RM Research

17th October 2012

ASX Code: HAS

Speculative Buy

Price Target: 22 cents

Hastings Rare Metals Ltd

Management effort delivers...Project fast-tracked

10K tpa of high purity REOs and rare metal oxides annually for 25+ years...

Capital Structure

Sector	Materials
Share Price (A$)	0.115
Fully Paid Ordinary Shares (m)	156.8
HASO (ex $0.15, exp 31/03/2014) (m)	77.4
Opt (ex $0.25, exp 31/12/2013 (m)	22.5
Opt (ex $0.40, exp 31/12/2013 (m)	15.0
Opt (ex $0.25, exp 9/3/2014 (m)	15.0
Dir's Opt (ex $0.20, exp2014/15 (m)	4.5
Market Capitalisation (m) undiluted	18.0
Approx Cash (A$m)	6.22

Directors & Management

David Nolan	Non Exec Chairman
Alastair Metcalf	CEO
Steve Mackowski	Technical Director
Anthony Ho	Non Exec Director
Guy Robertson	Company Secretary
Dr Tony Mariano	Strategic Advisor
Tony Grey	Strategic Advisor
Andy Border	Exploration Manager

Major Shareholders

Kongomi Noms Pty Ltd	15.1%
AET SFS Pty Ltd	5.1%
Swift Venture Holdings Corp	4.0%
Top 20	60.0%
Board & Management	2.0%

Analyst

Andy Comas +61 8 9488 0800

Share Price Performance

Scoping Study proves project viability

Hastings Rare Metals Limited (the "Company" or "**HAS**") has recently published a Scoping Study that not only proves an economical mining operation and extraction scenario would be viable, but propels the Company headlong into achieving the next key milestones: the proof-of-concept stage of pilot plant testing and the completion of a feasibility study. **RM Research** considers that the Company has cemented its position among global peers as the most advanced Australian heavy rare earth oxide (HREO) story to follow. So read on...

It is timely to recall that following the appointment of Technical Director, Steve Mackowski (October 2011) he has excelled at driving, promoting and winning recognition of **HAS** globally. During Steve's maiden year, the Company has:

- appointed Mr Alastair Metcalf as CEO (May 2012)
- engaged Australia's leading rare earth element (REE) technology specialist ANSTO (Australian Nuclear Science and Technology Organization) (March 2012)
- appointed Jacobs Engineering Group to oversee the project's development to the feasibility stage (March 2012)
- become a corporate member of REITA (Rare Earth Industry and Technology Association (March 2012)
- successfully raised A$8.38 million capital (April 2012, October 2012)
- attracted Japanese institutional investor **A1 Investments** (ASX: **AYI**) and Singapore based investors **Union Overseas Bank**, **Kay Hian Private**, and **Swift Resources** (April 2012)
- been invited to attend an Australian government trade mission to Europe (May 2012) specifically to meet with REE manufacturers and end-users, and
- been acknowledged in numerous industry forums, blogs, presentations, investment analyst research, and global press (including the Chinese press).

Price Catalyst

- Share price drivers which relate to the Hastings Project and include market updates on the progress towards the construction of a pilot plant, confirmation of technical viability at pilot plant scale, EIS approvals, the signing of a partnership for project funding, off-take MOUs or Letters of Intent (LOI) for the suite of REO products to be produced, drilling results that increase the resource potential, and completion of the definitive feasibility study (DFS).

Action and Recommendation

- Speculative BUY. Price Target: 22 cents. (+83% upside)

INVESTMENT CASE

- The Hastings Project resource has the highest known HREO to total rare earth oxide (TREO) ratio globally at 86% and the current total HREO content of 62,500 tonnes @ 0.18% places the Hastings Project fourth globally in comparable HREO projects (ex-China)
- The JORC compliant resource statement (NI43-101 equivalent) currently stands at a total resource (Indicated and Inferred) of 36.2 million tonnes @ 0.21% TREO
- **HAS** is well and truly on the radar of industry commentators and investors and is ahead of its Australian peers with a predominately HREO resource
- The Company is fast-tracking towards the crucial pilot plant proof-of-concept stage and the completion of the DFS.
- The capital raising announced on 15th October 2012 was heavily oversubscribed particularly by Asian based investors

COMPANY OVERVIEW

Location & Tenure

The Company has two projects exploring for rare earths in Western Australia (Figure 1). The 100% owned Hastings Project near Halls Creek in the East Kimberley region of Western Australia extends over 1990 hectares and is a HREO project containing critical rare earth oxides (CREO)s dysprosium and yttrium.

The 60% owned interest in the Yangibana Project in the Gascoyne region of Western Australia is 270km east-northeast of Carnarvon with tenements that cover approximately 206 km^2. It is predominately a light rare earth element (LREE) project rich in CREO neodymium. The free-carried JV partners are **Artemis Resources Ltd** (ASX: **ARV**) with a 10% interest and UK company **Rare Earth Minerals Plc** with a 30% interest.

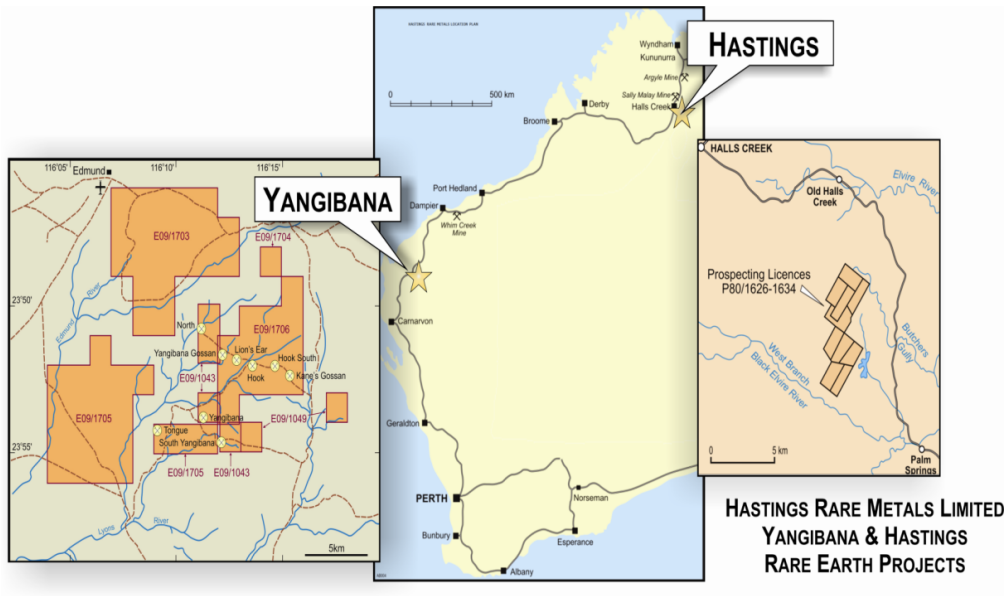

FIGURE 1: Hastings Project and Yangibana Project location map (*source*: **Hastings Rare Metals Ltd**, ASX Announcement 22nd June 2011).

EXPLORATION OVERVIEW

Hastings Project

Geology and Mineralisation

The mineralization of the Hastings Project is hosted in a Proterozoic age tuffaceous rhyolitic volcaniclastic unit known colloquially as the "Niobium Tuff" with the REEs hosted in fine grained minerals of bertrandite, bastnaesite, parasite, synchisite and potassium mica. The tuff has been mapped for over 3.5km and drilling has shown that it is both folded and has a vertical to steep easterly dip.

Previous Exploration

Aside from token efforts dating as far back as the mid-1950s, more intensive exploration was conducted between 1982-1985 under a joint venture between the predecessor of USA based **Molycorp Inc.** (Union Oil Development Corporation) and Australian company **West Coast Holdings Limited** (WCHL). After completing extensive metallurgical studies, WCHL progressed the project to initiating the construction of a pilot plant in the UK before running out of funds and the project ground to a halt until **HAS** acquired the project in March 2011.

The JORC resource is 36.2 million tonnes @ 0.21% TREO

The Company's inaugural drilling program in 2011 was conducted in order to produce a maiden JORC compliant resources statement. A total of 51 holes were drilled totaling 8,182 metres with a 96% success rate in intersecting mineralization. The drill program consisted of infill drilling and testing for depth extensions to the resource and confirmed that mineralization extends over at least 1.8km of the central zone of the mapped 3.5km of Niobium Tuff rock type that hosts the mineralisation and that it is present from surface to over 300 metres depth. The resource however, remains open at depth and more drilling will be required to flesh-out and upgrade the resource to a reserve status prior to the start of any mining operation.

The HREO content accounts for approximately 86% of the TREO content of the deposit.

Bulk surface sampling and assays results from the 2011 drilling program have shown that the HREO content accounts for approximately 86% of the TREO content of the deposit. Rare metals hafnium, gallium, niobium, zirconium and tantalum and heavy rare earths dysprosium, erbium, ytterbium and yttrium were found to be present in significant concentrations. As much as REE resources are generally classified to be LREE or HREE, the rare metal content is often overlooked. The Hastings Project is quite rich in rare metals niobium, hafnium and zirconium which adds significant economic value to the overall resource.

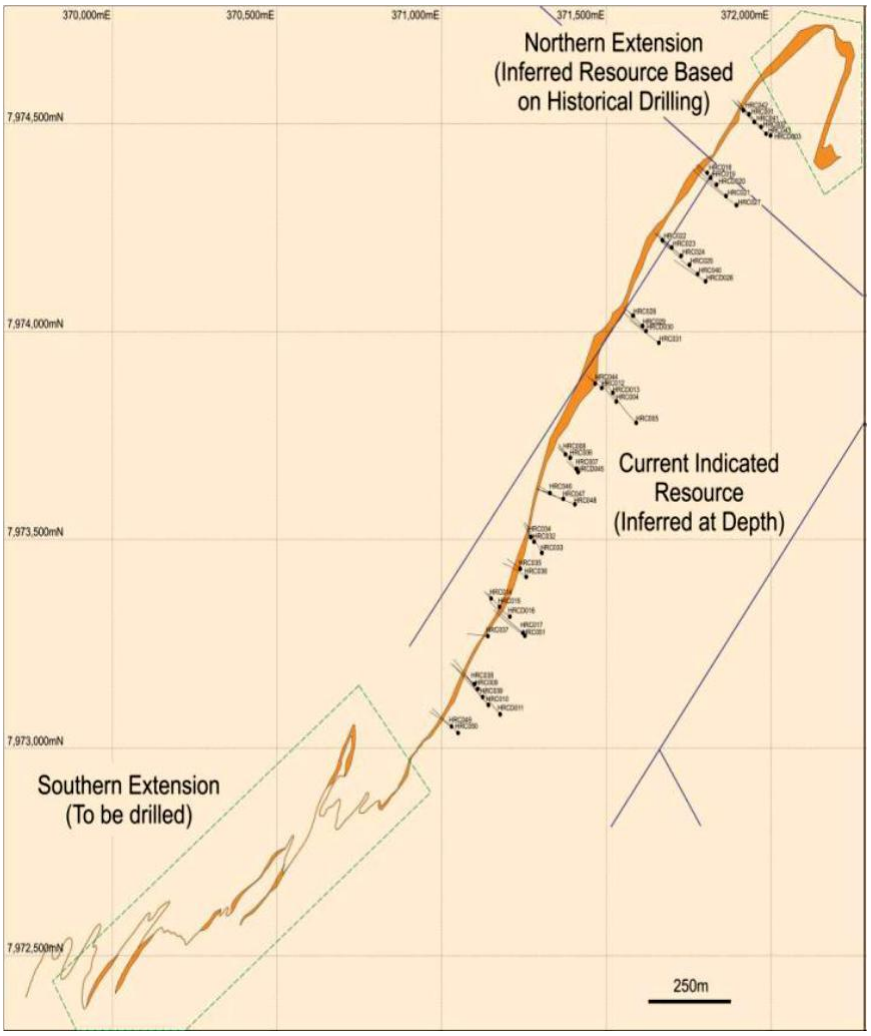

FIGURE 2: Hastings Project mapped resource (*source*: **Hastings Rare Metals Ltd**, ASX Announcement 5th September, 2012).

The Southern Extension adds an extra 750 metres of additional strike length to the resource.

Future Exploration

Geological surface mapping to the south of the drilled central zone, known as the Southern Extension, has discovered around 750 metres of additional strike length of possible economic mineralisation that has to date never been drill tested. The Company tentatively plans to target this area late in 2012 with a drilling program that could add significant tonnage (+/-20%?) to the current resource and hence likely extend the projected mine life greater than 25 years.

It is also likely that infill drilling will be required to upgrade the resource status both along strike and at depth, however a timetable has yet to be decided by the board given the immediate focus is on constructing a pilot plant and moving towards the completion of a definitive feasibility study.

RESOURCES AND RESERVES

Category	Tonnage million t	ZrO_2 ppm	Nb_2O_5 ppm	Ta_2O_5 ppm	Ga_2O_3 ppm	HfO_2 ppm	Dy_2O_3 ppm	Y_2O_3 ppm	Er_2O_3 ppm	Yb_2O_3 ppm	TREO ppm	HREO ppm
Indicated	27.1	8,913	3,545	182	110	318	186	1,120	173	139	2,103	1,803
Inferred	9.1	8,914	3,547	182	110	318	186	1,120	173	139	2,100	1,802
Total	36.2	8,913	3,546	182	110	318	186	1,120	173	139	2,102	1,802

*Based on a 1,500 ppm Nb_2O_5 cut-off grade

TABLE 1: (above) The Hastings Project JORC compliant resources statement (*source*: **Hastings Rare Metals Ltd**, ASX Announcement 11th November, 2011).

A maiden JORC compliant resource statement (NI43-101 equivalent) was published in September 2011 that confirmed the tenor of the project's mineralization and the geological interpretation of the resource. The total resource (Indicated and Inferred) currently stands at 36.2 million tonnes @ 0.21% TREO. The details are shown above in Table 1. Of particular note is that around 75% of the current total resource has had sufficient exploration such that it is in the higher confidence category of Indicated Resource for a total of 27.1 million tonnes.

Importantly, the higher economic value HREO content represents 86% of the TREO content of the resource which rates the Hastings resource as having the highest HREO ratio globally. The resource has yet to be fully drilled out and it is the opinion of **RM Research** that further drilling will not only add significant resource tonnes but will no doubt increase the more valuable contained tonnes of HREOs.

Yangibana Project

Geology and Mineralisation

The Company acquired the 60% interest in the Yangibana Project in June 2011 despite limited drill exploration data and no JORC compliant resource statement. REE mineralisation occurs in altered iron-rich carbonatites and ironstone dykes that are enriched in the CREO neodymium. Ironstones that have been mapped across the tenement package predominately contain REE bearing monazite of average grade 4,000 ppm Nd_2O_3 with bastnasite, pyrochlore and ferrocolumbite also found to host REEs. The mineralisation is predominately LREO of lanthanum and cerium with unusually high grade neodymium and gadolinium.

Previous Exploration

The Yangibana Project is neodymium rich.

Since acquiring the project, **HAS** has conducted limited mapping and sampling of ironstone outcrops as the priority exploration target has always been the Hastings Project. However, limited drilling was conducted in 1988 by previous owners.

The highest assay result returned to date from rock-chip sampling of the ironstone outcrops, was 12.8% (TREO) including 2.29% of CREO and a high 2.19% neodymium oxide (Nd_2O_3) value at the Lion's Ear prospect (Figure 3). The possibility of discovering a high neodymium content resource will be the initial exploration target given neodymium is considered to be a critical metal in short supply into the foreseeable future.

The Lion's Ear Prospect assayed up to 12.8% TREO including 2.19% neodymium oxide (Nd_2O_5)

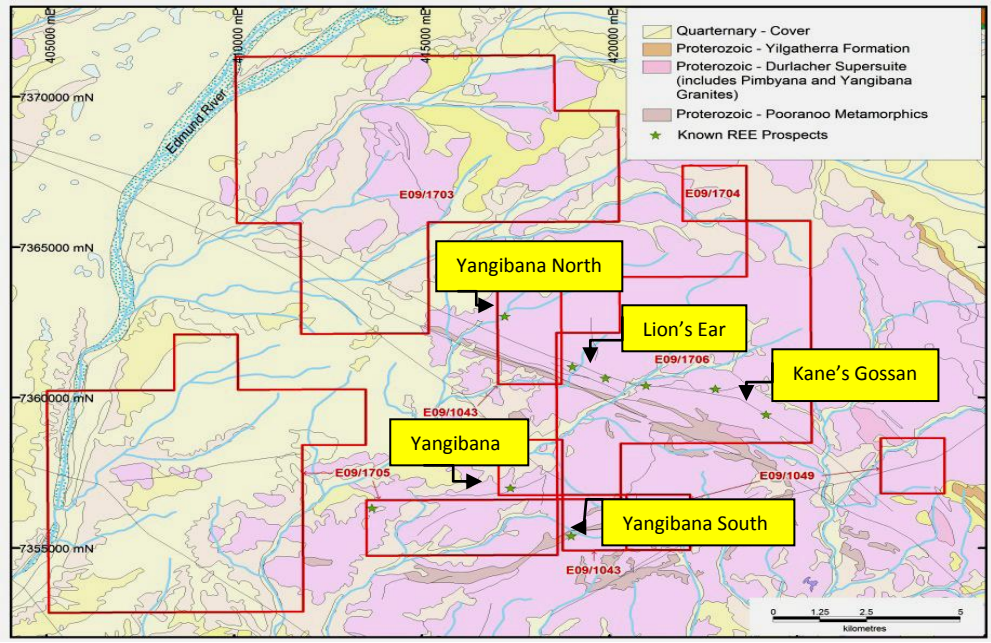

FIGURE 3: Location of Yangibana prospects (*source*: **Hastings Rare Metals Ltd**, ASX Announcement 11th November, 2011).

To put the resource potential in context, **Hudson Resources Inc.** (TSX.V: **HUD**) has the Sarfartoq Project in Greenland which is an exceptionally large carbonatite hosted resource. The project has an Indicated & Inferred resource (NI 43-101) of 8.34 million tons at 1.72% TREO. The average neodymium oxide grade is around 19% of TREO. A preliminary feasibility study projected that the project had a net present value of US$616 million with just a 2.5 year payback period.

As shown in Table 2 below, the average REE distribution in the ironstone lenses sampled to date is predominately LREEs with a relatively high percentage of neodymium (24.4%). Given the limited number of samples collected and assayed the potential of the prospects at Yangibana have yet to be fully assessed.

TABLE 2: Distribution of REEs from sampling at the Yangibana Project. (*source*: **Hastings Rare Metals Ltd**, ASX Announcement 11th November, 2011)

Oxides	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Er	Y	Total
% of TREO	16.7	46.3	6.4	24.4	3.0	0.7	1.4	0.1	0.4	0.2	0.4	100

Light rare earths — Heavy rare earths

Current Exploration

A 10km continuous ironstone lithology prospective for REE needs detailed exploration.

In March, **Hastings** commissioned HyVista Corporation to conduct an airborne hyperspectral survey over the Yangibana tenements. A hyperspectral survey maps the rock types and distribution of all mineralisation and alteration in minute detail to produce comprehensive geological maps that can be used in unison with field work to delineate the most prospective parts of the tenements for possible mineralisation.

The survey data discovered that a 10km continuous ironstone lithology extends from Yangibana North in the northwest to Kane's Gossan to the southeast. The strike length of the ironstone can be traced in Figure 4 as the yellow line indicated. Previously, it was thought from surface mapping that the ironstone was a series of discrete lenses.

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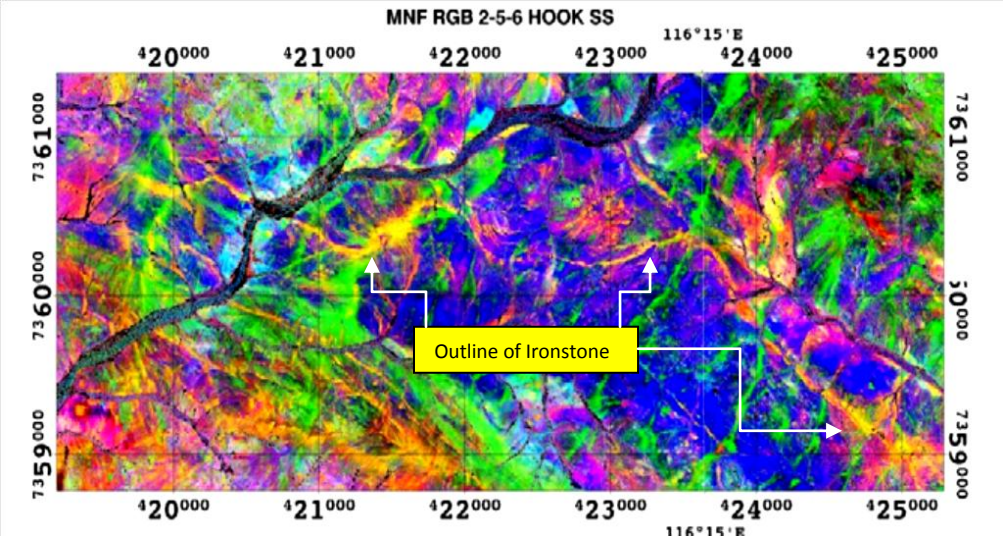
FIGURE 4: Yangibana Project hyperspectral geological map. (*source*: **Hastings Rare Metals Ltd**, ASX Announcement 24th July, 2012).



Future Exploration

The results of the hyperspectral survey will now dictate the future work program on the Yangibana tenements. It is envisaged that the maps generated will assist in further detailed mapping and sampling that will be undertaken across the tenements in order to better define the distribution of REE mineralisation in ironstones, carbonatites and related fenitic alteration, and pegmatites.

Drill targets will then be selected and prioritised for an inaugural drill program slated to start sometime in 2013. On the completion of the drill program, the Company should have sufficient data to then publish a maiden JORC compliant inferred resource statement for the project.

SCOPING STUDY

..the Hastings project will make money

Earnings of A$233 million per annum over a 25 year mine life.

The Company has successfully surpassed another major milestone with the announcement of the completion of an independent scoping study on September 5th 2012 (Table 3). In a nutshell, the Hastings project is financially viable. It will make money. Lots of money. Of the many variables taken into consideration for what are arguably very complex mineralogy, metallurgy and processing, the existing resource is forecast to have at least a 25 year mine life and to generate earnings of A$233 million per annum. For a company with a market capitalisation (market cap) of just A$18 million (undiluted), it is blatantly obvious that the investment community has failed to perceive the inherent value **HAS** represents.

The scoping study mandate was awarded to **Jacobs Engineering Group** (NYSE: **JEC**) (**Jacobs**) in March 2012 as they were deemed to have the requisite expertise to manage and drive the Hastings Project through the critical phases of development to the ultimate provision of a DFS by the end of 2013. **Jacobs** reviewed all the historical test work performed at the Warren Spring pilot plant in the United Kingdom in the late 1980s to early 1990s to devise a workable flow sheet (Figure 6), processing plant design and concurrently determined the expected capital and operating costs.

Additionally, Australia's leading REE technology specialist **ANSTO** (Australian Nuclear Science and Technology Organisation) was appointed in March 2012 to validate and verify the optimal REE extraction processes to produce the deposit's most valuable critical rare earth oxides (CREO) dysprosium and yttrium. The advantage of partnering with **ANSTO** is the in-house expertise they have especially since they have advised a number of **Hasting's** peers including the most advanced Australian projects, **Lynas Corporation's** (ASX: **LYC**) Mount Weld Project, **Arafura Resources Ltd's** (ASX: **ARU**) Nolans Bore Project and **Alkane Resource's** (ASX: **ALK**) Dubbo Project.

ANSTO optimized the extraction and recovery techniques as a two stage process (Figure 5) with the ultimate aims achieved to:

- validate & verify the flow sheet proposed for the pilot plant testing stage
- examine the optimal sulphation & leaching stages, and
- investigate optimal recoveries of rare metals and rare earths

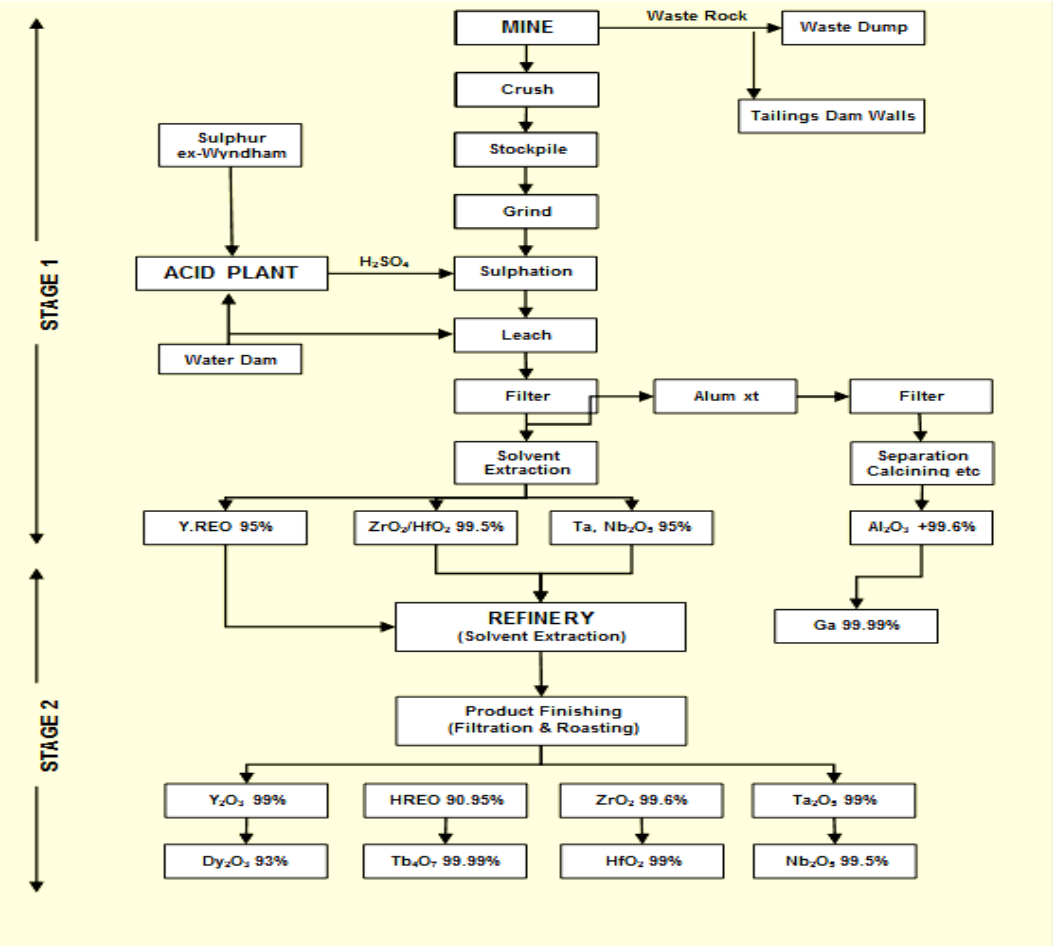


FIGURE 5: 1990 Proposed Flow Sheet to be verified and validated by ANSTO. (*source*: **Hastings Rare Metals Ltd**, ASX Announcement 5th July, 2012)

Metallurgical recoveries of 70% to 75% for rare metals and around 75% for REOs were achieved.

The first stage of validating the extraction process that was first proposed in 1990 at the Warren Spring pilot plant (Figure 5) was an outstanding success in regard to the recovery of REEs. Under various laboratory test conditions, optimal metallurgical recoveries of 70% to 75% for rare metals and around 75% for REOs were achieved which is most acceptable by the industry given the mineralogical and metallurgical complexities involved. There is no such one-size-fits-all process that other commodities can take advantage of when it comes to the REE industry. The good news is that the Hastings Project mineralisation is amenable to industry standard processing with the preference to produce high purity REOs rather than the less processed and hence lower value REE carbonates. Further optimising and tweaking may eventually extract higher recoveries which will only add to the overall economics of the project.

***HAS** can control the supply and distribution of its end-products and thereby retain higher profits.*

The revenue forecasts are based on the Company's source of current prices for REOs with mining and processing costs based on current industry rates. The scoping study has elucidated that the majority of the A$720 million for capital costs are associated with the processing and refining plant as the costs associated with the mining, crushing and freight to port for example, will be borne by contracted service providers. As part of the upcoming feasibility study, **HAS** may consider additional scenarios such as contracting out parts of the processing and refining operations to further lower the upfront capital expenditure costs.

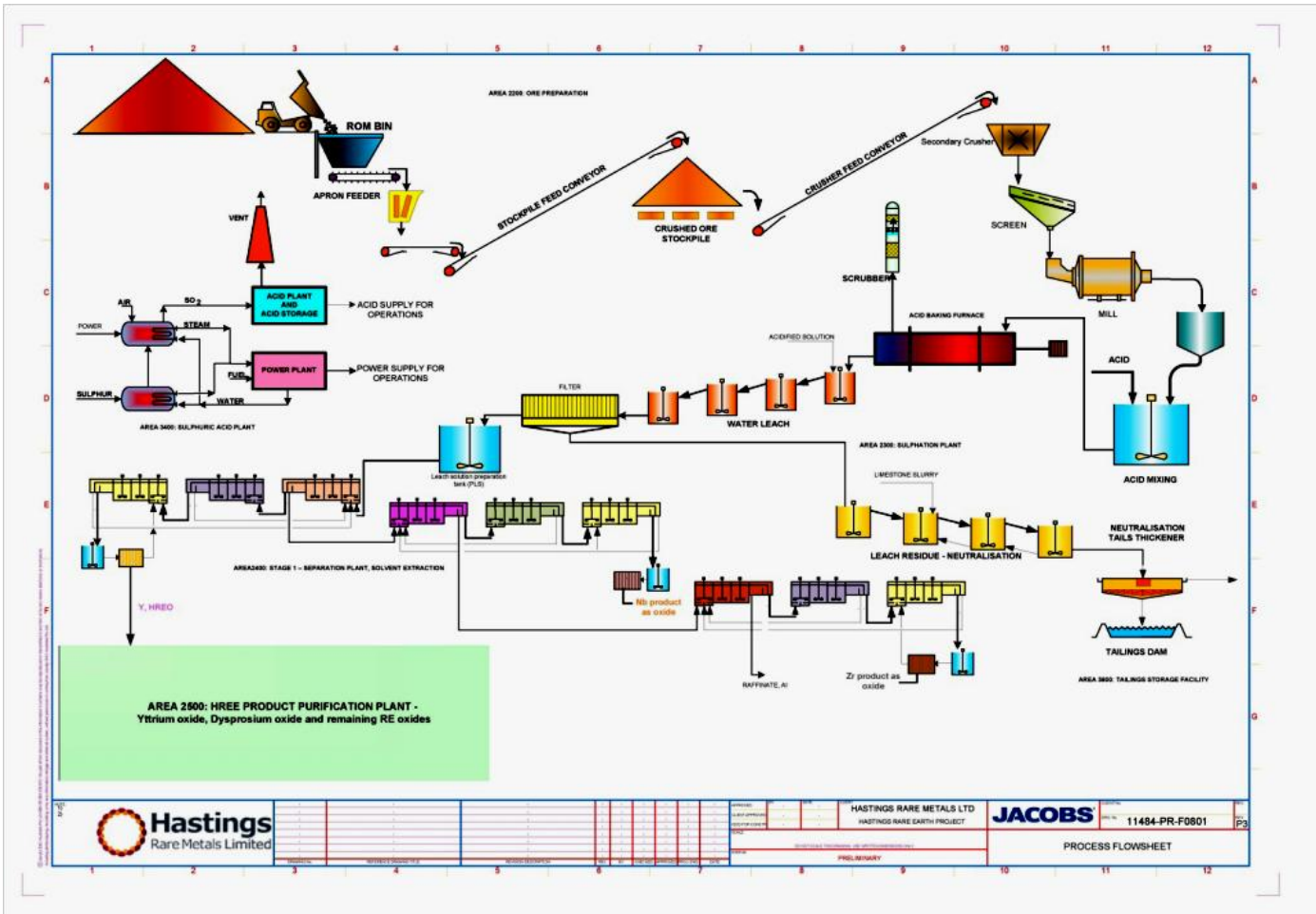


FIGURE 6: (above) Jacobs Engineering Proposed Process Flow Sheet of REE extraction and recovery for the Hastings Project. (*source*: **Hastings Rare Metals Ltd**, ASX Announcement 5th September, 2012)

Hastings *to fast-track the building of a pilot plant to produce the higher value HREOs dysprosium and yttrium.*

Additionally, the location of the project has direct road access via Halls Creek to port infrastructure readily available at Wyndham (375km) or Derby (500km). It is envisaged that a purpose built plant can be constructed on-site without blowing out capital expenditure costs. On-site processing will minimise transport costs and reduce most environmental concerns by consolidating processing, refining, plant, tailings and recycling activities to a defined area. Importantly for **HAS** shareholders, on-site processing to produce the higher value-added production of REOs and metals will allow **HAS** to control the supply and distribution of its end-products and thereby retain higher profits.

Metallurgical test work and process optimisation will be an ongoing exercise in order to determine the optimum processing and recovery of all contained REEs and rare earth metals as higher value oxides including hafnium, gallium, neodymium, tantalum and gadolinium. The recovery of any additional REEs will add to the overall profitability of the project.

Successful ongoing exploration to drill out the resource along strike and at depth will upgrade it to a Reserve JORC classification. Additional tonnes equates to enhanced project viability and profitability.

A significant point that sector peers and investors may have overlooked, is that **Hastings** achieved this outcome in what ordinarily can take up to three years to assess and prove. In a very short period of just six months, the optimal processing and extraction techniques have been determined. **Hastings** can now fast-track to the next stage of building a pilot plant to refine and separate out the various targeted suite of products with the focus on maximising the higher value HREOs dysprosium and yttrium.

The key findings of the Scoping Study confirms:

High purity REOs can be produced using standard processing techniques.

TABLE 3: Key Findings of the Scoping Study for the Hastings Project. (*source*: **Hastings Rare Metals Ltd**, ASX Announcement 5th September, 2012)

Mining	Conventional open-cut mining operation
Processing	1 million tonnes per annum (base case) with upside to 2mtpa.
Recoveries	75% for Dysprosium, Yttrium and Niobium, 70% for Zirconium
Average Annual Production	• 140 tonnes of Dysprosium oxide • 830 tonnes of Yttrium oxide • 590 tonnes of a mixed rare earths oxide • 2,630 tonnes of Niobium oxide • 6,170 tonnes of Zirconium oxide
Mine Life	Minimum 25 years based on the current JORC resource
Prices	August 2012 China FOB prices for Dysprosium, Yttrium, Niobium and Zirconium. 2.5% p.a. price increase for Dysprosium and Yttrium due to forecast strong demand and supply shortage
Exchange rate	A$ deflating to 85 cents by 2016
Capital cost	A$720 million over 2 years plus A$96 million for contingencies
Earnings	Annual revenue of A$482 million, operating costs of up to A$259 million, generating EBITDA of A$223 million per annum
Net present value	A$1.9 billion (pre-tax, 100% equity, 8% discount rate, real terms)
Internal rate of return	26%
Capital pay back	3.6 years
Notes to table: August 2012 Scoping Study. In Australian dollars	

The Hastings Project will be a more robust project if the resource base increases.

The forecast project schedule (Table 4) and the corresponding estimated funding required (Table 5) to the completion of the Definitive Feasibility Study (DFS) are portrayed below.

The Scoping Study has demonstrated that the base case assumptions for the Hastings Project makes for a robust project and that the economic viability increases significantly if the resource is increased and if the prices received for the suite of end-products remain strong.

RM Research considers that **HAS** should be able to fast-track the next few stages of pilot plant testing and seeking LOI and/or a strategic partner or two especially given the resource contains the higher value HREOs sought by manufacturers of hybrid and electric cars, wind turbines and phosphor lighting. The pilot plant stage should therefore be more perfunctory than investigative.

PROJECT SCHEDULE & FUNDING

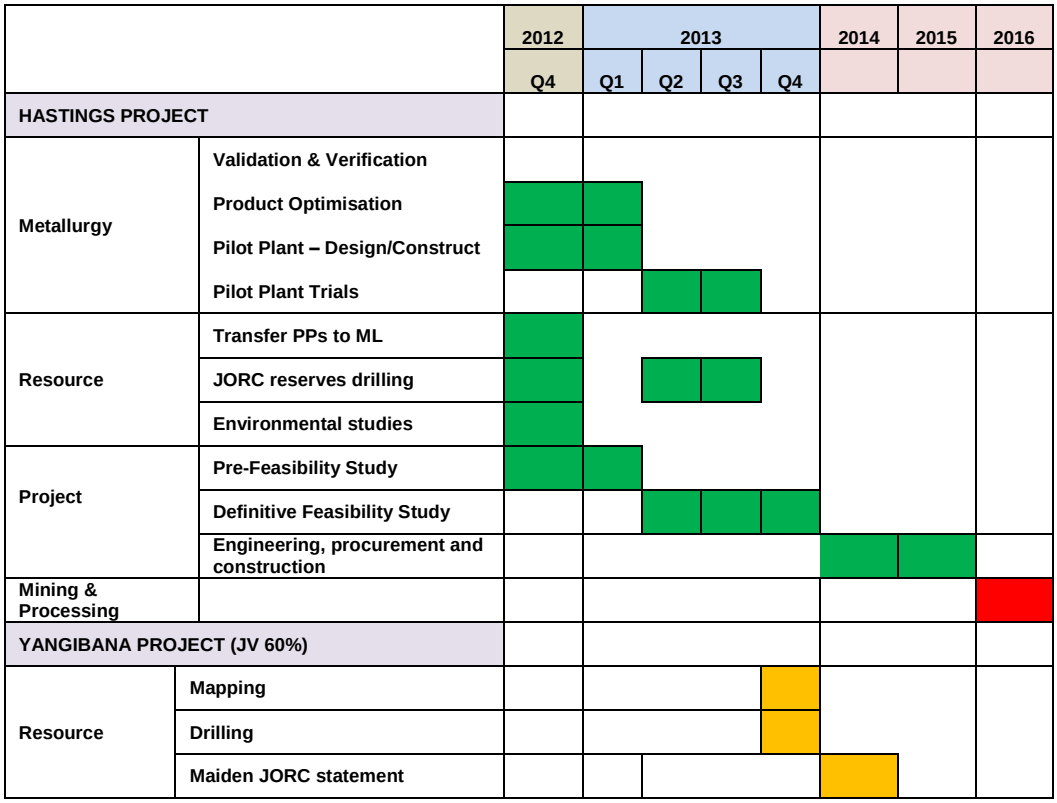


TABLE 4: Proposed project schedule. (source: **RM Research** estimates from Company discussions).

Estimated funding to the completion of the Bank Feasibility Study	A$M
Operating Costs, including overheads and general project costs.	3 – 4
Pilot plant, design, construction and operation	5
Pre-feasibility study and further ANSTO work and environmental approvals	5
Southern extension drilling and infill drilling	2
Definitive Feasibility Study	20 – 25
Total	**35 – 41**

TABLE 5: Estimated funding required to complete the DFS. (source: **RM Research** estimates).

The next major stage is proof-of-concept whereby a pilot plant will be specifically designed as proposed in the Scoping Study and be built at the **ANSTO** facilities at Lucas Heights (40 km southwest of Sydney, NSW). The design and construction are expected to start in late 2012 followed by three months of testing and tweaking starting in the first quarter of 2013. An initial 30 tonnes of **Hastings**' mineralization will be processed under optimal conditions to demonstrate the processing flow sheet and to produce the proposed suite of REO end-products.

Strategic partners are now being sought.

HAS will next need to engage an advisor to assist the company in determining a suitable strategic partner that is foremost interested in securing the supply of end-products produced. LOIs are usually required from potential customers in order to assist in tweaking the pilot plant design to produce customer specified end-products. However, in the case of **HAS**, the high purity individual REOs that can be successfully extracted and refined should meet the specifications of a number of potential customers. **HAS** can now progress negotiations in earnest with parties interested in funding the continued development of the project and importantly, securing supply of REOs used in their manufacturing industries.

RARE EARTHS MARKET OUTLOOK

The classification of REEs into light rare earth elements (LREE) and heavy rare earth elements (HREE) is quite definitive when based on the electron configuration of each element and which direction the electrons spin as defined by REEHandbook.com (*Source*: http://www.reehandbook.com/intro.html). Based on this reckoning, LREEs have atomic numbers 57 -64 and the HREEs 65 – 71 plus yttrium (39). We chose to use this classification scheme as we believe most sector commentators are confused by the historical divisions. Realistically, it simply doesn't matter whether any given resource is predominately LREEs or HREEs or a hybrid somewhere in between as the mineralogical composition, extraction and refining processes will ultimately determine which REEs projects will be commercially viable.

In 2010, the U.S. Department of Energy (DOE) produced the inaugural *Critical Materials Strategy* report in which REEs were further subdivided into a class they considered to be the CREOs based on the criticality of supply to clean energy applications. The annual update released in December 2011 considers that the supply of dysprosium, terbium, europium, neodymium and yttrium will be the CREOs still essential to clean energy applications over the next 15 years (Figures 7A, 7B).

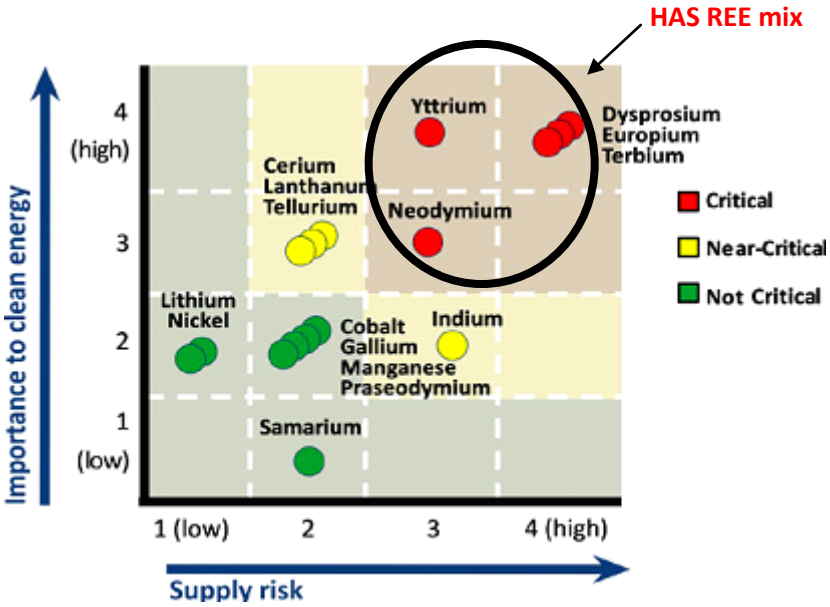


FIGURE 7A: Criticality Assessment of REEs, Present -2015 (*source*: US Department of Energy, DEC 2011: Critical Materials Strategy, Pg. 4).

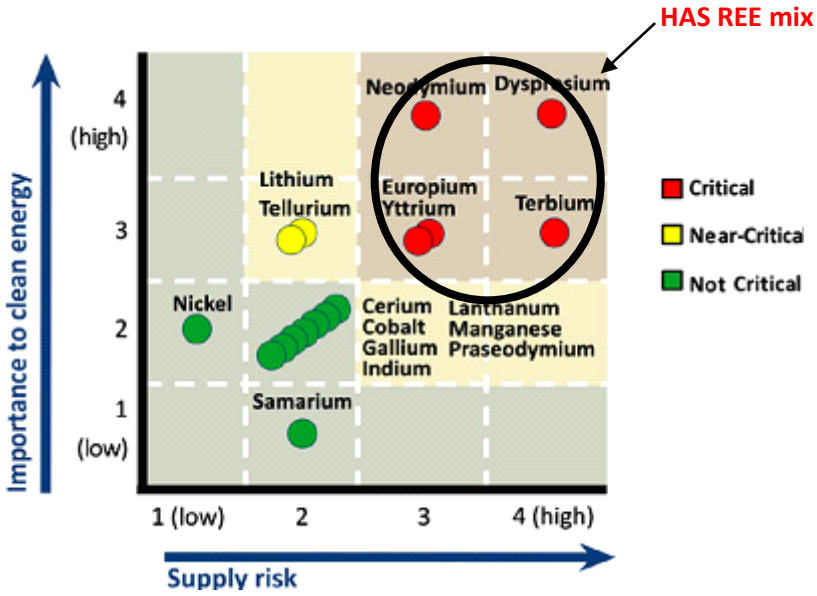


FIGURE 7B: Criticality Assessment of REEs, 2015 – 2025 (*source*: US Department of Energy, DEC 2011: Critical Materials Strategy, Pg. 4).

Hastings has the potential to be an alternative supplier of CREOs.

Of these CREOs, the Hastings deposit contains a relatively high metal content of yttrium, dysprosium and neodymium (Figure 8) and by value, dysprosium and yttrium (Figure 9). Dysprosium is predominately used in permanent magnets which are increasingly in demand for hybrid and electric vehicle motors and wind turbines. Yttrium demand will be driven by government sanctions for the use of energy efficient lighting as already imposed in Australia and the USA. In the future however, which REOs are deemed to be CREOs remains to be seen as new technologies are developed and substitute materials are sought. Most global production and supply of these two CREOs is from China hence alternative potential suppliers like **HAS** will be highly sought after to circumvent supply and pricing risks.

Significant REE industry developments like the recently announced possible breakthrough in the separation of CREOs by **Ucore Rare Metals Inc** (TSX-V: **UCU**) is important in developing rest of world (ROW) production and refining operations particularly in countries like the USA where funding and technological advances are government endorsed. Technology advancements may be a double-edged sword if it increases supply of hard to purify REOs.

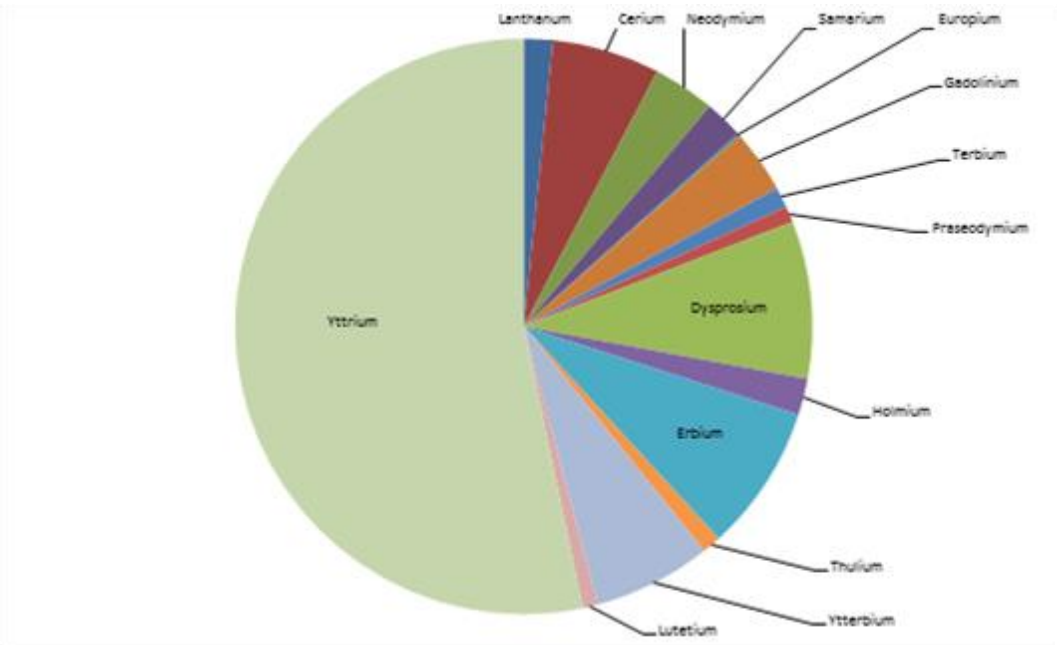


FIGURE 8: Distribution of Hastings Project REOs by volume (*source*: **RM Research** and **HAS** reports).

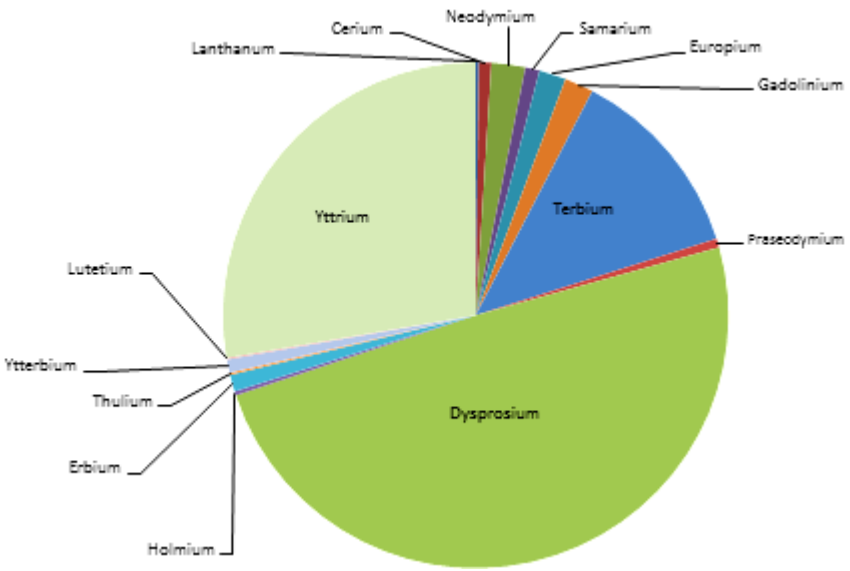


FIGURE 9: Distribution of Hastings Project REOs by value (*source*: **RM Research** and **HAS** reports).

In order to focus specifically on **HAS** and its HREO Hastings Project, it is beyond the scope of this report to detail the myriad uses for REEs and the supply and demand forecasts. There is much information in the public domain detailing in much minutia any information you may like to specifically know. We draw your attention to the Bibliography at the end of this report which lists some of the more credible sources to reference.

However, one credible source (albeit US-centric) that has researched the sector in some detail are Gareth Hatch and Jack Lifton at Technology Metals Research (TMR). TMR state that they actively track 441 REE deposits under various stages of exploration to advanced development by 269 different companies globally across 37 different countries outside of China and India (ROW). TMR have then distilled this data into their *TMR Advanced Rare-Earth Projects Index* which as at October 12, 2012 consisted of 45 REE projects in 14 ROW countries. **HAS** rightfully is included in the index and has therefore been brought to the attention of REE sector devotees and importantly, North American, Canadian, European and Asian investors. Source:http://www.techmetalsresearch.com/metrics-indices/tmr-advanced-rare-earth-projects-index/).

During 2011 when the prices for all REOs escalated and peaked, the number of REE projects undergoing exploration and development globally coincidentally also peaked. It never ceases to amaze me the positive correlation between a run-up in the pricing of commodities and the number of companies that suddenly have the world's best possible resource of that commodity. You may have since noticed that project development "news" by some of these very same companies appears to be drying up coincidentally positively correlated with the fall in pricing of REEs. This is particularly evident for companies with predominately LREE projects and in light of pending new global production and resultant oversupply from the behemoths of the LREO sector **Lynas Corporation** (ASX: **LYC**) and **Molycorp Inc.** (NYSE: **MCP)**. The same however, can also be said of companies that class themselves as HREE projects too. Investors need to be aware of which new projects will be coming into production and what the actual mix of HREO/TREOs will be given the demand and supply equation for each REE is different.

We still concur with Hastings Technical Director, Mr Steve Mackowski that of the ROW REE resources with a high HREO to TREO ratio that could be considered peers to the Hastings Project, there are only three. They are the Strange Lake (B Zone) Project being developed by **Quest Rare Minerals Ltd** (TSX.V: **QRM**; AMEX: **QRM)**, the Nechalacho (Thor Lake) Project that **Avalon Rare Metals Inc** (TSX: **AVL**, AMEX: **AVL)** is developing and **Tasman Metals**' (TSX.V: **HUD**) Norra Karr Project in Sweden.

PEER REVIEW

__HAS__ has the highest ratio HREEs to TREEs JORC compliant resource in Australia.

Jack Lifton, editor at Technology Metals Research (TMR) recently published the paper "Where Are The Non-Chinese Heavy Rare Earths Going To Come From And Who's Going To Buy Them?" on Sept 16, 2012 (Source: http://www.techmetalsresearch.com/2012/09/where-are-the-non-chinese-heavy-rare-earths-going-to-come-from-and-whos-going-to-buy-them/) in which he lists particular projects that have a good chance of producing HREEs in the next 10 years. **HAS**' project as we know is the highest ratio HREEs (to TREEs) JORC compliant resource in Australia and has the fourth highest ratio in the world (ex-China and India). Globally, there appear to be just 11 hard rock REE projects that have the capacity to produce HREOs economically. It is **RM Research's** view that a resource cannot truly be classified a HREE project unless the HREE/TREE ratio is at least 50%. Other sector commentators will beg to differ of course.

On this basis, we would argue that in an Australian context and at this point in time, there is just one real HREE project with a JORC compliant resource: **Hastings**. With due respect to Mr Lifton's analysis, **Lynas Corporation**'s Mt Weld Project is a LREE project that will produce HREEs and **Northern Minerals**' (ASX: **NTU**) Brown Range Project while expected to be a HREE mineral concentrate project, **NTU** have yet to produce a JORC compliant resources statement.

Australian company **Greenland Minerals and Energy Ltd** (ASX: **GGG**) has a world class uranium, REE and zinc resource in as their name suggests, Greenland. While technically a uranium resource containing REEs, the sheer size of the resource (956 million tonnes @ 1.1% TREO) will ensure that it will potentially become one of the largest global producers of REEs for over 50 years. Subject to acknowledged approval and securing funding, production is expected

to start in 2016 and the mine will have the capacity to supply around 20% of HREE demand thereafter with annual production of around 37,000 tonnes of LREOs and 7,000 tonnes of HREOs.

The other potential Australian HREE producer of note is **Alkane Resources Ltd** (ASX: **ALK)**. **ALK**'s Dubbo Zirconia Project is predominately a zirconium rich LREE resource with approximately a 25% HREO content and a mineralogical composition zirconium – niobium – tantalum – hafnium – yttrium – dysprosium. Production is expected in 2015 with a life-of-mine of over 100 years and the capacity to supply 10% of global HREE demand. **ALK** is ahead of **HAS** in the steps required to reach production (Table 7) having demonstrated the production of a suite of end-products from their pilot plant, secured off-take MOU agreements for around 1 Mtpa and is now working towards their EIS, financing and design.

There are two other Australian companies with projects that could be classified as HREE resources: **Northern Minerals** and **TUC Resources** (ASX: **TUC**). Both **NTU** and **TUC** have yet to lodge JORC compliant resource statements and until such time as they do we will not know just how these projects stack up against those of **HAS** or their peers. Their JORC compliant resource statements will be mandatory in order to satisfactorily complete their respective scoping studies and feasibility studies.

TABLE 6: Top 8 ASX-listed REE companies; 4 October, 2012 (*source*: **RM Research**).

Top 8 ASX-listed REE Companies	JORC resource	Mkt Cap A$ 6 Feb 2012	Mkt Cap* A$ 17 Oct 2012	% change
Lynas Corp - Mt Weld, WA (LYC)	yes	$2.5B	$1.3B	-48%
Alkane Resources – Dubbo, NSW (ALK)	yes	$325M	$359M	+10.5%
Greenland Minerals – Kvanefjeld, Greenland (GGG)	yes	$239M	$174M	-27%
Arafura - Nolans Bore, NT (ARU)	yes	$173M	$65.3M	-62%
Northern Minerals - Brown's Range, NT (NTU)	no	$96M	$61.6M	-36%
TUC Resources - Stromberg, NT (TUC)	no	$18M	$17.2M	-4%
Hastings Rare Metals - Hastings, WA (HAS)	**yes**	**$8.6M**	**$33.5M**	**+289%**

*Note: diluted market caps

***HAS** has more than doubled its market cap since February 2012.*

HAS is now being approached by potential end-users for its suite if REO products.

As shown in Table 6 above, the ASX-listed REE sector has taken a beating since February 2012 with the collapse in REE prices, particularly those projects which predominately contain the more common LREEs which are currently in surplus globally. The notable exception is **HAS** which has more than doubled its market-cap. In February 2012, **RM Research** believed that **HAS** was flying below the radar of most investors following the REE sector and that the stock was undervalued. Now however, the **HAS** story is better understood and given the Hastings Project is an advanced HREE resource, we expect the Company to receive approaches from potential end-users and strategic partners which in turn will lead to increased investor interest in the company.

Exploration and investment in the REE sector is considered high risk given the effects of massive fluctuations in REO prices we have seen in the last two years, current and future supply and demand equations and Chinese REE policy to say the least. At least one Australian REE explorer recently on completing a strategic review has decided to suspend exploration on its Australian REE project citing "diminished prospectivity of the LREE sector".

As can be seen in Table 7 below, with the exception of **Lynas Corporation**, most Australian REE projects are between two and five years away from production. A lot can happen in that time frame and aside from the costs associated with advancing a project to the production stage, REO prices and the supply and demand equations for each and every REO will determine whether a company's particular mineralogical composition will ultimately produce REOs which can be economically extracted.

ASX Code	JORC Resource Statement	Metallurgical & Process Testing	Scoping Study	Feasibility Study	Pilot Plant	EIS Approval	Marketing/ Offtake/LOI	DFS & Funding	Construction	Production
LYC										
ALK						2012	2012	2012	2013-2014	late 2014?
ARU				2012?	2012	2013	2012-2013	2013	2013-2014	2015?
GGG					2013	2012	2012-2013	2014-2015	2014-2016	2016?
NTU	2013	2013	2012	2013	2013	2013	2012-2013	2013	2013-2014	2015?
HAS				2012-2013	2013	2012-2013	2012-2013	2013-2014	2014	2016?
TUC	2013	2013-2015	2013	2014	2014-2015	2013-2015	2013-2014	2015-2016	2016-2017	2017?

LYC: Lynas Corporation; ALK: Alkane Resources Ltd; ARU: Arafura Resources Ltd; GGG: Greenland Minerals & Energy Ltd; NTU: Northern Minerals Ltd; HAS: Hastings Rare Metals Ltd; TUC: TUC Resources Ltd

TABLE 7: Steps to Production of Advanced Australian REE Companies (*source*: **RM Research**).

The right mix for a REE resource is one high in HREEs.

Valuation of 22c.

The majority of REE deposits currently under exploration may never reach the commercialisation stage depending on a huge range of factors including the mix of REEs. This is why **RM Research** believes that to invest in the REE sector either as an explorer or investor, the right mix of REEs is a resource with a high proportion of HREEs.

VALUATION

RM Research believe **HAS** is an advanced HREO project and stands out among its peers due to its relatively high HREO/TREO content of around 86%. However, the Hastings Project is currently a relatively small resource at just 36.2 million tonnes containing only 76,020 tonnes of TREOs (Figure 8). Since the HREO content is much higher than some of its peers, this is where the inherent value lies assuming that the pricing of HREOs remains elevated.

Given its current market cap (diluted) of just A$33.5M it is conceivable that to be in-line with its peers at a similar status of project development, **HAS** will attain a market cap of at least A$65M over the next 12 months which would equate to a share price of around 22 cents. On an enterprise valuation (EV) basis though a suitable share price target would be at least 18 cents. Share price drivers will be when future milestones are achieved such as the successful trialing of the pilot plant, off-take agreements announced and project funding secured. To crack the A$200 million market cap, **RM Research** considers that **HAS** will have lodged a definitive feasibility study and be in the construction stage.

Looking at the EV as a ratio to the TREO tonnage (Table 8), **HAS** (with an EV/TREO value of A$359/t) does not look that cheap when compared to its peers with larger resources. Given the current JORC compliant resource is relatively modest compared to some of **HAS**' peers, ideally the Company should look to drill out the resource further such that the TREO tonnage and correspondingly, the HREO tonnage increases. A more robust resource in terms of grade and tonnage will ameliorate any concerns about project viability particularly in light of the roller-coaster fluctuations REO prices have taken over the last few years.

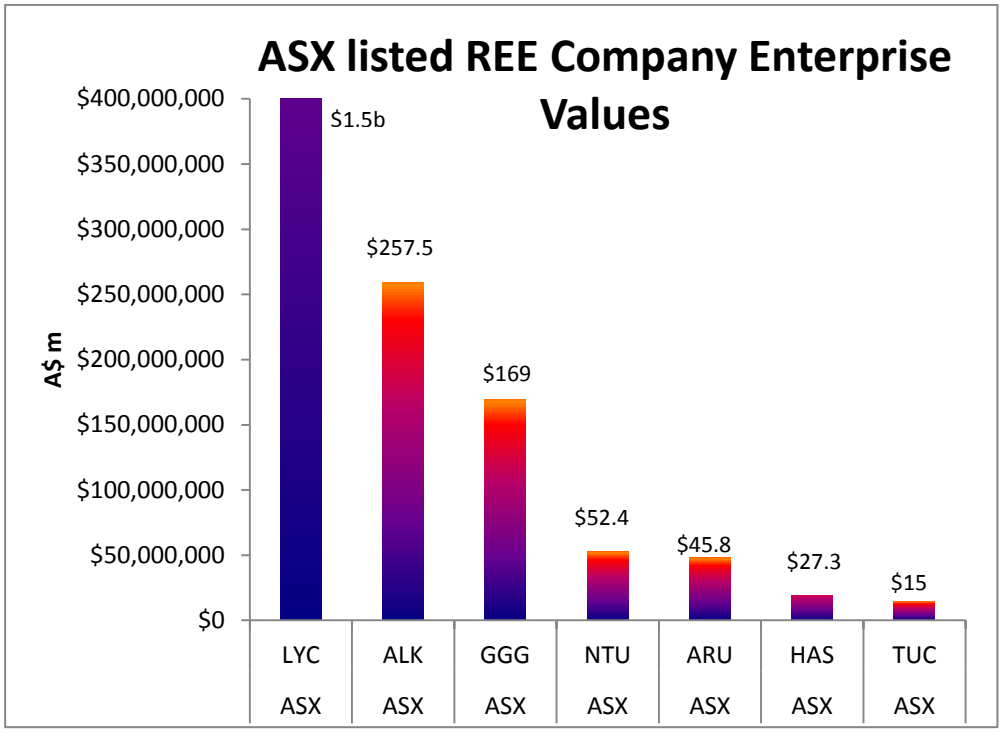


FIGURE 10: ASX-listed REE company's Enterprise Values. (*source*: **RM Research**).

Company	Market Cap A$*	Resource Tonnes (M)	TREO tonnes	HREO tonnes	HREO/TREO %	EV/TREO A$/t
Lynas Corp Mt Weld	$1.29B	23.9	1,928,730	100,380	5	$772
Alkane Resources Dubbo	$358M	73.2	658,800	183,000	28	$394
Greenland Minerals Kvanefjeld	$174M	956	10,330,000	1,210,000	4	$16
Northern Minerals Brown's Range	$61.6M	NP				
Arafura Resources Nolans Bore	$65.3M	47	1,217,000	42,300	4	$38
Hastings Rare Metals Hastings	$33.5M	36.2	76,020	65,160	86	$359
TUC Resources Stromberg	$17.5M	NP				

NP: Not published *diluted market-cap

TABLE 8: Comparison of JORC resources and EV/TREO for selected ASX-listed REE companies. (*source*: **RM Research** and company reports).

HAS will require further capital injections to progress the Hastings Project which will inevitably dilute existing shareholder's equity. The Company's EV will naturally increase as a result but unless the TREO tonnage increases, the project will look expensive compared to some of its peers.

There is no denying that **HAS** still has a long way to go in developing the Hastings Project into a successful production scenario but investors should take to heart that the company's board is successfully steering the company through a complex range of potential hurdles of technical and commercial challenges.

CORPORATE

On 8th February 2012, the Company announced a capital raising that ultimately resulted in the issuance of 53,800,000 new shares at an issue price of 10 cents to raise A$5.38 million. Additionally, the shares were issued with a free attaching option with an exercise price of 15 cents convertable by 31st March 2014 which if exercised, will top up the Company's coffers with addition funds of A$8.07 million.

The Company has since raised A$3 million (15th October 2012) with the new shares issued at 11 cents with a free attaching option for every two new shares with an exercise price of 15 cents convertable by 31st March 2014. The Company will require further funding of up to A$41 million by 2014 to lodge a successful DFS. We expect further capital of between A$5-A$10 million will be raised within the next 12 months.

RISK ANALYSIS

- **Exploration Risk:** Further resource drilling (infill, depth and along strike) and conversion of the current resource to a JORC reserve may not delineate a significant increase in the total resource to ensure a more robust project. The planned drilling of the Southern Extension may not increase the total resource as significantly as currently thought.
- **Project Partner Risk:** The Company is in a position to advance negotiations to secure a strategic project partner to fund the next major stages of development and success has yet to be confirmed. There is failure risk associated with engaging contractor's services for the pilot plant, mining and plant construction.
- **Project Costs:** Containing capital expenditure costs which will increase exponentially as the project progresses to the bankable feasibility stage and beyond will require judicious decisions to control. Additional costs of labor, infrastructure, fuel, transport, consumables etc given the remote location of the project.
- **Metallurgical and Processing risks:** Pilot plant studies and test work to extract and refine an optimal product suite is ongoing and may not improve the project's economics.
- **Project Funding:** Further funding which will be required in the future to assist in progressing the Company's projects, including, but not limited to, further exploration, the construction of a pilot plant and completion of the bankable feasibility study, will lead to the dilution of existing shareholder equity.
- **Commodity Risks:** Prices for REOs can be volatile and affected by a range of factors beyond the control of **HAS** as future pricing and demand for individual REOs is subject to market forces. REO prices may fall over the life of the project due to increased supply, less demand, alternative technologies developed and weak global economic growth especially in China.
- **Currency risks:** Continued strength of the A$ will diminish REO product sale returns (in US$) to some degree.
- **Technology Risks:** REE substitution to alleviate supply and cost issues may occur in the interim period prior to production.
- **The Yangibana Project:** The project is at an early stage of resource drilling and any commercial value has yet to be determined.

DIRECTORS AND MANAGEMENT

David Nolan — Non-Executive Chairman

Mr Nolan is a corporate lawyer with over 13 years experience advising on corporate acquisitions, capital raisings and financing for mining companies. Mr Nolan is a partner in the Sydney corporate advisory practice of Mills Oakley Lawyers and was previously a senior adviser at the London Stock Exchange.

Alastair Metcalf — CEO

Mr Metcalf has law and finance qualifications with over 26 years experience in resource sector financing, M&A, and business development. He has held positions with Rothschild Australia, Bankers Trust, GE Commercial Finance and GE Capital.

Steve Mackowski — Technical Director

Mr Mackowski, a qualified engineer in mineral processing, has over 30 years technical and operational experience in rare earths, uranium, industrial minerals, nickel, kaolin and iron ore. He brings expertise in rare earths processing having previously served as General Manager Project Development & Technology at rare earths company **Arafura Resources Ltd** (ASX: **ARU**). Additionally, he served at a number of major Australian mining companies including, **Iluka**, **TiWest**, **WMC**, **Comalco**, **Hamersley Iron** and **Mary Kathleen Uranium Ltd**.

Tony Ho — Non-Executive Director

Mr Ho has held executive directorships and chief financial officer roles with a number of publicly listed companies. He is a member of the Institute of Chartered Accountants and a fellow of both the Chartered Institute of Company Secretaries and the Institute of Company Directors. Mr Ho is currently a Non-Executive Director of **Dolomatrix International Limited** (ASX: **DMX**) and Non-Executive Director of **Greenland Minerals and Energy Limited** (ASX: **GGG**). He is also the Non-Executive Chairman of **Apollo Minerals Limited** (ASX: **AON**).

Guy Robertson — Company Secretary

Mr Robertson has extensive experience in finance as a Director and CFO to a number of companies while at the Jardine Group of companies and General Manager Finance for Franklins Limited in Australia. He is also the Principal of Integrated CFO Solutions which provides CFO and company secretarial services to companies such as **HAS**.

Tony Grey — Strategic Advisor

Mr Grey is a corporate advisor and professional company director specialising in the provision of strategic advice to the rare metal and rare earth mineral industry. His corporate career spans over 40 years with numerous appointments from a diverse range of highly successful rare metal companies. He is the former Chairman of **Kingsgate Consolidated Limited**, founder and former Chairman and Managing Director of **Pancontinental Mining Limited** and current Chairman of **International Ferro Metals Limited** and **IC Potash Corporation**. He was also the former Chairman of the Uranium Institute. He authored “Jabiluka: the battle to mine Australia’s uranium”.

Dr Tony Mariano — Strategic Advisor

Dr Mariano is a geological consultant to the rare metal and rare earth mineral industry with over 40 years experience within the industry. He is widely considered the preeminent authority on the geology and mineralogy of rare earths, niobium, tantalum, and other rare metals. Dr Mariano has a PhD in geology from Boston University, has consulted to the United Nations, the United States Government, many of the world’s rare metal and rare earth explorers and developers including **Union Carbide Corporation** and **Molycorp Inc**., and has authored and co-authored many technical publications on rare earths.

SUMMARY

The REE sector is inherently difficult to quantify and make meaningful comparable analytical commentary given the array of variables between the composition of a particular project's mineralisation and the long and costly path from discovery to production.

The future pricing of REOs is one of the greatest unknowns as is the market supply and demand equation. Arguably there is a list of CREOs (predominately dysprosium, yttrium and neodymium) that are thought to be the REOs of greatest value into the future on perceived supply shortages. China will continue to be a driver of the REE sector's headlines and pricing given its shadowy global supply and demand domination. More clarity on the pricing mechanism will become evident the sooner alternative ROW suppliers are able to deliver new supply into the global marketplace along with new refiners.

The Hastings Project contains a significantly higher ratio of HREOs and CREOs to TREOs than many of its global peers

The Hastings Project resource fortunately contains a significantly higher ratio of HREOs and CREOs to TREOs than many of its global peers and is steadily progressing along the path to likely commercial success at this point in time.

Given the long (up to 8 years) and costly lead time to reach the production stage there is no guarantee that prices for the REEs contained in a particular resource will render the project as economic in the future. The future demand for clean energy technologies as witnessed by the proliferation of wind farms and other defence related applications can be modelled, but in reality are difficult to quantify. The proliferation and uptake of consumer goods such as flat screen televisions (TVs), computing devices and mobile phones let alone fuel efficient cars increases with each generation and the industrialisation of economies. Incandescent lighting is gradually being phased out with a switch to the more energy efficient compact fluorescent lighting (CFL) that use phosphors of terbium, europium and yttrium. However, LED lighting use little or no REEs and **RM Research** wholly recommend their uptake over the use of CFLs.

***HAS** should produce a suite of high purity (99%) REOs.*

As defined in the scoping study, **RM Research** considers that it would be most beneficial for **HAS** to process and refine the defined resource on-site in order to produce a suite of high purity (99%) REOs (including the much higher value HREOs) and rare metal oxides. If on-site processing only produced a suite of carbonate products that then required further refining by the purchaser, **HAS** would in effect be giving away the upside value add. **HAS** may therefore be able to perhaps control the sales process to some degree and take advantage of beneficial pricing and supply scenarios.

CONCLUSION

It is well documented in the REE sector that greater than 95% of global supply is controlled by China and hence the rest of the world is beholden to the vagaries of Chinese export quotas, supply and demand uncertainty and resulting price volatility. Pending new production by Australia's **Lynas Corporation** and US based **Molycorp** will go a long way in addressing the supply constraints of LREOs but there is little forthcoming new supply of predominately HREO resources to fill the supply vacuum. **HAS** is well on its way to addressing this issue and is currently viewed as the 4th largest HREO project globall**y** with a significantly high HREO to TREO ratio and more importantly, higher ratio of the CREOs by volume and value. The rare metal content of niobium, hafnium, zirconium etc is often overlooked and should also be taken into account in evaluating the potential economics of the resource.

Don't forget the niobium and hafnium content.

RM Research currently has no doubt that **HAS** will have the potential to become a new supplier of HREOs and CREOs to the global marketplace. During 2013, there will be a raft of developments that will drive the share price with the focus on progressing the project into production. The preparatory work required for the DFS now underway in earnest. By the staging of the next Olympics in 2016 **HAS** will hopefully be in production**.**

Production target: 2016.

RM Research rates the Company as a **Speculative Buy** at current prices with potential upside to 22 cents over the next 12 months.

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Care has been taken to define the level of risk to return associated with a particular company.
Our recommendation ranking system is as follows:

Buy	Companies with 'Buy' recommendations have been cash flow positive for some time and have a moderate to low risk profile. We expect these to outperform the broader market.
Speculative Buy	We forecast strong earnings growth or value creation that may achieve a return well above that of the broader market. These companies also carry a higher than normal level of risk.
Hold	A sound well managed company that may achieve market performance or less, perhaps due to an overvalued share price, broader sector issues, or internal challenges.
Sell	Risk is high and upside low or very difficult to determine. We expect a strong underperformance relative to the market and see better opportunities elsewhere.

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