



## Ema Scoping Study

26 February 2025

# In-situ recovery Rare Earths

*Ultra Low Capex*

*Ultra Low Opex Production*

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## **Competent person statement**

The information in this announcement that relates to the Ema Mineral Resource is based on and fairly represents information compiled by Mr. Antonio de Castro (acts as BCM's Senior Consulting Geologist through the consultancy firm, ADC Geologia Ltda) and Mr. Leonardo Rocha (associate of GE21 Consultoria Mineral Ltda). Mr. de Castro is a member of the Australasian Institute of Mining and Metallurgy, and Mr. Rocha is a member of Australasian Institute of Geoscientists. Both have sufficient experience of relevance to the styles of mineralisation and types of deposits under consideration, and to activities undertaken to qualify as Competent Persons as defined in the 2012 Edition of the Joint Ore Reserve Committee (JORC) Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr. de Castro is the Competent Person for the geological and mineralization model database (including all drilling information). Mr. Rocha is the Competent Person for the construction of the 3D geology/mineralisation model plus the mineral resource estimation. Mr. Leonardo Rocha undertook a site visit to the Ema Project between July 11 and 15, 2024. Mr de Castro has planned, managed and/or conducted work programmes for the Ema/Ema East Project, including drilling. He has visited the site on numerous occasions. Mr. de Castro and Mr. Rocha consent to the inclusion in this report of the matters on their information in the form and context in which they appear.

The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and, in the case of Mineral Resources, that all material assumptions and technical parameters underpinning the estimates in the original release continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the relevant original market announcements. Refer to the attached Appendices for further information on the Mineral Resource Estimate and metal equivalents. "Ema Rare Earth Project Scoping Study", dated 26 February 2025.

All material assumptions underpinning the production targets and forecast financial information derived from the production targets in the previous announcement continue to apply and have not materially changed and are considered preliminary in nature.

## **Exploration results and mineral resources**

The information in this Presentation that relates to Exploration Results and Mineral Resources is based upon and fairly represents information previously released to the ASX on 22 May 2023, 6 June 2023, 17 July 2023, 31 July 2023, 13 September 2023, 3 October 2023, 19 October 2023, 7 December 2023, 29 January 2024, 6 February 2024, 22 February 2024, 13 March 2024, 3 April 2024, 22 April 2024, 3 May 2024, 20 May 2024, 8 July 2024, 2 August 2024, 6 August 2024, 19 August 2024, 8 October, 11 November, 19 November, 14 January, 21 January, 17 February and 21 February.

This presentation has been approved for release by the Board of Directors.

# Brazilian REE Landscape

## EMA Rare Earths Project

30 km south from Apuí



# In-situ recovery mining

## The most cost effective, environmentally friendly method of mining



### **RIGHT** Geology

Weathering less  
than 20m deep



### **RIGHT** Style of Mineralisation

Ore grades directly  
above bedrock



### **RIGHT** Hydrogeology

Permeable orebody  
Non-fractured bedrock



### **RIGHT** Chemistry

High recoveries and  
Ionic leaching



### **RIGHT** Reagents

MgSO<sub>4</sub>  
Non-aggressive fluids  
ESG compliant



### **RIGHT** Product

MREC with 98% purity



**Brazilian**  
Critical Minerals

**In-situ recovery is a well understood rare  
earth mining method**

**Significant contributor to current world  
production output**



**NO**  
Land Clearing



**NO**  
Open Pit Mining



**NO**  
Dirty Mining  
Equipment



**NO**  
Noisy Dusty Truck  
Haulage



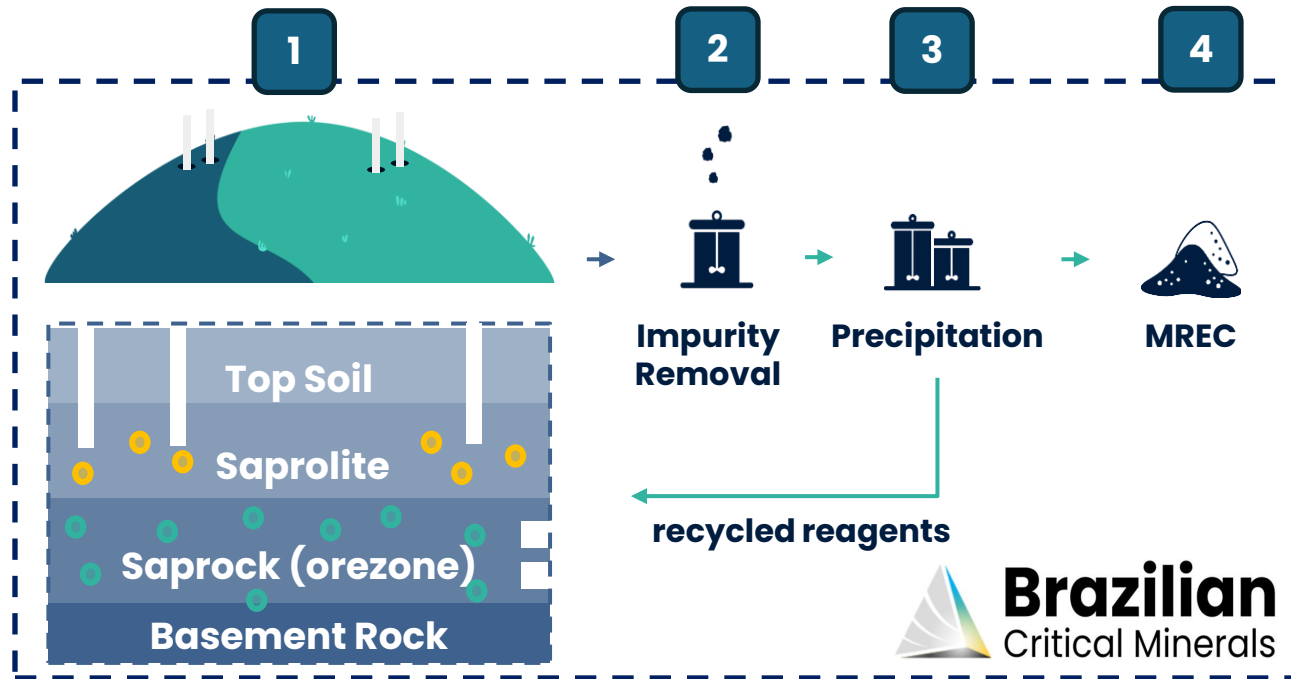
**NO**  
Large Processing  
Facility



**NO**  
Need for  
Reclamation



# 4-step flow sheet enables very low Capex – US\$55M



**Insitu leach – low CAPEX – low OPEX**

**Multiples lower Capex vs all other REE projects**

**Processing Plant  
Steps 2 – 3 – 4**



<https://mcreresources.com/>

# Highly Profitable at US\$60/kg NdPr (Spot Price)



**Brazilian**  
Critical Minerals

## **Annual Production (LOM avg)**

8,700t MREC

4,800t TREO

1,800t MREO

## **Pre-production Capital**

US\$55M

includes 35% contingency

## **Mine Life**

20 years – starter area  
only

## **Cash Costs**

US\$6.15/kg TREO

US\$16.95/kg NdPr

## **Free Cash Flow (post-tax LOM)**

US\$67Mpa

## **Free Cash Flow (post-tax Spot)**

US\$48Mpa

## **Total free Cash (post-tax LOM)**

US\$1.3B

## **NPV<sub>8</sub> (post-tax LOM)**

US\$498M

## **NPV<sub>8</sub> (post-tax Spot)**

US\$355M

## **IRR (LOM)**

55%

## **IRR (Spot)**

52%

## **Payback Period**

~2.4 years

# Capex and Operating Costs



Capex	Unit	Spot	LOM
Pre-production capital expenditure	US\$M	<b>55</b>	<b>55</b>
LOM sustaining capital expenditure	US\$ / year	<b>1.59</b>	<b>1.59</b>

Unit cash operating costs	Unit	Spot	LOM
Annual operating cost	US\$M	<b>29.4</b>	<b>29.4</b>
Annual operating cost	US\$/kg TREO	<b>6.15</b>	<b>6.15</b>
Annual AISC	US\$/kg TREO	<b>6.69</b>	<b>6.69</b>

**Capex of US\$55M** includes **35%** contingency

**Lowest** published **Capex** to produce high value mixed rare earth carbonate (**MREC**)

**In-situ recovery** capable of producing REO at world's **lowest** possible **cost structure and highest margins**

# Capex Cost

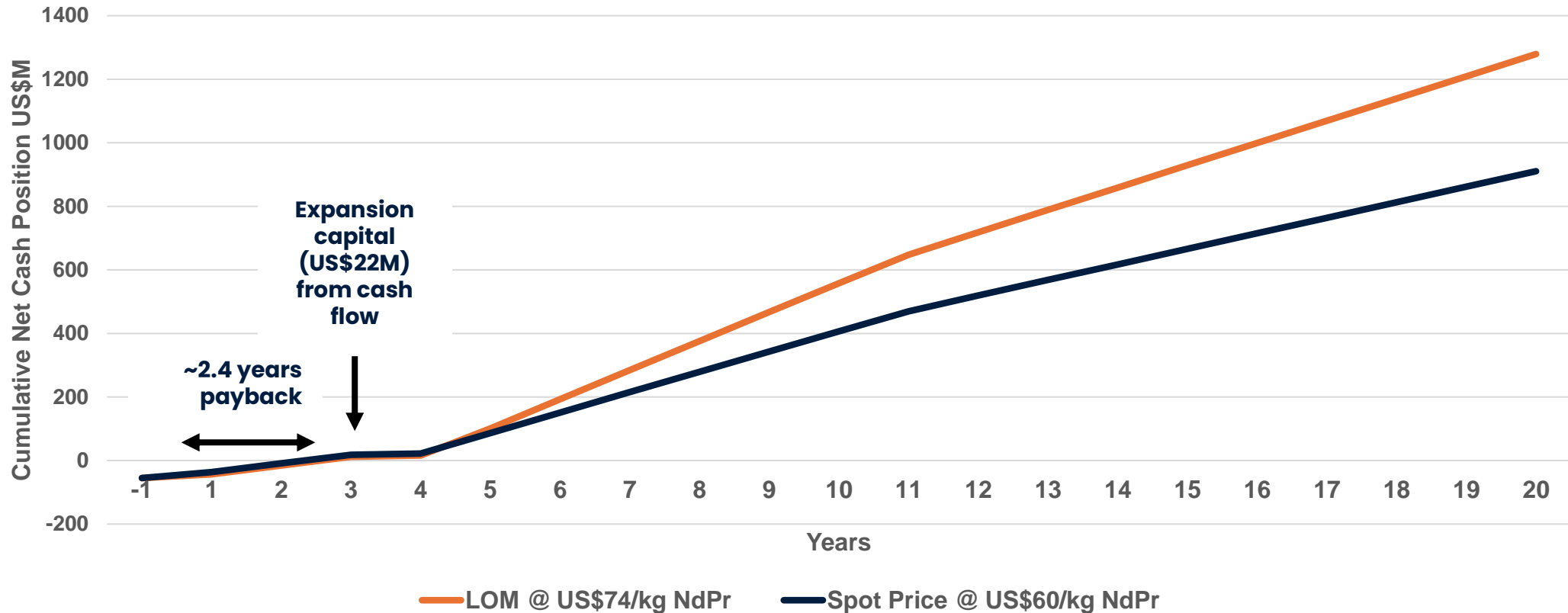


CAPEX	US\$M	% of total
<b>Direct Costs</b>		
Equipment	6.01	11.8%
Materials	1.50	2.9%
Plant Construction	17.11	33.5%
Wellfield Installation	4.62	9.1%
<b>Indirect Costs</b>		
EPCM	5.27	10.3%
Owner's Cost	1.46	2.9%
Other	1.83	3.6%
Contingency (35%)	13.23	25.9%
<b>Sub-Total</b>	<b>51.03</b>	<b>100%</b>
Pre-production drilling	4.10	
<b>Total</b>	<b>55.23</b>	

- Project is **simple, low-risk** and **quick to establish**
- **Pre-production Capex Ultra low**
- Largest cost centres are **well field setup** and **plant earthworks**
- **Ideal geology and topography** allow for **ISR** to develop **Lowest Opex and Capex** of any rare earth project in development producing an MREC



# US\$55M Capex – 2.4 year Payback



**LOM NPV – US\$498M** (post-tax)

**Spot NPV – US\$355M** (post-tax)

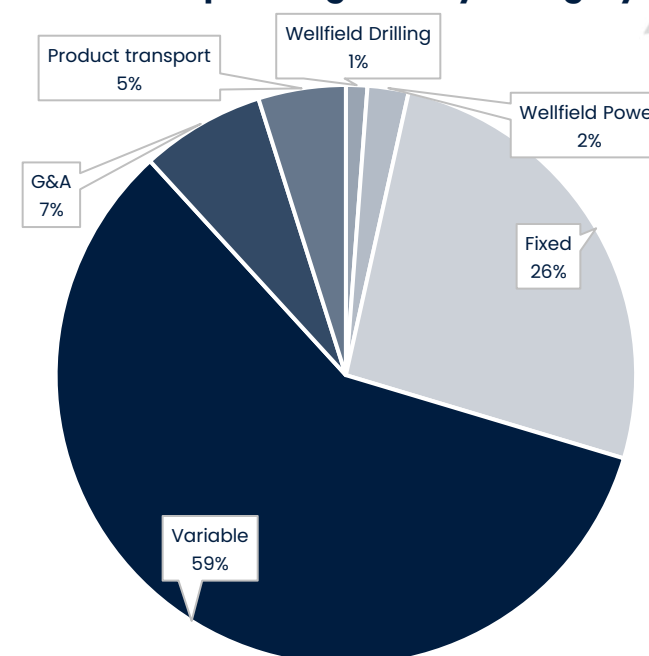
**LOM Pricing – US\$74\*/kg NdPr avg**

**Spot Pricing – US\$60\*/kg NdPr avg**

# Operating Costs

Operating Costs (Real LOM)	Average Cost Annual (US\$M)	Total Cost LOM (US\$M)
Well Field Drilling	0.34	7.1
Well Field Pumping	0.67	13.6
<b>Process Plant</b>		
Fixed – Average LOM	7.62	155
Variable – Average LOM	17.36	347
G & A – Average LOM	2.00	41
Product transport – Average LOM	1.44	29
<b>Total</b>	<b>29.43</b>	<b>593</b>
	<b>Unit</b>	<b>US\$/kg</b>
Operating Cost (LOM)	<b>US\$/kg TREO</b>	<b>6.15</b>
Operating Cost (LOM) – AISC	<b>US\$/kg TREO</b>	<b>6.69</b>
Operating Cost (LOM)	<b>US\$/kg NdPr</b>	<b>16.95</b>

Annual Operating Cost by Category



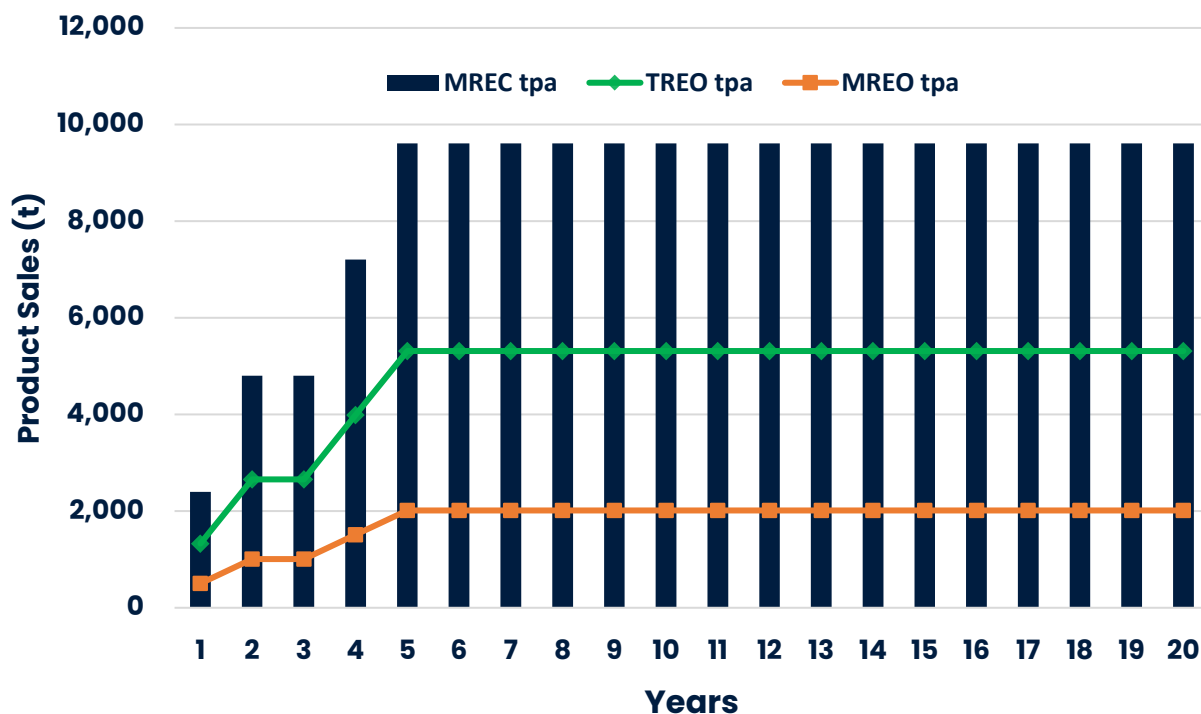
**Brazilian**  
Critical Minerals

- ISR Recovery Mining – common in REE ionic clay extraction
- Simple process flowsheet, 4 steps to final product
- High metallurgical recoveries of key REE elements
- Green, ESG complaint, magnesium sulfate reagent usage
- Owner operator power generation
- Access to local processing water
- Access to local transport infrastructure
- All transport costs are CIF Asia
- Accommodation facilities in nearby towns

# Long Life – Ultra Low Opex

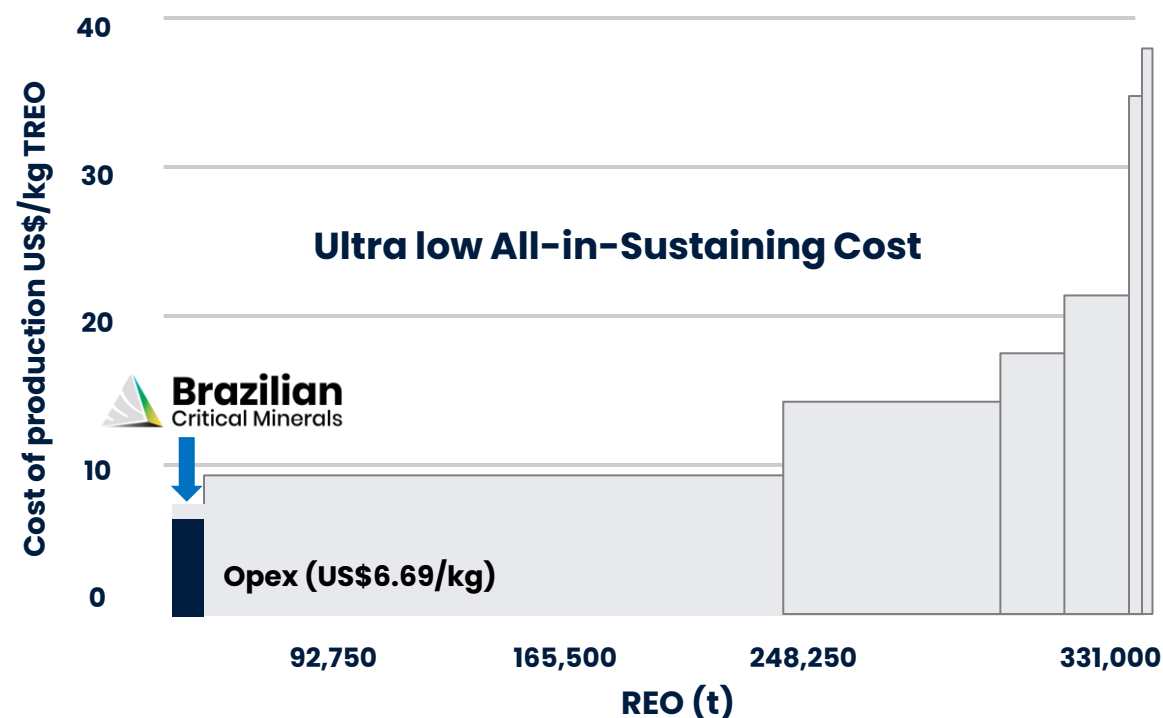


## Annual Production Profile



**MREC ~ 8,700tpa**, inclusive of  
**~ 4,800tpa TREO**, containing  
**~ 1,800tpa MREO**

## 2024 REO Cash Cost Curve



**LOM (AISC) US\$6.69/kg TREO**

# Key Financial Measures



Cashflow & Earnings Metrics	Unit	Spot	LOM
Annual Revenue	US\$M	<b>143</b>	<b>182</b>
Revenue (gross)	US\$M	<b>2,869</b>	<b>3,634</b>
Project net cashflow (post-tax)	US\$M	<b>911</b>	<b>1,279</b>

**Ema** able to generate exceptional returns post-tax at current **spot** prices

NPV, returns and key metrics	Unit	Spot	LOM
NPV <sub>8</sub> % (post-tax, ungeared)	US\$M	<b>355</b>	<b>498</b>
IRR (post-tax, nominal basis)	%	<b>52</b>	<b>55</b>
Payback period (post-tax, from first production)	Years	<b>2.4</b>	<b>2.4</b>
Capital efficiency (post-tax NPV / capex)	%	<b>449</b>	<b>601</b>

Rare Earth Pricing	Unit	Spot	LOM
R\$/US\$ (long term forecast)	USr	<b>0.174</b>	<b>0.174</b>
TREO price forecast	US\$/kg	<b>30</b>	<b>37</b>
NdPr price forecast	US\$/kg	<b>60</b>	<b>74</b>

# Passes the Stress Test



Post-tax (LOM) US\$	Base Case (NPV US\$498M, IRR 55%)				
(US\$M)	\$66/kg NdPr	\$60/kg NdPr flat	\$53/kg NdPr flat	Opex 50% higher	Plant Capex 50% higher
NPV	<b>394</b>	<b>355</b>	<b>265</b>	<b>398</b>	<b>461</b>
Discount Rate	<b>8%</b>	<b>8%</b>	<b>8%</b>	<b>8%</b>	<b>8%</b>
IRR	<b>47%</b>	<b>52%</b>	<b>40%</b>	<b>45%</b>	<b>41%</b>
CE (NPV/Capex)	<b>476%</b>	<b>428%</b>	<b>321%</b>	<b>481%</b>	<b>376%</b>

- **US\$66/kg NdPr** – 13% lower than LOM avg price (US\$74/kg), escalated in year 5
- **US\$60/kg NdPr** – 24% lower than LOM avg price (US\$74/kg) maintained flat
- **US\$53/kg NdPr** – 40% lower than LOM avg price (US\$74/kg) maintained flat
- Project **not sensitive** to Capex and Opex cost fluctuations

Under every **stressed scenario** the project is **extremely cash flow positive**

# Brazilian Ionic Clay projects



	Unit	BCM	MEI	Aclara	VMM
		Scoping	Scoping	PEA	Scoping
Date		Feb 2025	Oct 2024	Sep 2024	Feb 2025
Project		Ema	Caldeira	Carina	Colossus
Mine Life	years	20	20	22	20
Price Forecast - LOM	US\$/kg (NdPr)	74	111	197	90
NPV (pre-tax)	US\$M	668	1,403	2,337	1,433
IRR (pre-tax)	%	63	40	32	43
Price Forecast - Spot	US\$/kg (NdPr)	60	60	n/a	60
NPV (post-tax)	US\$M	355	174	n/a	388
IRR (post-tax)	%	52	15	n/a	20
Capex	US\$M	55	403	593	373
Inclusive Capex Contingency	%	35	35	30	30
Operating Cost (LOM)	US\$/kg TREO	6.15	6.74	27.60	6.00
Operating Cost (LOM)	US\$/kg NdPr	16.95	20.41	96.69	16.86
Payability	%	70	70	87	70

## Capex - US\$55M

- 7 x smaller than MEI
- 7 x smaller than VMM
- 11 x smaller than Aclara

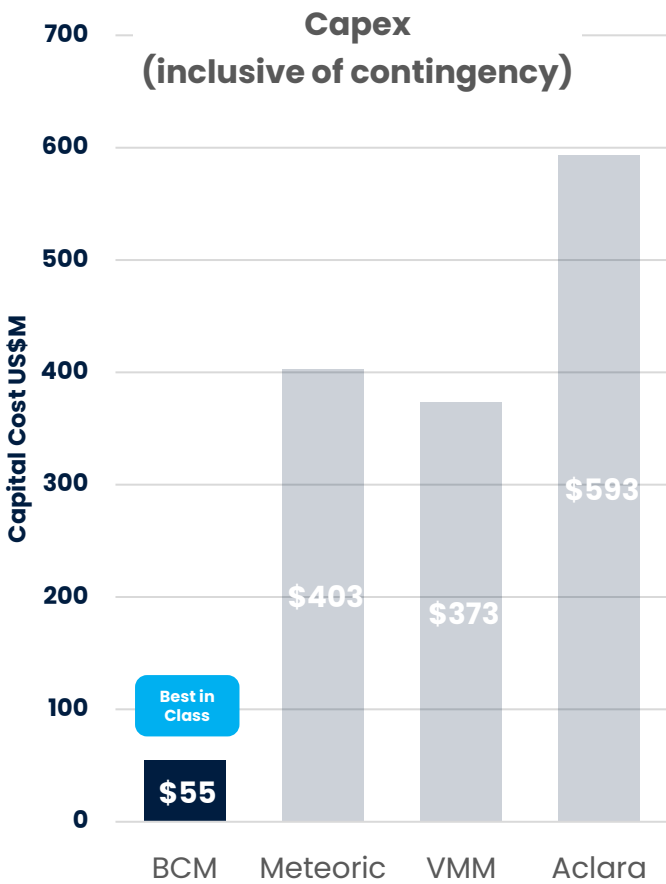
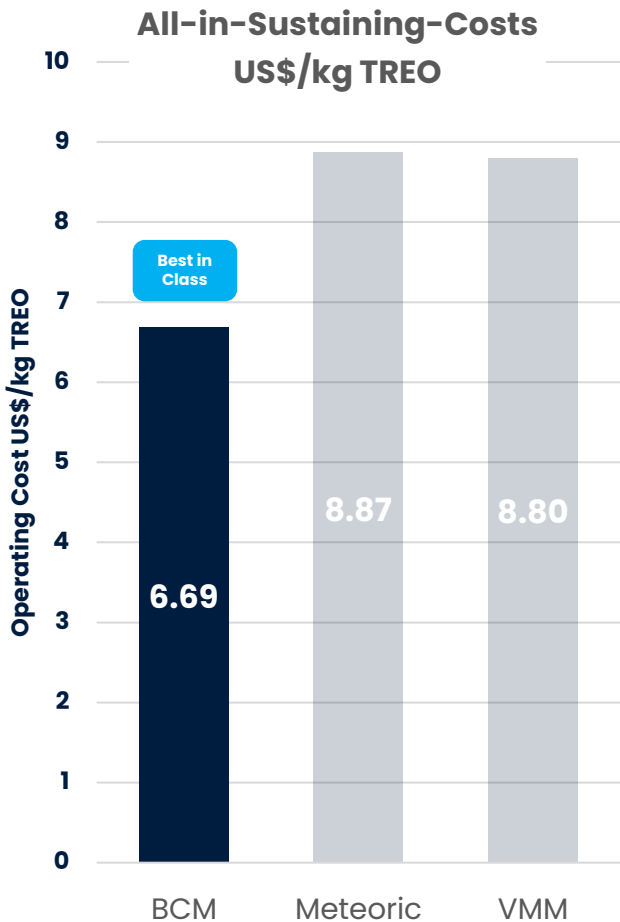
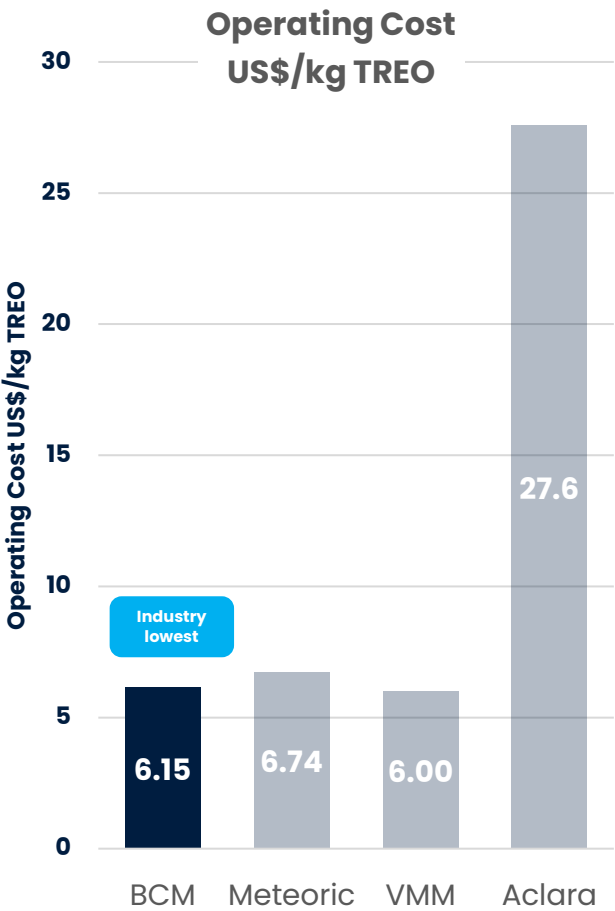
Industry **low Opex** and **Capex**

Industry **high NPV** and **IRR**



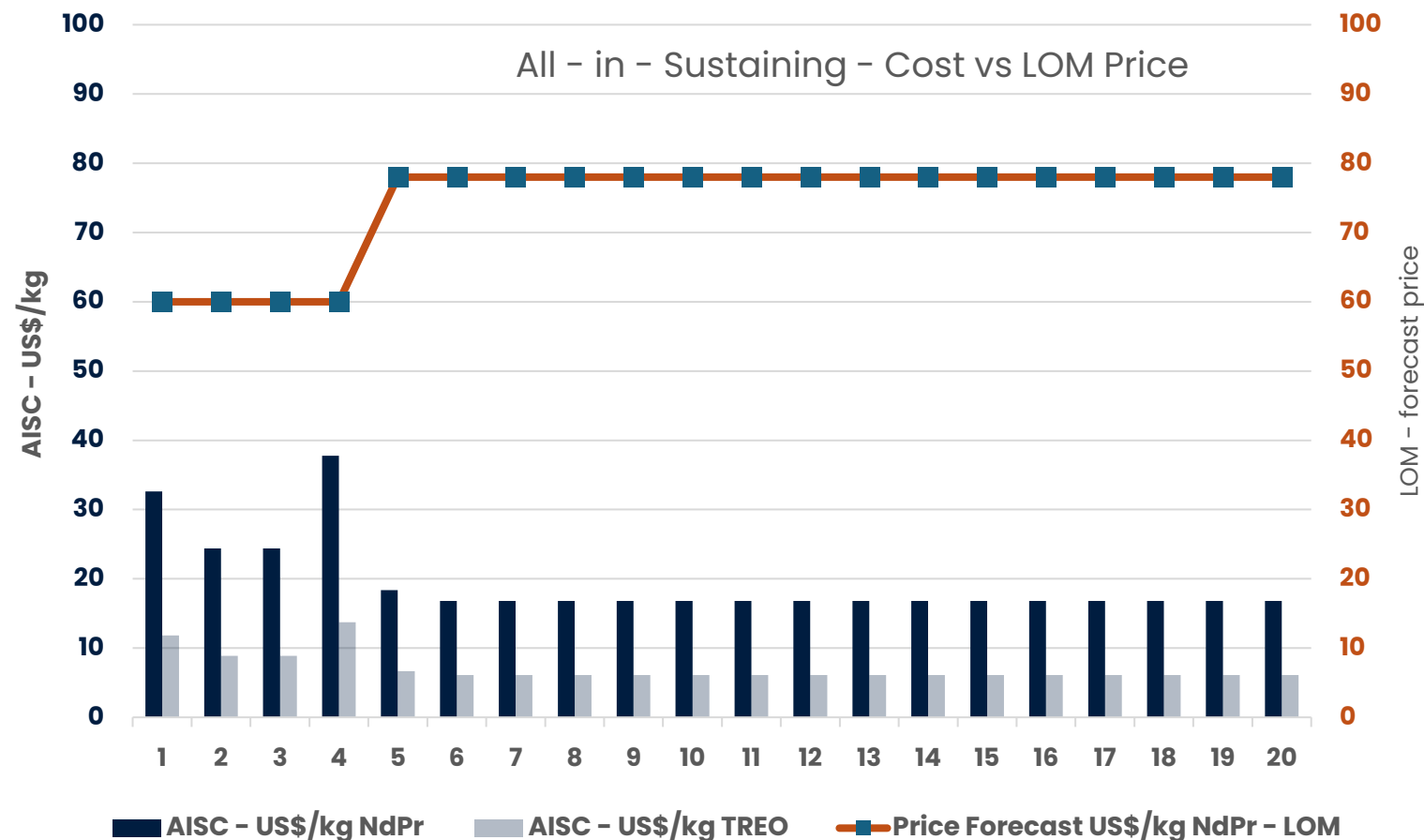
# Brazilian Ionic Clay projects

ISR: Simple extraction & flow sheet drives ultra-low capex and opex



Industry leading Capex and Opex of any rare earth project

# Brazilian Ionic Clay – AISC



Lowest LOM Price –  
**US\$74/kg**

Low All in Sustaining Cost –  
**US\$6.69/kg TREO**

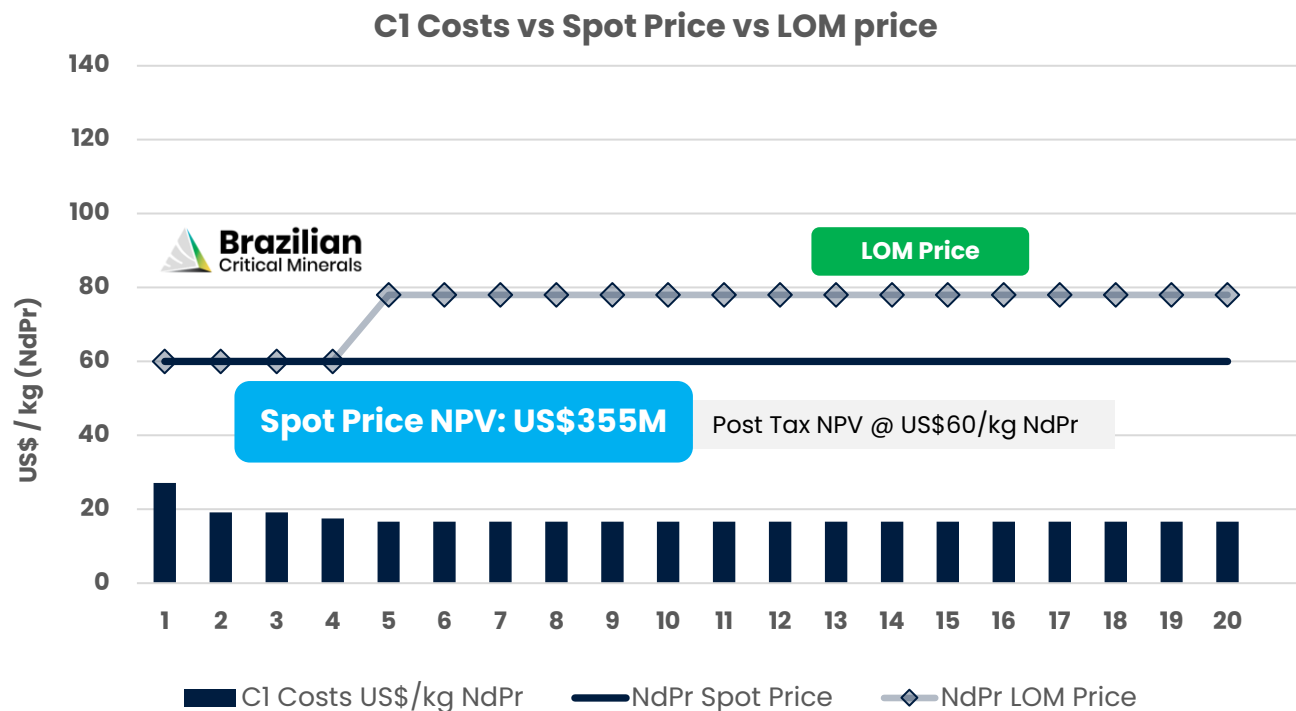
(Lowest for any REE project  
generating an MREC)

**High Margins and  
Profitability**

**High NPV post tax**

**15% corporate tax rate used for first 10 years**

# Brazilian Ionic Clay – REE Prices



**LOM Price US\$74/kg –  
NPV US\$498M**

Lowest avg price used for any  
REE project

**Spot Price US\$60/kg –  
NPV US\$355M**

Superior returns at different  
price points

**Project does not** require elevated REE prices to generate strong returns

# Large Resource Base



## Central Starter Area Mineral Resource Estimate – February 2025

73% of Central Starter Area classified as Indicated Resource

**746 341<sub>M</sub>**

TREO ppm

Tonnes Mt

**25% 190**

MREO:TREO

NdPr + DyTb ppm

### Ema REE Project 2025 Mineral Resource Estimate – Central Starter Zone

JORC Category	cut-off ppm TREO	Tonnes Mt	TREO ppm	NdPr ppm	DyTb ppm	MREO ppm	MREO:TREO %
Indicated	500	248	759	176	16	192	25
Inferred	500	93	712	168	16	185	26
<b>*Total</b>	<b>500</b>	<b>341</b>	<b>746</b>	<b>174</b>	<b>16</b>	<b>190</b>	<b>25</b>

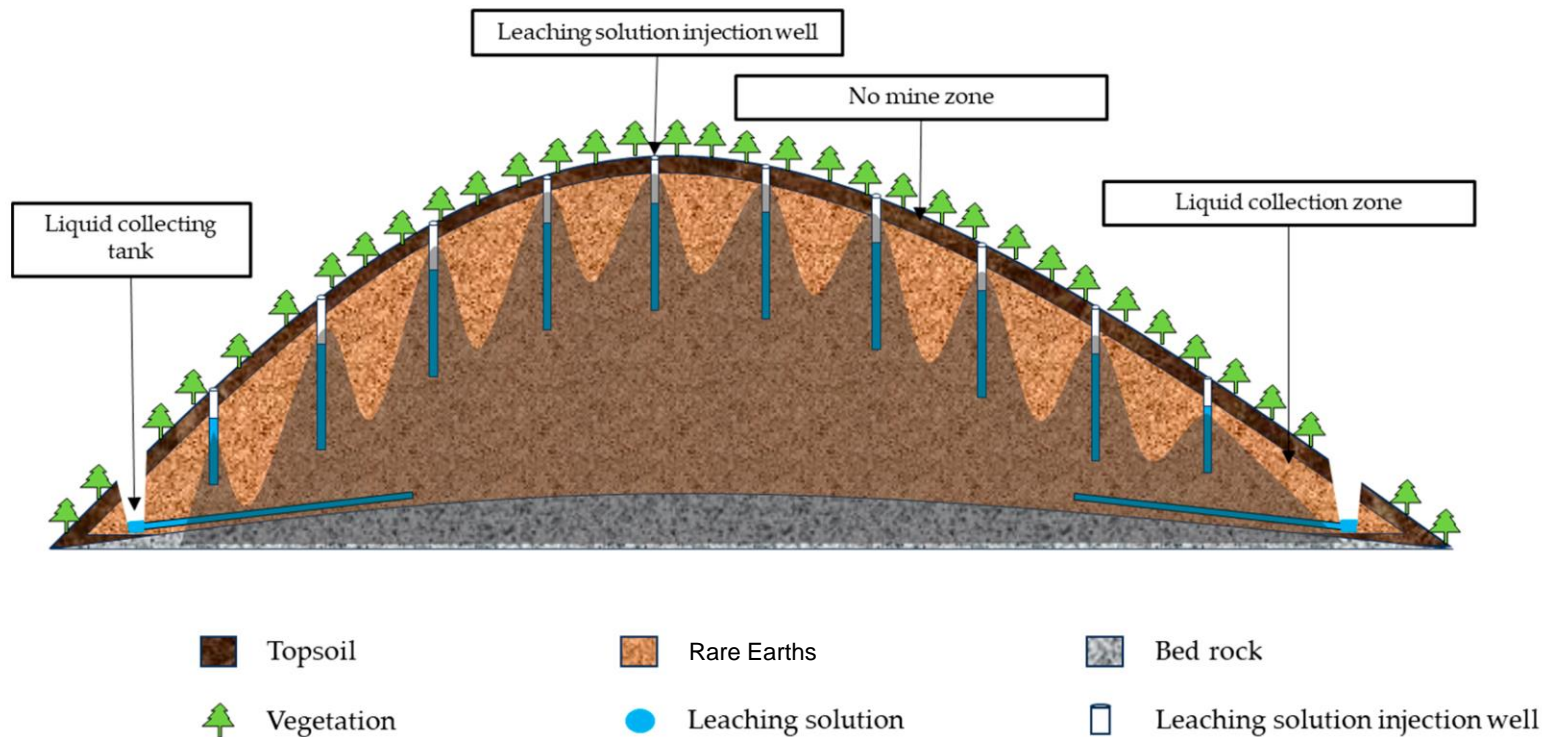
### Ema REE Project 2025 Mineral Resource Estimate – Global MRE

<b>Ind + Inf</b>	<b>500</b>	<b>943</b>	<b>716</b>	<b>168</b>	<b>16</b>	<b>184</b>	<b>26</b>
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Global MRE 943Mt is inclusive of Central Starter Zone total of 341Mt

# In-Situ REE Mining

## “highest margin REE operations World wide”



- **Readily leachable clays laden with rare earths**

- Suitable topography
- Impermeable bedrock
- High proportion of silica ~50% in clay allows solution flow
- Lower proportion of clay materials prevents solution blocking
- Volumes of pores (air spaces) in the clay allows solution flow

- **Proven decades old technology**

- **Only green reagents utilised**

- **Using gravity as our natural pumping system**

- **ISR accelerates natural processes in the ground**

# Superior Basket Price



SPOT MREC BASKET			BCM			VMM			MEI		
Head Grade (ppm)			965			4,472			4,439		
Reagent			Magnesium Sulfate			Ammonium Sulfate			Ammonium Sulfate		
Time			30 Minutes			30 Minutes			30 Minutes		
pH			4.5			4.5			4.5		
Product			MREC			MREC			MREC		
Oxide	Price (12.02.25) USD/kg		%	Basket \$		%	Basket \$		%	Basket \$	
La2O3	\$	0.53	34.7	\$	0.18	44.5	\$	0.24	57.6	\$	0.30
CeO2	\$	1.14	8.9	\$	0.10	2.4	\$	0.03	1.4	\$	0.02
Pr6O11	\$	62.47	7.1	\$	4.45	8.3	\$	5.20	8.6	\$	5.34
Nd2O3	\$	61.36	29.1	\$	17.88	29.2	\$	17.89	22.0	\$	13.50
Sm2O3	\$	2.09	4.6	\$	0.10	3.2	\$	0.07	2.4	\$	0.05
Eu2O3	\$	27.19	0.5	\$	0.15	0.8	\$	0.23	0.6	\$	0.16
Gd2O3	\$	23.15	2.9	\$	0.67	2.1	\$	0.49	1.5	\$	0.35
Tb4O7	\$	859.02	0.3	\$	2.33	0.3	\$	2.23	0.2	\$	1.72
Dy2O3	\$	242.64	1.4	\$	3.33	1.2	\$	2.86	0.8	\$	1.94
Ho2O3	\$	66.24	0.2	\$	0.16	0.2	\$	0.14	0.1	\$	0.07
Er2O3	\$	41.14	0.7	\$	0.29	0.5	\$	0.19	0.3	\$	0.12
Tm2O3	\$	112.40	0.1	\$	0.11	0.1	\$	0.06	0.0	\$	0.01
Yb2O3	\$	14.08	0.6	\$	0.08	0.3	\$	0.04	0.1	\$	0.01
Lu2O3	\$	718.17	0.1	\$	0.60	0.0	\$	0.29	0.0	\$	0.07
Y2O3	\$	5.72	8.7	\$	0.50	6.9	\$	0.40	4.5	\$	0.26
Basket Price US\$/kg (TREO)			\$	30.93		\$	30.34		\$	23.92	
Basket Price US\$/kg (NdPrDyTb)			\$	27.99		\$	28.19		\$	22.50	
MREO %			37.9			38.9			31.6		
TREO %			100.0			100.0			100.0		

**90%** Highly comparable

**Magnet value in Basket**

**38%** Highly comparable

**MREO:TREO – leading composition for Ionic Clay**

**\$30.93** Best in Class

**Value of Basket – highest for Ionic clay**

<sup>1</sup> Viridis Mining and Minerals (ASX:VMM) ASX Announcement "Colossus Maiden Mixed Rare Earth Carbonate (MREC) Product 24.09.24  
Prices [www.giti.sg/markets](http://www.giti.sg/markets)



# Ema – delivering exceptional results



## Resource

**Large Mineral  
Resource 943Mt**

**Starter Area 20  
year mine life**

**38% MREO  
inside TREO**

## Geology

**Unique attributes  
similar to  
Chinese projects  
allow low-cost  
ISR mining**

## Supply

**Ultra Low-cost  
NdPr production**

**Highly Profitable  
at current spot  
price**

## Capex & Opex

**Ultra Low Capex  
US\$55M**

**Factor of 5-30  
times lower  
Capex than  
other REE  
projects**

**Opex US\$6.15/kg  
TREO**

## Investment

- **NPV US\$498M**
- **IRR 55%**
- **2.4 year  
payback**

# Scoping Study – Key Contributors



Responsibility	Company
Environmental Baseline Studies	 <b>CERN</b> Consultoria e Empreendimentos de Recursos Naturais
Mineral Resource Estimation, pit shell optimisation and drilling field supervision	 <b>GE21</b> Consultoria Mineral
Geochemical Assay	 <b>SGS</b>
Metallurgical testwork	 Australian Government   <b>ANSTO</b>
Hydrology and Well Field Design	 <b>WSP</b>
Process design, concept plant layout and project cost estimate development	 <b>Ausenco</b>



Enquiries

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# QUESTIONS