# Quadrise Fuels International

Alternative energy

29 March 2022

## Progress on bioMSAR development

**Quadrise made significant advances in the development of bioMSAR, its biofuel variant of MSAR during H122. However, progress on the three key trial programmes with potential customers was slower than management had expected because of factors outside the company's control. Nevertheless, management notes that Quadrise has the cash resources to progress the ongoing trial programmes to revenue generation, which it expects will commence in calendar H222 (CY H222), subject to the successful conclusion of commercial project agreements.**

### Delays to key trial programmes

After experiencing delays to each of the three key trial programmes during H122, which are discussed in the body of this note, management now expects the potential roll-out to be as follows: 1) Quadrise and MSC Shipmanagement could potentially start on-vessel, commercial-scale trials by the end of CY22. These trials will take around nine months to complete; 2) production drilling should commence at a site in Utah this summer, potentially leading to client site trials in CY H222; and (3) an industrial-scale trial at a site of a potential Moroccan customer should commence in CY Q222 and a larger commercial-scale trial at another one of the same customer's sites later in CY 2022.

### Cash runway beyond CY H222

Quadrise is still pre-revenue. Stripping out share option and exceptional charges, operating losses were flat year-on-year during H122 at £1.4m. Free cash outflow increased by £0.1m to £1.4m. The group had £5.6m in cash and no debt or convertible securities at end H122. This represents c 23 months of costs (excluding those related to projects) at £240k/month. This gives a cash runway to progress the ongoing trial programmes into CY 2023, by which time the company could be generating revenues, subject to the timely completion of commercial project agreements.

### Valuation: Modest adoption transformational

We are not presenting forecasts at this stage. However, as a rough guide, based on data from the company, our scenario analysis calculates that even modest adoption of MSAR could generate material revenues and take the company to sustainable profitability. For example, adoption across only 9% of MSC's global fleet could generate around $80m in licence revenues and require minimal capex.

**Historical performance**

| Year end | Revenue (£m) | EBITDA (£m) | PBT (£m) | EPS (p) | DPS (p) | P/E (x) |
|---|---|---|---|---|---|---|
| 06/18 | 0.0 | (3.3) | (3.5) | (0.37) | 0.00 | N/A |
| 06/19 | 0.0 | (2.8) | (3.0) | (0.32) | 0.00 | N/A |
| 06/20 | 0.0 | (3.0) | (3.3) | (0.32) | 0.00 | N/A |
| 06/21 | 0.0 | (2.8) | (2.8) | (0.23) | 0.00 | N/A |

Source: Company accounts

| | |
|---|---|
| Price | 1.51p |
| Market cap | £21m |

**Share price graph**




**Share details**

| | |
|---|---|
| Code | QFI |
| Listing | AIM |
| Shares in issue | 1,406.9m |
| Net cash at end December 2021 | £5.6m |

**Business description**

Quadrise is the innovator, supplier and global licensor of disruptive oil technology that produces a synthetic, enhanced heavy fuel oil called MSAR and a biofuel called bioMSAR. The technology provides a low-cost and cleaner fuel for marine, power and industrial applications.

**Bull**

- Adoption of MSAR improves economics of refinery production and upstream operations.
- Adoption of MSAR improves profitability of upstream operations and reduces costs and emissions in industrial, marine bunker and power markets,
- bioMSAR gives better CO2 and cost savings than existing biofuels.

**Bear**

- Economics of adoption dependent on oil product spreads.
- Ability to progress trials adversely affected by COVID-19-related travel restrictions.
- Target markets slow to adopt new technologies.

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# Status of trial programmes

## bioMSAR – biofuel variant of MSAR

While the original MSAR is more environmentally friendly than heavy fuel oil (HFO), Quadrise went a step further with the launch of bioMSAR in December 2020. Results from tests on five tonnes of bioMSAR using a medium speed four-stroke Wärtsilä diesel engine by VTT in Finland, which were announced in August 2021, gave average $CO_2$ savings of 26% on a well-to-wake basis compared with conventional diesel. Part of the $CO_2$ reduction was attributable to an increase in engine efficiency of up to 7%. This result is better than the $CO_2$ savings achieved with existing biofuels, which are typically in the region of 10–15%. NOx emissions were lower than for HFO and comparable to diesel. Smoke and particulate levels were very low, as were unburned hydrocarbons emissions, due to efficient fuel combustion.

In January 2022, Quadrise announced that further tests carried out on an engine at Aquafuel Research that had been modified to simulate larger, high-compression engines like the low-speed two-stroke engines used in the marine sector set showed that engine efficiency can be increased by over 13% by advancing injection timing, further reducing fuel consumption and $CO_2$ emissions. Typically, higher engine efficiencies result in increased combustion temperatures and NOx emissions. However, it was possible to reduce the inlet air temperature with bioMSAR to the same level as with diesel, resulting in NOx levels around 45% lower than diesel fuel.

Quadrise plans to conduct further testing of bioMSAR with Aquafuel during calendar 2022 to fully define efficiency and emissions optimisation. Quadrise has jointly submitted an international patent application for bioMSAR with Nouryon, the supplier of surfactants used in the production process.

## Marine programme with MSC Shipmanagement

Under a joint development agreement (JDA) with Quadrise, MSC Shipmanagement is to carry out a letter of no objection (LONO) trial of MSAR on representative commercial vessels in MSC's global fleet deploying either large MAN ME and/or Wärtsilä/WinGD Flex two-stroke engines. Originally, Quadrise expected that the two parties would carry out high-level scoping and feasibility activities and define a project roadmap during H1 CY21 ahead of one or more on-vessel trials commencing in Q4 CY21. However, the shipping line is an early adopter of environmental technology and currently uses 850,000 tonnes of biofuel annually, making it one of the largest consumers of biofuel in the marine sector. Consequently, as more details of bioMSAR's performance were released, which was after the original agreement had been signed, MSC decided it wanted to fast-track Quadrise's biofuel option. This decision has contributed to delays in the preparatory phase. The preparatory phase has also been held up by lack of availability of engine manufacturer personnel to review the initial results from the bioMSAR trials because of coronavirus issues and their engagement in the testing of multiple new low-carbon fuels, of which bioMSAR is one of the options.

Quadrise continues to work with MSC to finalise the LONO programme and commercial terms for the supply of bioMSAR. Assuming that these discussions conclude successfully, Quadrise expects preparations for the LONO trial to start in CY Q222, ahead of the trial starting by end CY 2022. At the time of the FY21 results in October, management believed that the earliest the 4,000-hour LONO trial would start would be mid-CY22. Management expects that the LONO trial will take around nine months to complete. As part of the LONO preparation, Wärtsilä Switzerland has scheduled tests of MSAR and bioMSAR in its optical combustion chamber for late CY Q222 followed by testing of bioMSAR on an injector wear rig at end CY Q322. These land-based tests do not need to complete successfully before preparations for the LONO can commence.

### Converting oil from oil sands in Utah

Quadrise received crude oil samples from the Tar Sands II site in the Uinta Basin, Utah, where Greenfield Energy purchased an initial 10% stake, in August 2021. The subsequent tests confirmed that the sample could be converted to both standard MSAR and the bioMSAR variant for potential use in power and marine end-user applications domestically and internationally. Quadrise is currently working with TomCo Energy, which is the parent company of Greenfield Energy and with energy services company Valkor Technologies, which is a stakeholder in TomCo, to secure commercial opportunities for MSAR and bioMSAR in Utah. In February, TomCo announced that Greenfield had received the permits required to enable it to start drilling three exploratory wells in March.

In addition, Valkor is currently working with one of its clients elsewhere in the Uinta Basin which has started exploration drilling at its site and expects to start production drilling there this summer, assuming that it receives the necessary permits. This would result in oil being available for on-site trials converting oil to bioMSAR and MSAR during CY H222, potentially resulting in commercial sales by the end of calendar 2022, subject to commercial agreement. These timescales are similar to those given by Quadrise last October. Quadrise is confident that it will be able to convert oil from this alternative site to bioMSAR and MSAR because it is located close to the Tar Sands II site and the oil extracted will be from wells and therefore have much less sand in it.

### Industrial applications with partner in Morocco

Quadrise continues to work with an international chemicals and mining group headquartered in Morocco, which is considering using MSAR as a substitute for HFO in some of its kilns. Quadrise had hoped to conduct a pilot trial at one of its partner's sites (site A) in Morocco in March 2020, but COVID-19 restrictions meant that Quadrise's personnel were not able to gain access to the site and successfully complete the trial until October 2020. An industrial-scale trial at a different site (site B) owned by the same partner has been delayed from early CY Q121 because of a combination of site access restrictions and a recent internal management reorganisation at the client. The new client team has yet to sign an updated agreement, pushing back the industrial-scale trial from CY Q122, as per Quadrise's expectations in October, to CY Q222. Once the site B trial has completed, Quadrise intends to deliver the results and a feasibility study for MSAR use at site A to the client, so the commercial-scale trial at site A has been delayed from CY Q122/Q222 as anticipated last October to later in CY 2022, depending on the client's maintenance programme. Assuming the trials complete successfully, management intends to conclude a commercial supply agreement covering one or more of the client's sites in Morocco during H222, potentially leading to commercial deliveries by the end of calendar 2022.

## Management changes

Executive chairman Michael Kirk retired at the group's AGM in November 2021 and non-executive director Laurie Mutch became interim chairman while the group looked for Michael's successor. On 1 February 2022, Andy Morrison became non-executive chairman. Andy began his career at Royal Dutch Shell, where he spent 17 years in its oil products (including bunker fuel), lubricants and speciality chemicals divisions. His roles there included VP positions in sales, marketing, trading and strategy, spanning several continents. After leaving Shell, Andy held senior positions at BG Group and BOC Group in corporate strategy and new business development respectively. Since 2007 Andy has been involved with a number of junior listed companies including roles as chief executive officer of Xtract Energy and Silvermere Energy and non-executive director of Kanabo Group and Ondo InsurTech.

Following the resignation of former COO Mark Whittle in July 2021, Phil Hill was appointed to the post, which is not a board position, in January 2022. Philip is a chartered chemical engineer with

more than 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.

## Valuation: Modest adoption transformational

Since Quadrise has yet to generate commercial revenues, its value resides in the potential future cash flows generated from volume production of MSAR and bioMSAR. As there is substantial uncertainty on when the various projects Quadrise is working on with its partners will progress to commercialisation, precluding the preparation of estimates, we presented a high-level scenario analysis in our November note based on data from the company, which we understand is derived from the numerous detailed case studies it has carried out for prospective clients. The analysis concluded that adoption across only 9% of MSC's global fleet could generate around $84m in licence revenues and $13.8m in EBITDA and be transformational for Quadrise. The other two projects closest to commercialisation are smaller.

**Exhibit 1: Financial summary**

| £000s | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|
| 30-June | IFRS | IFRS | IFRS | IFRS |
| **INCOME STATEMENT** | | | | |
| Revenue | 9 | 22 | 0 | 17 |
| EBITDA | (3,284) | (2,780) | (3,006) | (2,752) |
| Operating Profit (before amort. and except.) | (3,514) | (3,010) | (3,178) | (2,887) |
| Amortisation of acquired intangibles | 0 | 0 | 0 | 0 |
| Exceptionals | 0 | 0 | (1,199) | (1,266) |
| Share-based payments | (53) | (154) | (474) | (303) |
| Reported operating profit | (3,567) | (3,164) | (4,851) | (4,456) |
| Net Interest | 11 | (3) | (139) | 46 |
| Profit Before Tax (norm) | (3,503) | (3,013) | (3,317) | (2,841) |
| Profit Before Tax (reported) | (3,556) | (3,167) | (4,990) | (4,410) |
| Reported tax | 294 | 184 | 147 | 150 |
| Profit After Tax (norm) | (3,209) | (2,829) | (3,170) | (2,691) |
| Profit After Tax (reported) | (3,262) | (2,983) | (4,843) | (4,260) |
| Minority interests | 0 | 0 | 0 | 0 |
| Net income (normalised) | (3,209) | (2,829) | (3,170) | (2,691) |
| Net income (reported) | (3,262) | (2,983) | (4,843) | (4,260) |
| Average Number of Shares Outstanding (m) | 862.2 | 888.7 | 982.8 | 1,175.4 |
| EPS - normalised (p) | (0.37) | (0.32) | (0.32) | (0.23) |
| EPS - diluted normalised (c) | (0.37) | (0.32) | (0.32) | (0.23) |
| EPS - basic reported (c) | (0.38) | (0.34) | (0.49) | (0.36) |
| Dividend per share (p) | 0.00 | 0.00 | 0.00 | 0.00 |
| **BALANCE SHEET** | | | | |
| Fixed Assets | 3,885 | 3,654 | 3,506 | 3,384 |
| Intangible Assets | 2,924 | 2,924 | 2,924 | 2,924 |
| Tangible Assets | 961 | 730 | 582 | 460 |
| Current Assets | 2,600 | 1,396 | 2,766 | 7,279 |
| Stocks | 61 | 61 | 61 | 61 |
| Debtors | 188 | 169 | 213 | 117 |
| Cash & cash equivalents | 2,229 | 1,060 | 2,380 | 7,006 |
| Other | 122 | 106 | 112 | 95 |
| Current Liabilities | (400) | (288) | (2,243) | (276) |
| Creditors | (400) | (288) | (198) | (276) |
| Tax and social security | 0 | 0 | 0 | 0 |
| Short term borrowings | 0 | 0 | 0 | 0 |
| Convertible securities | 0 | 0 | (2,045) | 0 |
| Long Term Liabilities | 0 | 0 | 0 | 0 |
| Long term borrowings | 0 | 0 | 0 | 0 |
| Other long-term liabilities | 0 | 0 | 0 | 0 |
| Net Assets | 6,085 | 4,762 | 4,029 | 10,387 |
| Minority interests | 0 | 0 | 0 | 0 |
| Shareholders' equity | 6,085 | 4,762 | 4,029 | 10,387 |
| **CASH FLOW** | | | | |
| Op Cash Flow before WC and tax | (3,284) | (2,780) | (3,072) | (2,752) |
| Working capital | 298 | (77) | (140) | 191 |
| Exceptional & other | 0 | 130 | 65 | 7 |
| Tax | 294 | 184 | 147 | 150 |
| Net operating cash flow | (2,692) | (2,543) | (3,000) | (2,404) |
| Capex | (135) | (24) | (24) | (29) |
| Acquisitions/disposals | 0 | 0 | 0 | 0 |
| Net interest | 11 | (3) | 1 | 46 |
| Equity financing | 0 | 1,401 | 2,343 | 6,513 |
| Dividends | 0 | 0 | 0 | 0 |
| Net Cash Flow | (2,816) | (1,169) | (680) | 4,126 |
| Opening net debt/(cash) | (5,045) | (2,229) | (1,060) | (2,380) |
| FX | 0 | 0 | 0 | 0 |
| Other non-cash movements | 0 | 0 | 2,000 | 500 |
| Closing net debt/(cash) | (2,229) | (1,060) | (2,380) | (7,006) |

Source: Company accounts

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