DANAKALI: POTASH INSIGHTS

FEED STUDY IMPROVES COLLULI ECONOMICS; POTASH BREAKFAST CONFIRMS SOP’S ATTRACTIONS

Hannam & Partners hosted a breakfast event focused on potash with presentations from Sean Mulholland, Senior Consultant on fertilisers at CRU, and Paul Donaldson, CEO of Danakali (“DNK”), developer of the Colluli sulphate of potash (“SOP”) project in Eritrea. Along with updated project economics announced last week, the event highlighted Colluli’s unique attractions, as well as several key advantages of SOP over other potash products. Danakali announced in November that it will seek a dual-listing in the UK on the LSE, alongside its existing ASX listing. In this report we provide feedback on DNK and CRU’s views on SOP, plus a review of the wider potash market.

UNIQUE PROJECT, WELL ADVANCED

DNK’s 50% owned Colluli project is currently the only fully permitted, post-BFS SOP project globally and has a number of unique advantages over its peers. Colluli has an exceptional 1.1bn tonne reserve that is suitable for low cost, shallow, open cut mining. The project also has the lowest capital intensity amongst global development SOP projects due to presence of existing infrastructure, and a relatively simple processing plant design. During the Potash Breakfast, DNK suggested that the likely commissioning date at Colluli would occur in late 2020.

FEED STUDY IMPROVES CAPITAL COSTS

DNK is currently completing front-end engineering design (FEED) which will lead to updated project economics in January 2018. Preliminary capex estimates, including working capital, show a small decrease to $332m from $337m. Operating cost estimates for FEED are currently being gathered and will be supported by contractor competitive bids in mining and power generation. Danakali has so far improved the cost structure of Colluli through each project study phase, which supports our confidence in management’s ability to deliver a profitable SOP project in Colluli.

SMALL PROJECT FOOTPRINT A KEY ADVANTAGE

The key advantage Colluli has is the right combination of carnallite and kainite salts for simple, high-yield conversion to SOP at ambient temperatures. As Colluli’s salts are already in solid form, there is no need to harvest from brines via evaporation, which significantly reduces the project’s evaporation footprint vs brine producers. For example, N American SOP producer Compass Minerals has 40k acres of evaporation ponds, whilst Colluli’s DFS plans using only 300 acres to harvest salts on its site. This combined with a lack of communities or other economic activity on site provides a unique advantage over SOP peers.

OFFTAKE DISCUSSIONS KEY

Danakali is set to become a globally significant SOP producer, with just Colluli Phase 1 providing around 8% of global SOP supply (based on CRU’s 2016 total SOP supply estimate of 6.1Mt). During the breakfast, Danakali outlined their offtake strategy which envisages having 85% of its supply under contract with 15% retained for price discovery. The Company’s marketing strategy is partly to target end users and partly the leading fertiliser traders, and not to focus on a single party solution. The importance of securing offtake for the 472 ktpa of production during Colluli Phase 1 and 850 ktpa during Phase 2 was emphasised by Monday’s announcement of a management change, where Danny Goeman will transition from Head of Marketing to the role of Chief Executive Officer where his focus will be on the completion of the binding offtake. The current CEO, Paul Donaldson, will become a Non-Executive Director on the Danakali Board.

SOP A BRIGHT SPOT IN AN OTHERWISE DIFFICULT POTASH MARKET

SOP is a specialty potash product, vital in the cultivation of chloride-intolerant crops such as fruit and nuts, for which potassium chloride (aka “muriate of potash” or “MOP”) cannot be used. The premium for SOP vs MOP has risen post the break-up of Uralkali and Belaruskali’s joint marketing deal in 2013, which caused MOP prices to fall, and as SOP demand has grown at a faster pace, especially in China. While we believe potash in general may see more modest demand growth in the coming years, the outlook for SOP appears particularly challenged by the amount of new capacity expected to come on line. However, we expect sticky demand from chloride-sensitive farmers and environmental limits on Chinese supply will allow SOP to sustain a healthy premium.

DNK VALUATION REMAINS UNCHANGED

Using a 0.5x NPV multiple and a $550/t SOP price forecast, we arrive at a valuation for Danakali of US$188m, or A$1.0 per share. This implies c.42% upside to the current share price. We will update our valuation in January following the release of updated FEED study project economics.

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Please see our 23rd Feb initiation for further details on DNK. Hannam & Partners (Advisory) LLP is acting as a retained advisor to Danakali Ltd.
CURRENT THEMES IN THE GLOBAL POTASH MARKET

Last week Hannam & Partners hosted a breakfast event focused on potash with presentations from Sean Mulholland, Senior Consultant on fertilisers at CRU, and Paul Donaldson, CEO of Danakali, developer of the Colluli sulphate of potash (“SOP”) project in Eritrea.

Overall, we came away optimistic on the likelihood of SOP, a “speciality” potash product, continuing to outperform standard “MOP” (potassium chloride, also known as “muriate of potash”) products, with SOP’s price premium remaining in excess of long run averages, in our view.

While the larger MOP market appears structurally challenged, in our view, we believe SOP should benefit from sticky demand from chloride-sensitive crop producers, latent demand for SOP from many would-be consumers in India and Brazil, and limitations on China’s ability to ramp up supply due to issues with disposing of hydrochloric acid, a by-product of the secondary production process.

This outlook should be positive for Danakali as it looks to negotiate offtake agreements, secure financing and develop Colluli towards first production in 2020.

Below we outline the key current themes in the global potash market, based on both CRU’s presentation and our own observations.

SOP TO REMAIN AN IMPORTANT SPECIALITY POTASH PRODUCT

CRU outlined SOP and more generally potash’s place in the fertilizer market. Potash is one of three critical macro nutrients for crop growth, alongside nitrogen and phosphates. Potash has many roles within plants, the most important of which is to support nitrogen and water uptake, improving the quality, taste and feel of crops.

The key advantage of SOP over MOP is its use in the cultivation of chloride-intolerant crops. Many crops suffer chloride toxicity, rendering MOP (i.e. potassium chloride) sub-optimal.

Chloride intolerance is a spectrum:

- Crops such as cereals, oilcrops and cotton are tolerant and are therefore unlikely to require SOP;
- Some crops such as tea, coffee and potatoes are only mildly sensitive, meaning farmers can substitute between MOP and SOP depending on relative cost, availability and expected pricing for the end-produce;
• However, many, such as almonds, strawberries and tobacco are completely intolerant, creating inelastic demand for SOP regardless of the relative cheapness of MOP.

As living standards and disposable incomes rise, consumer preference has led to increased cultivation of fruits, vegetables, tree nuts and tea. These crops are often sensitive or intolerant to the chloride content in ordinary MOP, resulting in faster demand growth for SOP in recent years.

The global market for potash fertilisers amounts to ~65Mt on a total product tonnage basis (as opposed to contained K$_2$O). The International Fertilizer Association (IFA) forecasts demand growth of ~2.2% pa over the 5 years to 2021, as compared with a long run CAGR of ~2.6% since 1960 and a 2.4% from 2011-16.

MOP represents ~90% of global potash use, with SOP (~7%) accounting for most of the remainder. As noted by CRU, demand for SOP has significantly outpaced the wider potash market, at a CAGR of ~6.9% over the last five years. Based on the advantages of SOP use outlined above and considerable latent demand in important agricultural regions such as India and Brazil, we believe demand for SOP can continue to grow faster than for MOP, albeit at a more modest pace than in recent years.

**Nutrient composition in global fertilizer market in terms of content - 2016**

- Potassium 17%
- Nitrogen 60%
- Phosphorus 23%

**Potash market breakdown by product on a K2O nutrient basis - 2016**

- Muriate of Potash (MOP) 89%
- Sulphate of Potash (SOP) 7%
- Potassium magnesium sulphate (SOPM) 2%
- Potassium nitrate (NOP) 2%

EXCESS CHINESE CAPACITY IS NOT A WORRY…

Chloride-sensitivity can be exacerbated by arid soils, as chloride can build up in the soil over time, facilitating demand growth in the Middle East and North Africa. Intensive crop rotation, such as occurs in China, has a similar effect.

China’s agronomic profile, with significant fruit, vegetables and tea also justifies its disproportionate share of global SOP demand. CRU estimates global SOP use at ~3.1Mt on a contained K$_2$O basis, equivalent to ~6.1Mt of total product; China’s share of global demand is estimated at 56%, or ~3.5Mt. Nonetheless, China’s SOP production capacity amounts to ~6.2Mt, around 62% of global capacity and outstripping China’s demand by almost 2 to 1.

**Global SOP use is concentrated in China – justifiably, according to CRU**

- China 56%
- Europe 20%
- USA 6%
- Other Asia 1%
- CIS 0%
- Other 5%

**Global SOP capacity – China has around 6.2Mt of 10Mt global capacity**

- China 62%
- Russia 12%
- USA 7%
- Other 4%
- Egypt 2%
- India 2%
However, the risk of a wave of SOP supply from China appears low due to heavy export tariffs and the fact that much of Chinese capacity is high cost and marginal.

Furthermore the majority of China’s capacity is secondary production (i.e. conversion of MOP to SOP using the Mannheim process). Secondary producers in China currently have difficulty disposing of hydrochloric acid, which is a by-product of the process. As such, we believe that low utilisation rates appear to be driven more by logistical constraints than low prices, and that this will hold back secondary SOP production in China, even if prices are high enough for plants to operate profitably.

…but new supply in Rest of World may exert pressure…

While excess Chinese capacity is not a major concern, we note that capacity in the rest of the world was still only ~72% utilised in 2016. On top of this, CRU outlined a pipeline of committed, probable, possible and speculative SOP projects which could add further to supply in the near to medium-term.

However, only one of these growth projects – the emerging Evergrow project in Egypt – is firmly committed, with 200ktpa in new secondary production expected in 2018 (nearly doubling Egyptian capacity).

Based on our analysis of the as yet uncommitted project pipeline, the current SOP price of ~US$490/t is more than enough to incentivise new supply. Amongst the “probable” new projects we estimate ~1.9Mt could meet a 20% return hurdle rate at current SOP prices, equivalent to over 30% of current SOP demand.

Nonetheless, based on the median project, this incentive pricing analysis would appear to be supportive of prices at around 10% below current levels - ~US$440-450/tonne, which in turn is more than enough for Danakali to generate strong returns from the Colluli project.

Incentive price analysis – estimated price required to give ROCE of >20% on project capex

Source: Company reports, H&P estimates. Note: incentive price is calculated as the SOP price (FOB) required to generate a 20% ROCE, (assuming 15-year straight-line depreciation schedule).

…and low MOP prices flatten the SOP cost curve

The relationship between the price of MOP and SOP is complex. To certain degrees, MOP is both a substitute for, and an input cost in, the production of SOP. The use of MOP and SOP for certain less chloride-sensitive crops is, to an extent, interchangeable (dependant on price). In addition, global SOP supply is roughly evenly split between “primary” mined SOP and “secondary” production which converts MOP to SOP by the addition of sulphuric acid via the Mannheim process.

Secondary producers have traditionally sat at the top of the cost curve; however, as MOP prices have fallen since 2013, Mannheim producers’ costs have fallen relative to primary SOP suppliers’. The SOP cost curve is, therefore, flattened by low MOP prices, which in turn is unsupportive for SOP pricing. Indeed, after the rally in last 12m, we believe current SOP prices are above the marginal costs for SOP.
In order for the new projects outlined in the chart above to be absorbed by the market, existing high-cost secondary supply will need to be displaced. This is likely to require prices to fall below the current level of ~US$490/t in order to dis-incentivise producers at the top of the cost curve which break even at around $400-440/t, according to estimates provided in DNK’s corporate presentation (see below).

**Estimated position of Colluli on 2016 SOP cost curve (US$/t)**

Source: Danakali presentation; Integer

**LONG-TERM, SUPPLY CHAIN DEVELOPMENT KEY TO UNLOCKING DEMAND**

Very little SOP is currently consumed in Brazil and India. CRU noted there is scope for both to be using significantly more, based on their crop mix. India’s low use is due to its current subsidy regime in urea (a source of nitrogen), which discriminates against the use of both SOP and MOP to aid nitrogen absorption.

The Indian Government has to date been reluctant to change its subsidy scheme due to a strong farming lobby. While we believe Narendra Modi’s BJP government sees the merits in overhauling the Indian subsidy system in general, we also believe the current administration is unlikely to make any major changes ahead of the next Indian elections in April-May 2019. Therefore, in our view, political realities dictate that such a move is most likely to happen within the first two years of the next Indian Government.

In Brazil, we believe there exists potential for significant SOP growth based on the country’s crop production mix, although the product would need to be marketed heavily in order for wider adoption to occur.

In our view, a key challenge for SOP in general is that farmers tend to make the decision on which fertiliser product to buy ‘last minute’, based on expected weather patterns and the likely pricing they can achieve when they harvest the end-product. The lack of immediately available SOP in many parts of the world is therefore a barrier to its wider adoption. In order for this to change, a shake-up of how SOP is distributed would need to happen. Nevertheless, the example of China would suggest that crop growers will be reluctant to switch back to MOP after trying SOP, underlining the potential demand which could be unlocked through supply-chain development in other regions.

**POLYHALITE AND SOP ARE NOT DIRECTLY COMPARABLE**

Unsurprisingly, given its relevance to the UK’s potential future growth in potash production, a key topic for debate at the Potash Breakfast was the outlook for polyhalite. In DNK’s view, polyhalite is not a direct competitor to SOP as it is not entirely chloride-free. However, it does contain magnesium, a less important, but still necessary, nutrient required in plant growth. As such, polyhalite could be more closely comparable to SOPM (potassium magnesium sulphate).

While we have no strong view on the potential for polyhalite, we note global demand for SOPM at ~0.8Mtpa on a K₂O content basis is a roughly quarter of that for SOP at ~3.1Mtpa, meaning significant new SOPM/SOPM-equivalent supply may be more difficult to place in the market.
**PREMIUM FOR SOP HAS EXPANDED, BUT OUTLOOK FOR MOP STILL A RELEVANT CONCERN**

Despite SOP’s advantages as described above, we believe the scope for substitution between SOP and MOP and the fact that MOP is a key input cost for much of global SOP production mean that a key factor in analysing the specialist SOP market is an understanding of the dynamics of the larger MOP sector.

While CRU’s commentary at breakfast focused mainly on the specialty SOP market, we provide our observations below on the wider potash market from an H&P perspective.

**MOP PRICES GRADUALLY IMPROVING FROM A LOW BASE…**

MOP prices fell by ~56% from 2012 to 2016, but have slowly and steadily begun to improve in the last 18 months. The drivers of the collapse were in part simple supply and demand – as new projects, sanctioned during a stronger price environment earlier in the decade, came onstream at the same time as developing market demand growth began to slow - but also the breakdown of the oligopoly in the market as the Uralkali and Belaruskali marketing agreement (known as the “Belarus Potash Company” or “BPC”), broke apart in 2013. BPC previously controlled ~35% of global MOP supply.

We also note the MOP price collapse also mirrored similar collapses in many agricultural commodity prices (e.g. corn -63%, wheat -62%, soybeans -52%, orange juice -52%).

**SOP premium to MOP has risen since 2013 (US$/t)**

The global potash price collapse came to an abrupt halt in mid-2016, before starting to slowly recover, in-line with global commodity price reflation. The turnaround also came after a series of mine suspensions by Potash Corp (PCS) in Saskatchewan and the eventual mothballing of the Piccadilly operation in New Brunswick, and preceded the announcement in Sep’16 of a merger between PCS and Agrium to create a North American agrimineral and fertiliser giant.

…**BUT STRUCTURAL POTASH OVERSUPPLY LIKELY TO LIMIT MOP UPSIDE**

Despite some evidence that demand has improved in 2017, after two years of destocking/deferral of purchases in 2015/16, the improvement in MOP has been notably more tepid than in other commodities. Potash prices in most regions are barely 20% off their mid-16 lows, versus over 30% for most industrial commodities (and >50% for copper and zinc).

A structural oversupply in the MOP industry is to blame in our view. While PCS has closed capacity at New Brunswick, it has also ramped up new capacity at Rockanville; elsewhere Russian producer EuroChem is planning to add almost 6% to global potash capacity over the next
4 years, with significant expansions also planned by K+S, Belaruskali and Mosaic. Overall, the IFA estimates a 20% increase in potash capacity by 2021 to ~107Mt in MOP terms.

Global potash capacity forecast based on changes in production of major producers

![Graph showing potash capacity forecast](image)

Source: Company reports, H&P estimates.

**COST CURVE ALSO UNSUPPORTIVE FOR MOP**

EuroChem – a key driver of capacity growth in MOP over the coming years – provided an estimate of the 2021 global potash cost curve within its Q2 results in August. The industry marginal cost for MOP of ~$200-250/t is not supportive of current price levels, with European MOP prices having recovered to ~$260/t at present. EuroChem and other’s new capacity coming towards the bottom of curve could exacerbate this dynamic, lowering the point at which expected demand cuts to the curve to ~$160-170/tonne, based on the company’s own estimates as shown below.

2021E global potash cost curve – delivered basis

![Graph showing 2021E global potash cost curve](image)

Source: EuroChem

**MOP OVERCAPACITY TO PERSIST, EVEN IF DEMAND SURPRISES TO THE UPSIDE**

MOP represents ~90% of the ~66Mt global potash fertiliser market. Various industry experts have provided estimates of future MOP demand. The International Fertilizer Association estimates demand growth of 2.2% pa over the next four years. This compares to a global CAGR in potash sales since 1960 of ~2.6%. As outlined above, we see capacity additions materialising well above expected industry growth rates until the end of the decade. Even if demand accelerates to c. 4% pa, almost double the IFA’s forecast, we estimate technical capacity utilisation is likely to remain below its long-term average of c 82% for the next 5 years.
Global potash sales and technical available capacity – sales CAGR of 2.6% since 1960; overcapacity has worsened in recent years

Global potash capacity utilisation – H&P estimate a 3.8% CAGR is required for utilisation rate to return to historic average level of ~82%; this compares to IFA’s 2.2% forecast and a long-run CAGR since 1960 of 2.6%

SUPPLY DISCIPLINE WILL BE KEY TO POTASH PRICE PROGRESSION

The merger of Potash Corp and Agrium to form “Nutrien” arguably does little to improve the structure of the global potash market, given both are already key members of the Canpotex joint marketing block. (Indeed, estimated operating synergies of ~$500m pa may even put downward pressure on the potash cost curve). However, combining the two companies’ project pipelines may promote capital discipline, pushing the development of more marginal projects further into the future than otherwise would have been the case, giving time for demand to catch up with supply in the longer-term, in our view.

Global potash capacity by producer

Source: K+S Company presentation, October 2017; IFA, H&P estimates.
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