Leading Edge Materials

Metals and mining

9 February 2026

Meeting Europe's rare earths challenge

Europe needs a long-term, secure source of rare earths and, increasingly, Greenland does not look like the answer. Rare earths are now clearly geopolitical, and, like the US, Europe will need 'in the ground' sources in safe jurisdictions where investors are willing to commit capital. Rare earth elements (REEs) are needed for decarbonising power grids, electric vehicle (EV) production, defence applications and robotics. Our analysis indicates that Leading Edge Materials' (LEM's) Norra Kärr deposit in Sweden has the potential to supply all of Europe's heavy rare earth element (HREE) needs, and this is likely to become more obvious as its development progresses and processing and offtake routes mature. In this note we look broadly at Europe's strategy to meet its HREE needs in what is, even for mining, a volatile sector.

The REEs landscape

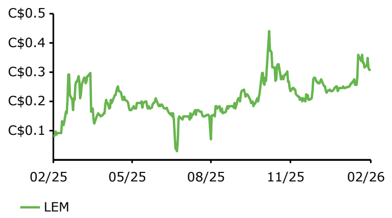
REEs are essential components of permanent magnets, which are used in EV drivetrains, wind turbines and industrial motors. They also have defence applications (eg drones) and, importantly for the future, uses in robotics. The REE supply chain is geopolitical because it is concentrated. China represents 60–70% of global mining, c 90% of separation and refining, and more than 90% of permanent magnet manufacturing. This dominance is the result of economics and industrial choices over recent decades, not scarcity or geology. The US is now responding to China's dominance with an integrated mine-to-magnet approach domestically and is eyeing international opportunities, while Europe has set up the Critical Raw Materials Act (CRMA), with 2030 strategic raw materials targets of 10% extraction, 40% processing and 25% recycling. The CRMA also sets a concentration risk test of no more than 65% at any relevant processing stage from a single third country. Its first wave of strategic projects included some rare earths, but mostly mid- and downstream operations and non-European mining, which does not fully solve long-term security where mining is key. Deposits inside Europe that can credibly supply magnet materials are limited and although Greenland is near Europe, it is now geopolitically complex.

The Norra Kärr deposit

LEM's Norra Kärr deposit in Sweden is critical for European HREE supply. We estimate current European dysprosium (Dy) demand to be 180–200tpa of Dy_2O_3 and global demand is 1,800–2,000tpa. Norra Kärr's disclosed preliminary economic assessment (PEA, August 2021) outputs are similar to European consumption, with average annual Dy_2O_3 of 248t and Tb_2O_3 of 36t within recovered total rare earth oxides (TREO) of 5,341t and magnetic REO (MREO) of 1,005t. Norra Kärr is unique in that it is European (excluding Greenland) and weighted towards HREEs. We have yet to provide a valuation or estimates for LEM. We intend to follow up with more detail on its corporate structure and strategy, but in this note we focus on how the Norra Kärr deposit fits into the broader REE landscape.

Price	**C$0.33**
Market cap	**C$80m**

Share price performance



Share details

Code	LEM
Listing	TSXV
Shares in issue	250.6m
Net cash/(debt) as at 31 October 2025	C$1.9m

Business description

Leading Edge Materials Corp is a Canadian public company focused on developing a portfolio of critical raw material projects within the European Union, including: in Sweden, the 100% owned Norra Kärr Heavy Rare Earth Element project, recognised as one of Europe's most significant deposits of heavy rare earth elements crucial for permanent magnets, and the 100% owned Woxna Graphite mine; and, in Romania, the Bihor Sud Nickel-Cobalt exploration alliance.

Bull points

- Norra Kärr is the only significant HREE deposit in Europe.
- REEs are likely to attract government support.
- Norra Kärr is large enough to meet all of Europe's HREE needs.

Bear points

- REEs have a history of volatility.
- Licensing and development funding can cause delays.
- Processing solutions need to be found for new REE mines.

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Europe's rare earth problem

There are 17 REEs (see Appendix), but only a handful are critical for high-performance permanent magnets. For NdFeB magnets, the volume drivers are the light rare earths neodymium and praseodymium (NdPr), while the HREEs dysprosium (Dy) and terbium (Tb) are added in smaller amounts to improve coercivity and maintain performance at higher operating temperatures, which is especially important for EV traction motors. Power generation is based on electromagnetic induction: when a conductor moves through a magnetic field, a voltage is induced, and while generators and motors can be built without rare earth permanent magnets, high-strength permanent magnets can improve efficiency and reduce size and weight. This is why they feature in key parts of the energy transition, including wind turbines, electric mobility and robotics. Rare earths have niche defence applications (eg NdFeB magnets are used in systems such as radar, guidance and aircraft actuation and small powerful magnets enable lightweight military drones) and magnet materials are strategically important for robotics. As part of an integrated value chain strategy, Europe will need supply chains that remain resilient under geopolitical stress.

Geopolitics and industrial policy are now needed

The rare earths supply chain is heavily concentrated in China. It is estimated China accounts for c 60–70% of global rare earth mining, c 90–91% of separation and refining, and more than 90% of permanent magnet manufacturing. This dominance is driven less by geology and more by historical and economic factors. Through the 1980s and 1990s, rare earth demand was dominated by relatively low-growth applications, with magnet demand becoming the strategic driver later. In this earlier period, China displaced much of the Western industry on cost. Cheap capital and labour, along with looser environmental enforcement, made it uneconomic for Western producers to sustain capacity or build new mines. The main REE producer, Molycorp, which operated the Mountain Pass Rare Earth Mine in California, filed for Chapter 11 bankruptcy in June 2015. It relisted as MP Materials (NYSE: MP) in 2020, has a market capitalisation of c US$11bn and includes the US Department of War (formerly the Department of Defense), General Motors and Apple among its strategic partners. In July 2025, MP Materials announced a public-private partnership with the United States Department of War, including $400m of equity and a $150m loan, to accelerate a domestic rare earth magnet supply chain. MP Materials is not alone – in January 2026, USA Rare Earth (Nasdaq: USAR) announced it had signed a non-binding letter of intent with the US Department of Commerce's CHIPS Program, covering $277m of proposed federal incentives and a $1.3bn proposed senior secured loan.

Supply is no longer governed by economics alone; policy is becoming as important, with governments and end-users actively trying to build value chains that exclude China. The geopolitical supply risk is not theoretical as rare earths have clear precedents as a policy tool, most notably the widely reported 2010 export interruption to Japan following a marine incident. This was followed by a World Trade Organization (WTO) dispute, in which China's export restrictions on REEs were ruled inconsistent with WTO rules in 2014 after complaints by the US, EU and Japan. In April 2025, China announced new export controls covering categories that included Dy and Tb, and prices for Dy_2O_3 and Tb_4O_7 spiked in the immediate aftermath. More recently, China has expanded export controls on rare earth-related products, equipment and technologies, including measures announced on 9 October 2025, which reinforces the strategic risk around licensing and access.

REEs are a small industry by revenue compared with bulk commodities such as copper or iron ore (a few billion dollars per year versus hundreds of billions of dollars for iron ore and copper), but they sit at critical choke points in modern industrial systems.

Sizing the heavy problem: How much Dy and Tb does Europe need?

Dy and Tb are generally classified as HREEs. As described above, they raise coercivity, with the trade-off being cost and scarcity (NdPr oxide prices are US$90/kg at present, against Dy_2O_3 prices of US$210/kg and Tb_2O_3 prices of US $890/kg). NdPr typically accounts for 30–35% of the rare earth basket in global deposits, whereas Dy and Tb make up 1–2% and are therefore more expensive. This is why magnet makers have spent years reducing HREE loading through design, grain boundary diffusion and tighter thermal management.

Data limitations make rare earth market estimation, particularly for individual elements, challenging. On our estimates, global Dy demand is c 1,800–2,000t Dy_2O_3 per year. We estimate Europe accounts for 8–10% of global demand (c 180–200tpa Dy_2O_3), broadly consistent with Europe's share of end-use manufacturing. This also broadly reconciles with a bottom-up sense-check using Dy intensity assumptions for European EV traction motors and permanent magnet wind turbines.

Europe's rare earth strategy and policy levers

Europe needs a secure source of REEs, and, in particular, the four magnet metals mentioned above (Nd, Pr, Dy and Tb). While this is recognised, and processing and downstream projects are now being considered, ultimate security means 'metal in the ground' (ie a secure, mined supply). Processing, separation, metals, recycling and magnet plants in Europe matter, but, in our view, do not form complete security of supply unless they are anchored to a European mine feed. We examine EU policy initiatives below to highlight the fundamental strategic need for REE projects in Europe, rather than an evaluation of the merit of the projects included to date.

The CRMA is the EU's core policy initiative. The Act came into force in May 2024 (Regulation (EU) 2024/1252) and sets out 2030 strategic raw materials targets. These are:

- 10% of annual consumption from EU extraction;
- 40% from EU processing;
- 25% from EU recycling; and
- a concentration risk test of no more than 65% of EU annual needs at any relevant processing stage coming from a single third country.

Rare earths for permanent magnets are explicitly within its scope, but the Act does not set separate quotas for NdPr or DyTb. The CRMA's delivery mechanism is biased towards the parts of the chain that Europe can move fastest. Europe can, and is, accelerating separation, refining, recycling and magnet manufacturing faster than it can permit and finance new mines (which face the traditional gating, licensing and development challenges). This is clear in the first wave of implementation. The first strategic projects call closed on 22 August 2024 and attracted 170 applications. The commission adopted the first EU list (47 projects) in March 2025, followed by a non-EU list in June 2025. Selection is criteria-based, with emphasis on supply-security contribution, feasibility and credible deliverability.

European incumbents and strategic projects

Europe does not have any existing material REE mine production and, with the exception of Greenland, no country is represented in the United States Geological Survey (USGS) (see Exhibit 1 below). Current global production is dominated by China, the US, Australia and South-East Asia. Most of the South-East Asian mine supply is processed and separated in China.

Exhibit 1: USGS Global Mine Output and reserves of REEs

	Mine production 2024 (t)	Reserves (t)
United States	45,000	1,900,000
Australia	13,000	5,700,000
Brazil	20	21,000,000
Burma	31,000	NA
Canada	0	830,000
China	270,000	44,000,000
Greenland	0	1,500,000
India	2,900	6,900,000
Madagascar	2,000	N/A
Malaysia	130	N/A
Nigeria	3,000	N/A
Russia	2,500	3,800,000
South Africa	0	860,000
Tanzania	0	890,000
Thailand	3,000	4,500
Vietnam	300	3,500,000
Other	1,100	
World total (rounded)	**390,000**	**>90,000,000**

Source: USGS

Europe has some incumbent processing plants, but the most visible progress to date is in the mid- and downstream segments of the supply chain: separation and refining capacity, recycled feedstock processing, specialist alloys and magnet manufacturing operations.

- European speciality chemicals group Solvay (Euronext Brussels/Paris: SOLB) is the major European player, with a history of rare earth processing at its **La Rochelle plant in France**. It historically produced rare earth-based formulations for catalysis, automotive emissions control, polishing and electronics. The site's output declined as Chinese separation capacity expanded. Solvay is now repositioning La Rochelle toward magnet value chains: in April 2025 it inaugurated a dedicated production line and began deliveries of rare earth materials for permanent magnets, framing this as a first step toward supplying 30% of Europe's permanent magnet rare earth oxide demand by 2030. Its feedstock strategy is explicitly 'diversified and recycled', with a non-binding 2022 memorandum of understanding for an initial 2,500tpa of mixed rare earth carbonate from the Yangibana joint venture (Wyloo 60%, Hastings 40%) (Australia) into La Rochelle, alongside announced recycling partnerships (including with Cyclic Materials).
- Neo Performance Materials (TSX: NEO) owns **NPM Silmet in Sillamäe, Estonia**, which had a long history as a Soviet-era site for rare earths. Neo now describes the operation as the EU's only operating commercial rare earth separation plant. It is expanding this into a local 'separation-to-magnet' hub via its Narva sintered NdFeB magnet plant (2,000tpa initial capacity, planned scale-up to 5,000tpa) plus an announced Dy and Tb oxide capability. Silmet has historically sourced the majority of its rare earth feedstock from a Russian supplier, but now seeks to diversify, including a US-to-Europe monazite route with Energy Fuels (mixed rare earth carbonate shipped to Silmet for separation) and non-binding offtake frameworks with Hastings (Yangibana, Australia) and Meteoric (Caldeira, Brazil).

The operations above are the historical processing plants based in Europe. The constraint will likely be feedstock and ultimately a European separator can only be as secure as its concentrate supply. A European heavy oxide project built around recycled magnets can only be as secure as scrap availability and as scalable as the recycling loop in the relevant time window. A European magnet plant can only be as strategic as the stability of upstream oxide, metal and alloy supply.

Exhibit 2: EU CRMA strategic projects – REEs

Value chain step	Project	Country	Role	Target products	Scale/timing (selected)
Processing	CAREMAG (Carester)	France	Separation/refining + recycling integration	NdPr, Dy, Tb oxides; boron (met grade)	Recycle c 2,000tpa magnets; refine c 5,000tpa concentrates; outputs cited c 800tpa NdPr and c 600tpa Dy+Tb; late-2026 start
Processing	Puławy REE Separation Plant (Mkango)	Poland	Separation/refining node (NdPr + HREE stream)	NdPr oxides/didymium; HREE-enriched carbonate; La-Ce carbonate	Initial c 2,000tpa NdPr oxides (and/or didymium) + HREE carbonate containing c 50tpa Dy+Tb (plus La-Ce)
Magnets/short-loop	MagFactory (MagREEsource)	France	Short-loop recycling + magnet manufacturing	Recycled magnet powder / permanent magnets	500tpa start-up; ambition to open 2027 (some sources cite ramp to 1,000tpa by 2030)
Recycling	INSPIREE (Itelyum)	Italy	Hydromet recycling to REE products	REE oxides/carbonates from spent magnets	Objective 2,000tpa permanent magnets; start with 500tpa spent magnets; LIFE project October 2023 to March 2027
Integrated	ReeMAP: Malmberget + Per Geijer + Luleå (LKAB)	Sweden	Integrated extraction components + processing (Luleå)	Rare earth elements for magnets	Demonstration plant; late-decade timing in public reporting

Source: EU CRMA, Edison Investment Research

Two non-European mines (Songwe Hill in Malawi and Zandkopsdrift in South Africa) were included in the first CRMA strategic projects list (47 projects) in March 2025. Both appear further advanced on paper, with Songwe Hill having a definitive feasibility study (DFS) and Zandkopsdrift a pre-feasibility study (PFS). That said, Norra Kärr has a longer technical lineage than the PEA label implies and the current focus is driven as much by permitting as by engineering.

Although Songwe Hill and Zandkopsdrift are included in the CRMA list, we note that they are relatively light in HREEs and, critically, not located in Europe. LEM could seek CRMA reconsideration, but the more direct route may be to progress through Sweden's domestic licensing pathway rather than via the EU, as Sweden is trying to shorten mine permitting timelines. In an interview with SVT (26 September 2025), Deputy Prime Minister Ebba Busch argued for a single-threaded process: 'På det sättet kan vi få en sammanhållen tillståndsprocess med en myndighet' ('That way we can have a coherent permitting process with one authority'). The government states it intends to establish a new environmental permitting authority during 2027 to make permitting more coordinated and predictable, including consolidating responsibilities that are currently spread across multiple bodies. In January 2026 the government received proposals to shorten environmental permitting and appeals processes.

A full comparison of REE distribution across these projects (and including Greenland) is included in Exhibit 4. Norra Kärr is unique in that is it European (excluding Greenland) and weighted towards HREEs.

Exhibit 3: Norra Kärr versus CRMA non-European mining projects

Project	Norra Kärr	Songwe Hill	Zandkopsdrift
Country/region	Sweden	Malawi	South Africa
Owner/operator	Leading Edge Materials (100%)	Mkango Resources	Frontier Rare Earths
Deposit type/REE host	Peralkaline nepheline syenite; REE mainly in eudialyte-group minerals (also Zr, Nb by-product potential)	Carbonatite-hosted; REE minerals include synchysite/apatite (per company)	Carbonatite-style REE-Mn deposit (per company disclosures)
Latest study stage (public)	PEA (Aug 2021, NI 43-101); earlier NI 43-101 PFS (Jan 2015, amended / restated Jul 2015) exists but is effectively superseded by the 2021 redesign and the permitting reset.	Definitive feasibility study filed (2022)	PFS completed (company statements); permitting claimed complete
Resource/reserve headline	Inferred resource: 110Mt at 0.50% TREO; by-product grades include c 1.7% ZrO_2 and c 0.05% Nb_2O_5	Feb 2019 MRE; 1.0% TREO cut-off): M+I 21.0Mt at 1.41% TREO; Inferred 27.5Mt at 1.33% TREO.	Reserves: 789,000t REO at 1.92% REO (implies c 41Mt ore) + 1,977,000t MnO at 4.81% MnO (company table)
HREE/magnet mix signal	HREO c 52% of TREO; relatively high Y and HREE share vs typical LREE-dominant deposits	HREO share c 7% of TREO (company definition includes Y + HREE); Nd_2O_3 c 16% of TREO in 2012 estimate	Very LREE-heavy (Ce+La dominate); Nd c 16%, Pr c 4.6%, Dy+Tb <1% each in company distribution table

Source: Leading Edge Materials, Edison Investment Research

Greenland: Rare earth optionality, but secure?

Greenland can provide optionality for rare earth supply chains near Europe, but arguably can no longer be considered secure for geopolitical reasons. At the time of writing, the US Trump administration had stated that it wishes to control Greenland, either by purchasing it from Denmark or via other means. From a strictly mining perspective, this is likely to create supply bottlenecks. Mines typically take many years to develop (licensing, financing, design etc) and the recovery of the capital employed can extend to decades. Any risk to title will immediately raise the cost of capital, and this has arguably now occurred for Greenland, and is unlikely to reverse quickly. In all likelihood, the only rapid development path now feasible for any mining project in Greenland is via US control of Greenland. This, of course, would mean that the deposits are of no strategic value to Europe.

We list the currently known key projects versus Norra Kärr along with key metrics in Exhibit 4 below. Mineral resource estimate (MRE) refers to the reported tonnage and grade of a defined resource (inferred/indicated/measured), distinct from proved and probable ore reserves. Key points for the relevant Greenland projects are:

- **Kvanefjeld (Kuannersuit)**: The project is held by Energy Transition Minerals (ASX: ETM; formerly Greenland Minerals). It is a large REE plus uranium deposit, with feasibility study reserve metrics showing total ore reserves of 108Mt (43Mt proved, 64Mt probable) at 1.43% TREO and 362ppm U_3O_8. Development is constrained by permitting and uranium policy, including Greenland's 100ppm uranium threshold, and the government of Greenland's final decision rejecting the exploitation licence application dated 1 June 2023. Subsequent arbitration developments and rulings remain a key constraint.
- **Tanbreez (Kringlerne)**: Tanbreez is held via Tanbreez Mining Greenland, with Critical Metals Corp (Nasdaq: CRML) disclosing a 42% interest and the right to increase this to 92.5% under an amended agreement announced in September 2025. The PEA was completed on 31 March 2025, and refers to the 30-year exploitation licence granted on 13 August 2020 to Tanbreez Mining Greenland. The headline MRE estimate is commonly cited at c 45Mt at c 0.38% TREO, with meaningful HREE exposure plus zirconium (Zr) and niobium (Nb) co-products. The public concept emphasises on-site physical concentration (dry magnetic separation), with downstream chemical processing offshore.
- **Sarfartoq (ST1 Zone):** Sarfartoq is held through Neo North Star Resources, a vehicle majority owned by Neo Performance Materials, and includes an offtake framework that gives Neo's Silmet operation the right to purchase up to 60% of future ore or concentrate. Neo's disclosures reference a historical inferred resource estimate for the ST1 Zone (2011) of 14.1Mt at 1.51% TREO. This deposit through ownership is potentially linked to Neo's European midstream footprint and disclosure is now dated.
- **Motzfeldt (Aries):** Motzfeldt is being acquired by Alba Mineral Resources (AIM: ALBA) through staged steps toward a 51% controlling interest, with an initial 25.5% interest completed in October 2025. It is a polymetallic Nb-Ta-Zr-REE system rather than a pure REE project: Alba cites a JORC inferred MRE headline for the Aries deposit of 340Mt containing 884kt TREO, alongside meaningful Nb, tantalum (Ta) and Zr content.

Exhibit 4: Distribution of REEs within baskets: Greenland, Sweden and EU CRM projects

Element (share of TREO, %)	Norra Kärr (Sweden)	Kvanefjeld/Kuannersuit (Greenland)	Kringlerne/Tanbreez (Greenland)	Sarfartoq ST1 (Greenland)	Motzfeldt/Aries (Greenland)	Songwe Hill (Malawi)	Zandkopsdrift (South Africa)
La	10.0	27.4	17.7	21.6	24.0	24.6	25.4
Ce	21.0	41.8	33.2	49.9	39.0	44.6	44.0
Pr	**3.0**	**4.2**	**3.2**	**5.8**	**4.0**	**4.8**	**4.6**
Nd	**11.0**	**12.8**	**12.2**	**18.8**	**12.0**	**16.4**	**15.9**
Sm	3.0	1.6	2.3	1.9	2.0	2.4	2.3
Eu	0.4	0.1	0.3	0.4	0.0	0.6	0.6
Gd	3.0	1.1	2.6	1.0	2.0	1.4	1.4
Tb	**0.7**	**0.2**	**0.5**	**0.1**	**0.0**	**0.2**	**0.2**
Dy	**5.0**	**1.1**	**2.9**	**0.2**	**2.0**	**0.8**	**0.8**
Ho	1.0	0.2	0.6	0.0	0.0	0.1	0.0
Er	3.4	0.6	2.4	0.0	0.0	0.3	0.0
Tm	0.5	0.1	0.3	0.0	0.0	0.0	0.0
Yb	3.3	0.5	2.0	0.0	0.0	0.2	0.0
Lu	0.5	0.2	0.3	0.0	0.0	0.0	0.0
Y	34.0	7.6	19.4	0.4	12.0	3.7	0.0
Other	0.2	0.5	0.0	0.0	3.0	0.0	4.8

Source: Leading Edge Materials, Edison Investment Research.
Note: Percent shares are taken from public sources; in some cases derived from oxide grade distributions or ppm tables. Where sources use CeO2/Pr6O11/Tb4O7 we mapped to element shares without oxide-to-oxide conversion. 'Other' is balancing item.

Exhibit 5: Norra Kärr versus Greenland projects: key attributes

Project	Norra Kärr	Kvanefjeld/Kuannersuit	Kringlerne/Tanbreez	Sarfartoq (ST1)	Motzfeldt (Aries)
Country/region	Sweden	Greenland	Greenland	Greenland	Greenland
Owner/operator	Leading Edge Materials (100%)	Energy Transition Minerals (licence holder; formerly Greenland Minerals)	Critical Metals (via Tanbreez Greenland)	Neo Performance Materials	Alba Mineral Resources (acquiring 51% stake; earlier Stallion/Regency materials)
Deposit type/REE host	Peralkaline nepheline syenite; REE mainly in eudialyte-group minerals (also Zr, Nb by-product potential)	Ilímaussaq alkaline complex; REE in steenstrupine (REE-U-Zn-F system)	Peralkaline intrusion; eudialyte-bearing kakortokite (REE-Zr-Nb)	Carbonatite; bastnäsite/monazite-style LREE mineralisation	Multi-element alkaline centre (Nb-Ta-Zr-REE); Aries prospect has TREO plus Nb/Zr/Ta
Latest study stage (public)	PEA (Aug 2021, NI 43-101); earlier NI 43-101 PFS (Jan 2015, amended/restated Jul 2015) exists but is effectively superseded by the 2021 redesign and the permitting reset.	Feasibility work published; exploitation licence process disputed/stalled	PEA (Mar 2025) + TRS (Mar 2025)	PEA (2011)	Inferred resource (historic); scoping/PEA work flagged in investor materials
Resource/reserve headline	Inferred resource: 110Mt at 0.50% TREO; by-product grades include c 1.7% ZrO_2 and c 0.05% Nb_2O_5	Resource (Feb 2015): Kvanefjeld 673Mt at 1.10% TREO (project total c 1.01Bt at c 1.0–1.1% TREO)	PEA/TRS resource: Indicated 25.4Mt at 0.37% TREO; Inferred 19.5Mt at 0.39% TREO	Resource (example, ST1): c 5.88Mt Indicated at 1.77% TREO and 2.46Mt Inferred at 1.59% TREO (1% cut-off)	Historic inferred resource (2012): 340Mt at 0.26% TREO (also ZrO_2, Nb_2O_5, Ta_2O_5)
HREE/magnet mix signal	HREO c 52% of TREO; relatively high Y and HREE share vs typical LREE-dominant deposits	Grade distribution implies LREE-heavy but with meaningful Y and some HREE; multi-element (U, Zn) is material	Company materials often cite meaningful Y/HREE component (historic); composition used here is from literature citing Tanbreez data	Very LREE-dominant (Ce, La, Nd, Pr); limited HREE contribution in published splits	Reported basket split heavily La+Ce; modest Nd/Pr/Dy; meaningful Y contribution in company 'basket distribution'

Source: Leading Edge Materials, Edison Investment Research

Norra Kärr

The analysis above indicates that LEM's Norra Kärr deposit is the leading source of secure HREEs in Europe. It is arguably the only significant source of HREEs, as we are not aware of any similar scale projects in development, although rare earth projects can emerge.

Norra Kärr is currently progressing through Swedish licensing and permitting, with the PEA as the latest published economic study. It is a very well-understood deposit, with over 16 years of development work and a previous 2015 PFS study. This earlier PFS has now been superseded following a redesign of the footprint of the proposed mine, off-site processing and the addition of co-products (notably nepheline syenite plus Zr and Nb). Separately, the Swedish mining lease pathway was reset after the 2016 Supreme Administrative Court decision and subsequent permitting sequencing questions. In December 2025, the County Administrative Boards for Jönköping and Östergötland endorsed the new mining lease application, and LEM is now waiting for the decision. With both County Administrative Boards supportive, the decision should be handled through the Mining Inspectorate rather than being escalated to government due to conflicting regional views.

Norra Kärr has long been identified as an important rare earth source. The Geological Survey of Sweden (SGU) designated Norra Kärr as a site of national interest in 2011 and has publicly highlighted its importance for Swedish and European rare earth supply, given its high heavy rare earth content. A 2014 European Commission study on rare earths (the ERECON network report) described Norra Kärr as an advanced-stage European rare earth project and highlighted its unusually low uranium and thorium levels, while citing indicative critical-REE outputs of c 2,300tpa of yttrium (Y), 280tpa of Dy and 40tpa of Tb, which supports the strategic relevance of the deposit.

Location and setting

Norra Kärr is a rare earth and industrial minerals project in southern Sweden, close to the small town of Gränna on the eastern side of Lake Vättern, about 240km from Stockholm. The main north-south motorway runs close to the project area. Lake Vättern is roughly 1.5km away, which is why water management and footprint have been central to the project's design and the permitting debate (see below).

Discovery, geology and why it is technically different

The Norra Kärr intrusive complex has been known for more than a century. The PEA cites initial identification during Swedish geological mapping in 1906, with later industrial interest including work by Boliden in the mid-20th century. The deposit is an alkaline nepheline syenite complex. Rare earths are hosted mainly in eudialyte-group minerals, with associated Zr and Nb and a large nepheline syenite component. This not a typical bastnäsite or monazite system and metallurgy and downstream processing routes need to be established.

According to the PEA, Norra Kärr is not a single-product rare earth project. On an average annual basis, the PEA attributes around **74% of gross revenue** to rare earth oxide products, with the balance coming from co-products: **nepheline syenite (11.6%)**, **ZrO_2 (10.6%)** and **Nb_2O_5 (4.8%)**, before any toll treatment charge assumptions. Within the rare earth revenue stream, value is concentrated in the HREEs: **Dy_2O_3 (43% of REO gross revenue)**, **Nd_2O_3 (21%)** and **Tb_2O_3 (16%).**

A 25-year mining lease was granted in 2013 and later revoked by Sweden's Supreme Administrative Court in 2016 on procedural grounds tied to the supporting environmental assessment, which reset the permitting pathway. The PEA describes the project as still in a permitting-led phase.

What changed in the 2021 PEA design

The PEA's central redesign is to keep the mine site to physical processing only (crush, grind and magnetic separation) and move chemical processing off-site. It presents this as a way to reduce the local footprint and simplify water and tailings handling versus earlier designs. In other words, it is a deposit that is being engineered to fit a sensitive setting, rather than assuming the setting will adapt to the mine.

Norra Kärr's next priorities are licensing, permitting and downstream processing options. We see it likely that these can be advanced directly by management in conjunction with the Swedish government and potential commercial partners. The CRMA could help, but management can progress licensing and processing/offtake directly.

Exhibit 6: Norra Kärr Project

Item	Disclosed metric	Notes
Study	PEA dated 19 August 2021	PEA-level study (Aug 2021) is the current published basis. Earlier PFS-level work (2015) relates to a prior project configuration and included a reserve statement, but is treated as historic.
Mineral Resource	Inferred: 110Mt at 0.5% TREO	Resource is Inferred in the 2021 PEA; earlier PFS-era work reported a Probable Reserve in a different project configuration. By-product grades include c 1.7% ZrO_2 and c 0.05% Nb_2O_5, with nepheline syenite reported at c 65%
Heavy rare earth share	HREO stated at 52% of TREO	Definition includes Y_2O_3 plus a suite of HREE oxides.
Life of mine	26 years	Base case mine life in the PEA.
Average annual oxide outputs	TREO 5,341tpa; MagREO (Nd, Pr, Dy, Tb) 1,005tpa	Includes Nd_2O_3 578tpa, Pr_2O_3 143tpa, Dy_2O_3 248tpa, Tb_2O_3 36tpa.
By-products	Nepheline syenite c 733ktpa; ZrO_2 c 10.2ktpa; Nb_2O_5 c 0.5ktpa	Reported co-products in the PEA base case.
Economics	Pre-tax NPV_{10} \$1,026m; post-tax NPV_{10} \$762m; initial capex \$487m; post-tax IRR 26.3%	
Flowsheet concept	Mine site limited to crushing, milling and magnetic separation, with chemical processing moved off-site	The PEA frames this as a footprint and permitting response versus the earlier 2015 PFS concept.

Source: Leading Edge Materials

Exhibit 7: Location of Norra Kärr (Sweden)

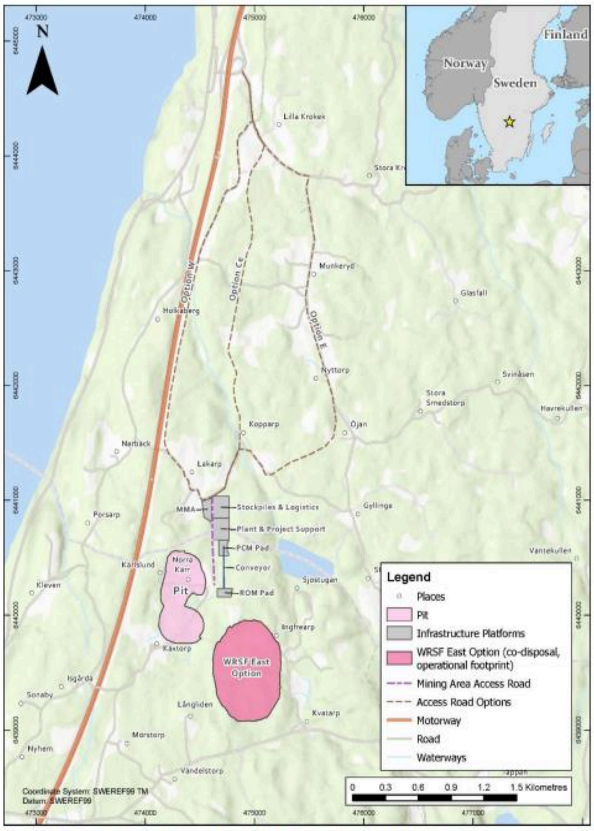

Figure ES 1: Proposed site layout and location. Insert show's location relative to the region.

Source: Norra Kärr PEA

Appendix

The term rare earths has become a generic catch-all for any mined element that is fashionably rare (in the same sense that many critical minerals are critical in the eye of the beholder, usually a specific producer lobby group). Rare earths are actually a defined set of elements (the lanthanides, atomic number 57 through 71 (see below), plus often scandium and yttrium). They are typically found together in nature and mined as a group. They are famously not rare, but not often found in economic concentrations. They are found in a broad range of mixes, and mining operations typically convert relatively small quantities of ore into a concentrate at the mine site, which then requires painstaking separation into individual rare earth compounds, typically oxides. China has come to dominate both mining and processing over the past 20 years.

Exhibit 8: Lanthanide REEs

	Rare earth element	Atomic number	Atomic symbol	Critical application
Light	Lanthanum	57	La	
Light	Cerium	58	Ce	
Light	Praseodymium	59	Pr	High strength magnets
Light	Neodymium	60	Nd	High strength magnets
Light	Promethium	61	Pm	
Light	Samarium	62	Sm	
Medium	Europium	63	Eu	
Medium	Gadolinium	64	Gd	
Heavy	Terbium	65	Tb	High strength magnets
Heavy	Dysprosium	66	Dy	High strength magnets
Heavy	Holmium	67	Ho	
Heavy	Erbium	68	Er	
Heavy	Thulium	69	Tm	
Heavy	Ytterbium	70	Yb	
Heavy	Lutetium	71	Lu	

Source: Edison Investment Research

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