

Rare Earth Element (REE) Recycling for the Permanent Magnet Industry

Corporate Presentation
January 2020



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Neodymium Oxide



Neodymium Metal



NdFeB Magnets



Electric Motors



- **2009 Geomega founded – focus on mineral exploration**
- **2011 Montviel carbonatite discovered in Quebec, Canada**
- **2012 Maiden resource estimate**
- **2013 Initial work on innovative REE separation begins**
- **2015 Largest 43-101 bastnaesite resource estimate in Canada published**
- **2015 Innord, private subsidiary created with the support of the Quebec Government. Focus on innovation in rare earths extraction and refining**
- **2015 Developed successfully an innovative hydrometallurgical process for Montviel. Low acid (HCl) and low power consumption**



- **2016 Focus switches to secondary sources in order to demonstrate technology - lower CAPEX risk than traditional mining**
- **2017 ISR technology successfully extracts and purifies Nd, Dy oxides and Co from NdFeB scrap (lab scale)**
- **2018 ISR technology 1st successful scale up (lab, 2L reactor)**
- **2019 ISR technology demonstrated in a 20L pilot**
- **Engineering begins for a demonstration plant with 1.5 tpd throughput capacity**
- **2020 Targeting initial production from the demonstration plant**

Geomega's ISR Technology

- Proprietary technology
- Environmentally safe
- Small footprint
- Low CAPEX

- Recovery of main reagents > 95%
- No liquid effluent produced
- Iron oxide as product

Other advantages:

- Works with both metallic and calcined phase of magnets
- Applicable to NdFeB and SmCo magnets
- Can process sintered and bonded magnets
- Batch process, ideal for the recycling industry
- No need to remove plating
- Can accept both magnetized and demagnetized material
- Can process rusty and broken scrap
- Currently adjusting to handle assemblies as well

ISR Technology Demo Plant

FEED study Updated Economics - production of 1.5 tons per day

Demo plant feed throughput	1.5 tpd / 8hr day
Average grade of feed stock	30% TREO (Nd, Pr, Dy, Tb)
Capital costs	\$2.6 MM
Direct operating costs	\$3 / kg of TREO
Targeted Sales	\$10 MM
Target Profit Margin	20%
Expansion potential	Up to 4.5 tpd / 24hr operation

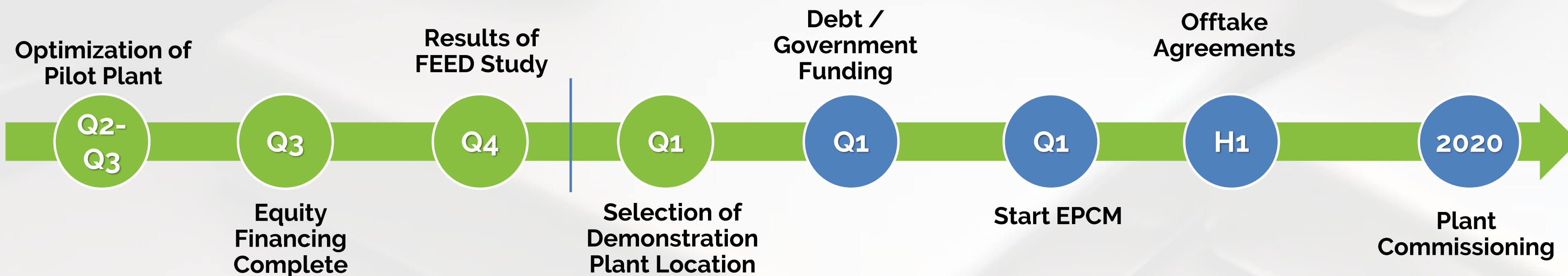
- **A brand-new industrial complex has been secured in Saint-Bruno-de-Montarville**
- **Strategic location for the first Rare Earth Magnet recycling operations in North America**
- **30 minutes from Montreal**
- **6 hours from Major North American cities (Boston, NY, Toronto)**
- **Within 30 minutes to major seaways through the Port of Montreal (access to largest container transshipment center in the Great Lakes system) and Contrecoeur marine terminal**
- **Serviced by CN and CP railways**
- **40 minutes from two airports (Trudeau & St Hubert airports)**



Upcoming Milestones

2019

2020



Feed Sourcing Contracts & Stockpiling Material – always ongoing

Primary - Magnet & Alloy
manufacturers residues



End of Life (EOL)
Bulk magnets



**Focusing on Magnet-based Feed
Grade – up to 40% REO (Nd, Pr, Tb, Dy)**



LOI with Rock Link –
100 to 200 tpy

German based specialist in
production waste and EOL recycling.



LOI with U.S. based magnet
manufacturer – 12 to 24 tpy

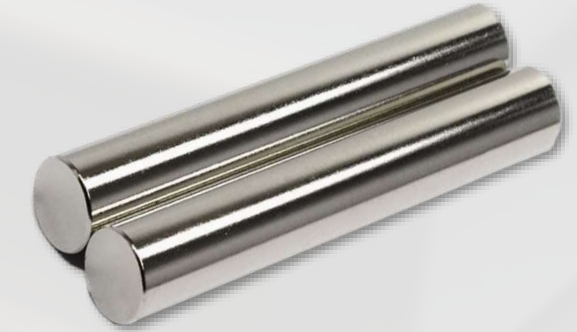


Collaboration with Comet
Traitement & U. Liege in a
Recycling Pilot study by
major EV manufacturer

Working on securing additional sources of both feed types

2018 Neodymium (NdFeB) magnet production – 160,000 tons (\$11B US)

- 15-30% waste in production = 24,000 to 48,000 tpy



Electric Vehicles – Avg. 3 kg NdFeB per EV

- 2018 sales – 2M EV = 6,000 tonnes NdFeB
- Avg. lifespan 8-10 years



Wind Power – 3MW = up to 2 tons NdFeB

- Annual growth – avg. 50,000 MW = 15,000 tpy NdFeB
- In 2017 decommissioned 650 MW and growing
- Decommissioning growth approx. 25% per year



MORE GROWTH = MORE MAGNET WASTE IN THE FUTURE

Educating the upstream recycler

- 100s to 1000s recycling & scrap companies in every country
- Most don't recognize the value of the magnet
- Magnet is considered waste and discarded with the steel
- Recycling industry always evolves towards new materials

Government Support

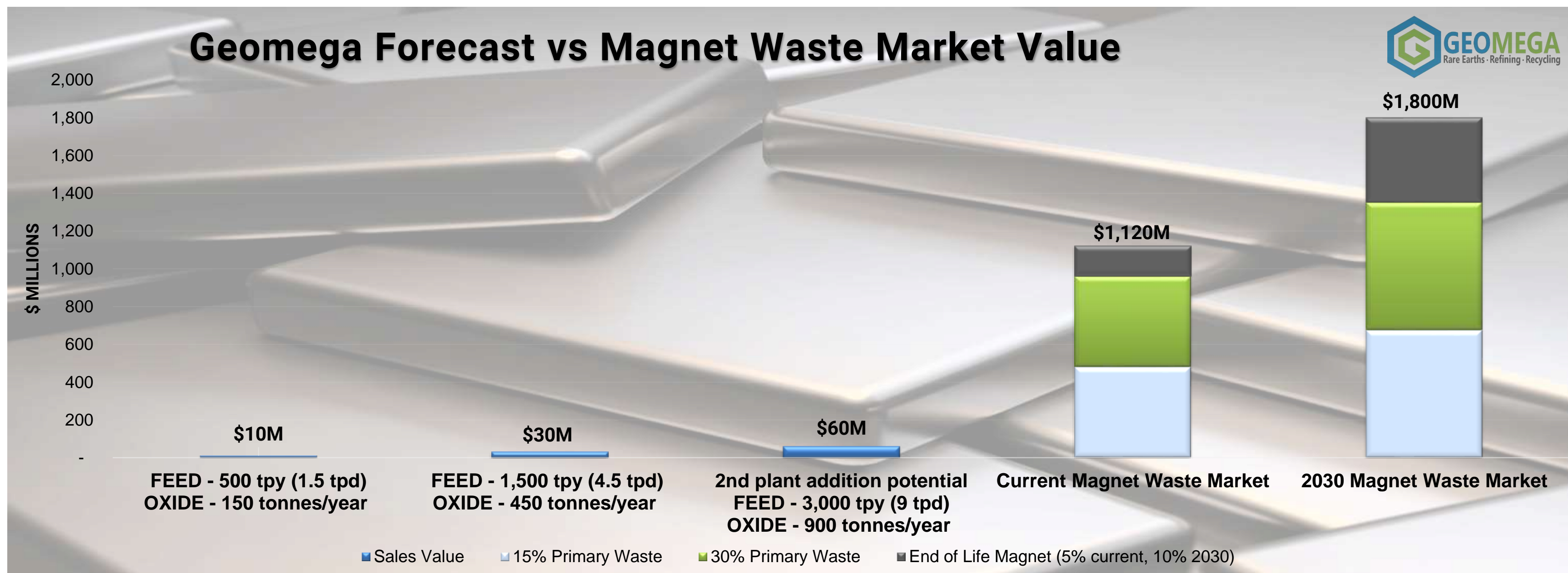
- Labeling as Critical Materials
- Regulations to mandate recovery

OEM / Major Corporations Support

- Everyone looking for a solution that is clean and cost efficient

NO BUYER / NO GOVERNMENT SUBSIDIES = NO RECYCLING

- Starting model is robust
- Growth opportunity in magnet recycling is significant
- Additional growth expected from other secondary sources



Sales Agreements

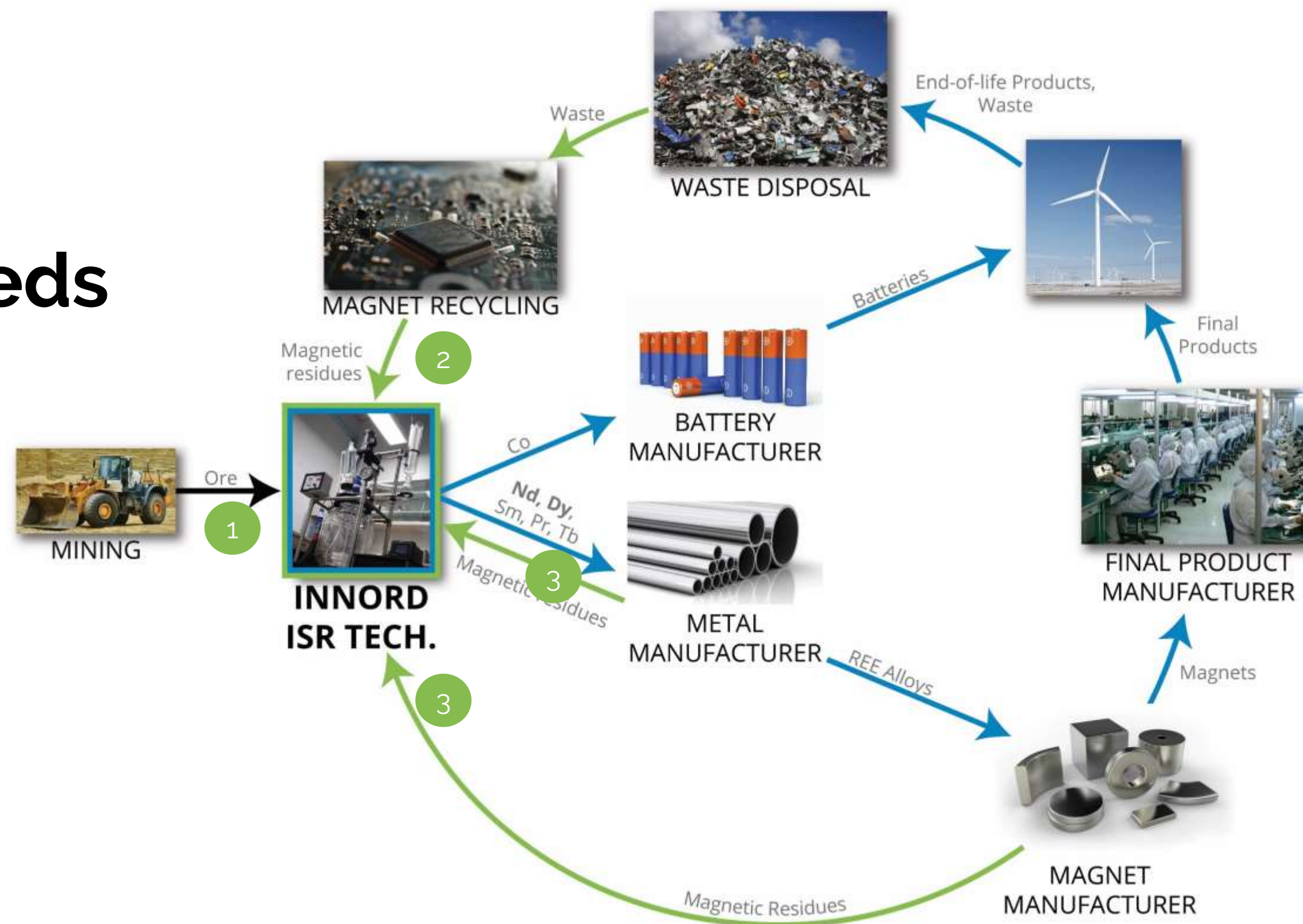


Ginger International Trade & Investment Pte Ltd ("GITI")

- Appointed official sales representative for Europe & Asia
- Singapore based, specializes in rare earths and minor metals
- Extensive network with REE manufacturers, traders and end users

Working on securing offtakes in Europe & North America

3 different feeds



Why Invest in the REE Sector?

Lanthanum 57 La 138.91	Cerium 58 Ce 140.12	Praseodymium 59 Pr 140.91	Neodymium 60 Nd 144.24	Samarium 62 Sm 150.36	Europium 63 Eu 151.96	Gadolinium 64 Gd 157.25	Terbium 65 Tb 158.93	Dysprosium 66 Dy 162.50	Holmium 67 Ho 164.93	Erbium 68 Er 167.26	Thulium 69 Tm 168.93	Ytterbium 70 Yb 173.05	Lutetium 71 Lu 174.97	Yttrium 39 Y 88.90
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15 Lanthanide elements critical to our clean tech & high tech industries

- Key demand is the permanent magnet – the driver of the renewable energy revolution & transportation electrification.
- Expected supply shortfall and increase in Magnet REE prices.



Strong demand growth in Wind Power and EV Industries

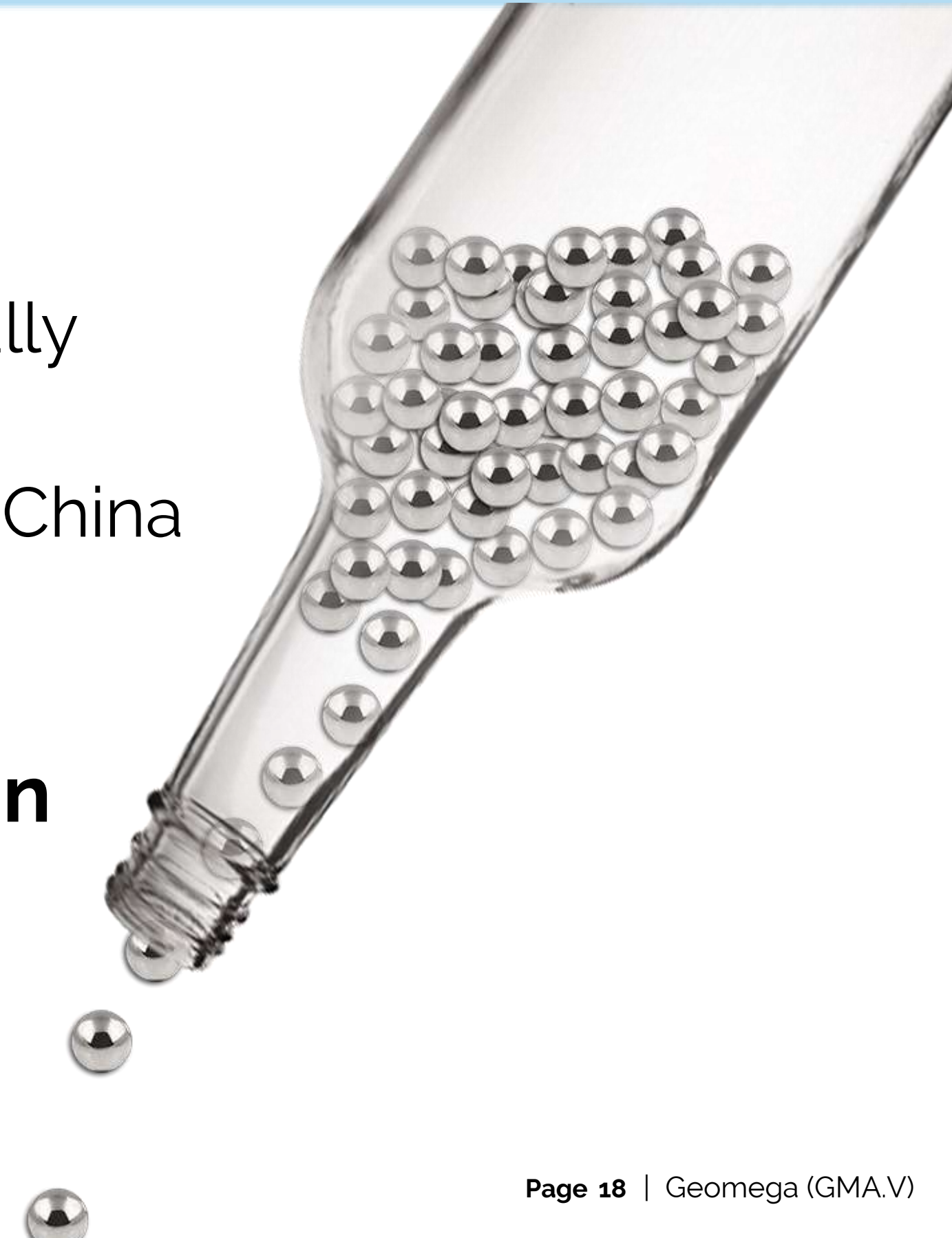


REE Industry Bottleneck – China's Chokehold

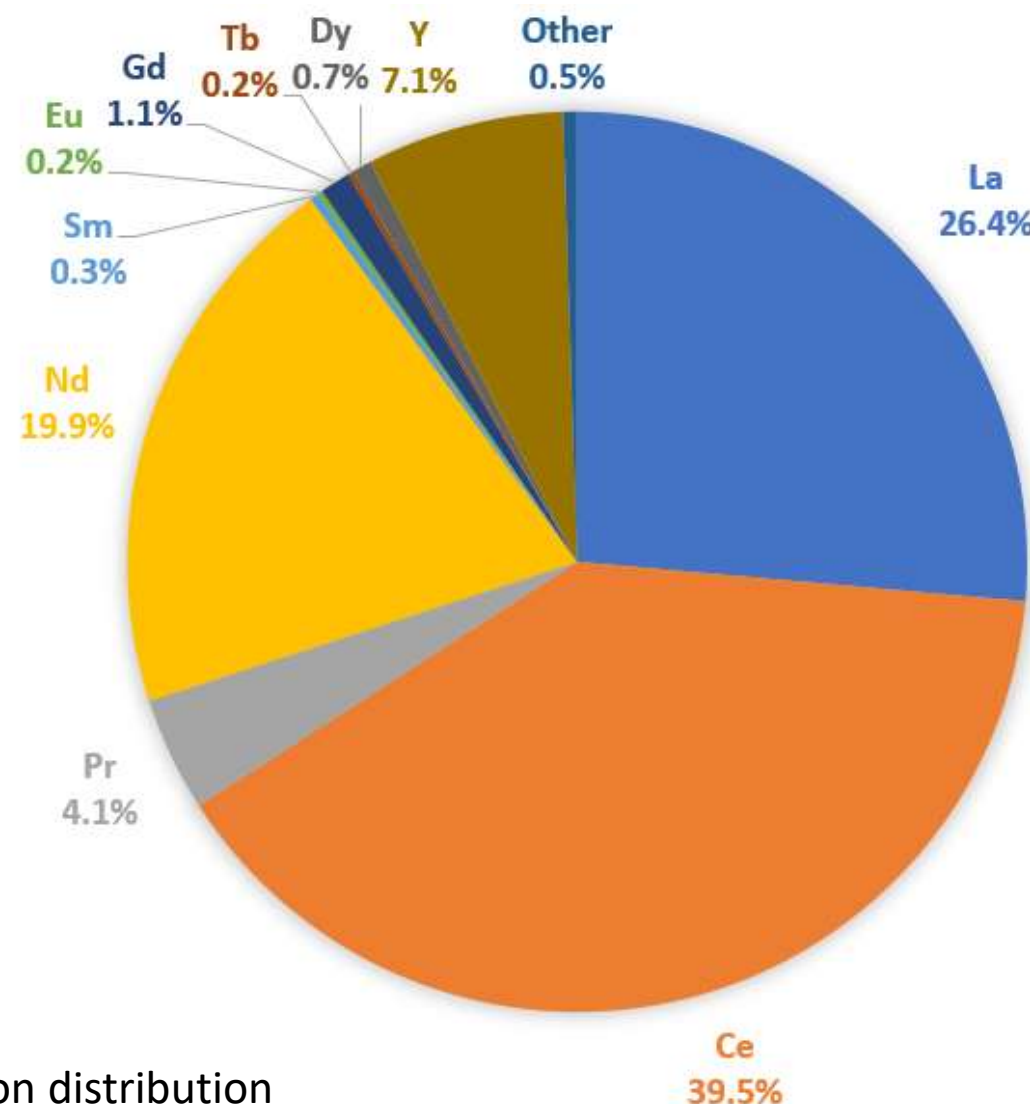
- Global REE refining capacity > 90%
- Solvent Extraction (SX)
- Solvents used in process not environmentally friendly
- High CAPEX & difficult to permit outside of China

Result:

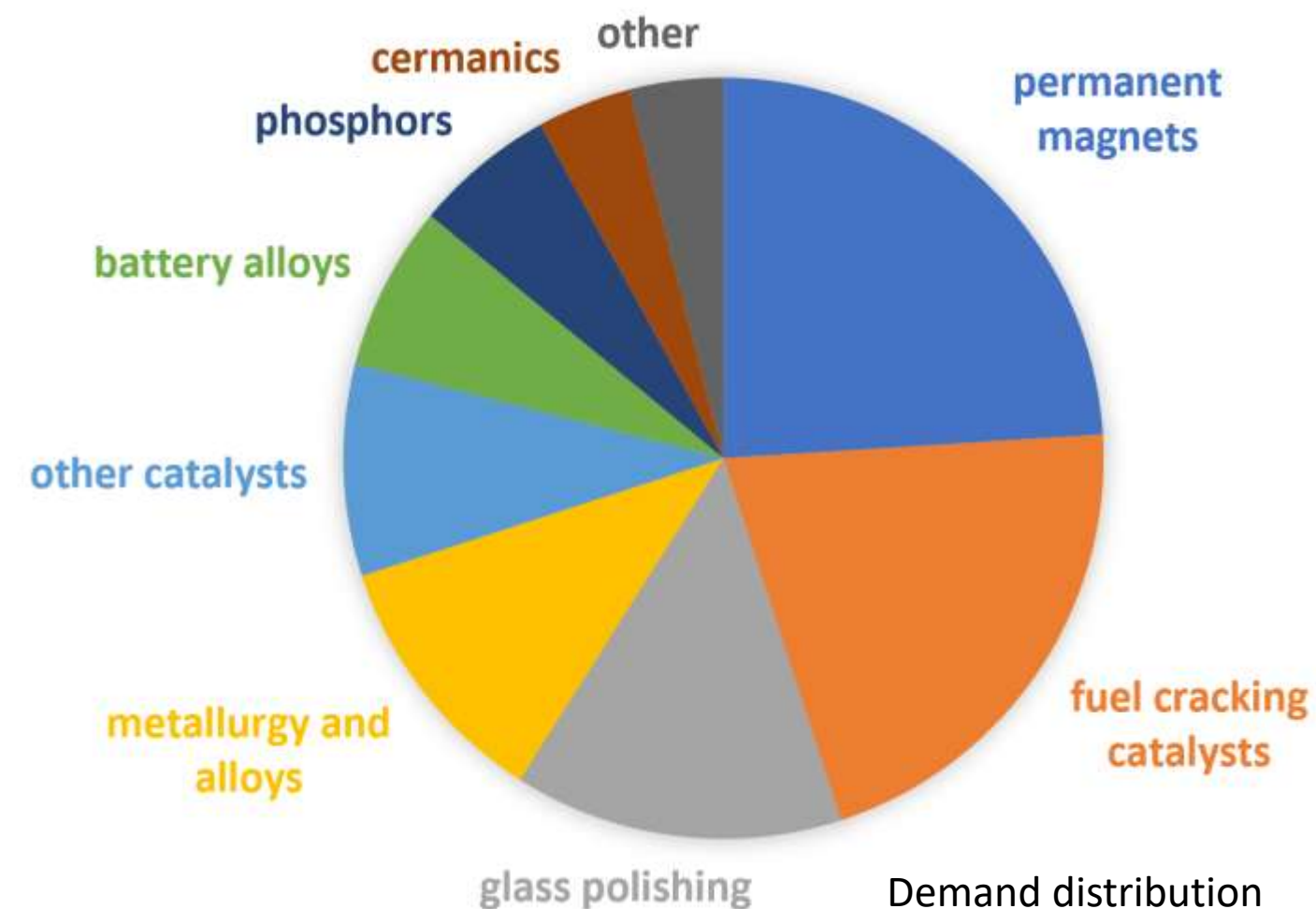
REE consumer is >85% in China & Japan



REE Production vs Usage



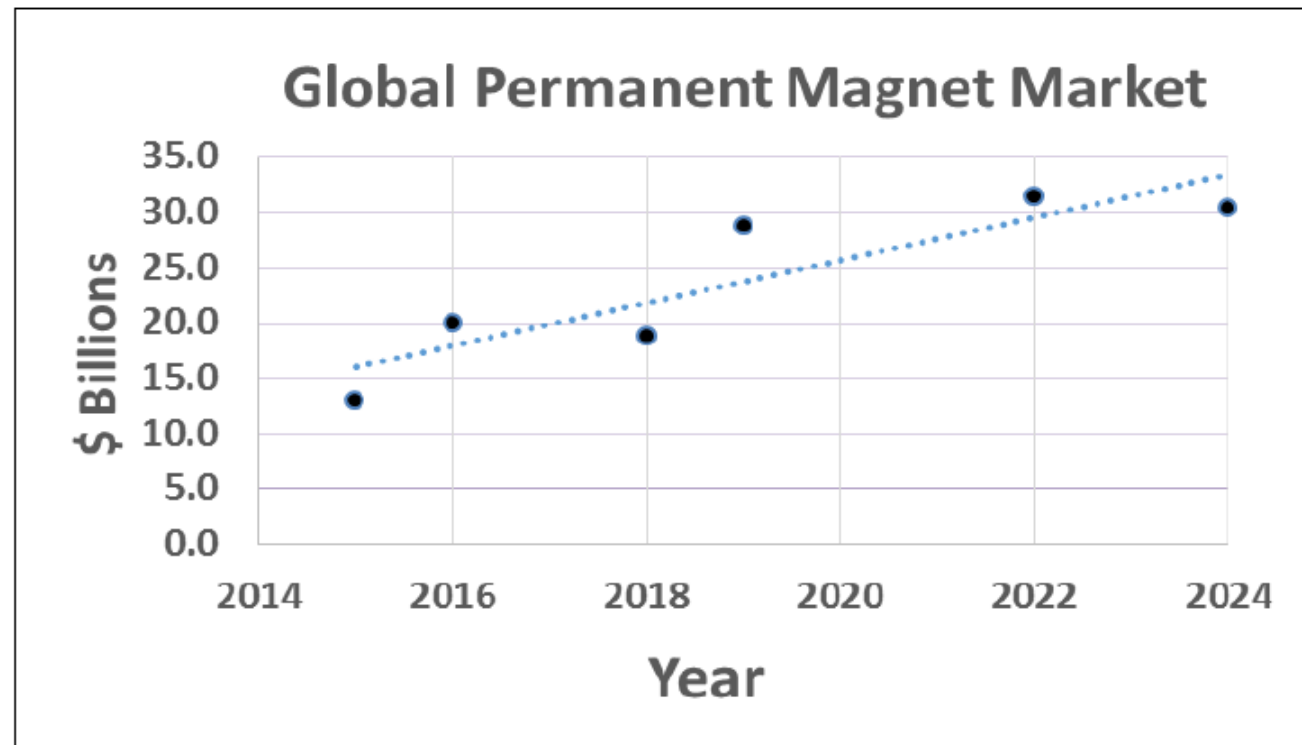
Production distribution
Source: British Geological Survey



Demand distribution
Source: Natural Resources Canada

- **Production distribution approximates the global demand for key uses (e.g. magnets)**
- **REE market evaluated at \$8B US in 2018, expected to reach \$14B in 2025 (CAGR 8.6%)**
- **Nd, Pr, Dy, Tb combine for approx. 30% of demand but 80% of the REE market value**

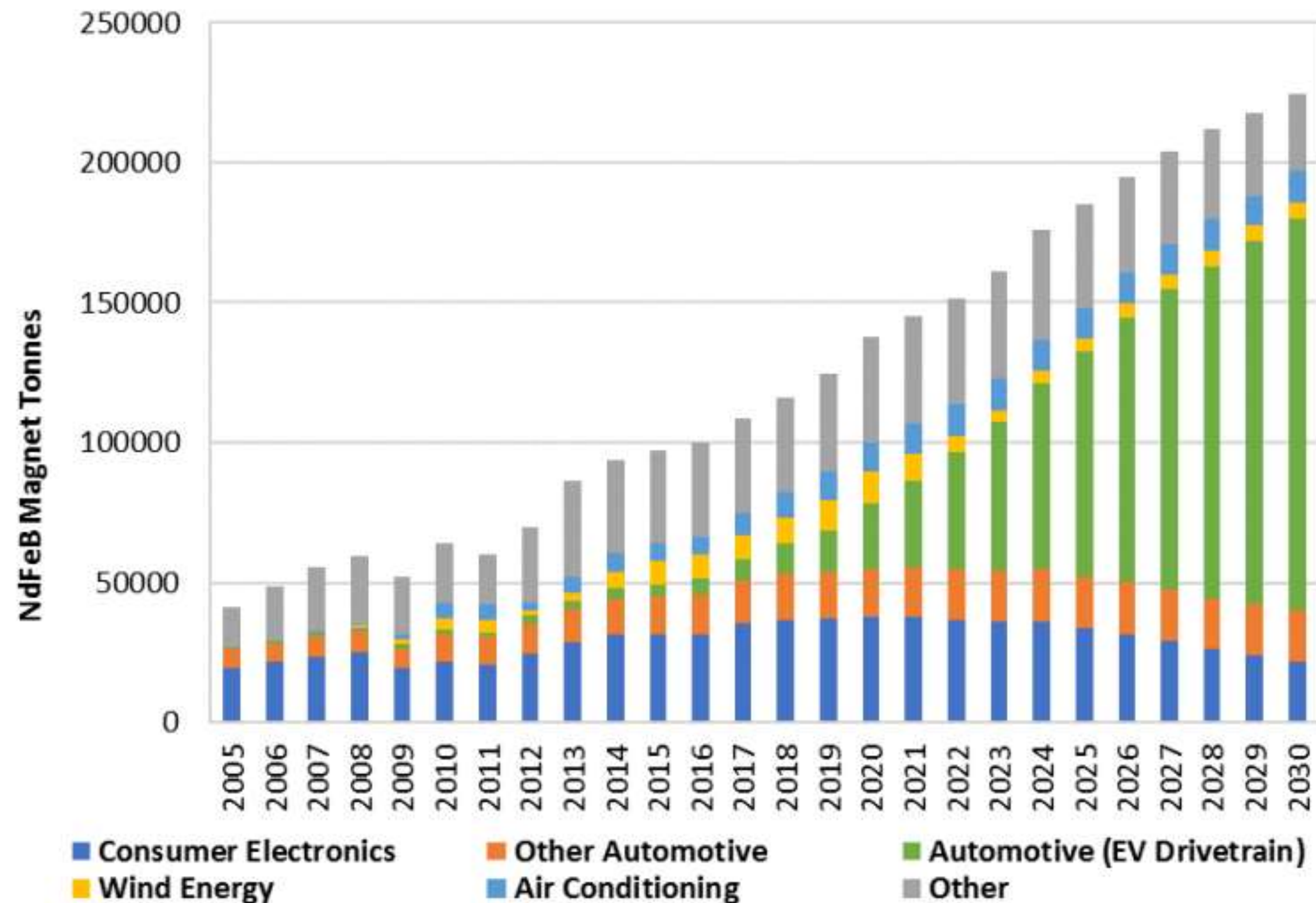
Permanent Magnet Sector



9.4% avg annual growth from 2015 to 2024

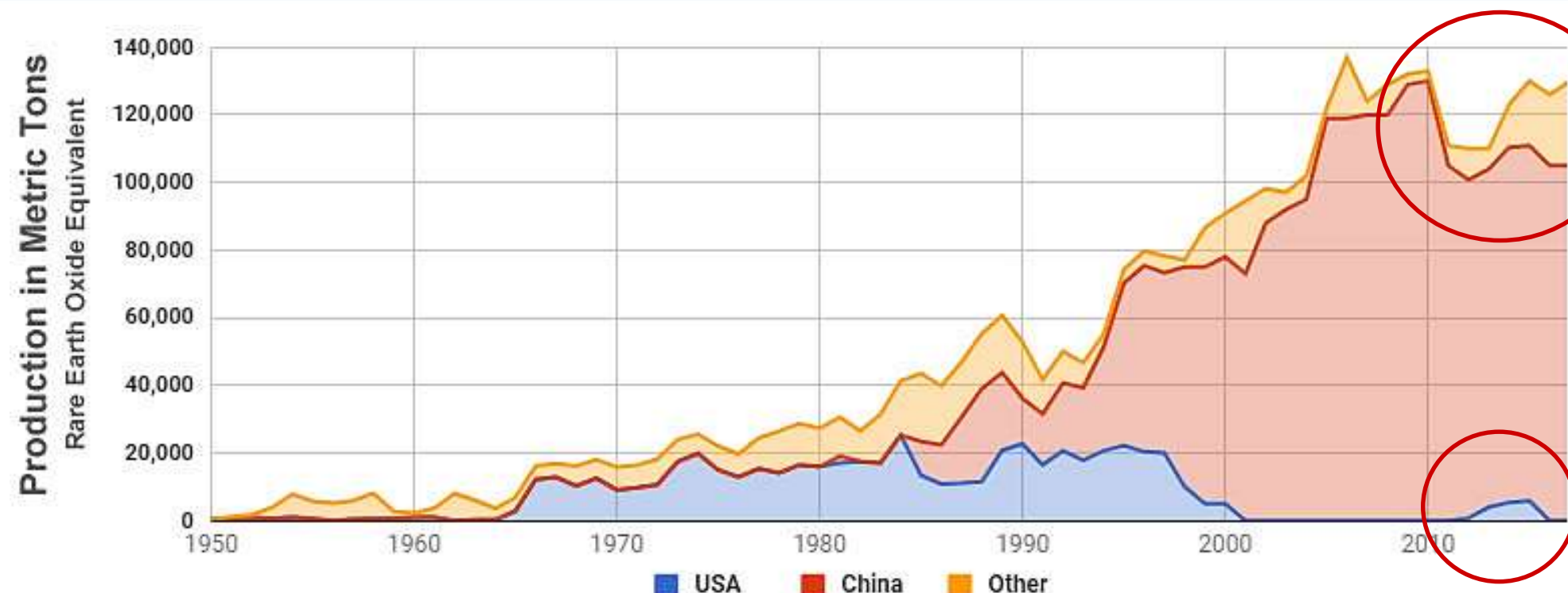
Material	Weight (000's Kg)	Value (\$ Millions)
NdFeB	160,000	11,200 (59%)
Ferrite	830,000 (82%)	5,800
Bonded NdFeB	11,000	1000
SmCo	4,200	400
Alnico	6,300	350
Other	2000	150
TOTAL	1,013,500	\$18.9 Billion

Source: Walter T. Benecki LLC & Dr. John Ormerod



Source: Roskill

Global Production & Prices



Chinese monopoly results in:

- Major geopolitical risk
- Price volatility & supply uncertainty
- Demand destruction
- Difficult to establish new mines

Source: Hobart M. King



BUT, today's reality is:

- Low but stable prices
- Drives demand growth
- Positive for innovation
- Positive for recycling

Source: Bloomberg

Nd, Pr, Dy, Tb Prices

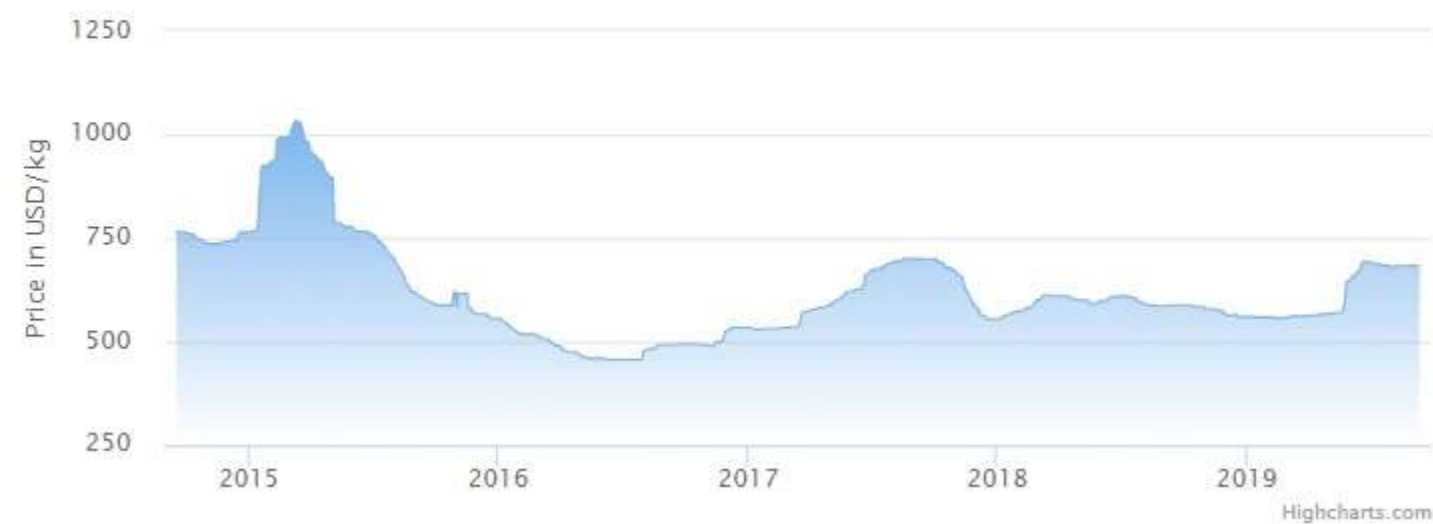
Neodymium Oxide (Nd) ask price chart



Praseodymium Oxide (Pr) ask price chart



Terbium Oxide (Tb) ask price chart



Dysprosium Oxide (Dy) ask price chart



Source: Kitco

Quebec – a future REE hub

- Strong support for innovation from Canada and Quebec
- Quebec becoming an electrification hub with developing supply of Lithium & Graphite
- ISR Technology to be used to establish Quebec as the clean and cost-efficient recycler of choice outside of China for NdFeB
- Expand to recycling other secondary feeds of rare earths / specialty metals
- Use ISR to refine REE mining concentrates
- Use ISR on alternative REE bearing feeds such as coal, tailings and other mining feeds

NdFeB
Recycling

RE &
Specialty
Metals
Recycling

Refining of
REE Mining
Concentrates

Processing
Alternative
REE Feeds

- Magnet recycling is not the future, it's the reality of today
 - China is the leader in REE recycling (established infrastructure & supply)
 - ROW is playing catch-up, AGAIN!
 - Blaming low rates of recycling on low REO prices is WRONG
 - Need cleaner and more cost-effective technologies, not higher prices
-
- What is the missing link in the outside of China REE supply chain? **RECYCLING**
 - What is the missing piece of the puzzle in establishing NdFeB magnet production outside of China? **RECYCLING**
-
- Low CAPEX, Low OPEX, Small Footprint, Clean Process
- The Achilles heel of China's dominance in the REE sector**



Kiril Mugerman - President & CEO

- Over 8 years in the REE sector
- Previously mining analyst with IA Securities in industrial minerals and exploration geologist with Gold Fields Ltd.
- President & CEO of Kintavar Exploration
- Holds a B.Sc. With Honors from McGill University in Earth & Planetary Science



Dr. Pouya Hajiani, Ph.D. - Chief Technology Officer

- Over 5 years of research in lanthanides extraction and purification
- Inventor of the FFE and ISR separation of REE and hydrometallurgical extraction method for REE and Nb for Montviel ore
- Previously project manager and process engineer for petrochemical companies under RSI



Mathieu Bourdeau, CPA, CA - Chief Financial Officer

- 6 years at Deloitte as Director of Audit and Consulting Services
- Previously financial controller for Explorance Inc.



Alain Cayer, P. Geo., M.Sc. - VP Exploration

- Responsible for delineating the large carbonatite deposit at Montviel
- VP Exploration of Kintavar Exploration
- Discovered the Eleonore gold deposit and the Mitchi Copper project

Gilles Gingras, CPA, CA

- Retired and former Partner in Audit and Advisory Services at Deloitte LLP (1987 to 2013)
- Member of Deloitte LLP Canadian Board of Directors and of its finance, risk management and governance committees (2002 to 2010)

Kosta Kostic

- Partner and member of McMillan LLP National Capital Markets and M&A group
- Practice focused on corporate finance, securities and M&A in the mining, renewable energy and information technology

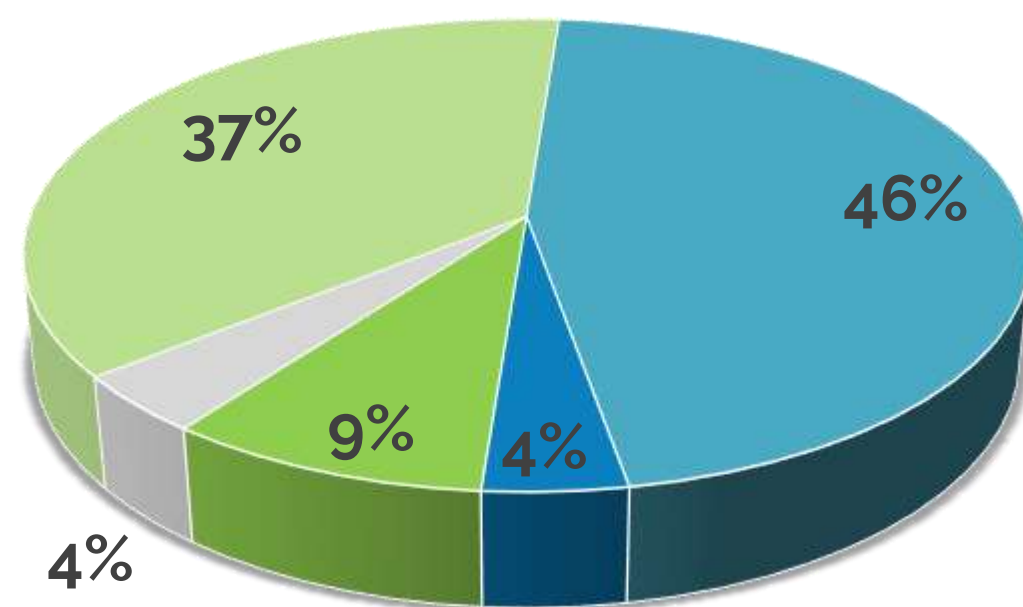
Jean Demers, P. Geo

- President of Geodem Inc. consulting in corporate financing and evaluation
- Assistant syndic and trainer for the Ordre des Geologues du Quebec and previously a director
- Involved in corporate governance for 20+ year & receipt of the Quebec Interprofessional Council's Merit Award

Mario Spino

- Model validations for National Bank of Canada
- Previously principal advisor with KPMG and financial market risk management and derivatives evaluation
- Holds a M.Sc. In financial engineering from HEC

Share Structure



- Management & Insiders
- Quebec Inst. Funds
- Strategic Investor
- Private Large Positions
- Retail

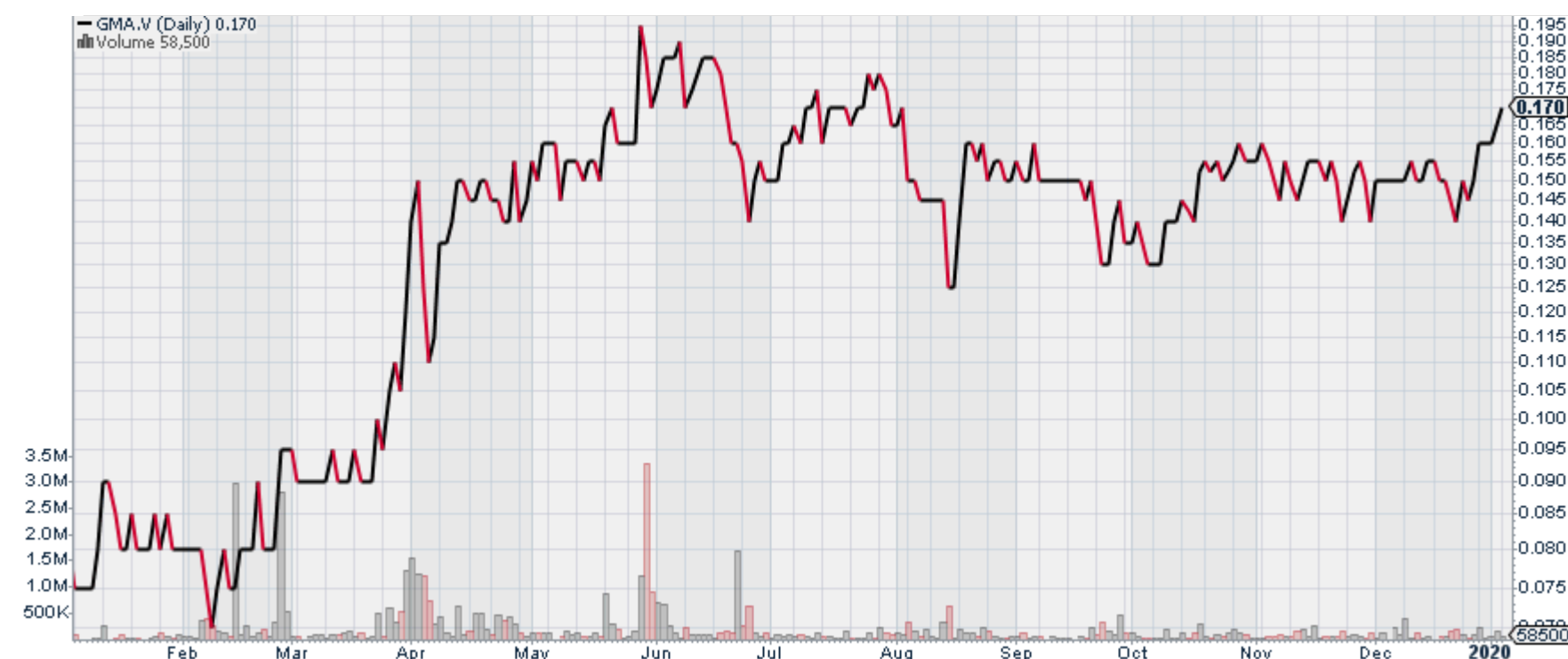
Issued & Outstanding **100,749,514**

Stock Options 6,252,500

Warrants 10,153,886

Fully-Diluted 117,155,900

Equity assets 16.8M shares of KTR.V



Rare Earths Recycling for the Permanent Magnet Industry



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