ALIGN
RESEARCH

Rainbow Rare Earths

6th June 2019

Production to be rapidly ramped up at one of the highest grade REE producers globally and one of the few outside of China

Rainbow Rare Earths Ltd listed on the LSE in 2017 at 10p per share and has a 90% stake in the Gakara Rare Earths Project in Burundi. This boasts some of the highest grades of Rare Earth Elements (REEs) on the planet. A recent maiden JORC compliant resource statement outlined 1.2Mt on just a small part of this vast 39km² licence area, confirming the true scale of the deposit for the very first time. Investor excitement sent the shares to 23p, but recently the stock has been oversold due to production delays and financing concerns.

REE production being ramped up targeting break-even by H2 2019

Mining began in September 2017 and is on course to achieve break-even in H2 2019 from two mining areas. This is dependent on the opening of another two areas which are planned to allow production to increase. Demand is very strong from end customers secured by partner Thyssenkrupp under a 10-year offtake deal for up to 5,000 tpa, plus first right of refusal on the next 5,000 tpa.

Scope to capture far higher margins with downstream processing

JV partner TechMet is to fund a DFS to determine the economic feasibility of processing the concentrate into separate REEs, which could reduce the discount to metal content price considerably from the current 70%.

Escalating US-China trade war looks likely to spill over into REEs

REEs are strategic commodities with deposits outside of China becoming strategically important. Rainbow has just started to attract attention for being just one of two quoted commercial REE producers outside of China.

Highly conservative NPV suggests upside of 70%

Our conservative valuation shows the potential. We initiate coverage of Rainbow with a target price of 10.53p and **Conviction buy** stance.

Table: Financial overview

Year to end Dec	2017A	2018A	2019E	2020E
Revenue (US$'000)	-	992	1,600	5,900
PTP (US$'000)	(1,402)	(2,515)	(6,200)	(3,850)
EPS (US$)	(0.01)	(0.02)	(0.03)	(0.01)

Source: Company accounts & Align Research

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CONVICTION BUY
Target price – 10.53p

RAINBOW RARE EARTHS

Key data

EPIC	RBW
Share price	6.2p
52 week high/low	19.10p/1.50p
Listing	LSE
Shares in issue	207.89m
Market Cap	£12.9m
Sector	Mining

12 month share price chart

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IMPORTANT: Rainbow Rare Earths (RBW) is a research client of Align Research. Align Research holds an interest in the shares of RBW. For full disclaimer information please refer to the last page of this document.

Business overview

Operations

Rainbow Rare Earths Limited (Rainbow) is a mining company focused on expanding production at its 90%-owned Gakara Rare Earth Project in Burundi, East Africa.

• **Gakara Rare Earth Project** – Gakara is one of the world's richest rare earth deposits with in-situ grades in the range of 47-67% Total Rare Earth Oxide (TREO). The project is located in Western Burundi, 20km SSE of Bujumbura - the former capital, the largest city and the country's main port. There is good infrastructure near to Gakara with decent road links to Dar es Salaam in Tanzania and Mombasa in Kenya. A Mining Licence was granted in March 2015, is valid for 25 years and can be renewed. The 39km² licence area has seen the discovery of numerous and extensive veins containing nearly pure bastnaesite and monazite minerals, which are both important sources of rare earths. Mining of REEs began in September 2017 followed by the first shipment of rare earth concentrate in December 2017. **Currently, production is planned to ramp up to achieve breakeven in H2 2019 followed by consistent production across four planned mining sites.**

Gakara Rare Earth Project showing the Kiyenzi prospect (left) and Gasagwe (right) mining area. Source: Company

Introduction

Investors' attention has recently been drawn to Rainbow, as over the last few weeks the share price has risen sharply as the US-China trade war has escalated. Some observers have been surprised that Beijing has not yet moved to block exports of rare earths to the US. Such a move would serve to hit a vast array of industries which rely on these commodities and serve only to increase the rarity premium on those companies mining REE's.

China continues to dominate supply and a large part of demand, but there have been growing concerns about constrained REE supplies and the vulnerability of China's monopoly over these vital and rare commodities. The latest machinations of the US-China trade war seem to provide further evidence that REE are strategic commodities. The market now seems to be anticipating that deposits outside of China will become strategically important, which could mean that Rainbow continues to remain in the spotlight.

RARE EARTHS

Rare earth elements (REEs) are a set of 17 chemical elements in the periodic table, which consists of the 15 lanthanides along with two others: scandium and yttrium. Scandium and yttrium are deemed to be REEs as they occur in the same ore deposits where lanthanides are found as well as sharing similar chemical properties. Despite their name, REEs are not actually that rare but, economically exploitable ore deposits are few and far between.

Rare Earth Elements		
Scandium or Sc (21)	Promethium or Pm (61)	Holmium or Ho (67)
Yttrium or Y (39)	Samarium or Sm (62)	Erbium or Er (68)
Lanthanum or La (57)	Europium or Eu (63)	Thulium or Tm (69)
Cerium or Ce (58)	Gadolinium or Gd (64)	Ytterbium or Yb (70)
Praseodymium or Pr (59)	Terbium or Tb (65)	Lutetium or Lu (71)
Neodymium or Nd (60)	Dysprosium or Dy (66)	

The 17 chemical elements listed in order of their atomic number that are defined as rare earth elements. Source: Rare Earth Technology Alliance

REEs have been found to be vital for many modern technologies such as consumer electronics, computers, communications and advanced transportation.

Application	Rare Earths	Demand Drivers
Magnets	Nd, Pr, Sm, Tb, Dy	Automotive, wind turbines, drivers for computers, mobile phones, MP3 players, cameras, voice coil motors (in loudspeakers), hybrid and electric vehicles, cordless power tools, sensors and medical imaging (MRIs).
LaNiH batteries	La, Ce, Pr, Nd	Hybrid vehicle batteries and hydrogen absorption alloys for re-chargeable batteries.
Phosphors	Eu, Y, Tb, La, Dy, Ce, Pr, Gd	LCDs, PDPs, LEDs and energy efficient fluorescent lights/lamps.
Fluid cracking catalysts	La, Ce, Pr, Nd	Petroleum production – greater consumption by heavy oils and tar sands.
Polishing powders	Ce, La, Nd	Mechano-chemical polishing powders for TVs, monitors, tablets, mirrors and (in nano-particulate form) silicon chips.
Auto catalysts	Ce, La, Nd	Tighter NO2 and SO2 standards – platinum is re-cycled but the recycling REE is not economic.
Glass additive	Ce, La, Nd, Er	Cerium cuts down transmission of UV light, whilst La increases glass refractive index for digital camera lens.
Fibre optics	Er, Y, Tb, Eu	Signal amplification.

Uses of rare earth elements. Source: Company

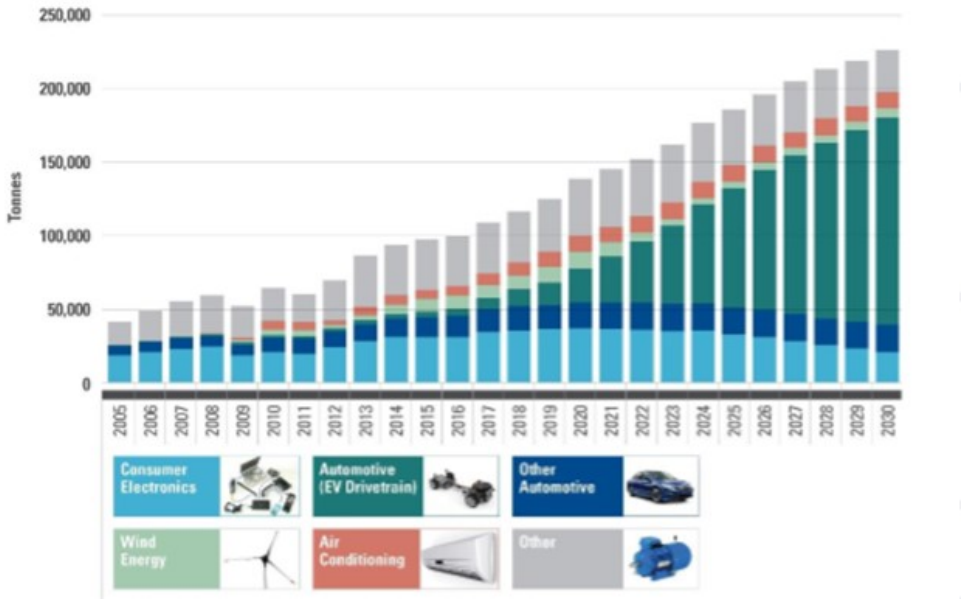
The most important use of REEs is currently in the manufacture of permanent magnets. The effectiveness of these magnets is down to the use of neodymium (Nd) and praseodymium (Pr) which has allowed the creation of the strongest commercially available magnets today. This has resulted in the ability to build powerful motors and generators with reduced size and weight which are critical in a number of rapidly growing markets, notably electric vehicles (EV), smart phones and wind turbines. Due to this important function, Nd and Pr represent the most significant elements in the lanthanide group.

Supply and demand

Rainbow's Gakara Rare Earth Project is one of few rare earth mines lying outside of China. In 2017, China was responsible for 86% of global refined production and the country continues to be the global leader in the production of both mined rare earth products and refined rare earth compounds. China has been cracking down on illegal mining, which is thought to responsible for a third of global supply.

Metal research firm Roskill in their 2018 REE outlook forecast that demand for rare earth permanent magnets will exhibit strong growth in the years to 2028. This is expected to further distort the rare earth demand ratios, with Nd, Pr and Dy forming a greater proportion of demand. La and Ce are forecast to continue to form the majority of rare earths demand by volume for their use in the catalysts industry.

NdFeB magnets (an alloy of neodymium, iron and boron) are seen to offer the best power to cost ratio. Roskill has also forecast that demand for NdFeB magnets for all applications (consumer electronics, automotive EV Drivetrain, other automotive, wind energy, air conditioning etc) will rise by 6% per annum (pa) until 2030. However, NdFEB demand growth for EV applications is forecast to eclipse that figure with an increase of 24% p.a. over that period.

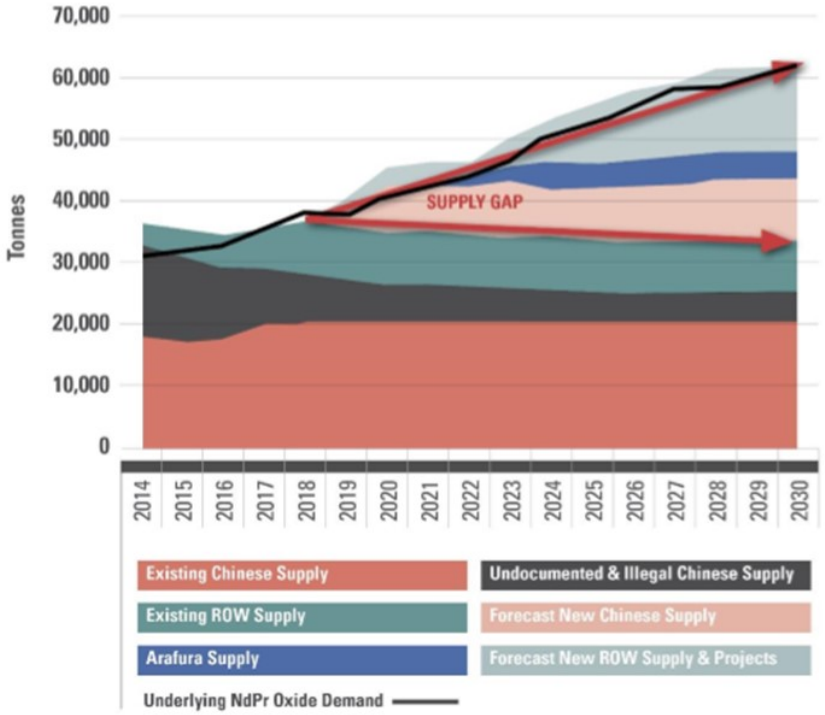


NdFeB magnet demand by applications. Source: Roskill via Arafura Resources.

China continues to dominate supply and a large part of demand. However, global demand is also rising with buyers increasingly seeking to develop supplies of rare earths from outside of China by sourcing REEs from places including Australia, Russia, Greenland and California. Electronics manufacturers, led by the German giant Siemens, seem to have moved to source supplies from outside of China. This is a trend that only really seemed to build up speed after the Chinese cut off supplies to Japan in 2010 over a long-standing territorial dispute. In recent years there have been growing concerns about constrained REE supplies and the vulnerability of China's monopoly over these vital elements.

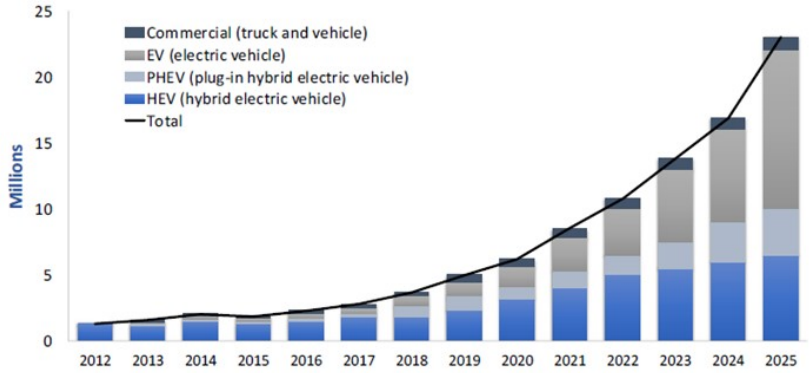
Today, the only significant supplier outside of China is **Lynas Corporation (ASX:LYC)** which provides an integrated source of REEs from mine to customer. This company's resource deposit is at Mt. Weld in Western Australia which was upgraded last year to a new mineral resource estimate (MRE) of 55.4Mt at an average grade of 5.4% TREO. Production over the last 12 months was 20,960t TREO.

An EU Joint Research Centre report in 2016 assessed the likely problems in the materials supply chain for the deployment of low-carbon energy and transport technologies across the twenty-eight member states. The report highlighted that there was vulnerability to supply bottle necks for certain REEs, namely Nd, Pr and Dy.



NdPr oxide supply and demand. Source: Roskill via Arafura Resources.

Roskill believes that new supply will not be able to come on stream quickly enough to meet demand for all the applications. China dominates the global supply chain, accounting for something like 80% of NdPr which goes into the production of NdFeB magnets across the globe. A combination of supply reforms, consolidation in the industry and higher environmental standards are expected to all act together to restrict any rapid increase in NdPr production in China. The end result is that worldwide supply growth of 20,000t of NdPr oxide has been forecast over the coming decade, with a supply gap of 20,000tpa +.

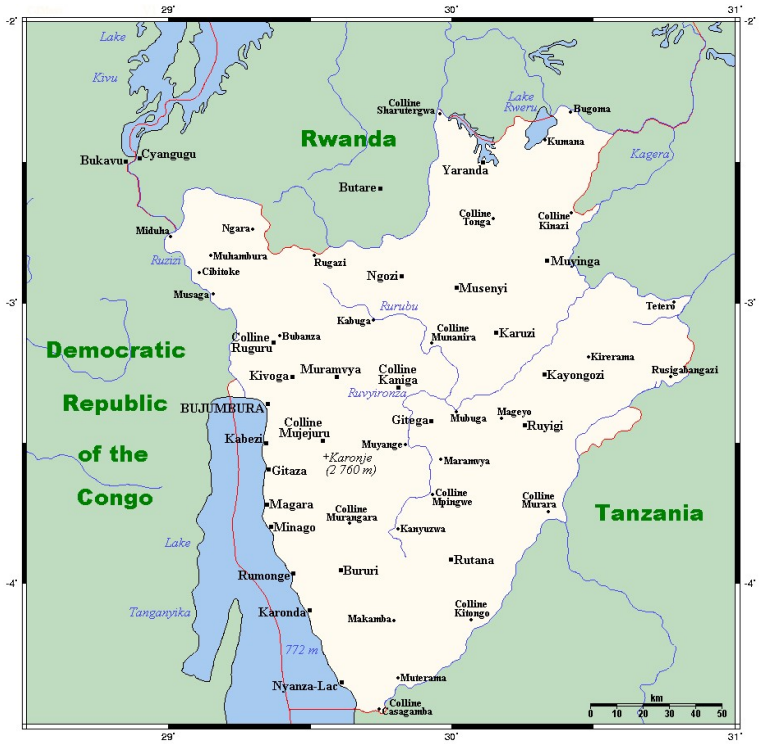


Forecast growth in global EV sales. Source: Roskill & UBS estimates via Hastings Tech Metals.

There is little doubt that EVs are seen as being the main catalyst for NdPr growth in demand. Accelerating EV demand comes on the back of green legislation being adopted in many countries, including the UK, India, Germany, France, Norway and China, which is expected to lead to an increasing NdPr supply-demand deficit.

Burundi

Burundi is a small landlocked country that lies in the African Great Lakes Region where East and Central Africa meet. To the SW, the country borders Lake Tanganyika. The country covers an area of 10,747 square miles, so is just slightly larger than Yorkshire, with a population of 10 million. Spells of ethnic cleansing, civils wars and genocide in both the 1970s and 1990s have left the country undeveloped and one of the poorest parts of Africa.



Map of Burundi. Source: Wikipedia

The country had a long history of independence before the Burundi and Rwanda region was colonised by Germany in the early 1900s and controlled as a single entity called Ruanda-Urundi. Following the defeat of Germany in World War I, Belgium gained control of the territory. The country gained independence in 1962, initially with a monarchy, followed by a series of tragic events unfurling over the next few decades.

Happily, since the signing of the Arusha Peace Accord in 2000, the country seems to have benefitted from some stability and economic recovery. Pierre Nkurunzizia has been the President of Burundi since 2005 and was re-elected in 2015 for a third term in office which, according to his opponents, contravened the constitution and provoked riots. Nkurunziza has stated publicly that he will not seek re-election in 2020.

The country's economy is largely agricultural, with industrial activities equating to less than 25% of GDP. Coffee (particularly arabica) is the main export crop and also the principal source of foreign exchange. Deficits in the balance of trade have seen the country become heavily dependent on foreign aid, which accounted for 33.5% of national income in 2016, down from 48% in 2015.

The country has significant unexploited resources, with nickel deposits in the east of the country along with reserves of vanadium, uranium and phosphates. Beneath Lake Tanganyika and in the Ruizi valley, geological assessment has indicated the presence of possible major oil and gas reserves. Mineral production in Burundi seems fairly limited to niobium, tantalum, gold, tin and wolframite (which is a source of tungsten).

Corporate Background

Rainbow Rare Earths Ltd was incorporated in August 2011 following the award of an Exploration Licence in May 2011. A Distribution and Offtake Agreement was signed with thyssenKrupp Materials Trading in December 2014 and between October 2015 to March 2016 trial bench mining fieldwork, test processing and process work was undertaken. The company was admitted to a Standard listing on the London Stock Exchange in January 2017. This move followed the placing of 65 million shares at 10p per share which gave the company an initial market capitalisation of £15.2 million. The £6.5 million raised was earmarked to fund the Gakara Project through trial mining and into production.

On listing, the company planned to be in production within nine months with a low capital expenditure of US$2.33 million. Mining to remove overburden began at initial mine site Gasagwe in April 2017, ahead of stockpiling the high-grade material from the main vein and from several recently discovered veins. In addition, significant progress was made in the preparatory work at the Kabezi site with permitting concluded ahead of the commencement of civil works and construction of the processing plant.

Exceptional rare earth grades were confirmed in August 2017. Independent laboratory testing of the main vein at Gasagwe returned an average TREO grade of 62.17% (compared with 57% average grade over the entire project area) which confirmed that Gakara was one of the highest grade REE mining projects on a global basis. The mining of ore began in September 2017.

In November 2017, the company announced the completion of an airborne magnetic survey which highlighted the presence of at least 4 large and highly prospective anomalies as a carbonatite source for Gakara's rare earth veins which provided significant exploration upside potential. December 2017 saw the first shipment of REE concentrate from Gakara. Soon after, Rainbow raised £2.8 million at 14p per share to fund an exploration campaign and expand the mining fleet to allow production to be ramped up by fast tracking the development of new mining areas.

Following the company's first full quarter of production, Gakara Q1 production figures were announced in April 2018 and showed that 279t of concentrate had been produced at a grade of 62% TREO. The realised sales value was US$2,357/t with a production cost of US$2,068/t. Later in the month, drilling results started to come in from Phase 1 exploration drilling which confirmed additional rare earth mineralisation followed by the results of laboratory analysis which confirmed the presence of multiple intersections of high grade REE.

In August 2018, the company announced a co-operation Agreement was entered into with TechMet Limited, with the two parties planning to enter a joint venture to undertake a Definitive Feasibility Study (DFS) focused on a downstream rare earth separation business capable of processing Rainbow's high-grade rare earth concentrate. At the same time TechMet agreed to subscribe for US$0.5 million of a US$2 million placing at 12p per share.

A maiden JORC Mineral Resource Estimate for Gakara was announced in December 2018. This first JORC compliant resource totalled over 1.2 million tonnes of ore and covered just a small part of the Gakara Project, confirming for the first time the scale of the deposit. In January 2019, the company announced a new funding agreement for up to US$7.75 million with an entity managed by The Lind Partners LLC ("Lind"). The company announced in May 2019 that it had suspended the equity drawdown structure after taking US$0.3 million from Lind.

Operations

Gakara Rare Earth Project

Rainbow is focused on expanding production at its 90%-owned Gakara Rare Earth Project, which is the only rare earth producing mine in Africa. The project is located in the Bujumbura Province in western Burundi in East Africa. High-grade rare earth concentrate is now being produced and shipped. Gakara lies some 20km south-southeast of Bujumbura and there is good infrastructure, with decent road links to Dar es Salaam in Tanzania and Mombasa in Kenya.

Location of the Gakara Rare Earth Project. Source: Company

A Mining Licence, which covers an area of 39km², was granted in March 2015. The licence is valid for a period 25 years, after which it is renewable. The company had to relinquish the remainder of its much larger exploration area in 2018 after the maximum 7 year term.

Kabezi Processing Plant, Burundi. Source: Company

History

Gakara was discovered in 1936 by a private Belgium company called Somuki. Between 1948 and 1978, the project was mined periodically by both Somuki and Sobumines (a joint venture between another private Belgian company and the Burundi government). Over 30 years of mining, it is thought that around 5,000t of high grade (approximately 50% TREO) bastnaesite and/or monazite bearing ore was extracted, mainly from the Gakara mine. Open pit and underground mining ceased in 1978, due to a decline in REE prices.

Geology

Gakara lies within the NE-trending Kibaran Fold Belt which extends from the eastern Democratic Republic of the Congo (DRC) to western Tanzania and so runs right across Burundi. The Kibaran Fold Belt in Burundi is made up of the Burundi Supergroup which consists of a highly deformed sequence of Meso Proterozoic granites, granitoids and amphibolite-greenschist facies, metasedimentary and metavolcanics rocks.

In Burundi, the geology and tectonic framework has been strongly influenced by repeated episodes of rifting which has occurred along existing structural trends. This process has resulted in numerous carbonatites and alkaline complexes being put in place over a prolonged period of geological time from the Lower Proterozoic to the Cenozoic periods.

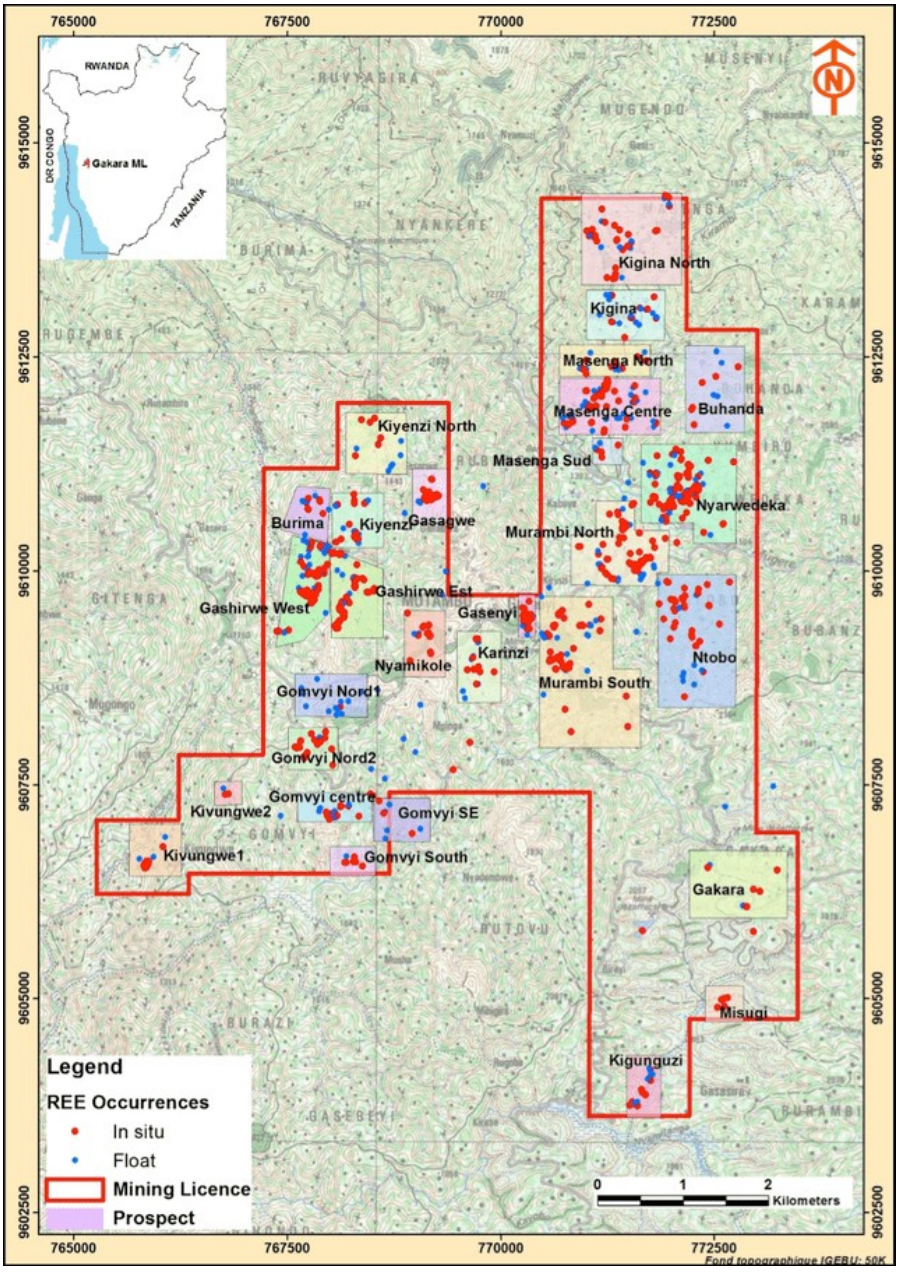
Geology in the project area is pretty well dominated by Mugere granitoids which are seen to contain numerous inclusions of metasedimentary rocks including Karinzi and Makara fragments, which are often to be found fault bounded at the contacts with granitoids. It is these granitoids which are the dominant host rock for the bastnaesite/monazite mineralisation in the project area.

The primary exploration target at Gakara is REE mineralisation which is hosted in narrow veins consisting mainly of bastnaesite and monazite. Bastnaesite is cerium fluoride carbonate CeCo 3(OH,F), however cerium is often substituted by light rare earths lanthanum, yttrium and thorium. Monazite is a rare phosphate mineral with the chemical composition of (Ce,La,Nd,Th) (PO 4, SiO 4), which is seen as an important source of REEs.

Exploration

In 2011, ahead of exploration work, Rainbow started off by retrieving and collating all the relevant historical exploration and mining records on Gakara, which led them to the museums in Belgium and Germany which held a lot of this data. Based on analysis of these past records, the company has since been involved in pitting and trenching, geological mapping, rock grab sampling, soil sampling, ground gravity, ground magnetics, detailed soil geochemical sampling, bulk sampling and airborne magnetic surveys ahead of drilling.

All this work has allowed the identification of numerous occurrences containing nearly pure bastnaesite and monazite minerals which provides for extremely high-grade REE ore. The analysis of 150 grab samples from REE veins revealed consistently high grades with an average of c.58% TREO and a range of between 47 and 67% TREO which serves to confirm that Gakara is one of the world's richest rare earth deposits. When it was last totted up, a total of 840 in-situ veins had been identified (Company announcement, December 2018). Historically, mining and exploration work has led to new veins being discovered.



Prospect areas within the mining licence. Source: Company

Drilling

In January 2018, Rainbow initiated its first drilling campaign designed to investigate the significant geological anomalies that had been identified by the airborne survey along with drilling at Kiyenzi. At that time, Kiyenzi, which was a large sill-like oval structure potentially 22m thick and 80m x 100m in size, had only recently been discovered by a ground gravity survey. The drilling programme was also designed to provide the data for the determination of a maiden JORC Resource.

Given the scale of this anomaly, Kiyenzi was a priority target for the Phase 1 drilling campaign (10 diamond drill holes for 464m) which commenced in January 2018. Drilling resulted in the discovery of new REE mineralisation with significant grades encountered in 5 of the 10 holes. Intersections ranged from 4cm to 6.50m of breccia mineralisation with these intersections lying at a depth of between 2m and 33m. Breccias with a thickness of 6.50m would allow for mechanised extraction and higher levels of production than have been seen at Gasagwe, which is currently being mined by manual methods.

Hole ID	From (m)	To (m)	Width (m)	Grade (TREO%)
GAK_DD_10	7.00	7.72	0.72	7.72% including 17cm @ 10.98%
GAK_DD_10	19.00	19.12	0.12	15.23%
GAK_DD_11	26.50	33.00	6.50	7.10% including 44cm @ 35.32%
GAK_DD_12	1.97	2.20	0.23	18.25%
GAK_DD_12	10.40	10.80	0.40	2.84%
GAK_DD_12	12.05	12.09	0.04	5.36%
GAK_DD_13	2.61	3.59	0.98	2.79%
GAK_DD_13	23.75	24.75	1.00	27.81% including 50cm @ 30.34%

Kiyenz discovery 2018 – Phase 1 drilling campaign results showed significant REE mineralisation encountered in five out of the 10 diamond drill holes (announced June 2018)
Source: Company

The Phase 2 drilling campaign (964m) was undertaken between July and September 2018 and targeted the definition of the extent of the REE mineralisation intersections from Phase 1 of the drilling campaign and so model the orebody.

Importantly, the analysis of the drill cores showed that aplites (intrusive igneous rock with the same mineral composition as granite, but much smaller grains at <1mm) and the gneiss (metamorphic rock) also had the potential to be mineralised, particularly in the zone surrounding the breccias. TREO grades running at 1 - 5% were found in aplites and gneisses, which could only be satisfactorily explained if some form of bastnaesite or monazite mineralisation had occurred.

JORC Resource

Following the drilling programmes, a maiden JORC resource was announced in December 2018 which was based on just four of the 28 mineralised targets across the existing Mining Licence and demonstrates that there is significant upside from future exploration.

Deposit	Measured (t)	Indicated (t)	Inferred (t)	Total Ore (t)	TREO Grade %	Contained TREO (t)
Gasagwe	153	273	570	996	58.7	585
Murambi South	972	2,917	4,480	8,369	54.8	4,586
Gomvyi Centre	-	861	2,265	3,126	54.0	1,688
Total high-grade deposits	**1,125**	**4,051**	**7,315**	**12,491**	**54.9**	**6,859**
Kiyenzi	58,671	297,274	837,033	1,192,978	2.2	26,570
Total	**59,796**	**301,325**	**844,348**	**1,205,469**	**2.8**	**33,429**

Maiden JORC resource (December 2018) for Gakara. Source: Company

The total maiden JORC complaint Resource of over 1.2Mt of ore comes from just a small part of the overall Gakara Project and serves to confirm the potential of it being a world class deposit. The Resource represents two years of high-grade feedstock plus big potential at Kiyenzi. In addition to the Resources figure, further tonnages were able to be classified under JORC as (Exploration) Target tonnes (see table overleaf).

Deposit	Exploration target (tonnes)
Gasagwe	1,026
Murambi South	6,622
Gomvyi Centre	5,132
Kiyenzi	1,065,170
Total	**1,077,950**

Further tonnages classified under JORC as Target tonnes in addition to the Resources figure. Source: Company.

Mining

Rainbow was granted a Mining Licence in March 2015 which is valid for 25 years and after that can be renewed. **The company has a 90% interest in Gakara with a non-dilutable 10% stake owned by the government of Burundi**.

Gasagwe mining area. Source: Company

At Gakara, the REE mineralisation is found in discrete narrow veins which tend to vary in width from a few centimetres to 50cm and are normally within a 3-10cm range. These veins have been found to extend laterally for tens of metres up to 200m in length (at Murambi) and extend to depths greater than 25m. Veins are mainly undercover, although they do outcrop on steep slopes or where rivers have cut through the rock. The mineralised material can be manual dug as it easily separates from the less dense host rock.

Development work at the mining areas consists of the digging of trenches 25m apart over a long section to estimate the tonnage of veins that can be extracted. The team models veins based on average widths of exposed veins and expects approx 25,000t - 40,000t of waste per month per pit needing to be removed to meet production targets. In volume terms, this monthly waste equates to around 12,000m^3 - 20,000m^3, which can be effectively handled by a modest sized excavator and truck operation allowing the veins to be uncovered.

The project produces a high-grade rare earth mineral concentrate (averaging at around 58% TREO). Mining in the past here has demonstrated not only the consistency of grade and mineralisation of the concentrate, but also provided substantial amounts of important data which serve to validate the vein/stockwork rare earth mineralisation system. **The company's exploration and drilling campaigns have shown that there are numerous and extensive veins which contain almost pure bastnaesite and monazite minerals with an exploration target of 34,400t – 137,500t of vein material reported in December 2018, plus obvious upside potential.**

Mining began in September 2017, with first sales of concentrate in December 2017. It is a simple operation with the overburden stripped away by a small mechanical fleet leaving the veins to be extracted by manual labour. Opex and capex costs are quite low, helped by the host rock being free-digging which means that no blasting is required.

Mining at Gakara. Source: Company

Initial mining commenced at the Gasagwe mine area with a second mining area (Murambi), coming into production in December 2018. The ore is mined by hand and filled into 50kg sacks which are collected in 10t loads and transported to the processing plant. The vein structure at Murambi is very similar to Gasagwe, with analysis showing that samples contain high-grade TREOs at 48-60%. The veins extensions seem to be longer at Murambi at up to around 200m, which is twice as long as seen at Gasagwe.

The ramp up in production has been slower than expected, however the mine is well on its way to becoming a key strategic supplier to the market. Currently, the Gasagwe and Murambi mine areas are being mined in parallel with total production running at around 100 tonnes per month (tpm) prior to the company's most recent quarterly announcement to March 2019, but issues have been highlighted caused by poor quality locally-rented mining machinery. Customer demand has been reported to be very strong, with all exported production sold by the period end, which serves to justify the increase in the number of mine areas being put into production.

With Murambi being brought into production, plus the development of two further mining areas (planned to open in 2019), this should allow the efficiency of the operations to be optimised to increase production and sales to a total of 250-300tpm in the near-term and become EBITDA positive in H2 2019. At the same time, work is ongoing to expand the resource base by identifying large deposit(s) which could provide a step change in production to 10,000tpa plus.

Quarter ending	Concentrate sold (t)	Grade TREO/t concentrate	Gross sales price US$/t	Cost of sales' US$/t
31 Dec 2017	-	62%	-	-
31 March 2018	125	61%	2,537	646
30 June 2018	350	55%	2,229	517
30 Sept 2018	350	59%	2,147	428
31 Dec 2018	300	56%	1,884	481
31 March 2019	100	56%	1,780	449

' Marketing, handling, transportation and royalty

Quarterly production results from the Gakara project. Source: Company

Processing

Due to the topography, the Kabezi processing plant lies 20km from the mining areas at a flat site which is 13km south of Bujumbura. The plant is favourably located next to an asphalt road allowing easy access for container trucks. The Kabezi processing plant employs a simple efficient gravity separation processing facility where minerals are separated from waste rock to produce a high-grade REE concentrate without the need for any hazardous chemicals or any complex technology. The plant was fully commissioned and handed over in March 2018.

Even though the veins can be unpredictable, concentrate produced from Gakara is able to be maintained at a reliable and consistent high-grade rare earth mineral concentrate with a TREO grade of around 58% on sales so far. The company's production over the past year or so has shown that this very high-grade vein stockwork structure allows for the tight control of tonnes to be processed and therefor minimises dilution.

Kabezi processing plant and the flow chart for the mineral processing. Source: Company

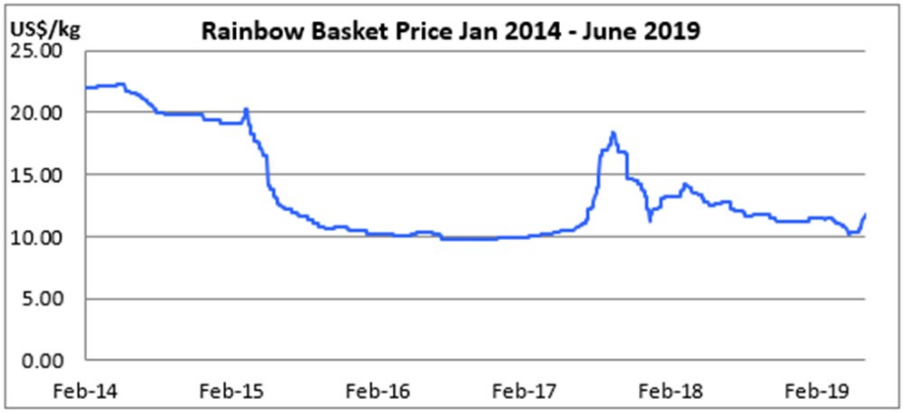
Recovery is currently running at 80-85% with some grade in the tailings. The jig and shaking tables lose about 10-15% TREO and currently there is about 400t of that material being stockpiled. There are buyers for this sort of product, but it will need higher REE prices to justify the shipping costs. There is also a clay product that comes from the filter process which is 6-9% TREO that was donated to local people and used for making bricks or used as landfill. Moving forward there seems to be the potential to upgrade the plant to gain a number of efficiency improvements.

Currently, there is sufficient capacity available to increase production substantially through the mill without requiring any additional capital expenditure. Loading, sealing and sampling process seems to be working efficiently with the Government of Burundi officials before the concentrate is export by container truck to port.

Sales and marketing

High-grade rare earths mineral concentrate is now being successfully exported from Burundi, via road to Port of Mombasa in Kenya. The concentrate is shipped to end customers secured by thyssenkrupp Raw Materials under a 10-year offtake agreement for 5,000 tpa of REE concentrate, plus the right of first refusal for additional 5,000 tpa.

The majority of the revenue from the sales of REE concentrate by thyssenkrupp is received by Rainbow upon delivery at Mombasa port for each export. Customer demand is reported to be extremely strong.



Rainbow basket prices (based on average grades of REOs within Gazagwe in-situ vein samples & market prices of separated REOs on China FOB. Source: Company

The ore value is highly weighted towards magnet rare earths with the following REO content: lanthanum 31%, cerium 48%, praseodymium 4%, neodymium 15% and other 2%. Magnet REEs (which are mainly neodymium, praseodymium and dysprosium) account for c.19% of contained rare earth oxides (REOs) within the ore, based on Rainbow's typical concentrate sales, but importantly represent an average of over 80% of the contained value of REOs at current market prices

Strategy for growth

Since production began more than 18 months ago, the team has learnt a lot and many factors have been de-risked. However, early forecasts were over optimistic which has resulted in a period of share price underperformance. However, the fundamentals of the Gakara project remain strong as it is one of the world's richest producing rare earth deposits and the 39km² licence area is riddled with REEs. The exceptional grades of more than 50% TREO are very consistent across hundreds of veins that have already been sampled.

By the year-end, Rainbow expects to have 3 or 4 mining areas operational. Gakara came into production with remarkably low capex, but it would seem that some of the savings have come back to bite them. Quarterly production has been hampered by poor quality excavators and trucks, which been especially problematic during spells of prolonged rainfall.

New mining equipment to both replace and augment the existing fleet is being sourced from nearby countries. In all the new equipment (excavators, dump trucks and TLB's) will require approximately US$1.7 million of financing. Plus, there will be approximately US$1 million of investment to open two new pits to cover the cost of surveying, environmental surveys, compensation, road building and development work.

Although Q3 2018/19 for the company was worse than Q2, overall the company had been doing around 100-125t per month (tpm) which largely came from a single pit. A slight improvement in productivity at Gasagwe and the duplication of that level of production at Murambi would be sufficient to breakeven in H2 2019, provided the required financing is in place. Break-even currently equates to approximately 250-275tpm, up from 250tpm depending on the prevailing basket price, which has risen sharply in recent weeks.

In the past, the focus was on hitting a run rate of 5,000 tpa (i.e. 420tpm), but given the setbacks the current goals are to achieve break-even, ahead of successfully mining simultaneously on four pits and then followed by stabilising the operation to ensure a consistent level of production. It is planned to take 6-9 months from starting the new pits before the targeted 200-300 tpm can be expected to be achieved. The expanding level of production moving forward will still be by manual mining, with each additional mining area (if the company wished to go beyond 4 mining areas) requiring the use of approximately US$0.7 million of new mining equipment and another team of thirty miners.

The first pit, Gasawge, was estimated to contain 3,000t and so could well last another year. Experience so far justifies the multiple pit strategy and new pits 3 and 4 are planned at Kiyenzi and Gomvyi. Exploration work undertaken on Kiyenzi and Gomvyi suggests that both areas can be successfully mined. These two new pits are expected to be in operation in H2 2019 following necessary permitting and compensation processes, as was recently successfully undertaken for Murambi. The team is already involved in exploration work at pits number 5 and 6, but the decision to increase the size of the operation further will be taken when production at four mining faces has been stabilised at a decent level.

By working four mining faces, the uncertainties and inconsistencies in the mineralisation and grade plus any production hiccups should serve to average themselves out nicely, helped by the increased scale of the operation. On that basis, with four pits being mined a total production level of more than 400t per month or 5,000tpa could potentially be on the cards. At that stage there is also the promise of plenty of potential upgrades.

There is no shortage of processing capacity at the mill which currently barely gets used for three hours a day. The front-end crusher has a nameplate capacity of 5t per hour and so could theoretically take 40,000 tpa of head feed. A capacity of just half that figure (20,000 tpa) would be adequate to allow 10,000t TREO to be produced on an annual basis. The only potential bottle neck is the drying space, but the management could resolve such an issue by bringing in infrared driers to speed up this phase of the processing.

Currently, Rainbow receives a price for its rare earth concentrate that is equivalent to a 70% processing discount to the FOB price of the metal content in China. There is scope to improve the price paid by further downstream processing of the concentrate into separate rare earths. In August 2018, the company signed a cooperation agreement with TechMet which will be spending US$3 million on a Definitive Feasibility Study (DFS) for such a downstream rare earth separation business, with the aim of significantly reducing this discount and improving margins.

TechMet is an investment vehicle of the prominent South African mining industry businessman Brian Menell which has a portfolio of technology metal projects. TechMet acquires and manages projects which produce, process and recycle the key strategic metals that go into batteries, electric vehicles and robotics including: cobolt, lithium, tin, tungsten, REEs, vanadium and graphite. The mining veteran's business is seeking to challenge the dominance of China in the battery market. Recent news was that the US government held talks with TechMet about potentially investing in the firm, working to secure better supplies of the rare metals needed to mass-produce electric cars.

Management has suggested that the capital cost of such a downtream processing facility could be in the region of US$20 – 50 million as it does not need to be that large due to the high grade of the project (55% TREO) and the concentrate. Such a capex range looks about right as **Peak Resources' (ASX:PEK)** REE operation in Tanzania is estimated to have a capex of US$200 million for the mine and US$165 million for the downstream processing plant to be sited in Teesdale, UK. However, Peak will be mining at an average REO grade of 4.80% with a mill throughput of 711,000 tpa producing 32,700tpa of REO mineral concentrate.

The capex for the plant does depend on the ultimate downstream product that is delivered. For a mixed carbonate product, where the REEs are not fully separated out, the processing discount that Rainbow suffers from could probably be reduced to 10-20%. Separating out the oxides would allow for a zero discount, but this would be the most expensive route with a higher capital cost. Obviously there is scope to use a modular plant which might prove to provide the optimum economic return allowing the capacity of downstream processing facilities to be expanded as production increases.

This processing facility could be sited anywhere and likely locations might be dependent on the proximity to a supply of cheap chemicals and power as well as government grants. The downstream process will require heat and sulphuric acid with the volume of reagents required will probably being higher than the REE concentrate that will be processed.

Such a facility could be financed in a number of standard ways. A possible source of financing may be Rainbow's offtake partner thyssenkrupp which has a vested interest as the agreement covers not only the exisiting concentrate but also a more refined product at a higher price, which is a product where there are more potential buyers. All of this is likely to be investigated in the DFS which will not be received until 2020. On this basis, it is possible that the processing discount could be substaially reduced within three years. However, currently the focus is well truly on the mining side.

REE prices might have weakened over the past couple of years, but there is forecast transformational growth in demand for NdFeB magnets for EV applications of 24% per annum. China might dominate the global supply chain at present, but it looks as though a number of factors will constrain China's NdPr production. Researchers predict that NdPr supply will need to growth by 50%+ by 2030, with some analysts forecasting that China will become a net importer by the early 2020s. **As the only producing mine in Africa, and one of only two listed commercially producing REE companies outside of China, Rainbow looks like a highly compelling geopolitical macro play on the REE market.**

Financials & current trading

First sales of REE concentrate began in December 2017 and so losses in previous years are largely due to administrative expenses, along with exploration and corporate expenditure.

12 months ending 30 June US$ '000s	2014	2015	2016	2017	2018
Revenue	-	-	-	-	992
Pre-tax profit (loss)	(548)	(639)	(1,200)	(1,402)	(2,515)
Net profit/(loss)	(548)	(639)	(1,200)	(1,402)	(2,611)

Rainbow's five-year trading history. Source: Company accounts

2018 results

The year ending 30th June 2018 covered the period when the Gakara mine was brought into production. By the financial year-end, a total of 475t of REE concentrate at an average TREO of 58% had been exported with a net sales price of US$2,088/t. Revenue for this period, which was prior to commercial production, totalled US$0.992 million. After US$0.992 of production, other sales costs and administration expenses of US$2.753 million and finance income/costs, the company made a pre-tax loss of US$2.515 million and a total loss after tax and comprehensive expense for the year of US$2.611 million and that attributable to owners of the parent was US$2.566 million. The loss per share came out at US$0.02.

2019 interim results

In the six months ending 31st December 2018, revenue was US$1.230 million, representing the sale of 650t of concentrate sold at a net sales price of US$1,892/t. The operating loss came out at US$3.19 million, afterUS$1.816 million of depreciation. The total loss for the period was US$3.196 million and that attributable to owners of the parent was US$2.979 million, which equated to a loss per share of 1.61 cents.

Recent developments

December 2018 saw the announcement of a maiden JORC Mineral Resource Estimate for Gakara. A total JORC compliant resource of over 1.2 million tonnes of ore covered just a small part of the Gakara Project, confirming the scale of the deposit for the first time. Three areas (Gasagwe, Murambi South and Gomvyi Centre) are very high-grade vein stockwork deposits - totalling 12,491 tonnes of Total Mineral Resource at an average TREO grade of 55% (compared to average rare earth project grades of c.1-4% TREO).

In January 2019, the company announced a new funding agreement for up to US$7.75 million with an entity managed by The Lind Partners LLC ("Lind"). Initial proceeds comprised a US$750,000 unsecured convertible security amount and an initial share subscription of US$100,000 from Lind. The funding agreement provided for Rainbow to issue ordinary shares linked to prevailing market prices, although we note that in May 2019 the company announced that it had suspended the equity drawdown with Lind after only 3 tranches totalling US$0.3 million.

An operational update for the three months to 31st March 2019 (Q3) was announced in early-May 2019 and revealed that 100t of concentrate were sold (vs 300t in Q1) at a grade of 56% (vs 56% in Q2). The gross sales price was US$1,780/t (vs US$1,884/t in Q2). At the time it was announced that an entity connected to the Chairman, Adonis Pouroulis, had advanced a loan facility of US$0.7 million which will be converted at the next equity placing price and management had put in place a plan to rapidly ramp up mining operations by opening two further areas before the end of 2019, subject to financing, which is expected to take the operation to break-even and beyond.

Risks

Geological risks

There are a series of risk factors concerning the amount of understanding of the geology of the project areas, the mineralisation being targeted and the distribution and concentration of coloured gemstones that have been identified in exploration work.

Political risk

There are political risks involved in companies operating in Burundi.

Exchange rate risks

The company's accounts are in US dollars and so are REE metal prices. However, the company's costs are both in US dollars, UK sterling and the Burundian franc. Fluctuations in the value of the Burundian franc against the US dollar and also the US dollar against the pound may have an effect on the valuation that Rainbow is awarded by the UK stock market.

Future funds

The market for raising funds for small cap resources companies steadily worsened over the course of 2018. Some recent fund raisings in the resources sector have seen share prices being undermined by investors demanding substantial discounts to provide the necessary capital.

Board of Directors

Adonis Pouroullis – Non-Executive Chairman

Adonis is an entrepreneur whose expertise lies in the discovery, exploration and development of natural resources across Africa. Having worked in the sector for over 25 years, he has extensive experience and a wide network of industry relationships across the continent. Adonis is the Founder and Chairman of Petra Diamonds (LSE: PDL), the Founder and a Director of Chariot Oil & Gas (AIM: CHAR) and the Founder and Chairman of the Pella Resources Group. He holds a Bachelor of Science Degree (Honours).

Martin Eales – Chief Executive Officer

After qualifying as a Chartered Accountant in 1997, Martin embarked on a 15-year career in corporate finance, corporate broking and equity capital markets in the City, rising to the position of Managing Director at RBC Capital Markets in London. With long experience of natural resources companies and transactions, he joined the Pella Resources Group as Business Development Director in early 2014 and was appointed Managing Director of that company later the same year.

Shawn McCormick – Non-Executive Director

Shawn is an International Affairs specialist with more than 20 years' political and extractive industries sector experience having served in The White House as Director for African Affairs on the National Security Council (Washington), Political Affairs Director of BP (London) and Vice President of TNK-BP (Moscow). He is currently Managing Director of Connaught Strategies Ltd and an adviser to the Pella Resources Group.

Robert Sinclair - Non-Executive Director

Robert is Managing Director of the Guernsey based Artemis Trustees Limited, and a Director of a number of investment fund management companies and investment funds associated with Artemis Trustees Limited. He has over 48 years' experience in finance and accountancy of which 38 years have been spent in the Guernsey financial services industry. Robert is a Director of several companies which are quoted on the London Stock Exchange. In the natural resources sector, he is a Director and Chairman of the Audit Committee of both Chariot Oil & Gas Limited and EF Realisation Company Limited. In the property sector, he is a Director and Chairman of the Audit Committee of Picton Property Income Limited. Robert is also Chairman of Schroder Oriental Income Fund Limited. He a Fellow of the Institute of Chartered Accountants in England & Wales and a Member of the Institute of Chartered Accountants of Scotland and the Society of Trust and Estate Practitioners. Robert is a resident of Guernsey.

Alexander Lowrie – Non-Executive Director

Alex is the co-founder of Telemark Capital LLP, a partnership focusing on capital advisory and asset management. Through its consulting subsidiary, Gunnerside Advisors, he is also involved in providing governance services as an independent investment committee member to a variety of advisory panels. Prior to this Alex worked for 13 years in investment banking. He was a director at Deutsche Bank and then RBS from 2004 to 2012, having started his banking career in 1998 at ABN AMRO. Through these positions, Alex has gained extensive market experience in primary and secondary equity offerings including bringing companies to market through IPOs (including structuring, marketing and distribution). He graduated from Durham University with a BA (hons) in Combined Social Sciences, and Alex is also in the process of completing an executive MBA from Henley Business School.

Atul Bali – Non-Executive Director

Atul is a corporate CEO with extensive experience in tech, government contracting and regulated industries operating on all six continents. Over more than 20 years he has led in excess of 50 M&A and joint venture transactions in more than 25 countries and both managed and served on the boards of several highly regulated businesses. Currently Atul serves as Non-Executive Director of Gaming Realms Plc, a mobile games publisher, and as Chairman of Meridian Gaming, regulated and operating in more than 30 countries, with a large footprint in Africa, Central and South America and Central and Eastern Europe. He has previously held divisional CEO or President positions with IGT (NYSE), Aristocrat (ASX), and Real Networks (NASDAQ), as well as a venture capital firm. Atul previously trained as a Chartered Accountant with KPMG in the UK.

Management

Gilbert Midende – General Manager

Gilbert has a doctorate in Geological Science, which he obtained in 1984 at the Université Libre de Bruxelles, Belgium. He was appointed Burundi Director General of Geology and Mines in 1987 and was Minister of Mines between 1988 and 1993. Gilbert has been a consultant to the World Bank since 2007. From 1996 to 2001, he was Principal of the University of Burundi and Minister of Higher Education and is currently Professor in Economic Geology at the University of Burundi. Gilbert is responsible for all of the Group's administration and Government relations in Burundi.

Peter Connery – Project Manager

Peter has nearly twenty years' experience of mine management on the African continent and has significant experience in leading and implementing the development of safe and reliable facilities in some of the most challenging commercial environments in the world. He has successfully held senior executive positions within competitive and diverse multinational organisations operating across Africa and has held management positions with Anglo American and BHP Billiton. Prior to his career in mining, Peter had a distinguished career in the British and French military.

Cesare Morelli – Technical Director

Cesare has over 29 years' experience in minerals exploration in Africa including 18 years in diamond exploration with De Beers managing projects in across Africa. Following his time with De Beers, he spent four years with BHP Billiton as Minerals Exploration Manager for Africa. At BHP Billiton, Cesare directed exploration projects in a variety of commodities, namely iron ore, aluminum bauxite, manganese, copper and base metals, nickel and potash. He has been affiliated with Rainbow since its inception and has been responsible for project managing all of Rainbow's exploration work to date. Cesare is a Director of Benzu Minerals (Pty) Ltd, a consulting company based in South Africa. He is a member of the South African Geological Society and the South African Council for Natural Scientific Professions.

Jim Wynn – CFO

Jim is a Chartered Accountant who was previously employed by Anglo American plc where he held a number of roles within the finance, business development, and strategy departments of Anglo Industrial Minerals. Jim's most recent role was as Finance Director of Avocet Mining Plc, where he developed extensive experience in francophone Africa as well as the London public company market.

Forecasts

We initiate coverage of Rainbow with forecasts for the FY ending 30th June 2019 and 2020. For 2019, we forecast that 2,000t of ore will be mined and 800-900t of concentrate sold from operations at two mining areas. At an average basket price of US$11.31/kg, revenue comes out at U$1.60 million from sales of REE concentrate from the project. The company has adopted a policy of rapidly writing off depreciation with the maiden deprecation in H1 2019 seen to be repeated in H2. The pre-tax loss comes out at US$6.2 million, with US$6.29 million as the total loss after tax. Income tax expenses relate largely to the cost of withholding tax on inbound goods and services in Burundi. The total loss after tax to owners of the parent is estimated at US$5.76 million giving loss per share of US$0.03.

For 2020, we forecast that a total of 5,400t of ore will be mined and 2,970t concentrate sold from the mining of four different faces, following the investment into developing new mining areas and the upgrading/enlargement of the mining fleet. We expect this will allow the operation to achieve break-even in the first half of the financial year. At an assumed basket price of US$12/kg revenue is forecast to be US$5.90 million. The pre-tax loss is estimated at US$3.850 million, with US$3.645 million as the total loss after tax to owners of the parent, which equates to a loss per share of US$0.01. This is after factoring in an additional 94.5 million shares at what we estimate to be at say 5p per share from a US$6 million raising as flagged to the market on 7th May 2019.

Year End 30 June (US$'000s)	**FY2017a**	**FY 2018a**	**FY 2019e**	**FY 2020e**
Revenues	-	992	1,600	5,900
Royalty and transport costs		-	(430)	(1,600)
Production and other sales costs	-	(992)	(2,670)	(2,900)
Gross margin	-	-	(1,500)	1,400
Administration expenses	(1,565)	(2,044)	(1,300)	(1,600)
Exploration expenditure	(95)	-	-	-
Total operating expenses	(1,600)	(2,044)	(1,300)	(1,600)
Loss from operating activities	(1,660)	(2,044)	(2,800)	(200)
Share based payments	-	(709)	(350)	(300)
Depreciation	-	-	(3,400)	(3,400)
Profit/(loss) from operating activities	(1,660)	(2,753)	(6,550)	(3,900)
Finance income	414	317	190	300
Finance costs	(156)	(79)	(160)	(250)
Profit/(loss) before tax	(1,402)	(2,515)	(6,200)	(3,850)
Income tax expenses	-	(96)	(90)	(75)
Total profit/(loss) after tax and comprehensive expenses for the year	(1,402)	(2,611)	(6,290)	(3,925)
Non-controlling interest	(13)	(45)	(530)	(280)
Owners of the parent	(1,389)	(2,566)	(5,760)	(3,645)
Earnings per share ($)	(0.01)	(0.02)	(0.03)	(0.01)
Weighted average number of shares	112,135,616	165,258,477	192,123,379	302,392,640
Total shares plus options and warrants	164,746,796	187,374,510	235,304,025	330,970,693

Source: Company/Align Research

Valuation

With production now in its second year at the Gakara Project we have sought to value the company based on our analysis of this expanding mining project. In order to determine a valuation for the company and a target price for the stock, we have developed a financial model and calculated a net present value (NPV) using a discounted cash flow (DCF) analysis as well as investigating peer group comparisons.

DCF analysis

It is assumed that surface mining continues in much the same way as it does at present with the waste removed by excavator and trucks and the high-grade ore being mined manually. Below we set out some of the main assumptions used in the financial model.

Life of mine – The mining licence expires in March 2040 and so now has just under 21 years to run, which has been selected as the life of mine (LoM).

Resource – The maiden JORC resource unveiled in December 2018 showed 12,491t of 54.9% TREO of high-grade deposits and 1.192Mt of 2.2% TREO at Kivenzi. Plus, there is a further exploration target of 1.077Mt.

JORC resources provide investors with the comfort that a degree of validity has been demonstrated in there being sufficient mineralisation of the right grade for a deposit to be economic over the LoM. However, it has to be pointed out that narrow vein/stockwork are not that amenable to drilling and so they are difficult to determine a resource figure for.

Hundreds of instances of rare earth mineralisation have already been discovered right across the 39km² Mining Licence area. Given the exceptional grades, this all points to a potentially world-class rare earth deposit. We have assumed that 145,875t of high-grade material averaging 55% TRE is mined over the LoM.

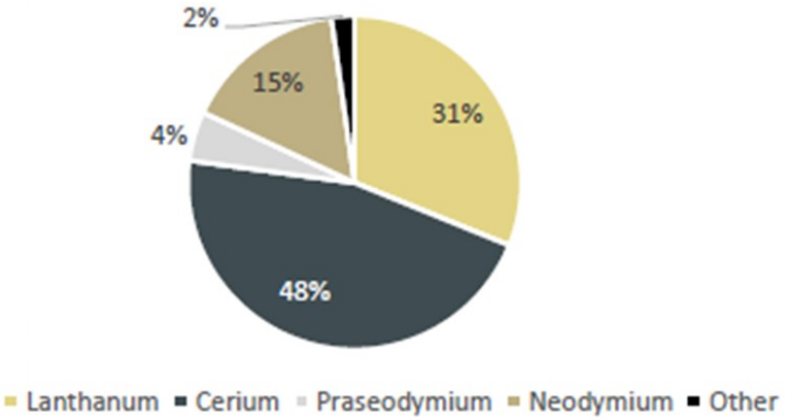
Production – Average production of head feed over the LoM is 7,200tpa at 55% TREO. It has been assumed that ultimately there will be four mining areas in production simultaneously. It is assumed that on average each mining site has a four-year life, with a new mining site opened pretty much on an annual basis. Each of these mining areas is assumed to have the potential on average to produce at a target rate of 200-300t per month within 6-9 months of starting a new pit.

Operating across a number of mining areas allows production inconsistencies to be ironed out and the delivery of the level of production which meets our average annual production rate of 7,200tpa. At the mill there is sufficient capacity to process the tonnages used in the financial model as the plant can handle c.40,000t of head feed.

Operating costs - Mining costs are estimated at being close to US$165 per tonne of ore mined. Processing costs are estimated to be around US$100 per tonne of ore mined.

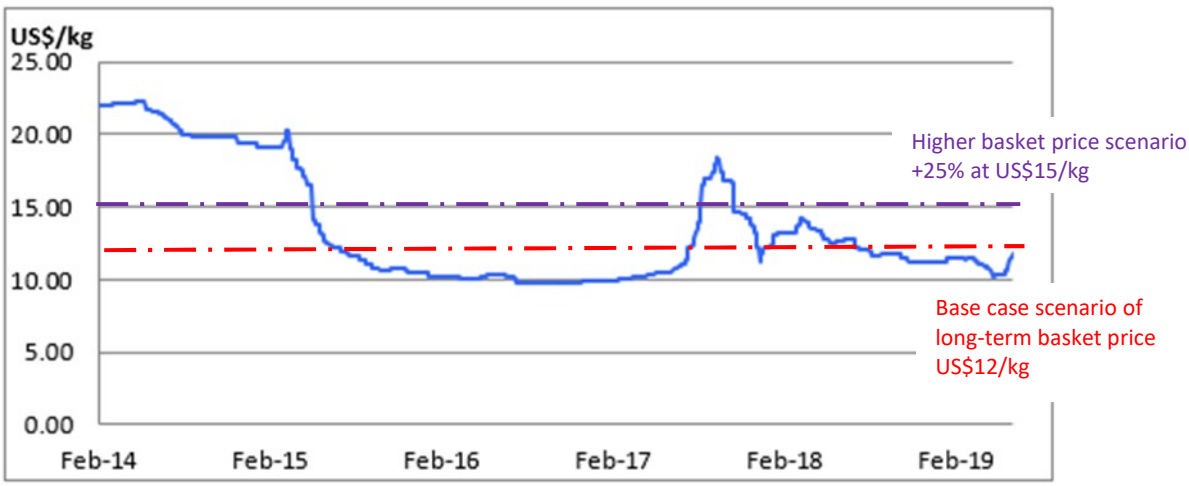
Recovery – Currently recovery is within the 80-85% range. To reflect a growing understanding of the processing of the ore, together with an improvement in recovery as the tonnage going through the mill increases substantially, a recovery factor of 85% has been chosen over the LoM.

Revenue – Despite the growing realisation of the future shortage of REE supply over the coming decade, the price of these elements has been falling over recent years. We have elected to investigate the project's NPV based on two basket price scenarios.



Basket composition – showing REO content. Source: Company

Prices have been firming and we have used a long-term base case basket price of US$12/kg, which represents a small premium above the US$11.41/kg which the company received in the last reported quarter. Given that the ore value at Gakara is strongly weighted towards the magnet rare earths, where future demand growth is forecast at a CAGR of 24%, we have also looked at a higher basket price scenario which is 25% higher than our base case of US$15/kg, which was the basket price not that long ago (in our analysis this price is assumed to be achieved in 2020-21).



Basket price scenarios against the Rainbow basket January 2014 – June 2019. Source: Company

Offtake agreement – It has been assumed that all the concentrate is sold to Thyssenkrupp under the agreed 10-year offtake agreement, and which could cover up to 10,000 tpa of concentrate. Beyond that period, we have assumed that this agreement is extended with Thyssennkrupp or a new agreement is made, both on similar terms as the original deal. A fee of 3.50% of revenue paid to thyssenkrupp and/or another partner has been included in this analysis.

Freight costs – In all, we assume freight costs of US$100/t for delivery to the port and US$175/t for the shipping of the product to the customer.

Royalty - Burundi charges a 4% royalty fee.

Capital expenditure – The company is in the midst of opening two more mining sites with Kiyenzi and Gomvyi expected to be developed by the year end in addition to the current operations at Gasawge and Murambi. Capex associated with developing a new mining area has assumed to be US$0.5 million (including a US$0.30 million compensation payment).

Our financial model based on the above assumptions was used to determine a pre-tax NPV for the project at discount rates of 10% and 12% for both basket price scenarios.

Discount rate	**10%**	**12%**
Basket price scenario	**US$ million**	
Base case US$12/kg	49.44	40.21
Higher price case + 25% (US$15/kg)	71.55	58.64

Net Present Value for the Gakara Project. Source: Align Research

	Sum-of-the-parts valuations US$ million			
	Base case basket price US$12/kg		**Higher price case +25% US$15/kg**	
Discount rate	10%	12%	10%	12%
Gakara Project (90% unrisked NPV)	44.50	36.19	64.40	52.78
Corporate costs (NPV)	(14.25)	(12.42)	(14.25)	(12.42)
Cash	0.10	0.10	0.10	0.10
Debt[1]	(1.90)	(1.90)	(1.90)	(1.90)
Total US$ million	28.45	22.68	48.35	38.56
Total £ million	22.40	17.86	38.07	30.36
Per share (207,892,640)	10.78p	8.59p	18.31p	14.60p
Following US$6 million financing				
Net proceeds from financing (US$ million)	5.70	5.70	5.70	5.70
Total US$ million	34.15	28.38	54.05	44.26
Total £ million	26.88	22.35	42.55	34.85
Per share valuations based on a financing at 5p per share				
Per share (302,392,640)	8.89p	7.39p	14.07p	11.52p
Based on financing at 5p per share (330,970,693)	8.12p	6.75p	12.86p	10.53p

[1] *- including the LIND loan*

Sum-of-the-parts valuations. Source: Align Research

Peer Group Comparisons

We have also investigated the valuations that have been awarded to the peer group of companies in the REE universe, which are shown in the table overleaf. The only significant supplier outside of China is **Lynas Corporation (ASX:LYC)** which provides an integrated source of REEs from mine to customer. In late-March 2019, **Wesfarmers Limited (ASX:WES)** made a surprise A$1.5 billion bid for Lynas, a move which provoked a number of the REE juniors to tap the market for cash.

Also in production is **Northern Minerals (ASX:NTU)** which opened its A$56 million Browns Range pilot plant in 2018 with a capacity to process 60,000 tpa of ore at 1.19% TREO. This is part of a three-year R&D study to test a number of process sheet variables that cannot be replicated in a laboratory and therefore further de-risk the development of the full-scale operation which is planned to involve the mining of 585,000 tpa ore at 0.63% TREO.

Company	Mine Country	Share price	EV £m	Stage	TREO resource		EV/t Resour-ce £	TREO Production (tpa)	EV/t Production £
					Grade %	Contained Mt			
Alkane Resources' (ASX:ALK)	Dubbo Zirconia, Australia	A$0.305	45.8	Production ready'	0.74	0.556	82	2,169	21,115
Arafura Resources (ASX:ARU)	Nolans Bore, Australia	A$0.081	26.8	DFS 2019	2.6	1.456	18	19,437	1,378
Avalon Advanced Materials (TSX:AVL)	Nechalach Canada	C$0.105	19.1	Feasibility study 2013[2]	1.36	4.14	5	11,819	1,616
Greenland Minerals and Energy (ASX:GGG)	Kvanefjeld Greenland	A$0.115	68.0	DFS 2015	1.10	11.13	6	40,000	1,700
Hastings Technology Metals (ASX:HAS)	Yangibana Australia	A$0.16	66.2	DFS 2017	1.17	0.246	269	7,819	8,467
Lynas Corporation (LYC)	Mt Weld, Australia	A$2.71	1,100	Production	5.4	3.00	367	20,960	52,481
Leading Edge Materials (TSX-V:LEM)	Norra Karr, Sweden	C$0.29	15.3	PFS 2015	0.55	0.202	76	5,120	2,988
Mkango Resources (LSE:MKA)	Songwe, Malawi	9.2p	4.8	BFS to be completed 2020	1.36	0.531	9	2,272	2,113
Northern Minerals (ASX:NTU)	Browns Range, Australia	A$0.079	70.5	Pilot plant in production since 2018	0.63	0.057	1,237	3,098	22,757[3]
Peak Resources (ASX:PEK)	Ngualla, Tanzania	A$0.052	23.1	BFS 2017	2.15	4.61	5	8,960	2,578
Pensana Metals (ASX:PM8)	Longonjo, Angola	A$0.022	13.2	Scoping Study 2017 PFS expected Sept 2019	1.60	2.695	5	4,900[4]	2,694
Texas Mineral Resources (OTC:TMRC)	Round Top, USA	US$0.38	14.1	PEA 2013	0.06	0.525	27	3,325	4,241
AVERAGES (EX-RAINBOW)									
Producers							802		37,619
Pre-production							50		4,889
All							**176**		**10,344**
Rainbow Rare Earths (LSE:RBW)	Gakara, Burundi	7.00p	16.0	Production	2.8	0.033	485	1,150	13,913

' – also has a producing gold mine

[2] - recent JV agreed on near surface mineralization

[3] - development of the full-scale operation which of 585,000tpa at 0.63% TREO for 3,098tpa, pilot plant has capacity to process 60,000tpa of ore at 1.19% TREO for 714tpa.

[4] - NdPr

Peer group analysis. Source: Align Research

Between 2005 and 2018, Lynas and Northern Minerals raised c.US$1.05 billion and US$104 million respectively of funds to get them where they are today. Over the same timeframe, others in the peer group like **Arafura Resources (ASX:ARU), Alkane Resources (ASX:ALK),** and **Avalon Advanced Materials (TSX:VAL)** have raised in the region of US$207 million, US$169 million and US$155 million respectively and still needed to raise substantial funds to get into production. Alkane Resources will need to invest A$1.49 billion (US$1.04 billion) to fund its Dobbo project to 1Mtpa of production in a two-phase modular build. **By comparison, it has to be pointed out that Rainbow has achieved production at a fraction of the cost of other projects**.

Target price

Peer comparisons show that today the company sits at a 40% discount compared to the average for current producers based on EV/t of resources and at a 61% discount based on EV/t of annual production**. It looks as though the sector as a whole is being valued on the basis of substantially higher assumed future REE prices which provides evidence that our higher case basket price valuation and target prices might be the more appropriate to use.**

Peer comparisons clearly demonstrate the big discount that Rainbow trades on against other REE producers in the sector. The stock currently trades at a price which gives an Enterprise Value (EV) that is more akin to companies which are at a pre-production stage where substantial funds needed to be raised for the mine and processing plant ahead of production commencing. This sort of discount could well provide the spark for M&A activity.

While the company was experiencing production issues and there were concerns about the manner of financing, these sorts of discounts might have been explainable. However, assuming the company proceeds with an equity placing to finance the planned production growth, this paves the way for not only for the poorly-received Lind financing deal to be curtailed, but also for new equipment to be purchased to upgrade and enlarge the mining fleet, which should allow past operational issues to be confined to history and the opening of two new mining faces.

Investors have already been drawn to Rainbow in recent weeks and the share price has shot up from its lows. It is fully appreciated that the company may be raising further funds to help improve performance, with the current level of interest in the stock suggesting that such a raise maybe sooner rather than later. In our analysis we have sought to determine a valuation per share based on the company raising US$6 million at 5p a share.

In order to remain conservative we have selected the NPV(12) figure and the valuation of the Gakara Project is determined using the higher case basket price scenario of US$15/kg given the recent improvement in the outlook for REE prices. On that basis we have determined a valuation for Rainbow of US$44.26 million (£34.85 million). **This equates to 11.52p per share based on the number of shares in issue (302,392,640) and 10.53p on a fully diluted basis (330,970,693)**, based on a US$6 million financing at 5p per share.

In our analysis, we have set out to present investors with a conservative valuation because, since listing in December 2017, forecasts in the market (with the benefit of hindsight) have been overly optimistic. Apart from the down to earth basket price employed, we believe that this valuation is a highly conservative one for a number of reasons. Firstly, annual production forecasts have been reined in. Secondly, the LoM could be considerably longer as the resource could be extended, and the company has the right to gain an extension of the mining licence. Plus, we know that there are some more highly prospective areas close by. Thirdly, no allowance has been made for an improvement in margins that might results from pursuing the results of the DFS for a downstream rare earth separation business. **On top of all those factors, the valuation has been determined using a discount factor of 12%, which serves to risk the project more than the commonly used 10% or 8% discount factors.**

Conclusion

The compelling combination of bonanza grades, the potential scale of the mineralisation across the 39km² Mining Licence and adjacent areas plus low-cost production, makes Rainbow a highly attractive prize in our view. The rapid acceleration in electric vehicle sales that is forecast, as well as the predicted future supply shortage in the REE magnet metals, only increases the stock's attractiveness given that Rainbow is one of the few producers outside of China.

We look forward to being given the opportunity to revise our valuation as a number of the uncertainties become better understood over the next 18-24 months. Over the near term, there looks to be a host of options which will create valued added milestones for investors including increasing production, achieving breakeven, bringing two more additional mining areas into play and the DFS on the further processing of the REE concentrate. So, there does look to be the promise of a healthy news flow over the coming months from the company.

At the same time, it does look as though the company's renaissance may come just as there are serious improvements afoot for REE stocks. March 2019 saw a hostile bid for Lynas and more recently it has emerged that the company's JV partner TechMet has been in talks with the US government about a potential investment in the firm to gain improved supplies of REE required for mass-produced electric cars. The man behind TechMet is South African mining tycoon Brian Menell, who has been building up stakes in companies and mining projects in technology metals which includes REEs.

China has dominated production of the metals needed for EVs and with the awkward US-China trade war raging, Brian Menell has been fast to point out *"...It's a competitive issue and a massive national security issue in the US."* Undoubtedly the latest machinations of the US-China trade war seem to provide further evidence that REE are strategic commodities. The market is anticipating that deposits outside of China will become strategically important – which is just the message that Rainbow has been trying to get across to investors for some time now.

Currently, lowly priced Rainbow could well find itself in the right place at the right time. **We initiate our coverage of Rainbow with a Conviction Buy stance and a target price of 10.53p.**

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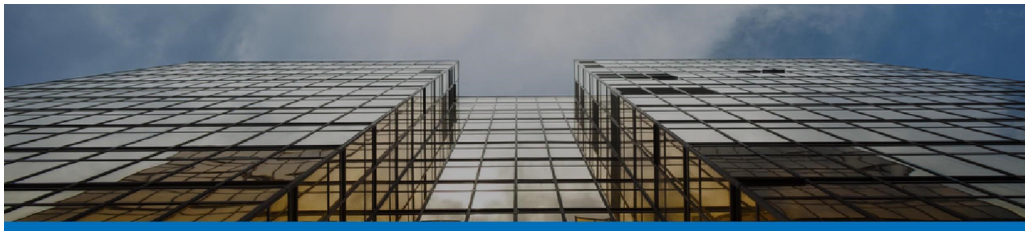

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