26 July 2023

OIL & GAS

Initiation Note

Marketing Communication (Connected Research)

Quadrise Plc#

BBG Ticker: QED LN *Price: £0.012* *Mkt Cap: £19.1m* **BUY**

Progressive Decarbonisation

Effortless Disruption

Quadrise (QED LN) has developed emulsion fuel technology products which we believe have a key role to play in the global energy transition. Unlike many energy transition solutions, we see their products as minimising disruption while achieving significant environmental gains. Targeting high-emission energy sectors like shipping, heavy industry, and power; QED offers stable and safe fuels and biofuels without expensive upgrades. Their development pipeline includes zero carbon fuels, aligning with steadily tightening legislation. The current products are all based on the company's oil-in-water emulsion technology, and this approach differentiates QED from competitors that produce water-in-oil emulsion fuels, while the management team has previously successfully commercialised an oil-in-water product with the Venezuelan state oil company.

Near-Term Commercialisation

The company has three advanced commercial trials underway, each of which if translated into a full commercial agreement, would have a transformational impact on the earnings and valuation outlook. The company has two business models: the licensing and tolling of its emulsion fuel products. We anticipate that the licensing model could deliver annual EBITDA of around US$8-9mpa while tolling could deliver between US$15-22mpa each, with just four manufacturing units installed. Over a ten-year timeframe, these contracts would deliver pre-tax NPV8 of US$45-90m respectively, depending on the product and target sector. The recent signature of the Utah based project agreement could bring commercial revenue as soon as August 2023 while upcoming talks are expected to lead to an agreement in Morocco with an industrial group in H2 2023 while testing for the marine project is due to commence on the marine project in Q4 2023.

Recommendation

The company recently announced that it has raised £1.94m by way of an accelerated book build and open offer. Management believes this will provide sufficient working capital to successfully complete the current three commercial trials, secure commercial agreements and revenues thereafter.

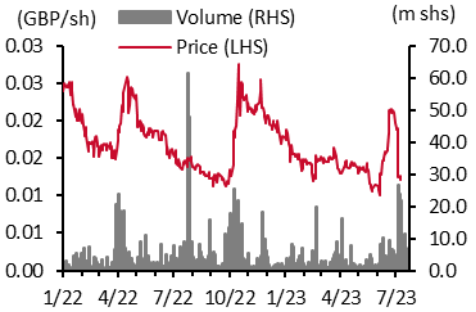
Although we have presented scenario analysis and the potential impact of commercial success, we do not yet have sufficient visibility for full forecasts and a quantitative valuation. That said, trading at close to all-time lows but with multiple advanced commercial trials, the risk reward on offer currently is attractive particularly given the status of these trials and now that the company has strengthened its balance sheet.

We initiate coverage with a Buy recommendation.

Company Description

UK-based company engaged in developing and marketing emulsion fuels.

One Year Price Performance



Price % chg	1mn	3mn	12mn
	-43.4%	-14.1%	-11.3%
12mn high/low			£0.027/0.010

***SOURCE**: Eikon, as of 25 July 2023 close.*

Market:	LSE AIM
Shares in issue	1,563m
Free float:	92.8%
Net cash (Dec '22):	£2.6m
Enterprise value:	£16.5m

Major shareholders	
Hargreaves Lansdown	20.4%
Interactive Investor Trading	14.9%
Halifax Share Dealing	8.5%

Oliver O'Donnell, CFA, Natural Resources

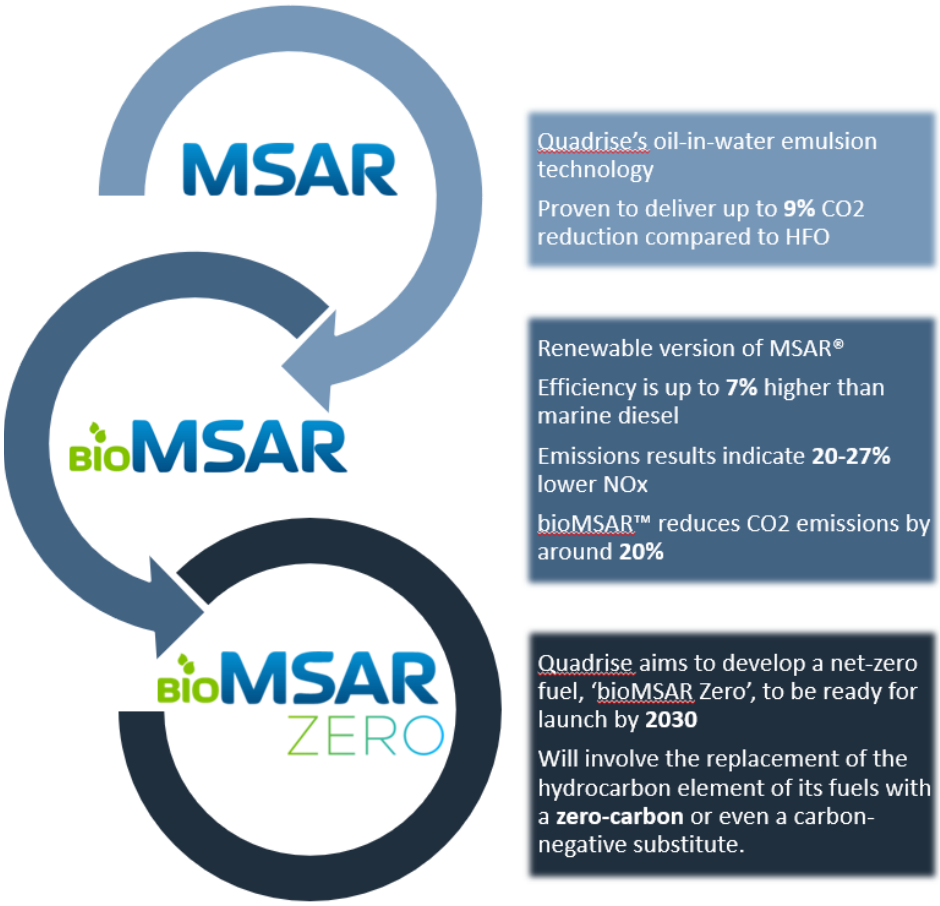
+44 (0)20 3005 5005 | oodonnell@vsacapital.com

Investment Case Summary

QED presents an attractive investment opportunity, with two saleable products already in the market and one in development. The progression from MSAR to bioMSAR, along with the upcoming bioMSAR zero, offers a viable pathway for companies heavily reliant on fossil fuels to gradually decarbonise their energy use. This aligns with increasingly stringent legislation concerning air quality and carbon emissions. QED's proprietary emulsion technology allows businesses to achieve this transition without incurring the high capital investment typically associated with alternative transitional energy technologies.

QED's products demonstrably and quantifiably improve fuel efficiency through total combustion, thereby reducing nitrous oxide (NOx) emissions and soot (particulate emissions). bioMSAR which uses glycerine, builds on this by delivering a significant reduction (up to 25%) in carbon dioxide (CO_2) emissions making it comparable to natural gas, which for many industries is the obvious transition fuel despite the high cost required to retrofit engines or supply LNG.

The Journey from MSAR to bioMSAR to bioMSAR Zero



SOURCE: *Company Data, VSA Capital Research.*

With emissions legislation tightening progressively over the next decade, beyond the reduction that LNG offers against HFO, LNG is likely only an interim option. QED's pipeline which includes a net zero biofuel will build on the existing principles of compliance with conventional engines. In an uncertain and rapidly changing landscape, this flexible option that avoids intensive investment is expected to be an attractive selling point to customers. Recent developments such as the EU's softened position on efuels, highlight the challenges faced by the industry and suggest further changes ahead.

For the **Mediterranean Shipping Company (MSC)**, with whom QED is progressing towards commercial agreement, we estimate that with a fleet of over 800 ships the cost to retrofit to LNG could range from US$16-25bn with the estimated cost per ship at between US$20-30m. Around US$500m (US$625k per ship) in investment into QED equipment would

provide sufficient capacity for 100% of the current fleet. QED fuels are expected to save MSC 10% on fuel bills totalling some US$5bn annually (assuming 10mntpa fuel is used by MSC at US$500/t on average today). Given that further investment into an alternative other than LNG will likely be required within the next twenty years, QED products appear an attractive and less disruptive alternative.

QED has commenced three key projects which are at an advanced stage, all of which could lead to commercial agreements within the next twelve months. These are in the key target industries with prominent industry groups in the marine, industrial and upstream oil sectors.

The Utah Oil Sands project with Valkor Technologies is the most advanced and with the recent announcement of a Site License and Supply Agreement, the company could begin to receive commercial revenues as soon as August 2023 on the back of well permitting, where a hearing date has been set with the authorities in Utah. Although conditional this would be a major milestone for QED triggering initial staged payments of up to US$1.5m.

Prior to the commercial agreements themselves, we expect interim milestones arising from the successful completion of testing. Aside from Valkor, the first of these is likely to be the completion of testing in Morocco where the QED systems and fuels are onsite, although we note an equipment failure has temporarily delayed testing whilst a replacement is installed.

Obtaining a Letter of No Objection (LONO) from Wärtsilä for bioMSAR in relation to the MSC trial is another potential catalyst as this not only demonstrates the success of this individual trial but that the company are satisfied that QED products can be used on their engines as MSAR has already received an interim LONO. Wärtsilä is one of the shipping industry's largest engine manufacturers globally, almost two hundred years old with a market capitalisation of US$7.6bn and while positive testing results have previously been published, the LONO would be a significant validation and derisking milestone for QED that could be used in seeking commercial agreements more widely for their fuels.

Near-Term Opportunities

Project	Stage	Next Steps
Morocco Industrial Group	Commercial testing underway	Fuel Supply Agreement Q3 2023
Mediterranean Shipping Company	Refit of demo ship underway in dry dock	Three-way agreement with QED, MSC and a fuel supplier for the trial.
Utah Oil Sands (Valkor)	Drilling permits outstanding due August 2023	Signature of licence agreement with Valkor, subject to award of permits.

SOURCE: *Company Data, VSA Capital Research*.

Investment Summary

The company recently announced that it had raised a total of £1.94m at 1.25p/sh. by way of an accelerated book build and an open offer. The proceeds are used primarily for working capital and the completion of the commercial trials. This should therefore take the group through to commercial revenue providing working capital into calendar H2 2024.

In the context of the groups QED is speaking to, a successful agreement with any or each would be transformational, and our analysis based on just four MMUs represents only a small proportion of these groups' total consumption of substitutable fuel.

Although the commercial testing is approaching a crucial time, commercial agreements are to be agreed on completion of the testing and at this stage it is not possible for us to determine group forecasts with conviction. Our analysis is based on management guidance of how licensing or tolling agreements are likely to look demonstrating that the installation of four MSAR Manufacturing Units (MMUs) that would power 45 ships or provide 0.9mntpa of fuel oil could generate revenue to QED of US$26-57m and EBITDA of US$6-14m.

Target Markets

Since Covid 19, the rationale for decarbonisation and the transition to Net Zero has been accelerated, enshrined in legislation with financial and practical implications for companies and industries which do not adapt their operating practices to suit the proposed changes.

QED's technology and suite of products provide an opportunity for some of the most intense Greenhouse Gas (GHGs) emitters such as shipping, industrials, cement manufacture, and power generation to progressively decarbonise without major upfront investment. QED's products with minor adaptation work well with existing boilers and engines and the company's current commercial trials reflect the breadth and depth of opportunity.

Marine

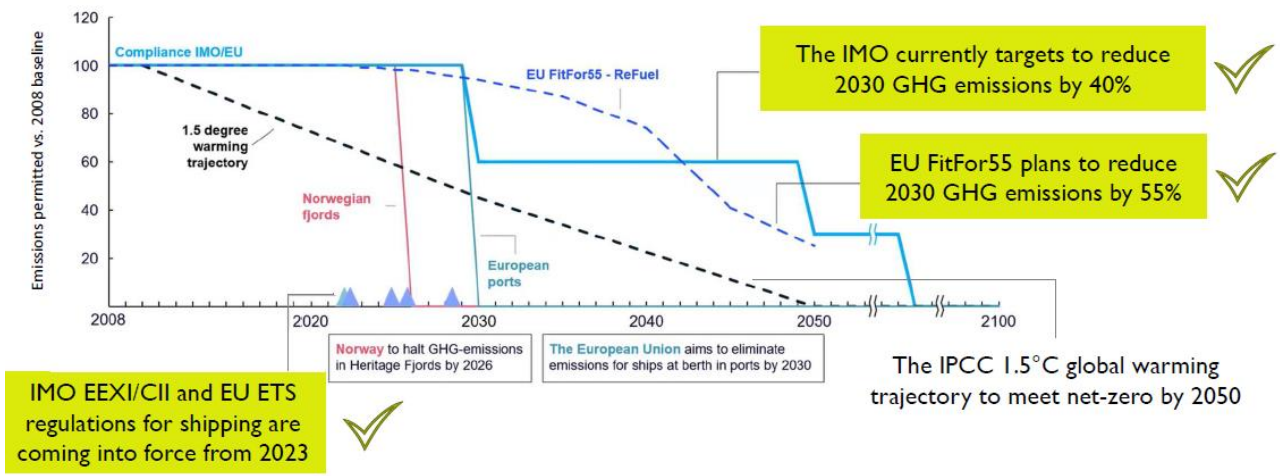
The marine industry is responsible for transporting 90% of world commerce and is almost entirely powered by heavy fuel oil (HFO) consuming in excess of 300mntpa, making the industry one of the most significant contributors to global GHGs. As a result, the International Maritime Organisation (IMO) has set a target to reduce CO_2 emissions from the industry by 40% by 2030 and 70% by 2050.

A number of measures are being introduced by the IMO such as the Energy Efficient Design Index, Energy Efficiency Existing Ship Index, the Carbon Intensity Indicator, and the Ship Energy Efficiency Management Plan to monitor these efforts which coincide by regional legislative changes such as by the EU including the Emissions Trading system Directive which now encompasses the maritime sector. The FuelEU Maritime Regulation comes into effect in 2025 and is more aggressive than the IMO targets requiring a 2% reduction in GHG intensity by 2025 against 2020 and 75% by 2050 with intermediate targets to that point. Shipping companies that fail to comply will be fined and may eventually be banned from EU waters.

LNG is around 25% less emissive than conventional marine fuel in relation to CO_2 and is often cited as an option for the industry to reduce emissions. It is considered a transitional fuel by the EU and is comparable to the performance of bioMSAR in this respect; however, retrofitting a ship to run on LNG can cost at least US$20m. Across a fleet this would be a substantial cost and would only be a temporary solution. Furthermore, when emissions are measured on a full life cycle basis (e.g., "well-to-wake") the 25% reduction (measured on a "tank-to-wake" basis) from LNG becomes significantly lower, and potentially zero if methane slip occurs in the production and supply chain.

Each of QED's production units costs an estimated US$7m to install and can provide fuel for around 12 ships, while the development pipeline which uses substantially the same production technology includes a net zero biofuel which would likely align with the longer-term standards required of the industry.

New Regulations are Driving the Requirement to Decarbonise



SOURCE: *Company Data, VSA Capital Research.*

Heavy Industry

Schemes such as the EU Emissions Trading Directive affect all heavy industry not simply the maritime industry. The cap-and-trade approach means that the base of available credits reduces each year, implying the cost of emitting carbon should increase over time. Consequently, heavy industry such as cement manufacturing or non-renewable power is incentivised to decarbonise wherever possible. Cement accounts for 7% of global carbon dioxide emissions with fossil fuels burned to generate the heat required to produce cement clinker.

The incentives for changing are not simply the efficiency savings but reducing the impact of financial penalties of non-compliance. With QED's pipeline of products including a net zero bioMSAR moving to the current product range, it is a transitional step that avoids intensive spending on new infrastructure. The company's commercial trials in Morocco and Utah represent significant opportunities for traction within this space.

Power Markets

The other market that QED is targeting and has had some modest success historically is in the power generation market.

According to the International Energy Agency (IEA), the use of oil for electricity generation accounted for around 3.9% of global electricity generation in 2019. However, this figure can vary significantly depending on the region. For example, in the Middle East and North Africa, fuel oil accounted for around 20% of electricity generation in 2019, while in Europe it accounted for less than 1%.

Clearly over the longer term, many regions are looking to replace fuel oil with cleaner alternatives and QED's products therefore present an opportunity that again relies on less intensive infrastructure spending whilst not removing base load type energy, particularly before batteries are rolled out broadly to solve the intermittent nature of renewable power generation.

Definition and Benefits of Emulsion Technology

An emulsion is a mixture of two or more liquids that are normally immiscible. Due to this unfavourable mixing, emulsions are unstable, and the technological breakthrough needed to make commercial products has been in creating lasting stability.

There are broadly three types of emulsion: water-in-oil, oil-in-water and water-in-oil-in-water, also known as a complex emulsion. To form an emulsion a mechanical force is required to disperse one liquid in another, however, this is only temporary unless surfactants or emulsifying agents are added to prevent the immiscible liquids from beginning to separate once again.

Emulsification is the dynamic and non-spontaneous process used to disperse the liquids and requires energy, often via shaking, mixing with rotor systems, liquid injection high pressure homogenisers and ultrasound.

QED products are water-based fuels, and the emulsification encourages more efficient and cleaner burning of the fuel which has both environmental and economic benefits through the reduction in particulate emissions arising from inefficient burning and also a higher energy yield from greater efficiency. They do this while maintaining the integral qualities of fuel oil being of high energy density, ignitable, low volume, combustion efficiency and stability. QED focuses on oil-in-water technology (as it provides a lower cost, low viscosity fuel with enhanced combustion properties) while many of the emulsion fuel peers are developing water-in-oil products (including London listed **SulNOx**) making QED unique.

These are clear benefits and investors may wonder why emulsified fuels have not already been commercialised widely. There are a number of reasons for this; firstly, creating a stable and long-lasting fuel emulsion is difficult while changing the makeup of the fuel can also lead to power degradation, corrosiveness and higher fuel viscosity that can impact the running of existing engines. The value in QED's products is therefore largely derived from having overcome these challenges through optimisation of the ratios and surfactants involved. Over time, emulsions tend to separate, and QED

has developed stable products which have a robust shelf life of many months and if needed over a year under normal storage conditions.

To date, the emissions savings and cost / efficiency gains have often not been sufficient to overcome the convenience of using conventional fuels. What has changed in the last few years has been the widespread adoption of greenhouse gas related regulation and legislation forcing groups that have high carbon emissions to reduce their footprint. QED has a range of products enabling companies to progressively decarbonise without major investment into altering their infrastructure to accommodate alternative solutions such as ammonia, methanol, or hydrogen.

Although the commercial adoption has been limited to date in the context, we note that management, particularly the CEO, Jason Miles was closely involved with one of the largest commercial emulsion fuel developments in the world. Having been developed in the 1980s, a product called Orimulsion was developed using bitumen from **Petroleos de Venezuela (PDVSA)** alongside BP. Over 60mnt was sold between 1993 and 2006; unfortunately, Orimulsion was then one of the casualties of the "Bolivarian Revolution" instigated by the late president, Hugo Chavez, that led to the demise of PDVSA and the domestic oil industry.

Quantified Economic and Environmental Benefits of QED Products

QED has been able to quantify the commercial and environmental benefits of the production of its emulsion fuel products through extensive testing. There are commercial benefits to both the manufacturer and also to end consumers. The environmental benefits result from a reduction in CO_2 emissions, and oxides of nitrogen (NOx that leads to smog) and particulate matter (PM) emissions. Each of these apart from the economic benefit to refiners, is primarily a result of the more efficient and complete combustion of the fuel as a result of pre-atomisation which enables higher carbon burn-out reducing black soot.

The underlying principle in each case is that the emulsion process leads to the superfine dispersion of fuel in the water phase to a greater extent than in heavy fuel oil: 5-10 microns versus 100 microns respectively. This means that the fuel has a greater surface area which enables complete combustion of the fuel. The water in the fuels reduces the temperature of combustion which reduces NOx by up to 45% with no visible black soot.

QED's MSAR and bioMSAR fuels are direct substitutes for Heavy Fuel Oil (HFO) and biofuels. In HFO, oil residues are mixed with expensive distillate fuels in order to reduce their viscosity. QED's emulsion technology instead allows the residues to be mixed with water, freeing up the distillates for sale more profitably by the refinery. The resulting fuel is ~10% cheaper than HFO (due to the cheaper residue feedstock) but its similar properties allow it to be used on existing infrastructure. bioMSAR incorporates glycerine into the emulsion to produce a biofuel substitute which is up to 10% cheaper than existing biofuels. Further cost savings are generated due to efficiency gains (at around 3-5% for MSAR).

Results from testing on two types of engines and their impact on performance and emissions have been released. One with **Aquafuels Research Ltd** and the second with **VTT** in Finland on a Wärtsilä engine**.** The data focuses on bioMSAR as this is the renewable version of MSAR and likely to have the greater commercial potential in the current environment, in our view.

Aquafuel testing on a Cummins diesel engine confirmed that bioMSAR performs well as an alternative fuel. It is 3% more efficient than diesel and results in emission reductions of 20-27% for NOx and 20% for CO_2 using standard engine settings. Retuning of the engine to optimise for emulsion fuels demonstrated 13% more efficiency than diesel whilst remaining within NOx emissions limits.

MSAR

MSAR is the oil-in-water emulsion technology developed by the company using heavy residual or refined oils combined with specialist chemicals and water to a bespoke formulation. The ratios and methodology are the company's proprietary technology. In broad terms, it is 30% water and 1% chemicals and the low viscosity liquid at room temperature makes it easier to handle and reduces the heating costs for storage, transport and use compared to heavy fuel oils. MSAR is a direct substitute for Heavy Fuel Oil (HFO) and is ~10% cheaper.

bioMSAR

The bioMSAR product is related to the original MSAR product but incorporates glycerine further enhancing the environmental benefits of the emulsion fuel technology. It is manufactured in the same way as MSAR but uses glycerine, residual oils, water, and small amounts of chemicals. The oil content is closer to 40-50% with 40-50% water and less than 1% chemicals. bioMSAR is a direct substitute for biofuels and is up to 10% cheaper.

Glycerine reduces surface tension between fuel and water helping to stabilise the emulsion, this allows better mixing and dispersion which prevents separation promoting greater stability. It also improves the solubility of the water in the fuel and has a positive heat of combustion meaning that it can provide additional energy when burned thus increasing the overall energy content of the fuel.

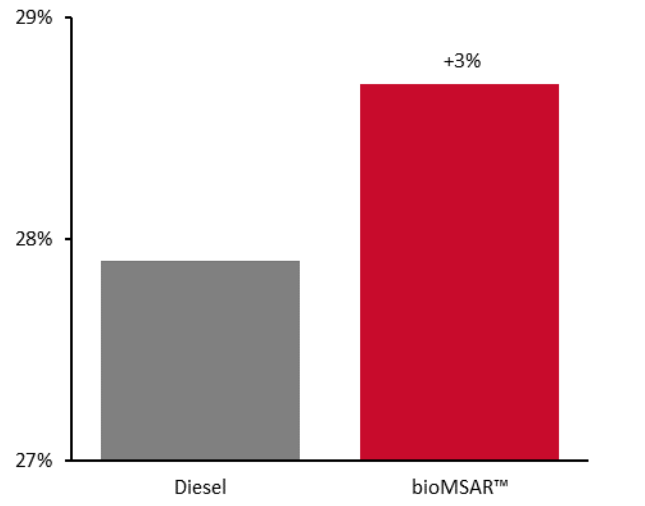
Future net zero Fuel: bioMSAR Zero

QED intends to take bioMSAR a step further by replacing the hydrocarbon element with a zero-carbon or even carbon negative substitute. This is a natural extension of QED's progressive carbon reduction approach and could mean that users of existing engines feel very little impact from the energy transition.

QED is targeting 2030 for launching this fuel range, timed to coincide with a number of step changes in legislation.

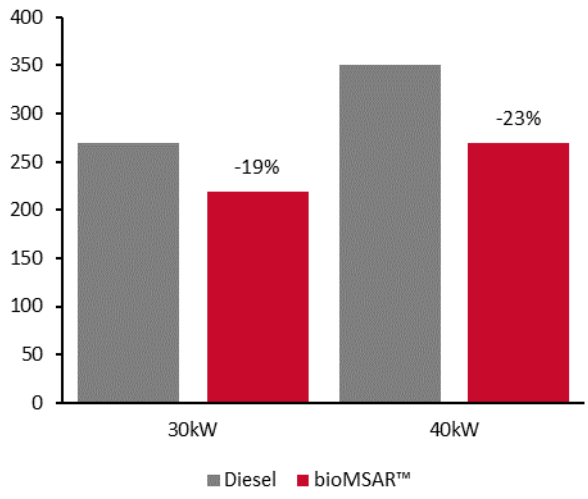
The company has a Joint Development Agreement with **Vertoro BV** a specialist in sustainable biofuels. Vertoro supplies technology to produce biomass-based biofuels including crude lignin oil which is a substitute for methanol and crude sugar oil (CSO). Vertoro is supported by Maersk Growth, highlighting further involvement by the shipping industry in finding carbon reduction solutions for marine fuel. QED started its JDA with respect to using CSO as an alternative to glycerine but now this has widened to incorporate development of the zero-carbon product.

Engine Net Efficiency % at 30kW -3° TDC



SOURCE: *Company Data, VSA Capital Research.*

NOx Emissions (ppm) at 30 & 40kW



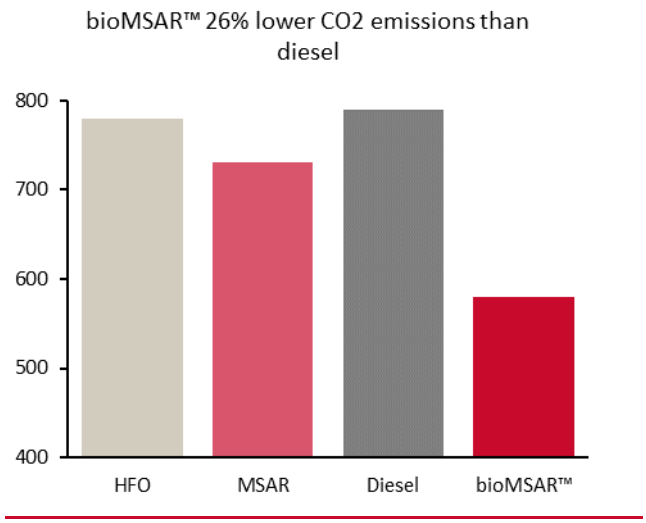
SOURCE: *Company Data, VSA Capital Research*

Typically, advancing injection timing increases engine power and fuel efficiency, however, this also increases emissions due to higher combustion temperatures. Manufacturers therefore try to optimise timing to balance power, efficiency, and emissions. The testing undertaken with Aquafuel tested a range of settings and demonstrated that when using bioMSAR while advancing injection timing it was also possible to reduce the inlet air temperature resulting in a reduction in NOx emissions ceteris paribus.

Although compared to bioMSAR under normal engine conditions NOx emissions were higher, with the adjustment to the air inlet temperature NOx levels were 30% lower than diesel under normal conditions and 45% lower than using advanced injection. Therefore, bioMSAR can achieve significantly enhanced engine efficiency compared to the standard 3% whilst also reducing NOx emissions.

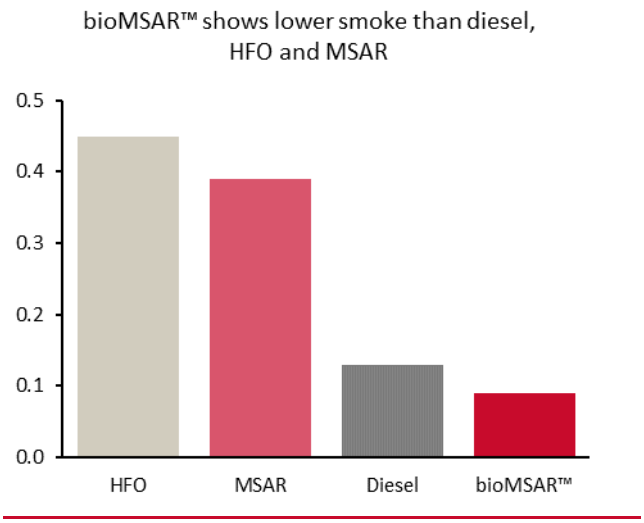
As well as the testing with Aquafuel, QED has also carried out testing with Wärtsilä, which supplies engines to MSC and is a leading supplier to the marine industry. Therefore, although the testing is important to the potential MSC contract, the demonstration with Wärtsilä and proof that the fuels work with its engines is a valuable cred for breaking into the wider marine industry.

Well-to-wake CO2 emissions (g/kWh) at 75% Load



SOURCE: *Company Data, VSA Capital Research.*

Filter Smoke Number (mg/m³) at 75% Load



SOURCE: *Company Data, VSA Capital Research*

The results demonstrated higher efficiency, reduced CO_2 and NOx emissions and that the fuels are compatible with the existing engines. Testing was done using 5 tonnes of bioMSAR manufactured by QED using the same formation as the Aquafuel tests and compared against marine diesel using 75% load for each which is a typical operating level for a marine 4 stroke diesel engine.

Using the same range of engine loads the tests resulted in a reduction in CO_2 emissions of between 24-29% compared with diesel. These results were standardised to align with the marine industry which is attempting to standardise GHG reporting with fuels considered on a "well to wake" basis, i.e., life-cycle analysis. The baseline tests for fuel indicate 90 gCO2e/MJ for diesel and 69 gCO2e/MJ for bioMSAR. This is comparable to natural gas with retrofitting of ships to run on LNG, an interim option that is being considered, however, this comes with considerable conversion cost and there is also the ongoing risk of "methane slip". Methane is far more impactful than CO2 when it comes to climate change and incomplete combustion of natural gas can lead to the release of methane, but this is not a risk with bioMSAR. MSAR by comparison led to a 5% reduction in CO2 emissions versus diesel.

The same pattern was recorded in relation to NOx with higher engine loading resulting in higher NOx emissions if additional engine tuning was not done although with the Wärtsilä engine this was not carried out on an extended basis.

Manufacturing

Both fuels are manufactured using the broadly the same process.

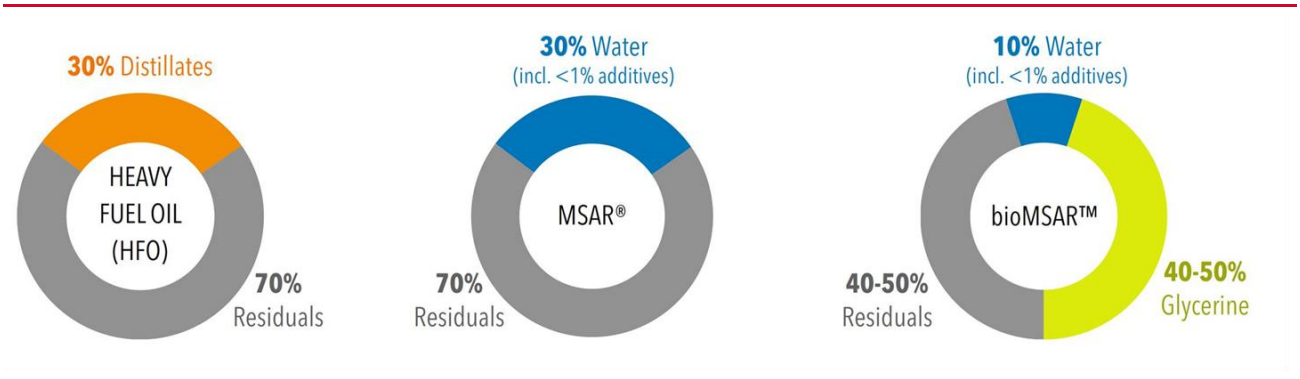
1. Oil residues are taken from the refinery of heavy oil production and cooled to under 200c to achieve the required viscosity.
2. Water, often recycled or from waste streams and treated/purified, is added to the residue.
3. Chemical additives supplied by the company's long-term partner Nouryon is included in the water phase to stabilise the emulsion for long term storage and transport.
4. The mixture is then processed by QED-designed equipment to produce a highly stable oil-in-water emulsion.

5. For bioMSAR, glycerine is also added to the water, although the two products can be made interchangeably and are compatible with each other once blended.

Currently QED does not produce commercial quantities and has production facilities deployed for the production of test volumes. However, the company own two production units (MMUs) that can each produce 0.3mntpa and can have the necessary equipment installed at a terminal or refinery in 6-12 months.

Lead times on the key equipment (normally supplied to the road industry to make emulsions) are typically three months but this can be between 4-6 months if ordered during Q2 as bitumen suppliers become active ahead of the summer tarmacking season. Once the equipment is on site, installation and commissioning takes up to three months. In relation to the near-term opportunities, equipment for testing is already installed so the lead time is for expansion to commercial scale but revenues can be generated as soon as terms are agreed.

HFO vs MSAR & BioMSAR



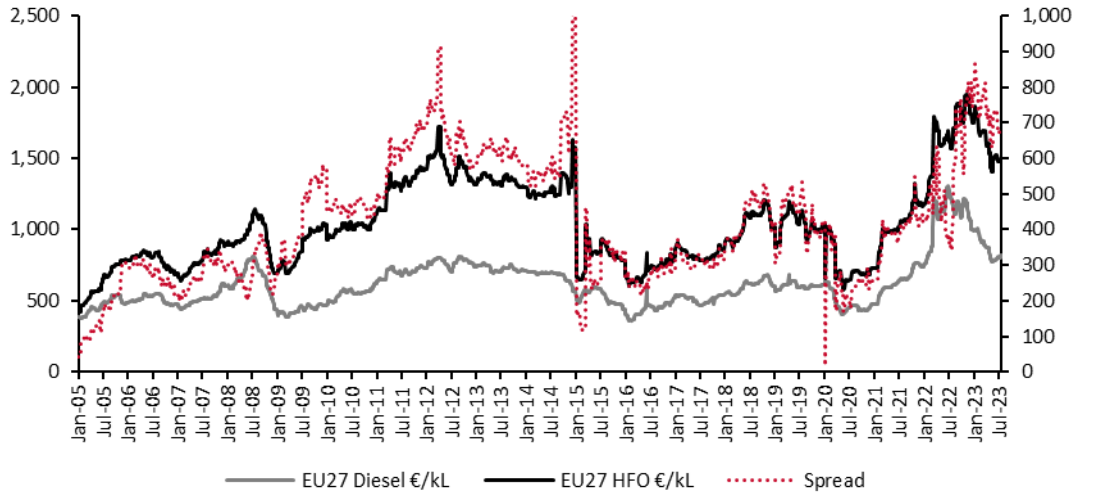
SOURCE: *Company Data, VSA Capital Research*.

Raw Materials

Oil refineries produce a range of products both in terms of characteristics and value. QED focuses on the low value output associated with the production of higher value transportation fuel. Heavy Fuel Oil is made from the leftover residue after all of the high value products have been removed from crude oil. This substance is virtually solid at room temperature due to high viscosity with a limited range of uses such as in bitumen for tarmacking. Some of the higher value products can be mixed with this refined residue to create HFO also known as fuel oil, heavy oil, marine fuel, bunker oil, and similar derivations.

HFO is sold at a discount to crude oil, this discount changes depending on market conditions. Although the main driver of adoption of QED's products, in our view, is now most likely to be legislation relating to net zero and air quality there remains an economic incentive for refineries to adopt the company's products. This is driven by the spread between diesel and HFO. The data shows that this spread over the long-term retains a stable margin. There are only periods of extreme pricing such as the collapse of oil prices in 2014, or the start of the Covid 19 pandemic, that have led to a temporary narrowing of the margin where there is little or no spread between the products.

Euro Diesel vs HFO Spreads



SOURCE: *Eikon, VSA Capital Research*

There is also a benefit to a refinery which is that when making conventional HFO the refiner must use high value middle distillates to mix with the heavy oil residues to turn it into a usable product. QED's techniques mean that refiners can sell all of their middle distillates without having to sell them as part of cheaper fuel oil. The refiner can therefore sell the low value residues without sacrificing higher value products. This means there is an additional incentive to aid in production of the product and sourcing residues, as they are able to sell a greater proportion of the higher value products for full value and make a better margin on the residues. The company believe that a refinery can generate savings of between 10% and 40% with MSAR and 10-15% for bioMSAR. For either product, QED can adjust the blending ratios to suit the heavy oil residue.

Additives

Nouryon is a global chemicals company with close to 8,000 employees and in November 2022, QED announced an extension of three years to its exclusive supply agreement with Nouryon. QED has agreed to continue to purchase speciality chemicals used as emulsifiers exclusively from Nouryon. We note that intellectual property arising from joint development activity is jointly owned by the parties in agreed territories.

Nouryon is a major partner with operations in 80 countries and achieved US$4.9bn revenue in 2021. This is a major partner for QED to have secured and should give investors confidence in the company's ability to secure raw materials particularly as the company is approaching commercialisation and may in short order need a much larger and consistent supply of additives.

Water is typically consumed in large quantities by oil refineries and there is likely to be ample of supply of usable wastewater that can be utilised to further minimise the environmental impact.

Glycerine is added to MSAR to create bioMSAR; it is a co-product from biodiesel produced from biomass. For every tonne of biodiesel produced about 100kg of glycerine is also generated as a by-product. The potential for growth in the biodiesel market means that there could be ready growth in the supply of glycerine. Glycerine has a high mass to calorific value but has a high flash point and is therefore hard to ignite; mixing with the heavy residue means that the energy density benefits can be harnessed as this has better ignition quality whilst also being biodegradable and non-toxic.

Commercialisation Options Nearing Earnings and Valuation Inflection Point

QED has three major opportunities for near-term commercialisation of its technology and products. These mean that within 12 months the company could be revenue generative. Given the scale of the market opportunities and the nature of the potential partners, the success of any of these trials leading to commercial agreements would be transformative, in our view, to the earnings and valuation outlook. The three near-term opportunities are with **Mediterranean Shipping**

Company (MSC), the largest container shipping group in the world and a private Swiss company, with a Moroccan company in the industrial space that uses HFO as a source of electrical power and an upstream opportunity to directly create HFO from heavy oil sands in Utah, USA.

Near Term Opportunities

Project	Stage	Next Steps
Morocco Industrial Group	Commercial testing underway	Fuel Supply Agreement Q3 2023
Mediterranean Shipping Company	Refit of demo ship underway in dry dock	Three-way agreement with QED, MSC and a fuel supplier for the trial.
Utah Oil Sands (Valkor)	Drilling permits outstanding due August 2023	Signature of licence agreement with Valkor, subject to award of permits.

SOURCE: *Company Data, VSA Capital Research*.

As well as these advanced opportunities the company remains active in business development, seeking additional new opportunities.

MSC Marine Fuel Opportunity

In January 2021, QED entered into an agreement with MSC for proof of concept and subsequent operational trials for both MSAR and bioMSAR. MSC acquired a ship from Maersk which had carried out a trial on MSAR previously but ran aground before the trial could complete. The ship is currently in dry dock being refitted ahead of the proof-of-concept testing which is a relatively short test that requires around 1,000t of fuel.

QED are currently in negotiation with potential fuel suppliers to manufacture the fuel needed for the trial. Once an agreement has been signed with the supplier, QED and MSC, QED's equipment will then be installed at the supplier site ahead of fuel production commencing.

The trials are set to commence in Q4 2023 and to achieve the 4,000 operating hours, it is likely to take between six to eight months with commercial discussions commencing in H1 2024. Given the results of the prior testing with Maersk, we expect the results of the testing to be similarly positive. Maersk completed around 1,500 hours of testing using MSAR on the same ship mentioned above with positive results and an interim LONO supplied by Wärtsilä for MSAR at the time. Maersk did not proceed to commercial agreements despite the positive results as its aim had been to use the savings generated by MSAR to fund the gradual addition of scrubbers (to capture sulphur emissions) by 2025, however, the International Maritime Organisation brought forward this deadline to 2020 and Maersk opted to switch to using more expensive low sulphur fuel despite the higher cost, it was preferable to the rapid installation of scrubbers across the fleet which involved both expense and taking ships out of service to complete the work. MSC has installed scrubbers for half of their fleet by contrast, meaning they continue to use high sulphur fuel for conventional and biofuel blends.

Given the successful prior testing, we see limited technical risk in the coming trials, but the commercial agreements are yet to be signed and the timing and nature of these is uncertain.

Morocco Industrial Opportunity

QED has had an agreement with a large industrial group in Morocco since 2019 to explore the use of MSAR and bioMSAR as a substitute for HFO to generate heat for some of its operations. Initial testing was delayed by Covid 19, but the team was able to get on site by October 2020 to undertake the pilot trial. This was successfully completed.

An updated agreement was completed in late 2021 for cooperation and further testing. There were some logistical issues with the MSAR fuel held up at Moroccan customs pending final clearance which delayed the test by a few months.

Site engineering has been completed with QED staff on site in mid-May. Discussions around a commercial fuel supply agreement due to commence shortly after the trial completes subject to positive results. The company anticipates working with supply partners and signing a fuel supply agreement in H2 2023.

The agreement could be between 2-5ktpd of fuel as a starting point and potentially higher if rolled out across the entire group. On the back of the latest testing a commercial agreement is due to be agreed.

Utah Oil Sands (Valkor Technologies)

In April 2022, QED signed a commercial development agreement with **Valkor Technologies** in Utah, USA to commercialise MSAR and bioMSAR at Valkor's projects in Utah updating original agreements from 2020. Valkor has equity stakes in multiple heavy oil projects in the USA.

However, in a significant development QED recently announced the signature of a Site License and Supply Agreement (SLS) marking a major milestone towards commercialisation of the company's products. The SLS Agreement is subject to certain conditions but if executed could mean that commercial revenues are realised as soon as August 2023.

Valkor will license QED technology while QED will provide services, additives, and technical support. There are four key sub agreements within the SLS:

- Valkor have a hearing scheduled for August 2023 for the receipt of underground injection permits from the Utah Board of Oil, Gas and Mining. We believe that the receipt of permits will lead to project financing likely to be around US$15m meaning Valkor will then be ready to execute first production. QED has the exclusive right and license to its technology to produce MSAR and bioMSAR from this site and to market the fuel on a non-exclusive basis in Utah. QED will receive US$1.5m in upfront payments with US$1m on receipt of permitting and project financing and US$0.5m on delivery of the first MSAR Manufacturing Unit. This will cover QED's project start-up costs, in our view.

- As part of the agreement QED and Valkor agreed a Technology Transfer and Purchase Option Agreement (TTP OA); for the support services provided by QED, Valkor will pay QED an additional quarterly retainer of US$75,000 for a minimum of two years after which Valkor will have an option to purchase QED's technology and MMU for US$1m at which point QED would no longer provide services.

- The commitment from QED is to supply a 40tph MSAR and MMU and associated equipment. It will remain under QED's ownership unless the TTPOA is exercised.

- QED will supply the additives; surfactants and chemicals needed to manufacture QED's products. This will be sourced under the agreements with Nouryon.

This provides a starting point with both companies envisaging the potential for further resources to be committed. Consequently, a profit share agreement based on a pro rata of costs and time has been agreed for future sales which we expect to drive the bulk of commercial revenues beyond the initial prepayment which largely covers start-up expenses, in our view. The agreement has an initial term of ten years.

Environment, Sustainability and Governance

The company is intimately involved in the energy transition enabling companies to reduce their emissions footprint while limiting the intensive capital cost of retrofitting to alternatives such as hydrogen or LNG. As a growth company it is in the nascent stages of outlining and executing the wider strategy in relation to the environment and sustainability

We see potential opportunities in areas such as carbon credits and the company is investigating the possibility of generating carbon credits from the savings in emissions arising from using QED products. This could produce new revenue streams for the company that could be sizeable depending on the result of lifecycle analysis on the products and the quantum of commercial agreements and associated sales.

As a small business, the company's own emissions are at this stage limited but the company has recognised the importance of reporting and transparency in this regard and has begun to publish appropriate metrics on its own output voluntarily. We recognise that reporting is not standardised, but the company has tried to use global reporting benchmarks where possible and the company is targeting being net zero by 2030.

Streamlined Energy & Carbon Reporting, UK & Offshore, July 21 to June 22

Details	Amount
Total energy consumption used to calculate emissions (kWh)	37,986
Emissions from combustion of gas (Scope 1 – tonnes of CO_2 equivalent)	2 tCO_2e
Emissions from purchased electricity (Scope 2, location-based – tonnes of CO_2 equivalent)	6 tCO_2e
Total gross tCO_2e based on above	8 tCO_2e
Intensity ratio: Gross tCO_2e / FTE (Full Time Employees)	0.84

SOURCE: *Company Data, VSA Capital Research*

In addition, the company has set out its own targets and wants to be a net zero company by 2030. The aims achieved by 2022 were in terms of assessing Scope 1 and 2 emissions, voluntary disclosure and the commissioning of regular sustainability reporting as well as tracking electricity use with a view to reducing energy consumption from non-renewable sources.

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

Valuation & Business Model

With three major projects close to commercialisation, the company is approaching an inflection point in terms of earnings, however, the timing and nature of any agreement is subject to final contract negotiations making a quantitative valuation challenging at this stage. We believe that successfully executing an agreement and commencing sales would be transformational for QED's outlook and have undertaken some analysis which demonstrates that even modest size contracts could deliver strong earnings that would quickly deliver cash generative earnings and have a significant impact on the valuation.

The company recently raised a total of £1.94m at 1.25p/sh. with £1.1m via a placing and £0.84m via an open offer. This implies an additional 155.6mn shares taking the outstanding share count to 1,562mn. Management has indicated that this will take the company through to calendar H2 2024 at which point the commercial trials are expected to have been completed, with agreements signed and first revenues achieved.

The burn rate is around £230k per month excluding project expenses so assuming the contracts come in as expected this is a reasonable assumption, in our view, with the last fundraise of £7m in March 2021. We note the latest announcement in relation to Valkor which includes upfront payments of up to US$1.5m which in part cover dedicated project costs meaning that winning new business does not imply the need to raise funds as we would anticipate similar structures on other contracts.

QED 5-Year Share Price Chart (GBp)

SOURCE: *Eikon, VSA Capital Research*

The stock has been trading close to the 2020 lows throughout this year and the stock is down 32% YTD. The recent volatility which led to the stock first dropping through the long term support level and subsequently recovering on the back of the Valkor news demonstrates that although there is some caution the market is likely to react strongly to positive developments and the achievement of key expected milestones. The announcement of the financing price resulted in the shares pulling back to around the issue price as might be expected, however, with a stronger working capital position the company is now well placed to achieve its announced milestones potentially without the need to return to the market. In our view, trading at close to all-time lows but with multiple advanced commercial trials we believe that the risk reward on offer currently is attractive.

Indeed, we see limited downside risk at the current level; with the current market capitalisation of £19.1m we see much of that as being attributed to the inherent value of the product with little expectation priced in for successful execution of the agreements. This is the current opportunity, in our view, with the market overly cautious on the potential for success and having offered attractive gains from this level in the past notwithstanding the near-term potential to convert major commercial opportunities.

Business Model and Transformational Outlook

There are two structures that commercial contracts are most likely to take: a technology license and supply arrangement or a tolling agreement. Under the former, QED provides the technology, chemicals, services and charges a fee relating to a fixed margin to cover costs. For a tolling agreement, QED owns and operates the equipment and charges a tolling fee per tonne of fuel sold (this higher fee compared to licensing covers the cost of equipment over time, in our view). Operating costs relate to the chemicals and labour primarily with residue etc provided by the refinery or purchased by the end customer and the company will negotiate agreements around a suitable margin.

Capex for installation of each unit including third party tie-ins is estimated at around US$7m per MMU. Therefore, although the margins on tolling agreements are likely to be higher, in its current form QED has limited capital with which to take on larger tolling agreements. Currently with two operational MMUs, these could be installed on this basis but beyond this further cash would be required. That said, we expect that financing could be raised against firm commercial agreements more easily. The scenarios presented highlight the modular nature of the ramp up envisaged but a larger capital outlay could be deployed if the resources were available. We note that from a valuation perspective tolling is generally more value accretive and in the longer term this may be the preferred option.

Earnings Scenario Analysis

Marine Market (MSAR)				
Number of MSAR manufacturing units	1	2	3	4
No. of vessels equivalent	12	23	34	45
% of MSC fleet	1.9%	3.7%	5.4%	7.2%
Revenues (licence model US$m per annum)	14.1	27.2	40.0	52.8
EBITDA (licence model US$m per annum)	2.4	4.6	6.7	8.9
Revenues (tolling model US$m per annum)	17.8	37.0	56.5	76.1
EBITDA (tolling model US$m per annum)	3.7	8.7	14.1	19.5
Total Capex (tolling model cUS$7m per MMU)	(7.0)	(14.0)	(21.0)	(28.0)
Marine Market (bioMSAR)				
Number of bioMSAR manufacturing units	1	2	3	4
Revenues (licence model US$m per annum)	10.7	20.4	29.8	39.2
EBITDA (licence model US$m per annum)	2.4	4.6	6.8	8.9
Revenues (tolling model US$m per annum)	14.9	31.2	47.8	64.5
EBITDA (tolling model US$m per annum)	(1.5)	2.7	8.7	14.6
Total Capex (tolling model cUS$7m per MMU)	(7.0)	(14.0)	(21.0)	(28.0)
Power Market				
Number of MSAR manufacturing units	1	2	3	4
Fuel quantity processed (HFO Eq) mtp/a	0.2	0.5	0.7	0.9
Fuel quantity processed (HFO Eq) kbp/d	5.8	11.7	17.5	23.3
% global HFO market	0.1%	0.2%	0.3%	0.3%
Revenues (licence model US$m per annum)	9.4	17.8	25.9	34.0
EBITDA (licence model US$m per annum)	2.2	4.3	6.2	8.2
Revenues (tolling model US$m per annum)	13.8	28.9	44.5	60.0
EBITDA (tolling model US$m per annum)	4.2	9.7	15.7	21.6
Total Capex (tolling model cUS$7m per MMU)	(7.0)	(14.0)	(21.0)	(28.0)

SOURCE: Company Data, VSA Capital Research.

The examples above show that the installation of just two MMUs could turn the group cash flow neutral with any growth beyond this cash flow generative. As yet the company does not have a definitive commercial agreement and the actual results could differ substantially from the scenarios we present, however, based on management guidance we believe if the MSC or Valkor agreements are commercialised the company could quickly be generating profits.

Based on management guidance we have built earnings scenarios and conducted a valuation analysis; given the uncertainty on timings we cannot yet use this to provide a definitive target price. Our DCF assumption is based on a ten-year agreement, and we apply a 25% corporate tax rate in line with the UK, however, we highlight that QED has tax losses of up to £60m which could offset this and further enhance the potential valuation and for this reason we have presented the valuation in pre-tax form as well. We use an 8% discount rate as our base case assumption.

DCF Valuation Based on Scenario Analysis (Pre-Tax NPV8) US$m

	Licensing	Tolling
Marine	48.1	79.0
Power	44.7	90.3
bioMSAR	48.3	90.3

SOURCE: Company Data, VSA Capital Research

We highlight that these scenarios are relatively small scale running at a maximum of 4 MMUs. This would account for around 10% of the MSC fleet's fuel demand. Clearly, a serious adoption of the fuel by any one of these groups would likely be on an even larger scale. The adoption of any one of the commercial contracts in Morocco, MSC or Utah currently being tested would be transformational, in our view, and QED is quickly approaching realisation.

DCF Valuation Based on Scenario Analysis (Post Tax NPV8) US$m

	Licensing	Tolling
Marine	36.1	53.3
Power	33.5	61.8
bioMSAR	36.2	61.8

SOURCE: Company Data, VSA Capital Research

Risks

- **Commodity Prices**. The company is primarily exposed to oil prices and those of its related products. Unexpected changes could impact the outlook for the company.
- **Macro Risk.** Changes to the general business environment could affect the outlook for the business. The company will likely receive earnings in non-GBP currencies, most likely the USD, meaning the company is exposed to fluctuating exchange rates.
- **Legislation Risk.** Changes to the legislation in the underlying industries QED is targeting could affect the commercialisation of its products.
- **Execution Risk.** Operating and logistical delays could impact execution of key projects and lead to delays in project commercialisation.
- **Financing Risk.** Access to financing is a perennial challenge for small cap companies.

Appendix 1: Board of Directors

Jason Miles, Chief Executive Officer

Jason spent the first 12 years of his career developing emulsified fuel projects as a Process Engineer for BP, and subsequently for PDVSA as Business Development Manager where he implemented number Orimulsion® power projects globally. Jason joined Quadrise in 2006 and now has some 25 years' technical and commercial experience in the emulsion fuels industry. Jason is a chartered Chemical Engineer, with an honours degree in Chemical Engineering from Loughborough University and has an Executive MBA from the Cass Business School in London.

Andy Morrison, Non-Executive Chairman

Andy is a director of growth businesses with almost 40 years' experience encompassing major multi-national corporations and junior public companies. Andy spent 17 years at Shell plc in their oil products, lubricants and speciality chemicals divisions, where his roles included VP positions in sales, marketing, trading and strategy. Andy then held senior positions at BG Group plc and BOC Group plc in Corporate Strategy and New Business Development respectively. Since 2007, Andy has led a number of junior listed companies in both the energy and ESG sectors, where he has significant experience covering restructuring, turnarounds, new listings and acquisitions. Andy holds a first-class bachelor's degree in chemical engineering and fuel technology from the University of Sheffield.

Laurie Mutch, Non-Executive Director

Laurie is a management consultant to multi-national organisations. He has 25 years' experience in the energy industry with the Royal Dutch/Shell Group where he sat on the Board of Shell International Gas & Power, as Executive Director for business development in the Eastern Hemisphere. From 1994-1996, he was the Finance Director in Shell International Gas and Principal Executive to the International Energy Agency's Coal Industry Advisory Board (CIAB). Prior roles include senior management positions in Shell's Coal and Chemical Divisions. During his last two years of service, he was Group Chief Information Officer. Laurie holds a BSc in Mathematics & Physics and an MSc in Astrophysics. He is a member of the QED Audit, Remuneration and Nomination Committees.

Dilip Shah, Non-Executive Director

Dilip has over 25 years' commercial experience in trading, finance, manufacturing and distribution. He has most recently been involved in trading and manufacturing in West Africa with focus on Nigeria, Democratic Republic of Congo and Ghana. He is a founder member of various successful companies in West Africa involved in the distribution of fertilisers, chemicals, tobacco related products and the manufacture of food products. In addition, he serves on the boards of a number of private UK and international companies.

Philip Snaith, Non-Executive Director

Philip has spent more than 35 years with the Royal Dutch Shell group in senior executive positions, latterly as General Manager of Shell International Trading & Shipping Company Limited in London. Between 2004 and 2008, Philip spent four years in Singapore as President of Shell International Eastern Trading Company - with responsibility for Asia-Pacific trading portfolio. Concurrent with this executive position, he was a non-executive director of Shell Eastern Trading Company (Pte) Ltd, with annual revenues of around US$55 billion, and was also Chairman of both Shell Tankers Singapore (Pte) Ltd and Shell International Shipping Services (Pte) Ltd. Philip holds an MBA from Cranfield University, a BSc (Physics) from Imperial College and a Diploma in Marketing (Dip.M) from the UK Chartered Institute of Marketing. Philip is a member of the QED Audit and Compensation Committees.

Ian Farrelly, Company Secretary

Ian Farrelly, of MSP Corporate Services Limited that acts as corporate secretary of Quadrise and its subsidiaries, is a qualified solicitor with 25 years' experience as Company Secretary of a range of AIM and FTSE listed businesses.

Key Management Personnel

Philip Hill, Chief Operating Officer

Philip is a Chartered Chemical Engineer with over 20 years of experience in fuels and chemicals manufacturing, sales and distribution for BP and INEOS. He has significant technical and commercial experience in production operations, technology licensing, asset optimisation, project development and strategic planning. Prior to joining INEOS, he managed and held directorships in a number of BP's joint ventures, where he worked to develop and license gas-to-liquids technology for downstream and synthetic biofuel applications, and to supply jet fuel to the airline industry. Philip holds a Master's degree in Chemical Engineering from the University of Manchester's Institute of Science and Technology.

David Scott, Chief Financial Officer

David qualified as a Chartered Accountant with KPMG, where he progressed to Audit Manager prior to joining Cable and Wireless plc as a Finance Manager. He then spent four years as a Financial Controller at Consolidated Water Co Ltd, a NASDAQ listed utility and engineering Company. David joined Quadrise as Financial Controller in 2011, progressing to the CFO role in 2017. David has a Master's degree in Physics from Durham University.

Bernard Johnston, Head of Operations

Bernard joined Quadrise in 2008 as a consultant with over 25 years of experience in the manufacturing, chemicals and oil industry. He specialises in project and risk management, health & safety, process commissioning, streamlining, problem solving and fabrication. Bernard is well versed with emulsion fuels having spent nearly 10 years with PDVSA assisting Jason with Orimulsion power project development activities, and prior to that supporting BP Engineering emulsion fuel initiatives for boilers. Bernard started his career at Hawker Siddley Aviation and Imperial College, London.

Appendix 2

Financials

Profit & Loss , £'000 June Year End

	Year ended 30/06/21 £'000s	Year ended 30/06/22 £'000s	6-months ended 31/12/22 £'000s
Continuing operations			
Revenue	17	75	-
Production and development costs	(1,377)	(1,447)	(1,049)
Other administration expenses	(1,527)	(1,419)	(649)
Fair value adjustments arising on Convertible Securities	(1,257)	-	-
Share option credit/(charge)	(303)	44	(77)
Warrant charge	-	(18)	-
Foreign exchange loss	(9)	5	(4)
Operating loss	**(4,456)**	**(2,760)**	**(1,752)**
Finance costs	(4)	(3)	(1)
Finance income	50	1	4
Loss before tax	(4,410)	(2,762)	(1,749)
Taxation	150	164	-
Loss and total comprehensive loss for the year from continuing operations to owners of the parent	**(4,260)**	**(2,598)**	**(1,749)**
Basic	(0.36)	(0.18)	(0.12)
Diluted	(0.36)	(0.18)	(0.12)

SOURCE: *Company data, VSA Capital Research.*

Balance Sheet, £'000 June Year End

	Year ended 30/06/21 £'000s	Year ended 30/06/22 £'000s	6-months ended 31/12/22 £'000s
Assets			
Non-current assets			
Property, plant and equipment	460	398	418
Intangible assets	2,924	2,924	2,924
Total non-current assets	**3,384**	**3,322**	**3,342**
Current assets			
Cash and cash equivalents	7,006	4,423	2,645
Trade and Other receivables	117	103	100
Prepayments	95	177	148
Stock	61	-	126
Total current assets	**7,279**	**4,703**	**3,019**
Total assets	**10,663**	**8,025**	**6,361**
Equity and liabilities			
Current liabilities			
Trade and Other payables	276	262	270
Total current liabilities	**276**	**262**	**262**
Equity attributable to owners of the parents			
Issued share capital	14,069	14,069	14,069
Share premium	77,189	77,189	77,189
Merger	3,777	3,777	3,777
Share option	3,344	1,151	840
Warrant reserve	1,017	970	18
Reverse acquisition reserve	522	522	522
Accumulated losses	(89,531)	(89,915)	(90,324)
Total shareholders' equity	**10,387**	**7,763**	**6,091**
Total equity and liabilities	**10,663**	**8,025**	**6,361**

SOURCE: *Company data, VSA Capital Research.*

Cashflow Statement, £'000 June Year End

	Year ended 30/06/21 £'000s	Year ended 30/06/22 £'000s	6-months ended 31/12/22 £'000s
Operating activities			
Loss before tax from continuing operations	(4,410)	(2,762)	(1,749)
Fair value adjustments arising on Convertible Securities	1,257	-	-
Depreciation	135	120	57
Loss on disposal of fixed assets	16	-	-
Finance costs paid	4	3	1
Finance income received	(50)	(1)	(4)
Share option (credit)/charge	303	(44)	77
Warrant charge	-	18	-
Working capital adjustments			
Decrease in trade and other receivables	96	14	3
(Increase)/decrease in prepayments	17	(82)	29
(Decrease)/increase in trade and other payables	78	(14)	8
Decrease in stock	-	61	(126)
Cash utilised in operations	**(2,554)**	**(2,687)**	**(1,704)**
Finance costs paid	(4)	(3)	(1)
Taxation received	150	164	-
Net cash outflow from operating activities	**(2,408)**	**(2,526)**	**(1,705)**
Investing activities			
Finance income received	50	1	4
Purchase of property, plant and equipment	(29)	(58)	(77)
Net cash outflow from investing activities	**21**	**(57)**	**(73)**
Financing activities			
Issue Of Ordinary share capital	7,015	-	-
Issue costs	(502)	-	-
Increase in Convertible Securities	500	-	-
Net cash inflow from financing activities	**7,013**	**-**	**-**
Net (decrease)/increase in cash and cash equivalents	**4,626**	**(2,583)**	**(1,778)**
Cash and cash equivalents at the beginning of the year	2,380	7,006	4,423
Cash and cash equivalents at the end of the year	**7,006**	**4,423**	**2,645**

SOURCE: *Company data, VSA Capital Research.*

Disclaimer

Investment Analyst Certification

In our roles as Research Analysts for VSA Capital Limited. we hereby certify that the views about the companies and their securities discussed in this report are accurately expressed and that we have not received and will not receive direct or indirect compensation in exchange for expressing specific recommendations or views in this report.

Non-Independent Research

This is a marketing communication. It is non-independent research as it has not been prepared in accordance with legal requirements designed to promote the independence of investment research and is not subject to any prohibition on dealing ahead of the dissemination of investment research.

Important Disclosures

This research report has been prepared by VSA Capital Limited, which is party to an agreement to be paid a fee as corporate finance advisors and arrangers with, or has provided investment banking services to, Quadrise Plc, or has been party to such an agreement within the last twelve months, and is solely for, and directed at, persons who are Professional Clients as defined under Annex II of the Markets in Financial Instruments Directive, Directive 2004/39/EC, or as defined in the FCA Handbook. Persons who do not fall within the above category should return this research report to VSA Capital Limited, Park House 16-18 Finsbury Circus EC2M 7EB, immediately.

VSA Capital may distribute research in reliance on Rule 15a-6(a)(2) of the Securities and Exchange Act 1934 to persons that are major US Institutional investors, however, transactions in any securities must be effected through a US registered broker-dealer. If you are a US person, you must fulfil the requirements of a major US institutional investor as defined by the Securities Exchange Act 1934 and subsequent guidance from the SEC to receive this research report. Any failure to comply with this restriction may constitute a violation of US law for which VSA Capital Limited does not accept responsibility.

The information in this report is not intended to be published or made available to any person in any jurisdiction where to do so would result in contravention of any applicable laws or regulations. Accordingly, if it is prohibited to make such information available in your jurisdiction or to you (by reason of your nationality, residence or otherwise) it is not directed at you.

This research report is not intended to be distributed or passed on, directly or indirectly, to any other class of persons. It is being supplied to you solely for your information and may not be reproduced, forwarded to any other person or published, in whole or in part, for any purpose, without out prior written consent.

Neither the information nor any opinion expressed constitutes an offer, or an invitation to make an offer, to buy or sell any securities or any options, futures or other derivatives related to such securities.

The information and opinions contained in this research report have been compiled or arrived at by VSA Capital Limited from sources believed to be reliable and in good faith but no representation or warranty, express or implied, is made as to their accuracy, completeness or correctness. All opinions and estimates contained in the research report constitute the Company's judgments as of the date of the report and are subject to change without notice. The information contained in the report is published for the assistance of those persons defined above but it is not to be relied upon as authoritative or taken in substitution for the exercise of the judgment of any reader.

The Company accepts no liability whatsoever for any direct or consequential loss arising from any use of the information contained herein. The company does not make any representation to any reader of the research report as to the suitability of any investment made in connection with this report and readers must satisfy themselves of the suitability in light of their own understanding, appraisal of risk and reward, objectives, experience and financial and operational resources.

The value of any companies or securities referred to in this research report may rise as well as fall and sums recovered may be less than those originally invested. Any references to past performance of any companies or investments referred to in this research report are not indicative of their future performance. The Company and/or its directors and/or employees may have long or short positions in the securities mentioned herein, or in options, futures and other derivative instruments based on these securities or commodities.

Not all of the products recommended or discussed in this research report may be regulated by the Financial Services and Markets Act 2000, as amended by The Financial Services and Markets Act 2012, and the rules made for the protection of investors by that Act will not apply to them. If you are in any doubt about the investment to which this report relates, you should consult a person authorised and regulated by the Financial Conduct Authority who specialises in advising on securities of the kind described.

The Company does and seeks to do business with the companies covered in its research reports. Thus, investors should be aware that the Company may have a conflict of interest that may affect the objectivity of this report. To view our policy on conflicts of interest and connected companies, please go to: http://www.vsacapital.com/policies/conflict-of-interest-policy.

VSA Capital acts as Joint Broker to Quadrise Plc and is therefore classed as a connected company.

Investors should consider this report as only a single factor in making their investment decision.

Definition of Ratings

VSA Capital Limited uses the following stock rating system to describe its equity recommendations. Investors should carefully read the definitions of all ratings used in each research report. In addition. since the research report contains more complete information concerning the analyst's views. investors should carefully read the entire research report and not infer its contents from the rating alone. In any case. ratings (or research) should not be used or relied upon as investment advice. An investor's decision to buy or sell a stock or investment fund should depend on individual circumstances and other considerations.

VSA Capital Limited's recommendations are defined as follows:

BUY:	The stock is expected to increase by in excess of 10% in absolute terms over the next twelve months.
HOLD:	The price of the stock is expected to move in a range between -10% and +10% in absolute terms over the next twelve months.
SELL:	The stock is expected to decrease by in excess of 10% in absolute terms over the next twelve months.

In addition. on occasion. if the stock has the potential to increase by in excess of 10%. but on qualitative grounds rather than quantitative. a SPECULATIVE BUY may be used.

Distribution of VSA Capital Limited's Equities Recommendations

VSA Capital Limited must disclose in each research report the percentage of all securities rated by the member to which the member would assign a "BUY". "HOLD. or "SELL" rating. and the proportion of relevant investments in each category issued by the issuers to which the firm supplied investment banking services during the previous twelve months. The said ratings are updated on a quarterly basis.

Equities breakdown: 26/07/23	BUY	SPEC BUY	HOLD	SELL
Overall equities coverage	85%	15%	0%	0%
Companies to which VSA has supplied investment banking services	100%	100%	n/a	n/a

Recommendation and Target Price History

Valuation basis

It is not yet possible to attribute a quantitative rating for the stock.

Risks to that valuation

Commodity prices, macro risk, political risk, legislation risk, execution risk, financing risk.