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Investments in future & low cost Potash Fertilizer Producers

Benefit from the increasing demand
for healthy food

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Preface

Welcome to the first report on CommodityScreener.com. It is about a commodity that is certainly not known to many private investors. However, it is indispensable for feeding the world.

I am talking about a potash fertilizer, which is needed for the cultivation and growth of many high-quality crops. This report will show that it offers many attractive points that speak for an investment in this type of commodity. In the further course of this report, I will introduce some companies that are developing such projects. There are projects with different stages of progress, up to projects which are close to production. A detailed table compares the most important information and key figures of the projects with their competitors. In my opinion, this makes it easier to discover the favorites in this area.

As already written above, this is my first report. Therefore I would be pleased about suggestions or constructive criticism. Also please forgive possible spelling or grammatical errors. I always try to improve my English skills. You can reach me at any time by e-mail or via the various social media accounts. You can find more information on my website: commodity-screener.com.

If you liked the report, please feel free to forward it to interested persons. I would really appreciate that.

Now I wish you much fun with reading this report!

Best regards

Julian Platen

CommodityScreener.com

Important: Please also note the disclaimer at the end of the report and on our website.

1. Introduction

Modern agriculture would be unthinkable without fertilizers. Because nutrients are often not available in the soil in the optimally usable form and quantity, fertilizers are used to supplement the nutrient supply for the crops grown. In addition to heat, light, air, and water, plants also need nutrients for their growth. Fertilization improves plant nutrition, promotes plant growth, increases yields, improves the quality of harvested products, and ultimately maintains and promotes soil fertility. These are the reasons why the use of fertilizer increased by 800% between 1961 and 2019. A further general increase in demand for fertilizers appears to be necessary given a further increase in the world population, which makes a further increase in the productivity of the areas under cultivation necessary. Another consequence of the increasing world population is the decrease of fertile land. This, in addition to a change in diet, will also lead to increasing demand for fertilizers.

However, the negative consequences of the use of fertilizers are also becoming more frequent. Besides the formation of CO₂ during production, over-fertilization is a very common problem. If more fertilizer is applied than required, this leads to the pollution of groundwater and surface water. As part of greater environmental awareness, the production of environmentally friendly fertilizer is becoming increasingly important.

2. Overview of different fertilizer types

"Market-ready" fertilizers can be classified into three types:

Nitrogen (N) Adds crop volume through enhancing protein and chlorophyll production

Phosphorus (P) Helps transfer energy and is the key to photosynthesis

Potassium (K) strong stem growth, movement of water in plants, promotion of flowering and fruiting, raises resistance to infection and parasites;

Next are three secondary macronutrients: calcium (Ca), magnesium (Mg), and sulfur (S); there are also some micronutrients, but covering these would go beyond the scope of this report. Classification is mostly done by the category single nutrient fertilizers and multi-nutrient fertilizers.

Nitrogen fertilizer: Nitrogen fertilizers are fertilizers that provide plants with mainly their main nutrient nitrogen. It is the most important type of fertilizer. These fertilizers can be of natural origin (e.g. as potassium nitrate) or produced by industry. The energy-intensive Haber-Bosch process, for which BASF applied for a patent in 1910, enabled the artificial production of ammonia as a starting material for fertilizer production. The large-scale industrial production of mineral fertilizers by this process made the immense growth of the world population in the 20th century and thus also modern society possible.

Phosphorus fertilizer: Phosphate fertilizers supply plants mainly with the main nutrient phosphorus (P) in the form of salts of phosphoric acid. All phosphate fertilizers are obtained by extraction from minerals. The most popular phosphate-containing minerals are called phosphate rock. The mineral is then converted to water-soluble phosphate salts which have a higher impact and lower costs.

Potassium fertilizer: Also called Potash; includes various mined and manufactured salts containing potassium in water-soluble form. It is typically extracted by open-pit or underground mining. Another method that has been used for decades in some areas and is currently becoming increasingly popular, especially in the production of SOPs, is the extraction of potash from brine using evaporation.

3.0 In-depth look into Potassium

After nitrogen and phosphorus, potassium is the third major plant and crop nutrient, in fact, 90% of the worldwide potassium production is used as a soil fertilizer. Even though it is the seventh most abundant element in the earth's crust, it does not occur in a pure form in nature. The reason for it is that it reacts with water. In addition to fertilizers, potash is also used for several other applications, but these account for only 10% of global demand. The most important application besides fertilization is of course the brewing of beer. Other applications include for example aluminum recycling, applications in medicine, or water softening.

Why is potash important for agriculture?

The growth of many plants is limited by potassium availability. Potash is important for agriculture because it improves water retention, yield, nutrient value, taste, color, texture, and disease resistance of food crops. It has wide application to fruit and vegetables, rice, wheat, and other grains, sugar, corn, soybeans, palm oil, and cotton, all of which benefit from the nutrient's quality-enhancing properties.

3.1 Types of potash

Today, the word *potash* is mostly used to describe naturally occurring potassium salts and the ready to sale commercial product. There are several different potassium compounds but only two species are important for the report and the worldwide market. The largest market with an annual production of around 70 Mtpa is muriate of potash (MOP), chemical name potassium chloride (KCl). It is a white looking salt compound, consisting out of the chemical elements potassium and chlorine. Because the growth of many plants is limited by potassium availability, it is used in many areas of agriculture. The current market price is around US\$250-300/t.

The second inorganic compound from the potash family is sulphate of potash (SOP), chemical name potassium sulfate (K_2SO_4). The global market of this type of fertilizer is a lot smaller, with an annual production of about 7Mtpa. Similar to MOP, SOP is also white and water-soluble. In mineral form, potassium sulfate is relatively rare. It is also included in some other minerals where it can later be separated.

There are two ways of producing the fertilizer product SOP. The first and most used way is called the Mannheim process. This is also called secondary production. Simply put, MOP is heated to about 600 to 800 Celsius in a cost-intensive and energy-demanding process. About 2/3 of the total SOP production is done by the Mannheim Process.

The other possibility is evaporation from brines. The brine is pumped into large evaporation ponds. The sun lets the water evaporate and the recovered salt is then treated in a plant.

This process is significantly less labor- and capital-intensive and therefore also cheaper, as many steps are eliminated. The current market price is around US\$450-500/t, so SOP is trading at a significant premium to the more often used MOP. But why is that?

Difference between MOP and SOP

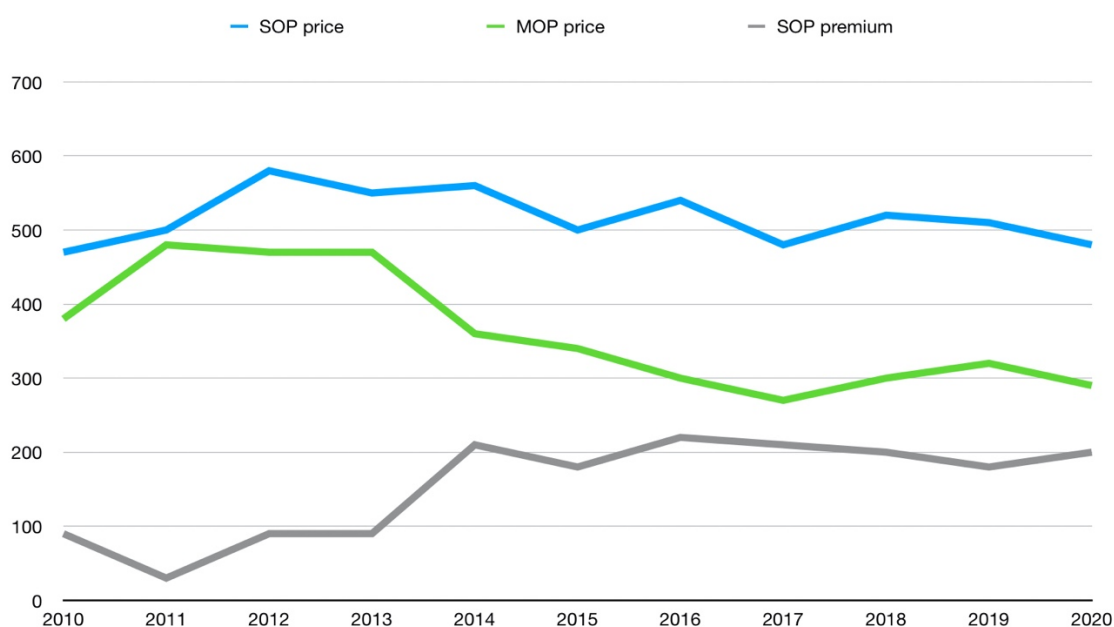
As stated in the paragraph above, even though both products belong to the same category of fertilizers, the worldwide demand and the price are very different. The reason for this is the composition of the product. While MOP consists out of the elements potassium and chlorine, SOP consists out of potassium and sulfates. The important factor is that for some plants the element chlorine is harmful. There are plants in agriculture like cocus nuts or sugar cane that are categorized as chloride-loving crops. Plants like wheat, rice, or maize are more chloride-tolerant crops. When it comes to plants that are generally more healthy and expensive, SOP is often the fertilizer of choice. Crops like tomatoes or ananas are categorized as part chloride-tolerant. High-quality fruits like strawberries or vegetables like avocados are even classified as chloride-sensitive crops. To ensure high quality and good taste, SOPs must be used with the lowest possible content of chlorine.

Price Comparison

There is no exchange, like for oil or wheat, where potash fertilizers are traded. That's why there is no worldwide set price. Prices differ, depending on the quality or location of the product. Nevertheless, there is price data for both MOP and SOP. The MOP price has underperformed in the last years, comparing a price of around US\$450/t in early 2013 to a current price of around US\$300/t, despite a CAGR of 2,5% in the last 10 years.

The SOP price on the other hand remained stable within the last 10 years, trading basically always between US\$600/t and US\$500/t per tonne. The CAGR within the last 10 years was more than double as high compared to MOP, with 5.7%.

Picture 2: SOP & MOP price comparison



It is also worth mentioning that SOP has managed to sustain a pretty stable premium in comparison to MOP since 2013. This is caused by tight supply and the trend towards healthier diets. With some fluctuations, the premium was and still is about US\$200/t. SOP is also one of the commodities with the lowest annual price variance. The average 10-year price variance is just 4%. Compared to Copper (12%) or MOP (14%) this is very low and thus facilitates long-term planning or calculations.

We can, therefore, conclude that SOP is the premium potash product. The points mentioned above qualify SOP as an attractive investment opportunity for companies and thus also for shareholders.

Why is SOP so important for modern agriculture?

It is undisputed that especially in the western world a rethinking has been taking place for some years now. The customer wants to consume fruits and vegetables of higher quality more and more often. This trend is driven by higher income and greater health awareness. These high-quality specialty crops (citrus fruits, potatoes, beans, nuts, strawberries, mangoes, tomatoes, coffee, tobacco, spinach, peas, etc.) are depending on ultra-low chloride content fertilizers. SOP checks all the boxes. It is the fertilizer for enhanced quality fruits and vegetables. It improves the storage quality and the color of fruit and vegetables. It is known for increasing the size and resistance of plants to drought and colder temperatures. A further benefit is the increased sugar content of crops like fruit carrots or onions.

Another important food sector in which SOP plays a decisive role are tree nuts like cashews or almonds. These nuts have become increasingly popular in recent years. SOP contains 18% sulfur which is especially important for oil crops. SOP is also used for other superfoods such as avocados.

It can, therefore, be concluded that the use of SOP plays a crucial role in the cultivation of high-quality crops and that a further increase in demand for these products is likely to lead to a further increase in demand for this fertilizer.

SOP consumption worldwide

SOP is currently mostly used in China (71kg/ha) and the established western economies Europe (43kg/ha) and the USA (57kg/ha). It is striking that in the countries with the highest predicted population growth there is significantly lower use of SOP. All regions use less than 10kg/ha SOP. China currently uses more than 4 times more kilograms SOP per hectare than Latin America, Africa, India, and Southeast Asia together.

In all these countries, the demand for SOPs is expected to increase when an increasing population meets a decreasing amount of arable land and an increasing middle class. The following picture shows the worldwide distribution of SOP use.

Picture 3: SOP consumption worldwide



SOP: Good for plant growth but also good for the environment?

On the one hand, the customer wants high-quality plants, but on the other hand, the products must be environmentally friendly and low in CO₂. Does SOP meet these requirements?

When I look at it, I only mention the environmental friendliness of fertilizer production. It should be clear that there are other points such as cultivation or transport which should be used for complete consideration.

For this purpose, the two possible production methods must be compared. As already mentioned, 2/3 of the worldwide production of SOPs is produced using the Mannheim process. It is also called a secondary process. The basis of this process is already extracted MOP, which is then separated from the chloride it contains. SOP is then produced by using KCl (MOP) in combination with sulphuric acid. Both products must be bought before producing SOP. This process is extremely energy-intensive and therefore also more expensive. The production costs in this process are about \$400/t. It is also comparatively environmentally unfriendly since a large amount of energy has to be used for its production.

When it comes to primary production methods (directly extracting SOP from minerals containing both potassium and sulfate), there are two methods. One is the mining of solid salts, underground or open-pit, and the extraction of brine. The presence of solid salts that are low on chloride is very rare. The brine extraction method is used since the 1970s in some regions successfully. In contrast to the Mannheim process, this method offers many advantages, as long as an appropriate resource is available which does not contain chlorides.

These Projects are located on salt lakes. The brine is extracted and pumped into big evaporation ponds. The sun lets the water evaporate and the salt can be harvested. The salt is then treated in a processing plant using simple and low-cost methods. This production type comes with another big benefit other than the fact that it is far more environmentally friendly. Production costs are cheaper. When compared to the Mannheim process, production costs of SOP are on a whole other level. Current figures show, that the cash costs are located around the 200\$/t mark for most projects. That is nearly 50% lower compared to SOP from secondary production.

It is therefore clear that the primary production of SOPs has clear advantages over secondary production. Thus, when looking for a suitable investment, one should concentrate on companies that either directly mine the salt or which can produce SOP out of brine. These methods are both environmentally more friendly and a lot cheaper. This boosts future company revenues and makes them more resistant to possible price fluctuations.

4. Potash producers worldwide

There are a handful of fertilizer producers worldwide who either only produce Potash or produce other types of fertilizer in addition to Potash. Canada based Nutrien is the world's biggest producer of potash and the second-largest producer of nitrogen fertilizer. The company produces over 27 million tonnes of potash. The second-largest company in this business is Mosaic. Even though nearly all mines are located in Canada, it is a US company. Next to potash, it is also producing phosphate fertilizers. The annual production of potash is around 10.5 million tonnes. Both companies are holding a 50% stake in Canpotex. This company is the world's largest exporter of potash.

Other major players are Uralkali (9.1 m.t.) and Belaruskali, located in Russia and Belarus respectively.

The German company K+S, which in addition to potash also produces magnesium and salt and mines in the USA, Canada, and Chile, is also known worldwide.

All companies have in common that they often produce other fertilizers besides potash. Also, there is currently no significant producer whose main product is SOP. On the exploration side, some companies are currently in the process of filling this gap in the future.

5. What's to look out for when looking for an excellent future SOP project?

Project location

Besides the country in which the project is located, a good location is characterized by good infrastructure. As the end product is produced in large quantities, a nearby railway or at least good roads are necessary. The distance to a freight port is also particularly important, as the product usually has to be shipped worldwide to the purchasing countries.

Location of the deposit

Deposit location is important for the production costs. As underground mines are normally more expensive than open-pit mining, mines that are mining solid salts are generally cheaper when open-pit mining is possible. When using the solar evaporation method another detail is very important. The project should be located in an area with a particularly low probability of precipitation. Since the brine is pumped into large evaporation basins, precipitation can slow down the evaporation process because the brine is then diluted by the rain. Although the Australian projects are all located in areas with particularly low precipitation, this is a risk that should also be taken into account when a project is in production.

Grade & Evaporation

These two points are of decisive importance for the profitability of a project. The higher the SOP concentration in the brine and the higher the evaporation rate due to much solar radiation, the lower the production and the development costs. This can be easily explained using an example. Suppose two different projects want to produce an identical amount of SOP. The first project is located in an area with a lot of sun and the SOP concentration in the sole is very high. The second project is worse on both counts. In order to achieve the same production volume, the second company has to build larger ponds and has to pump more brine into the basins because the weaker sun makes the water evaporate slower. In addition, due to the low SOP concentration, less salt is produced which can be processed. It, therefore, follows that more often in the year sole has to be pumped into the basins to reach the same level as in the first project. Larger basins lead to a higher CAPEX and the more frequent pumping results in a higher OPEX.

Management

I don't need much writing for that. Good management with experience is very important. Also, it is always important to me that the management invests its own money into the company. Although incentive options, for example, are a way to motivate, nobody is more motivated than a person who has invested his own money at the beginning.

Capital Costs

There is no question that good and large projects require a lot of capital for project development. However, the relationship between the cost of capital and the subsequent return must always be taken into account. And here, the rule is that, in terms of project size and capital costs, bigger is not always better. The past has shown that even very good projects take a long time to secure complete financing. How is a small company with 40

million market capitalization supposed to finance a project with 400 million CAPEX? (This was only a fictitious example). Smaller projects that offer a good return are often able to obtain financing more easily and quickly. One must always ask oneself how quickly or whether medium to long-term financing is possible/likely at all.

5.1 The comparative table of different SOP development projects

I have created a table that contains a series of the most important SOP projects. The different figures are intended to make it easier to compare different projects. Of course, the projects are not 100% comparable, but here you get a good first impression. If you look at the table for the first time, do not hesitate. I know it looks confusing at first glance. Just work your way from figure to figure.

In the first section, you will find the name of the company and some important data about the share. They are sorted by project location and market capitalization. Following are the most important data about the project. The third part compares the main financial figures of the projects. Of course, it is important to note that these figures are based on different study accuracy levels and that different assumptions may have been made.

All data is based on the respective studies and presentations, which can be found on the company's website. If possible, I have had my data checked by the company before publication. However, errors cannot be excluded! I do not take responsibility for them. You must inform yourself about the company before making any investment decisions.

So we'll get right in.

"The First League": Largest and most advanced SOP brine projects in Western Australia			
Company Name	Salt Lake Potash	Kalium Lakes	Agrimin
Number of projects	9	2	2
Market capitalization	US\$129 million	US\$70 million	US\$62 million
Share price	0.51 A\$	0.14 A\$	0.45 A\$
Cash position	A\$17,3 million	A\$20,5 million	A\$7,5 million
Project Name	Lake Way	Beyondie	Mackay
Project Info & Numbers			
Project location	Australia (Western)	Australia (Western)	Australia (Western)
Type of deposit	Brine	Brine	Brine
Study stage completed	BFS	BFS	PFS
SOP equivalent reserve (Mt)	5.4(Mt)	5.1(Mt)	123(Mt)
Production (ktpa)	245(ktpa)	164(ktpa)	426(ktpa)
Mine life (years)	20 years	30 years	20 years
SOP grade (kg/m3) LOM average	5.0kg/m3	N/A	8.0kg/m3
Average total cash costs	US\$205/t	US\$161/t	US\$222/t
Secured funding	US\$150 million	US\$194 million	N/A
Secured production offtake (%)	224.000tpa	90.000tpa	N/A
Distance to port	780km	630km	940km
Stake in the project	100%	100%	100%
Project Financials			
Capital cost	US\$178 million	US\$151 million	US\$409 million
Capital intensity	US\$729/t	US\$1300/t	US\$960/t
Realised sales price	US\$550/t	US\$606/t	US\$555/t
NPV8 Post-Tax	US\$335 million	US\$243 million	US\$453 million
IRR Post-Tax	28%	16.5%	20%
EBITDA	US\$77,7 million	US\$81,2 million	US\$137 million
EBITDA margin	63% @ US\$550/t SOP	61% @ US\$606/t SOP	N/A
Free cash flow	US\$54,6 million	US\$53,2 million	US\$95,5 million
Payback period	3.5 years	8.3 years	4.2 years
Product Specifications			
Potassium (% K2O)	>53%	>51%	>52%
Sulphate (% SO4)	>55%	N/A	>46%
Chloride(% CL)	<0.1%	<0.5%	<2%
Assumptions: 14 June 2020 - (AUD/USD) 0,6862			
All information without guarantee. Data based on public available publications of the companies.			

You can find more information here:

<https://www.so4.com.au/>

<https://www.kaliumlakes.com.au/>

<https://agrimin.com.au/>

Note: These are external links for which I take no responsibility.

"The Second League": Further SOP brine development projects in Western Australia & the US				
Company Name	Reward Minerals	Australian Potash	Salt Lake Potash	Crystal Peak Minerals
Number of projects	1	2	9	1
Market capitalization	US\$21million	US\$16 million	US\$129 million	US\$10 million
Share price	0.19 A\$	0.05 A\$	0.51 A\$	0.04 C\$
Cash position	A\$1,4 million	A\$720.000	A\$17,3 million	US\$2,0 million
Project Name	Lake Disappointment	Lake Wells	Lake Wells	Sevier Playa
Project Info & Numbers				
Project location	Australia (Western)	Australia (Western)	Australia (Western)	USA (Utah)
Type of deposit	Brine	Brine	Brine	Brine
Study stage completed	PFS	DFS	Scoping	FS
SOP equivalent reserve (Mt)	N/A	3.6(Mt)	N/A	6.8(Mt)
Production (ktpa)	407(ktpa)	150(ktpa)	200/400(ktpa)	30,000-372,000
Mine life (years)	25 years	30 years	20 years	30 years
SOP grade (kg/m3) LOM average	13.4 g/l SOP	N/A	8.7 kg/m3	N/A
Average total cash costs	US\$230/t	US\$262/t	US\$215/t* - US\$164/t*	US\$205/t
Secured funding	N/A	N/A	N/A	N/A
Secured production offtake (%)	N/A	70.000tpa	N/A	N/A
Distance to port	866km	ungefähr 1100km	969km	N/A
Stake in the project	100%	100%	100%	100%
Project Financials				
Capital cost	US\$309 million	US\$208 million	US\$200 mil. * - US\$39 mil. *	US\$398 million
Capital intensity	N/A	US\$1,387/t	N/A	N/A
Realised sales price	US\$500/t	US\$614/t	N/A	US\$575/t
NPV8 Post-Tax	US\$201 million	US\$302 million	N/A	US\$730 million
IRR Post-Tax	15%	21%	N/A	21%
EBITDA	US\$81 million	US\$78 million	N/A	N/A
EBITDA margin	45% @ US\$500/t SOP	55% @ US\$614/t SOP	N/A	N/A
Free cash flow	US\$84 million	US\$48 million	N/A	N/A
Payback period	N/A	4.75 years	N/A	4.5 years
Product Specifications				
Potassium (% K2O)	N/A	N/A	N/A	N/A
Sulphate (% SO4)	N/A	N/A	N/A	N/A
Chloride(% CL)	N/A	N/A	N/A	N/A
*Figures based on Scoping Study (accuracy +/- 30%). I have increased all figures by 30%.				
Assumptions: 14 June 2020 - (AUD/USD) 0,6862				
All information without guarantee. Data based on public available publications of the companies.				

You can find more information here:

<https://rewardminerals.com/>

<https://www.australianpotash.com.au/site/content/>

<https://www.so4.com.au/>

<https://crystalpeakminerals.com/>

Note: These are external links for which I take no responsibility.

East African Potash Projects in the Danakil Salt Basin Region			
Company Name	Danakali	Danakali	Circum Minerals
Number of projects	1	1	1
Market capitalization	US\$104 million	US\$104 million	Private company
Share price	0.44 A\$	0.44 A\$	N/A
Cash position	A\$22.7 million	A\$22.7 million	N/A
Project Name	Colluli (Stage 1)*	Colluli (Stage 1+2)*	Danakil
Project Info & Numbers			
Project location	Eritrea (Danakil Salt Basin)	Eritrea (Danakil Salt Basin)	Ethiopia (Danakil Salt Basin)
Type of deposit	Solid Salts	Solid Salts	Brine
Study stage completed	FEED	FEED	DFS
SOP equivalent reserve (Mt)	203(Mt)	203(Mt)	248(MT)
Production (ktpa)	472(ktpa)	944(ktpa)	750(ktpa)
Mine life (years)	200 years	200 years	N/A
Average total cash costs	US\$258/t	US\$242/t	N/A
Secured funding	US\$250 million	US\$250 million	N/A
Secured production offtake (%)	472.00tpa	472.00tpa	N/A
Distance to port	230km	230km	600km
Stake in the project	50%	50%	100%
Project Financials			
Capital cost	US\$302 million	US\$504 million	US\$1 billion
Capital intensity	US\$640/t	US\$534/t	N/A
Realised sales price	US\$569/t	US\$569/t	N/A
NPV8 Post-Tax	US\$242 million (NPV10)	US\$439 million (NPV10)	N/A
IRR Post-Tax	29.7%	31.3%	N/A
EBITDA	N/A	N/A	N/A
EBITDA margin	N/A	N/A	N/A
Free cash flow	US\$43 million	US\$86,5 million	N/A
Payback period	3.25 years	N/A	N/A
Product specifications			
Potassium (% K2O)	52%	52%	N/A
Sulphate (% SO4)	55%	55%	N/A
Chloride(% CL)	<0,1%	<0,1%	N/A
* The project is executed in two stages. Stage 2 is scheduled for years 6.			
Assumptions: 14 June 2020 - (AUD/USD) 0,6862			
All information without guarantee. Data based on public available publications of the companies.			

You can find more information here:

<https://www.danakali.com.au/>

<https://circumminerals.com/>

Note: These are external links for which I take no responsibility.

In my report, I have focused on projects that are generally already more advanced and have a certain market capitalization. It is noticeable that there is a certain focus on the Western Australia region. This is simply because there are many development projects in that area. Australia is not only a safe legal jurisdiction but also has capital markets that are particularly well developed for small commodity companies. I am also aware that there are several other companies in Australia alone that have sop projects in development. However, I do not have the time to cover all the companies here. In my opinion, the most important ones are included here. I cover in detail the 4 companies with the highest market capitalization because these projects also have the highest chance of going into production sometime. In fact, 3 of these 4 companies are planning production within the next 2 years, some even much earlier.

6. Prospective SOP producers

6.1 Australia: Race for the title "first sop producer"

Like many other countries is Australia dependent on imports of SOP. So far there is no SOP producer on the continent. However, some companies are competing for the title of being Australia's first SOP producer. Another argument in favor of Australia as a location is that it is close to many future markets such as Asia or India. The future Australian projects are all brine projects and are located in Western Australia, where are many salt lakes present. Australia is also the most established mining country among investors besides Canada.

What the projects have in common

All projects using the primary extraction of brine for the production of SOP. As this method is one of the most cost-effective, cash costs of all projects are all located in the first quartile for global SOP producers, beating the secondary methods like the Mannheim process by a huge margin.

Picture 4: brine evaporation ponds



What the projects do not have in common

First of all, the projects are at different stages. This also applies to the numbers since the respective data have different accuracy levels. However, a large amount of data shows which projects are particularly interesting and are suitable for possible investments. There are also major differences in project costs, which vary widely. The lower the costs, the easier it is to finance. This poses problems for many companies, as several hundreds of millions of dollars are always needed for financing.

How does the brine evaporation method work?

SOP production is similar in all brine projects. However, they can of course differ slightly in some points. The brine evaporation method is a process that is relatively easy to explain. It can be divided into 5 levels. First of all, the brine, which contains among other things the potassium-containing salts, must be brought to the surface. This is done by pumping the brine from the underground basal sands and from a network of trenches constructed in the superficial lake bed sediments into large ponds. These solar evaporation ponds are then used to concentrate the brine. Various salts are formed during evaporation. As soon as one salt has formed, the remaining brine is pumped into a new pond. In this way, potassium and sulfate-containing salts such as kainite and carnallite are obtained, which are required for SOP production. When planning the ponds one should focus on details such as wind direction to speed up evaporation, proximity to the processing plant, and choice of a location that will conceal as little of the reserves as possible. As soon as the mixed potassium salts have crystallized they get harvested. In step 4 the mixed potassium salts are fed into a purification plant. Here the salts are converted into schoenite through a conversion and recycling process and later into the end product SOP using the addition of KCl. In the final step, the SOP is dried and packaged and is then ready for shipment.

6.1.1 Agrimin (ASX:AMN – FWB:A12GWN)

Agrimin develops Australia's largest potash project named Mackay. The portfolio also includes project Lake Auld, although this is still in an early stage. The current focus is on the Mackay project, which is planned to output 426,000t SOP per year. Cash Costs are forecasted at US\$222/t. Since the project is very big (resource of 123MT SOP) the capital costs are with US\$409M quite high (in absolute numbers). These high front costs are the biggest problem for the company. Post-tax IRR is 20% and all data is based on the Pre-Feasibility Study. So all numbers may subject to some change. A DFS will be published in the near future. The project also includes the construction of a waterfront freehold property.

Compared to other projects, Mackay is at a comparably early stage. Although the size of the resources is known, there is still a lack of financing and purchase agreements. For this reason, the value of the company is also significantly lower. Risks such as problems in finding financing are included in the current price. However, if you compare the company with Danakali, which has a roughly equal annual production, the figures speak clearly for Danakali. In addition to longer mine life, profitability is also significantly higher. However, Agrimin's locational advantage is a plus point.

My opinion

Mackay's resource is impressively big, which is, next to the project location the biggest plus point. However, compared to other competitors, there are still no purchase agreements and no financing. The project is simply still in an earlier stage. The latter might well be a challenge. Financing from competitors has shown that this can be a lengthy process. Furthermore, all figures are still based on a PFS. An IRR of 20 is roughly in the middle range compared to the (smaller) competitors. Therefore I think that some competitors have a better risk/reward ratio. Interested parties should wait and see DFS and pay attention to the updated profitability figures and cash costs. It will be several years before the first SOP can be produced.

However, these values are at least partly reflected in the company valuation. Companies which have already partially mastered the steps are valued higher despite a smaller reserve.

6.1.2 Kalium Lakes (ASX:KLL – FWB:A2DHAZ)

Kalium Lakes is close to finishing the construction of its 100% owned SOP Brine project Beyondie. Originally the project should be finished in January 2021. However, major cost overruns occurred in February 2020. After a significant dilution of the existing shareholders, production is now scheduled to start in Q3 2021. More on this later.

SOP reserve with 5.1(Mt) is comparable to another close competitor. Salt Lake Potash also wants to go into production soon. The cash cost of US\$161/t is standing out. This is considerably lower than the costs of the Australian competition, although they are already very cheap compared to secondary production. The BFS showed Capital Costs of US\$151 million (pre-cost overrun) and an IRR of 16.5%. A Payback period of 8.3 years is very high. One reason for it is the production rate of 164(MT) which is quite low compared to the competition. An offtake agreement with K+S guaranteeing the offtake of 50% of the full production with a timeframe of 10 years.

A large list of cost overruns made it necessary to raise new capital in late February. DFS planned a total of AUS\$216 million for the construction. Changes in the planning of the processing plant and other categories made it necessary to take up additional AUS\$61 million. This was executed by a capital raising in which the number of shares was more than doubled. This meant a substantial dilution of the existing shareholders at a price that was 2/3 below the market price before the cost overrun. The management and cornerstone investor Greenstone agreed to participate in the capital raising, investing additional A\$5.8 million and A\$14 million respectively.

My opinion

The company is now cheap, but such misconduct does not shed any good light on the previous management. Neither are the project figures very convincing nor can we guarantee that everything will go according to plan from now on. If you want to take this risk, you buy a share that is currently extremely cheaply valued. If you assume that the cash flow of US\$53.2 million from the BFS can be maintained, you could make a bargain with a current market capitalization of only 70 million. Those who do not want to take this risk will find a very good alternative.

Therefore in my opinion there are better alternatives in the field of future Australian SOP producers.

6.1.3 Salt Lake Potash (ASX:SO4 – LSE:SO4 – FWB:2ABJY)

This company has a portfolio of nine potassium-rich salt lakes in Western Australia and is currently focusing on bringing their Lake Way project into production. With a SOP reserve of 5.1 million tons, it is comparable to the Beyondie project from Kalium Lakes, however, the annual production is significantly higher, reaching 245ktpa when in full production. Production is scheduled to begin in Q1 2021, with the processing plant starting construction right now. The BFS results of this project are very convincing. Construction costs are US\$178 million, from which a large part has already been financed. Cash costs of US\$205/t are located on the first quartile of SOP producers. These good numbers are leading to an IRR of 28% and a payback time of just 3.5 years. The management under MD and CEO Tony Swiericzuk delivered all previous milestones on time and budget. They also managed to sign 5 different offtake agreements that are securing the offtake of 91% of the total production for at least 5 years.

If everything goes according to plan the project should deliver an EBITDA of US\$77,7 million (based on a SOP price of US\$550/t). Another important information is the breakeven SOP price of just US\$307/t. This means a big buffer in case the sop prices should fall, which I do not assume. The fact that the company owns 8 further salt lakes enables significant growth potential in the long term, including for the stock price. Recent insider buying activity from Chairman Ian Middlemas, holding now 14,25 million shares, and CEO Tony Swiericzuk, holding now approx. 4 million shares, shows that the management has skin in the game and that they consider the current price to be a good buying opportunity.

I already mentioned at the beginning that the company owns another 8 potash lakes. These are summarized under the name Goldfields Salt Lake Projects and are covering 4,750km² of total surface. All projects are located in a region with good road, rail and gas connections. These lakes are all in different stages of development. For Lake Wells, for example, a scoping study has already been published, which shows very good figures. According to the company all lakes have been selected to meet requirements like scale and potential of the brine volume, known brine characteristics, and the proximity to transport and energy infrastructure.

The intention behind this strategy is clear: There is substantial potential for integration, economies of scale, operating synergies, and overhead sharing in the Project due to the number of highly prospective lakes. Clearly, the company is aiming for a multi-lake production in the long term. Nevertheless, the start of production on Lake Way is of course the current priority. In the long term, however, the large lake portfolio offers room for much growth and scalability.

My opinion

Of all the projects in Australia, the Lake Way Project, together with Beyondie, is the most advanced. If all goes according to plan, Salt Lake Potash should win the race for the first SOP produced in Australia with a lead of about two quarters. Of all Australian companies, Salt

Lake Potash is my personal favorite. For the following reasons. First, the Lake Way Project has the best financial figures compared to other Australian projects. The offtake of the product, which is one of the best in the industry, is already secured and the project is almost fully financed. Also, the strong management team has already shown their skills in scalable projects in the past. The fact that the company owns 8 additional lakes will enable further growth in the future. This is where the strength of the management in terms of scalability could be fully exploited. In addition, all deadlines were met, even during Covid-19. If there are no more problems, the first finished SOP fertilizer will leave the plant towards the end of Q1.

Other junior development companies in Australia

In addition to the companies presented here, other companies develop SOP Brine projects in Western Australia. These include Lake Disappointment (Reward Minerals) and Lake Wells (Australian Potash). The Lake Way project of Australian Potash has already published a DFS study and signed the first off-take contracts. However, complete financing is still missing. A possible interesting comparison is with the Salt Lake Potash project which has the same name. Of course, the projects are far apart from each other in terms of development, but the data allows an interesting conclusion to be drawn; at least in my opinion. Especially the cash costs stand out. I have already changed the data from the scoping study to the worst possible.

I will not go into these further here, because these projects are still far away from production and they often lack funding/money. The most important data are contained in the overview table.

6.2 Further project outside of Australia

As can be seen from the previous project presentations, many SOP projects are located in Australia. They also use Brine as a source of SOP extraction. The next company I present is different in many respects. Not only does it use a different mining method, but the project is also of a different size.

6.2.1 Danakali (ASX:DNK – LSE:DNK – FWB: A14UCJ)

Danakali's Colluli project is impressive in many ways. More on that later. The project is located at the Danakil Depression which is a salt basin located at the Eritrean-Ethiopian border. Colluli is located on the Eritrean side of the border, in close distance to other projects in Ethiopia from companies like Yara or ICL. The project itself is held by the Colluli Mining Share Company (CMSC), a 50:50 joint venture vehicle owned by Danakali and ENAMCO. Therefore, 50% is owned by Danakali itself, the other 50% belong to ENAMCO, which is the Eritrean government-owned Eritrean National Mining Company. What makes this project different from other SOP projects is that the salts are in solid form and that the resource is located very close to the surface. This makes mining in an open-pit operation possible. But what makes this project so impressive?

Exceptional project numbers

A short note before we begin: All figures are based on a feed study. So they are very accurate. The reserve contains 203 million tons of SOP equivalent. To put this in a better perspective, the whole SOP reserve would be in theory sufficient to supply 100% of the current SOP demand for up to 30 years. This results in a mine life of incredible 200 years with an annual production of 944 ktpa when in full production. Thanks to the location and nature of the resource, the capital costs of US\$302 million are surprisingly low for a project of this size. The mineralization starts just 16 meters below surface which allows for simple, safe open-cut mining. For this reason, the IRR of 29,7% is also very good. Note that these figures are already based on Danakali's 50% stake in the project. The average total cash costs are located at very competitive US\$258/t in module 1 and are sinking when the mine reaches module 2 in the sixth year of production. Last but not least, the project has also the shortest payback time of 3.25 years, when compared to other development projects.

Recent insider buying activity from Chairman Seamus Cornelius for an amount of A\$1,375 million suggests that he views the future very positively. Chairman Cornelius now owns approx. 13,5 million shares, currently worth about A\$6.9 million. That's what I call skin in the game.

Progress of the Project

The project is already very far advanced. The FEED study, which has an accuracy of +/- 10%, was completed in January 2018. Since then the managed accomplished almost all important steps. A binding 10-year offtake agreement (take-or-pay offtake agreement) was signed with EuroChem in June 2018. EuroChem agreed to take up to 100% of the module 1 SOP Production (472ktpa). If desired by Danakali, up to 13% of production can be sold through other distribution channels. The conclusion of a take-off contract for such a high production volume, which the project requires, was an important milestone for the company. Furthermore, the off-take partner is a worldwide leading supplier of fertilizers based in Switzerland. The other important point, in the current status the project is in, is the funding. The company needs US\$320 million for development and working. In December the company announced the execution of a US\$200 million senior debt agreement with AFC (Africa Finance Corporation) and Afreximbank. Furthermore, AFC agreed to an additional equity investment of US\$50 million, from which US\$21.6 million was received in December 2019 and US\$28.4 million is planned to settle by November 2020. This second tranche is now delayed by several months making some investors question if it is still valid. According to the company, the subscription agreement is still valid. The subscription price is A\$0.60 per share. This means that US\$72 million is still needed for full financing. The company expects construction to begin in 2021 following the production in 2022.

Infrastructure & Location of the project

Another advantage of the project is the proximity to the coast. The deposit is just 230km away from the established Massawa port. For comparison: All Australian projects are between 700km to 1,500km away from the closest port. There is also the possibility to export the product via the Anfile Bay Port which is just 87km away from the port. This could potentially unlock significant value for Colluli.

Is the project location in Eritrea a potential problem?

I don't think so. And here is why: First of all, the government of Eritrea already has a 50% stake in the project via their ENAMCO company that is basically free. This drastically reduces the likelihood of the State claiming a further stake in the project. Furthermore, Eritrea has already mining projects running successfully since 2010. Due to numerous political improvements, the UN lifted their sanctions against Eritrea in November 2018. The Colluli project was also covered in the UN Development Report in January 2019. The report concludes that Colluli has the potential to significantly boost the Eritrean economy and meaningfully advance the Sustainable Development Agenda of Eritrea, in particular on 13 specific SDGs criteria. Another important milestone was the rapprochement of the country with Ethiopia. It was agreed to resume diplomatic relations after decades of hostility in June 2018. Since then, great progress has been made (border opening, etc.). So, yes the political risk is higher than compared to for example Australia, but especially the support of two big foreign African banks shows the support for the project and therefore also for the country. The assessment of a stable political situation was also supported by the US\$1.4 billion takeover of Newsun by Chinese based mining company Zijin in 2018.

As the project, due to its size, has a huge impact on the country, there should be sufficient incentives to avoid jeopardizing the Colluli project; if rational thought is used.

Are there comparable projects in the region?

Yes, there are some other projects in the Danakil Depression region even though a comparison is quite difficult. The first project is Yara Dallol by Norwegian chemical company Yara. But I could not find any data about the project other than the project is currently on hold. The other project that is located in Ethiopia is Danakil. This project is developed by the private company Circum Minerals. Just some and old data can be found online. SOP Reserve is 238Mt and a production of 750ktpa is planned. Capital Costs are a whopping US\$1 billion.

Current rumors regarding a possible takeover

Already for some time, there have been rumors that Danakali could be taken over. This is due to the recent slowdown in the progress of financing. Danakali is currently waiting for the second tranche of the capital increase, which AFC has subscribed to. Only when these US\$28.4 million have arrived the company will start building the mine. Personally, I cannot understand the behavior of the AFC Bank. AFC has already provided the company with 100 million in debt and 23 million in fresh equity. By delaying the transfer of the last tranche, the bank delays the start of the mine construction and thus damages itself, because Danakali can now repay the loans later. For this reason, there are rumors that the partners in Eritrea are slowly losing their patience and are interested in a new partner who is more able to keep the schedules. In this case, it would lead to a takeover of Danakali.

When you looking at the figures it is only understandable that a large company, which is active in the fertilizer sector, might be interested in the Colluli project. Looking at the possible annual production, cash costs, and annual EBITDA, Danakali, with a market cap of A\$160 million, seems like a bargain. If Danakali is taken over, the takeover price would be significantly higher than the current price of A\$0.50. AFC paid A\$0.60 for their shares.

My opinion

The Colluli project could, due to its size, be a game-changer project. The last piece of the puzzle is the missing US\$72 million for complete project funding. Since the project figures are very good, I do not assume that this will cause the project to fail. The many possible by-products are not even considered which offers the project further future growth opportunities. If Danakali is taken over I guess that the takeover price will be at a higher level than the current market price.

7. Final conclusion

With the commodity SOP fertilizer, many points come together, which makes it so attractive for commodity investors. It is a niche market, with stable growth in demand and low market price volatility. All the companies/projects presented here that are currently in development have a significant price advantage over the previously established production forms. However, it should not be forgotten that not all projects will make it into production. This is still an investment area with high risks, which can quickly lead to a total loss of the invested capital.

Only a company that:

- has good management with a track record of achieving milestones in time & on budget
- which develops a project with excellent figures
- can secure financing
- manages to sign purchase contracts with reputable partners

will ultimately succeed. If this is successful, the shareholder can look forward to very high returns.

Personal positions

I myself have both Salt Lake Potash and Danakali in my personal account. Both companies check all the above-mentioned boxes. Salt Lake has excellent management with a track record of delivering results. The Lake Way project has very good profitability figures and production is on the horizon. The large project portfolio will enable further growth in the future. Danakali's project figures are no less impressive. After completion, the Colluli mine will generate high profits for over 200 years. The management has done a good job so far. If the rest of the financing is secured, the big fear should disappear. Colluli is a huge project with a great impact on the region and the worldwide SOP market. All this is currently available at a low price.

8. Disclaimer

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In accordance with §34b of the German Securities Trading Act, I would like to point out that I hold shares in the following companies: Danakali Limited, Salt Lake Potash Limited

This document contains a lot of links where you can get to another page by clicking on them. There might be a security risk when visiting these websites for which I can not take any responsibility.

Picture information:

Picture 1: Galore777/[shutterstock.com](#)

Picture 2: Data is roughly based on Salt Lake Potash Investor Presentation February 2020
<https://www.investi.com.au/api/announcements/so4/47042401-634.pdf>

Picture 3: Data is based on Danakali 2019 Investor Pack presentation
https://www.danakali.com.au/images/stories/pdf/Investor_Pack_2019.pdf

Picture 4: Galore777/[shutterstock.com](#)