

Breaking Ground on an Independent and Sustainable Rare Earth Processing Hub

Saltend Chemicals Park
Humber Freeport, UK

18th International
Rare Earth Conference
Las Vegas October 2022

“We are committed to producing traceable rare earths which have the industry’s lowest embedded carbon and are aiming for Net Zero across the value chain by 2040.”

Blueprint for Sustainable Rare Earths www.pensana.co.uk/sustainability

PENSANA Plc

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 ~ 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>



CARBON NEUTRAL
2060 PLAN

Breaking ground on the world's first Rare Earth processing hub at the Saltend Chemicals Park Humber UK July 2022

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

Producing the critical rare earths to drive the energy transition.



World-class ultra-modern facility located inside Saltend Chemicals Park which will import high-value feedstock from around the world and produce 12,500 tpa of rare earth oxides including 4,500 tpa of NdPr oxides equivalent to ~5% of world demand.

One of the first major rare earth separation facilities to be established in over a decade and the first to be established in a Freeport.

Creating 450 jobs during construction and 125 high-value full-time jobs.

Provides diversification and secure supply chain resilience for European automotive and offshore wind OEMs.

Freeport status to establish Saltend as an international processing hub

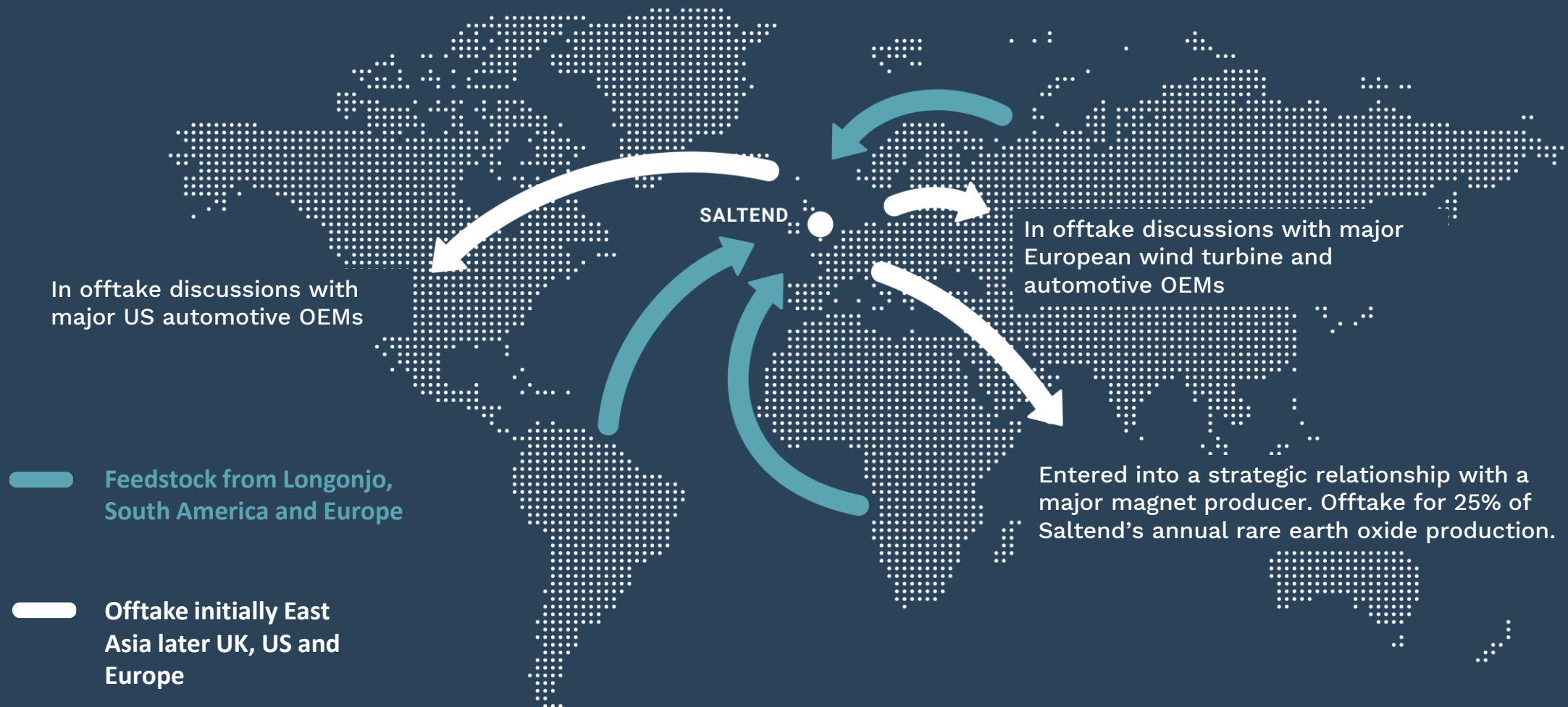
Pensana was part of the team behind the highly successful Treasury approved Humber Freeport bid led by Associated British Ports. The range of benefits is expected to include:

- 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

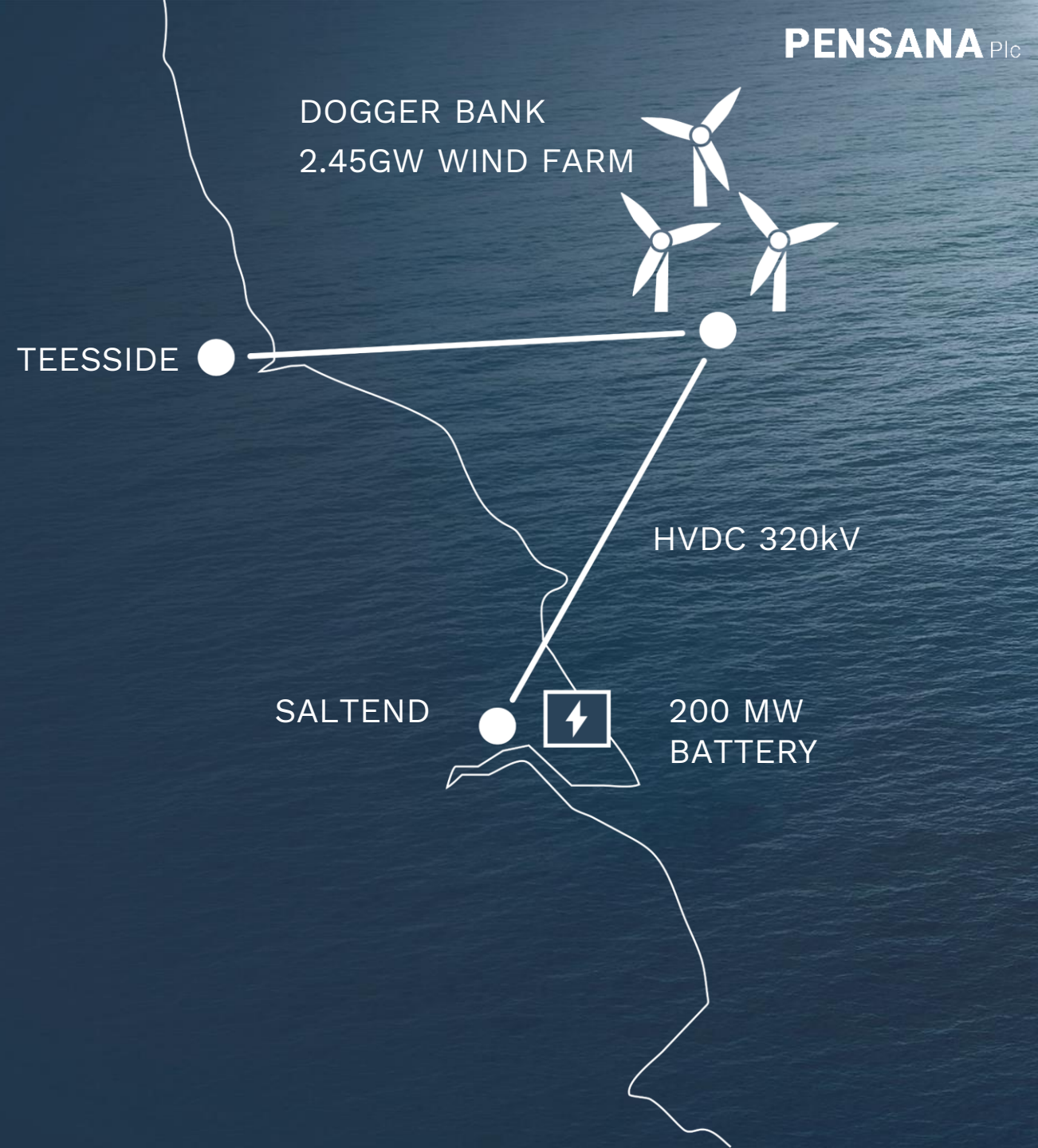
Independent Rare Earth Processing Hub



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 becoming increasingly common as operators have to pay to dispatch electricity during periods of high wind and low demand.



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.

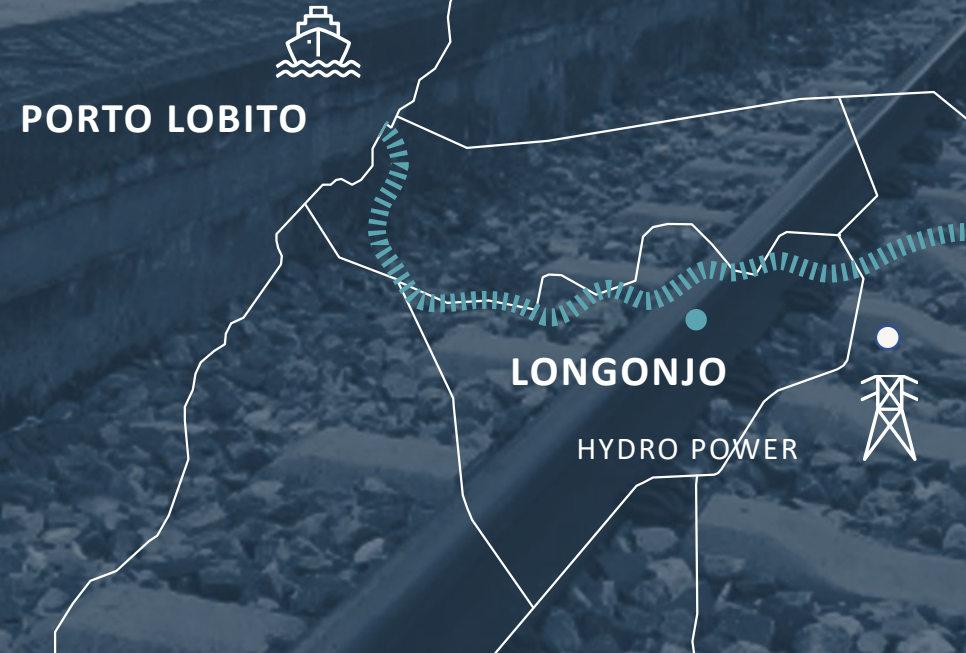
UK Engineers Wood Group plc has designed the mine to ICMM guidelines featuring solar, hydroelectric power and ~70% reagent recycling.

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.



Competent Persons Report



Ore Reserve Estimate completed by Snowden Optiro over both the Longonjo and Saltend operations underpinning its initial 20-year life. Ore Reserves are classified according to the JORC 2012 code.

The capital cost estimate (Capex), compiled by Pensana from inputs by all consultants includes direct plant and supporting infrastructure, indirect costs and is to an accuracy level of $\pm 15\%$ and includes appropriate contingency amounts. Reviews and audits of capex were independently conducted by Project Cost Consultants (PCC).

The Feasibility Study (FEL3) including the preparation of Capital and Operating Cost Estimates to the appropriate AACE (American Association of Cost Engineers) standard (Class 3) and a full Financial Review and Model.

Link to Competent Persons report: [SnowdenOptiro Pensana Longonjo Ore Res Statement.pdf](#)

Proved and Probable Ore Reserve September 2022

<u>Classification</u>	<u>NdPrO cut-off (%)</u>	<u>Tonnes (Mt)</u>	<u>NdPrO (%)</u>	<u>TREO (%)</u>	<u>NdPrO (t)</u>	<u>TREO (t)</u>
Proved	0.3–0.4	13.3	0.67	3.19	89,300	424,000
Probable	0.3–0.4	16.8	0.46	2.05	77,000	323,000
Total	0.3–0.4	30.1	0.55	2.55	166,000	767,000

50t

ZPMC
PORTO DO LOBITO

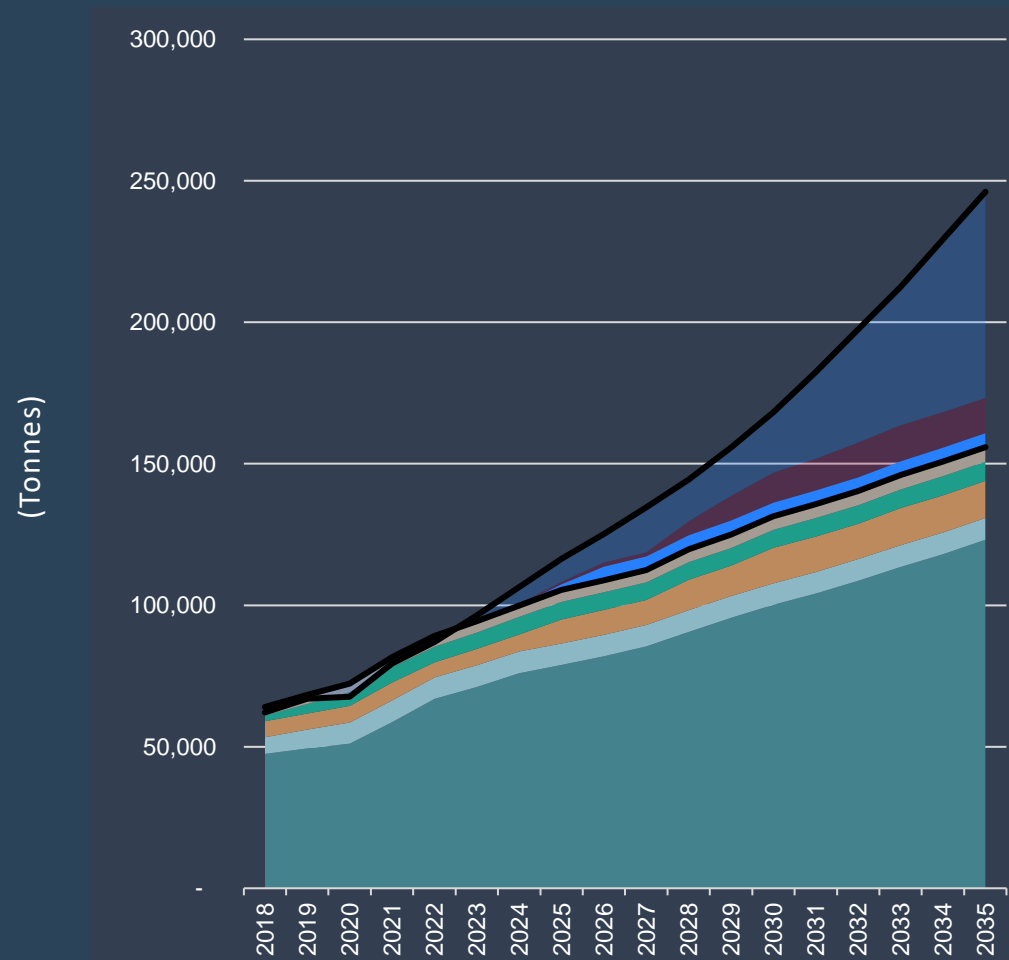
41t RTG3 PORTO DO LOBITO

ZPMC
QC01

PORT OF LOBITO
US\$2 BILLION UPGRADE
WORLD-CLASS CONTAINER HANDLING FACILITIES

Adamas Intelligence forecasts probably overestimate the supply side

Supply / Demand Magnet REO



Shortfall

New projects not expected to come online as planned - exacerbating the growing shortfall

Source: Adamas Intelligence and Management estimates based on public domain information

Saltend's growing importance as an independent and sustainable supplier to European EDU OEMs

By 2025 Europe will produce approximately 6.6million EDUs.

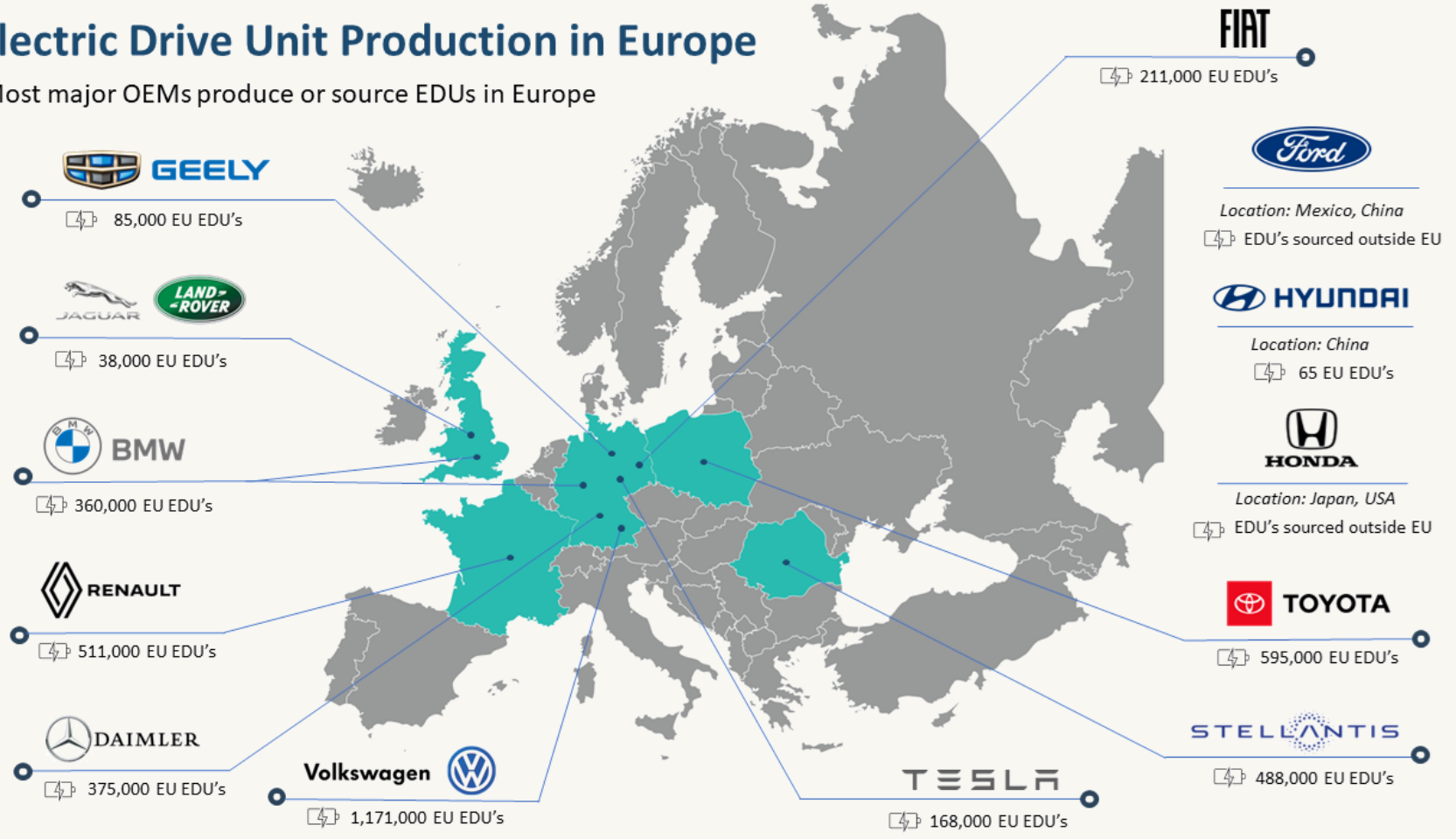
Exporting around the world supporting the burgeoning demand for electric vehicles globally.

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

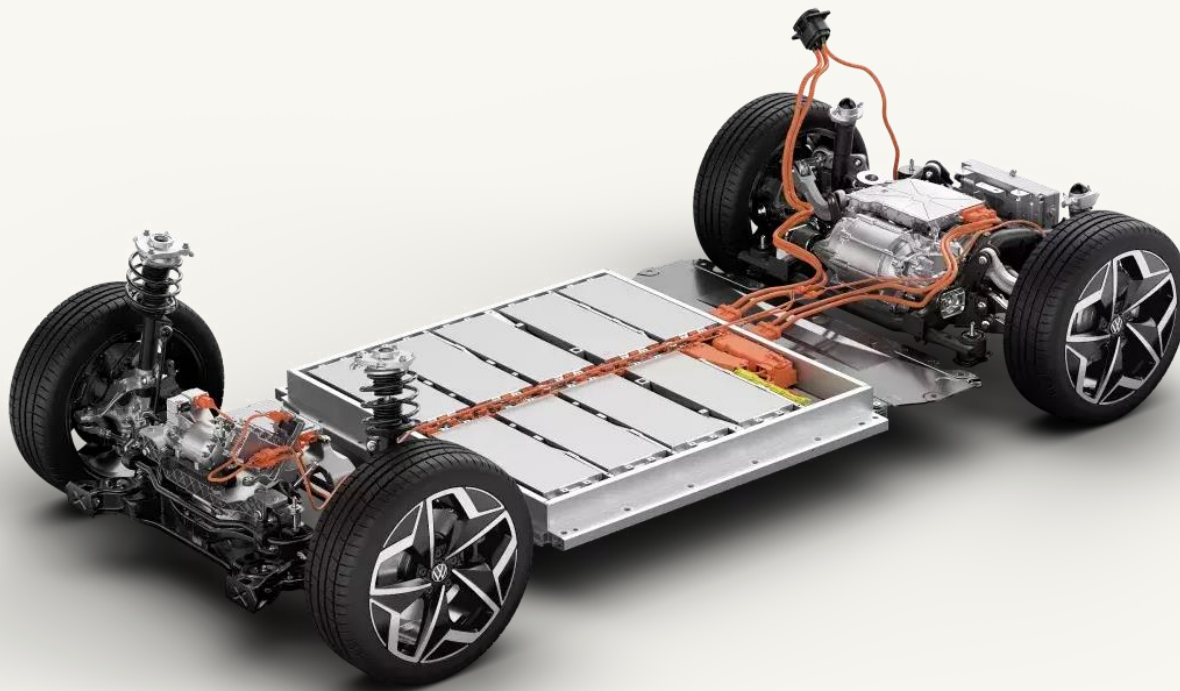
Highlighting Saltend's growing importance as an independent and sustainable supplier.

Electric Drive Unit Production in Europe

Most major OEMs produce or source EDUs in Europe



European Automotive OEMs increasingly concerned about *transparency* and embedded carbon



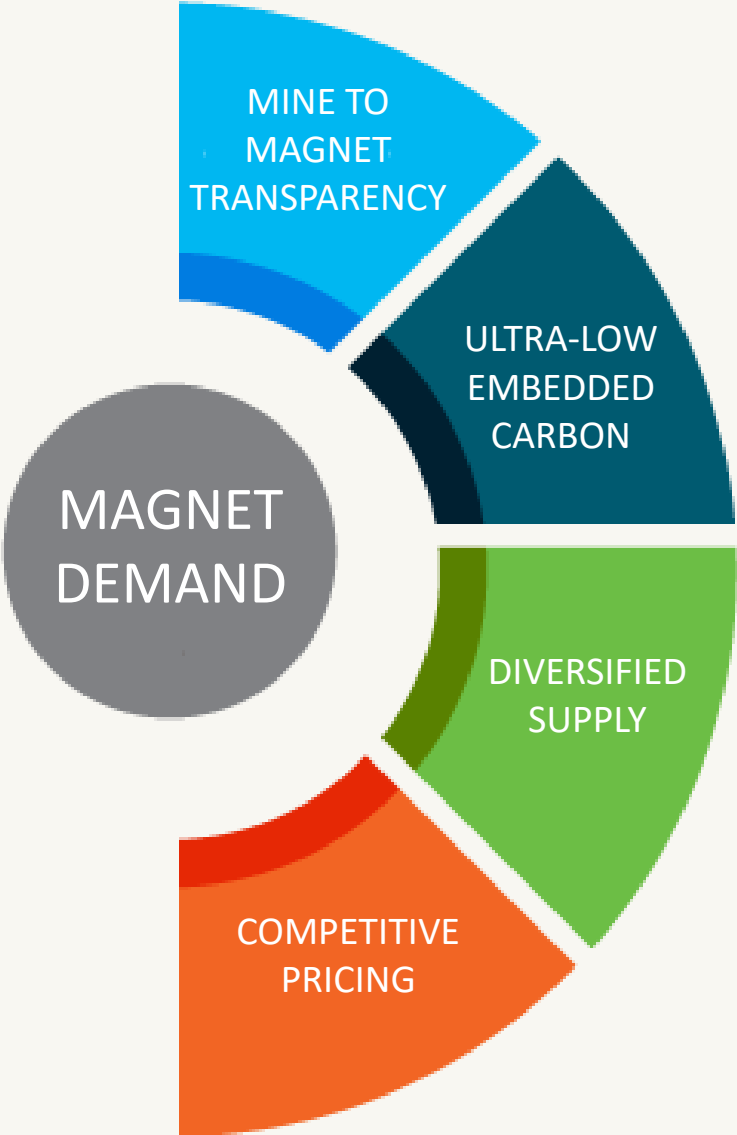
Mercedes has committed to 50% of its production to be EVs by 2025 and has challenged its suppliers to have 50% of their rare earth permanent magnets sourced outside China.

Source: Management discussions with Mercedes and other European OEMs

Meeting Customer Demands

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

C02 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.

Automotive and Wind Turbine OEMs driving Magnet Demand

MAGNET MANUFACTURE	MOTOR MANUFACTURE	TURBINE MANUFACTURE	OEM FINAL ASSEMBLY
<p>Japan</p> 			
<p>Europe</p> 		<p>PUMP MANUFACTURE</p>	
<p>Other</p> 			

A new demand shock - this time from industrial robots?

Robots are becoming increasingly popular with rising labour costs, policy support and a strong push for modernisation.

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

Pensana Awarded Green Bond Certification

CICERO a leading global provider of Second Opinions on green bonds has rated Pensana's operations as LIGHT GREEN with a Governance score of GOOD.

CICERO has rated Pensana as in line with its principles, based on the Company's plans to create a sustainable magnet metal supply chain through its Saltend Processing Hub and beneficiation in Angola.

Source: Cicero



Strong Independent Board and Experienced Executive Management Team



PAUL ATHERLEY
CHAIRMAN

Mr. Atherley is a highly experienced mining executive and is the founder of the Company. He has a wide-ranging media profile. Previously Executive Director of the investment banking arm of HSBC. He is co-founder of the Arch Sustainable Resources Fund and is Non Exec Chair of Alkemy Capital Investments Ltd.



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 Teams For Both Saltend and Longonjo



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



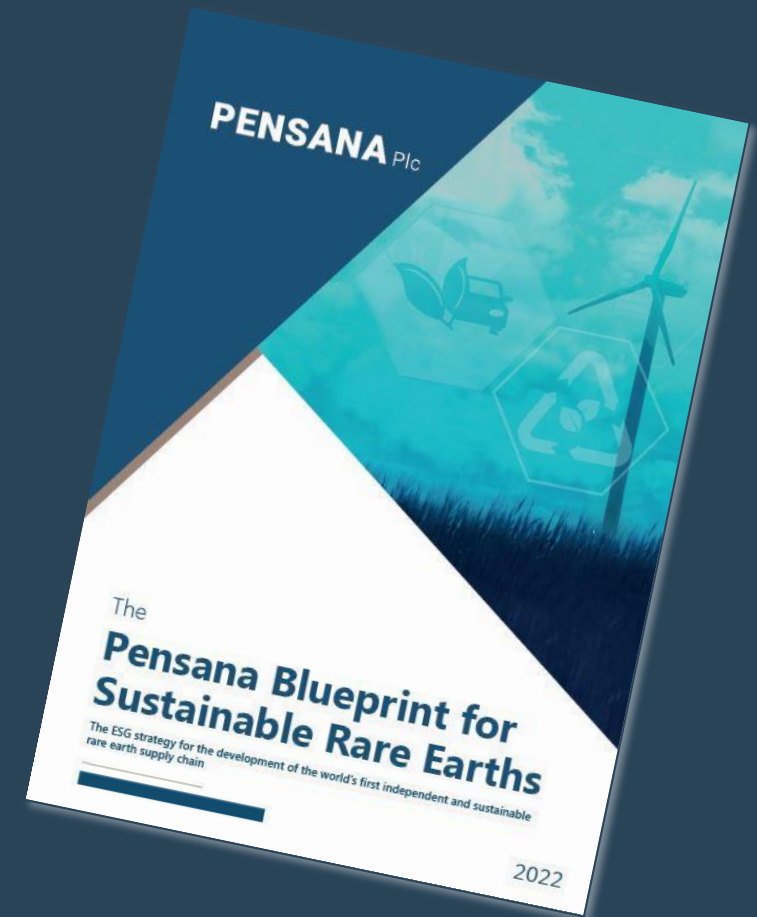
DAVE PORTER
BULK POWER INFRASTRUCTURE, LONGONJO

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.

A Blueprint for Sustainable Rare Earths

Pensana has committed to producing fully traceable products, the lowest embedded carbon rare earths in the market and aims for Net Zero across the value chain by 2040.

The Pensana Blueprint for Sustainable Rare Earths
www.pensana.co.uk/sustainability



Polestar 0 Project

Research needed, here and now

PENSANA Plc

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.

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



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.

Pensana Chairman Paul Atherley with Equinor President and CEO Anders Opedal

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 - Mine plan schedule and pit optimisation

SRK - Mineral resource estimates & geotechnical

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