DILEMMAS OF NATURAL RESOURCE-BASED DEVELOPMENT

The case of rare earths in Brazil

Can Brazil turn strategic mineral wealth into technological learning and domestic value addition?

Thomas J. Trebat • AFEE Annual Meeting Washington • January 3, 2027

Why rare earths have become strategic

Demand is growing; secure access to processing—not just ore—is the bottleneck

DEMAND

2×

Global demand for key magnet REEs, 2015–2025

+45% additional demand projected by 2030

APPLICATIONS

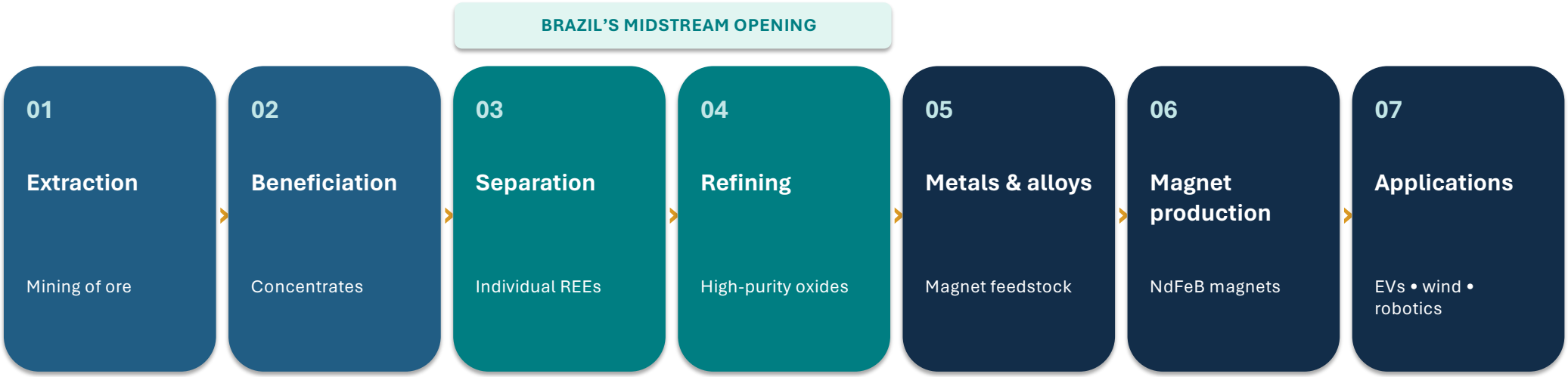
- Electric vehicles and wind turbines
- Robotics, automation and sensors
- Aviation, defense and advanced industry

Strategic magnet elements: Nd • Pr • Dy • Tb

Source: IEA (2026b), as cited in the paper

From mine to magnet: where value is added

A stylized supply chain — with Brazil's near-term midstream opportunity highlighted



Recycling returns recovered REEs to earlier stages of the chain

China: ~60% of mining; ~90% of separation/refining and magnet production (IEA 2026b).

What the next step could look like

Illustrative large-scale separation and refining infrastructure relevant to Brazil's midstream ambitions



Illustrative rendering of a rare-earth separation and refining complex; included for visual context in discussing Brazil’s possible midstream pathway.

The development dilemma: a neo-structuralist perspective

THE HISTORICAL RISK

- Enclave-style mineral extraction
- Limited technology transfer
- Few domestic industrial linkages

THE DEVELOPMENT OPPORTUNITY

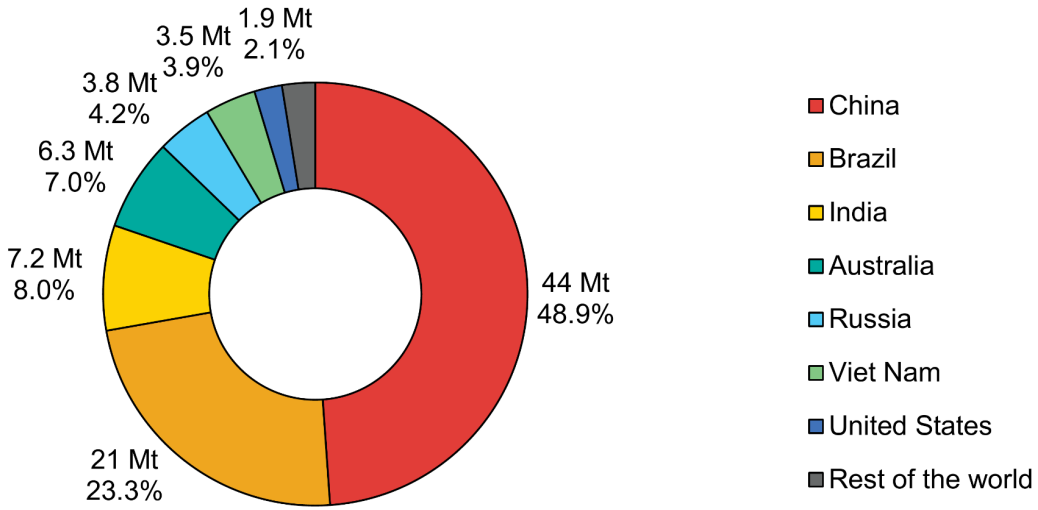
- Productive diversification
- Technological learning
- A stronger domestic supply chain

The question is not simply who mines the minerals — but who captures the value added.

Brazil has a major geological opportunity

Figure 1 • Geographic distribution of global rare earth reserves (2026)

Geographical distribution of rare earth reserves, 2026



IEA. CC BY 4.0.

Notes: The figures are estimated in terms of rare earth oxides equivalent and include all rare earth elements. The shares are based on the volume of the reserves that could be economically extracted at the time of determination. Myanmar is excluded from the chart due to lack of reliable data on reserves, but the country is one of the largest mined producers of medium and heavy rare earths.

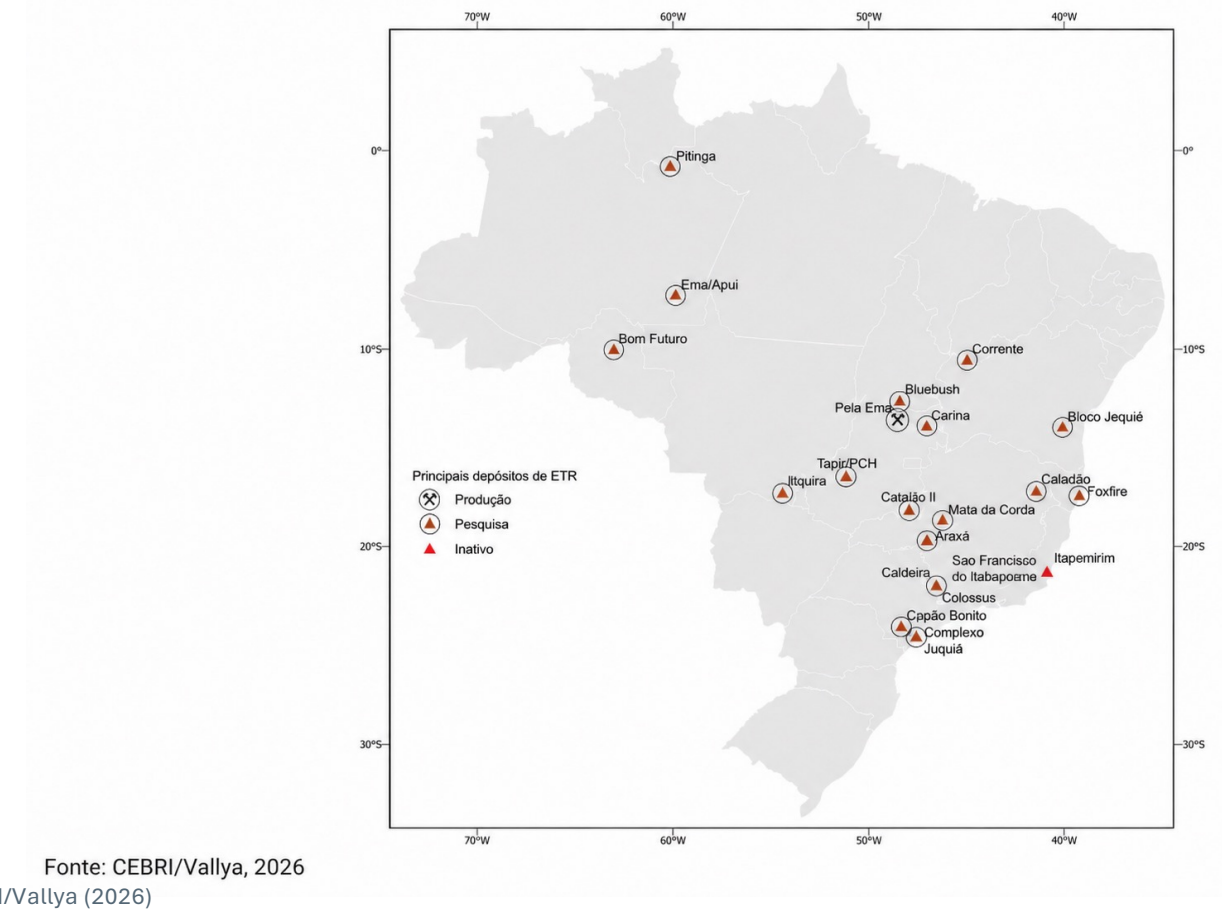
Sources: US Geological Survey (2026), Mineral Commodity Summaries; Government of India (2026), India's Rare Earth Strategy: Manufacturing, Corridors, and Global Integration.

23.3%

Brazil's estimated share of global reserves

Brazil’s deposits: breadth, but uneven maturity

Figure 2 • Principal deposits; operating, exploration and inactive sites distinguished



Fonte: CEBRI/Vallya, 2026

Map source: CEBRI/Vallya (2026)

KEY CASE

Serra Verde (Pela Ema) Goiás

Serra Verde: commercial success, industrial limits

A pioneering non-Chinese source of Nd, Pr, Dy and Tb

WHAT IT ACHIEVES

- Operating commercial mine in Goiás
- US$565m DFC financing facility
- Long-term offtake and price support
- Exports, jobs and local economic effects

WHAT IT DOES NOT YET ACHIEVE

- Little domestic separation or refining
- Most advanced processing occurs abroad
- Weak links to Brazilian manufacturing
- Limited domestic technological learning

Case study conclusion: participation in a new supply chain is not the same as domestic industrialization.

An incremental route to Brazilian industrialization

The CEBRI/Vallya study makes the midstream proposition concrete

PRIORITIZE FIRST

Separation + refining

Build competitive higher-purity intermediate products before pursuing the entire integrated chain.

ILLUSTRATIVE MODEL RESULTS

16.5% Equity IRR, base case

>30% With offtake, price floors and lower-cost financing

Conditional estimates, not guaranteed returns. Source: CEBRI/Vallya (2026), pp. 137–159.

Brazil's 2026 critical-minerals policy adds a domestic value-addition framework.

Toward a global rare earth alliance

International supply-chain security can be aligned with Brazilian development

Brazil contributes strategic deposits; partners contribute capital, technologies and markets.

Financing

Reduce project risk

Technology

Transfer processing know-how

Offtake

Guarantee purchases and prices

Domestic linkages

Anchor Brazilian downstream demand

Bottom line: secure global supply chains should create value in Brazil, not just extract value from Brazil.