MINING PROJECTS
Special Report

BN FEATURE

MINING PROJECTS

BUSY: David Klanecky (left), Simon Birmingham, Arthur Culvahouse and Mark McGowan at the sod-turning ceremony for Albemarle's Kemerton plant.

Key takeaways

- Lithium projects increasingly among state's biggest
- Rebound in iron ore price opens market to smaller players
- WA at centre of another commodities boom, as agricultural sector's demand for potash set to soar

Billions pour into WA's top 10

High-level iron ore, lithium and gold projects set pace for more than 50 developments in fresh commodities boom.

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TOTAL investment in Western Australia's 10 biggest mining projects is worth $21 billion, research by *Business News* has found (see list).

Of 57 major mining projects in the BNiQ database, a large portion are poised to be commissioned, with 24 under way and 16 classified as likely to proceed.

Iron ore, including magnetite, continues to dominate the list of the state's largest projects, with seven that are either likely or ongoing, worth a combined $12.34 billion.

However, lithium is becoming entrenched at the top end of the list, as miners in WA gradually seek to expand their involvement further up the processing chain.

The lithium industry in WA has continued its rapid growth, and there are now 13 projects in the pipeline, with a total value of $6.45 billion.

The planned 100,000 tonnes per annum lithium hydroxide plant at Wodgina, jointly owned by Mineral Resources' and US-based battery metals giant Albermarle Corporation, tops

BNiQ SEARCHENGINE ...your key to WA business

WA's Top 10 Mining Projects

(Included if project is classified as 'likely' or 'ongoing')

Rank	Project Name	Owner/Developer	Category	Cost
1	South Flank	BHP Group	Iron ore	$4.6bn
2	Iron Bridge	Fortescue Metals Group, Formosa Plastics Group, Baosteel	Magnetite	$4.4bn
3	Koodaideri	Rio Tinto	Iron ore	$3.5bn
4	Wodgina Refinery	Mineral Resources, Albermarle Corporation	Lithium	$2.2bn
5	Eliwana	Fortescue Metals Group	Iron ore	$1.7bn
6	Robe River sustaining	Rio Tinto	Iron ore	$1.3bn
7	Kemerton refinery	Albemarle Corporation	Lithium	$1.0bn
9	Greenbushes expansions	Talison Lithium	Lithium	$836m
8	West Angelas C & D	Rio Tinto	Iron ore	$800m
10	Kwinana refineries	Tianqi Lithium	Lithium	$700m

FULL LIST ONLINE businessnews.com.au/List/project

7 IRON ORE PROJECTS WORTH **$12.34bn**

13 LITHIUM PROJECTS WORTH **$6.45bn**

8 GOLD PROJECTS WORTH **$1.19bn**

4 MINERAL SANDS PROJECTS WORTH **$1.01bn**

$115m COST INCREASE OF SHEFFIELD RESOURCES' THUNDERBIRD PROJECT

OFF-TRACK: Sheffield Resources increased the capital expenditure estimate for its Thunderbird project to $463 million.

the lithium list, with an expected cost of about $2.2 billion.

The Wodgina lithium plant encompasses two 50,000tpa lithium hydroxide modules, with the first scheduled to be completed in 2022 and the second at a later date.

Albermarle has been busy in WA over the past few months, with construction recently kicking off at its Kemerton lithium hydroxide plant.

In late March, Premier Mark McGowan joined new US Ambassador to Australia, Arthur Culvahouse, federal Trade Minister Simon Birmingham and Albemarle representatives to turn the first sod on the construction, which the state government said was expected to cost at least $1 billion.

However, Albermarle has not disclosed exact financial details, and many believe the actual cost will be closer to the Wodgina figure.

It is set to create 500 construction jobs and another 100 operational jobs in the South West. The plant has approval to produce up to 100,000tpa of lithium hydroxide.

Kemerton will have an expected initial capacity of 40,000tpa of lithium hydroxide when it is commissioned in 2021, reaching full capacity in 2025.

Kidman Resources' proposed $613 million Kwinana lithium hydroxide refinery received a shot in the arm earlier this month when conglomerate Wesfarmers launched a $776 million takeover bid for the Melbourne-based company.

The refinery is expected to be commissioned in 2021 and produce 45,000tpa of lithium hydroxide, using ore from the planned $450 million Mt Holland mine.

Kidman has a 50 per cent interest in the project, with the other half owned by Sociedad Quimica y Minera de Chile S.A., one of the world's largest producers and marketers of lithium product.

The refinery will be almost a stone's throw away from Tianqi Lithium's Kwinana lithium hydroxide refinery. Tianqi commissioned its $400 million stage one development in January, and stage two is set to be completed by the end of the year, at a cost of $300 million.

Combined, Tianqi anticipates the two stages will produce 72,000tpa of lithium hydroxide.

While there has been a surge of activity around lithium hydroxide projects, lithium concentrate developments are also attracting substantial investment.

Tianqi's 51 per cent-owned subsidiary, Talison, (Albermarle 49 per cent) resolved a crucial legal battle in March with Global Advanced Metals, after the Massachusetts-owned company said a proposed expansion to Talison's Greenbushes operation could potentially sterilise and waste tantalum resources it received from Greenbushes.

The resolution means Talison's $516 million stage two expansion of Greenbushes will go ahead, with expected completion to bring output to 1.95 milliion tonnes of lithium concentrate per annum.

Earlier this month, it also received Environmental Protection Authority recommendation for its stages three and four expansions to proceed.

The $320 million stage one expansion is due to be completed in the second quarter of 2019, as planned.

In November, Pilbara Minerals' $231 million stage two Pilgangoora expansion was approved, with commissioning of the stage targeted for the March quarter of 2020. A $225 million stage three expansion is also planned.

In March, Pilbara said it was considering selling between 20 per cent and 49 per cent of the $646 million Pilgangoora concentrate project, as it declared commercial production from the processing plant.

Big project cost rises

While many projects are being completed on budget, each of the state's single largest projects in the pipeline for gold, nickel, mineral sands and potash all experienced significant capital cost increases over the past year.

Gold Road Resources and Gold Field's 50-50 Gruyere gold project, which is set to be commissioned this quarter, had its capital cost revised to $621 million in July.

The company said the upgrade in costs included $30 million due to changes in the scope of works, added costs associated with extreme weather conditions, design changes and increases in the schedule of rates.

Other cost pressures included increased charges for certain equipment, along with employment changes due to a tighter labour market and increases in camp and certain logistical costs.

Gold Road indicated about three months prior to the cost revision the project would come in at the upper end of the capital cost estimate of between $506 million and $585 million, after initially estimating a $532 million expenditure.

Gruyere dwarfs the second largest gold project in the state, Capricorn Metals' $133 million Karlawinda project, which is located south-east of the town of Newman, and is projected to be commissioned in the third quarter of 2019.

Western Areas' definitive feasibility study on its Odysseus nickel project, released in October, detailed a capital cost of $299 million.

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LOSS: FMG expects its Iron Bridge project will perform better than other magnetite projects such as Karara (pictured). **Photo: Attila Csaszar**

Billions pour into WA's top 10

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The capex within the DFS increased between $99 million and $109 million from the pre-feasibility study range, mainly due to the installation of a shaft haulage system for $68 million.

Odysseus is located 370 kilometres north-west of Kalgoorlie.

Also in October, mineral sands aspirant Sheffield Resources revised the capital expenditure estimate for its Thunderbird project, located 60 kilometres west of Derby, to $463 million.

It said the $115 million capital cost blowout was due to changes in the scope of work and the infrastructure ownership model, and since this announcement its shares have nearly halved to 56 cents per share, as of May 6.

The Thunderbird project is anticipated to start production in 2020 with a 42-year mine life.

Agrimin's Lake Mackay sulphate of potash project (see page 18), had it is capital cost increased from around $371 million to $587 million following a pre-feasibility study that detailed scope to increase annual production from 370,000tpa to 426,000tpa.

First commercial production is still a relatively distant target, estimated for the fourth quarter of 2022.

Nerves of steel

It has been well documented that WA's only major magnetite operations, CITIC Pacific Mining's Sino Iron, and Ansteel and Gindalbie Metals' Karara, have both suffered multi-billion dollar losses.

However, this has not deterred Fortescue Metals Group in its hunt for a higher grade of iron ore, as it gave the green light to its 69 per cent-owned $4.4 billion Iron Bridge project last month, $700 million of which was put towards a pilot plant to ensure it does not join WA's magnetite graveyard.

FMG's main competitors, BHP Group and Rio Tinto, have also been making moves that have kept iron ore at the top of WA's projects list, buoyed by momentum from strong iron ore prices.

Early construction at Rio's Robe River and West Angelas C & D projects, worth a combined $2.14 billion, started this year, with first ore from both projects slated for 2021.

After approving its $3.5 billion Koodaideri project in November, Rio purchased a fleet of 20 automated trucks from Caterpillar for the East Pilbara mine earlier this month.

BHP has also ramped up the award of contracts on its $4.5 billion South Flank project, the most expensive mining project in the state.

The beneficiaries include a string of WA-based companies, such as Decmil, Clough, Monadelphous and NRW Holdings, as part of its commitment to provide at least 75 per cent of the work to local businesses.

South Flank is the only substantial iron ore project BHP has in development in WA, and is still on track to be completed by May 2021.

It is set to produce 80 million tonnes per annum.

Mineral Resources may have diverted some of its attention to lithium over the past few years, but it has made several moves in iron ore, including the acquisition of the Koolyanobbing mine in the Yilgarn and BCI Minerals' Kumina deposit in the Pilbara last year.

It has maintained a focus to commission its $300 million Marillana iron ore project, a 50-50 joint venture with Hong Kong-based Brockman mining, in the fourth quarter of 2020.

The iron ore market could become more crowded and less centralised in the next few years, as several juniors assess restarting projects in WA.

100,000tpa
EXPECTED OUTPUT OF LITHIUM HYDROXIDE AT WOODGINA

2021 BHP's **$4.6bn**
SOUTH FLANK SCHEDULED FOR COMPLETION

Iron ore juniors back in game

The price rebound this year has sparked renewed mining interest in a range of mothballed projects.

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A RESURGENT iron ore price has opened the door for several junior miners in Western Australia to revive idle projects.

Business News has identified at least seven suspended iron ore projects, most of them in WA, which small mining companies are aiming to reopen.

Many of the projects were squeezed out of the market and abandoned as the iron ore price slid to a $US37 a tonne low in late 2015, after nudging all-time highs of more than $US190/t in February 2011.

But over the past year, the price has rebounded, boosted by the fall in supply caused by Brazilian iron ore giant Vale SA's tailings dam disaster at its Córrego do Feijão mine in January.

Around $US19 billion was wiped from Vale's share price the next day, and the iron ore price surged from around $US75/t to $US92/t in the week after the disaster because of anticipated short-to-medium-term supply shortages.

Closer to home, the closure of the Port Hedland port combined with localised flooding in the area caused by cyclone Veronica in late March also created a temporary supply gap.

Commonwealth Bank commodities analyst Vivek Dhar estimated the two events halted up to 6 per cent of the world's seaborne iron ore supply.

West Perth-based small cap Mount Gibson Iron has been a beneficiary of the price surge. Last month it completed the $180 million resurrection of its Koolan Island mine, which contains ore with a grade of 66 per cent.

It waved goodbye to the first iron ore shipment in about four years from the project.

Nathan River Resources, a subsidiary of London-based British Marine, is restarting the Roper Bar mine in the Northern Territory, and Adelaide-based Havilah Resources received $100 million of investment to partially go towards its iron ore projects in South Australia.

But the majority of the activity has been in WA, as locally based companies have sought to seize the favourable conditions and revive projects.

Jupiter Mines said in March it was seeking to restart its Central Yilgarn operations in the eastern Wheatbelt, which comprises the Mount Ida and Mount Mason hematite projects that were placed under care and maintenance in 2012 and 2014, respectively.

Last month, Macarthur Minerals selected Aurizon as the rail haulage operator for its $226 million Moonshine Magnetite mine in the Yilgarn, which has been stuck in the pre-feasibility study stage since 2012.

Also in the Yilgarn region, Cazaly Resources appointed engineering consultants Avora to assess advancing its Parker Range project, which has been dormant since Cazaly completed a definitive feasibility study on it in 2010.

Cazaly joint managing director Nathan McMahon said the $170 million project had all the requisite permits, both environmental and mining, with an iron ore grade of 61.9 per cent.

Mr McMahon said he hated to forecast prices, but was optimistic about the future for junior iron ore miners.

"The general consensus from what we believe is that it (the iron ore price) will stay around these levels for quite a long time, which is obviously great," he told *Business News*.

But analysts have mixed views on the price outlook.

Investment bank UBS has downgraded its BHP share price forecast on the back of predictions Vale will begin to regain its lost production over the next year.

"We do not see spot iron ore of approximately $US93 per tonne as being sustainable and expect prices to fall back over the next 12 months as Australian supply normalises and Brazilian supply starts to recover," UBS said.

"We look for an average price of $US83 per tonne in 2019."

The WA Treasury's latest iron ore price assessment anticipates the price returning to around $US66/t by 2020-21.

However, the signs do not look promising for a Vale comeback, as its mines face increasing regulatory scrutiny following the dam disaster.

Earlier this month, a Brazilian court overturned a decision to allow the restart of its Brucutu mine, which produces about 30 million tonnes of iron ore a year and is Brazil's second largest mine.

The iron ore price hit $US95/t after the announcement.

Mr McMahon said one of the benefits in the current market was the export capacity available at certain WA ports, after major players like Mineral Resources diverted some of their attention to other projects and commodities.

"We operate in an area where there's spare capacity on the rail as well as at the port of Esperance, which is an iron ore port," he said.

"Mineral Resources is doing around 6.25 million tonnes, I believe, and that rail is capable of around 13 million tonnes."

> **We believe ... (iron ore prices) will stay around these levels for quite a long time, which is obviously great**
> – Nathan McMahon

Mr McMahon said he believed the main factor determining the success of the operation would be the US dollar exchange rate.

The board of Nedlands-based Shree Minerals echoed Mr McMahon's sentiment. In April it highlighted the exchange rate as a key reason behind the planned restart of its Nelson Bay mine in Tasmania, after it ceased mining at the $25 million operation in 2014.

"The iron ore prices in Australian dollar terms have improved due to the exchange rate of AUD to USD at around $0.71 levels, compared to around $0.95 levels when the Nelson Bay project was last operating in 2014," the company said in a statement to the ASX.

But while there is evidently ample opportunity on the supply side, issues could arise around demand for the product.

According to the latest seasonally adjusted data from the Australian Bureau of Statistics, iron ore exports to China fell by $212 million in March, or 14 per cent, compared with the previous month.

However, while the overall demand for iron ore in China remains volatile, the demand for high-grade iron ore of at least 62 per cent, with lower impurities, is high, because it requires less pollution-causing beneficiation, which is ideal for the country as it ramps up its efforts on environmental control.

Commonwealth Bank's Mr Dhar said the increased demand for high-grade ore would be a long-term shift.

"While we expect that premium (for higher grades) to pull back slightly from current levels, we believe the broad preference for higher-grade ores is a structural change in the market," he said.

OPEN: Mt Gibson Iron recently exported its first iron ore shipment from Koolan Island in about four years. **Photo: Mt Gibson**

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MINING SERVICES COMPANIES

RANKED BY TOTAL STAFF IN WA

Rank	Change from previous year	Company name	Senior executive and title	Year est. in WA	Total staff in WA	Offices a) WA b) inter-state	Services offered	Notable clients
1	—	**WesTrac**	Mr Jarvas Croome Chief Executive Officer	1989	**1,400**	a) 9 b) 17	Authorised Caterpillar dealer, machinery and construction equipment, finance, maintenance and resale services	Rio Tinto
2	—	**Ausdrill**	Mr Mark Norwell Managing Director	1987	**1,148**		Drill, blast, and exploration	Anglogold Ashanti, Independence Group, Gold Fields, Western Areas
3	—	**Pilbara Access**	Mr Stephen Easterbrook Managing Director	2007	**500**	a) 2	Scaffolding and rope access labour, and equipment supplier	Rio Tinto, BHP, Roy Hill
4	—	**Hampton Mining and Civil**	Mr Bart Jones General Manager	2003	**400**	a) 2	Open pit mining, ore haulage, heavy equipment hire, heavy haulage, potable water, drill and blast, crushing and screening, road construction and maintenance	Northern Star, Westgold, Saracen, Kimberley Metals Group, Sandfire Resources, Minjar Gold
5	↑	**Tasman Rope Access**	Mr Brendan Halstead General Manager	2015	**350**	a) 1 b) 2	Comprehensive rope access maintenance services for short or long term shutdowns and projects; Efficient means of access to difficult to reach areas of critical fixed plant equipment; Inspection services including NDT testing; Full wear plate/liner installation services; Crushing, screening, sampling, overland conveyor maintenance; ...	Rio Tinto Iron Ore, Fortescue Metals Group, AngloGold Ashanti, Newmont, Western Areas, Dampier Salt, Gold Fields
6	↑	**Orontide Group**	Mr Stewart Maddison Chief Executive Officer	1979	**330**	a) 5	Engineering, maintenance, preservation, manufacturing, fabrication	BHP, Rio Tinto, FMG, Roy Hill, Nickel West, Worsley Alumina, Newmont
7	↑	**Murray Engineering**	Mr Craig Lindsay-Rae Managing Director	2006	**290**	a) 2 b) 3	Electrical, mechanical, pumping, rental and automation	ABB, Mako Mining
8	↑	**JSW Australia**	Mr Jeff Branson Chief Executive	2010	**280**	a) 3 b) 1	Drilling and blasting, mineral sample drilling and water well drilling	BHP, FMG, Alcoa, AMAL, Batchfire
9	—	**FLSmidth**	Mr Laurie Barlow Head of Mining, Australia		**200**	a) 1 b) 5	Engineering and mining services in materials handling and mineral processing	Rio Tinto
10	↑	**Immersive Technologies**	Mr Peter Salfinger Chief Executive Officer	1993	**170**	a) 2 b) 1	Supplier of surface and underground mining equipment simulators for operator training to the global mining industry	

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WND: Would Not Disclose, NFP: Not For Publication, N/A: Not Applicable or Not Available.

WA'S LARGEST MINING CONTRACTORS

RANKED BY NO. OF MINNG CONTRACTING STAFF IN WA

Rank	Change from previous year	Company name	Senior executive and title	Year est. in WA	Offices a) WA b) inter-state	No. of mine sites in WA	No. of mining contracting staff in WA	Current projects in WA
1	—	Byrnecut	Mr Steve Coughlan Executive Chairman	1987	a) 1 b) 1	6	NFP	Northern Star: Jundee gold mine, Newcrest: Telfer, St Barbara: Gwalia Deeps, Gold Fields: Athena at St Ives gold mine, Sandfire Resources: DeGrussa copper-gold mine, Ramelius: Water Tank Hill
2	↑	MACA	Mr Chris Tuckwell Chief Executive Officer	2002	a) 1 b) 1	7	1,334	Regis Resources: Garden Well, Moolart Well & Rosemont gold mines; Pilbara Minerals: Pilgangoora, Ramelius Resources: Mt Magnet, Blackham Resources: Wiluna, BHP: Area C
3	—	Macmahon Holdings	Mr Michael Finnegan Chief Executive Officer	1964	a) 2 b) 2	4	1,206	Tropicana, Telfer, Mount Morgans
4	—	Barminco	Mr Paul Muller Chief Executive	1989	a) 2	11	1,200	AngloGold Ashanti: Sunrise Dam gold mine; Western Areas: Flying Fox & Spotted Quoll nickel mines; Gold Fields: Agnew gold mine, New Holland D/D, Wallaby; Darlot; Plutonic D/D
5	↑	Downer	Mr Mike Sutton Chief Operating Officer Mining - West	1968	a) 1 b) 2	25	900	Open cut mining projects currently include: Karara magnetite mine (Karara Mining), Christmas Creek iron ore mine (Fortescue Metals Group), Roy Hill iron ore mine (Roy Hill), Sunrise Dam gold mine (AngloGold Ashanti)
6	↑	Thiess	Mr Abdul Jarrah Executive General Manager, Australia & Pacific	1962		2	NFP	Fortescue Metals Group: Solomon Hub iron ore project, BHP Billiton Nickel West: Rocky's Reward Nickel Mine (Leinster)
7	↑	Westgold Resources	Mr Peter Cook Managing Director	2016	a) 1	8	400	Starlight (Fortnum), Paddies Flat/Jack Ryan/South Emu/Comet/Great Fingall/Big Bell (Central Murchison, HBJ (South Kalgoorlie)
8	↑	RUC Cementation Mining Contractors	Mr Barry Upton Managing Director	1991	a) 2	2	350	Edna May, Mt Morgans
9	↓	Swick Mining Services	Mr Kent Swick Managing Director; CEO (from Oct 2017)	2004	a) 1	12	350	Newmont: Tanami, Northern Star Resources: Jundee
10	—	GBF	Mr Franko Roberts General Manager, IR & Sustainability	1988	a) 2 b) 2	2	300	Silver Lake Resources: Daisy Milano underground development and haulage

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Potash players primed for sli

As land and population pressures drive the need for more productive farming, WA finds itself at the centre of a new mining race.

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MILESTONE: Brett Hazleden (left) and Mal Randall believe Kalium Lakes will be the first commercial producer of SOP in Australia.

INTEREST and specialist knowledge around sulphate of potash was scarce in Australia when Brett Hazleden and Brent Smoothy co-founded **Kalium Lakes** in October 2014.

"No one really knew much about potash in Australia, Brent and I did some sampling, and we just suddenly fell into it and have been learning ever since," Mr Hazleden, now Kalium's managing director, told *Business News*.

At first glance, you may not be able to tell Mr Hazelden has been venturing into uncharted waters, with development of Kalium's flagship Beyondie project.

The Balcatta-based outfit has rapidly progressed its 82 tonnes per annum sulphate of potash (SOP) operation, with plans to eventually ramp up to production of 164,000tpa and significantly offset existing SOP imports into the Australian market.

The project, located approximately 160 kilometres south-east of Newman, has a capex of $216 million, and has received commitments for around 91 per cent of its funding.

German bank KFW has locked in $102 million, $74 million is coming from the Northern Australia Infrastructure Fund, and $20.8 million from UK-based private equity firm Greenstone.

It has also signed a 10-year offtake agreement with German salt and potash miner K+S, the biggest producer outside of China.

In April, it became the first potash project in Australia to receive Environmental Protection Authority recommendation for approval and, after a final investment decision is made this half-year, the company expects it will be the country's first commercial producer of potash as it ramps up towards nameplate production during next year.

SOP, also known as potassium sulphate, is a fertiliser product and a premium version of muriate of potash (MOP).

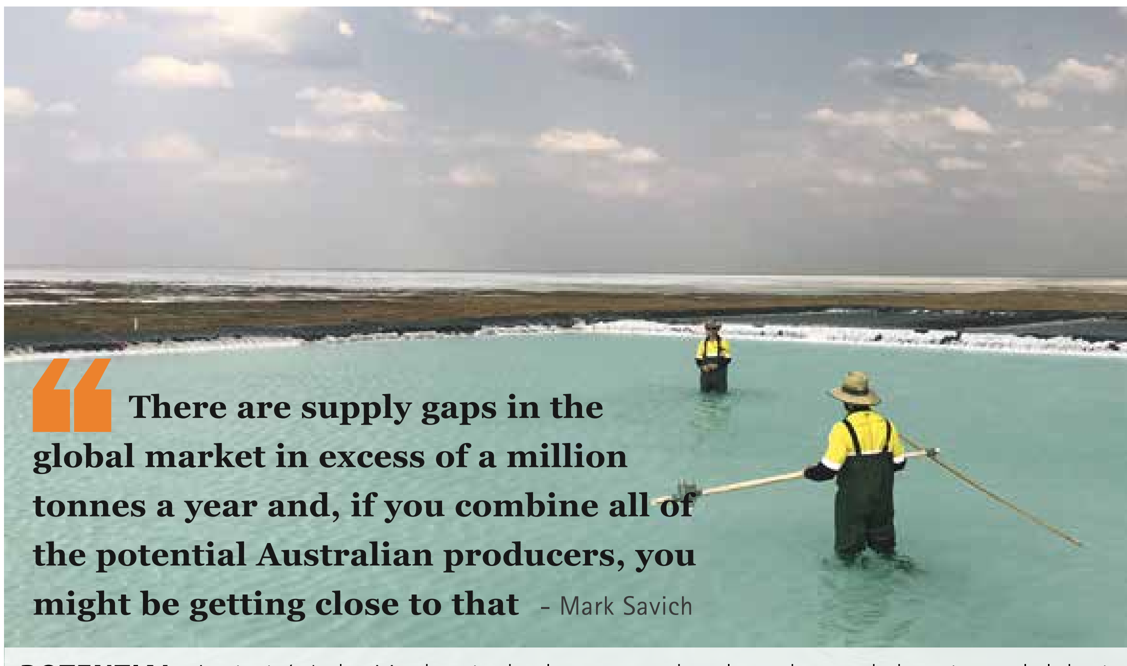
Compared with MOP, SOP produces higher yields per hectare, encourages increased water retention in crops and raises its resistance to the elements and diseases.

Currently in Australia, only about 75,000tpa of SOP is used each year, as it is all imported, primarily from Germany, Canada or Russia.

However, after domestic production starts and drives the price down for Australian farmers to purchase the product, Integer Research estimates that between 100,000tpa to 200,000tpa will be required to meet demand in the country.

There is also a potential international opportunity.

A United Nations report has



There are supply gaps in the global market in excess of a million tonnes a year and, if you combine all of the potential Australian producers, you might be getting close to that – Mark Savich

POTENTIAL: Argimin's Lake Mackay is the largest undeveloped potash-bearing salt lake in

ce of growing market

Photos: Gabriel Oliveria.

revealed the world has lost about 30 per cent of arable land in the past 30 years, a large portion of

the world. **Photo: Argimin**

"You can have the best gold mine, the best iron ore resource on the planet, but if it's in the middle of nowhere – it's not going to happen – Mal Randall

this occurring in Asia. It also estimates Asian populations will grow by two billion people in the next 30 years.

Even in Australia this trend is evident. According to World Bank Group, from 1967 to 2016 the hectares of arable land per person in the country fell from around 3.5 to 1.9.

Investor demand for SOP projects increased in Australia as this trend became more widely acknowledged.

Several other potash projects have sprouted in WA and started to gain momentum, while Kalium has methodically ticked off project milestones.

But there are several prospective producers hot on Kalium's heels, including **Australian Potash**, with its Lake Wells project, 180 kilometres north of Laverton, scheduled for first production by the end of 2020.

The two-stage, $338 million project is awaiting a green light from the EPA.

Salt Lake Potash is set to release a mineral resource for its Lake Way project this quarter, which is situated approximately 300 kilometres west of Lake Wells near Wiluna, and it is seeking to rapidly ramp up development for a targeted first production in late 2021.

SITE: Alwyn Vorster says a SOP project's proximity to a port is a crucial factor.

Lake Wells is the most developed prospect within Salt Lake's broader Goldfields Salt Lake project, which is comprised of 11 lakes stretching across around 615 kilometres.

Reward Minerals was initially the trailblazer in the potash industry after it struck a native title deal with Indigenous land owners in 2008 for its Lake Disappointment SOP project, located approximately 320 kilometres east of Newman.

But, the Nedlands-based junior has been hampered by an inability to attract significant capital, with net cash of just $3.2 million at the December quarter, and several delays at its project.

Most recently it had to suspend an infill drilling program that was 66 per cent completed at the lake in September, after its amphibious machines became bogged and sometimes succumbed to complete mechanical failure.

Reward did make a positive step in late January, when it was granted approval to have Lake Disappointment assessed by the EPA.

There are three SOP projects in the state which exist below Geraldton, however all three are currently early-stage exploration plays.

Parkway Minerals and Brisbane-based **ActiveEX** kicked off initial studies and drilling on their projects in 2011 and 2009, respectively, with little advancement made on them over the years.

Trigg Mining, which is due to list on the ASX next month, will be hoping its $4.5 million initial public offering will give it momentum to get its Laverton Links development up and running.

The Keren Paterson-led Trigg initially tried to list in 2018, but a weak capital market forced the company to temporarily shelve those plans.

Outside of WA, **Verdant Minerals** is the most notable SOP player, with its Karinga Lakes and Lake Amadeus projects in the Northern Territory, but both projects are yet to surpass the feasibility study stage.

Mr Hazelden said all this activity was to be expected.

"There's obviously the normal rush as soon as there's something that looks good, people are quick to jump on the bandwagon," he said.

"But I think in the grand scheme of things there might be a couple of us who will get up and running, some of the others – it's like any other mine around the place, it might be too low grade, too far away from infrastructure, and they'll just never get through the normal hurdles."

Location, location?

Kalium chairman Mal Randall believes project location is a key indicator of success.

"There's a lot of questions asked along the lines of what's the difference between us and the others, and really it's a tyranny of distance," he told *Business News*.

"You can have the best gold mine, the best iron ore resource on the planet, but if it's in the middle of nowhere – it's not going to happen."

Continued next page

Potash players primed for slice of growing market

From previous page

Mr Hazleden said Beyondie, which is situated on a 2,400-square kilometre site next to the Great Northern Highway just south of Newman, can effectively use all the back haulage trucks going up to the town and coming back empty.

"One of our other benefits is we sit close to the Goldfields gas pipeline and it's a short route for us to go in there," he said.

BCI Minerals managing director Alwyn Vorster agrees with sentiment around the importance of location, and takes it a step further, suggesting the project's distance from port is the most crucial factor.

"All the other SOP projects currently being developed in Australia are between around 800 kilometres and 1,200 kilometres to the closest port," Mr Vorster told *Business News*.

"So do the basic maths on 800 kilometres (of transport costs) ... in some cases there aren't good roads either that are being developed in those areas.

"Our Mardie project is right on the coast, with a planned jetty right next to SOP and salt plants, that would save between $50 and $100 per tonne in logistics costs."

Mardie is both a salt and SOP project, with SOP as a by-product of salt production, and is located approximately 80 kilometres south-west of Karratha.

Mr Vorster worked with Mr Hazleden and Mr Randall at Iron Ore Holdings, which BCI was formerly known as when it was iron ore-focused.

But after the iron ore bubble burst, Mr Vorster said the company set out to diversify in order to avoid another near-death experience.

"For the next one-and-a-half to two years, BCI considered many, many opportunities, predominately in the industrial minerals space, before we decided in 2018 that the highest-value, long-term opportunity was our own Mardie project on the Pilbara coast," he said.

The pre-feasibility study in June 2018 outlined a $248 million investment to produce 3.5 million tonnes per annum of salt, along with an $87 million capital cost for 75,000tpa of sulphate of potash.

BCI has a $35 million cash balance and receives royalties from the Mineral Resources-operated Iron Valley iron ore project, as the commodity's market recovers, which generated royalty earnings before interest, tax, depreciation and amortisation of $5.6 million last financial year.

The project is still some way off in order to accommodate both the salt and SOP operations, with first production scheduled for at least 2023, meaning BCI is not near the front of the pack for first SOP production in Australia.

But with an enviable location and financial position, Mr Vorster is confident BCI will not face the same "serious challenges" many of the other producers will encounter to get their projects up and running efficiently.

One project which does not have the benefits of a prime location, is **Agrimin**'s Lake Mackay, which is located approximately 785 kilometres south of Wyndham Port near the Northern Territory border in sparse desert.

It is a remote location, even by WA mining standards.

But Agrimin managing director Mark Savich said the project, which is the largest undeveloped potash-bearing salt lake in the world and the largest salt lake in Australia, will generate significant cost savings in production and transport as the SOP product makes its way to Wyndham port.

"This involves loading very high tonnages, we'll be able to load quad road trains with 140 tonnes, there's a lot of economies of scale in tonnages that big that allow us to get the costs down," Mr Savich told *Business News*.

"We're using public infrastructure and we have a dedicated trucking fleet, which minimises rehandling."

The $587 million project is expected to yield 426,000tpa of SOP and is slated for first production in the final quarter of 2022.

The large scale of the project meant Agrimin was one of the biggest winners from the state government's changes to the rental rates of potash projects, announced in December.

Due to the scale and long-life of potash projects, the existing mining lease rental rate of $18.70 per hectare was reduced to $2.32 per hectare for the first five years of the lease and $4.64 per hectare from year six onwards.

Spanning around 5,000 square kilometres, Agrimin will save $8 million in lease fees in its first year alone.

Mr Savich is hoping to penetrate the existing Chinese market, the biggest market in the world, with a more premium product.

He said there was room for all of the WA producers in the current market, but the potash boom would not be limited to Australia, which could create oversupply.

"There are supply gaps in the global market in excess of a million tonnes a year and, if you combine all of the potential Australian producers, you might be getting close to that," he said.

"But there are also comparable peers in Ethiopia and Eritrea which have very large projects, bigger than what we've seen in Australia."

Map: Google Maps