exist, but due to cost and availability, these are currently not feasible for adoption at scale.

Quadrise aims to develop a commercially-competitive net-zero fuel, 'bioMSAR Zero', to be ready for launch by 2030. This will involve the replacement of the hydrocarbon element of our fuels with a zero-carbon or even a carbon-negative substitute.

Our joint development with Vertoro BV will progress one credible pathway towards this goal, combining our bioMSAR™ technology with Vertoro's patented process to extract crude sugar oils using sustainable biomass and lignins. This has the potential to disrupt the liquid fuel industry with a clean, stable, safe and cost effective liquid fuel without capital intensive upgrades.

> *Sugar has been Mother Nature's fuel of choice for over 3 billion years. Today, we announce a unique pathway to use our crude sugar oil, produced from sustainable forestry and agricultural 2G biomass residues, as a drop-in for heavy fuel oil-based biofuels through this new partnership with Quadrise.*
>
> *Dr. Michael Boot*
> *Co-founder and CEO, Vertoro BV*
> *21 September 2022*

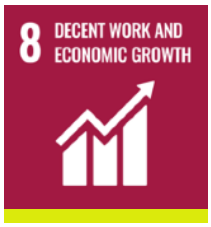


ALIGNMENT TO SUSTAINABLE DEVELOPMENT GOALS

Quadrise aligns its company-wide strategy to the UN Sustainable Development Goals (SDG) to address key environmental challenges and to enable sustainable, responsible growth.



Lower-cost MSAR® and bioMSAR™ deliver savings for investment into emissions abatement.



Quadrise works to exceptional HSEQ standards. Our culture is one of openness, fairness, trust and continuous improvement. We are an equal opportunities employer.



Our innovative MSAR® and bioMSAR™ fuels work with existing HFO infrastructure, avoiding the cost and the waste involved in upgrades.



Quadrise collaborates with partners and customers to promote sustainable development through responsible use of lower-carbon fuels. Stringent HSEQ and CSR policies are in place to secure local community support.



Quadrise's technology enables efficient use of the world's finite fossil fuel resources and sustainable biofuels to provide safer, less-toxic energy solutions, whilst producing no harmful waste products.



Quadrise's technology produces lower-carbon fuel: 9% reduction from MSAR® and over 20% reduction with bioMSAR™. We aim to have a net-zero fuel by 2030.



Our lower carbon fuel options mitigate ocean acidification that damages marine ecosystems. In the unlikely event of a spill, MSAR® and bioMSAR™ readily disperse in water.



Our fuels' enhanced combustion properties reduce particulate matter, black soot, SO_2 and NO_X that create smog, damage sensitive ecosystems and harm respiratory health.



Quadrise voluntarily adopts the UK Corporate Governance code, placing us in the top tier of AIM companies. We are led by a highly-experienced Board and supported by first class team of professional advisors.



Quadrise is working with global partners Wärtsilä, Nouryon and MSC, sharing expertise, technology and financial resources to advance our low-carbon and low-cost solutions, including in developing countries.

OUR **EMPLOYEES** & **LOCAL COMMUNITIES**

The world needs better energy solutions to ensure sustainable, responsible growth. We are committed to providing safer, cleaner and more affordable energy that creates value.

- We assist our partners & clients to promote sustainable development through the responsible use of our fuels and technology.
- We enable clients to enhance their engagement with local communities and stakeholders by reducing their social impacts by following stringent CSR and HSEQ procedures.
- We secure local support wherever we directly interact with the community.
- We maintain high ethical standards in carrying out business activities in accordance with the Group Compliance Policy, Practices & Procedures (which comply with the Bribery Act 2010).
- We place safety at the forefront of our corporate culture and practices, regularly reviewing our Health, Safety and Environment (HSE) policies.
- We provide equal employment opportunities. We respect the rights of employees, consultants, partners and counter parties, treating them fairly and without discrimination.
- We strive to build a workforce that reflects the societies in which we operate. We recognise there is a gender skew in our sector and we are reviewing our recruitment policies to mitigate bias wherever we can.
- We provide training, development and mentoring opportunities for our staff to support their career aspirations, help them develop their leadership and teamwork skills, exploit their potential, and enhance their well-being.
- Our share option schemes reward strong employee performance with a stake in the success of the company, whilst conserving our cash resources.
- As a company built on technology and innovation, our culture is one of continuous improvement; we encourage openness, fairness and trust ensuring stakeholders are satisfied with the results and the way the company operates.
- We strive to create a flexible and fun working environment, reflecting the needs of a modern workplace where people can be at their best.



Quadrise has an exciting and inclusive workplace, where I have quickly developed my skillset as an engineer through engaging in projects that will make a real difference in the world.

Jack Williams
Project Engineer, Quadrise



MANAGEMENT & OVERSIGHT

Since admission to trading on AIM in 2006, Quadrise has voluntarily adopted the UK Corporate Governance Code (the 'Code'), that establishes standards for good corporate governance in accordance with five clear principles of board leadership, effectiveness, accountability, appropriate remuneration and good relations with shareholders. Companies which adhere to the Code must set out how they comply, or explain instances of non-compliance. Quadrise's disclosures under the Code are on our website: https://www.quadrisefuels.com/investor-relations/corporate-governance/

As an AIM quoted Company we are always required to announce any material information via RNS, however, our goal is to ensure that all our shareholders, whether retail, institutional or our longstanding high net worth shareholders are as informed as possible through our regular use of online presentation and Q&A sessions, our social media channels and TV interviews.

Quadrise maintains a comprehensive suite of policies and practices appropriate for our size and stage of development, including policies on Health, Safety and Environment (HSE) and a Sustainable Travel policy. Each of these is reviewed and signed off by at least one nominated Executive or Non-executive Director with appropriate subject matter expertise.

Everything we do at Quadrise is to deliver our purpose. We only grow when our cleaner technologies are adopted in the market. In that sense, our incentives are perfectly aligned with ESG goals. As we mature, our intent is to also incorporate ESG into our selection criteria for projects, suppliers and partners. Our commitment to reducing the CO_2 footprint of our products and activities will be embedded into our corporate targets which form the basis of our remuneration today and in the future. Ultimate accountability for ESG matters rests with Quadrise's Board; with each committee considering ESG as part of its deliberations. The Board fully embraces the importance of ESG in delivering value to our stakeholders.

The highest standards of corporate governance have always been a strength of Quadrise. We believe this places us not just at the very top tier of AIM companies but amongst the best in the FTSE as well.

- We adopt the highest disclosure standards of the FRC's UK Corporate Governance Code.
- Our Board of Directors is highly experienced, and we follow stringent board policies and procedures.
- We work to exceptional HSEQ standards with strong risk management processes in place.
- We are supported by a first class team of professional advisors.

SHORE CAPITAL
CAPITAL MARKETS

BDO

GENKOS

VIGO Consulting

Quadrise

Energy Decarbonisation



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