BUCKLE UP

Lithium, aka 'white petroleum', leads a new investment class.

By Tim Treadgold

Understanding lithium, and other members of the battery metals family, is as easy and as impossibly difficult as answering one simple question. How many electric cars will be sold over the next three years?

The correct answer is nobody knows. Battery metals are a game-changing phenomenon and electric cars, despite widespread expectations, are yet to make a serious dent in overall vehicle sales. Batteries are essential components of the motors of electric vehicles.

That means the starting point in comprehending a complex puzzle of multiple moving parts is to appreciate that, while there is a desire to cut pollution by switching from petrol-power to electric motors, the changeover is burdened by issues such as market demand, price and the availability of some particularly scarce metals.

For investors eyeing lithium stocks, which have been among the best performers on the Australian stock market in recent years, the battery-metal revolution represents an entirely new investment opportunity.

Anthony Tse, chief executive of mining company Galaxy Resources, says the outlook for lithium has not changed for five years ago. This point is demonstrated by the price for lithium carbonate, which took off in late 2015, soaring from around $US6,000 a tonne to reach $US23,000 a tonne in mid 2016.

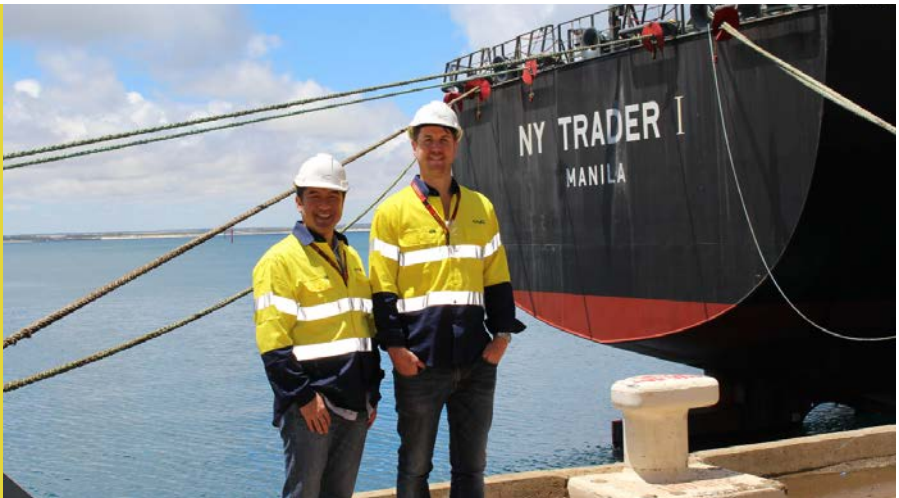
Galaxy's share price has mimicked the lithium price, rising from a low point of 14 cents to $2.60 in less than 12 months, then reaching $4.46 earlier this year, not far away from the $6.07 share price the stock reached in the first flush of the lithium boom in 2009.

The moniker white petroleum, lithium's nickname goes a long way to explaining what battery metals are about. But even that snappy description, which implies a time when lithium will rival oil, is only partly correct.

Lithium does play a critical role in storing electricity but it's not the only component necessary because the rechargeable batteries used in electric cars and an assortment of tools and gadgets also need other metals such as graphite, nickel, manganese and cobalt. The mix depends on the battery maker.

Then, there's the potential for the biggest bogeyman of all to disrupt lithium producers. Which is that battery makers are experimenting with other metals for long-term electricity storage, including vanadium and molybdenum.

Multiple metals and no set standards add to the risk factor for investors in this nascent field. Another is the potential for



Anthony Tse, managing director on the left with Nick Rowley, corporate development, Galaxy Resources

a lithium glut; it's not previously been widely mined, and there appears to be an abundant supply.

Cobalt, a metal that also plays a role in battery production, is different. It is rare, expensive, and the war-torn Democratic Republic of Congo currently dominates supply.

Scarcity of cobalt could be the issue which derails the expected boom in electric cars, especially as one country, China, has moved quickly to stitch up supply. This has squeezed European, Japanese and US car makers out of the market and driven up the price by a factor of four, from $US25,000 a tonne to approaching $US100,000 a tonne.

Another challenge is how far a battery-powered car can travel before it needs recharging. This is a psychological problem known as 'range anxiety' faced by electric-car owners who currently lack ready access to recharging stations in the way petrol-powered car owners have easy access to service stations.

Until range anxiety and other issues are fixed, there could be a slowdown in the electric car revolution, and a commensurate drop in lithium demand. If those challenges aren't enough to cause investment anxiety, there are other concerns such as the type and grade of lithium to buy.

Most Australian lithium is hard rock, mined in the traditional dig-and-deliver method familiar in bulk commodity mines such as coal and iron ore. In contrast, most South American lithium is extracted from brine in ancient salt lakes.

Lithium quality is a question continuing to evolve, largely because battery makers are demanding higher specifications every year because the better the lithium the more electricity it can store.

None of those issues have dampened investor demand for companies leading the battery-metals section of ASX, such as Orocobre, Pilbara Minerals, Mineral Resources, Altura Mining, Tawana Resources and Galaxy Resources.

Galaxy is credited with starting the Australian lithium rush, albeit prematurely with the opening in late 2009 of the Mt Cattlin mine in Western Australia, followed by the development of a lithium processing plant at Jiangsu in China to produce lithium carbonate, the raw material for making batteries.

Unfortunately, high hopes associated with both projects were dimmed by design and construction issues in China and sluggish demand for lithium from Mt Cattlin, which was mothballed in late 2012.

It's a different story today. Over the next few years, most major carmakers in the world plan to roll out new battery-powered models. As car manufacturers engage in a race to capture market share, lithium stocks are hot again.

But with a stampede among mining companies to join the lithium game, there are concerns the battery metals business is overheating. This is a point made by leading investment bank, Morgan Stanley, in a report written earlier this year, *The long-term pain of new supply*.

Investors who rode the Australian iron ore boom between 2002 and 2011 understand what that means. As iron ore supply rose to fill demand, the price contracted from a peak of $US160 a tonne to around $US70 a tonne, squeezing out high-cost and low-grade miners.

Tse says the picture for lithium today is a lot different to five years ago, with strong underlying demand the primary explanation for the current high price.

"Whether it's the share market or the product market, lithium is increasingly a sector which is 70 per cent driven by fundamental supply and demand and 30 per cent by sentiment, which is binary. You're either positive or negative."

A good example of the split opinion on lithium occured in mid February, when Morgan Stanley released its negative report which tipped a 46.5 per cent fall in the price of lithium carbonate over the next three years, from its recent level of around $US13,750 a tonne to $US7332 a tonne in the year 2021.

Investment banks Citi dismissed Morgan Stanley's view, telling clients in a report that, "supply concerns were more than priced into" the share prices of leading Australian lithium stocks.

Ken Brinsden, chief executive of Pilbara Minerals, said the negative view of lithium failed to account for strong demand and the complex process of mining and conversion to battery-grade material.

"I am firmly of the view that everyone, including Morgan Stanley, is grossly underestimating how quickly the market is moving on the demand side," Brinsden said.

Support for his positive view can be found in a series of deals struck by Pilbara Minerals with Asian customers and investors.

The latest is an agreement to supply the Korean industrial group POSCO with lithium. The Koreans, in turn, are making a direct investment in Pilbara Minerals, with those funds underpinning a second-stage expansion of the company's Pilgangoora mine in WA's Pilbara region.

POSCO joins three Chinese companies, Ganfeng Lithium, General Lithium and Great Wall Motors, which are already buying material from Pilbara, as well as investing in the Australian company.

Another interesting aspect of Pilbara's stage two expansion is it is not expected to

"STRONG GLOBAL MARKET FUNDAMENTALS FOR LITHIUM CARBONATE PRODUCTS PERSIST. PRICES CONTINUE TO RISE AND WE EXPECT TO SEE AN INCREASE OF APPROXIMATELY 25 PER CENT IN THE SECOND HALF OF THE 2018 FINANCIAL YEAR."

complete stage one until late June. In other words, Pilbara is doubling the size of its bet on a second race before the first race is run.

Orocobre, like Galaxy, did not have a smooth start as a lithium producer, but has now ironed out teething troubles in its Olaroz brine operations in a region known as the lithium triangle, a location high in the Andes mountains of South America where Chile, Bolivia and Argentina meet.

Like Pilbara, Orocobre has the backing of a big car maker, Japan's Toyota through its associate Toyota Tsusho.

Expansion plans at Olaroz include lifting annual output to 42,500 tonnes of lithium carbonate annually, as well as developing a 10,000 tonne-a-year lithium hydroxide plan with Toyota Tsusho in Japan.

Orocobre's managing director, Richard Seville, said in late February when releasing the company's December half profit result, the market for lithium remains robust.

"Strong global market fundamentals for lithium carbonate products persist," Seville said. "Prices continue to rise and we expect to see an increase of approximately 25 per cent in the second half of the 2018 financial year on those received in the first half."

Mention of the lithium hydroxide plant introduces another aspect of lithium, which is important when trying to understand the industry.

In simple terms lithium comes in several forms. There is the ore (generally spodumene mined from a rock formation called a pegmatite) with most lithium mines working ore assaying between one per cent and two per cent lithium.

Spodumene concentrate, as produced by hard rock Australian miners, is generally of six per cent lithium grade. It requires processing into a material preferred by battery makers, such as lithium hydroxide.

A rush to build hydroxide plants effectively matches the rush to develop new mines, with the most advanced in Australia being processing plants under construction in WA for China's Tianqi Lithium and Albemarle Corporation of the US

Tianqi and Albemarle jointly own the Greenbushes mine in WA, a project with several distinguishing features. It is the world's biggest single source of lithium. It has a high-grade ore body at around three per cent lithium and it has been operating for more than 100 years, originally as a tin mine, later for its tantalum and now for its lithium.

Delivering what customers want is one of the biggest challenges emerging for lithium producers with impurities in raw material earning hefty discounts in the same way iron ore is discounted if it contains too much impurity.

Galaxy's Tse explains the complexity of lithium quality."The whole question of battery specification is moving higher," Tse said. "The specification issue is defined by cathode and battery manufactures.

"When people talk about 99.5 per cent lithium quality that's not the real issue. What the battery makers, and battery material makers really care about is what's the gunk in the 0.5 per cent. They want to know what's in the impurities.

"They need to hit so many parts per million of calcium, iron, manganese or other material, but it's actually more than that because the specification has changed over time."

Investors need to be aware having a pegmatite in the ground is not an automatic pathway to success. Nor does it matter greatly if the lithium comes from a hard-rock mine in Australia or a brine lake in Argentina.

Both sides in the mining aspect of lithium argue their material is best. But the key is not so much at the mining level as it is at the processing level, which is why there is a push by miners to get involved in processing to meet battery-maker demands.

Knowing how much lithium the world needs, or whether there is a surplus emerging or a possible shortage is a tricky question.

Morgan Stanley estimates a lithium shortfall last year of 10,300 tonnes would become a surplus this year of 12,800 tonnes, rising to 97,300 tonnes in 2012.

UBS reckons the shortage this year is 7,200 tonnes, rising to a shortage next year of 18,300 tonnes and then up to a shortage of 35,100 tonnes in 2020, with a surplus of lithium only emerging in 2022.

With those dramatically divergent views it's easy to understand why most investors are uncertain about the lithium outlook, largely a function of electric vehicles sales, and that's a question no-can honestly answer.

Lithium is undoubtedly the metal of the moment, but how long that moment lasts is anybody's guess.