

**PENSANA** Plc

# Building an Independent and Sustainable Magnet Metal Supply Chain

AGM Presentation  
December 2022

**LSE: PRE**



# Introduction

Pensana is establishing in the UK a world-class, independent, and sustainable supply chain for rare earth magnet metals vital for the electric vehicle and wind turbine industries.

## Corporate Profile

LSE standard listing (LSE: PRE)

248 million shares on issue

Market cap ~£150 million

## Major Shareholders

Angolan Sovereign Wealth Fund (24%)

Pershing Securities (8%)

M&G Investments (5%)

Jarvis Investment Mgt (5%)

Selection capital (4%)

HSBC International Trustee (3%)

Hargreaves Lansdown Asset Mgt (3%)

Pensana Plc Directors and Related Parties (3%)

### Pensana Plc's historical share price (GBp)



# The electrification of motive power is forecast to become the biggest energy transition in history

Two of its biggest components are the phasing out of internal combustion engines in favour of Electric Vehicles and the rapid growth of Offshore Wind... both of which are heavily dependent on powerful rare earth permanent magnets.

China currently supplies circa 90% of the world's rare earth permanent magnets

*“China has no obligation to be the rare earth supplier to the world.”* Lin Boqiang, Director of the China Center for Energy Economics

Source: <https://chinabigidea.substack.com/p/gep-innovation-in-china-2025-carbon>





# Broken ground on the world's first Rare Earth processing hub

**Secretary of State for Business, Energy and Industrial Strategy Rt Hon Kwasi Kwarteng MP launched the UK's Critical Minerals Strategy at the ceremony and commented:**

*"It is a great privilege to have broken ground on the world's first independent and sustainable rare earths separation plant. This incredible facility will be the only one of its kind in Europe and will help secure the resilience of Britain's supplies into the future.*

*Pensana is set to play a vital role in transforming the UK's electric vehicle and offshore wind industries by producing low-embedded carbon magnet metals and creating high-value jobs."*



# Saltend Rare Earth Processing Hub



## Ultra-modern facility

Producing:

- 12,500 tpa of rare earth oxides
- including 4,500 tpa of NdPr oxides equivalent to ~5% of world demand.
- Creating 450 jobs during construction and 125 high-value full-time jobs.
- Providing a secure supply chain for European automotive and offshore wind OEMs.



# Project Delivery Teams for Saltend and Longonjo onsite and early construction programmes commenced

Saltend



Longonjo



# Freeport status establishes Saltend as an international processing hub

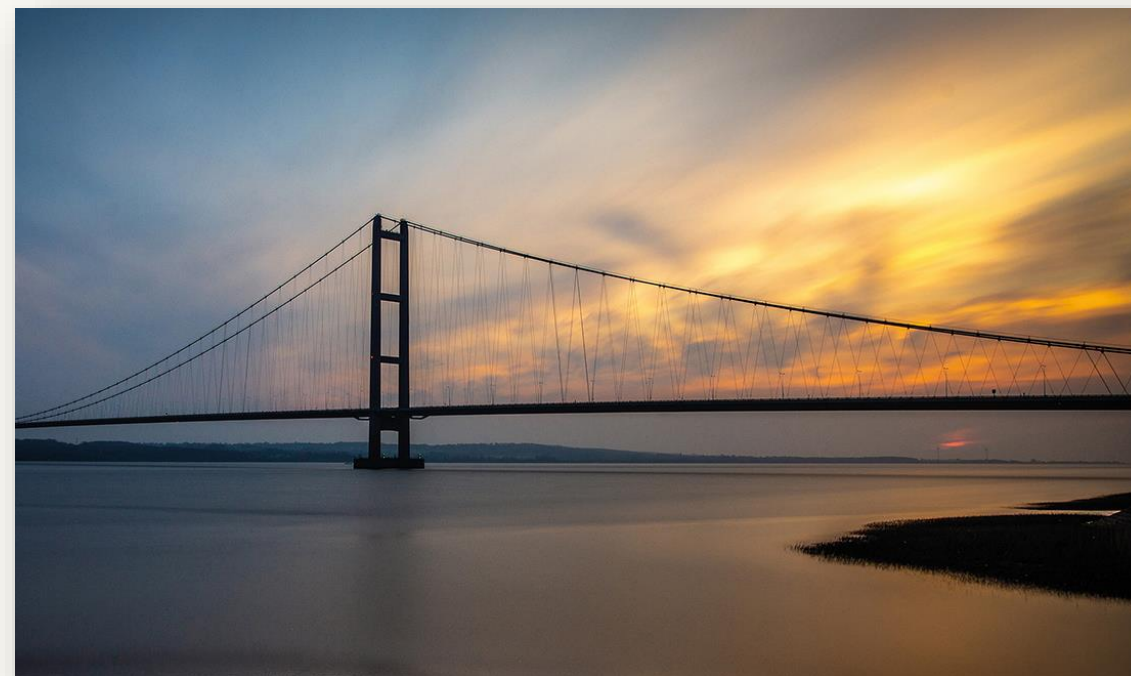
Pensana was part of the team behind the highly successful Treasury approved Humber Freeport bid led by Associated British Ports.

The range of benefits is expected to include:

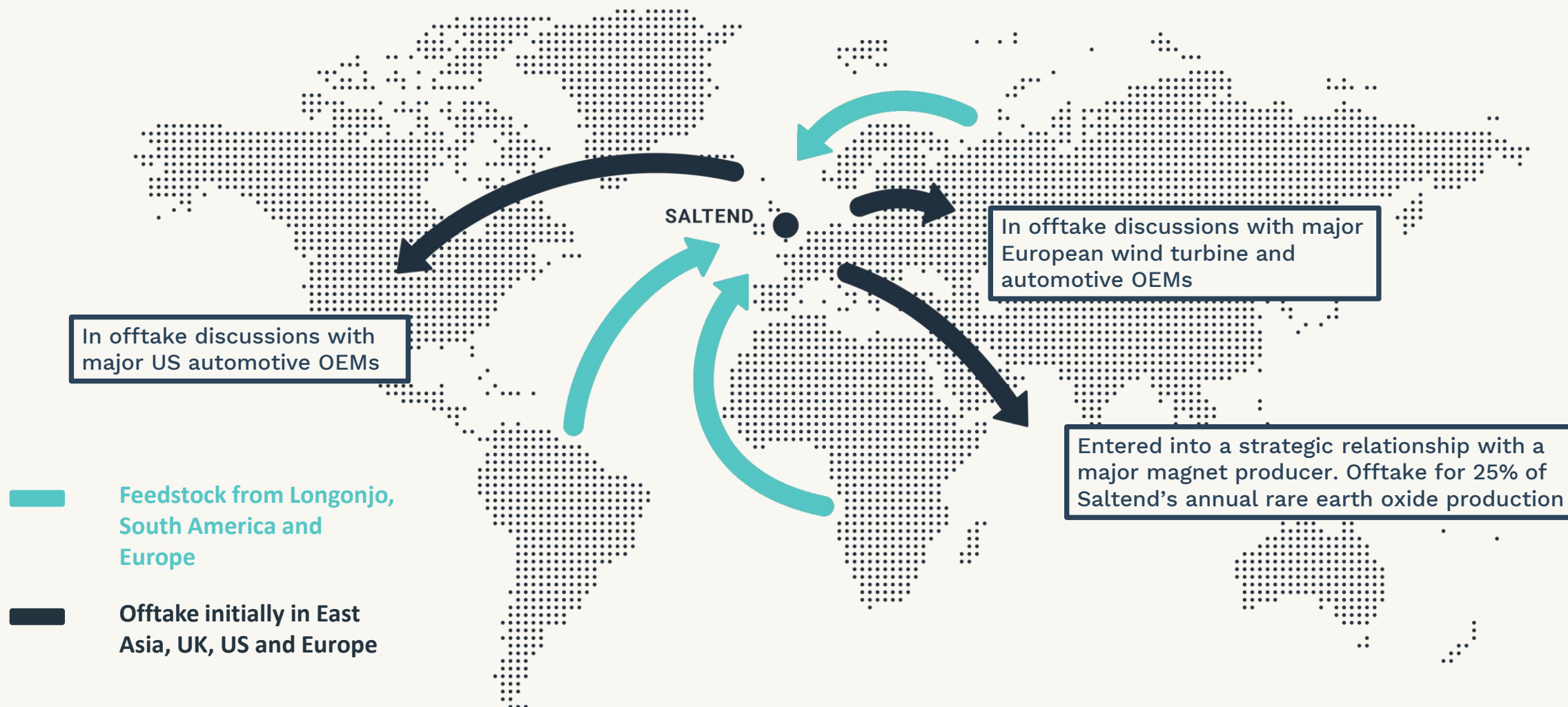
- Business rates relief for five years of operation
- National insurance relief for new employees
- Discounts on land tax and stamp duty
- 130% deduction for main pool assets
- 100% deduction for special pool assets

Awaiting Customs Zone approval.

*Source: Company information*



# Independent Rare Earth Processing Hub





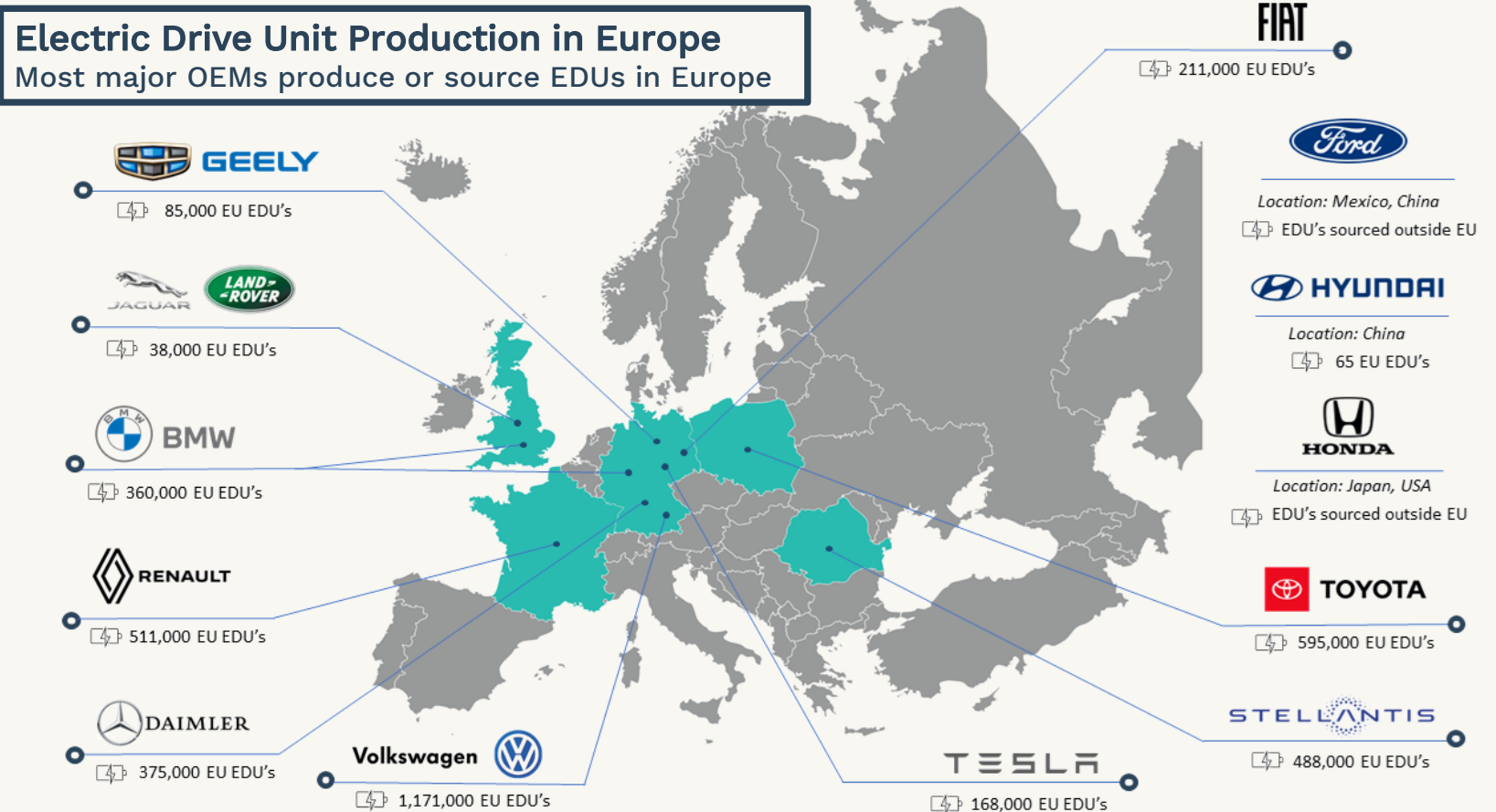
# Saltend's growing importance as an independent and sustainable supplier of European OEMs

By 2025 Europe will produce approximately 6.6million EDUs.

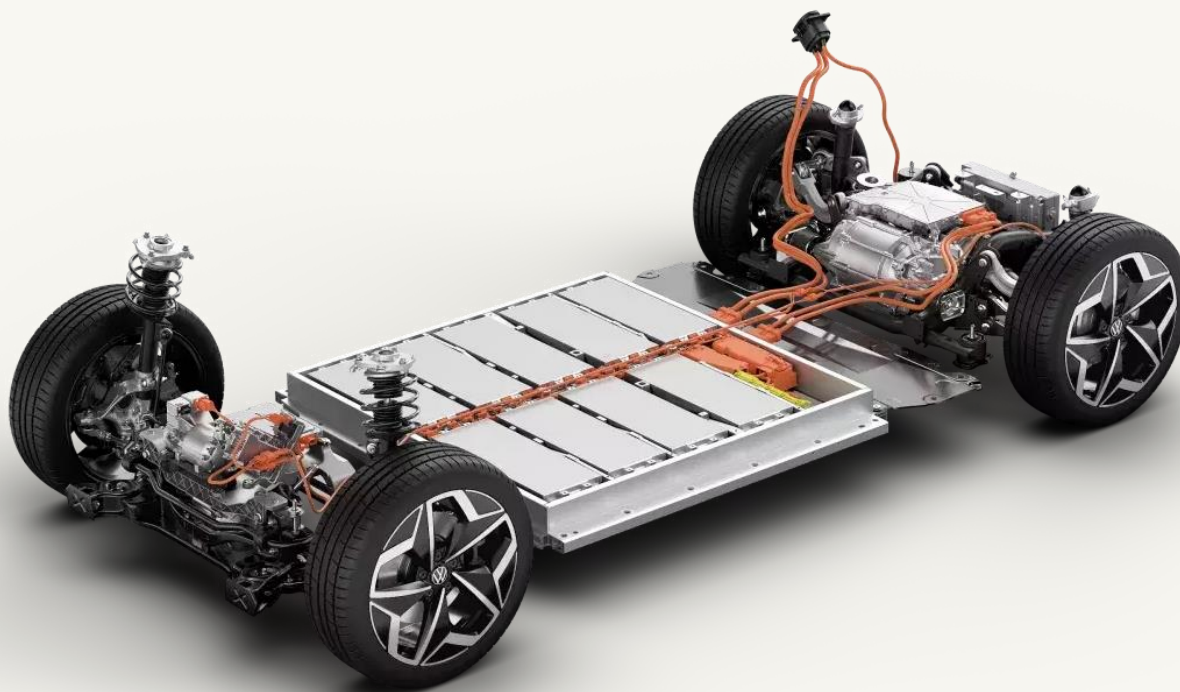
Exporting around the world supporting the burgeoning demand for electric vehicles globally.

Europe expected to follow the recent US decision to mandate supply chains for critical minerals.

Highlighting Saltend's growing importance as an independent and sustainable supplier.



## European automotive OEMs increasingly concerned about *transparency* and embedded carbon



- VW's ID.3 range of EVs will consume the equivalent of Saltend's entire production for over a decade.
- Mercedes has committed to 50% of it's production to be EVs by 2025 and has challenged its suppliers to have 50% of their rare earth permanent magnets sourced outside China.

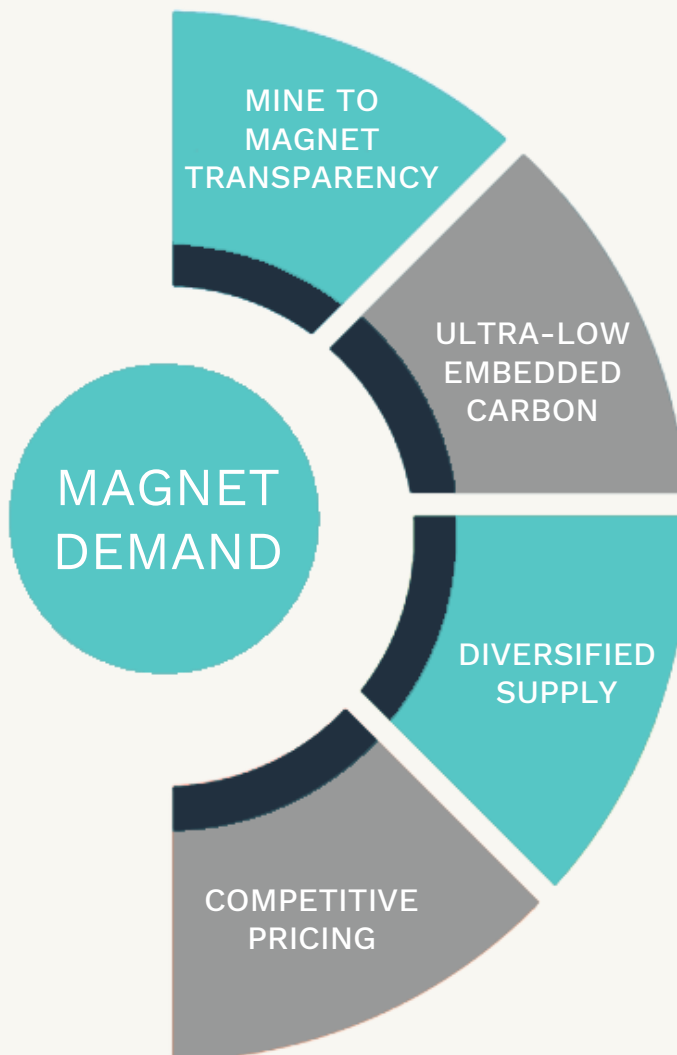
*Sources: ID.3 forecast based on management expectations and VW Financial Services forecast sales of 1.5 million units per annum expected to be sold by 2025. Estimated rare earth usage per vehicle private communication Adamas Intelligence, Saltend production based on nameplate capacity.*

# Meeting Customer Demands

**Competitive pricing, transparency and low embedded carbon**

Pensana is committed to producing **traceable rare earths** which have the industry's **lowest embedded carbon** and is aiming for Net Zero across the value chain by 2040.

*With pricing competitive to market.*



Mercedes-Benz

CO2 targets as a key criterion and 50% diversified supply chain.

## Polestar

Net-Zero by 2030. Responsible sourcing: Ethical and transparent supply chain.



Net-Zero 2039. Full transparency for all supply chain partners.



## PENSANA PARTNERS WITH POLESTAR

Pensana is partnering with Polestar (Nasdaq: PSNY) on its moon-shot goal of creating the first truly climate-neutral car by 2030.

The scope of the Polestar 0 project is to identify and eliminate all greenhouse gas emissions from the extraction of raw materials to when the car is delivered to the customer and onwards to the end of vehicle life.

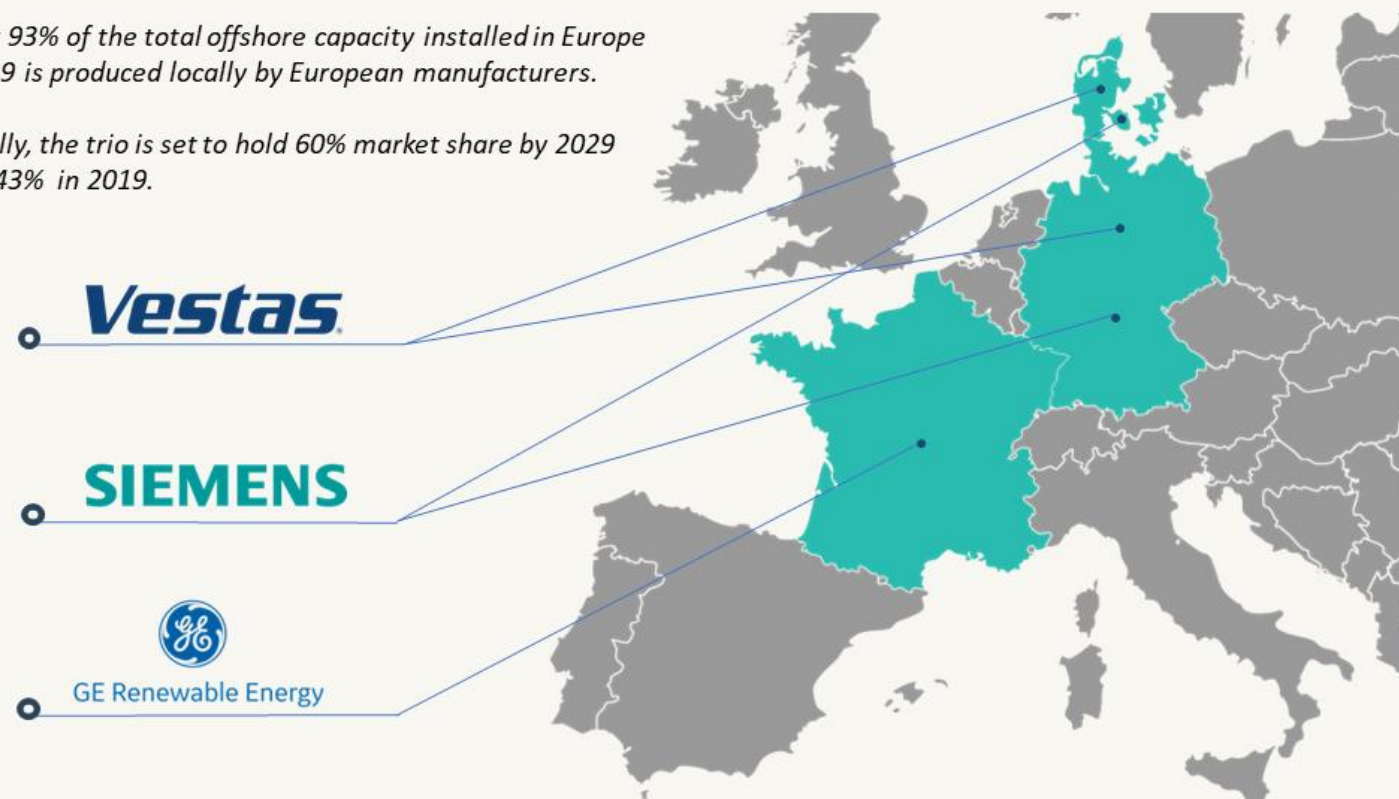


*Chairman Paul Atherley with Hans Pehrson Project Lead, at the Stockholm launch of Polestar's moon-shot climate-neutral car.*

# Offshore Wind Dominated by European OEMs - who are looking to establish local supply chains





*About 93% of the total offshore capacity installed in Europe in 2019 is produced locally by European manufacturers.*

*Globally, the trio is set to hold 60% market share by 2029 from 43% in 2019.*



- Europe is a major offshore wind supplier to the world.
- Wind OEMs are being pressured to reduce the installed cost to £37/MWh – on the back of increasing material costs.
- Strategic purchasing has identified rare earths as a significant focus to protect the business going forward, on the back of 60% increase in prices.

# Automotive and Wind Turbine OEMs driving Magnet Demand *and moving upstream quickly*

MAGNET MANUFACTURE	MOTOR MANUFACTURE	TURBINE MANUFACTURE	OEM FINAL ASSEMBLY
<div>Japan</div> <div>   </div> <div>Europe</div> <div>  </div> <div>Other</div> <div></div>	<div>                    </div>	<div> GE Renewable Energy    </div> <div>PUMP MANUFACTURE</div> <div></div>	<div>       Polestar   Mercedes-Benz    Volkswagen   TESLA</div>

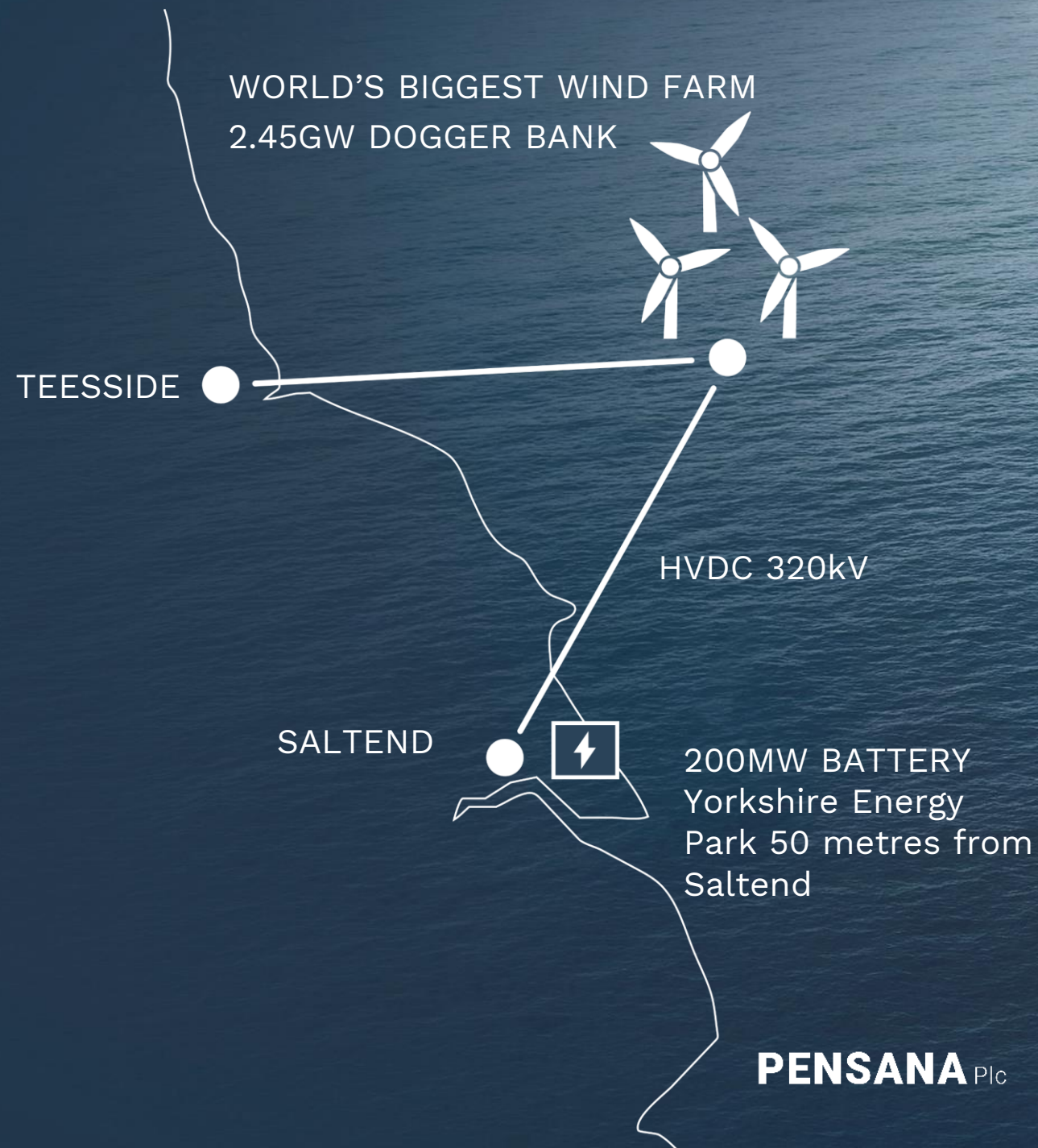


# Private Wire connection to Offshore Wind to power low cost, ultra-low carbon metal production

Hitachi installing 320kV HVDC cable, connecting Dogger Bank, the world's largest offshore wind farm, to Harmony Energy's 200MW battery storage facility.

As Offshore Wind expands, ***negative Electricity pricing becomes increasingly common*** as operators have to pay to dispatch electricity during periods of high wind and low demand.

Letter of intent securing **private wire connection** to Yorkshire Energy Park for 4MW rising to 10MW of low-carbon electricity for 10 years.



# Cooperation Agreement with Equinor to Recycle Offshore Wind Turbine Magnets using Low Carbon Hydrogen



*Pensana Chairman Paul Atherley with Equinor President and CEO Anders Opedal*

Pensana is partnering with leading energy provider, Equinor, to develop a low-energy method for recycling end-of-life wind turbine magnets using low-carbon Hydrogen produced from Equinor's Hydrogen to Humber (H2H) at Pensana's Saltend Rare Earth processing hub.



# Low Capex Hydro-Electric powered *state-of-the-art* modern mine

Longonjo is one of the world's largest undeveloped rare earth deposits with an initial 20-year mine life.

UK Engineers Wood Group plc has designed the mine to ICMM guidelines featuring solar, hydroelectric power and ~70% reagent recycling.

The near surface mining, 1.6 mtpa flotation concentrator, calcining and precipitation circuits will produce 40,000 tpa of clean, high value mixed rare earths sulphate for export to Saltend.


## LOW CAPEX (AND OPEX) DUE TO EXCELLENT INFRASTRUCTURE

Recently upgraded US\$2bn Benguela rail line provides direct link to Atlantic port of Lobito.

Hydro Electricity @ US2c per KWh for 10-year contract.

  
**PORTO LOBITO**

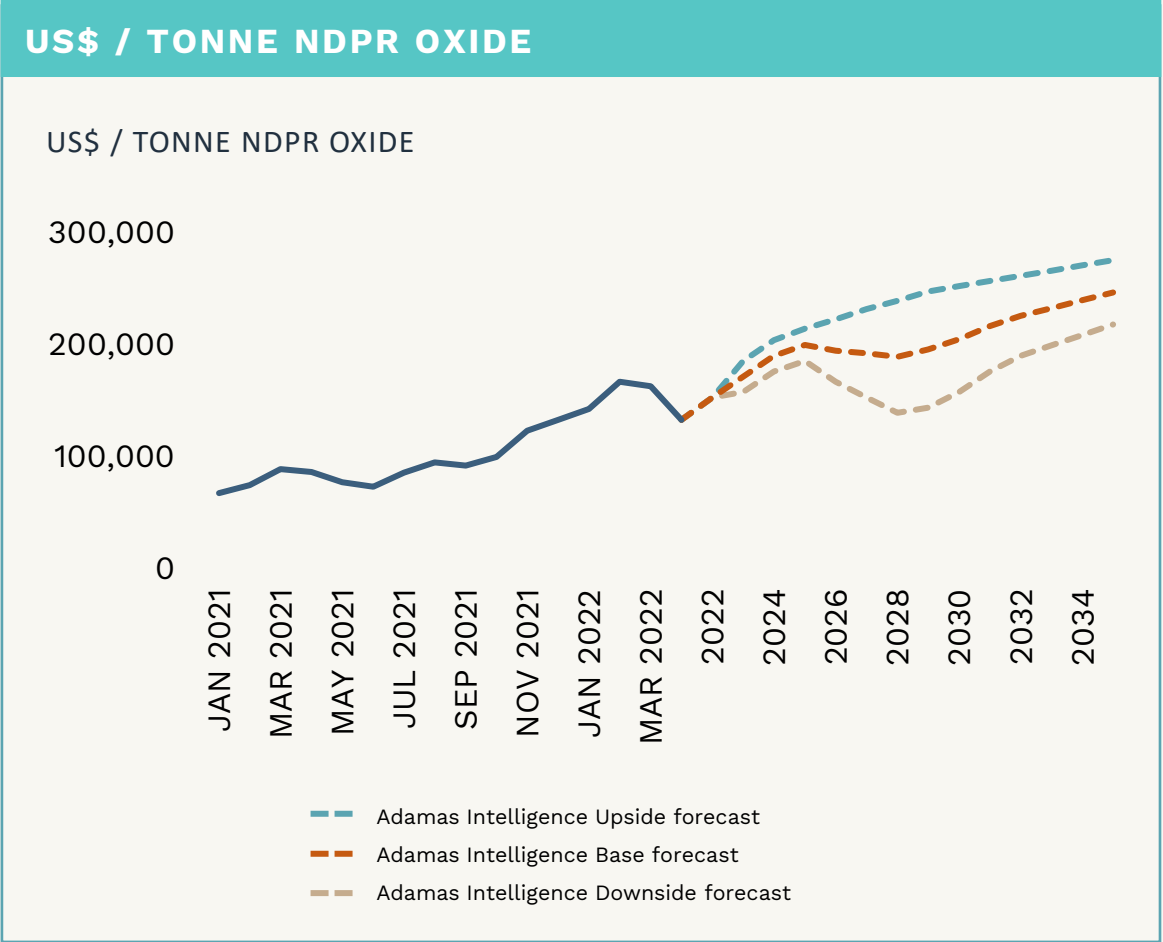
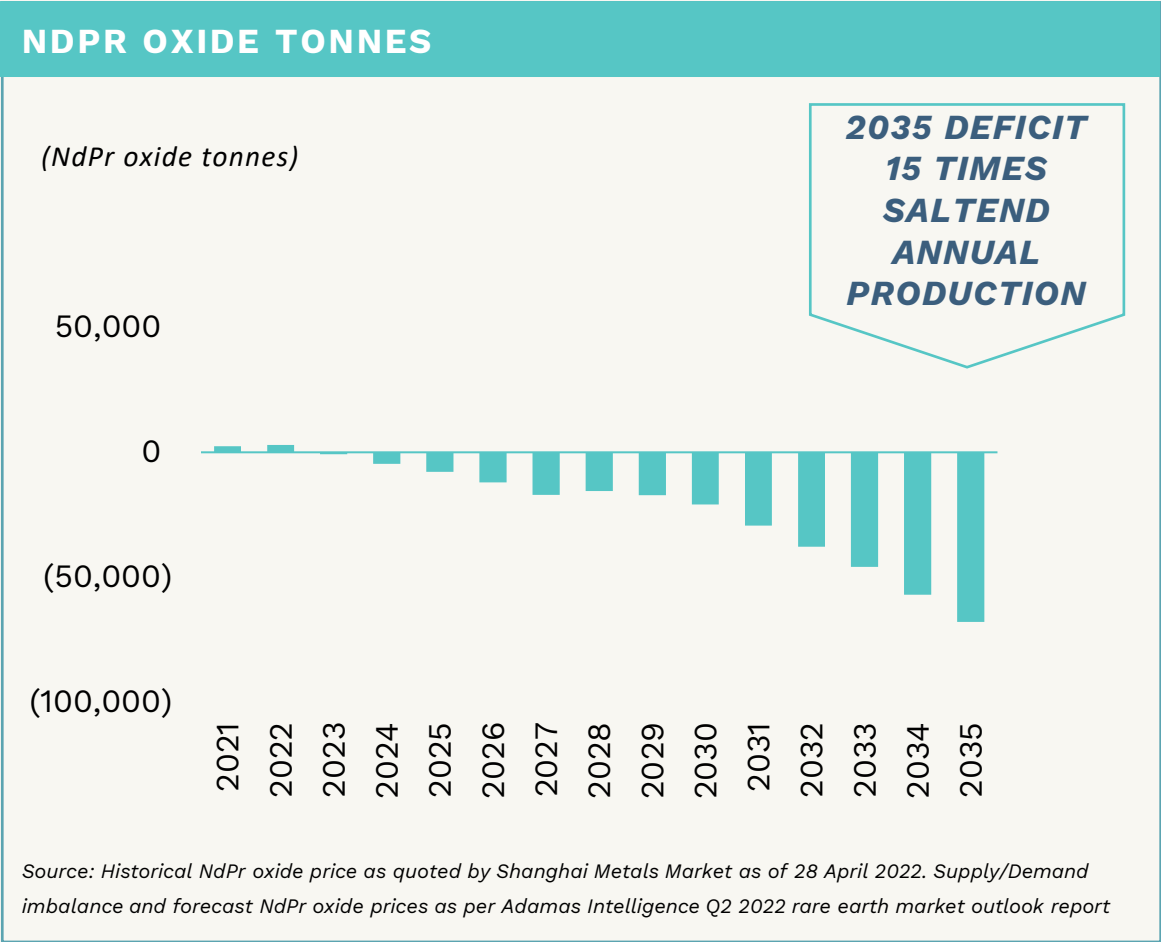
**LONGONJO**

HYDRO POWER 



# Growing Supply Deficit

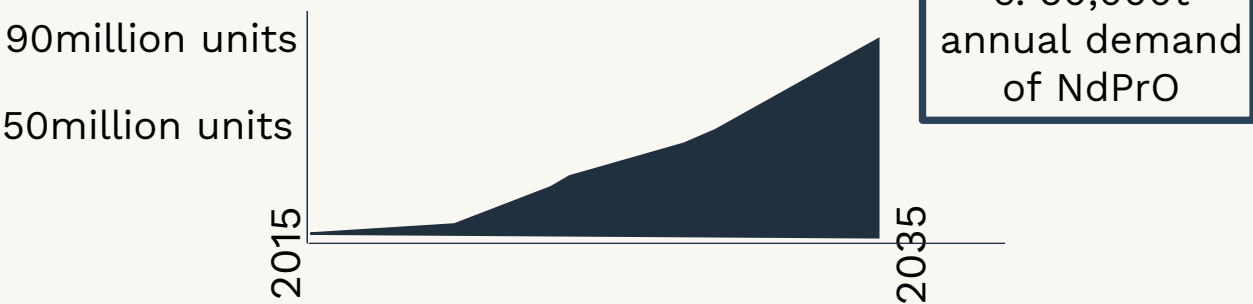
## Adamas Intelligence Price Forecasts



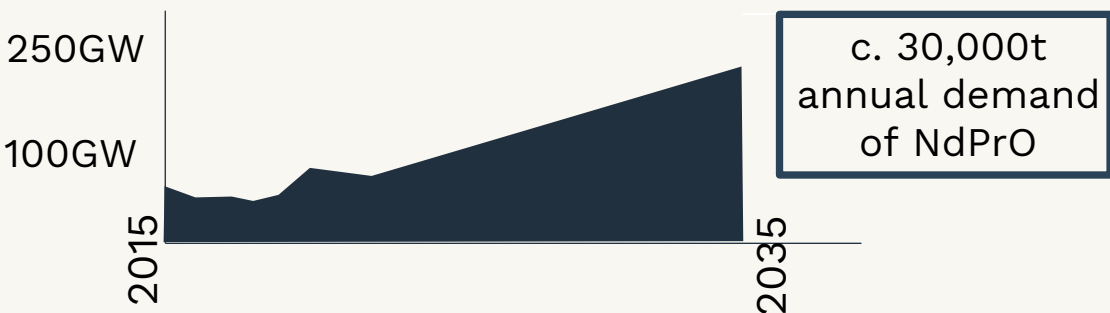
# Market Dynamics: Both EV and Offshore Wind demand continuing to grow

Pensana is securing the supply chain for rare earth metals vital for the electric vehicle and wind turbine industries

Growth in EV sales to 2035



Growth in Direct Drive Wind Turbine sales to 2035



Adamas Intelligence Rare Earth Magnet Market Outlook to 2035 Q2 2022



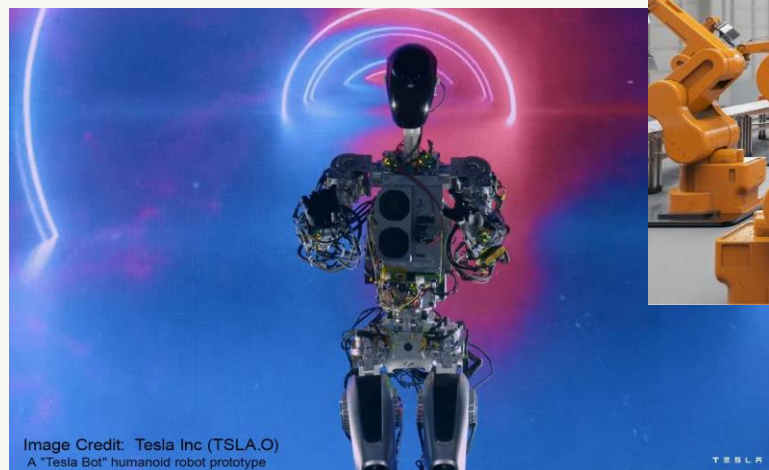
Image Source: <https://cleantechnica.com/>

# A new demand shock – this time from industrial robots?

With rising labour costs, policy support and a strong push for modernisation robots usage is expanding rapidly.

High-performance NdFeB magnets are the key component of industrial robot servo motors.

Forecast CAGR 20% by 2025.



	2020	2021	2022E	2023E	2024E	2025E
China industrial robot production	237,100	336,000	475,900	571,000	685,200	822,300
Global industrial robot production (units)	384,000	522,900	634,500	713,800	856,500	1,027,900
Global industrial robot NdFeB demand (kg/unit)	20	20	20	20	20	20
Global total demand (tonnes)	7,680	10,456	12,690	14,276	17,131	20,557



# Financial Summary

## Based on Adamas Intelligence Base Case Pricing

ANNUAL PRODUCTION	11,600 – 12,900 tonnes of TREO, including 4,500 – 5,000 tonnes of NdPr oxide		
CAPEX	SALTEND REFINERY		US\$ 195M
	LONGONJO MRES REFINERY		US\$ 127M
	LONGONJO CONCENTRATOR		US\$ 123M
	LONGONJO MINE AND INFRASTRUCTURE		US\$ 49M
OPEX	US\$ 20 / kg TREO (Average per annum based on first five years at steady state)		
REVENUE	US\$ 984 MILLION (Average per annum based on first five years at steady state)		
EBITDA	US\$ 628 MILLION (Average per annum based on first five years at steady state)		
NPV8** (UN-LEVERAGED, POST TAX)	US\$ 3.4 BILLION		
IRR	60%		
PAYBACK FROM FIRST PRODUCTION	1.5 YEARS		

Source: Company information. Management estimates, inclusive of Longonjo and Saltend operations, are based on underlying independent studies undertaken by consultants listed in Appendix 1. NPV is calculated at an operational level pre-financing which is anticipated to be a blend of equity and long-term debt financing. Revenue is based on NdPr oxide prices according to Adamas Intelligence base forecast (Q2 2022). NdPr oxide prices starting at \$153/kg in 2022, escalating at CAGR of 3.7% p.a. to 2035, flat real thereafter.

# Major achievements during 2022

PENSANA<sub>Plc</sub>

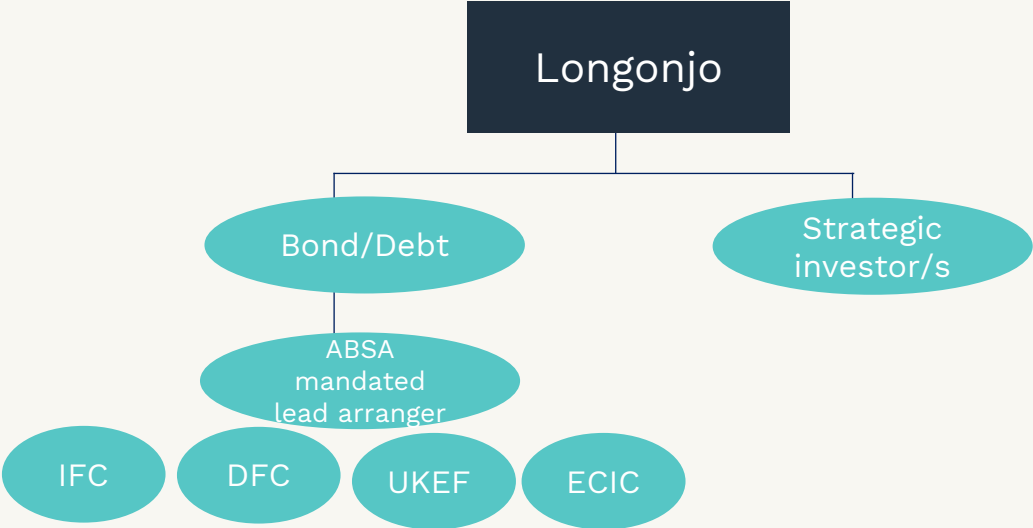
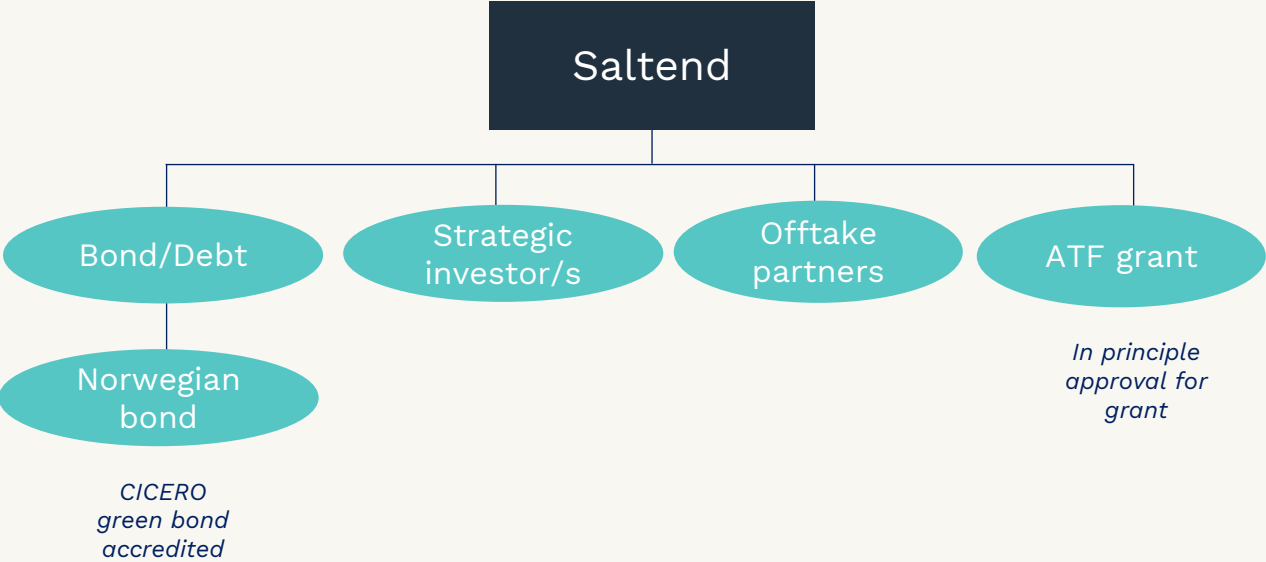
- Longonjo and Saltend **fully permitted, and FEED completed**
- Appointment of a highly experienced **Project Delivery Team**
- **Saltend groundbreaking, launch of the UK's Critical Minerals Strategy** by Secretary of State at BEIS, Rt Hon Kwasi Kwarteng MP
- Longonjo **earthworks and civils contractor mobilised to site with early construction programmes commenced**
- 10-year contract for low-cost, low-carbon **hydroelectric power** at Longonjo
- LOI Saltend, securing **private wire connection** to Yorkshire Energy Park for 10MW of low-carbon electricity for 10 years

- **Green bond accreditation** received from CICERO
- In principle approval of **ATF grant**
- Financing advanced for both Saltend and Longonjo
- **Blueprint for sustainable rare earths** launched, outlining Pensana's aim of achieving net zero no later than 2040
- Developed a process route **to recycle chemicals** at Longonjo

- **Significant engagement with major automotive and offshore wind OEMs** who are seeking **offtake arrangements**
- MoU signed with a large non-Chinese magnet manufacturer for **25% offtake**
- Collaboration with Polestar on **the Polestar 0** project, targeting the world's first climate-neutral car
- **Partnership with Equinor** on the Hyrdogen2Humber Saltend Project to recycle permanent magnets

- **World Class JORC Mineral Reserve estimate of 30 million tonnes**, reported by Snowden Optiro
- **Significant exploration discoveries** on the Coola license, including 68 metres at 3.4% TREO at surface.
- **Mining Trade Mission to Angola**, including the UK DIT, Ambassador of Norway, Rio Tinto, Anglo American and Angolan Gov

# Financing outline



## Debt

Saltend: ABGSC engaged. Norwegian green bond (CICERO green bond accredited)

Longonjo: ABSA appointed as MLA. Lender consortium inclusive of ECIC, UKEF, IFC and DFC

## Strategic investors

Due diligence currently being undertaken by several potential strategic investors for both Saltend and Longonjo

## Offtake partners

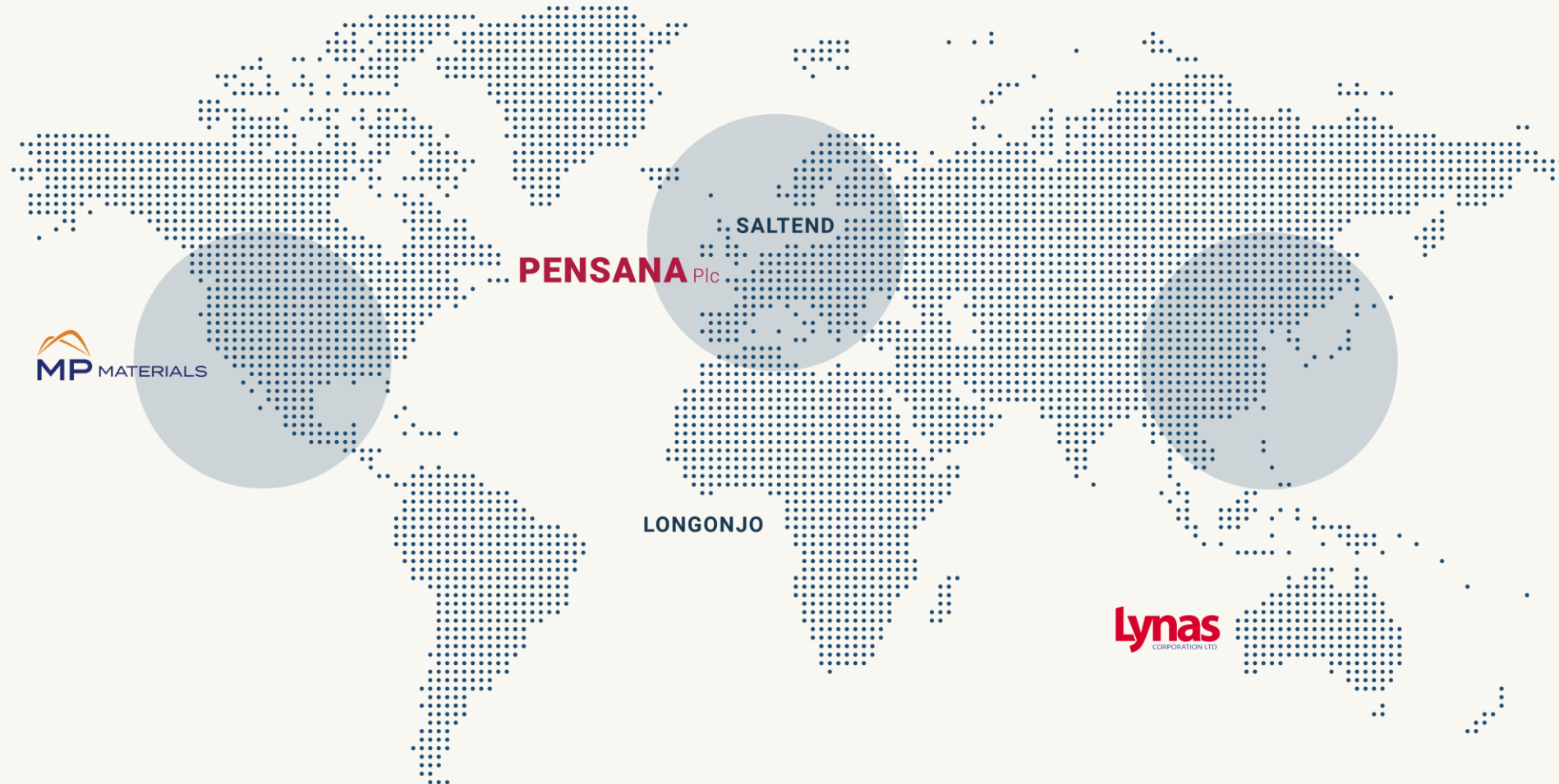
Upfront funding with various offtake partners under consideration

## UK Government grant

In principle approval of grant via the Automotive Transformation fund (ATF) at Saltend



**Lynas Corporation (LYC.ASX) is currently the only major producer of separated rare earths outside China**





LYC:ASX



MP:NYSE



PRE:LSE

**MARKET  
CAP US\$**



**US\$5.1bn**

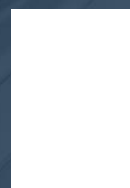


**US\$5.8bn**



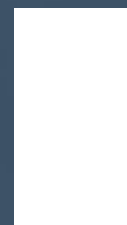
**<US\$150m**

**NdPr PRODUCTION  
tonnes per year**



5,900  
tonnes

**IN PRODUCTION  
SINCE 2013**



6,500  
tonnes  
by 2024

**IN DEVELOPMENT**



4,500-5,000  
tonnes  
by 2025

**IN DEVELOPMENT**

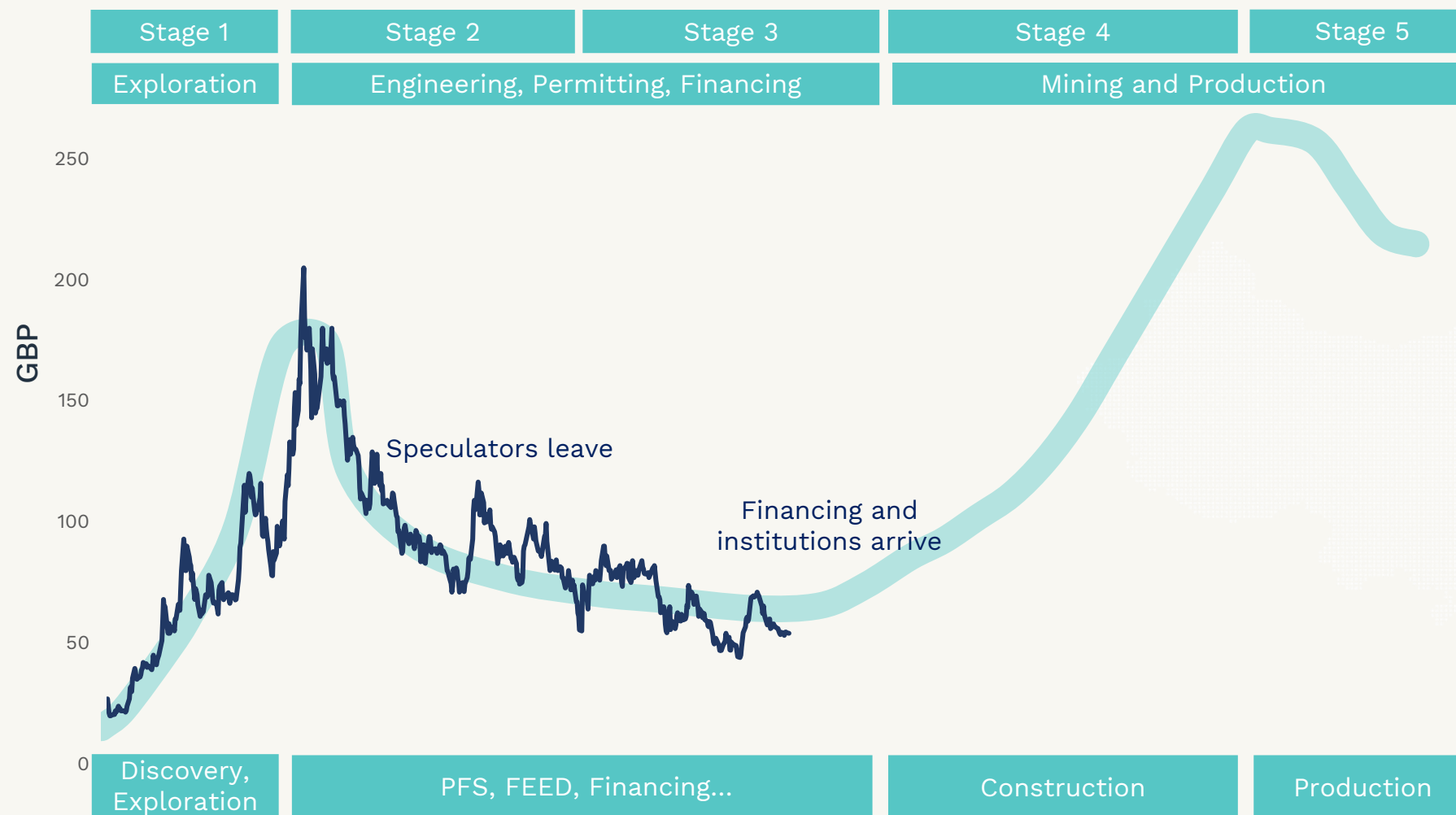
**CAPEX US\$**

**c. US\$1.5 billion**

**>US\$2 billion**

**US\$500 million**

# The Lassonde Curve





# Strong Independent Board and Experienced Executive Management Team

**PENSANA** Plc



**PAUL ATHERLEY**  
**CHAIRMAN**

Mr. Atherley is an experienced mining executive and is the founder of the Company. Previously Executive Director of the investment banking arm of HSBC. He has completed numerous successful acquisitions and financings of resource projects in Europe, China, and Australasia.



**RT HON BARONESS NORTHOVER**  
**NON-EXEC DIRECTOR**

Baroness Northover was the Prime Minister's Trade Envoy to Angola (2016- 2020), Zambia (2017-2020) and Minister in the Department for International Development ("DFID") 2011-15, including serving as Parliamentary Under Secretary and Africa Minister, 2014-15.



**ROBERT KAPLAN**  
**FINANCE DIRECTOR**

Mr Kaplan is a Chartered Accountant with over 20 years' operating experience in the African mining sector. He brings a broad skill set in both the UK and sub-Saharan corporate finance together with experience in mining operations in Angola, South Africa and Tanzania.



**TIM GEORGE**  
**EXEC DIRECTOR/ CEO**

A Minerals Engineer, Mr. George leverages over 30 years of experience in the mining and engineering sectors, with a broad experience in mining project development throughout Sub-Saharan Africa.



**STEVE SHARPE**  
**NON-EXEC DIRECTOR**

Mr Sharpe is a highly experienced natural resources financier. He is an Executive Board Member of EIT Raw Materials. Previously, he was Chair of AME Group, Managing Director at Canaccord Genuity, Managing Director at Endeavour Financial and held senior positions at Standard Bank and NM Rothschild.



**ROCKY SMITH**  
**CHIEF OPERATIONS OFFICER**

Rocky Smith is a highly experienced Chemical Engineer with 35 years' rare earths experience. He was Managing Director of Molycorp's Mountain Pass rare earth project in California, US, which is now owned by New York Stock Exchange listed MP Materials.



**JEREMY BEETON**  
**NON-EXEC DIRECTOR**

Former Director General of the 2012 London Olympic and Paralympic Games, Principal Vice President of Bechtel, Advisory Board of PWC, and Non-Exec of SSE Plc. Currently also a Non-executive Director of John Laing.



**ALISON SAXBY**  
**NON-EXEC DIRECTOR**

Alison is an industry-leading expert with over 35 years of experience in industrial minerals and metals. She was previously a Managing Director at metals consultancy Roskill. Alison is the author of numerous publications on critical and other minerals and was originally trained as a mineral engineer.



**WILLIAM IZOD**  
**CHIEF COMMERCIAL OFFICER**

William Izod has extensive experience in managing and developing rare earth supply chains, including 10 years working with large multi-national companies, including managing a Motor and Powertrain supply chain controlling £1bn of annualised spend.

# Highly Experienced Project Delivery Team

**PENSANA** Plc



**HAMISH WESTWATER**  
**PROJECT DIRECTOR, SALTEND**

Hamish has over 30 years' experience delivering complex projects in the chemical engineering sector for both contractor and client. He specialises in fast-track delivery and leading all project phases from FEED studies through to final commissioning and start-up.



**MIKE HAMER**  
**COMMERCIAL & COST MANAGEMENT, SALTEND**

Mike is a Chartered Surveyor with over 35 years' experience in strategising and leading the whole life cycle delivery of capital projects worldwide.



**MIGUEL DOS SANTOS**  
**OPERATIONAL READINESS & LOGISTICS MANAGER**

Miguel is a ECSA registered Chemical Engineer with 25 years' experience in the chemical, mining and minerals, and energy industries. After starting his career within the Unilever group in the late 1990's, he spent the first 10 years in various senior operational management and project roles.



**KEVIN BOTHA**  
**PROJECT DIRECTOR, LONGONJO**

Kevin is a qualified Electrical Engineer and Project Management Professional with over 45 years' experience in the global mining industry. He has worked for blue-chip international companies and as a Director and Owner of companies providing engineering and project management services to the sector.



**RICHARD DEWHIRST**  
**PROCESS ENGINEERING, SALTEND / LONGONJO**

Since graduating in Metallurgy with Mining from Nottingham University, Richard's long career in the mining industry has seen him work around the globe for major mining companies such as Anglo American, de Beers, BHP, Rio Tinto and Vale as well as a number of engineering companies including Fluor, Jacobs, Ausenco, SKM, SMEC and Behre Dolbear.



**NIGEL HUDSON**  
**INFRASTRUCTURE & SERVICES ENGINEER, SALTEND**

Nigel has over 30 years' experience in business leadership, project management, engineering and operations support, gained in the oil and gas, petrochemical, conventional power, nuclear power, water and infrastructure industries.

A Fellow of the Chartered Management Institute, Nigel has held senior project management positions with international engineering organisations, managing large white-collar and blue-collar delivery teams here in the UK and in the Asia Pacific.



**JEREMY CLARKE**  
**PROJECT SPONSOR, LONGONJO**

Having trained with Anglo American, Jeremy has 20 years' of experience in gold, uranium, copper, and diamonds. He was previously Consulting Metallurgist for De Beers where he was responsible for metallurgical excellence at their plants globally



**DAVE PORTER**  
**BULK POWER INFRASTRUCTURE, LONGONJO**

Since graduating with a B.Sc. Electrical Engineering (Cum Laude) in 1981, Dave has managed portfolios of mining projects throughout Africa and has directed project delivery for mining clients in various commodity sectors including rare earth metals, diamonds, gold, manganese, iron, copper, cobalt and zinc.

# Market and Technical Advisers

## MARKET INTELLIGENCE

**Adamas Intelligence**

Market forecasts

**Roskill**

Market forecasts

## SALTEND TECHNICAL

**Wood Group**

Technical engineering and design

**Px Group**

Saltend owner operator

**Oakdene Hollins**

Circular economy

**On Line Design**

Planning application

**SLR consulting**

Air quality assessments

**EEG**

Geotechnical design

**Ivy House**

Environmental design

## LONGONJO TECHNICAL

**Wood Group** - technical engineering and design

**Paradigm Project Management** - Longonjo site infrastructure and bulk services technical engineering, design and cost estimates

**Auralia Metallurgy** - specialist metallurgical and processing laboratory

**Nagrom** - geochemistry testing and analysis

**ALS / Eriez** - pilot plant test work

**HCV Africa** - ESIA, EMP, RAP and hydrology

**ANSTO** - Australia nuclear science and technology association

**Grupo Simples** - Longonjo ESIA

**Snowden Optiro** - Mine plan schedule, pit optimisation and ore reserve statement

**SRK** - Mineral resource estimates & geotechnical