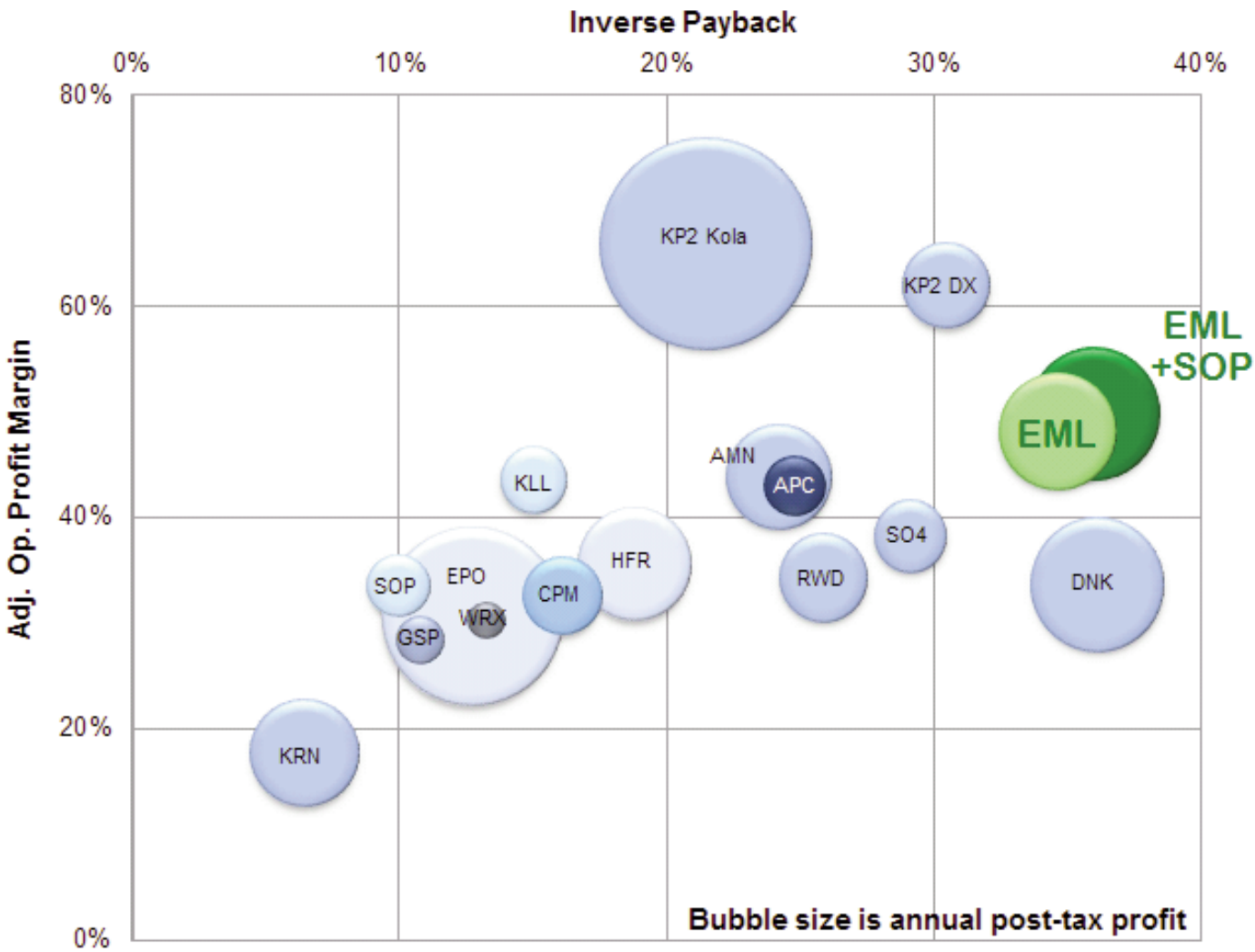
Equities Research
**September 2020**

# Emmerson plc

## Best of both MOP and SOP worlds

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**House Stock**
**Current price 4.1p**
**Mining**

# Emmerson plc+

## Best of both MOP and SOP worlds

| | |
|---|---|
| FTSE - No Index | |
| Reuters/Bloomberg | EML |
| Shares in Issue (m) | 726.6 |
| Market Cap (£m) | 29.8 |
| Net cash (£m) | 2.1 |
| Enterprise Value (£m) | 27.7 |
| Website | www.emmersonplc.com |

| | |
|---|---|
| Next update | |
| ESIA Submission | Early Q4 2020 |



**We are initiating coverage of Emmerson Plc, which recently completed a Feasibility Study (FS) on its very appealing, wholly-owned Khemisset MOP (Muriate of Potash) project in Morocco. Emmerson also has the potential to become a major producer of SOP (Sulphate of Potash), which we believe could make it a strategically attractive acquisition target. In our view, Emmerson is a standout pick in the junior potash space (whether MOP or SOP): infrastructure, logistics, geotechnical and byproduct advantages result in bottom-quartile delivered costs; capex would also be bottom quartile; and Morocco's fiscal terms are generous (low tax, negligible royalties, no free-carried interest for the government). A comparison with peer MOP and SOP developers serves to illustrate just how attractive Emmerson is as an investment proposition or acquisition target: it boasts the second-highest margin and second-fastest payback (post-tax basis, with or without SOP). We estimate a Risked NPV of 7.0p/share fully diluted (FD) post construction financing.**

**Valuation significantly higher than current share price:** Our base-case post-tax FY2021F valuation for Emmerson is £662m or 13.9p/share FD, predicated on the company successfully achieving financial close during H2 2021. We derive a Risked NPV of 7.0p/share by applying a 40% discount to our rounded valuation.

**Sensitivities suggest ample upside and relatively limited downside:** Our sensitivity analyses suggest ample upside to our base-case valuation, whereas downside risk is relatively limited. For example, the combination of NPV uplift over time and a reduction in discount rate to 5% yields a FY2026F value of 22.8p/share. Meanwhile, a worst-case scenario combining a potash price of US$230/t plus capex and opex 20% above our base case still yields 5.6p/share.

**Shares should be c.3-6x higher:** Our valuation is conservative in that we have assumed that debt only comprises c.55% of Emmerson's funding package, with a further US$195m of 'other' funding modelled entirely as equity – which is typically the most 'expensive' form of finance. Furthermore, we used the downwards-rounded current share price as the assumed issue price. We expect that the actual price will be significantly higher for various reasons, e.g.: MOP prices should be considerably stronger by the time; Emmerson's shares should be trading c.3-6x higher given the EVs of peers currently raising construction funds; and we envisage equity being raised as the last piece of the financing 'jigsaw', giving equity investors clarity and confidence in their investment. If the actual equity requirement was US$150m and raised at 8p/share (for example), our valuation would be c.82% higher at 26.7p/share.

### Results and Forecasts

| Year to December | Revenue (£m) | EBITDA (£m) | Adj PBT (£m) | Adj EPS (p) | Net Cash (£m) | PER (x) | EV/EBITDA (x) | FCF Yield (%) | DPS (p) | Div Yield (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2019A | 0.0 | (1.1) | (1.1) | (0.2) | 2.1 | n/a | n/a | n/a | 0.0 | n/a |
| 2020F | 0.0 | (1.0) | (1.0) | (0.1) | 8.3 | n/a | n/a | n/a | 0.0 | n/a |
| 2021F | 0.0 | (1.1) | (1.0) | (0.0) | 188.7 | n/a | n/a | n/a | 0.0 | n/a |
| 2022F | 0.0 | (1.1) | (0.6) | (0.0) | 104.5 | n/a | n/a | n/a | 0.0 | n/a |

Source: Company Data; Shore Capital Markets

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# Strong investment case

Comparison with peers illustrates Emmerson's attractiveness

A comparison of Emmerson with listed peer MOP and SOP developers illustrates just how compelling Emmerson's investment case is, in our view. On a post-tax basis, Emmerson generates the second-highest margin (bettered only by Kore Potash), resulting in the second-fastest payback (with Danakali only slightly ahead).

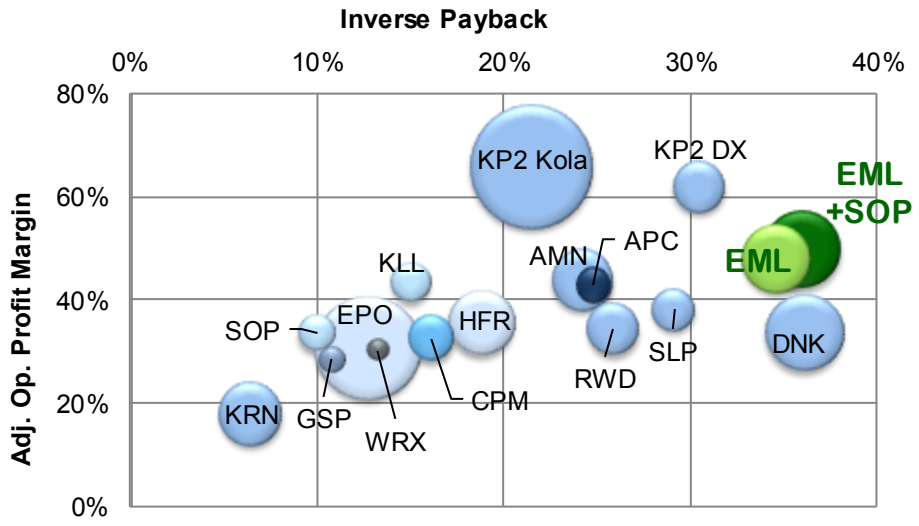
## Shines on key metrics versus developer peers

To facilitate comparability of margins and payback, we use standard MOP and SOP prices to calculate profits, margins and capital efficiency on a standardised basis

To facilitate comparability, we use the following standardised FOB prices: MOP of US$290/t, SOP of US$525/t and salt of US$50/t.

- Taking operating cost from companies' latest studies (standardised by including site G&A but excluding contingencies and sustaining capital), the resulting profit is multiplied by full production volume to yield an 'annual pre-tax operating profit'.
- Income taxes and royalties are then applied to derive 'post-tax adjusted operating profit' and associated margin.
- To reflect capital efficiency, we divide the total capital investment necessary to obtain maximum production (excluding contingencies) by post-tax profit.

**Figure 1: Khemisset compares very well against peer projects[1,2,3,4,5,6]**




[1] For the purposes of this exercise, we consider only listed developers that have completed at least a scoping study, and within the past five years.
[2] Market cap and EV priced as at 21st September 2020.
[3] Production, LOM (life of mine), capex and opex reflect companies' last published studies or study updates. Where there is more than one scenario, we opt for the 'maximum production' case, except for Gensource (first 'module' modelled), Kalium Lakes (164ktpa BFS 'base case' assumed to be 'maximum' case) and Western Resources (Phase I modelled, as FS for 'full' project was completed in 2013). Capex is that required to achieve maximum production; it excludes contingencies and sustaining capex. FOB opex includes site G&A and transport costs, but excludes royalties and depreciation. We infer Kalium Lakes' real transport cost from nominal proportions. SOPerior's updated PFS assumed a sulphuric acid price of US$115 per short ton FOB Rail at Plant – we have adjusted this to US$75/ton FOB Rail at Plant to reflect our expectations of Gulf CFR prices and acid offtakers' transport costs.
[4] Where necessary, we convert short tons to long tonnes; and A$, C$, €, £ figures to US$ at US$0.725/A$1, US$0.75/C$1, US$1.18/€1 and US$1.30/£1, respectively.
[5] Bubble size is annual post-tax profit.
[6] For Emmerson, we model a 20% corporate tax rate, pro-rated downwards for a five-year tax holiday. With Australian projects, we assume State and Native Title royalties of 2.5% and 1.0% of gross revenues, respectively. In CPM's case, we use the effective royalty rate as calculated by the company's Feasibility Study (FS). For Kore, we assume tax and royalties as per its Mining Convention of June 2017. Potash taxation in Saskatchewan is complex – we model total income taxes of 27%, government royalties of 6%, a 35% profit tax and an average base payment of C$11.665/t (with a 10-year holiday).

Source: Bloomberg; Company Data; Shore Capital Markets

Khemisset boasts the second-highest margin and second-fastest payback, with or without SOP production

We find that, on a post-tax basis:

- If some of Khemisset's MOP output is converted into SOP at a facility located in the port of Jorf Lasfar (with MOP supplied by Khemisset at cost), Emmerson would boast the second-highest margin, bettered only by Kore Potash.
- Emmerson would also enjoy the second-fastest payback of its peers, with Danakali only slightly ahead.

The above remain true even if Emmerson foregoes SOP production.

## Caution: many popular comparables are likely to mislead

For comparables assessments to be meaningful, appropriate metrics should be chosen

Comparables are an ever-popular tool for assessing resource companies. However, we stress that for any assessments to be meaningful, careful thought is required to select appropriate metrics. Many popular comparables, including some that are practically 'bread-and-butter' in the potash sector and in mining more generally, are likely to yield misleading results and should therefore be eschewed.

Conventional wisdom has it that 'grade is king'…

Take resource size and related measures (e.g. EV/t), for example. These are widely acknowledged to fail to take grades into account, whereas conventional wisdom has it that 'grade is king'. Grade comparisons are accordingly very popular.

…but grade can be very misleading when evaluating potash projects

Nevertheless, as we explain in more detail below, in evaluating potash projects, grade can be misleading as an indicator (particularly when considered in isolation). A lower-grade orebody can boast superior economics relative to an apparently higher-grade body due to a variety of other factors. Grade also doesn't account for MOP and SOP having very different prices. Prices and other assumptions also stymie comparisons of key outputs from companies' feasibility studies such as NPV, IRR and NPV:capex.

For reasons of space and time, we do not discuss the shortcomings of other comparables, trusting that readers will be able to work these out for themselves.

### Location and favourable geology offset lower grade

Khemisset's lower grade and resulting higher minegate costs are more than offset by a multitude of other advantages

In terms of grade, Khemisset is indisputably on the lower side, resulting in higher minegate costs. However, these apparent disadvantages are more than offset by a multitude of other advantages:

- All the requisite infrastructure for a potash project is not only already in place but of high quality, e.g. electricity and transport. For potash projects in remote locations, transport and power often represent a significant chunk of opex. Labour costs should be significantly lower than in countries such as Australia and Canada.
- The orebody at Khemisset is relatively shallow, with no major overlying aquifers. Depth and (potential) water inflows are often major causes for concern at other potash projects.
- The infrastructure advantages and favourable geological properties make for bottom-quartile capital intensity. Combined with Khemisset's relatively modest size, absolute capex is relatively low. We believe that these attributes will enhance fundability.

- Another major advantage stemming from Khemisset's eminently strategic location is relatively low logistics costs, resulting in competitive delivered costs to a choice of key markets. We see this as offering the possibility of Emmerson preferentially directing sales to markets with the highest 'netbacks' (the residual value to Emmerson after deducting shipping costs).
- Further cementing Emmerson's competitiveness will be byproduct credits from sales of de-icing salt. Our base case assumes 1Mtpa of de-icing salt sales, but we believe there to be the potential for multiples of this. Salt sales also have the benefit of reducing tailings costs.
- There is good potential to enhance value further via the conversion of some MOP production into much higher-priced SOP (or, alternatively, SOP sales could be viewed as additional byproduct credits towards MOP production costs). A SOP production facility located at Jorf Lasfar would enjoy various location-related benefits that would translate into significant sustainable competitive advantages, we believe.
- Last but not least, Emmerson will benefit from favourable fiscal terms in Morocco. For example, a reduced corporate income tax (CIT) rate of 20% is provided for exported products (including local sales that are ultimately exported; otherwise, 35%), new mines enjoy a five-year tax holiday from first production, mining royalties are negligible (just 1-3 dirham or US$0.11-0.33 per tonne of extracted product leaving the mine – i.e. royalties would not be payable on Emmerson's SOP production) and there is no requirement for the government to be provided with a free-carried interest. In contrast, some jurisdictions subject potash projects to very onerous fiscal terms, e.g. Canadian potash mines have to pay a number of Federal and State taxes and royalties; Eritrea has a 38% CIT rate with no tax holidays; Western Australia has not yet determined what royalty rate will be payable by SOP producers, but we expect that it will be 2.5-5.0%, and additional royalties are often payable to holders of Native Title (we believe that c.1% of gross revenues or c.1.25% ex-works would be typical).

## Enviable existing high-quality infrastructure

Khemisset benefits from an impressive endowment of existing high-quality infrastructure proximal to the project site, e.g. modern highways, a fully equipped export port, electricity and dam-regulated water

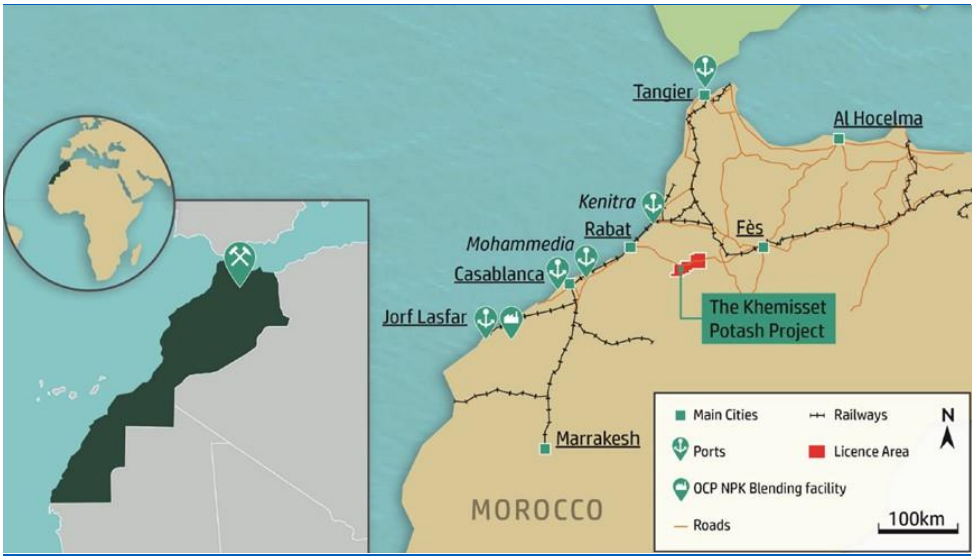
Khemisset stands to benefit from an impressive endowment of existing high-quality infrastructure proximal to the project site. For example:

- Modern highways connect Khemisset to a number of nearby ports (c.150-300km driving distance).
- Emmerson's port of choice, Casablanca (c.190km distance) already possesses an ore terminal with sufficient spare capacity and all the requisite equipment, so no port capex will be required.
- Electricity will be sourced from a 225kV national grid line, with the connection point just c.15km from the project site. Furthermore, Emmerson is likely to enjoy electricity tariff savings by entering into a contract directly with a third-party renewables provider which would supply electricity through the national grid infrastructure. According to Emmerson, this is a relatively common practice for industrial operations in Morocco, a result of the country's investment-friendly legislation.
- Dam-regulated water will be obtained from a river that conveniently flows beside the project site.

Peer projects are often in remote locations lacking in existing infrastructure, with long overland distances to port

In contrast, peer potash projects are often in remote locations lacking in existing transport, power and/or other infrastructure, requiring significant capital investments. Product often has to be transported over very long distances to port (e.g. c.1,700-2,000km by rail from the mines in Saskatchewan to Vancouver), with the cost of doing so sometimes representing as much as a third to half of FOB opex.

**Figure 2: Khemisset's location is eminently strategic relative to infrastructure and export ports**



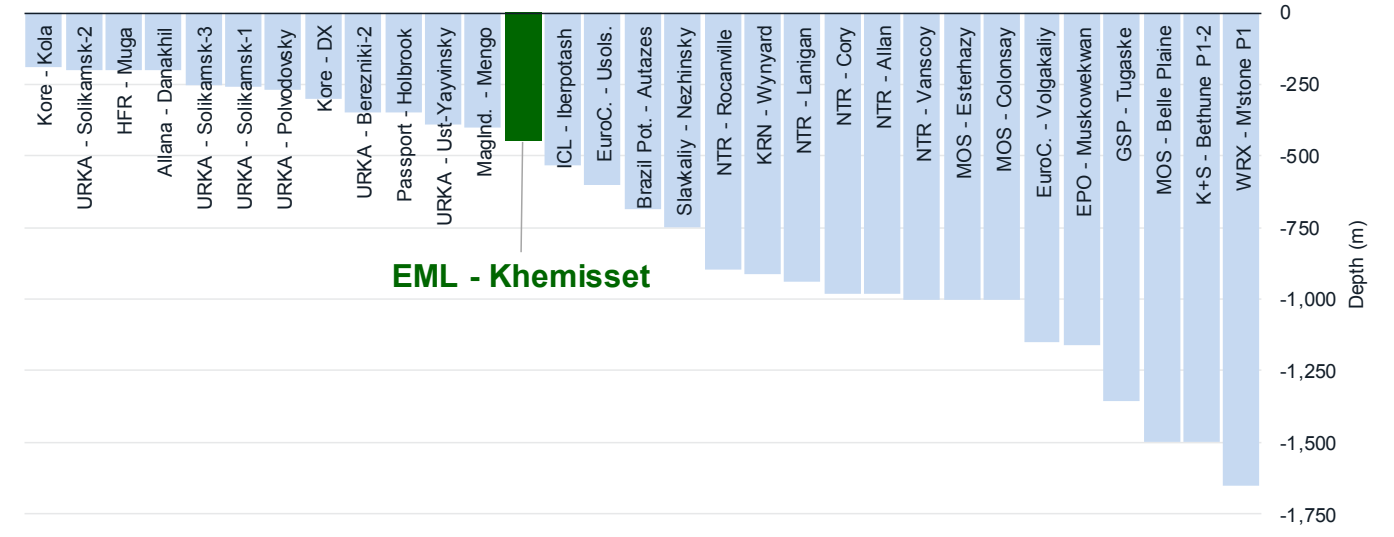

Source: Company

## Favourable geological attributes

Technical risk is much lower than typical due to relatively shallow depth with no major aquifers

Technical difficulties/risk in construction and production should be much lower at Khemisset, as the shallowest part of the orebody sits just c.450m below surface, with no major overlying aquifers.

**Figure 3: The shallowest part of the Khemisset orebody sits just c.450m below surface**




Source: Company Data; Shore Capital Markets

Potash deposits elsewhere are often significantly deeper, and with major overlying problems; managing such aquifers can be problematic, expensive and time-consuming

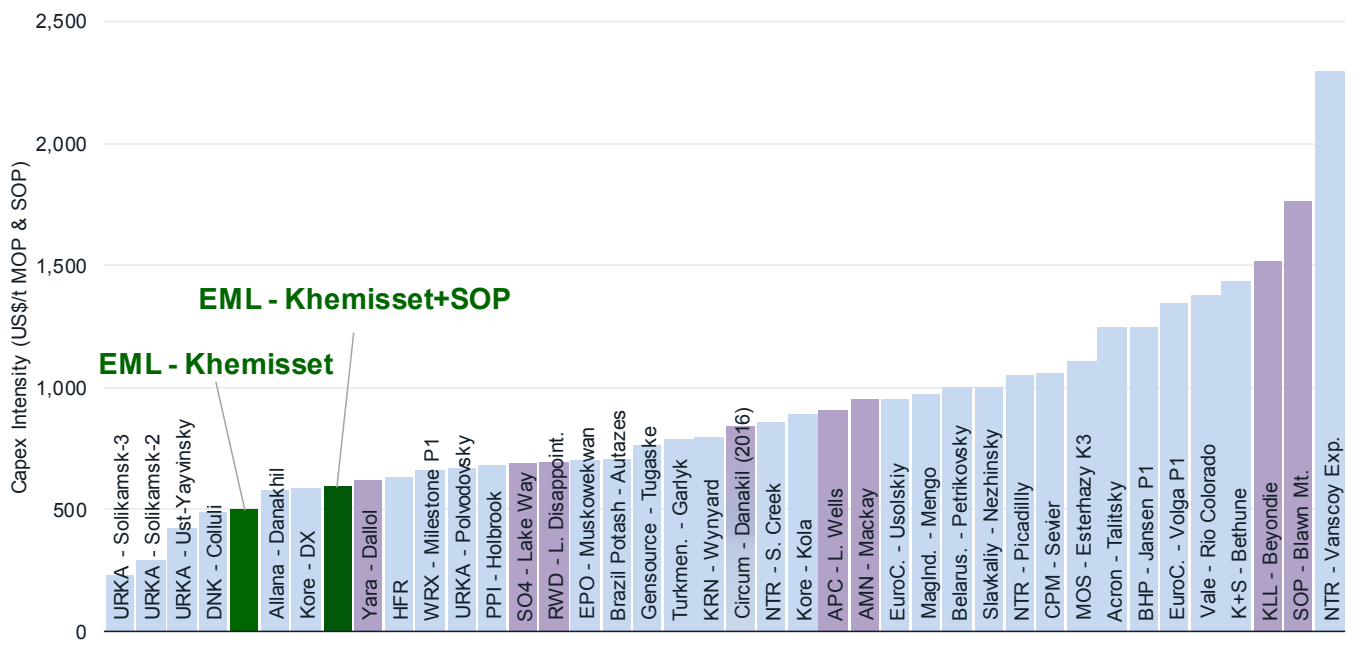
In contrast, hard-rock potash deposits elsewhere are often significantly deeper (e.g. Canadian deposits typically start at c.1,000m or deeper) with major overlying aquifers. Managing inflows from aquifers can add significantly to opex; worse yet, water inrush has led to considerable delays and massive cost overruns during shaft sinking and/or significantly increased mine operating costs. Entire mines in Canada, Russia and the Republic of Congo have had to be abandoned as a result of flooding.

## Bottom-quartile capex intensity; relatively low capex should aid fundability

Khemisset should enjoy bottom-quartile capex intensity; combined with relatively low absolute capex, this should make it easier to fund

As a result of the aforementioned advantages, we are expecting Khemisset to rank in the bottom quartile for capital intensity, despite being on the smaller side for a MOP project (c.735ktpa MOP; larger projects can weigh in at 2-4Mtpa or more). The combination of low capex intensity and smaller scale results in a relatively low absolute capex bill that we believe should be easier to fund.

**Figure 4: Emmerson will enjoy bottom-quartile capital intensity (MOP = blue; SOP = purple)**




Source: Company Data; Shore Capital Markets

## Strategic location = competitive delivered costs to choice of key markets

Emmerson should enjoy very competitive logistics costs to key Atlantic Corridor markets

Shipping from Morocco, Emmerson should enjoy very competitive logistics costs to key Atlantic Corridor markets, e.g. Brazil, Northwest Europe and the USA (not to mention the growing domestic Moroccan and other African markets).

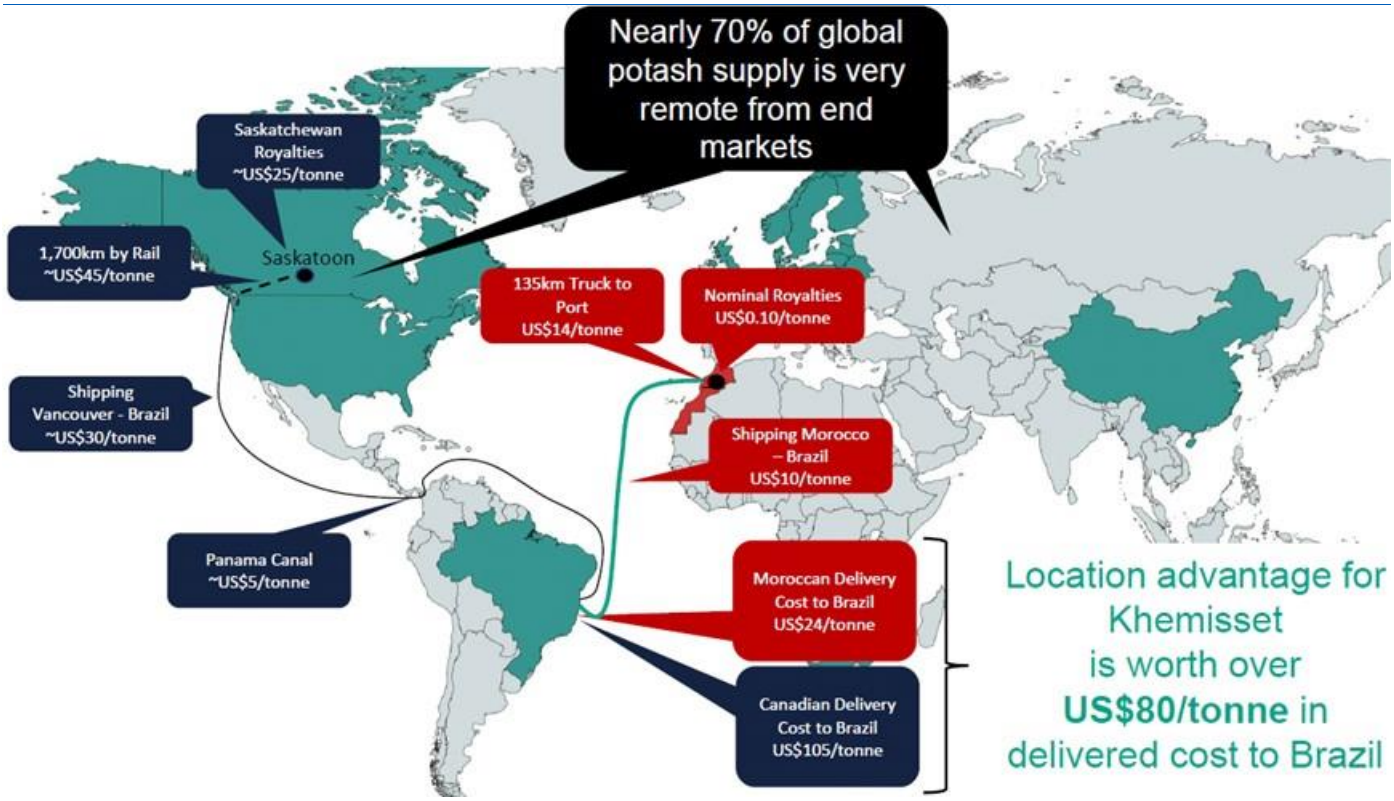
Due to its eminently strategic location (and byproduct credits), Khemisset should enjoy lowest-quartile delivered costs to these markets

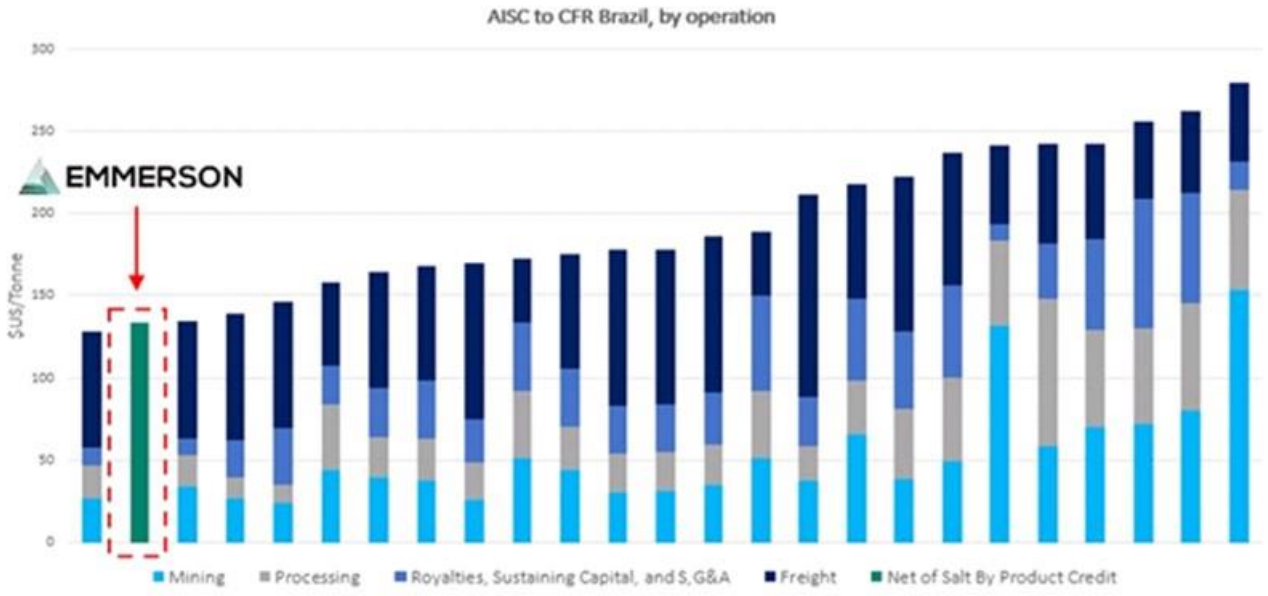
Due to its eminently strategic location (and byproduct credits, see below), Khemisset should enjoy lowest-quartile delivered costs to these markets. For example, Emmerson has estimated its shipping advantage to Brazil relative Saskatchewan potash mines at over US$80/t MOP.

- Shipping from Casablanca to Brazil represents a distance of c.6,300km, a trip that takes around 10 days.

- For comparison, Vancouver to Brazil is c.14,000km, requires transit through the Panama Canal (which limits maximum shipment size) and takes three to four weeks.

**Figure 5: Emmerson's logistics advantages should result in competitive delivered costs to key markets such as Brazil**




Source: Company Data

Emmerson's logistics advantage would be most pronounced in the fast-growing Moroccan market

Naturally, Emmerson's logistical advantages would be most pronounced within Morocco itself. Fortuitously, the country happens to be one of the fastest-growing markets for potash, with 2018's import volume of 748kt representing a CAGR of c.120% since 2012.

Value can potentially be maximised by preferentially directing sales to markets which offer the highest netbacks

It needs to be understood that MOP and SOP prices and freight costs can vary significantly between markets due to local demand-supply factors. Boasting lowest-quartile delivered costs to a number of key markets is advantageous in that it suggests to us the possibility (offtake agreements allowing) of Emmerson maximising value by preferentially directing sales to markets which afford the highest netbacks.

## De-icing salt and SOP sales add significant economic value

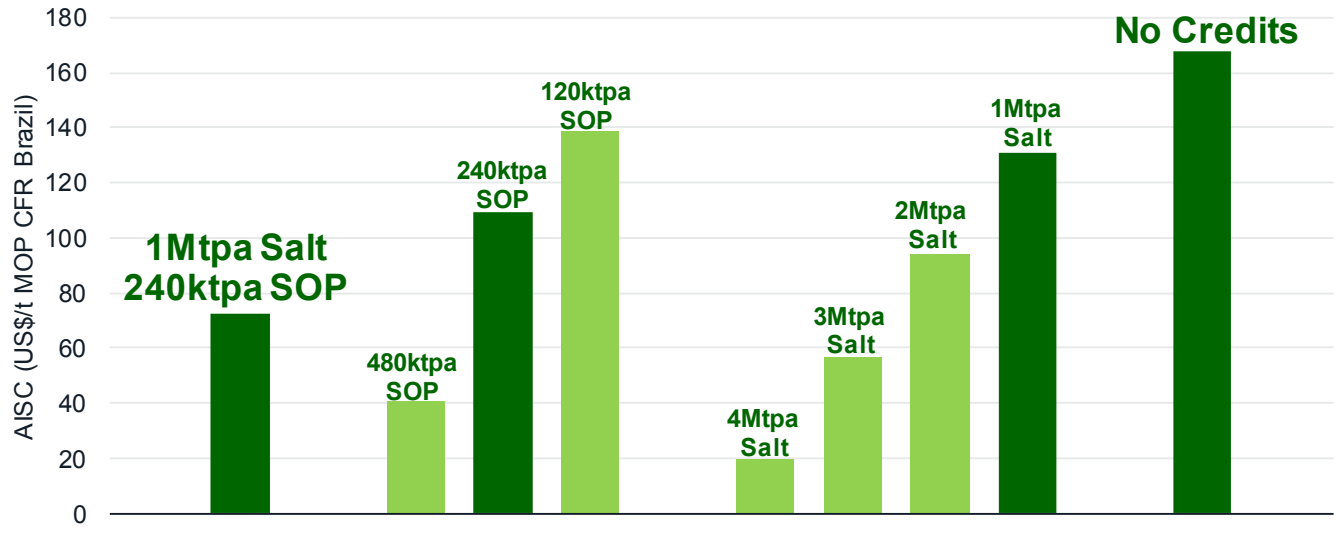
There is potential upside if higher-than-envisaged de-icing salt sales volumes can be realised

The FS envisaged the sale of 1Mtpa of de-icing salt – whereas Khemisset would actually produce c.4.5Mtpa of salt, implying the potential for upside if higher sales volumes can be realised.

The credits from 1Mtpa of de-icing salt sales would be sufficient to secure Emmerson a place in the lowest quartile of the delivered cost curve

The credits from such sales would effectively serve to reduce MOP production costs. Importantly, the credits from 1Mtpa of de-icing salt sales would be sufficient to secure for Emmerson a place in the lowest quartile of the delivered cost curve (2Mtpa would see Emmerson easily be THE lowest-cost producer) – which would be of particular benefit in ensuring survival through any prolonged periods of exceptionally low MOP prices.

**Figure 6: Salt and SOP[1] credits could significantly enhance the cost competitiveness[2] of Emmerson's MOP (dark green = base case)**




[1]The scenario depicted here assumes Khemisset supplies MOP to the SOP facility at Jorf Lasfar on an arm's length basis (i.e. at 'market price').
[2]Depicted here on an All-In Sustaining Cost (AISC) basis.

Source: Shore Capital Markets

The production and sale of SOP would similarly benefit Emmerson's MOP production costs; alternatively, Emmerson could be considered a SOP producer with MOP credits

The production and sale of SOP would similarly benefit Emmerson's MOP production costs. Alternatively, Emmerson could be considered a SOP producer, with MOP treated as a credit.

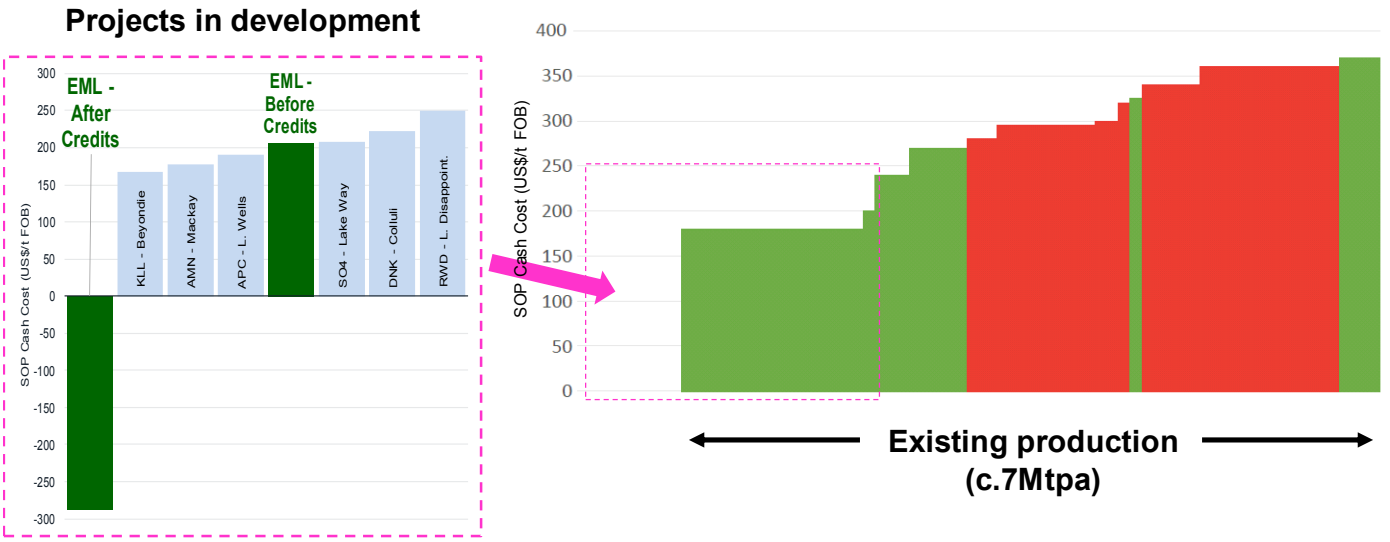
- SOP production at a facility using Mannheim technology located at the port of Jorf Lasfar would benefit from numerous important sustainable competitive advantages. These include availability of sulphuric acid and, very importantly, several monetisation options for what would otherwise be waste hydrochloric acid (the safe and cost-effective disposal of which is often the key factor limiting Mannheim SOP production).

- MOP is a key input in the Mannheim process and, assuming supply from Khemisset at cost, Emmerson's SOP production would benefit from having a nearby secure source at reasonably stable, low prices. In contrast, existing Mannheim SOP producers are not vertically integrated and their input costs can therefore vary significantly with the price of MOP.

SOP production costs would be bottom quartile – and negative after credits

Indeed, if MOP is supplied by Khemisset at cost, then we expect Emmerson's SOP production cost to be in the bottom quartile – with negative costs after 'byproduct' credits from the sale of the balance of Khemisset's MOP output.

**Figure 7: Emmerson's SOP production would be bottom quartile[1]; Mannheim production (red) is more typically high cost[1,2]**




[1] This scenario assumes that Khemisset supplies MOP to the SOP facility at cost.

[2] LHS widths are not to scale; pink outline on RHS is intended to be conceptually illustrative and is not to scale.

Source: Company Data; Shore Capital Markets

## Fiscally favourable

The government of Morocco is supportive of mining; corporate tax and royalty rates are attractive, and Khemisset will benefit from an income tax holiday

Already a major producer of phosphate and oil, Morocco benefits from a stable government that is supportive of mining investments. For example, a reduced CIT rate of 20% is provided for exported products (including local sales that are ultimately exported; otherwise, 35%), new mines enjoy a five-year tax holiday from production commencement and mining royalties are negligible at just 1-3 dirham (US$0.11-0.33) per tonne of extracted product leaving the mine (i.e. royalties would not be incurred on Emmerson's SOP production). In addition, Emmerson will not be required to provide the government with a free-carried interest in Khemisset since the project was not secured under a joint venture or acquisition agreement with a government body.

The Moroccan government has indicated that cash subsidies and further tax concessions could be made available

In December 2019, Emmerson reported that initial discussions with the Moroccan government indicated that direct cash subsidies and further tax concessions could be available (via negotiation) for Khemisset under a formal investment convention. The Moroccan government could potentially:

- Fund up to 10% of Khemisset's total capex in the form of direct cash subsidies, including: up to 5% of external infrastructure investment (e.g. power connection, road access, water intake, used water treatment, port upgrades); up to 20% of land acquisition costs; and up to 20% of approved employee training costs.
- Provide additional tax concessions, including a three-year VAT exemption on equipment and plant purchases, and exemption from import tax duties on plant, equipment and mining machinery.

In addition, Emmerson also expects to benefit from invaluable formal support from government agencies in all project implementation processes.

## Strategically attractive partner/target

FS completion has served as a catalyst for more-involved discussions with potential financiers and partners

According to Emmerson, completion of the FS has served as a catalyst for more-involved discussions with potential financiers (e.g. banks, debt funds, and 'alternative' financing partners such as royalty and private equity groups) and strategic partners, which include fertiliser companies.

We believe that Emmerson represents an attractive partner or acquisition target

Shore Capital believes that Emmerson represents an attractive partner or acquisition target, not only for fertiliser producers/distributors but also for diversified miners looking to establish a presence in the potash space. Indeed, in September 2020, Emmerson noted that its independence as a supplier – with offtake as yet uncommitted – in an oligopolistic market is proving to be "a major attraction" to potential partners.

### OCP elephant to significantly increase potash consumption

OCP Group is the obvious candidate as a strategic partner or acquirer

Moroccan fertiliser parastatal OCP Group is the obvious candidate as a strategic/offtake partner or acquirer for Emmerson. A vertically integrated producer of NPK fertilisers, OCP effectively controls Morocco's phosphate resources – which represent c.75% of the world's reserves.

It currently sources MOP and SOP on the markets

We understand that OCP is aiming to triple its NPK fertiliser production capacity by 2027. To this end, it has already secured the requisite supplies of two of the three major NPK components: phosphate (P) from its own operations, and nitrogen (N) guaranteed via a deal with Abu Dhabi. For potassium (K), however, MOP and SOP currently have to be sourced on the markets (typically from Arab Potash and ICL, but also from as far afield as Belarus, Russia and Canada), and meeting its expansion target would see OCP quadrupling its potash consumption to c.2Mtpa (from the current c.0.5Mtpa).

OCP has acquired tenements in the Khemisset Basin in the hope of producing its own MOP

With the aim of producing at least some of its own potash in-house, OCP acquired certain tenements in the Khemisset Basin amidst those of Emmerson's. However, we understand that Emmerson's database of historical drilling results indicates that the bulk of potash mineralisation on OCP's tenements is comprised of carnallite (which is less desirable from mining and processing viewpoints), generally with lower $K_2O$ grades.

We are doubtful that a standalone MOP mine on OCP's tenements will be economically viable; instead, we believe OCP should strike a deal with Emmerson – we see two cooperative 'win win' possibilities

We are therefore doubtful that a standalone MOP mine on OCP's tenements will be economically viable. Instead, it would seem to us to make eminent sense that OCP should look to strike a deal with Emmerson. We see two cooperative 'win win' possibilities:

- A single operation designed to optimally exploit OCP's and Emmerson's tenements would likely enjoy an economic value that is greater than the sum of two standalone operations, we believe.
- Alternatively, OCP could simply strike an offtake agreement with Emmerson, with the two parties splitting the savings in shipping costs. Such a deal would secure a significant proportion of OCP's potash requirements while reducing its procurement costs. In addition, there would be no need for OCP to fund the construction of a potash operation. Meanwhile, Emmerson would enjoy an enhanced netback – and we understand that, under Moroccan law, importantly, Emmerson will still benefit from the 20% CIT rate incentive on any sales to OCP (as the transformed products would ultimately be exported).

Less palatable, from our point of view, is OCP acquiring Emmerson, at least at or near the current market cap

A third option is rather less palatable, from our point of view: that of OCP acquiring Emmerson and/or Khemisset. Emmerson's market cap is currently quite low relative to Khemisset's potential value, so barring a significant rally in Emmerson's shares (and/or a very hefty premium), we perceive an acquisitive transaction as being of rather more benefit to OCP than to Emmerson's shareholders.

### Fertiliser firms

Emmerson could prove an attractive target for multinational fertiliser companies, especially those seeking to establish or increase their presence in SOP

Emmerson could also prove an attractive target for multinational fertiliser companies, we believe, particularly those seeking to establish or increase their presence in low-chloride or 'speciality' fertilisers. We see ICL and Yara International as the most likely suitors, with K+S poised to become another candidate once its current financial tightness has been resolved.

- **ICL:** ICL walked away from its Allana Afar project in Ethiopia in 2016 and the Boulby mine stopped producing MOP in 2018 due to depletion of its sylvinite resources. Most importantly, the risk remains that ICL could lose its flagship Dead Sea concession in 2030, albeit this risk has recently reduced with the new management regime appearing to have managed to improve relations with the government of Israel. Speaking of which, in relation to Emmerson, we note that Morocco is thought to be about to normalise diplomatic relations with Israel, following in the footsteps of Egypt and Jordan. While Morocco and Israel already have trade and tourism ties, the formal establishment of diplomatic relations can only be helpful.
- **Yara:** Despite being a major producer of potash-based NPK fertilisers, Yara does not actually own any operating potash mines and hence is one of the largest buyers of potash. In 2012, to secure its SOP supply, Yara made an ill-judged investment in IC Potash (now long since written off). Subsequently, in 2015, Yara completed a feasibility study on a 600ktpa SOP solution mine at its 58.2%-owned Dallol project in Ethiopia (adjacent to the aforementioned Allana Afar), but this project has effectively been 'on hold' since. We would put it to Yara that it would be better off striking an agreement with Emmerson.
- **K+S:** K+S is a major producer of MOP, SOP and salt, for whom Emmerson would appear a 'natural fit' as a partner or acquisition target, particularly as Emmerson's projected low costs would help offset K+S's German production, which is high cost and subject to potential environment/permitting-related risks. However, of late, K+S has become severely financially constrained, to the extent that it is having to sell off its Americas salt unit. Once this sale has been completed and assuming a recovery in MOP prices, we believe that K+S could once again become a strong contender.
- **SQM:** SQM already produces MOP, SOP and potassium nitrate in Chile. However, we suspect that, going forward, the company will prefer to focus on its lithium business. That is not to say that SQM might not be tempted – e.g. in 2016, SQM acquired an 18.1% interest in MOP developer Kore Potash for US$20m.

- **Nutrien and Mosaic:** In terms of 'firepower', Nutrien and Mosaic are best positioned. However, from a MOP perspective, we suspect they would prefer to acquire an established MOP producer with existing distribution and sales infrastructure. On the other hand, they might find Emmerson attractive from a SOP perspective. During PotashCorp's failed attempt to acquire K+S in 2015, PotashCorp (now part of Nutrien) praised K+S for achieving "some good diversity in specialty products", saying that this was "something [it would] be interested in". Meanwhile, Mosaic has a wealth of experience of selling speciality fertilisers such *K-Mag*, *MicroEssentials* and *Aspire*.

Middle Eastern nitrogen-based fertiliser producers and major fertiliser buyers/distributors would also be strong partners

We note that there are a number of nitrogen-based fertiliser producers in the Middle East for whom some sort of tie-up with Emmerson would be useful (à la Yara), particularly for the production of NPK fertilisers. Major fertiliser buyers/distributors such as Archer-Daniels-Midland (ADM) and Wilmar would also represent strong partners.

## Other potential partners

Diversified miners are increasingly aware of the long-term strategic attractiveness of the potash sector

Diversified miners are increasingly aware of the longer-term strategic attractiveness of the potash sector, particularly given a backdrop of increasing emphasis on environmental and sustainability good practices. Exemplifying this trend are Anglo American's £386m acquisition of Sirius Minerals in early 2020 and BHP's highlighting of beneficial megatrends.

- Anglo American said it is focusing on "later-cycle products that support a fast-growing population and a cleaner, greener, more sustainable world". In Anglo's view, the use of fertilisers is "one of the most effective ways to help to address the anticipated future imbalance caused by a fast-growing global population and limited additional land availability for agricultural use".
- In its latest potash outlook, BHP highlighted that long-term potash demand "stands to benefit from the intersection of a number of global megatrends"; these being: rising population, changing diets and the need for sustainable intensification of agriculture. BHP is anticipating trend demand growth for potash of 1.5-2.0Mtpa (i.e. 2-3%/year) through the 2020s.

We suspect that, as a MOP play, Emmerson may be a bit too small for the diversified miners; however, Emmerson could potentially be attractive as a SOP producer

From a MOP volume perspective, we suspect that Emmerson may be regarded as a bit too small for the diversified miners (who tend to covet 'mega projects'). On the other hand, we believe that Emmerson could be perceived as quite attractive as a 'specialty' (SOP) fertiliser operation:

- In theory, Emmerson could produce c.860ktpa of SOP using all of its MOP output – making it one of the world's largest producers in a market whose size is currently c.7Mtpa. Importantly, in doing so, it would enjoy a bottom-quartile cost position, cemented by sales of de-icing salt byproduct.
- From environmental and sustainability perspectives, low-chloride SOP is superior to MOP.
- Hydrochloric acid disposal is typically a concern and constraint for Mannheim SOP production. However, at Jorf Lasfar, hydrochloric acid could be used to produce value-added byproducts – a positive environmental and sustainability solution that monetises what is elsewhere often a costly and environmentally problematic issue.

# Morocco – attractive mining jurisdiction

The Kingdom of Morocco sits across the Strait of Gibraltar from Spain

The Kingdom of Morocco (710,850km$^2$; population: c.36m) in western North Africa is strategically located directly across the Strait of Gibraltar from Spain. Rabat is the country's capital, but Casablanca is its largest city. Arabic and Berber are the official languages, although French is widely spoken. The official currency is the Moroccan dirham, a closed currency which is currently pegged to the Euro (60%) and the US dollar (40%).

Morocco was the second-highest ranked African country in the World Bank's 2020 Ease of Doing Business Index

Morocco, which boasts Africa's fifth-largest economy, has enjoyed steady growth, low inflation and falling (if still high) unemployment. The country ranked 53rd out of 190 countries in the World Bank's 2020 Ease of Doing Business Index – or second in terms of African countries.

The government of Morocco is supportive of mining: corporate tax and royalty rates are attractive, new mines benefit from a five-year income tax holiday and there is no requirement for a government free-carried interest

Already a major producer of phosphate and oil, Morocco benefits from a stable government that is supportive of mining investments. For example, a reduced CIT rate of 20% is provided for exported products (including local sales that are ultimately exported; otherwise, 35%), new mines enjoy a five-year tax holiday from production commencement and mining royalties are negligible at just 1-3 dirham (US$0.11-0.33) per tonne of product. In addition, there is no need to provide the government with a free-carried interest in projects (such as Khemisset) that were not secured under a joint venture or acquisition agreement with a government body.

Emmerson was one of the first companies to achieve permit consolidation under Morocco's new Mining Code of 2015

The Moroccan government has thus far appeared to us to be supportive of Emmerson and the Khemisset project. For example, in relation to the permit consolidation described later in this document, Emmerson was one of the first companies – if not THE first – in Morocco to be granted this under the country's new Mining Code of 2015.

The Moroccan government has indicated that cash subsidies and further tax concessions could be available under a formal investment convention

Subsequently, in December 2019, Emmerson reported that initial discussions with the Moroccan government indicated that direct cash subsidies and further tax concessions could be available (via negotiation) for Khemisset under a formal investment convention. According to the company, the Moroccan government could potentially:

- Fund up to 10% of Khemisset's total capex in the form of direct cash subsidies, including: up to 5% of external infrastructure investment (e.g. power connection, road access, water intake, used water treatment, port upgrades); up to 20% of land acquisition costs; and up to 20% of approved employee training costs.
- Provide additional tax concessions, including a three-year VAT exemption on equipment and plant purchases, and exemption from import tax duties on plant, equipment and mining machinery.

Government agencies would also provide invaluable support

In addition, Emmerson also expects to benefit from invaluable formal support from government agencies in all project implementation processes.

Investment convention negotiations should be concluded by mid-2021

We understand that negotiation of the investment convention is expected to commence by the end of 2020 and should be concluded by mid-2021.

# Khemisset – MOP and de-icing salt

Emmerson acquired Khemisset in 2018; Shore Capital visited the project in December 2019

Shore Capital visited the Khemisset project in December 2019. Emmerson acquired the project via the reverse takeover (RTO) of Moroccan Salts Limited (MSL), as a result of which it was readmitted to the LSE's Main Market in June 2018 (having originally listed as an investment company in February 2017).

The project comprises a 100% interest in 37 research permits and one mining licence, covering an area of 815km$^2$

The project covers an area which is c.60km by c.20km, adjacent to the city of Khemisset. The city is c.80km east of Morocco's capital Rabat and 50km west of Meknes. It originally comprised a 100% interest in one mining licence and 39 research licences covering 576km$^2$. Subsequently, Emmerson was granted 18 further research permits, bringing the area covered to c.844km$^2$. Emmerson's permits surround two blocks of 11 licences owned by OCP.

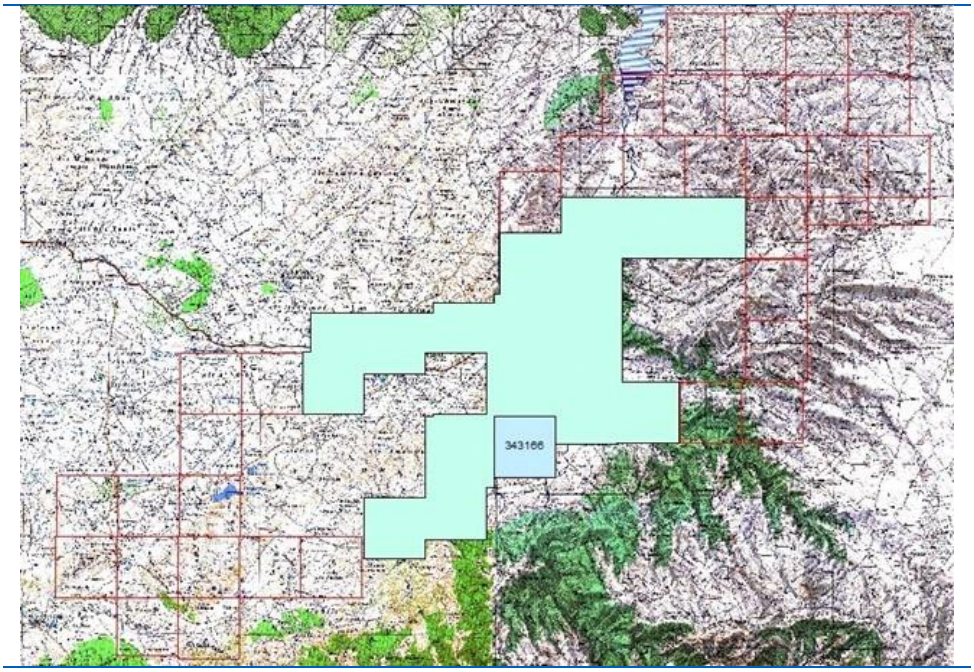
The mining licence area contains an uncompleted historical salt decline; rehabilitation liability remains with previous owners Westmin

The mining licence area contains an uncompleted decline for a small historical salt mining operation. Our understanding is that any rehabilitation liability remains with previous owners Westmin. In any case, much of the salt left on surface from decline construction was consumed by Emmerson in preparation of drilling fluids, and Emmerson has previously estimated the rehabilitation cost at just c.US$0.1m.

In September 2019, 21 core exploration permits were fused into a single project permit, paving the way for a simplified mining application

In September 2019, the Moroccan government approved the consolidation of 21 core exploration permits into a single project permit, significantly reducing Emmerson's administrative burden and paving the way for a simplified mining permit application. Emmerson was one of the first companies – if not THE first – in Morocco to achieve this under Morocco's new Mining Code of 2015. The fused permit expires in February 2023, while the 'non-core' permits variously expire(d) between August 2020 and September 2021. Renewal applications are being filed as permit expiration dates come up.

**Figure 8: Emmerson's Khemisset Basin permits (consolidated permits in blue)**




Source: Company

## Feasibility study: good results

Good results were reported from a feasibility study completed in June 2020; the FS envisaged a conventional underground mine producing 735ktpa MOP and 1Mtpa of de-icing salt; build capex was estimated at US$411m, all-in MOP unit cost at US$158/t FOB Casablanca; overall post-tax $NPV_{8\%}$ and IRR were calculated to be US$1.4bn and 38.5%, respectively, assuming flat real MOP and de-icing salt prices of US$412/t CFR Brazil and US$60/t CFR US East Coast

In June 2020, Emmerson reported good results from a feasibility study on the Khemisset project.

- A conventional underground operation was envisaged, with steady-state average production of 735ktpa of K60 (95% KCl) MOP and 1Mtpa of de-icing salt. Mining would use the room-and-pillar method, access would be via twin declines and processing would involve hot leaching and crystallisation. Initial mine life was put at 19 years, with Emmerson believing there to be the potential for longer (since the FS mine plan focused on only one of three deposit areas, hosting just c.43% of Khemisset's total resources of 537Mt @ 9.24% $K_2O$).
- Pre-production capex was estimated at US$411m (±20-25% accuracy), including US$24m for the salt plant and a 16% contingency of US$45.5m. According to Emmerson, this equated to a capital intensity of US$507.4/t of annual MOP capacity.
- Unit total cash costs and AISC (All-In Sustaining Costs) for the first full year of operations were forecast at US$125.3/t MOP and US$158.0/t MOP, respectively (±20-25% accuracy), FOB Casablanca basis. Delivered costs to target markets (e.g. Brazil, NW Europe, Morocco) were projected to be bottom quartile. Indeed, including salt byproduct credits, independent consultants Argus FMB projected Khemisset ranking second lowest on an all-in-sustaining delivered cost to Brazil basis.
- Assuming flat real MOP and de-icing salt prices of US$412/t CFR Brazil and US$60/t CFR US East Coast, respectively (with 3.0% escalation applied to both operating costs and revenues), steady-state average EBITDA and post-tax cash margins were projected at 61.5% and 47.1%, respectively.

Based on the above, nominal post-tax NPV and IRR were estimated at US$1.4bn (8% discount rate) and 38.5%, respectively.

## Figure 9: FS parameters, assumptions and outcomes

| Operational Parameters | | |
|---|---|---|
| Initial Operating Life | Years | 19 |
| Annual ROM Extraction Rate | Mtpa | 6 |
| Average LOM Head Grade | % $K_2O$ | 8.6% |
| Average LOM Metallurgical Recovery | % | 85.2% |
| Average Annual MOP Production | ktpa | c.735 |
| Average Annual Salt Production | Mtpa | 1 |

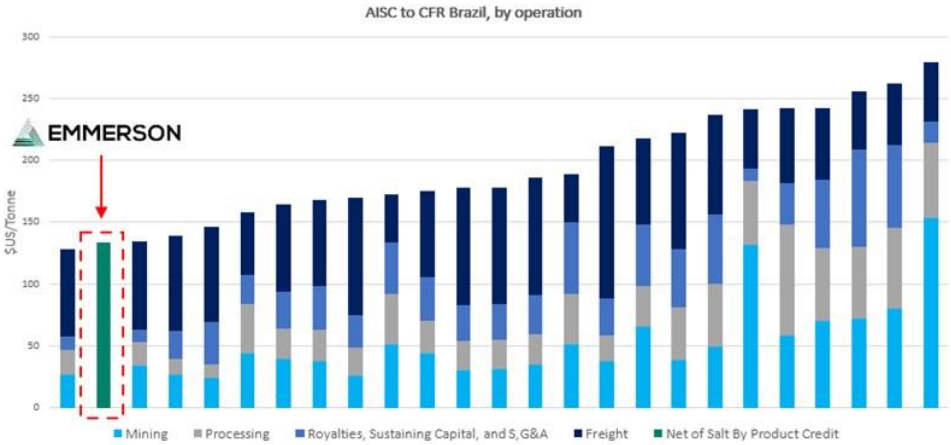
| Operating Costs (First Year of Full Production, MOP Only) | | |
|---|---|---|
| Mining | US$/t MOP | 60.2 |
| Processing | US$/t MOP | 42.7 |
| Other Site Operating Costs | US$/t MOP | 5.6 |
| Administration | US$/t MOP | 2.8 |
| **Total Minegate Cash Cost** | **US$/t MOP** | **111.2** |
| Trucking to Casablanca & Port Charges | US$/t MOP | 14.1 |
| Sustaining Capital | US$/t MOP | 32.7 |
| **AISC FOB Casablanca** | **US$/t MOP** | **158.0** |
| Freight to Brazil | US$/t MOP | 10.0 |
| **AISC Delivered Brazil** | **US$/t MOP** | **168.0** |

| Capital Costs | | |
|---|---|---|
| Mining | US$m | 89.6 |
| Processing Plant | US$m | 146.6 |
| Surface Infrastructure | US$m | 17.9 |
| Tailings Storage | US$m | 30.5 |
| **Total Direct** | **US$m** | **284.6** |
| EPCM | US$m | 32.8 |
| Indirects | US$m | 47.9 |
| Contingency (16%) | US$m | 45.5 |
| **Total Pre-Production Capital Cost** | **US$m** | **410.9** |
| Capital Intensity | US$/t MOP | 507.4 |

| Key Assumptions | | |
|---|---|---|
| Average MOP Price CFR Brazil (Flat, Real) | US$/t | 412 |
| Average Salt Price CFR East Coast USA (Flat, Real) | US$/t | 60 |
| Annual Escalation of Costs and Revenues | % | 3% |
| Corporate Tax Rate on Exported Product | % | 20 |
| Corporate Tax Holiday | Years | 5 |
| Pre-Production | Years | 2 |
| Ramp-Up in Year 1 | % | 50% |

| Economic Outcomes (Annual Average at Steady-State) | | |
|---|---|---|
| EBITDA | US$m | 307 |
| EBITDA Margin | % | 61.5% |
| Post-Tax Cash Flow | US$m | 235 |
| Post Tax Cash Margin | % | 47.1% |
| Discount Rate | % | 8 |
| Post-Tax NPV (Nominal) | US$bn | 1.4 |
| Post-Tax IRR (Nominal) | % | 38.5 |
| Post-Tax Payback | Years | 2.6 |

| NPV - US$ millions | Flat Real MOP Price - US$/tonne | | | | |
|---|---|---|---|---|---|
| | 288 (-30%) | 350 (-15%) | 412 (Base) | 473 (15%) | 536 (30%) |
| Discount Rate 4% | 1,151.0 | 1,719.6 | 2,288.3 | 2,857.0 | 3,425.7 |
| Discount Rate 6% | 855.5 | 1,316.0 | 1,776.5 | 2,237.0 | 2,697.5 |
| Discount Rate 8% | 634.9 | 1,012.9 | 1,390.9 | 1,768.9 | 2,146.9 |
| Discount Rate 10% | 468.1 | 782.4 | 1,096.7 | 1,410.9 | 1,725.2 |




Source: Company Data

## Geology in brief

The Khemisset Basin can be divided into five formations

The Khemisset Basin is a marginal sedimentary basin of Triassic age. A half-graben that is c.60km long and 20km wide, it is bounded by mainly northeast-southwest faults. The centre of the basin can be divided into five formations, which in descending order are the: Upper Clay Formation (20-170m thick); Upper Salt Formation (50-650m); Basalt Formation (30-100m); Lower Salt Formation (up to 190m); and Lower Clay Formation (over 250m).

**Figure 10: Strata in the Khemisset Basin**

| Stratum | Logging Code | Sub-Unit | Thickness (m) | Description |
|---|---|---|---|---|
| Upper Clay Formation | UCU | | 20-170 | Red-brown sandy mudstone with traces of anhydrite, gypsum, marl |
| Upper Salt Formation | USU | | 50-650 | Bedded halite, gypsum, anhydrite, dolostone and siliciclastic mudstone, sub-economic potash occurrences |
| Basalt Formation | BST | | 30-100 | Basalt lavas with local lenses of claystone, limestone and evaporite |
| Lower Salt Formation | LSU | L2.2 | up to 190 | Massive banded salt with the principle economic potash layer (sylvite and carnallite) |
| | | L2.1 | | Black chaotic to massive banded salt with potash inclusions |
| | | L1 | | Red-brown mudstone salt interbedded with red beds |
| Lower Clay Formation | LCU | | over 250 | Red brown shale with traces of gypsum and halite |

Source: Company Data

The potash horizon is located within the Lower Salt Formation

The principal potash-bearing horizon, within the Lower Salt Formation, is of variable thickness (generally thinning to the basin edges), dip and grade (on average, 2.5m thick, dipping 0-10º northeast and grading 9.24% $K_2O$). The hangingwall and footwall are comprised of halite (although generally with some potash content), with the hangingwall (1-2m thick) abutting the overlying Basalt Formation. In terms of potash mineralogy, carnallite and sylvinite dominate (albeit in varying proportions), with rinneite also significant in the northeast. The insolubles fraction is low, generally in the range of 1-2%.

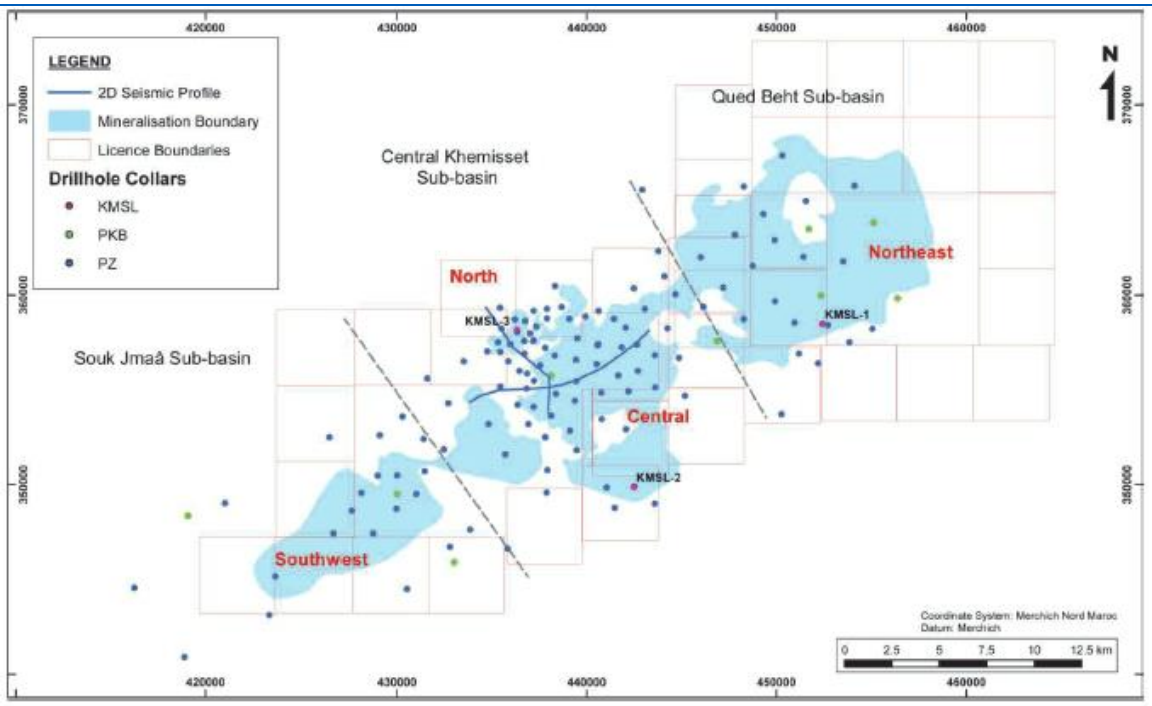
Four deposit areas have been identified in three distinct sub-basins: the north and central deposits in the Central sub-basin; the southwest deposit in the Souk Jmaâ sub-basin and the northeast deposit in the Oued Beht sub-basin

Four deposit areas have been identified in three distinct sub-basins: the north and central deposits in the Central sub-basin, the southwest deposit in the Souk Jmaâ sub-basin and the northeast deposit in the Oued Beht sub-basin. They are separated by 'sterile' areas where potash salts are absent or very thin.

- **Northeast:** The potash horizon here occurs at depths of 390-1,170m below surface, dips up to 6º to the northeast, covers an area of c.53km$^2$ and averages 1.7m thick (range: 0.2-5.2m) and 9% $K_2O$ (range: 4-15% $K_2O$). It has a more complex distribution of potash minerals than the other deposits: a mixture of carnallite and rinneite is found towards the west and north; to the east is sylvinite and rinneite; the south has zones of sylvinite and rinneite. Only one major fault has been interpreted; a basin boundary fault in the south. It is thought likely by Emmerson that there will be some minor faulting parallel to other northeast-southwest structures, but these are unlikely to pose significant problems for mining.
- **Central:** Occurring at 430-960m, the potash horizon dips up to 8º to the northeast and covers an area of c.28km$^2$. It averages 3.7m thick (1.1-9.4m) and 9.6% $K_2O$ (6-16% $K_2O$). The central carnallite zone gradually changes to sylvinite towards the southwest and northwest; a mixture of sylvinite and carnallite is present in the intermediate zone.

- **North:** Sitting at 490-800m, the potash horizon dips up to 7º to the northeast and covers an area of c.3km$^2$ (mainly under Khemisset city). It averages 3.0m thick (0.3-8.2m) and 10% $K_2O$ (5-17% $K_2O$). The potash mineral here is mainly sylvinite, but changes to a mix of sylvinite and carnallite at the southern edge.
- **Southwest:** The potash horizon here occurs at depths of 450-600m, is generally flat-lying (dipping 1-3º to the northeast), covers an area of c.25km$^2$, and averages 3.0m thick (range: 0.4-5.4m) and 9.4% $K_2O$ (range: 7-12% $K_2O$). It comprises a central carnallite zone surrounded by sylvinite.

**Figure 11: There are four areas of potash deposits within three sub-basins**




Source: Company

BRPM, a Moroccan parastatal agency, conducted extensive exploration in the Khemisset Basin during the 1950s and 1960s

## Exploration history

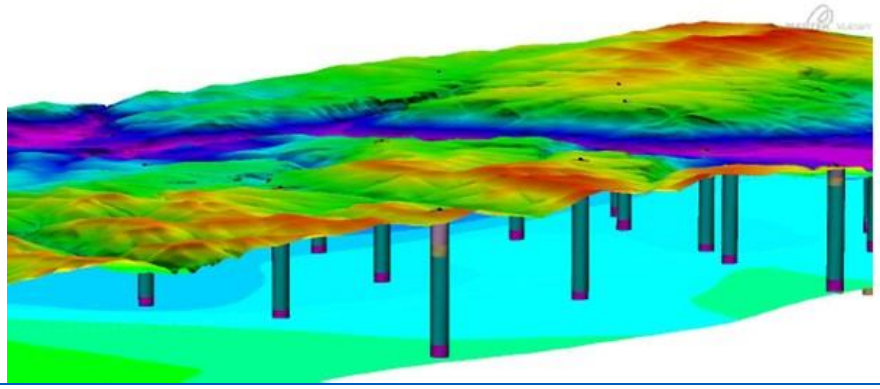
Exploration of the Khemisset Basin was first conducted in the 1950s by Moroccan parastatal agency Bureau de Recherches et de Participations Minières (BRPM) in collaboration with Mines Domaniales des Potasse d'Alsace (MDPA). BRPM subsequently continued exploration in the 1960s with assistance from the United Nations Development Programme (UNDP).

- Nine holes were drilled (totalling 7,518m) over 1955-1958, of which four lie within what is now Emmerson's licence area (two of which intersected potash).
- Subsequently, over 1962-1969, 124 diamond holes were drilled (75,000m). Of these, 61 (c.35,000m) are within Emmerson's licence area (of which 35 intersected potash). The average grid spacing was 3km over the majority of Emmerson's licence area (c.1.5km in the central area).
- Surface geophysical and a 69km 2D seismic survey were also undertaken.

Khemisset may possibly be the most densely drilled potash project; Emmerson possesses the detailed historical logs but not the cores; the company's own drilling and seismic surveys have validated the historical dataset

The density of historical drilling is such that Khemisset may possibly be by far the most densely drilled potash project in the world, as far as we are aware. Unfortunately, Emmerson does not have access to the historical drill cores – but does possess the detailed historical logs. In 2016, Emmerson completed a three-hole verification programme (totalling 1,543m) to verify the accuracy of the information. This was followed in 2019 by a nine-hole infill campaign (6,485m) in the Oued Beht sub-basin (i.e. the area targeted for initial mining operations, which tightened average spacings in the sub-basin to 1.0-1.5km. Emmerson also conducted 69km of 2D seismic surveying in 2018, which enabled further validation of the historical dataset and 2018 interpretations.

**Figure 12: Oblique view of geological model**



Source: Company

## Resources and reserves

The bulk (c.70%) of Khemisset's resources is Indicated; the remainder, Inferred

Khemisset currently possesses JORC 2012-compliant resources totalling 536.9Mt @ 9.24% $K_2O$. The bulk (c.70%) of that, 375.2Mt @ 9.36% $K_2O$, is in the higher-confidence Indicated category; the remaining 161.8Mt @ 8.96% $K_2O$ is Inferred.

**Figure 13: JORC 2012-compliant resources (October 2019)[1]**

| | Mt | %$K_2O$ | % KCl | KCl Contained Mt |
|---|---|---|---|---|
| Indicated | 375.2 | 9.36% | 14.87% | 55.8 |
| Inferred | 161.8 | 8.96% | 14.24% | 23.0 |
| **Total** | **536.9** | **9.24%** | **14.68%** | **78.8** |

[1] Resources were estimated by the application of a 'value' (grade x thickness) cut-off of 7.5, and absolute cut-offs of 7.5% $K_2O$ and 0.8m minimum thickness.

Source: Company Data; Shore Capital Markets

A 'value' (grade x thickness) cut-off of 7.5, and absolute cut-offs of 7.5% $K_2O$ and 0.8m minimum thickness, were used in estimating resources

Resource estimation utilised:

- Drilling data from the historical campaigns and Emmerson's verification and infill programmes, supplemented by 2D seismic information. Average drillhole spacing in the block model was 1.2km.
- A 'value' (grade x thickness) cut-off of 7.5, and absolute cut-offs of 7.5% $K_2O$ and 0.8m minimum thickness.

There is potential to extend the resource to the northeast

The Khemisset Basin remains open towards the northeast. There is therefore potential for resource upside in this direction, albeit mining depths would likely be at >1,000m.

### Probable reserve comprises bulk of mine plan

While not mentioned in the FS, we understand that Khemisset's resources include Probable reserves of 80.5Mt @ 9.06% $K_2O$

Although not mentioned in the FS announcement, we understand that included within Khemisset's Indicated resources are JORC 2012-compliant Probable reserves that currently stand at 80.5Mt @ 9.06% $K_2O$.

- The reserves used a 7.5% $K_2O$ cut-off and assumed a minimum mining height of 1.5m and 8.3% waste dilution. The diluting waste was assumed to be barren (other than 7.5cm from mining panel roof and floor boundaries, which were assumed to grade 2% $K_2O$).
- In the first 16 years of the FS mine plan, 93Mt of material is scheduled – the 80.5Mt Probable reserve and 12.5Mt of 'unclassified' material (mineralised 'waste' grading 6-7% $K_2O$ which will be processed). Years 17-19 comprise Inferred resources, which we expect will be upgraded following additional drilling and/or seismic surveys in due course.

## Conventional underground mining

The run-of-mine target rate is c.6Mtpa over a 19-year mine life

Mining would be conducted underground, using the room-and-pillar method, with access and ventilation via twin declines. The run-of-mine target rate is c.6Mtpa over a 19-year mine life.

The FS mine plan focused on the northeast deposit only; Emmerson is studying the potential of mining the central and southwest deposits with an eye to securing a longer mine life; there is also potential to extend mining to the northeast

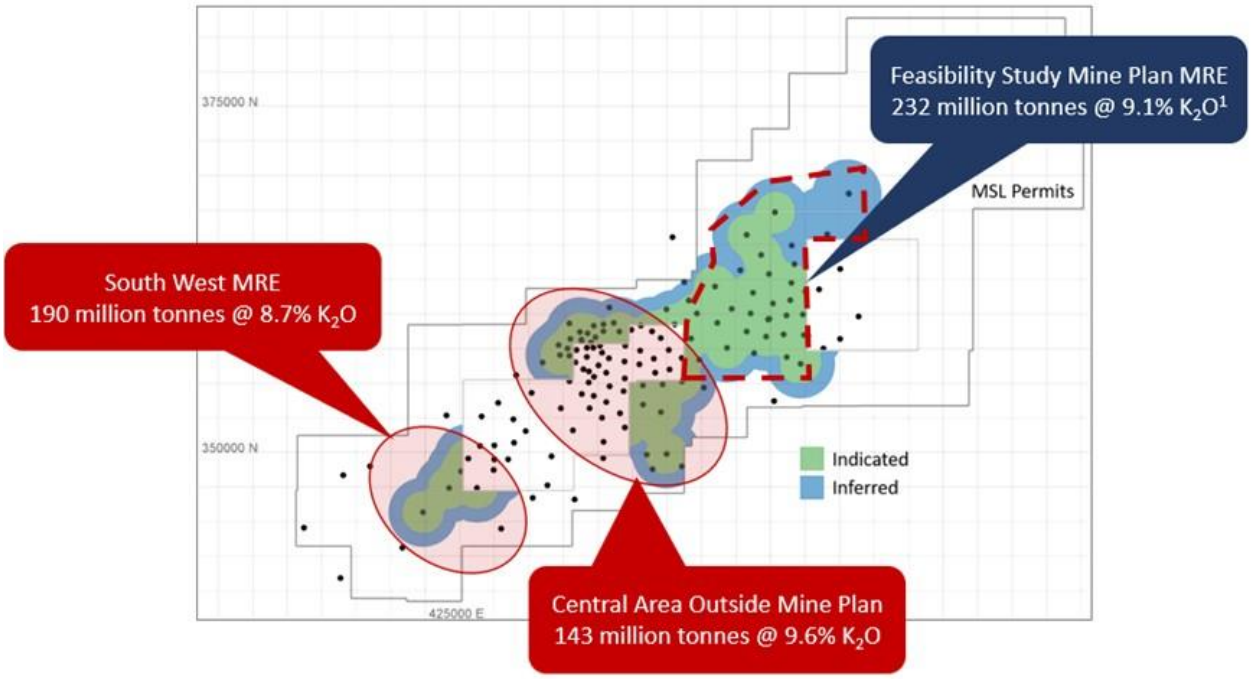
It should be noted that the FS mine plan focused on the northeast deposit's c.204Mt of resources (c.232Mt @ 9.1% $K_2O$, including mineralised waste). Emmerson is studying the potential of mining the southwest and central deposits with an eye to securing a longer mine life.

- The southwest deposit has a similar-sized resource at similar depth (c.190Mt from 450m below surface). We envision a separate decline system, with ore hauled/conveyed c.12km to the plant site.
- The central deposits contain 143Mt of resources that could potentially be accessed via the FS underground mine design. The northern portion underlies Khemisset city and it is currently unknown whether or not extraction will be possible.
- As noted earlier, there is also potential to continue mining to the northeast, albeit this would be at depths of >1,000m. Refrigeration may be required.

If agreement can be struck, Emmerson could potentially mine into OCP's ground from the northeast and southwest

If an agreement can be struck, mining could be extended into OCP's tenements from Emmerson's northeast and southwest deposits, we believe. A 2014 advertisement by Moroccan parastatal ONHYM (Office National des Hydrocarbures et des Mines) suggested that the Central sub-basin licences contained 180Mt of carnallite (9.5% $K_2O$; 4.4m average thickness), but the basis for this was unknown and has not been validated, according to consultants SRK. Emmerson's historical database apparently indicates that OCP's central licences contain a small area of sylvinite; the southwest licences, less-desirable carnallite.

**Figure 14: Plan view of resource estimate area**




[1] Includes 27Mt of mineralised waste.

Source: Company

## Access and ventilation

Mine access will be via twin declines, which will also be used for ventilation

Mine access at Khemisset is to be via twin c.3.2km-long, 8m-wide declines with slopes of c.1:7. Personnel access and air intake will be via the service decline; the production decline will be used for ventilation exhaust and equipped with a conveyor for extracted material.

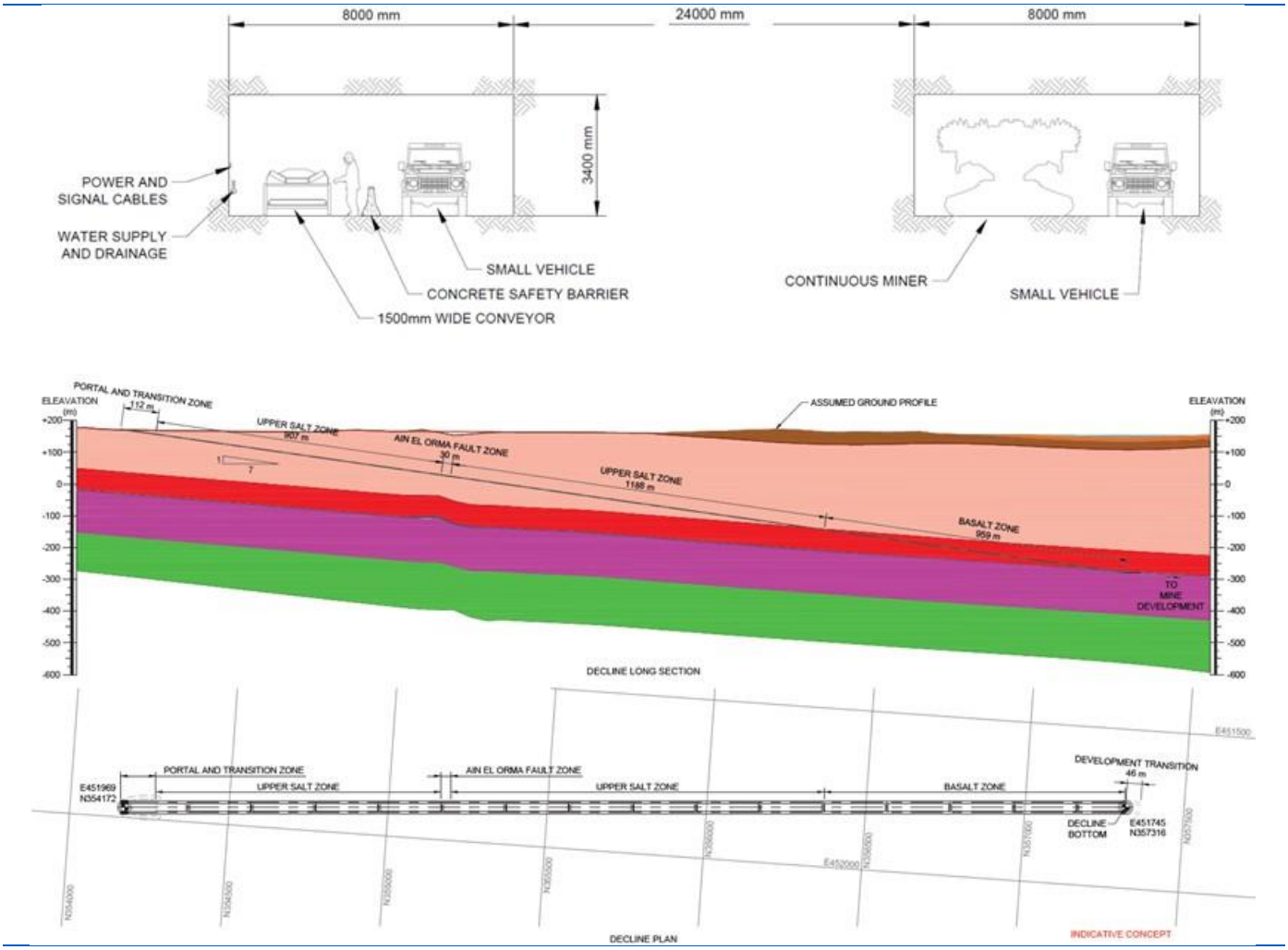
The declines would traverse three major strata; support is to be installed appropriate for each stratum

The parallel declines would be separated via a 24m-thick barrier pillar, albeit with cross-cuts every 200m. Three major strata would be traversed: a minor clay formation (c.10m thick), the Upper Salt Formation (c.320m thick) and the Basalt Formation (c.60m thick). Support would be installed appropriate to each stratum, selected to maintain stability for the life of mine.

That the abandoned Westmin decline remains in good condition, with no roof support installed, bodes well

According to Emmerson, the historical, uncompleted Westmin salt decline – abandoned whilst still incomplete in 2012, with no roof support installed – remains in good condition. We find this very encouraging in that this is 'real-life proof' of the geotechnical stability of the Upper Clay Formation and the Upper Salt Formation.

**Figure 15: Mine access is to be via two c.3.2km-long, 8m-wide declines, largely developed in salt**




Source: Company

Khemisset's declines should be relatively low cost, with lower timeline and execution risks compared with vertical shafts

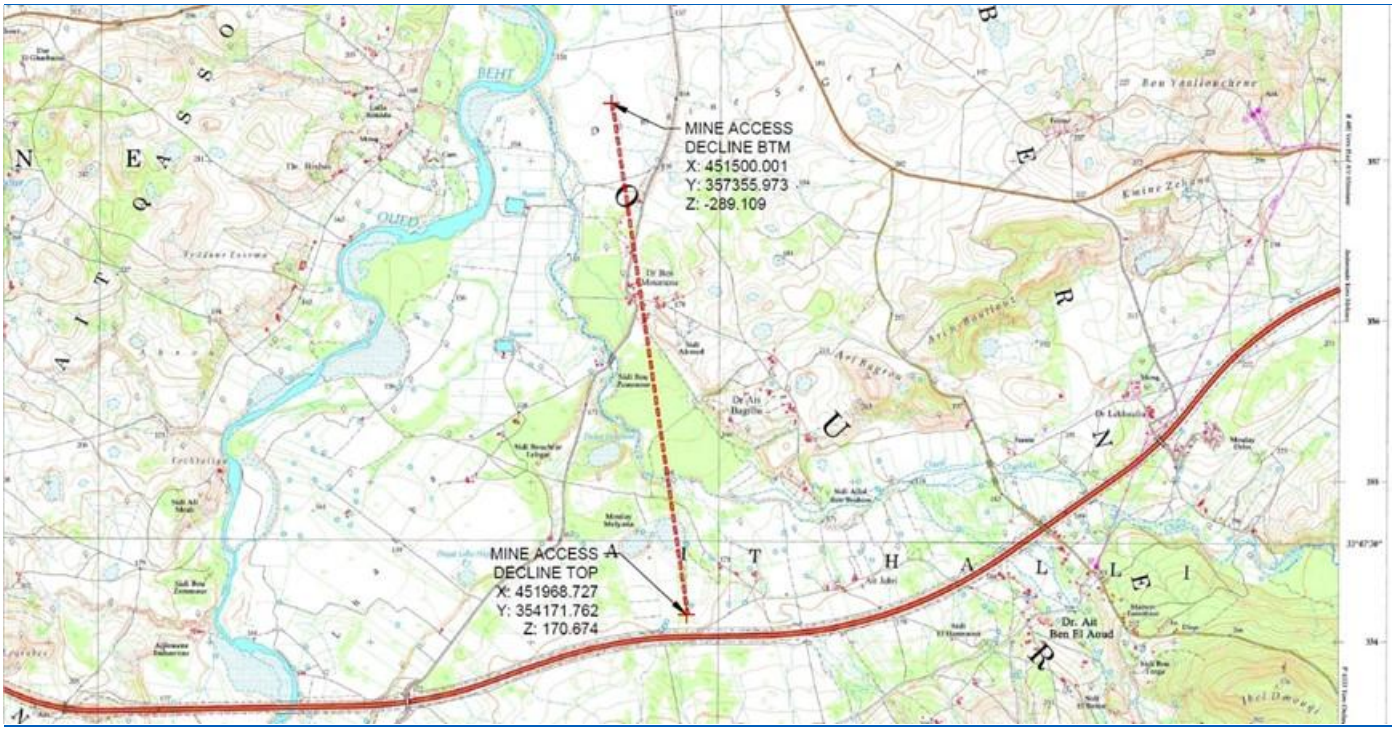
Most potash projects use vertical shafts (often necessary due to a combination of depth and aquifer presence), construction of which tends to be expensive and pose considerable timeline and execution risk. In contrast, Khemisset's declines should be relatively low cost, with lower timeline and execution risks. Key reasons include:

- The relatively shallow depth of the deposit, which starts at c.450m, and a lack of overlying major aquifers. As a rule of thumb, vertical shafts are more economic and faster to construct at depths of c.800m. They would also be significantly lower cost and easier to construct at shallower depths where major aquifers have to be navigated.
- That most development will be undertaken in salt should enable high-rate development using continuous miners (CM) – construction is expected by Emmerson to take just 14 months, so mine access would not represent a critical path item (unlike for many underground mining projects).
- The portal sites enable the potash horizon to be intersected at its shallowest depth (while minimising faulting on the decline path), thereby minimising decline lengths and construction time and costs. The portal positions are also optimal in being close to the process plant (minimising tramming distance) and key infrastructure (roads, power and water).

Mine access-related capex was estimated at just c.US$42m

Given the above, mine access-related capex was estimated in April 2020 (as part of the FS) at just c.US$42m (excluding mining equipment). That the same CMs can subsequently be used in gallery development and mining production obviates the need to purchase additional mining equipment and thereby further reduces capex.

**Figure 16: The site for the mine portal and plant is optimally located in relation to infrastructure access**




Source: Company

Effective heat management will be important, particularly during the summer months

The geothermal gradient at Khemisset is expected to be 1ºC for every 40m depth, and at the maximum planned depth of 1,000m, virgin rock temperature would be 42.6ºC (based on a mean annual surface temperature of 17.6ºC). Effective heat management will therefore be important, particularly during the summer months (when surface air temperatures can exceed 40ºC) and during mining in the northeast.

The mine is to be air-cooled; a ventilation shaft will be raise-bored later in the mine's life to maintain flow rates

The mine is to be air-cooled (using a chilled water system; refrigeration is not thought necessary), with the FS calculating the ventilating air requirement at 170m$^3$/s for a 6.0Mtpa operation with a diesel fleet. We understand that a ventilation shaft will be raise-bored later in the mine's life to maintain flow rates as mining extends further from the declines.

## Mining via room-and-pillar with continuous miners

Mining will be via the room-and-pillar method with low-profile continuous miners

Mining at Khemisset will be via the room-and-pillar method with continuous miners (as used in the vast majority of potash mines around the world). Low-profile CMs are to be used, given a minimum mining height of 1.5m. Shuttle cars would transport ore from production faces to feeder-breakers, which control the flow of ore onto the conveyors to surface.

- 'Rooms' are the voids arising as a result of rock extraction; 'pillars' are rock columns left between rooms to support the 'roof'. Room-and-pillar mining usually allows for good productivity while being less capex intensive than longwall mining. The high number of available working faces confers high levels of flexibility in adjusting mine plans.
- In room-and-pillar mining, rock extraction can be via drilling-and-blasting or using CMs. CMs cut ore using a rotating drum or borer equipped with picks. This makes for flexibility of mining width, enabling the maintenance of high production rates while minimising dilution even where orebody thickness is variable (such as is the case of the potash horizon at Khemisset). CMs also have the advantages over drill-and-blast of lacking cyclic delays, significantly lower ventilation requirements and better safety and risk mitigation.

Ore extraction ratios are expected to be c.42-64% at depths of c.600-1,000m

To ensure safe operations, the dimensions of pillars and openings (and hence extraction ratios) must consider factors such as the ore types present (carnallite is weaker than sylvite, so areas with higher proportions of carnallite mineralisation require more support), mining heights and depths from surface (c.450m initially, down to c.1,000m in the later stages of mine life; average working depth is 600-800m). According to the FS, assuming 6m-wide rooms, 10-20m pillars and room heights of 1.5-3.5m, ore extraction ratios would range from c.47-64% at 600m depth to c.42-59% at c.1,000m. In addition, 100m barrier pillars are to be left either side of the main 'roadway', while drillholes will have barrier pillars of 50m radius.

Care must be taken in 'robbing' pillars to improve ore extraction ratios

We believe there to be the possibility of 'robbing' (mining) pillars in mined-out areas to improve overall ore extraction ratios. However, care must be taken not to adversely affect safety in working areas and on surface (due to subsidence).

Secondary roof support will be used where required

Secondary roof support in the form of bolting into the halite hangingwall (and potentially into the overlying basalt) will be used where required. Four different ground support classes have been identified: Classes 3 and 4 may be applied in areas of geotechnical weakness; most permanent openings will have a minimum of Class 2.

Definition drilling will be important, we believe, enabling mining layouts to be adjusted as appropriate at the 'local' level

We regard it as being of high importance that definition drilling be conducted well ahead of mining. Doing so would enable mining layouts to be adjusted at the 'local' level (e.g. relocating panels and pillars) to reflect changes in mineable thicknesses, dips and grades; and/or the presence of previously unidentified faults and other structures that might be water- or gas-bearing so that appropriate measures can be taken, e.g. grouting or avoidance (although there has to date been no indication of gas in the deposit, we understand).

Emmerson intends to use contract mining, which reduces capex but increases opex

Emmerson has elected to use contract mining for both development and production, primarily to reduce the execution and operational risks associated with a first-time operation. Contract mining translates into reduced capex but higher opex.

## Geohydrology

The lack of a major overlying aquifer significantly reduces the risk of large-scale water inflows

Importantly, the potash horizon at Khemisset is not situated below or near a major aquifer – this significantly reduces the risk of large-scale groundwater inflows into the mine, and also reduces the risk of mine development impacting water resources.

Aside from limited near-surface groundwater, decline construction should be broadly dry

Consequently, aside from "very limited" quantities of groundwater in the Quaternary and Miocene strata (which contain minor exploitable aquifers), the formations that would be encountered during decline construction are expected by Emmerson to be "broadly dry". Nonetheless, prudently, pumping provision is to be included as a risk mitigation measure.

Similarly, any groundwater inflow into the mine should be minor and manageable with mobile pumps

Similarly, any groundwater inflow into the underground mine is expected by the company to be negligible and manageable with mobile pumps.

- Any such inflows would most likely be from the overlying Basalt Formation, where exposed, and would reduce as the sequence is drained. We regard it as encouraging that groundwater has only been identified in four of the 145 drillholes (and even then, principally on the basin margins) and hydraulic tests by Emmerson indicated that permeability is very low (our understanding from the company is that it appears that all fractures have been effectively sealed by salt).
- The aforementioned minor Miocene and Quaternary aquifers are separated from the Lower Salt Formation by the Upper Clay Formation and the Upper Salt Formation (both above the Basalt Formation). Consequently, we believe that leakage from these units into the mine would be unlikely (except where there are open structures or faults).

## Processing

The plant is expected to average 735ktpa MOP and 1Mtpa of de-icing salt

The FS envisaged the Khemisset plant producing on average 735ktpa of K60 MOP (95.5% KCl) and 1Mtpa of de-icing salt byproduct. All MOP and salt product would be trucked to the Port of Casablanca for export.

Khemisset is unusual in having a small but significant proportion of potash mineralisation in the form of rinneite

The ore feed to the plant will likely contain a variable mix of potash minerals – largely sylvite (KCl) and carnallite ($KMgCl_2 \cdot (H_2O)_6$), with minority rinneite ($K_3Na\ [FeCl_6]$) – as it is unlikely that segregation of the various minerals will be possible/practical.

- Carnallite-rich/mixed potash ores are commonly processed using decomposition, followed by hot leaching and crystallisation (collectively referred to as 'crystallisation', henceforth).
- Khemisset is relatively unusual in having a small but a significant proportion of its potash mineralisation in the form of rinneite (and even here, it is limited to the northeast deposit). Rinneite has been the subject of detailed studies historically (particularly in Germany) but is not currently processed into MOP on an industrial scale. We stress that this is due to its relative rarity, rather than any technical challenges.

Importantly, testwork has shown that rinneite will decompose very similarly to carnallite

Importantly, from our perspective, testwork has shown that Khemisset's rinneite will decompose very similarly to carnallite, albeit efficient rinneite decomposition requires finer crushing (to 0.4mm, whereas 12-15mm will suffice for carnallite). Furthermore, in a combined circuit, not only is decomposition efficient but $FeCl_2$ and $MgCl_2$ impurities dissolve readily. Accordingly, crystallisation has been selected as the basis for processing at Khemisset.

Crystallisation is much better able to deal with mixed potash ores than flotation is

The crystallisation process route is energy intensive and higher cost relative to the main alternative, flotation. However, technical risk is significantly lower with crystallisation in that it is much better able to deal with the variability of mixed potash ores, from which it yields higher recoveries, with significantly better control over product quality.

The FS process flowsheet comprises two-stage crushing, decomposition, hot leaching and crystallisation

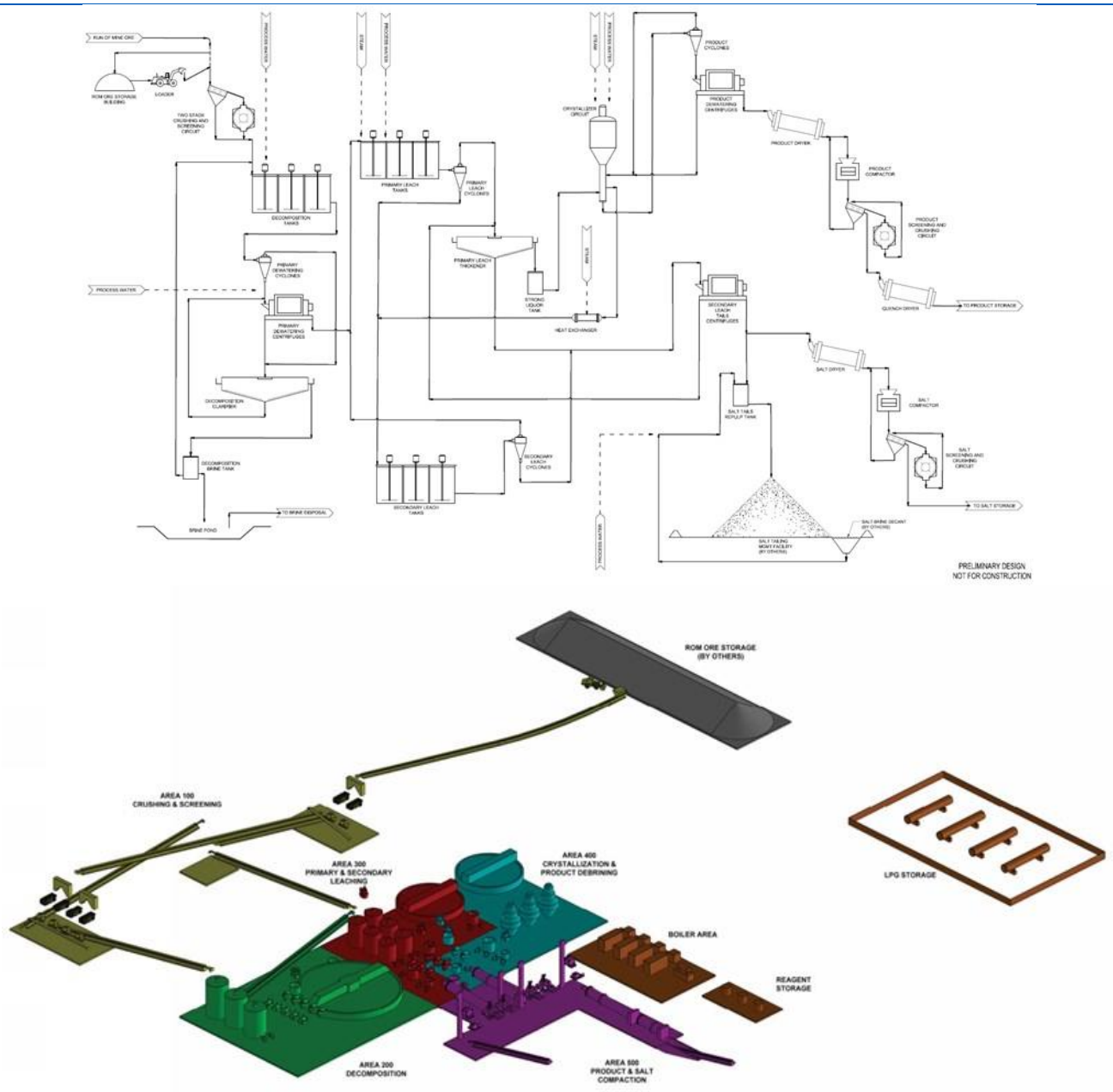
A simplified description of the FS process flowsheet is as follows:

- **Two-stage crushing.** The second stage of crushing (to 0.4mm) is required for efficient rinneite decomposition, so only the first stage (to 12-15mm) is necessary when rinneite is absent.
- **Decomposition.** Mixed crush ore is combined with recycled brine and fresh water to decompose carnallite and rinneite into KCl and NaCl solids. Mg and Fe impurities dissolve in the brine; and Mg- and Fe-containing brine is partially recycled. The remainder is pumped to a brine storage pond for eventual disposal via deep well injection into the Trias Argilo Gréseux Inférieur (TAGI), a thick stratum of sands and conglomerates that is c.200m into the Lower Clay Formation (LCU). In other words, the TAGI is separated from the potash horizon and any potential shallow aquifers (that might be used for irrigation or drinking purposes) by c.300-400m and c.500-600m of impermeable material, respectively.
- **Hot leaching and crystallisation.** KCl is hot leached from the KCl/NaCl solids, then precipitated by cooling in a crystalliser. The resulting purified KCl product (and NaCl byproduct) will be de-brined, dried, compacted and sized. 'Excess' NaCl will be disposed of in a Tailings Storage Facility (TSF).

Weighted LOM average recovery is expected to be 85.2%, slightly below average as high Mg and Fe concentrations make brine recycling undesirable

Weighted LOM average KCl recovery is expected to be 85.2%, which we consider to be slightly below average. The reason is that the ability to improve recoveries by recycling brine is limited at Khemisset due to the high concentrations of Mg and Fe impurities from carnallite and rinneite, respectively. Mg is undesirable in that it can cause fouling in the crystallisation circuit. It will be particularly important to keep Fe from reporting to leaching and crystallisation as it makes brine acidic (which would require expensive alloy construction). We understand that neutralisation in the plant's brine ponds should be relatively inexpensive, given ample local sources of limestone, and will serve to protect the 'downstream' processes from acidity.

**Figure 17: Plant flowsheet and pictorial layout**




Source: Company

## Sales of byproduct salt reduce plant tailings and increase revenues

Khemisset's salt 'waste' would be suitable for sale in the East Coast US market

Khemisset's primary waste product will be c.4.5Mtpa of a relatively fine +95%-pure NaCl, suitable for sale as de-icing salt (after compaction) in the East Coast US market. The US East Coast states consume c.10Mtpa (and significantly more in severe winters), over 80% of which is currently imported, mainly from Chile, Mexico and Morocco. Major de-icing salt producers K+S and Compass Minerals have indicated 10-year average prices of c.US$60/t.

Credits from such sales would effectively reduce the cash cost of producing MOP; incremental costs for producing de-icing salt would be very low

Credits from the sales of de-icing salt would effectively reduce the cash cost of producing MOP. Importantly, Emmerson's incremental costs for producing de-icing salt would be very low, since the only processing required would be compaction. The FS estimated:

- Capex for the production of 1Mtpa of de-icing salt at just US$24m (including contingency).
- All-In Sustaining Cost (AISC) of just US$32.7/t on a delivered basis, which we believe to be competitive, particularly in relation to Chilean product.

Emmerson's competitive costs imply attractive margins; discounts could be offered to establish/expand market share

The competitive costs imply attractive margins. If necessary, they would allow Emmerson to offer price discounts (whilst still enjoying decent margins) to establish market share. Similar tactics could subsequently be used to expand market share further, in order to facilitate sales volumes significantly higher than envisaged in the FS.

The more de-icing salt is sold, the less salt would have to be stored as tailings, reducing the environmental impact and lowering disposal-related costs

Additional salt sales volumes would reduce the amount of process tailings that need to be stored, in turn potentially lessening environmental disturbance and lowering waste disposal-related opex and capex. The FS sized the TSF to store 3.5-4.4Mtpa of NaCl (deposited in the form of a wet slurry, with water recycled back to the decomposition circuit by seepage and decanting), albeit construction is to be phased to gradually increase capacity.

The TSF location was selected for its low permeability (for natural protection against brine leakage); seepage will be pumped back to the plant and evaporation ponds; diversion channels around the WSF will intercept storm water

The TSF site was selected for its proximity to the plant and low natural ground permeability (providing natural protection against brine leakage). Seepage downstream of the TSF will be collected in two sumps at low points at the toe of the embankment, and managed by pumping to the process plant and to two evaporation ponds. Clean storm water from the valley sides will be intercepted by diversion channels around the TSF's perimeter. All ponds are to be equipped with spillways for extreme flows.

## Superb regional infrastructure

The project area is sparsely populated outside of Khemisset city – but is nonetheless blessed with excellent infrastructure

Outside of Khemisset city (population: c.132k in 2014), the project area is sparsely populated, with subsistence farming within river valleys and non-arable farming on hill slopes. Despite this, the project area is blessed with excellent infrastructure and, with high regional unemployment, there should be no shortage of relatively low-cost labour.

### Logistics: trucking to Casablanca preferred, viable alternatives available

High-quality highways connect Khemisset to key export ports

High-quality highways connect Khemisset to key export ports (notably: Casablanca, c.190km; Mohammedia, c.160km; Kenitra, c.120km; and Jorf Lasfar, c.300km). Access to this network will essentially require Emmerson to construct a new entrance to the A2 toll highway. Meanwhile, there is an existing train-loading platform at Meknes (c.55km by road).

Emmerson chose trucking to Casablanca over other trucking and railing options

After examining its various options, Emmerson settled on trucking from site to Casablanca port. Two other options were considered and ruled out:

- Trucking to Mohammedia and storage in a port warehouse (cost: US$9.12/t MOP).
- Railing to Casablanca (US$13.57/t MOP), which would involve double-handling: product would have to be trucked to Meknes, offloaded and re-loaded onto trains. This is the most expensive option.

Trucking to Mohammedia would be cheaper, but capex would have to be spent upgrading the port's facilities

Trucking to Casablanca was priced at US$11.39/t MOP, or US$12.9/t if product is stored in a port warehouse, i.e. cheaper than rail transport but more expensive than trucking to Mohammedia. However, c.US$10.0m would have to be spent upgrading Mohammedia's facilities, which would more than offset the opex benefit, according to Emmerson.

**Figure 18: Excellent highways link the project site to port**


Source: Company

Product would be delivered 'on time' to the wharf in high-intensity campaigns, obviating the need for port storage

Following consultation with Marsa Maroc (who operate the ore terminal at Casablanca) and a transport & logistics company (described by Emmerson as one of Morocco's largest), Emmerson further refined the Casablanca logistics solution to exclude port storage. Instead, product would be delivered 'on time' to the wharf front for loading onto ships. The reason is that Khemisset's shipping quantities would be well within the limits of delivering and loading in high-intensity 'campaigns' conducted over 3-5 days – indeed, this is the method already utilised by existing de-icing salt and clinker operators at Casablanca.

Shore Capital was assured by the operator of the ore terminal that ample capacity is available

The management of Marsa Maroc assured Shore Capital during our visit to the port that it would have ample capacity to handle Emmerson's projected potash and salt export volumes. (Moroccan fertiliser parastatal OCP Group operates its own 10Mtpa ore terminal at the port.)

Mohammedia is to be cultivated as a viable, risk-mitigating alternative; railing could be preferred in the future once a new line is built via Khemisset

Mohammedia nonetheless represents a viable, risk-mitigating alternative to Casablanca, an option which Emmerson intends to continue to cultivate. Also, railing could yet become the preferred option in the future. According to Emmerson, Morocco's national railway owner and operator ONCF has plans to construct a new railway line between Meknes and Rabat via Khemisset (paralleling the A2 highway) that could potentially be completed by 2030.

### Electricity from nearby high-voltage line

Official approval has been received to tap into a nearby 225kV line

A number of high-voltage power lines run within c.10-30km of the project site that have sufficient capacity to meet Khemisset's needs. Emmerson has received official approval to tap into a 225kV line at a connection point just c.15km away. As a result, the cost of connecting Khemisset to the electrical grid (including an on-site substation) was estimated by Emmerson at just US$10.5m (including 10% contingency).

This key regional line should provide high and stable levels of availability

As this particular line is a strategic one (connecting the Rabat and Meknes regions), it is built and maintained to very high standards, so we expect high and stable levels of availability. Moroccan national grid operator ONEE has indicated that it expects only eight hours of planned outages annually for preventative maintenance.

Some on-site generation capacity is to be installed to provide back-up power to key underground utilities

A contingency powerline and/or significant on-site generation capacity will therefore not be required. Instead, the intention is to install 1MVA of on-site generation capacity as an emergency Uninterruptible Power Supply (UPS), which would provide back-up power for key underground utilities (e.g. lighting, fire rescue and ventilation).

Emmerson should benefit "strongly" from Morocco's renewable energy push

Emmerson expects to benefit "strongly" from Morocco's renewable energy legislation, which has been implemented to help achieve the government's target of having over 50% of the country's electricity needs generated from renewable sources by 2030. Importantly, the law allows a customer to establish a commercial contract directly with a renewable energy producer at a tariff that is significantly cheaper than the government's regulated tariff regime.

We believe that the cost of renewable power could be 20-30% lower than that of regulated tariffs; power would be supplied over the existing grid, so no additional capex or opex would be required for this option

In 2019, a Memorandum of Understanding (MoU) was signed with global renewable energy developer Voltalia to examine the potential for supplying Khemisset with renewable power. Voltalia is developing a number of large-scale renewable projects in Morocco which, according to Emmerson, could supply all of Khemisset's electricity requirements.

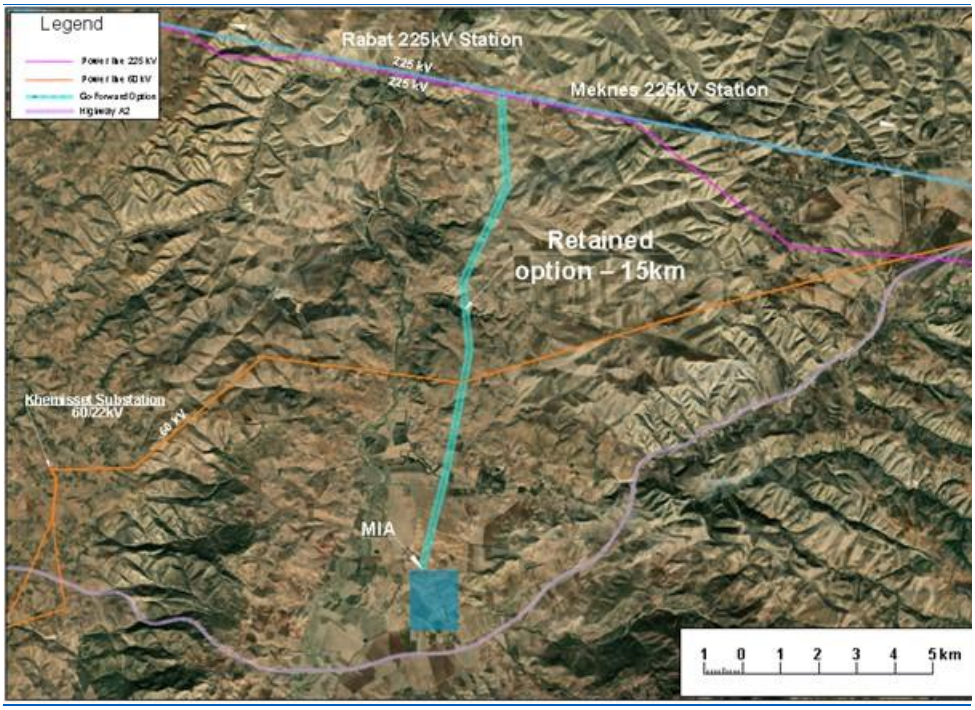
- We believe that the cost of renewable power could be 20-30% lower than that of Morocco's regulated tariff rates. As an indication of the significance of this saving, we understand that electricity accounted for around a third of cash operating costs in the scoping study on Khemisset from November 2018, which assumed the regulated tariff rates.

- Voltalia would supply power over Morocco's broader energy transmission grid, so Emmerson would bear no additional capex or opex as a result of opting for renewable power. In addition, should the supply from renewables prove less than required, the difference could be sourced from non-renewable sources at the regulated tariff rates.

A partnership with Voltalia would be a 'win win'

We believe that Voltalia would be incentivised to provide Emmerson with a 'good deal' as a partnership between the two has the potential to be a 'win win'. For Emmerson, Khemisset could enjoy significantly reduced electricity tariffs and carbon footprint (boosting the company's sustainability credentials). Meanwhile, having Emmerson as a customer would support the securing of a market for Voltalia's projects.

**Figure 19: Khemisset will connect to an existing 225kV grid power line just c.15km way**




Source: Company

## Gas: supplier willing to maintain on-site facility at own cost

A leading Moroccan supplier has confirmed its willingness to build and maintain an on-site LPG facility at its own expense; gas would be supplied under a long-term agreement, priced with reference to global market prices

A supply of gas will be required, mainly for the generation of steam (in the crystallisation process, brines are heated to up to 90ºC) and the drying of debrined, purified product. According to Emmerson, a leading Moroccan supplier has confirmed its willingness to build and maintain an on-site Liquified Petroleum Gas (LPG) facility at its own expense (i.e. at no cost to Emmerson) under a long-term supply agreement. Gas would be supplied to site with reference to global market prices plus freight and taxes, allowing Emmerson to hedge its gas exposure (and thereby protect against short-term price volatility).

Gas prices should fall as domestic production increases

We note that Moroccan gas prices are currently relatively high as the country is a net importer. However, prices are expected to fall as domestic production increases.

### Water from river: new upstream dam will smooth the flow, prevent flooding

Water will be obtained from the Oued Beht River

Khemisset's water requirements will be c.3GL/year, which the company plans to abstract from the Oued Beht River, which flows from south to north across the project area.

A new dam upstream of Khemisset will regulate the flow, preventing flooding and ensuring water availability during dry seasons

The river is dammed for irrigation by the El Kansera dam, c.20km downstream of the project. Meanwhile, the Ouljet Essoltane dam, c.17km upstream of Emmerson's project area, was commissioned in late 2019. A key function of this new dam (aside from irrigation and c.12MW of power generation) will be stabilisation of downstream river flow. As such, it should eliminate any potential for flooding at Emmerson's project site (which used to be a flood plain prior to Ouljet Essoltane's construction) while ensuring water availability for downstream users (including Emmerson) during dry seasons.

Morocco's water agency has been supportive; we understand that in-principle approval should be sufficient for the ESIA

Given the river's other existing water uses, we have been encouraged to learn from Emmerson that Morocco's water agency has been supportive of the company. We understand that in-principle approval should be sufficient for the Environmental and Social Impact Assessment (ESIA; see below), with ultimate extraction authorisation requiring a process that will commence after the mining licence has been granted.

## Targeting receipt of main permits in H1 2021

Emmerson is targeting the receipt of both environmental and mining permits during H1 2021

The major permitting workstreams include conversion of existing Research Permits to Mining Permits, environmental approval, and obtaining water and construction permits. In September 2020, Emmerson said that the Moroccan mining ministry and other relevant authorities were helpful, providing confidence that the company's target of having both environmental and mining permits in place during H1 2021 can be successfully achieved.

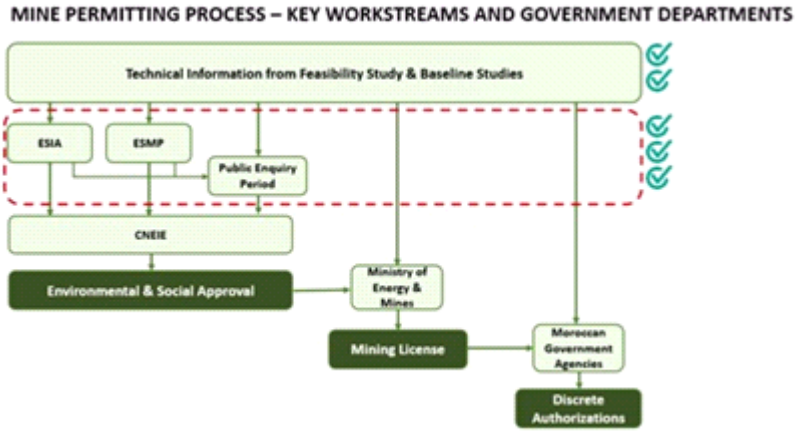
The ESIA is on-track for submission in early Q4 2020; it is being produced to high standards, and no red flags or fatal flaws have been identified to date

As we went to press, the ESIA was on-track for submission during early Q4 2020. Very commendably, Emmerson intends that its ESIA will be "much more robust" than Morocco's minimum standards, with the document being produced in adherence with the Equator Principles and IFC Performance Standards. We understand that, encouragingly, no red flags or fatal flaws have been identified to date.

Opportunities to speed up the mining permit process are being looked at, with a view to ensuring its receipt in H1 2021

Opportunities to speed up the process of securing the mining permit are being investigated, to ensure its receipt in H1 2021. We understand these to be a combination of ensuring preparation of application data well in advance and approaching elements of permit requirements in parallel (rather than following a typical sequential approach).

**Figure 20: Mine permitting process**




Source: Company

# Jorf Lasfar: ideal for Mannheim SOP

A scoping study on a Mannheim SOP production facility at Jorf Lasfar using MOP from Khemisset yielded positive results; despite the use of a high internal transfer price of US$345/t MOP, post-tax $NPV_{10\%}$ and IRR were still estimated at US$411m and 52.1%, respectively, assuming a real flat SOP price of US$525/t FOB Morocco

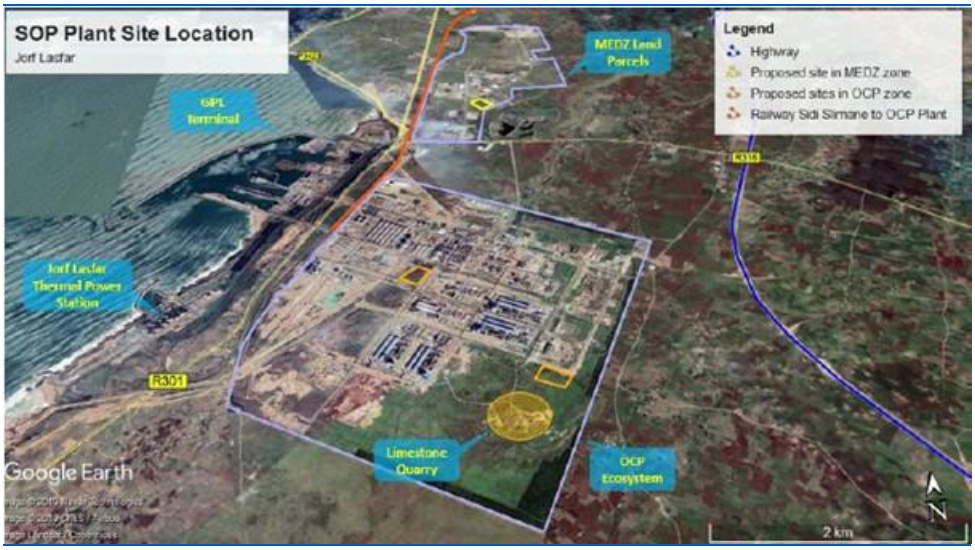
In November 2019, Emmerson released positive results from a scoping study on the production of SOP.

- The scoping study envisaged the Mannheim process being used to convert 205kpta of Khemisset's MOP output into 240ktpa K50 SOP (initially 120ktpa). The SOP facility would be located in one of a choice of pre-prepared industrial sites available for large-scale industrial plants (replete with all the usual utilities) at Jorf Lasfar. Jorf Lasfar is a deepwater port located 305km from Khemisset, with the two linked by high-quality roads.
- All-In Sustaining Cost (AISC) was estimated at US$396/t SOP FOB Morocco, albeit this assumed an internal transfer price of US$345/t MOP (AISC is US$101/t excluding MOP). Build capex was put at US$119m (including US$28m contingency), based on US$4.3m per 20ktpa twin-furnace modules (including piping, electrical and instrumentation).
- The above yielded a nominal post-tax $NPV_{10\%}$ and IRR of US$411m and 52.1%, respectively, assuming a real flat SOP price of US$525/t FOB Morocco. At US$525/t SOP, NPV would be US$129m (equivalent to c.US$100m real, we estimate).

Work is currently ongoing towards delivering a PFS; Emmerson could elect to progress directly to a FS, as with Khemisset

Work is currently ongoing towards delivering a PFS; as we went to press, Emmerson was in the process of finalising the scope of work, which we understand will likely be more thorough than a typical PFS. Indeed, given that there is not a multitude of trade-off options requiring evaluation, Emmerson may elect to proceed directly to a FS (as per Khemisset).

**Figure 21: Potential sites for SOP facility at Jorf Lasfar**




Source: Company

## The Mannheim process – waste HCl disposal is key

The Mannheim process is well understood, being responsible for c.50% of global SOP production

The Mannheim process is well understood, with Mannheim-based production (mostly in Europe and China) accounting for c.50% of global SOP production. Typically, in the production of a tonne of SOP using this process:

- Around 0.56-0.58t of 98% sulphuric acid and 0.84-0.86t of MOP is reacted in a furnace at a temperature of c.550-600ºC.
- Around 1.2t of hydrochloric acid (HCl) is produced via the absorbing byproduct chlorine gas in absorption towers (a process which helps limit atmospheric emissions).

The energy-intensive Mannheim process requires reasonably-priced supplies of MOP, sulphuric acid and gas; HCl disposal is often the key constraint that limits Mannheim SOP production

In other words, the Mannheim process is energy intensive, and requires secure and reasonably-priced supplies of MOP, sulphuric acid and gas. However, it is HCl disposal that is usually the key constraint that limits Mannheim SOP output. In some locations, HCl can actually be sold as a valuable revenue-enhancing byproduct. However, where there is not such a market (or one of sufficient size), HCl represents a problematic waste whose safe disposal is expensive and challenging.

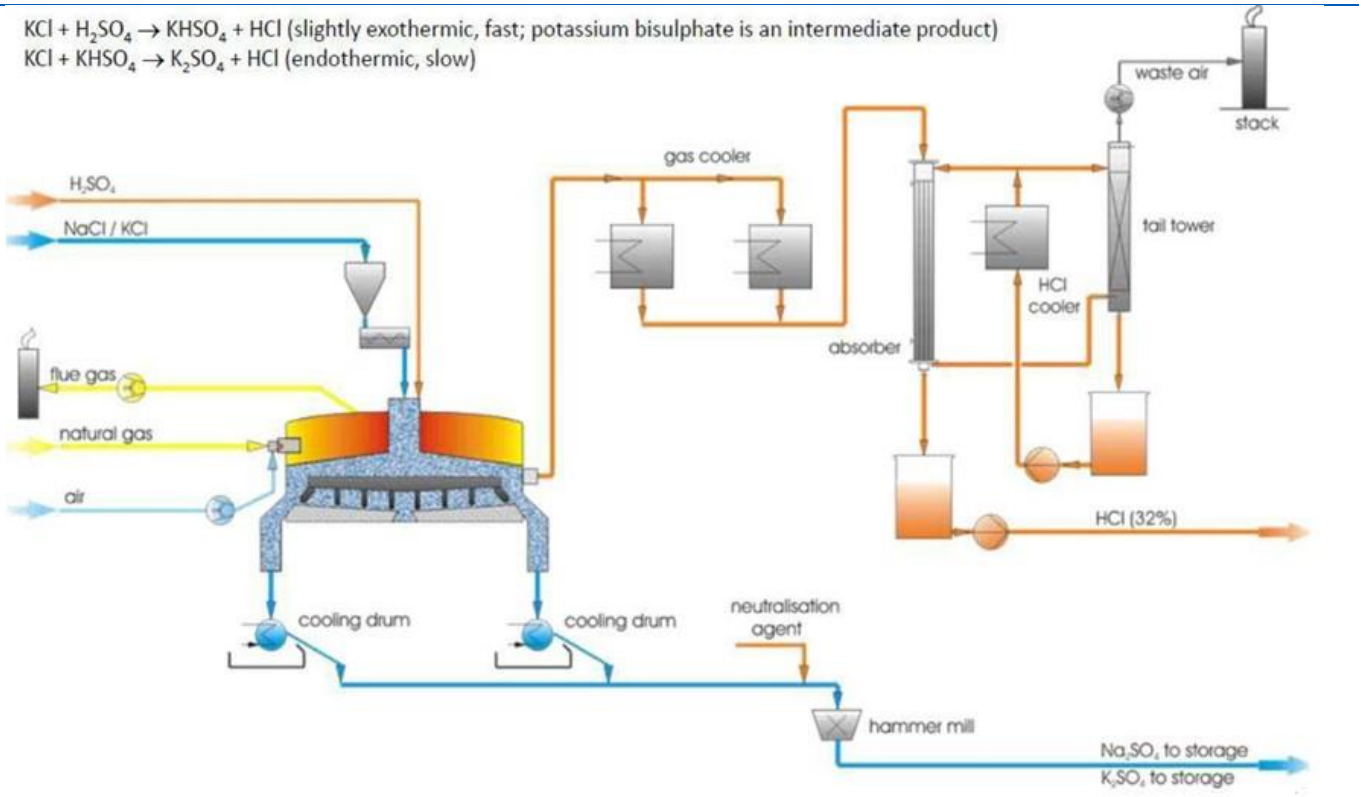
Modern furnaces are highly efficient

Modern Mannheim furnaces are fully automated, reducing labour requirements and thereby operating costs. Research into acid-resistant technologies has increased component lifespans, reduced maintenance costs and improved operational efficiencies.

The modular nature of the process makes for scalability; smaller operations could potentially be viable

Multiple furnaces (typically of 10ktpa; or 20ktpa pairs thereof) can be combined to create facilities capable of up to 500ktpa (or more). However, scale benefits from such a modular buildout are likely to be limited, according to Emmerson. The flipside is that smaller operations could potentially be viable, especially in situations where only minimal investment in supporting infrastructure is required. Indeed, smaller operations would theoretically be easier to fund, while disposal of the resulting smaller volumes of 'waste' HCl should be less problematic.

**Figure 22: The Mannheim process**




Source: Company

## Numerous sustainable competitive advantages

A SOP facility at Jorf Lasfar is likely to enjoy a number of sustainable competitive advantages inherent to the strategic location, including:

A SOP facility at Jorf Lasfar is likely to enjoy a number of sustainable competitive advantages inherent to the strategic location, we believe. These include:

- A nearby captive source of MOP.
- Relative proximity to likely customers via an existing fertiliser export port.
- Excellent infrastructure with key inputs readily available.
- Multiple monetisation options for HCl.

### Nearby captive source of MOP

A secure captive source of low-cost MOP;

None of the Mannheim-based SOP producers are vertically integrated; their input costs can therefore vary significantly with the price of MOP. In contrast, Emmerson's SOP production would benefit from secure, low-cost MOP supply from Khemisset and, in turn, confer significant incremental value.

### Relative proximity to likely customers via existing fertiliser export port

Relative proximity to likely customers via an existing fertiliser export port;

The primary port for exports of phosphate rock (of which Morocco is the world's largest producer), Jorf Lasfar is well-located to service multiple SOP markets, including the premium-priced US market and the northwest European market. More immediately, OCP has a large export-orientated NPK fertiliser blending facility at the port that is a significant consumer of imported MOP and SOP (from Arab Potash and ICL, but also as far afield as Belarus, Russia and Canada), and so we believe represents a potential customer.

We understand from Emmerson that direct trucking from Khemisset to Jorf Lasfar would cost c.US$17-18/t; we expect that railing will prove similar due to double-handling.

### Excellent infrastructure with key inputs readily available

Excellent infrastructure with key inputs such as low-cost sulphuric acid and steam available;

Fortuitously, one of Africa's largest sulphuric acid plants is located at Jorf Lasfar, from which relatively low-cost sulphuric acid (and co-generated steam) should be available. (Alternatively, we understand from Emmerson that there is a surplus of sulphuric acid in the EU.) All the other usual utilities (including gas, power and water) would also be available. In terms of logistics, the port is a deepwater facility capable of accepting ships of any size; inland transport options include both road and rail transport.

### Multiple monetisation options for HCl

And very importantly, multiple monetisation options for what would otherwise be 'waste' hydrochloric acid

A SOP facility at Jorf Lasfar would be proximal to consumers of hydrochloric acid, and sources of phosphate rock and limestone (there are numerous quarries within 50km), providing multiple options for monetisation of 'waste' HCl. Emmerson could thus choose to sell hydrochloric acid; or some or all of the acid could be neutralised by reaction with phosphate rock or limestone to produce dicalcium phosphate (DCP) or calcium chloride ($CaCl_2$), respectively. DCP is a high-value animal feed; calcium chloride is a high-value industrial salt and a superior de-icing agent/salt that is also used in dust suppression. In the worst-case scenario, we understand that calcium chloride can be safely disposed of via marine discharge.

# Next steps

Environmental and mining permits should be received during H1 2021

Emmerson is currently focused on moving Khemisset towards 'shovel-ready' status, including operational capability build-out, Front End Engineering & Design (FEED), permitting and financing. We are expecting that ESIA submission should occur in early Q4 2020, which should see both the environmental and mining permits granted during H1 2021.

A range of other activities and objectives are also targeted to be completed by mid-2021

Thereafter, Emmerson is targeting to have completed by mid-2021:

- Geotechnical drilling for site and to de-risk the decline.
- A further seismic survey and additional drilling to prove up the early mining blocks.
- Ventilation modelling, cuttability testing and further process work.
- Detailed mine design and planning, and basic engineering of the process plant, decline and infrastructure.
- Agreements over land for the project site.

We assume that construction financing will be completed during H2 2021

We assume that Emmerson would then look to complete the construction finance package during H2 2021. Construction could thus commence in early 2022, with first and 'steady-state' MOP production achieved in early 2024 and 2025, respectively.

In addition, we look forward to further studies on SOP production, the upscaling of de-icing salt production and potential mine life extensions

In addition, we expect that Emmerson will be looking to conduct further studies on: SOP production, including a PFS and/or FS; the technical and market impact of upscaling de-icing salt production; and on incorporating more of Khemisset's resources into the mine plan in order to extend mine life and/or increase production.

# Impressive economics

## Key base-case assumptions

### Khemisset

We model along the lines of the FS for the time being, pending actual developments; LOM average All-In Sustaining Cost is US$158/t MOP; capex, US$411m

Emmerson is currently investigating options for phased development that have the potential to materially reduce upfront capital costs. Pending actual developments, we opt for now to model along the lines of the FS.

- Construction and production commence in early 2022 and early 2024, respectively. 'Steady-state' MOP production (averaging 735ktpa) is achieved in 2025, while 'full' production of byproduct salt is achieved during 2024. Mine life is 19 years, including a ramp-up year.
- All-In Sustaining Cash Cost (FOB Casablanca) at steady state is US$158/t MOP (before byproduct credits).
- Capex is modelled as being US$411m, which is conservative in implying that all of the US$45.5m (16%) contingency provision in the FS is actually spent.

### SOP

SOP production is modelled per the November 2019 scoping study; if Emmerson proceeds directly to an FS, this could shave a year off our timelines

Similarly, pending more definitive developments, we elect to model SOP production on a 'standalone' basis, along the lines of the November 2019 scoping study. We assume that a PFS is completed during H1 2021, followed by a FS in H1 2022. Construction occurs over 2023-2024, with first production in early 2025. Should Emmerson elect to proceed directly to an FS, we expect that this would shave around a year off our timelines.

At steady state, 240ktpa of SOP is produced from 205ktpa MOP, supplied by Khemisset on an arm's length basis; All-In Sustaining Cost is US$359.7/t SOP; capex, US$120m

At steady state (from 2026 onwards), 240ktpa of SOP is produced from 205ktpa MOP. We apply a nominal 'transfer' price that is the same average FOB price that Khemisset receives for other MOP sales, plus additional trucking costs (from Casablanca to Jorf Lasfar), i.e. on an arm's length basis. The result is an All-In Sustaining Cash Cost (FOB Jorf Lasfar) at steady state of US$352/t SOP. Capex for the SOP facility is US$120m, with the intermediate option of US$94m for an initial production capacity of 120ktpa.

If MOP is supplied at cost, All-In Sustaining Cash Cost would be US$246.8/t SOP

We also evaluate the production of SOP on an 'integrated' basis, wherein MOP is supplied to the SOP facility at cost. In this case, All-In Sustaining Cash Cost (FOB Jorf Lasfar) is US$240/t SOP.

We assume that 'waste' hydrochloric acid is sold and/or converted into (and sold as) calcium chloride. For the time being, we do not attribute any value to sales of hydrochloric acid or calcium chloride.

### Prices and FX

Our base case uses a flat MOP price of US$290/t FOB (versus our long-term US$350/t forecast)

Opting for conservatism, our base-case scenario applies a flat average MOP price of US$290/t FOB Casablanca (equivalent to US$300/t CFR Brazil) – which is actually our medium-term price forecast. Our long-term MOP price assumption (from 2025) is actually US$350/t FOB (US$360/t CFR Brazil).

We model US$50/t FOB for de-icing salt, US$525/t FOB for SOP and FX of US$1.30/£1

We also model flat prices for de-icing salt and SOP of US$50/t FOB Casablanca and US$525/t FOB Jorf Lasfar, respectively. For FX, we use a flat FX rate of US$1.30/£1. In the event of an unfavourable outcome to the Brexit negotiations, we see the possibility of a material weakening of the pound, which would have a favourable impact on our numbers.

### Other assumptions

Income tax is 0% for the first five years and 20% thereafter; royalties are assumed to be US$0.33/t for MOP and de-icing salt

We provide for a five-year corporate income tax holiday from first production (first MOP production in the 'integrated' SOP scenario but first SOP production in the 'standalone' scenario) and 20% thereafter. Royalties are assumed to be 3 dirham (US$0.33) per tonne of MOP and de-icing salt (although we are hopeful that a lower rate may be negotiated).

## Financial analysis

Emmerson ended H1 2020 with £0.8m of cash and raised a further £1.72m in July 2020; we assume that a further £10m will be raised during H2 2020 towards engineering and other studies

Emmerson does not yet generate revenues and so is currently reliant on capital market financing to cover its funding requirements. The company ended H1 2020 with £0.8m of cash and no debt (April 2020: £1.2m of cash).

- In July 2020, Emmerson raised £1.72m (gross) via an oversubscribed placing of 40.5m shares priced at 4.25p/share, resulting in the company having 726.6m shares in issue. The proceeds were intended to be put towards the mine permitting process, technical work (including geotechnical drilling and drilling to confirm brine deep well injection) and investigating the possibility of a phased development of the Khemisset project.
- We model a further £10m of equity being raised at 4.0p/share (the current share price rounded down) during H2 2020 in order to complete FEED and other studies (to be clear, this is a Shore Capital assumption rather than company guidance).

The peak funding requirement in our model is c.U$400m in 2024

In relation to financing Khemisset's construction, our model projects Emmerson having a peak funding requirement of c.US$400m in 2024 (including corporate overheads but before financing costs). Emmerson has no preconceived notions as to the optimal financing mix but, instead, intends to weigh up all available options (and combinations thereof) in order to select the structure that maximises benefit for shareholders.

A range of construction funding permutations are possible; for now, we assume that a US$425m financing package is completed during H2 2021, comprising: US$230m of senior secured debt (7.5% interest) and US$195m of 'other' funding, conservatively modelled as entirely equity priced at 4.0p/share

In our view, a portion of the financing will almost certainly be in the form of equity, but a broad range of funding permutations would be possible for the remainder (e.g. convertible debt, project finance, royalty finance, strategic investments, etc). Consequently, pending actual developments, we assume that:

- A total financing package of US$425m is completed in H2 2021, a bit higher than the peak funding requirement in order to provide a cushion with which to provide some comfort.
- Based on indicative terms from "a major European commercial bank", US$230m takes the form of senior secured debt, drawn down in tranches over 2022-2024 to minimise interest. The interest rate is 7.5%/year, on the simplified assumption of a flat LIBOR of 2.5% plus 5%. We model a three-year principal repayment holiday from first drawdown (with interest rolled up during this period). Accrued interest and principal are repaid in equal instalments over seven years.
- US$195m is raised from 'other' sources, which for convenience and conservativeness we model for now as taking the form of equity (which is typically the most 'expensive' form of finance). As always, we opt not to guess the equity raise price – instead, we again simply adopt the downwards-rounded current share price of 4.0p/share as our 'base-case' assumption and have provided sensitivities to enable readers to pick their own preferred equity price.

Our senior debt assumptions are based on an estimate provided to Emmerson that was based on a MOP price of US$235/t CFR Brazil; a greater debt quantum may be possible if offtake contracts have higher floor prices

Our senior debt assumptions are based on a formal debt sizing estimate provided to Emmerson in June 2019 by "a major European commercial bank". The bank estimated a debt capacity of up to US$230m, with final sizing and terms subject to conditions such as finalisation of offtake agreements. The indicative capacity was based on what we consider to be a highly conservative flat MOP price of US$235/t CFR Brazil. Consequently, we believe there to be the potential for a greater debt quantum if Emmerson is able to negotiate offtake contracts containing floor prices that are higher than the bank's base-case price.

Phased development options could not only materially reduce upfront capex but should also allow financing to be considered at different levels

Engagement with potential strategic partners, debt providers and anchor investors has been reported to be progressing well, with multiple opportunities under consideration and due diligence processes underway. We remind readers that Emmerson is conducting work to confirm opportunities for phased development. Such options would not only have the potential to materially reduce upfront capital costs, but should also allow financing to be considered at different levels.

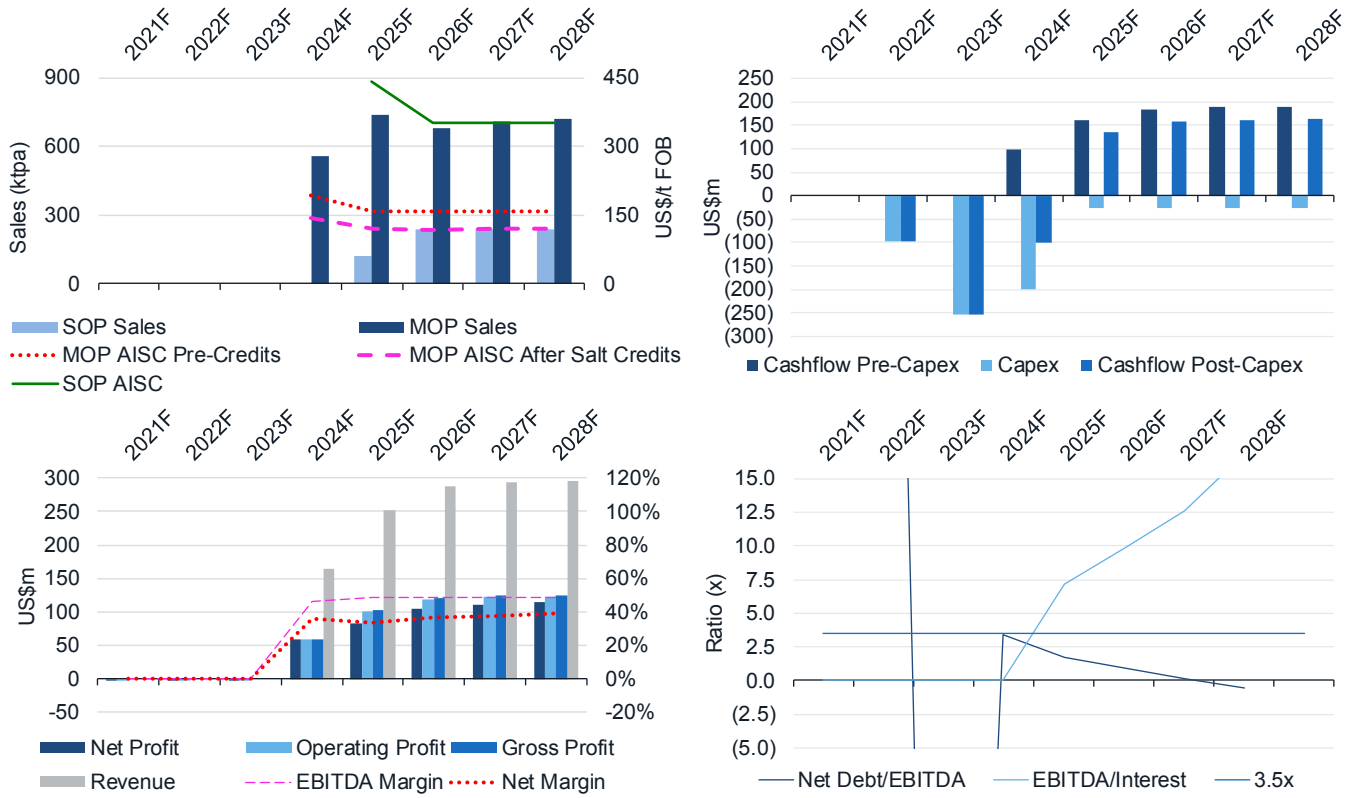
## Strong high-margin cash generation

Our model projects strong cash generation at decent margins; margins are particularly attractive if Khemisset supplies MOP for SOP production at cost

Our model projects strong cash generation at decent margins. Interestingly, if SOP is produced on an 'integrated' basis (whereby MOP is supplied to the SOP facility at cost), absolute EBITDA is unchanged but the EBITDA margin becomes quite attractive indeed.

- With our conservative base-case assumptions, steady-state EBITDA and EBITDA margin average c.£143m and c.48.6%, respectively. EBITDA/interest would exceed 3.0x and net debt/EBITDA would be below 3.0x by FY2025F. If Khemisset were to supply MOP for SOP production at cost, the EBITDA margin improves to 57.3%.
- On our long-term MOP price forecast of US$350/t FOB Casablanca, steady-state EBITDA and EBITDA margin average c.£167m and c.51.0%, respectively. Net debt/EBITDA would be below 3.0x by FY2025F. As before, if MOP is supplied for SOP production at cost, the EBITDA margin improves, this time to 61.1%.

**Figure 23: Base-case vital statistics**




Source: Company Data; Shore Capital Markets

**Figure 24: Base-case financial model (December year-end)**

All £ unless otherwise noted

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Shares OS | m | 686.1 | 918.9 | 4,668.9 | 4,668.9 | 4,668.9 | 4,668.9 | 4,668.9 | 4,668.9 |
| Shares FD | m | 740.0 | 1,016.4 | 4,766.4 | 4,766.4 | 4,766.4 | 4,766.4 | 4,766.4 | 4,766.4 |
| **INCOME STATEMENT** | | **FY2019A** | **FY2020F** | **FY2021F** | **FY2022F** | **FY2023F** | **FY2024F** | **FY2025F** | **FY2026F** |
| **Revenue** | **£m** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **163.4** | **252.0** | **287.1** |
| Operating Costs | £m | (1.1) | (1.0) | (1.1) | (1.1) | (1.2) | (88.4) | (130.1) | (147.5) |
| **EBITDA** | **£m** | **(1.1)** | **(1.0)** | **(1.1)** | **(1.1)** | **(1.2)** | **75.0** | **121.9** | **139.6** |
| Depreciation | £m | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | (16.5) | (21.3) | (21.2) |
| **EBIT** | **£m** | **(1.1)** | **(1.0)** | **(1.1)** | **(1.1)** | **(1.2)** | **58.4** | **100.6** | **118.4** |
| Finance Income | £m | 0.0 | 0.0 | 0.0 | 0.5 | 0.5 | 0.2 | (17.1) | (14.2) |
| **Pre-Tax Profit** | **£m** | **(1.1)** | **(1.0)** | **(1.0)** | **(0.6)** | **(0.7)** | **58.7** | **83.6** | **104.2** |
| Taxes | £m | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Minorities | £m | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Attributable Net Income** | **£m** | **(1.1)** | **(1.0)** | **(1.0)** | **(0.6)** | **(0.7)** | **58.7** | **83.6** | **104.2** |
| **EPS** | **p/share** | **(0.17)** | **(0.13)** | **(0.04)** | **(0.01)** | **(0.0)** | **1.3** | **1.8** | **2.2** |
| **BALANCE SHEET** | | **FY2019A** | **FY2020F** | **FY2021F** | **FY2022F** | **FY2023F** | **FY2024F** | **FY2025F** | **FY2026F** |
| Cash & Equivalents | £m | 2.1 | 8.3 | 188.7 | 166.3 | 79.5 | 13.3 | 19.4 | 64.3 |
| Other Current Assets | £m | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 41.1 | 103.8 | 134.8 |
| **Current Assets** | **£m** | **2.3** | **8.6** | **189.0** | **166.5** | **79.8** | **54.4** | **123.2** | **199.1** |
| PP&E | £m | 6.2 | 10.2 | 14.2 | 92.6 | 291.6 | 432.2 | 434.6 | 436.7 |
| Other | £m | 0.0 | 0.0 | 0.0 | 4.3 | 17.6 | 36.1 | 36.1 | 36.1 |
| **Total Assets** | **£m** | **8.6** | **18.8** | **203.2** | **263.5** | **388.9** | **522.7** | **594.0** | **671.9** |
| Short-term Debt | £m | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other Current Liabilities | £m | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 25.9 | 37.5 |
| **Current Liabilities** | **£m** | **0.4** | **0.4** | **0.4** | **0.4** | **0.4** | **0.4** | **25.9** | **37.5** |
| Long Term Debt | £m | 0.0 | 0.0 | 0.0 | 61.8 | 190.1 | 266.1 | 228.1 | 190.1 |
| Other Long Term Liabilities | £m | 0.0 | 0.0 | 0.0 | 0.0 | (0.0) | (0.0) | 0.0 | 0.0 |
| **Total Liabilities** | **£m** | **0.4** | **0.4** | **0.4** | **62.2** | **190.5** | **266.6** | **254.1** | **227.6** |
| Shareholder Equity | £m | 10.8 | 22.7 | 217.8 | 218.0 | 218.2 | 218.4 | 218.6 | 218.8 |
| Retained Income | £m | (4.2) | (5.8) | (16.6) | (18.3) | (21.3) | 36.2 | 119.8 | 223.9 |
| Other | £m | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| **Total Liabilities & Equity** | **£m** | **8.6** | **18.8** | **203.2** | **263.5** | **388.9** | **522.7** | **594.0** | **671.9** |
| **CASHFLOW STATEMENT** | | **FY2019A** | **FY2020F** | **FY2021F** | **FY2022F** | **FY2023F** | **FY2024F** | **FY2025F** | **FY2026F** |
| Pre-Tax Profit | £m | (1.1) | (1.0) | (1.0) | (0.6) | (0.7) | 58.7 | 83.6 | 104.2 |
| DD&A | £m | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.5 | 21.3 | 21.2 |
| Other | £m | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Change in Working Capital | £m | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | (40.8) | (37.2) | (19.3) |
| **Cash Flow from Operations** | **£m** | **(0.9)** | **(0.9)** | **(0.9)** | **(0.4)** | **(0.5)** | **34.5** | **67.8** | **106.2** |
| Capital Expenditure | £m | (2.5) | (4.0) | (4.0) | (78.4) | (199.0) | (157.1) | (23.7) | (23.3) |
| Other | £m | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Cash Flow from Investments** | **£m** | **(2.5)** | **(4.0)** | **(4.0)** | **(78.4)** | **(199.0)** | **(157.1)** | **(23.7)** | **(23.3)** |
| Equity Issues | £m | 2.1 | 11.7 | 195.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Net Borrowings | £m | 0.0 | 0.0 | 0.0 | 57.5 | 115.0 | 57.5 | (38.0) | (38.0) |
| Other | £m | 0.0 | (0.6) | (9.8) | (1.2) | (2.3) | (1.2) | 0.0 | 0.0 |
| **Cash Flow from Financing** | **£m** | **2.1** | **11.1** | **185.3** | **56.4** | **112.7** | **56.4** | **(38.0)** | **(38.0)** |
| **Net Cashflow** | **£m** | **(1.2)** | **6.3** | **180.4** | **(22.5)** | **(86.8)** | **(66.2)** | **6.1** | **44.9** |
| FX Adjustments | £m | (0.0) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Cash at End of Year** | **£m** | **2.1** | **8.3** | **188.7** | **166.3** | **79.5** | **13.3** | **19.4** | **64.3** |

Source: Company Data; Shore Capital Markets

## Valuation

Our base-case post-tax FY2021F valuation is 13.9p/share; this includes NPV8% valuations for Khemisset of 7.5p/share and for a standalone SOP operation of 2.3p/share

Our base-case post-tax FY2021F valuation for Emmerson is £662m or 13.9p/share FD. Our estimate is:

- Predicated on Emmerson being fully funded, with financial close successfully achieved during H2 2021.
- Underpinned by NPV8% valuations for Khemisset (c.£359m or 7.5p/share) and a standalone SOP operation (£109m or 2.3p/share), with the former supplying MOP to the latter on an arm's length basis.

**Figure 25: Base-case sum-of-the-parts valuation evolution**

| Asset | FY2021F | FY2022F | FY2023F | FY2024F | FY2025F | FY2026F |
|---|---|---|---|---|---|---|
| Khemisset | 358.5 | 387.2 | 492.6 | 680.8 | 766.0 | 731.6 |
| SOP | 108.9 | 117.6 | 127.0 | 183.3 | 244.1 | 255.9 |
| **Net Operating Assets** | **467.4** | **504.8** | **619.6** | **864.1** | **1,010.2** | **987.5** |
| Cash | 188.7 | 166.3 | 79.5 | 13.3 | 19.4 | 64.3 |
| Debt | 0.0 | (61.8) | (190.1) | (266.1) | (228.1) | (190.1) |
| Options & Warrants | 5.7 | 5.7 | 5.7 | 5.7 | 5.7 | 5.7 |
| **NPV (£m)** | **661.8** | **614.9** | **514.6** | **616.9** | **807.1** | **867.4** |

| Asset | FY2021F | FY2022F | FY2023F | FY2024F | FY2025F | FY2026F |
|---|---|---|---|---|---|---|
| Khemisset | 7.5 | 8.1 | 10.3 | 14.3 | 16.1 | 15.3 |
| SOP | 2.3 | 2.5 | 2.7 | 3.8 | 5.1 | 5.4 |
| **Net Operating Assets** | **9.8** | **10.6** | **13.0** | **18.1** | **21.2** | **20.7** |
| Cash | 4.0 | 3.5 | 1.7 | 0.3 | 0.4 | 1.3 |
| Debt | 0.0 | (1.3) | (4.0) | (5.6) | (4.8) | (4.0) |
| Options & Warrants | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| **NPV (p/share)** | **13.9** | **12.9** | **10.8** | **12.9** | **16.9** | **18.2** |

Source: Shore Capital Markets

We estimate a Risked valuation of 7.0p/share; Emmerson could be trading around or upwards of 20p/share in a few years, we believe

We derive a Risked valuation for Emmerson of 7.0p/share by applying a 40% 'haircut' to our base-case valuation and rounding the result. As Emmerson is further de-risked and lower discount rates can be justified, we believe that the shares could be trading around or upwards of 20p/share in the years following production commencement.

### Sensitivity analyses of base-case valuation

Our valuation is most sensitive to prices, opex and discount rates

Sensitivity analyses reveal that our base-case valuation of Emmerson is most sensitive to product prices (in particular, that of MOP), operating costs and the discount rate.

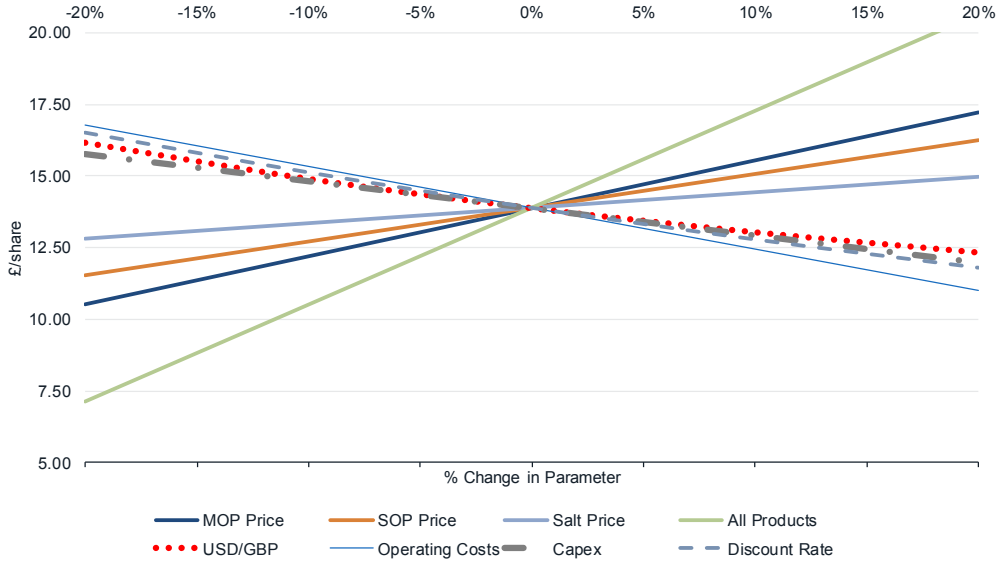
There are many potential sources of upside to our valuation, e.g.: applying our long-term MOP price of US$350/t yields 17.3p/share; NPV uplift with time, 18.2p/share by FY2026F; the combination of time uplift and a reduction in the discount rate to 5%, 22.8p/share by FY2026F

Our sensitivity analyses suggest many potential sources of upside to our valuation. For example:

- A potentially significant source of upside is MOP prices. We remind readers that our long-term MOP price forecast (2025 onwards) is actually US$350/t FOB Casablanca (whereas our base case uses US$290/t), and we envisage Khemisset commencing production in 2024 and achieving steady state in 2025. Applying a flat MOP price of US$350/t results in a c.25% increase in our FY2021F valuation to 17.3p/share.
- As capital is sunk and production draws closer and then commences, NPV inexorably rises. As a result of this NPV uplift with time, our valuation rises to 18.2p/share by the time steady-state production is achieved at both MOP and SOP operations in FY2026F.

- We believe that lower discount rates can be applied as Emmerson is progressively de-risked. Supposing that the discount rate can be reduced to 5% at steady-state production: this, combined with NPV uplift over time, yields a FY2026F value of 22.8p/share.

**Figure 26: Base-case valuation sensitivities**




| FY2021 NPV/share | | Average Received MOP Price (US$/t FOB) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 230 | 260 | 290 | 320 | 350 | 230 | 260 | 290 | 320 | 350 |
| Discount Rate | 5% | 14.7p | 17.0p | 19.4p | 21.7p | 24.0p | 5.9% | 22.6% | 39.4% | 56.1% | 72.8% |
| | 6% | 13.1p | 15.2p | 17.3p | 19.4p | 21.5p | (5.9%) | 9.2% | 24.3% | 39.4% | 54.5% |
| | 7% | 11.6p | 13.5p | 15.4p | 17.3p | 19.3p | (16.1%) | (2.4%) | 11.3% | 25.0% | 38.7% |
| | 8% | 10.4p | 12.2p | 13.9p | 15.6p | 17.3p | (24.9%) | (12.5%) | 0.0% | 12.5% | 24.9% |
| | 9% | 9.4p | 11.0p | 12.5p | 14.1p | 15.7p | (32.5%) | (21.1%) | (9.8%) | 1.6% | 13.0% |
| | 10% | 8.5p | 9.9p | 11.4p | 12.8p | 14.2p | (39.0%) | (28.6%) | (18.2%) | (7.9%) | 2.5% |
| | 11% | 7.7p | 9.0p | 10.3p | 11.6p | 13.0p | (44.7%) | (35.2%) | (25.6%) | (16.1%) | (6.6%) |
| | 12% | 7.0p | 8.2p | 9.4p | 10.6p | 11.9p | (49.6%) | (40.9%) | (32.1%) | (23.3%) | (14.6%) |

| FY2021 NPV/share | | Opex | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 80% | 90% | 100% | 110% | 120% | 80% | 90% | 100% | 110% | 120% |
| Capex | 80% | 18.7p | 17.2p | 15.8p | 14.3p | 12.9p | 34.6% | 24.1% | 13.7% | 3.2% | (7.2%) |
| | 90% | 17.7p | 16.3p | 14.8p | 13.4p | 11.9p | 27.7% | 17.3% | 6.8% | (3.6%) | (14.0%) |
| | 100% | 16.8p | 15.3p | 13.9p | 12.4p | 11.0p | 20.9% | 10.4% | 0.0% | (10.4%) | (20.9%) |
| | 110% | 15.8p | 14.4p | 12.9p | 11.5p | 10.0p | 14.0% | 3.6% | (6.8%) | (17.3%) | (27.7%) |
| | 120% | 14.9p | 13.4p | 12.0p | 10.5p | 9.1p | 7.2% | (3.2%) | (13.7%) | (24.1%) | (34.6%) |
| | 130% | 13.9p | 12.5p | 11.0p | 9.6p | 8.1p | 0.3% | (10.1%) | (20.5%) | (31.0%) | (41.4%) |

| FY2021 NPV/share | | Other Proportion of Fund Raise - Modelled as Equity (US$m) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 225 | 200 | 195 | 175 | 150 | 225 | 200 | 195 | 175 | 150 |
| Equity Price (p/share) | 2.0 | 7.1p | 7.7p | 7.8p | 8.3p | 9.1p | (48.6%) | (44.9%) | (44.0%) | (40.2%) | (34.3%) |
| | 2.5 | 8.7p | 9.3p | 9.4p | 10.0p | 11.0p | (37.4%) | (33.0%) | (32.1%) | (27.7%) | (20.8%) |
| | 3.0 | 10.2p | 10.8p | 11.0p | 11.7p | 12.7p | (26.7%) | (21.9%) | (20.8%) | (15.9%) | (8.3%) |
| | 3.5 | 11.6p | 12.3p | 12.5p | 13.2p | 14.4p | (16.6%) | (11.3%) | (10.1%) | (4.8%) | 3.4% |
| | 4.0 | 12.9p | 13.7p | 13.9p | 14.7p | 15.9p | (7.0%) | (1.3%) | 0.0% | 5.7% | 14.3% |
| | 4.5 | 14.2p | 15.0p | 15.2p | 16.0p | 17.3p | 2.2% | 8.2% | 9.6% | 15.5% | 24.5% |
| | 5.0 | 15.4p | 16.3p | 16.5p | 17.3p | 18.6p | 11.0% | 17.3% | 18.7% | 24.8% | 34.1% |
| | 5.5 | 16.6p | 17.5p | 17.7p | 18.6p | 19.9p | 19.4% | 25.9% | 27.3% | 33.6% | 43.2% |
| | 6.0 | 17.7p | 18.6p | 18.8p | 19.7p | 21.1p | 27.4% | 34.1% | 35.5% | 42.0% | 51.7% |
| | 7.0 | 19.8p | 20.7p | 20.9p | 21.9p | 23.2p | 42.5% | 49.4% | 50.9% | 57.5% | 67.3% |
| | 8.0 | 21.7p | 22.7p | 22.9p | 23.8p | 25.2p | 56.3% | 63.3% | 64.8% | 71.5% | 81.3% |
| | | 200 | 225 | 230 | 250 | 275 | 200 | 225 | 230 | 250 | 275 |
| | | Debt Proportion of Fund Raise (US$m) | | | | | | | | | |

Source: Shore Capital Markets

## Emmerson appears significantly undervalued relative to peers

The amount of equity that actually has to be raised is likely to be smaller, and at a higher share price, than we have modelled; we expect Emmerson's share price to rise over the coming months for a number of reasons

The quantum of equity that is required, and share price at which this is raised, represent significant potential sources of upside to our valuation. As noted earlier, we have modelled all 'other' funding as equity, which is conservative in that equity is typically the most 'expensive' source of finance. Furthermore, we expect Emmerson's share price to rise as:

- Development advances, and environmental and mining permits are received, thereby reducing execution and permitting risks.
- Offtake agreements and elements of the financing package are announced, reducing commercial and financing risk. We envision all capital elements being raised conditional on the basis of a complete financing package being put together, with equity representing the last piece of this 'jigsaw', giving equity investors clarity and confidence in their investment.
- MOP pricing improves into 2021 – we believe 2020 represents a firm bottom.

Emmerson appears heavily undervalued relative to peers that are at a similar stage of development

Also in relation to the share price, we note that Emmerson appears heavily undervalued relative to peers that are about to raise, or are already in the process of raising, construction funds:

- Highfield Resources, whose 1Mtpa Muga MOP project bears many similarities with Khemisset, has an enterprise value (EV) of c.£79m, or nearly triple that of Emmerson's.
- Danakali has previously estimated that it would need to raise US$322m (100% basis) to build its 50%-owned Colluli project in Eritrea, of which US$200m of senior debt and US$21.5m of equity have been procured thus far. Colluli is projected to produce 472ktpa SOP in Phase 1, expanding to 944ktpa in Phase 2. We note that Emmerson could theoretically average just over 800ktpa if all of Khemisset's MOP production was converted to SOP. Yet, Danakali has an EV of c.£79m, implying a valuation for Colluli of c.£160m on a 100% basis (i.e. c.3-6x Emmerson's).
- Salt Lake Potash, whose Lake Way project in Australia is planned to produce 245ktpa SOP, has an EV of c.£137m, after adjusting for its Stage 1 bridge facility and the A$98.5m of equity recently raised as part of the company's efforts to unlock the very expensive US$138m main project facility from Taurus Funds Management.

We believe Emmerson's shares should be trading at c.12-24p/share; if the equity raise were US$150m at 8p/share, our valuation would be c.82% higher

On the basis of the above, it would seem to us that Emmerson's shares should be trading at c.3-6x the current level, i.e. c.12-24p/share. Supposing it turned out that Emmerson's equity quantum required was US$150m and that this were raised at 8p/share (rather than US$195m @ 4p/share), our FY2021F valuation would be c.82% higher at 26.7p/share.

## Downside risk appears limited relative to upside potential

We are satisfied that downside risk is limited relative to upside potential

As a matter of prudence, we examine the following worst-case scenarios:

- A reduction in the flat MOP price to the spot price of US$240/t CFR Brazil (US$230/t FOB Casablanca) still yields an FY2021F valuation of 10.4p/share.
- If, on top of the lower flat MOP price, we increase capex and opex by 20%, our valuation becomes 5.6p/share.

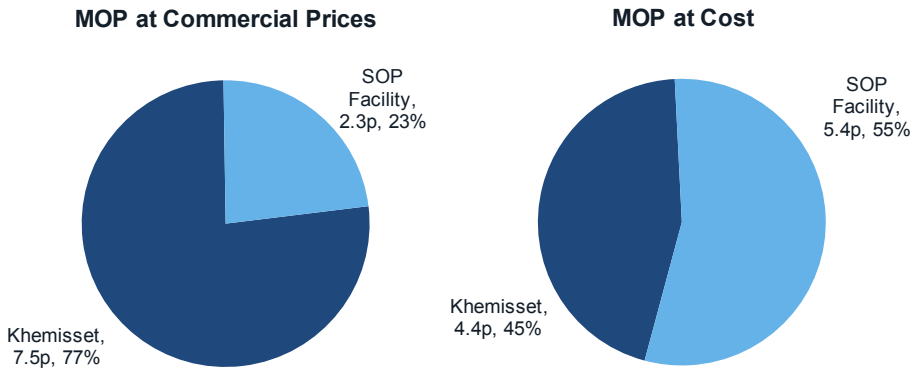
Given the above, we are satisfied that downside risk is limited relative to upside potential.

## Byproduct/coproduct scenarios: salt and SOP sales potentially very valuable

The incremental value of SOP production exceeds that of Khemisset if MOP is supplied at cost

Our base-case valuation for the SOP facility of £109m or 2.3p/share is reflective of the incremental value to Emmerson of SOP production. An alternative way of thinking about the value of the SOP basis is to look at it on an 'integrated' basis, whereby MOP is supplied to it by Khemisset at cost. In this case, the $NPV_{8\%}$ of the SOP operation jumps to £258m or 5.4p/share. The opportunity cost to Khemisset is reflected in its $NPV_{8\%}$ falling to £212m or 4.4p/share.

**Figure 27: Impact of transfer price on relative values of Khemisset and SOP facility**




Source: Shore Capital Markets

If SOP production is 480ktpa rather than 240ktpa, our Emmerson valuation improves by c.16.5%

We have also examined the increment to our Emmerson valuation of increasing SOP production to 480ktpa. We model the additional 240ktpa as being produced at a separate but identical facility at Jorf Lasfar, allowing for an intermediate step to 360ktpa. Capex for the expansion to 360ktpa (from 240ktpa) would be US$94m; to 480ktpa, a further US$26m – it would therefore be better to bypass the sub-optimal intermediate expansion if capital is not constraining. Our Emmerson valuation improves by c.16.5% to 16.2p/share at 480ktpa.

SOP production could continue even after the Khemisset mine is closed

Once the Khemisset mine is closed, the Jorf Lasfar facility could – and would likely, we believe – continue to produce SOP effectively indefinitely, using imported MOP as feedstock. We have not attributed any value to this.

**Figure 28: Increasing sales of de-icing salt and/or SOP would improve Emmerson's valuation**

| FY2021 NPV/share | | De-icing Salt (Mtpa) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.0 | 1.0 | 2.0 | 3.0 | 4.0 | 0.0 | 1.0 | 2.0 | 3.0 | 4.0 |
| SOP (ktpa) | 0 | 8.9p | 11.6p | 13.9p | 16.3p | 18.6p | (35.6%) | (16.5%) | 0.4% | 17.2% | 34.0% |
| | 120 | 9.7p | 12.3p | 14.7p | 17.0p | 19.3p | (30.3%) | (11.2%) | 5.7% | 22.5% | 39.3% |
| | 240 | 11.2p | **13.9p** | 16.2p | 18.6p | 20.9p | (19.1%) | **0.0%** | 16.8% | 33.7% | 50.5% |
| | 360 | 12.0p | 14.6p | 17.0p | 19.3p | 21.6p | (13.8%) | 5.3% | 22.1% | 38.9% | 55.8% |
| | 480 | 13.5p | 16.2p | 18.5p | 20.8p | 23.2p | (2.7%) | 16.5% | 33.3% | 50.1% | 66.9% |

Source: Shore Capital Markets

Without de-icing salt sales, Khemisset's $NPV_{8\%}$ falls to 4.9p/share

Our base-case scenario has Khemisset producing 1Mtpa of de-icing salt as a byproduct. The importance of salt sales to our base-case valuation is underlined by the fact that if we assume zero salt sales, Khemisset's $NPV_{8\%}$ falls to £232m or 4.9p (from £359m or 7.5p/share).

Each 1Mtpa increment of de-icing salt sales adds c.2.3p/share to our Emmerson valuation

On the other hand, we remind readers that overall salt production is actually expected to be c.4.5Mtpa and that the 'excess' is stored as waste. There is thus clearly potential for upside if higher sales volumes can be realised.

- To try to quantify this upside, we simplistically add US$24m to capex for each 1Mtpa increment of de-icing salt sales (up to a maximum of 4Mtpa). In reality, we would expect incremental capex to fall due to economies of scale. Opex should fall slightly with lower tailings volumes, but we conservatively opt not to reflect this.
- Our model indicates that each 1Mtpa increment adds c.2.3p/share to our Emmerson valuation, e.g. a doubling of de-icing salt sales to 2Mtpa increases our valuation by 17%, to 16.2p/share.

## Options for mine expansion/extension

There is potential for upside from mine life extension

There is clearly potential for upside from a number of mine life extension possibilities, albeit we have not yet attempted to model these (pending further studies/developments). We remind readers that Emmerson is currently investigating the mining of the southwest and central deposits. In addition, we highlight the potential to continue mining at depth to the northeast and, if a suitable agreement can be struck, the possibility of extending mining from the central and southwest deposits (if these go ahead) into OCP's tenements.

## Conclusion: attractive proposition

Our Risked NPV is 7.0p/share post construction financing; we believe the shares could be in excess of c.20p/share in the years following production commencement

All things considered, we believe that Emmerson offers a more robust, lower-risk investment with the prospect of better returns than typical of its peers. We estimate a rounded Risked NPV for Emmerson of 7.0p/share post construction financing, derived by applying a 40% discount to our FY2021F valuation. As Emmerson is de-risked and lower discount rates can be justified, we believe the shares could trade around or upwards of c.20p/share in the years following production commencement.

# Directors and key management

Emmerson is putting together an operational team; personnel already in place possess a formidable blend of relevant skills and experience gained at other potash companies and elsewhere

As Emmerson moves towards production, additional skills will be required to ensure that the company's rapid progress continues unabated. Recognising this, Emmerson has commenced building an operational team, with the intention of maintaining its ethos of a lean team with roles filled by committed and talented personnel.

In Shore Capital's view, the personnel already in place possess a formidable blend of relevant skills and experience – including mining, construction, development, permitting, product marketing and fund-raising experience gained variously at ICL, Sirius Minerals and Highfield Resources – that we believe will go a long way in helping to make a success of the company. Certainly, they are well equipped for the current stage. In particular, we highlight that:

- We view the appointment in June 2020 of Graham Clarke as CEO as a coup for Emmerson. Mr Clarke is a rare beast in the potash industry, with experience not only of running an operating underground mine but also of taking another from concept through to construction. As MD of ICL's Cleveland Potash, he was responsible for numerous operational improvements within the mining operation (including the introduction of new technologies/equipment, modified layouts, etc) that resulted in improved efficiency, profitability and safety. He also oversaw the driving of two declines (each c.1km long, using a combination of CMs and drill-and-blast equipment) from the salt horizon to the polyhalite horizon. Subsequently, as a key member of Sirius Minerals' executive team, he oversaw all technical aspects of the development of the Woodsmith mine, delivering numerous positive technical and engineering outcomes and the receipt of permissions for construction.
- Chairman Mark Connelly has an enviable deal-making track record, including the US$700m sale of Adamus Resources to Endeavour Mining in 2011 and the US$570m sale of Papillon Resources to B2Gold in 2014. More recently, as Chairman, he shepherded West African Resources through the development, construction and commissioning of the Sanbrado gold mine in Burkina Faso.
- Director and former Emmerson CEO Hayden Locke and Head of Corporate Development Phil Cleggett are focused on the financing and strategic partner discussions. Prior to joining Emmerson, they were at Highfield Resources, where they were key team members in delivering a credit-approved debt facility from a syndicate of European commercial banks for nearly €200m. Mr Locke has been directly involved in the raising of over US$200m in equity capital for mining projects globally, and also managed the debt financing process for Papillon Resources prior to its sale in 2014.
- Lahcen Alloubane oversaw a mining permit application for Kasbah Resources, which is developing a tin project in Morocco.

Directors and management are currently own c.12% of Emmerson's issued shares.

**Figure 29: Directors and key personnel**

| | |
|---|---|
| **Graham Clarke** CEO | Mr Clarke has over 35 years' potash mining experience, 26 years of which were at Cleveland Potash (seven years as MD). He is credited with pioneering the exploration and development of Cleveland's polyhalite resources, resulting in it being the world's first commercial producer of polyhalite. He was most recently a key member of Sirius Minerals' senior executive team, overseeing all technical aspects of the development of the Woodsmith mine, successfully overseeing it from concept into the initial phases of construction. |
| **Mark Connelly** Chairman | Mr Connelly has 30 years' experience in financing and development of mining projects. He has worked with a number of multinational companies and across multiple jurisdictions (including Africa, Europe, Australia and the Americas). He was MD and CEO of Papillon Resources when that company was sold to B2Gold for A$650m in 2014. |
| **Hayden Locke** Executive Director | Mr Locke has c.15 years' experience in mining, private equity and investment banking. Prior to joining Emmerson, he was Head of Corporate and Technical Services (Geology, Mining and Processing) at potash developer Highfield Resources. Before that, he was Head of Corporate for Papillon Resources (which was sold to B2Gold in 2014 for A$650m). |
| **Dr Robert Wrixon** Executive Director | The holder of a PhD in Mineral Engineering (University of California, Berkeley), Dr Wrixon led MSL from its inception in 2013. He has 18 years' commercial experience in mining, including with Xstrata in various strategy roles, and as MD and CEO of Manhattan Corporation Limited and Haranga Resources Limited. He is a Director and founding partner of Hong Kong-based natural resources private equity group Starboard Global. |
| **Edward McDermott** Non-Executive Director | A former investment banker with 15 years' experience in the management and financing of small companies, Mr McDermott is currently a Non-Executive Director of Fishing Republic and FastForward Innovations. He has previously served as a Director of Stellar Resources and Noricum Gold. |
| **Phil Cleggett** Head of Corp. Development | A qualified accountant with c.10 years' experience in mining and investment banking, Mr Cleggett was previously Manager of Corporate Strategy at potash developer Highfield Resources. |
| **Lahcen Alloubane** Manager Logistics & Operations | A Moroccan national, Mr Alloubane has nearly 10 years' experience in the mining sector, including with Morocco-based tin developer Kasbah Resources. |
| **Mohammed Ouabid** Project Geologist | A Moroccan national, Mr Ouabid has over 15 years' experience in a variety of commodities, including potash. He previously worked for Morocco-based tin developer Kasbah Resources and a number of other Moroccan mining entities (e.g. Managem). |
| **Dr Enrique Sanz** Consultant Geologist | A geologist with 20 years' experience in industrial minerals (primarily evaporite minerals), Dr Sanz was formerly project geologist for worldwide exploration with Rio Tinto. He has extensive experience in the Khemisset Basin and other Moroccan Triassic-Liassic salt basins. |
| **Said Hamdioui** Advisor | A Moroccan national, Mr Hamdioui has over 16 years' professional experience. He co-founded MSL and has been involved with the Khemisset project since 2014 (focusing on national stakeholder engagement and management). |

Source: Company Data; LinkedIn

# Potash

## A brief overview of fertilisers

Plants need macronutrients and micronutrients for their growth

Plants require a variety of mineral nutrients for their growth. These can be broadly divided into 'macronutrients' and 'micronutrients', based on the amounts required. Potassium (K) is classed as a 'primary' macronutrient, sulphur (S) as a 'secondary' macronutrient and chlorine (Cl) as a micronutrient.

**Figure 30: Essential plant nutrients**

| | | | |
|---|---|---|---|
| Primary Macronutrient | Potassium | K | Helps regulate metabolism and water pressure; promotes flowering, good fruiting (influences colour, shape, etc) and hardiness |
| | Nitrogen | N | Promotes leafing; essential component of all proteins |
| | Phosphorus | P | Important role in metabolic processes, promotes development of roots and shoots |
| Secondary Macronutrient | Sulphur | S | Essential component of several amino acids (the building blocks of proteins) and vitamins |
| | Magnesium | Mg | Important component of chlorophyll and many enzymes |
| | Calcium | Ca | Required for cell walls (and hence growth), regulates transport of other nutrients |
| Micronutrient | Boron | B | Important in cell walls; plays roles in sugar transport, cell division and synthesis of certain enzymes |
| | Copper | Cu | Important for photosynthesis, involved in manufacture of cell walls |
| | Iron | Fe | Required for photosynthesis, also a component of many enzymes |
| | Manganese | Mn | Important for photosynthesis, including building of chloroplasts |
| | Molybdenum | Mo | Involved in nitrogen metabolism; cofactor to many enyzmes |
| | Zinc | Zn | Required by many enzymes, has essential role in DNA transcription |
| | Chlorine | Cl | Needed for osmosis and ionic balance, plays a role in photosynthesis |

Source: Company Data; RHS; Shore Capital Markets

Fertilisers are concentrated sources of one or more nutrients; NPK formulations are increasingly incorporating magnesium and/or sulphur

Fertilisers are concentrated sources of one or more nutrients. They are applied to correct nutrient deficiencies and improve plant growth and yields. NPK (nitrogen, phosphorus and potassium) multi-nutrient fertilisers are the most common, and these are increasingly including sulphur, as crop yield responses to 'standard' NPK formulations have generally been flattening in recent years, with soil-supplied secondary nutrients becoming a potential limiting factor due to depletion.

We expect global fertiliser demand trends to remain positive for the foreseeable future

Overall, global fertiliser demand trends should remain positive for the foreseeable future. The imperative of feeding an ever-growing global population in the face of competing pressures for (arable) land requires more intensive agriculture. This, in turn, generally necessitates greater fertiliser use – the Food and Agriculture Organization (FAO) of the United Nations (UN) has estimated a compound annual growth rate (CAGR) of global fertiliser use of 0.6% over 2015-2030.

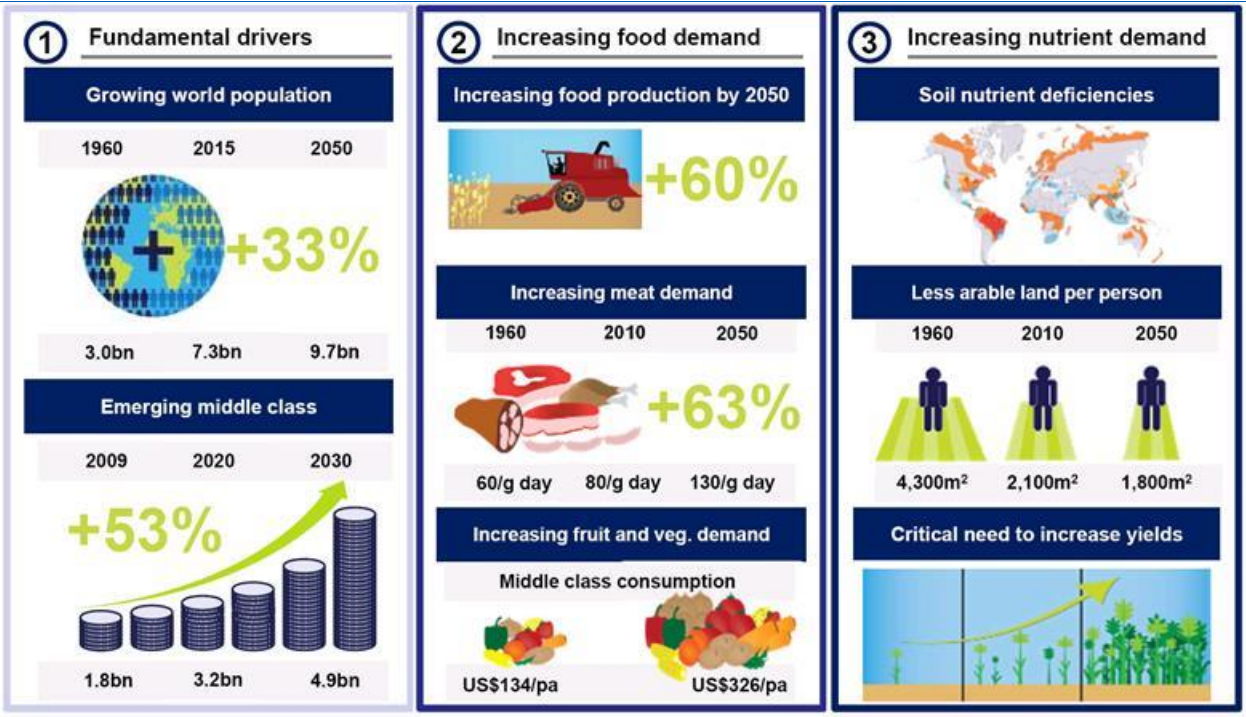
'Potash' is the generic term for potassium fertilisers

'Potash' is a generic term referring to potassium salts that are used for fertiliser. The most common of these are currently potassium chloride (KCl, also known as Muriate of Potash or MOP) and potassium sulphate ($K_2SO_4$; Sulphate of Potash or SOP).

- MOP accounts for the bulk of the potash market, at c.64-67Mtpa (depending on source of estimate). In contrast, SOP is currently essentially a niche fertiliser, with a current market size of c.7Mtpa.
- All MOP production is 'primary', i.e. mined, as is c.35% of SOP production (albeit extracted from lake brines). 'Secondary' SOP production (which uses MOP as a raw material) occurs via the Mannheim process or by reaction with sulphate salts (as practised by K+S); these methods account for c.50% and c.15% of global SOP supply, respectively.

- To facilitate comparisons between the different potassic salts, potassium content is generally described in units of $K_2O$-equivalent. MOP typically contains c.60% $K_2O$ ('K60'), but higher-purity products can contain up to 63% $K_2O$; SOP typically c.50% $K_2O$ and up to 52-54% $K_2O$.

**Figure 31: Pictorial summary depicting some of the multiple drivers driving demand growth for fertilisers**




Source: Sirius Minerals

## MOP – buyers welcome new entrants

Over 90% of MOP produced is consumed as fertiliser

Over 90% of MOP produced is consumed as a fertiliser or as a feedstock for production of other potash fertilisers (e.g. SOP and SOPM), with the balance (<10%) finding a variety of industrial and consumer uses. As a fertiliser, it is mostly (over 70%) applied as part of an NPK product, with the remainder (<30%) directly applied.

### Demand to benefit from intersection of global megatrends

Global MOP consumption in 2019 was c.64-67Mt

Global MOP consumption in 2019 was c.64-67Mt, with the four largest markets (China, Brazil, India and the USA) accounting for c.60% of demand.

Demand has been steadily trending up at a long-term rate of c.2.8%/year; we expect this to continue during the 2020s; long-term demand stands to benefit from the intersection of a number of global megatrends

Demand has been relatively steadily trending upwards at a long-term average of c.2.8%/year, with a typical range of c.2-4%/year (e.g. a CAGR of 2.9% over 2010-2018, 2.1% over 2010-2019, or c.3.6% over 2012-2018). As BHP noted in its latest potash outlook:

- The long-term trend is noted to be “quite reliable”. In contrast, short-term (individual year) volatility can be significant due to the vagaries of weather, swings in farm incomes, exchange rates, etc.
- Indeed, long-term potash demand stands to benefit from “the intersection of a number of global megatrends”: rising population, changing diets and the need for sustainable intensification of agriculture.

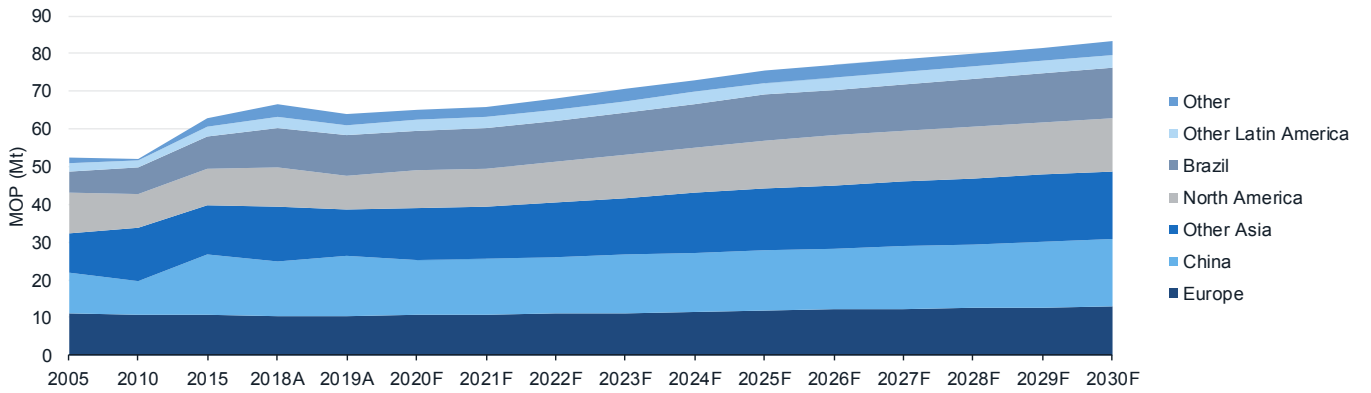
Developing regions are expected to account for much of the growth in potash demand going forward

Developing regions have accounted for much of the demand growth in recent times, particularly Asia and Latin America, with European and North American consumption essentially flat. This pattern should persist through the 2020s.

Shore Capital’s base case sees global MOP demand rising to c.75Mt in 2025 and c.83Mt in 2030 – a CAGR of 2.5%

Shore Capital’s base-case scenario forecasts global MOP consumption of: c.65Mt in 2020, c.66Mt in 2021, 68Mt in 2022, rising to c.75Mt in 2025 and c.83Mt in 2030. We believe our base case to be reasonably conservative given that the 2020-2030 CAGR of 2.5% is lower than that of the long-term demand trend. In our upside scenario, demand reaches c.94Mt in 2030, based on an average annual growth rate of 4% over 2022-2030.

**Figure 32: Shore Capital MOP demand forecasts**



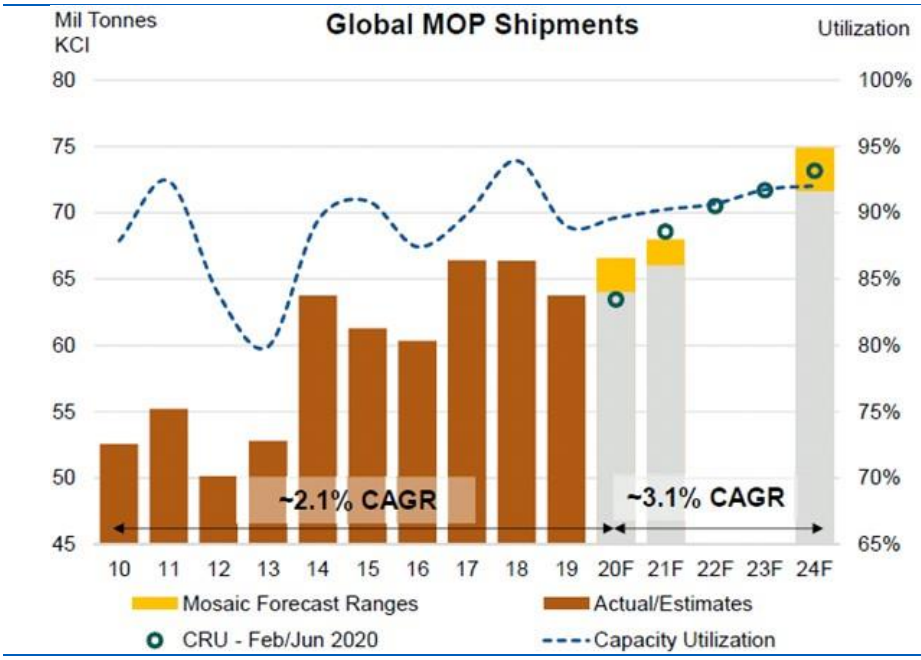

Source: Shore Capital Markets

Our base-case expectations appear in line with those of the market in general, e.g. Mosaic is forecasting 72-75Mt in 2024; Nutrien c.80Mt in 2024; one industry consultant is forecasting 94Mtpa by 2040 (requiring three Khemissets every two years); and BHP is projecting demand growth of 1.5-2.0Mtpa through the 2020s

In addition, we believe our base-case expectations to be in accordance with those of the market in general. We note that many market participants and observers expect trend demand growth of c.1.2-2Mtpa (c.2-3%) through the 2020s.

- Mosaic is forecasting 64-66Mt in 2020, 66-68Mt in 2021, rising to 72-75Mt in 2024 (a CAGR of c.3.1%, in line with its estimate of the 2010-2018 growth rate, i.e. prior to demand stepping back in 2019).

**Figure 33: Mosaic's MOP demand forecasts assume a return to the 2010-2018 growth rate**




Source: Mosaic

- Industry consultant CRU has 2022-2024 forecasts that are similar to Mosaic's.
- Nutrien is projecting c.80Mtpa by 2024.
- We understand that another industry consultant is forecasting demand of 94Mtpa by 2040 – an average annual incremental increase of 1.2Mt – or three Khemissets every two years.
- BHP is projecting demand growth of 1.5-2.0Mtpa through the 2020s.

## Supply is currently very concentrated

MOP supply is very concentrated; potash buyers would be very welcoming of new producers like Emmerson

MOP supply is currently very concentrated, and will likely continue to be for decades to come:

- Four countries (Belarus, Canada, China and Russia) accounted for nearly 80% of global capacity of c.74Mt in 2018. Belarusian and Russian capacity could increase from c.34% to 40% by 2030 (with a number of new mines in ramp-up or under construction), at the expense of Asia, Europe and the Middle East.
- In terms of companies, just four (Belaruskali, Mosaic, Nutrien and Uralkali) control c.65% of global capacity – with Canpotex handling the overseas sales of Nutrien and Mosaic. Belaruskali and Uralkali used to jointly market their products, until they fell out in 2013.

Unsurprisingly, potash buyers would be very welcoming of new producers like Emmerson.

## Demand-supply balance determines pricing

The 2020 Chinese MOP benchmark settled at a near-decade low of US$220/t CFR, which major producers have described as unsustainable (Uralkali has described prices below US$300/t as being "fundamentally unreasonable"

In April 2020, the China benchmark MOP price was settled by Belarusian Potash Corp (BPC) at a near-decade low of US$220/t CFR (similar to 2016's US$219/t). The last settlement prior to this was at US$290/t in September 2018 – a subsequent bad spring and late autumn planting seasons in North America and high inventories in China enabled the Chinese to hold off signing a new deal well into 2020, when further delays were caused by COVID-19 restrictions.

- Mosaic said that the 2020 benchmark price is not sustainable in the long term, with even the lowest-cost MOP producers (i.e. Belaruskali and Uralkali) unable to cover "the costs of sustaining their businesses, replacing reserves, etc".
- Indeed, Uralkali lambasted the contract price, saying this would drive producers to cut their capital investment, ultimately leading to a shortage of KCl in the market. Uralkali has previously described prices below US$300/t as being "fundamentally unreasonable".

Whilst the price disappointed, the contract settlement provided much-needed clarity and 'unblocked' stalled sales

Whilst the 2020 contract price may disappoint, it at least provided some much-needed clarity, 'unblocking' sales which had been stalled whilst the contract settlement was awaited and set a floor on which prices could build. Potash producers reported afterwards a positive change in market sentiment, improved demand and higher prices in markets like Brazil.

We generally expect MOP prices to rise towards c.US$260/t CFR in 2020, c.US$300/t during 2021 and c.US$360/t by the mid-2020s

We regard the 2020 Chinese contract price as effectively representing a 'firm bottom' and expect spot MOP prices to rise towards c.US$260/t CFR in 2020 (in regions where they are not already higher but with the notable exception of North American prices, which we expect to lag other regions), c.US$300/t during 2021 and then c.US$360/t by the mid-2020s.

We regard Chinese inventories as the key risk to our short-term MOP price targets, but Nutrien and Mosaic do not believe that Chinese inventories will prove problematic in 2021

In our view, the key potential fly in the ointment to achieving c.US$290/t in 2021 (other than adverse weather and COVID-19 disruptions) is Chinese inventories. As Nutrien explained, it was "clear" that China drew down its inventories and tapped into strategic reserves "to gain leverage in the last contract". Nutrien believes that "they won't be able to do that again this year" (unless shipments in 2020 prove significantly higher than Nutrien's forecast). While Chinese port inventories as of mid-2020 may appear high at c.3.5Mt, in-country inventories are actually "relatively low" (Mosaic) or "reasonably tight" (Nutrien).

The key risk to our longer-term price forecasts relates to industry overcapacity; however, we believe that demand growth should generally be able to accommodate net capacity additions through to 2030

The key risk to our longer-term price forecasts relates to industry overcapacity. Global capacity utilisation in 2019 was c.89%, and a handful or so of major new mines (mainly in Russia and Belarus) are currently in ramp-up or expected to commence production over the next few years. However:

- A portion of the associated capacity in fact replaces that of existing mines (e.g. Mosaic's K3, Uralkali's Solikamsk-2 and Ust-Yayvinsky).
- For a variety of reasons, progress at these projects has been proving rather slower than planned. Consequently, we believe that demand growth (as per our base-case forecasts) should generally be able to accommodate net capacity additions through to 2030, with scope for undersupply (should there be further delays to said projects).

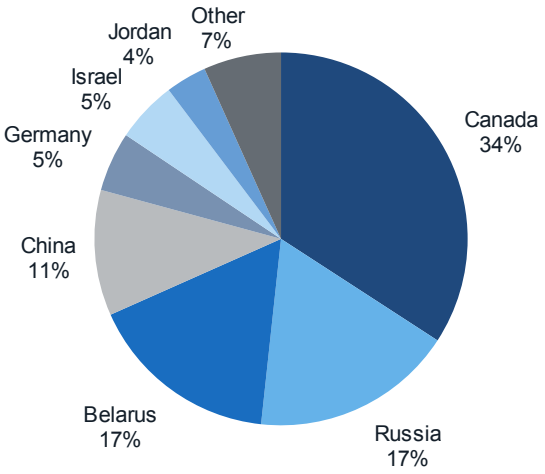
Capacity utilisation should be c.95% (effective full capacity, we believe) by the mid-2020s

Consistent with our expectations, extrapolation of Mosaic's projections suggest that global capacity utilisation should approach c.95% by the mid-2020s, which we regard as effective full capacity.

Nutrien has observed that new capacity would be "more than absorbed" if demand grows at just 2.5% per annum

Nutrien's latest view is that the "majority of new potash capacity is now online and being absorbed in the market", with "no significant new nameplate capacity expected" in the near term. Nutrien has also previously observed that new capacity would be "more than absorbed" if demand grows at just 2.5% per annum.

**Figure 34: Global MOP operational capacities**




Source: Company Data; Shore Capital Markets

The mammoth Jansen project being developed by BHP is the potential elephant in the longer-term supply-demand balance, but there is significant resistance amongst the company's shareholders to its going ahead

The potential elephant in the longer-term supply-demand balance is BHP's mammoth Jansen project in Saskatchewan. Jansen's Stage 1 alone is projected to have a capacity of 4.3-4.5Mtpa at a (further) capital cost estimated in 2019 of US$5.3-5.7bn – and COVID-19 has added to the costs. (Stages 2-4 were envisioned adding 4Mtpa/stage at c.US$4bn/stage.) Assuming the much-delayed Board approval to 'go ahead' with Stage 1 is given in mid-CY2021, we believe that Jansen could potentially commence production around 2026-2027, reaching full capacity around 2029-2030. However:

- Stage 1 IRR was estimated by BHP at a relatively paltry 14-15%, assuming average prices of US$325-342/t FOB Vancouver (which we estimate to be equivalent to c.US$360-377/t CFR Brazil, roughly in line with our long-term MOP price forecast).
- We have been given to understand that there is currently insufficient port and (in particular) railway capacities to support BHP's ambitions – which suggests to us that getting Stage 1 into production could take much longer, and cost substantially more.
- Certain significant shareholders have voiced strong opposition to the project, citing the already poor returns on very high capital costs and fears that Jansen's volumes could result in an oversupplied potash market (and, in turn, equity value destruction).

BHP shareholder concerns will have been stoked by Nutrien's warning that it has 6Mtpa of shuttered capacity that can be returned to production relatively quickly

BHP shareholder concerns will have been stoked by Nutrien's warning that it has c.6Mtpa of shuttered (relatively high cost) capacity that can be returned to production relatively quickly for "minimal" capital, if warranted by demand and pricing. Beyond that, Nutrien has "line of sight" on 5Mtpa of brownfield expansion opportunities, which could be brought on relatively quickly and at relatively low capital intensities (of US$500-700/t MOP).

Our thesis is that Nutrien will actually only seek to bring such capacity as is required to maintain a MOP price ceiling of c.US$360/t CFR until the mid-to-late 2030s in order to discourage BHP from bringing Jansen online until the 2030s

Our thesis is that Nutrien will actually only seek to bring online such capacity as is required to maintain a MOP price ceiling of c.US$360/t CFR until the mid-to-late 2020s, based on the following rationale:

- BHP has indicated in the past that it would be willing to put Jansen on ice for some years if it perceived MOP prices as insufficiently high – and we believe that BHP will be looking for >US$360/t CFR. If BHP can be 'encouraged' to postpone a 'go-ahead' decision until the late 2020s, Jansen would only commence production during the 2030s. By that time, potash demand should be sufficient to absorb not only Jansen's production but all of Nutrien's spare and potential expansion capacity.
- Nutrien has previously indicated that it sees long-term average MOP pricing as being "closer to US$400/t". We imagine that Nutrien would like to see MOP prices as close to that as possible – but without being sufficiently high as to enable BHP to justify bringing Jansen onstream in the 2020s. At prices of just under US$360/t, Nutrien would enjoy attractive margins.

Coincidentally, BHP now sees a window for new supply from "the late 2020s or early 2030s"

Coincidentally (or perhaps not), BHP's latest official line is that a window for new potash supply will be open from "the late 2020s or early 2030s", after "the spare capacity held by incumbents and capacity additions that are under construction have been absorbed".

We expect that MOP pricing will be capped at c.US$360/t during the 2020s, assuming demand grows as per our base-case scenario; we see the potential for US$400/t from the mid-2020s if demand growth proves stronger, but we adopt US$360/t as our long-term price for the time being

Given the above, assuming demand growth as per our base-case scenario, we expect that MOP pricing will be capped at c.US$360/t for much of the 2020s by incumbent producers seeking to prevent BHP's Jansen coming online 'prematurely'. Thereafter, we believe there to be the potential for prices to rise to c.US$400/t and beyond. On the other hand, should demand growth prove closer to our upside scenario, then concerns about Jansen would recede, in which case we believe there to be the potential for c.US$400/t and above from the mid-2020s. However, erring on the side of conservativeness, we adopt US$360/t as our long-term MOP price for the time being.

## SOP – chloride-free potassium and sulphur

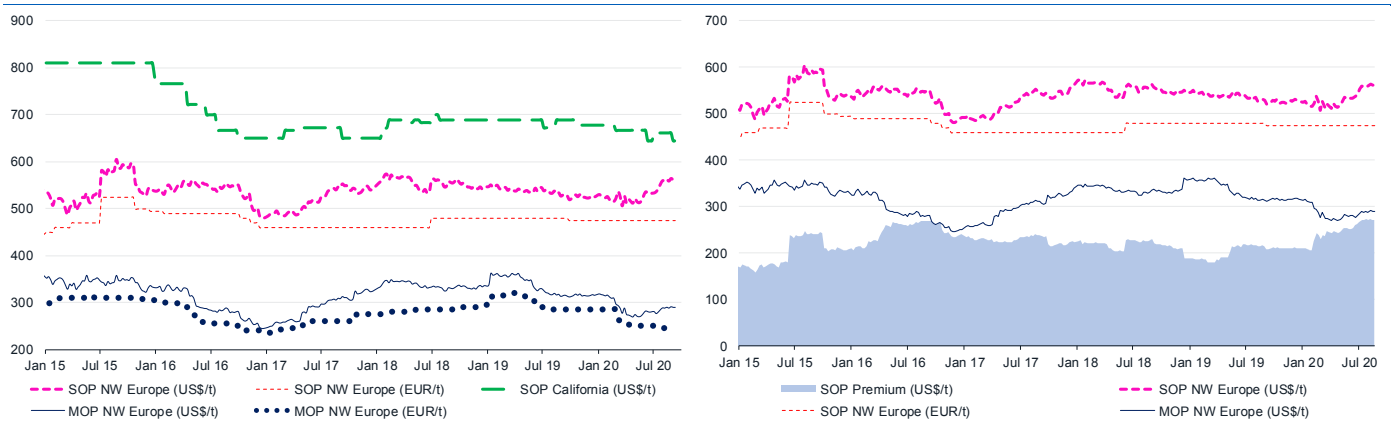
SOP is mainly marketed as a 'chloride-free' potash source

SOP is mainly marketed as a 'chloride-free' potash source. All plants require chlorine as a micronutrient, but high concentrations can reduce crop yields due to toxicity effects. The chloride content of SOP is effectively negligible (typical max specification: 0.5-1% Cl; MOP is c.47% Cl).

SOP has sustained a c.US$200-300/t premium over MOP in recent years, which we believe reflects a chloride-free premium and supply constraints

In recent years, SOP has sustained a sizeable price premium (c.US$200-300/t) over MOP, despite SOP having a lower $K_2O$ content. Around US$100/t of the premium could be attributed to the cost of converting MOP to SOP in the Mannheim process (which accounts for c.50% of global SOP production). The 'excess' premium over the conversion cost reflects SOP's low-chloride nature and, we believe, chronic supply constraints (see later).

**Figure 35: SOP premium commands a sizable premium over MOP despite having a lower $K_2O$ content**




Source: Bloomberg; Shore Capital Markets

SOP is increasingly marketed as a bi-nutrient fertiliser, given the increasing prevalence of soil sulphur deficiency

SOP is also increasingly being marketed as a bi-nutrient fertiliser, given its sulphur content. Soil sulphur deficiency is becoming more common globally due to reduced sulphur deposition by acid rain as a result of improved control over sulphur dioxide ($SO_2$) gas emissions. A SOP product containing 50% $K_2O$ will also contain c.17.5% S.

There are three main 'grades' of SOP: standard, granular and soluble; granular and soluble SOP command premiums over standard SOP; soluble SOP is most commonly produced via the Mannheim process

There are three main 'grades' (or forms) of SOP.

- **Standard SOP:** Taking the form of fine crystals, standard SOP is used as a direct application fertiliser and as a feedstock in the manufacture of compound fertilisers.
- **Granular SOP:** The most widely used grade in many parts of the world, this grade comprises small granules with a typical particle size of c.4mm. It typically commands a premium of c.10% over standard grade.
- **Soluble SOP:** A fine powder which dissolves rapidly in water, soluble SOP is used in fertigation (fertilisation via irrigation), foliar feeds and hydroponics. Soluble SOP commands a substantial premium (up to 20%) over standard grade – but only accounts for c.5% of the SOP market. Due to the low levels of insolubles typically specified (<0.1%), soluble SOP is most commonly produced via the Mannheim process.

## Demand is being constrained by supply

Global SOP consumption has plateaued at c.7Mtpa since 2017, which we believe to be due to supply constraints; were consumption able to grow unconstrained, we believe it could reach c.9-10.4Mtpa by 2030, assuming CAGR of 2.5-4%

Over 2000 to 2017, global SOP consumption grew from c.3.1Mtpa to c.7Mtpa (a CAGR of c.4.9%). Since then, however, consumption has plateaued, holding at c.7Mtpa.

- We (and many market observers) believe this to be due to supply constraints, resulting in unmet 'pent-up' demand (rather than a lack of demand growth). Pent-up demand is illustrated by the expansion of the Chinese SOP market as a result of the commissioning of a 1.2Mtpa SOP facility by SDIC Luobupo some years ago.
- We note that if SOP consumption were able to grow unconstrained at a rate of just 2.5% annually, it would reach c.8Mtpa by 2025 and c.9Mtpa by 2030; if 4%, c.8.5Mtpa by 2025 and c.10.4Mtpa by 2030.

SOP is mainly applied to chloride-sensitive crops such as fruits and vegetables, which are typically higher value; consumer demand for such crops is increasing

Globally, consumer demand for fruits and vegetables is growing due to a rising world population and, more specifically, an unprecedented expansion of the relatively affluent and increasingly health-conscious global middle class (which could to grow to c.5.5bn in 2030, from 3.2bn in 2015). For example, MOP producer Nutrien has noted that in China, there has been a shift to more potassium-intensive crops like fruits and vegetables. These higher-value crops actually usually do better with SOP as they tend to be chloride-sensitive: yields and important value-determining aspects such as taste and appearance can be significantly improved.

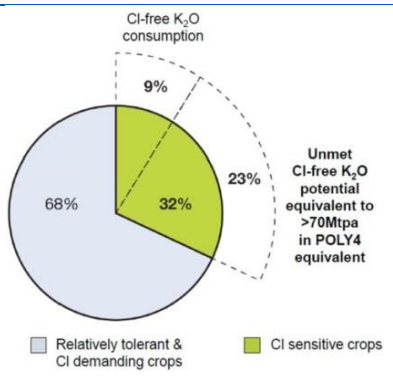
SOP application is particularly desirable in arid and saline areas

We also expect that SOP demand will be boosted by the increasing criticality of ecologically sustainable farming. SOP has a significantly lower salt index than MOP, and lower salinity is particularly desirable in arid and saline areas, where a lack of rainfall or irrigation results in salt and/or chloride accumulation and significantly reduced productivity. The United Nations estimates that c.2,000ha of farmland is being lost daily to salt-induced degradation, with c.25% of the world's irrigated land now affected by varying degrees of salinity. Combined with urbanisation, there is now c.46% less arable land globally than in 1961. Meanwhile, global water resources are under increasing pressure from growing demand and climate change.

The MOP-fertilised low-chloride market could potentially be up to c.15Mtpa

Furthermore, crop trials have demonstrated that even ostensibly 'chloride-tolerant' crops can benefit from the inclusion of some low-chloride fertiliser. For example, Sirius Minerals has estimated that c.32% of global $K_2O$ consumption is applied to chloride-sensitive crops, whereas only c.9% of $K_2O$ production is low-chloride (i.e. the remainder is MOP fertilised). If correct, the MOP-fertilised low-chloride opportunity could be up to c.15Mtpa.

**Figure 36: The MOP-fertilised low-chloride opportunity could be up to c.15Mtpa**




Source: Sirius Minerals

If RoW SOP application rates were just half that of the USA and China, global SOP consumption today would be c.8-9Mtpa

Yet, while SOP application rates in China and the USA are variously estimated at c.60-70kg/ha, the RoW (Rest of the World, excluding the USA and China) average is just c.10-15kg/ha. India is said to grow 18% of the world's chloride-intolerant crops while China grows 17%, yet China uses c.35-40 times more SOP than India does. India, together with Indonesia, Malaysia and Brazil, accounts for but c.2% of SOP consumption. If RoW application rates were just half those of the USA and China, then global SOP consumption today would be c.8-9Mtpa.

## Supply

A reason for RoW SOP under-application is lack of seaborne supply

We believe that one of the reasons for the RoW's under-application of SOP is the lack of availability of seaborne supply, which is only c.2Mtpa. Furthermore, producers in Western and Northern Europe account for c.60-70% of that supply, most of which is imported by other European countries – leaving little for elsewhere. This is corroborated with our hearing anecdotally that farmers in many countries find it difficult to source SOP.

Supply constraint is also evidenced by the production non-response to SOP's sustained price premium; we believe this to be largely due to ever-tightening environmental legislation globally

Further evidence that there exists a general constraint on supply takes the form of a lack of production response to SOP's aforementioned sustained 'excess' premium over MOP. We believe this to be attributable to the straitjackets of ever-tightening environmental legislation globally (particularly that surrounding emissions and waste disposal), resulting in falling Mannheim capacity (e.g. over 0.5Mtpa of Chinese Mannheim capacity was shuttered over 2014-2017). We expect to see further capacity shuttering going forward.

'Primary' SOP production has been unable to take up the slack arising from Mannheim capacity closures; we expect Chinese and Chilean salt lake production to continue to fall

'Primary' SOP production (i.e. that from salt lake brines or underground mining) has been unable to take up the resulting slack for various reasons:

- Production from salt lakes (c.35% of global SOP supply) requires that brine concentrations of potassium and brine must be sufficiently high, but such lakes are relatively rare. Furthermore, in recent years, there has been a greater focus on lithium production (at the expense of SOP production) at Chinese and Chilean salt lake operations. Depletion is also an issue in China (and we suspect will also prove an issue in Chile before too long). Going forward, therefore, we expect Chinese and Chilean production will continue to fall.
- K+S has weathered various environment- and waste disposal-related production constraints at its German operations.

The above capacity losses should be more than offset by new capacity coming online

Going forward, however, the above capacity losses should be more than offset by new capacity coming online.

- Over 2021-2025, we expect to see c.1Mtpa of new capacity from the aforementioned Australian salt lake projects, these being Agrimin, Australian Potash, Kalium Lakes and Salt Lake Potash. A further 0.5Mtpa or so could come from Reward Minerals and BCI over 2025-2030.
- Three hard-rock projects in Eritrea and Ethiopia could in theory be in production by 2025. However, Yara's 600ktpa Dallol project is "on hold", while Circum Minerals is looking to downscale its production ambitions after a long and apparently unsuccessful struggle to obtain construction funding. Pending more clarity from Circum, we only pencil in 0.5Mtpa from Danakali (which we expect will expand to c.1Mtpa post-2025).
- We do not believe Crystal Peak's and SOPerior's North American projects to be viable and thus exclude them from consideration.

Our base case sees c.1.5Mtpa coming online by 2025, and a further c.1Mtpa over 2025-2030…

In short, excluding Emmerson, we project as our base case c.1.5Mtpa of new capacity coming online by 2025, and a further c.1Mtpa over 2025-2030. That said, after providing for potential closures, we believe that net capacity additions will more likely be c.1Mtpa by 2025 and <1Mtpa over 2025-2030.

## Prices should rise despite new supply

…and the calculated market balance would depend on the growth rate assumed

Assuming demand grows at 2.5% per annum, on our base-case supply scenario, we calculate that there could potentially be a small surplus of 0.5Mtpa in 2025 (excluding Emmerson's output); if the growth rate is 4%, supply and demand would be in balance; at the long-term trend of 4.9%, the market would be in deficit.

We believe that in practice, pent-up demand will prove capable of absorbing all of the new supply

Given our observations regarding RoW application rates and the very limited supply available to those markets, we believe that, in practice, pent-up demand will prove capable of absorbing the projected new supply. In the worst-case scenario, SOP developers and producers may have to tap into the MOP-fertilised but somewhat-chloride-sensitive market, which we noted above could potentially be up to c.15Mtpa.

The more of the MOP-fertilised low-chloride opportunity that has to be tapped, the lower SOP prices will have to be

However, the greater the extent to which this market has to be exploited, the lower the SOP price point will likely have to be (in order to compete with MOP). Having said that, we expect that little (if any) price 'adjustment' should be needed for the first few million tonnes - which would be more than ample to cover all the potential capacity in development (i.e. beyond our base case).

Our long-term price assumptions for Emmerson's standard and granular SOP output are US$500/t FOB Jorf Lasfar and US$550/t, respectively, for a blend price of US$525/t (assuming a 50:50 standard:granular mix)

All things considered, we adopt:

- US$500/t FOB Jorf Lasfar as our long-term price for Emmerson's standard-grade product – this price is the approximate bottom of the NW Europe benchmark (which we believe to be a geographically appropriate given Morocco's proximity to Europe) in recent years. We consider this particularly conservative bearing in mind that our expectation is that MOP prices will rise to c.US$360/t by the mid-2020s. (Higher MOP prices can be expected to support higher SOP prices, since MOP is a key input for the Mannheim process, which accounts for c.50% of global SOP supply.)
- US$550/t for granular product, derived by applying a 10% premium to the standard price.
- A US$525/t blended price, assuming a 50:50 standard:granular mix.

We do not make any provision for soluble grade at the time being due to its small size

We opt not to make any provision for soluble grade for the time being. While soluble SOP enjoys the highest prices and the fastest growth rates (5-10% CAGR), it also makes up but a small proportion of the overall SOP market. We believe this to be why Salt Lake's offtake agreement with Mitsui for water-soluble SOP was for only 4ktpa, whereas the company's other agreements were for 30-70ktpa each. Furthermore, if all potash developers attempted to maximise soluble SOP sales, we would expect the premium for this grade to erode.

# Risks

As with any other junior mining company, investing in Emmerson is not without its risks; key ones are discussed here

As with any other junior mining company, investing in Emmerson has its risks, and these are not insignificant. We believe investors should pay particular attention to commodity, execution and financing risks.

## Commodity and forex risks

The market for MOP is large and price risk is to the upside, but a number of factors could constrain (or even reduce) prices; SOP demand and prices should prove less elastic; de-icing salt demand and prices will be heavily influenced by weather severity

The value of Emmerson will be primarily related to MOP, SOP and de-icing salt prices. MOP prices are currently near decade lows. The 2020 China benchmark price of US$220/t CFR likely represents a 'firm bottom' as, at this price level, even the lowest-cost mines are unable to cover sustaining capital costs. Going forward, the major potential risks that could constrain (or even reduce) MOP prices include adverse weather, excess inventories, crop prices, global economic growth, COVID-19 and oversupply (if capacity additions prove higher and/or faster than we expect). We expect SOP demand and prices to be less elastic – indeed, SOP prices have remained relatively stable over the past few years, although falls cannot be ruled out. Meanwhile, de-icing salt demand and prices will be heavily influenced by weather severity.

Selling up to c.240ktpa SOP and c.1Mtpa of de-icing salt should not be too problematic, but higher levels would be more challenging

The global SOP market size and the US East Coast de-icing salt market are relatively small at c.7Mtpa and c.10Mtpa respectively. We believe that selling c.240ktpa SOP and c.1Mtpa of de-icing salt (or less) should not prove overly problematic. However, selling higher levels (e.g. c.0.5-0.8Mtpa SOP or c.2-4Mtpa of de-icing salt) would clearly be much more challenging.

SOP demand growth should see new supply absorbed; we believe there to be c.15Mtpa of 'pent-up' demand; Emmerson could potentially expand Mannheim SOP production via incremental additions in line with demand

That said, we think that SOP demand could grow to c.8Mtpa by 2025 and c.9Mtpa by 2030; this incremental demand would be in excess of what we believe to be likely supply from Emmerson and developer peers. Furthermore, we estimate there to be c.15Mtpa of potential 'pent-up' demand from the spectrum of somewhat-chloride-sensitive crops that are currently being MOP fertilised – albeit lower SOP prices would likely be required. In any case, the modular nature of Mannheim production could in theory allow Emmerson to expand SOP production via incremental capacity additions in line with demand.

De-icing salt sales would have a number of benefits; we expect that Emmerson will target markets such as to maximise netback

As a byproduct of MOP production, de-icing salt sales would effectively reduce MOP production costs (bolstering Emmerson's competitive position), and also lower the amount of process tailings (with positive implications for waste disposal costs and the environment). We note that Emmerson is also well placed to sell into Europe, and would expect that markets will be targeted such as to maximise netback.

Importantly, some or all of the hydrochloric acid 'waste' from SOP production could be converted into (and sold as) DCP or calcium chloride

Were Emmerson to produce, say, c.500-800ktpa SOP, we believe it unlikely that the company would be able to sell all of the c.0.6-1.0Mtpa of the 'waste' hydrochloric acid that would be generated. Importantly, therefore, some (or even all) of the hydrochloric acid could potentially be converted into, and sold as, DCP and/or calcium chloride. Sales of hydrochloric acid, DCP and/or calcium chloride would benefit SOP production in the same ways which de-icing salt sales would benefit MOP production. In the worst-case scenario, we understand that calcium chloride can be safely disposed of via marine discharge.

A global mining downturn could see lower quotes and shorter lead times

The prices of other commodities (e.g. steel, diesel) are likely to impact Emmerson's costs. A global mining industry downturn (due to, say, trade wars or COVID-19) could be beneficial in that quotes and lead times for equipment, materials and services could generally be lower than in the past.

Revenues and valuation are likely to be influenced by exchange rates

We assume that all production is exported, priced in US dollars. The company's revenues and valuation would, therefore, be influenced by changes in exchange rates, most notably that of the US dollar, British pound and Moroccan dirham.

## Exploration risks

We believe there to be a good likelihood of Emmerson being able to upgrade existing resources, and to delineate further resources

Additional drilling is required to upgrade resources to higher-confidence categories and, in particular, to reserves. We believe there to be a good likelihood that with further drilling, a good proportion of: Indicated resources can be upgraded to Measured resources and reserves; Inferred resources to Measured and Indicated resources and reserves. That the Khemisset Basin remains open to the northeast also suggests the possibility of resource upside.

Emmerson is relying heavily on historical drilling data, for which core is not available; twin drilling by the company in five strategic locations confirmed the historical information

There is a heavy reliance on historical drilling data, but drill core has not been available for sampling and assaying, raising the possibility that the data might prove inaccurate and/or inadequate. Emmerson conducted twin drilling of five historical holes in strategic locations, which confirmed the historical information. The company also resurveyed historical drill collars (67% of which could be located), which resulted in corrections to 67% of original borehole coordinates. Importantly, 73% of discrepancies were less than 30m (i.e. not considered significant), with 43% 10m or less. The largest discrepancies were within the Central and Southwest sub-basins or outside Emmerson's licence area. Emmerson also conducted a seismic survey in 2018, which enabled further validation of the historical dataset and 2018 interpretations. However, in the southwest and to the east, drilling remains wide-spaced and seismic information lacking (i.e. there may be as-yet unidentified major faults in these areas).

Further exploration work could see resources reduced and/or downgraded rather than expanded/upgraded

On closer-spaced drilling and/or additional seismic surveys, parameters such as grades, thicknesses and continuities could prove worse, while geological structures could prove more prevalent and problematic than expected. There is the possibility that further exploration and development work to upgrade resources disappoints, or even results in the downgrading and/or reduction of existing resources.

## Execution risks

Further engineering work could result in cost estimates increasing

We are hopeful that detailed engineering work will identify opportunities to reduce opex and capex. However, it cannot be discounted that the results from such works could be unfavourable, which could also lead to the downgrading of existing resources and reserves.

Scarcity of suitable personnel and equipment could result in delays and drive up costs

As relatively few MOP and SOP operations have been constructed globally in recent years, it could prove difficult to source personnel with appropriate experience. Potential knock-on effects include higher costs (e.g. through competition for personnel) and delays to the project schedule, and failure to meet financial or other obligations.

Construction and operational risks are lower than those at many peer projects

In our view, construction and operational risks at Khemisset are lower than those at many peer projects. For example: the lack of any major overlying aquifers (groundwater flow into the decline and mine are likely to be very limited and manageable with mobile pumps); the choice of declines (over vertical shafts) means that in the event of power failure, personnel can simply walk out of the mine; mining using CMs should translate into significantly lower safety risks than drill-and-blast.

Nonetheless, a myriad of things could prove worse or more variable than expected

Nonetheless, a myriad of things could prove worse and/or more variable than expected, e.g. grades, extraction rates, dilution and process recoveries could prove worse than expected; the potash horizon could be found to undulate more than modelled; unmapped geological structures may be encountered that are small (below seismic resolution) but nonetheless sufficiently large to pose problems in mining, and such structures could be water- or gas-bearing; labour, haulage, power, reagent and other costs could turn out to be higher than predicted; and equipment and plant breakdowns could occur more frequently and/or take longer to fix than allowed for. Logistics operations would be controlled by third parties.

Processing risks are on the lower side: the chosen process route is well understood, and testwork has shown that rinneite will decompose very similarly to carnallite

We regard processing risk to be towards the lower side:

- The process route of decomposition, hot leaching and crystallisation is widely used in the production of MOP and so well understood.
- Rinneite is a relatively rare potash mineral that is not currently processed into MOP on an industrial scale. However, this is due to its relative rarity rather than any technical challenges. Indeed, importantly (from our perspective), Emmerson's testwork has shown that Khemisset's rinneite will decompose very similarly to carnallite. In the worst-case scenario, being iron-bearing, rinneite can be magnetically removed from Khemisset's ore feed.
- Mg and Fe impurities will be discarded as brine, which has the effect of reducing KCl recoveries slightly. It will be particularly important to keep Fe from reporting to leaching and crystallisation as it makes brine acidic (which would require expensive alloy construction).

Processing risks would be higher if SOP is produced

Processing-related costs and risks would be increased if Emmerson decides to produce SOP (and potentially DCP and/or calcium carbonate), as process complexity would increase significantly.

That Khemisset is in a sparsely populated area and that the SOP facility would be in an industrial park reduce waste-related risks

Waste disposal and tailings containment have been topical subjects of late. That the Khemisset project site is located in a sparsely populated area and that the SOP facility would be located in an existing industrial site help reduce risks. The sale of de-icing salt would minimise the amount of salt tailings that needs to be stored at the minesite, thereby lessening environmental disturbance and reducing waste disposal-related costs. In a similar vein, sales of hydrochloric acid, DCP and calcium chloride should mean that waste disposal is not a constraint on SOP production. Meanwhile, the credits would serve to reduce Emmerson's production costs, thereby improving the competitiveness of its MOP and SOP output.

Any issues could manifest as lower revenues and/or higher costs than expected

Any of the considerations discussed above could manifest as lower-than-expected revenues and/or higher-than-expected unit costs. Ever-tightening environmental and social legislation could also adversely impact costs and economics.

### Financing risk

There can be no guarantee that Emmerson will be able to raise all the requisite funds

Emmerson will need to raise substantial funds to finance overheads, exploration, development and construction. There can be no guarantee that a sufficient quantum can be raised.

Commodity prices and capital market conditions will influence the ease with which funds can be obtained

Generally speaking, the price of MOP (and, potentially, that of de-icing salt and SOP) will have an important bearing in that high(er) prices generally improve sentiment and make obtaining funds easier. However, turmoil in the global capital markets has the opposite effect, and there is the possibility that market conditions could deteriorate.

Emmerson's independence as a supplier is proving attractive to potential partners; phased development could reduce upfront capital requirements and should also allow financing to be considered at different levels

Encouragingly, Emmerson reported recently that engagement with potential strategic partners, debt providers and anchor investors is proceeding well. Emmerson's independence as a supplier (with offtake as yet uncommitted) is reportedly proving to be "a major attraction" to potential partners. According to the company, multiple opportunities are being investigated, with due diligence processes underway. We remind readers that Emmerson is conducting work to confirm opportunities for phased development. Such options would not only have the potential to materially reduce upfront capital requirements, but should also allow financing to be considered at different levels.

Emmerson may need to strike a balance between debt financing and equity upside potential

Some forms of financing require offtake agreements to be struck with fixed prices. Fixed-price agreements are likely to entail discounts to entice the conclusion of agreements. Emmerson would need to strike a balance between such financings and equity upside potential.

### Tax and royalty risk

Morocco's mining tax and royalty regimes are currently very competitive, but this could change for the worse

Morocco currently boasts very competitive mining tax and royalty regimes that are very favourable for mining at present. However, tax and royalty regimes can be rescinded or revised to the detriment of Emmerson. Examples include Australia's abortive Mineral Resource Rent Tax and Zambia's flip-flopping on tax policies. There is a growing trend for countries (particularly in Africa) to seek increased free-carried interests, higher royalties/taxes and more local spending/purchasing, and to impose capital gains tax in the event a mining company sells on individual projects or the company itself, e.g. Liberia and Mozambique.

### Country/political risk

We regard Morocco as a lower-risk jurisdiction for potash production

Emmerson is operating in Morocco, which we regard as being one of the lower-risk jurisdictions in which a potash operation could be developed. In contrast, many potash projects are located in rather more 'exotic' locations like Belarus, Eritrea, Ethiopia, the Republic of Congo (RoC), Russia and Turkmenistan. More generally, specialist country risk consultants generally rate it as being of moderate risk.

Morocco ranks second amongst African countries in the World Bank's Ease of Doing Business Index

We believe it worth highlighting that in the World Bank's 2020 Ease of Doing Business Index, Morocco was ranked second highest amongst African countries, or 53rd out of 190 countries globally. We note that of the countries in which potash developer peers are focused: Australia is 14th, Canada is 23rd, Spain is 30th, Brazil is 124th, Argentina 126th, Ethiopia 159th, RoC 180th and Eritrea 189th.

Protectionism is a potential challenge, but should such measures be imposed in any given country, Emmerson could simply focus on a range of alternatives

Emmerson's ability to sell its product(s) into other countries/markets could potentially be adversely affected by licensing or other protectionist measures. For example, the USA's Department of Commerce is currently investigating whether Morocco and Russia provide unfair subsidies to phosphate producers. An adverse ruling could result in the imposition of duties on imports of Moroccan and Russian phosphate into the USA. We would not expect Emmerson's MOP and de-icing salt production to be similarly targeted, given that US MOP production is negligible, while Morocco's de-icing salt exports represent but a small fraction of the overall US de-icing salt market. However, were Emmerson to become a significant producer of SOP, we believe the chances would be higher. We note that, in the worst case scenario, Emmerson's eminently strategic location means that the company would have a choice of alternative markets on which to focus.

## Permitting/title risk

We regard Emmerson's title and permitting risks as being on the low side

We believe Emmerson's title and permitting risks to be relatively low. Emmerson was one of the first companies – if not THE first – to achieve a consolidation of core permits under Morocco's new Mining Code of 2015. In September 2020, Emmerson said that the Moroccan mining ministry and other relevant authorities were proving helpful, providing confidence that the company's target of having both environmental and mining permits in place during H1 2021 can be successfully achieved.

Failure to meet commitments and/or a change of government could adversely impact permitting

However, there can be no guarantee that pending or future licence applications/renewals will be granted or upgraded, particularly if the company fails to meet its commitments and/or there is a change of government. There is also the possibility of objections to exploration and/or mining from NGOs and/or other parties on environmental and/or cultural grounds. Accidents or other unforeseen events may compromise performance of legally mandated environmental and/or social obligations, which could have negative regulatory and financial implications.

The project area is sparsely populated and regional unemployment is high; Khemisset will confer significant socio-economic benefits locally, regionally and nationally; the ESIA is being produced above and beyond Morocco's minimum standards, with no red flags or fatal flaws to date

Helping Emmerson's case is that the project area is sparsely populated outside of Khemisset city (with subsistence farming within river valleys and non-arable farming on hill slopes), with regional unemployment said to be high.

- A recent socio-economic study conducted by a renowned local academic reported positive findings: Khemisset will create 2,385 direct and indirect jobs during mine construction and 760 during operations (a total of 1,500 roles will be created via the employment multiplier); local GDP per capita should be lifted by 40%; and fiscal contributions were estimated at 176% of tax revenues generated locally, 5.1% regionally and 1% nationally.
- The Khemisset ESIA is being produced in adherence with the Equator Principles and IFC Performance Standards, above and beyond Morocco's minimum standards. Encouragingly, no red flags or fatal flaws have been identified to date, we understand.

Emmerson intends to provide preferential treatment to local providers of equipment and labour

Emmerson is cognisant of the importance of good Environmental, Social and Economic Sustainability (ESEC) practices. Aside from taking steps to ensure compliance with Morocco's rules and regulations, Emmerson is targeting the recruitment of 90% of its workforce from the local area, and is to adopt a procurement strategy that provides preferential treatment to locally-based providers of equipment.

## Liquidity and dilution risk

Entering/exiting significant positions could see adverse share price movements

Entering into or exiting from significant positions in Emmerson could take time and result in sharp adverse share price movements. Capital-raising events and employee remuneration could result in existing shareholders being diluted.

# Appendix I: Companies mentioned

**Figure 37: Companies discussed in this document[1,2,3]**

| Company | Ticker | | Recommendation | Current Price |
|---|---|---|---|---|
| Acron^ | AKRN RM | AKRN RM Equity | NR, CNP | RUB6,010 |
| Arab Potash^ | APOT JR | APOT JR Equity | NR, CNP | JD17.65 |
| Archer Daniels Midland^ | ADM | ADM Equity | NR, CNP | US$46.51 |
| Agrimin^ | AMN AU | AMN AU Equity | NR, CNP | A$0.56 |
| Allana Potash^ | Delisted | | - | - |
| Anglo American^ | AAL LN | AAL LN Equity | NR, CNP | 1871p |
| Australian Potash^ | APC AU | APC AU Equity | NR, CNP | A$0.15 |
| BCI Minerals^ | BCI AU | BCI AU Equity | NR, CNP | A$0.24 |
| Belaruskali^ | Unlisted | | - | - |
| BHP Billiton^ | BHP LN | BHP LN Equity | NR, CNP | 1705p |
| Brazilian Potash | Unlisted | | - | - |
| Compass Minerals^ | CMP | CMP Equity | NR, CNP | US$56.07 |
| Crystal Peak Minerals^ | CPM CN | CPM CN Equity | NR, CNP | C$0.01 |
| Danakali^ | DNK LN | DNK LN Equity | NR, CNP | 27.50p |
| Emmerson+ | EML LN | EML LN Equity | NR, CNP | 4.10p |
| Encanto Potash^ | EPO/H CN | EPO/H CN Equity | NR, CNP | C$0.07 |
| EuroChem^ | Unlisted | | - | - |
| Fortescue Metals Group^ | FMG AU | FMG AU Equity | NR, CNP | A$16.20 |
| Gensource Potash Corporation^ | GSP CN | GSP CN Equity | NR, CNP | C$0.17 |
| Glencore^ | GLEN LN | GLEN LN Equity | NR, CNP | 173p |
| Highfield Resources^ | HFR AU | HFR AU Equity | NR, CNP | A$0.58 |
| Intrepid Potash^ | IPI | IPI Equity | NR, CNP | C$9.18 |
| Israel Chemicals^ | ICL IT | ICL IT Equity | NR, CNP | ILS12.28 |
| K+S^ | SDF GY | SDF GY Equity | NR, CNP | EUR5.22 |
| Kalium Lakes^ | KLL AU | KLL AU Equity | NR, CNP | A$0.14 |
| Karnalyte Resources^ | KRN CN | KRN CN Equity | NR, CNP | C$0.25 |
| Kore Potash+ | KP2 LN | KP2 LN Equity | NR, CNP | 0.71p |
| MagIndustries^ | Delisted | | - | - |
| Nutrien^ | NTR CN | NTR CN Equity | NR, CNP | A$53.29 |
| OCP Group^ | Unlisted | | - | - |
| Passport Potash | Delisted | | - | - |
| Qinghai Lenghu Bindi^ | Unlisted | | - | - |
| Reward Minerals^ | RWD AU | RWD AU Equity | NR, CNP | A$0.16 |
| Rio Tinto^ | RIO LN | RIO LN Equity | NR, CNP | 4804p |
| Salt Lake Potash^ | SO4 LN | SO4 LN Equity | House Stock | 27.0p |
| SDIC Xinjiang Luobupo Potash^ | Unlisted | | - | - |
| Slavkaliy^ | Unlisted | | - | - |
| SOPerior Fertilizer Corp^ | SOP CN | SOP CN Equity | NR, CNP | C$0.05 |
| SQM^ | SQM | SQM Equity | NR, CNP | US$32.90 |
| The Mosaic Company^ | MOS | MOS Equity | NR, CNP | US$17.81 |
| Turkmenhimiya^ | Unlisted | | - | - |
| Uralkali^ | URKA RX | URKA RX Equity | NR, CNP | RUB119.04 |
| Western Resources^ | WRX CN | WRX CN Equity | NR, CNP | C$0.18 |
| Wilmar International^ | WIL SP | WIL SP Equity | NR, CNP | S$4.35 |
| Yara International^ | YAR NO | YAR NO Equity | NR, CNP | NOK345.10 |
| Vale^ | VALE | VALE Equity | NR, CNP | US$11.13 |

[1] Priced as at 21st September 2020.
[2] NR = No Recommendation, CNP = Coverage Not Pending.
[3] Shore Capital Stockbrokers Limited acts as Joint Broker to Emmerson Plc and Kore Potash.

Source: Bloomberg; Shore Capital Markets

# Appendix II: Glossary – terms and abbreviations

| | |
|---|---|
| **Aircore drilling** | This drilling method uses a bit with steel or tungsten blades to cut into unconsolidated ground, typically limited to depths of 50-60m. Compressed air is used to blow drill cuttings up an 'inner tube' in the drill rod |
| **Aquiclude** | An effectively impermeable area that acts as a barrier to the flow of groundwater |
| **Aquifer** | A geological formation that can store and transmit useable amounts of water or brine |
| **Aquitard** | An area of low permeability that restricts the flow of groundwater |
| **BFS** | Bankable Feasibility Study |
| **CAGR** | Compound Annual Growth Rate |
| **CIF** | Cost, Insurance and Freight. The seller arranges the transport of goods by sea (and insurance) to a named port; risk transfers to the buyer once the goods have been loaded on the vessel |
| **DCF** | Discounted Cash Flow |
| **DFS** | Definitive Feasibility Study |
| **Diamond drilling** | Drilling technique used to extract uncontaminated cylindrical cores of rock using a diamond-impregnated drill bit; core is gathered in a core tube |
| **Dip** | Angle at which a planar geological feature is inclined from the horizontal |
| **EIA** | Environmental Impact Assessment |
| **FOB** | Free on Board. The seller is required to deliver goods on board a buyer-designated vessel; the seller's obligations are fulfilled when the goods have passed over the ship's rail |
| **Footwall** | Underlying side of a stratigraphic unit, fault, orebody or stope |
| **FSA** | Framework Sales Agreement |
| **g** | Gram |
| **g/t** | Grams per tonne |
| **ha** | Metric hectare (100m x 100m) |
| **Halite** | Rock salt, mineral form of sodium chloride (NaCl) |
| **Hanging wall** | Overlying side of a side of a stratigraphic unit, fault, orebody or stope |
| **Horizon** | Tabular layer containing mineralisation |
| **Hydrological** | Pertaining to water either above or below the surface |
| **I&I resources** | Indicated & Inferred resources |
| **Indicated resource** | Mineral resource where quantity, grade/quality, densities, shape and physical characteristics can be estimated with sufficient confidence for application of technical and economic parameters to support mine planning and evaluation of the economic viability of the deposit. Based on reliable, detailed exploration where sampling is sufficiently closely spaced for reasonable assumption of geologic or grade continuity |
| **Inferred resource** | Mineral resource where quantity and grade/quality can be estimated based on geological evidence and limited sampling, and reasonably assumed (but not verified) geological and grade continuity |
| **JORC** | Joint Ore Reserves Committee, the Australasian Code for reporting of mineral resources and ore reserves |
| **K** | Potassium |
| **KCl** | Potassium chloride |
| **KCl-Eq.** | Potash content stated in the form of equivalent potassium chloride value |
| **kg** | Kilogram (1,000g) |
| **Kieserite** | A magnesium sulphate mineral |
| **km** | Kilometre |
| **ktpa** | Thousand tonnes per annum |
| **kWh** | Kilowatt hour |
| **LOI** | Letter of Intent |
| **LOM** | Life of Mine |
| **m** | Metre |
| **mbgl** | Metres below ground level |
| **Measured resource** | Mineral resource where quantity, grade/quality, densities, shape and physical characteristics are sufficiently well established as to allow their estimation with sufficient confidence for application of technical and economic parameters to support mine planning and evaluation of the economic viability of the deposit. Based on reliable, detailed exploration where sampling is sufficiently closely spaced for reasonable assumption of geologic or grade continuity |
| **Mg** | Magnesium |

| | |
|---|---|
| **M&I resources** | Measured & Indicated resources |
| **M,I&I resources** | Measured, Indicated and Inferred resources |
| **MOP** | Muriate of Potash, common name for potassium chloride, used in fertilisers |
| **MoU** | Memorandum of Understanding |
| **Mtpa** | Million tonnes per annum |
| **MVA** | Megavolt amperes |
| **MW** | Megawatt (1,000 kilowatts) |
| **MWh** | Megawatt hour |
| **Na** | Sodium |
| **NI 43-101** | Canadian National Instrument 43-101 |
| **NPK** | Fertiliser comprising nitrogen (N), phosphorus (P) and potassium (K) |
| **NPV** | Net Present Value of future cash flows discounted at an appropriate risk rate |
| **PEA** | Preliminary Economic Assessment |
| **PFS** | Pre-Feasibility Study |
| **Polyhalite** | A hydrated sulphate of potassium, calcium and magnesium – $K_2SO_4.MgSO_{4\cdot2}CaSO_{4\cdot2}H_2O$ |
| **Potash** | Any of several potassium-containing compounds, the most common of which is potassium chloride (KCl), used mainly in fertilisers |
| **Probable reserve** | Economically mineable Indicated resources (and/or Measured resources, in some circumstances), as demonstrated by at least a Preliminary Feasibility Study |
| **Proven reserve** | Economically mineable Measured resources, as demonstrated by at least a Preliminary Feasibility Study |
| **RC drilling** | Reverse Circulation drilling uses a chisel bit attached to a downhole hammer to produce rock cuttings; the hammer is powered by compressed air, which also acts as the medium to bring drill cuttings up to surface within an inner tube inside the drill rod, thereby reducing contamination |
| **(Mineral) Reserve** | Economically mineable Measured and/or Indicated resources, as demonstrated by at least a Preliminary Feasibility Study. Includes diluting materials and allowances for mining losses |
| **(Mineral) Resource** | Concentration of mineral in such form, quantity and grade/quality that there are reasonable prospects for economic extraction |
| **S** | Sulphur |
| **SOP** | Sulphate of Potash, a salt compound of potassium, sulphur and oxygen principally used as chloride-free potassium fertiliser |
| **Strike** | The horizontal direction of a stratigraphic unit; the extent of the strike is the strike length |
| **Sylvinite** | An ore that is the mechanical mixture of sylvite and halite |
| **Sylvite** | Potassium chloride (KCl) in its natural mineral form, the most important ore for production of MOP |
| **t** | Metric tonne (1,000kg) |
| **Tailings** | Finely ground rock from which valuable minerals have been extracted |
| **Tailings dam/dumps** | Dams/dumps created from waste material arising from processing of ore |
| **TBM** | Tunnel Boring Machine |
| **tpa** | Tonnes per annum |
| **W** | Watt (joule per second) |

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