



# YUN SHENG (U.S.A.), INC.

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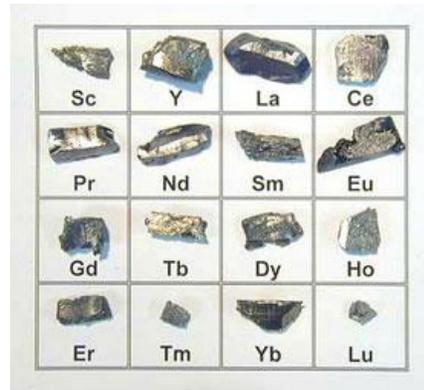
## A new Rare Earth Market crisis reverberates through the industry:

### Echoes of 2011?

By John Ebert

Those of who survived the 2011 Rare Earth crisis, may be asking themselves, is this déjà vu? Are we witnessing a wholesale repeat of 2011 in 2021, almost to the day? What are the driving factors behind the current price volatility, this time around? How are they different from a decade ago? How long can we expect these prices to last? Most importantly, when will material prices stabilize, again? In this White Paper, we will investigate and discover the drivers behind the current price behaviour, and determine what to expect and your options, going-forward.

Rare Earth Elements																	
by Geology.com																	
H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La-Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac-Lr	Rf	Db	Sg	Bh	Hs	Mt									
Lanthanides																	
La Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb Lu																	
Actinides																	
Ac Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No Lr																	



The Rare Earth Elements (REE) represent a family of elements in the Lanthanide series, which share an affinity for possessing excellent, magnetic properties. They make ideal permanent magnets, for voice coil motors used in all manner of speaker technologies, particularly audio devices with small space claim requiring high output. The modern formulation of these rare earth magnets, known as sintered NdFeB, has become an integral material base for the audio and loudspeaker industry.

### The First Rare Earth Crisis

If we quickly review 2011, shortly after Chinese New Year, Neodymium (Nd) and its counterpart Praseodymium (Pr), which occur naturally juxtaposed to each other in the periodic table, surpassed all-time highs of \$30/Kg to eventually top out at over \$300/Kg. This price surge took place over a period of four months, peaking in June and dropping down to a new normal of \$45/Kg over the next nine months. Prior to the Rare Earth crisis, \$25/Kg had been the accepted market price level for Neodymium.

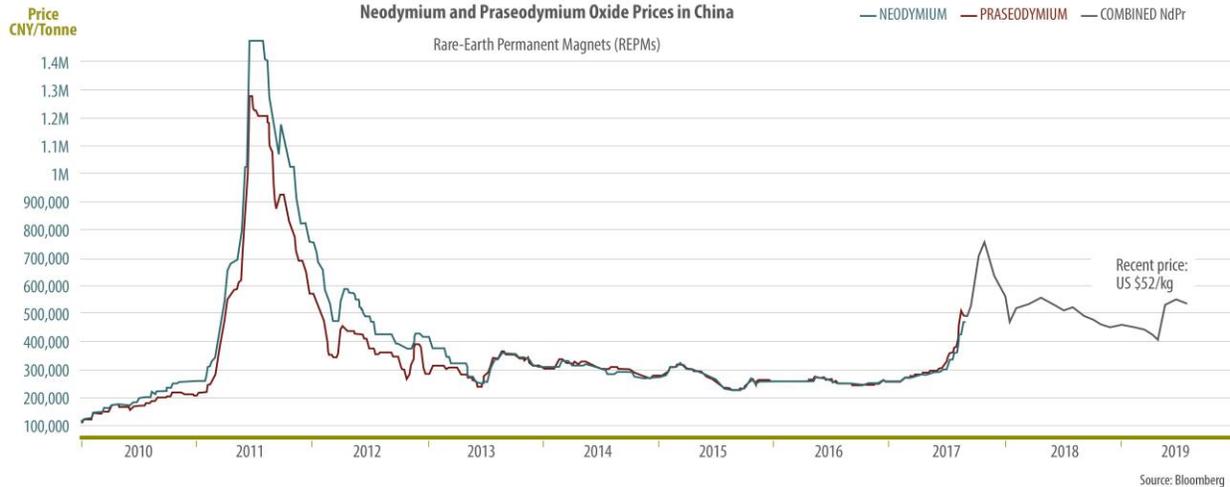
In 2011, the entire Chinese (global) REE market, totaled a mere \$500M. The fundamental cause of the 2011 global crisis was stockpiling and panic-buying of REE, triggered by speculators. Unlike nationally-regulated commodity exchanges, such as



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COMEX, LME, or the Minor Metals Exchange, the Chinese REE market had no hedging instruments, or governmental protection from speculation.



The famous Chinese axiom, “For want of a nail, the war was lost”, epitomized the monumental failings of the Chinese Government to understand the integral impact of the rare earth permanent magnet market on their most critical downstream manufacturing industries (electronics, automotive, windpower, speakers, etc).

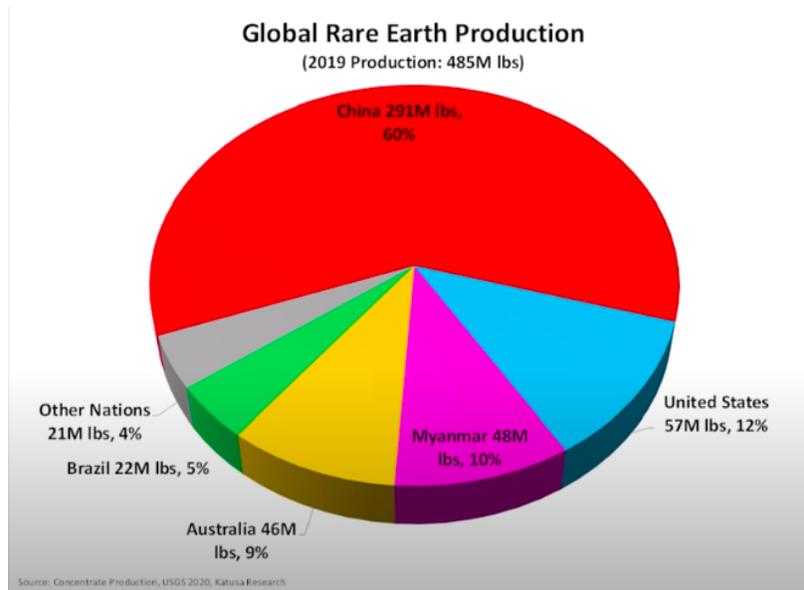
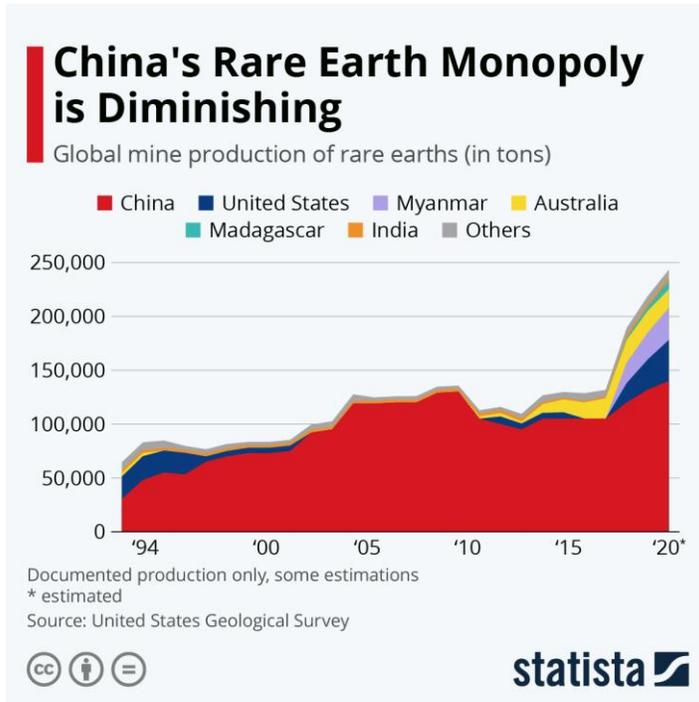
Only when the Chinese Government finally took steps to halt rampant speculation, did the crisis abate. In November 2011, government regulations were introduced to regulate the sale of REE from rare earth mine operators to legitimate manufacturers, and to further penalize racketeering with fines in excess of five times the value of any profits made from the said speculation. These regulations are still in force, today.

Since 2011, Neodymium has only once topped out at \$100/Kg in late 2017, on reports of a rare earth mining accident in China. The market quickly recovered and we have been trading mostly between \$55-75/Kg, as China’s dominance in the REE wavered from over 95% to 60%. Led by Australia, the USA, Myanmar, India and Brazil, now combine for almost 40% of global REE output. The establishment of a viable global market rate for REE, has been the basis for the proliferation of successful REE mines outside China.



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Fast forward to 2021, we are again, at a crossroads. Neodymium prices starting surging in Dec 2020 and have reached as high as \$120/Kg in April. However, REE speculation has been utterly curbed by government regulations. The global REE market is no longer monopolized by one country. Moreover, the world is still recovering from the economic devastation of Covid-19 pandemic. So, what is different in 2021?



## The drivers in 2021

Essentially, the factors responsible for the price volatility in 2021, fall into five categories. The first two are globally-based, and the rest are domestic (China) issues.

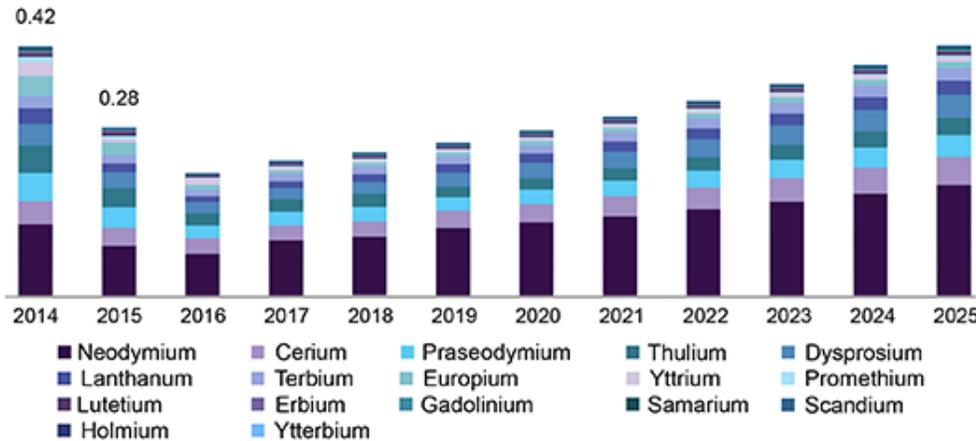
1. Market cyclicity applies to all industries and all commodities. Even with the aberration of the first Rare Earth crisis, the global market for REE has realigned itself, with more players in new markets and a new normal for REE pricing. Gone are the days \$25/Kg Neodymium. Today, \$45/Kg represents the lower limit of a viable global market rate, while the upper limit sits at \$120/Kg. The REE market will find its natural range, based on the laws of supply and demand.
2. Global demand for REE continues to rise as the demand for electronics, Electric Vehicles (EV), green energy and high-efficiency electric motors continues to rise. Our planet's insatiable drive towards zero carbon electrification guarantees a growing demand for rare earth magnets. Driven by political expedience, the UK, EU and many developed nations have proposed bans on the sale of ICE (Internal Combustion Engines) vehicles after 2030. The Governor of California even proposed legislation to do the same at the state level before 2030. The implication is that only battery EV's will be permissible, spelling a boon for EV manufacturers. Of course, there is not enough REE globally to meet the production requirements for this many EV's. But, that is another story.



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North America rare earth elements market size, by product, 2014-2025 (USD billion)



Source: www.grandviewresearch.com

3. The Export Control Law (ECL), introduced Dec. 1<sup>st</sup>, 2020, was China's retaliatory response to the US tariff war. It enabled China to legally weaponize trade. Modelled closely on the USA's own export control laws, this legal remedy allows China to control its exports and exporters. Japan and Germany, as the key nations outside of China, capable of independent rare earth magnet production, could be primary targets for ECL's export controls. Moreover, ECL contains lists of export items that China could also use against the USA and its allies. More importantly, ECL can be manipulated as a protectionist measure to favor its rare earth mining resource heavyweights, State-Owned Enterprises (SOE), such as: Bao Steel, Chinalco, Shenghe Resources, MinMetals, etc.
4. Delisting a stock on the Chinese Stock Exchange is a viable, but legally arduous technique used by public companies to indefinitely suspend trading, without loss or change to their stock price. During Covid-19, the Chinese government modified the delisting regulations to favorably permit its SOE's in the rare earth mining sector, to delist with minimum hardship or consequences. The government was a shareholder in most of these SOE's.

By delisting, these SOE's were able to avert considerable loss in share prices during Covid-19, while the rest of the world took a dive with their failing economies. As China pulled out of the pandemic, these SOE's resumed trading relatively unscathed, with little to no loss in stock value. In fact, some SOE's gained significant share value as the trading public heavily invested into the Government's favored resource giants. Subsequently, such increases in stock



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Rare Earth Quotas for 2020&2021 H1 (REO, T)										
No.	Six Rare Earth Groups	2020 H1 (REO, T)			2021 H1 (REO, T)			Change		
		Mining		Separation	Mining		Separation	Mining		Separation
		LRE	MHRE		LRE	MHRE		LRE	MHRE	
1	Chinalco Rare Earth & Metals Co., Ltd.	7,175	1,250	10,940	8,730	1,500	14,327	1,555	250	3,387
	Thereinto: China Iron&Steel Research Institute Group	2,050		750	2,580		1,020	530	0	270
2	China Minmetals Rare Earth Co., Ltd.		1,005	2,829		1,206	3,395	0	201	566
3	China Northern Rare Earth (Group) High-Tech Co., Ltd.	35,375		30,492	44,130		38,270	8,755	0	7,778
4	Xiamen Tungsten Co., Ltd.		1,720	1,981		2,064	2,378	0	344	397
5	China Southern Rare Earth Group Co., Ltd.	13,875	4,250	11,956	19,650	5,100	16,267	5,775	850	4,311
	Thereinto: Sichuan JCC Rare Earth Metals Co., Ltd.	13,875		8,160	19,650		11,712	5,775	0	3,552
6	Guangdong Rare Earths Industry Group Co., Ltd.		1,350	5,302		1,620	6,363	0	270	1,061
	Thereinto: China Nonferrous Metal Industry's Foreign Engineering And Construction Co.,Ltd			1,805			2,166	0	0	361
		56,425	9,575	63,500	72,510	11,490	81,000	16,085	1,915	17,500
Total		66,000		63,500	84,000		81,000	18,000		17,500

valuation, enabled SOE's to artificially maintain high REE prices without concern for actual transactions or deliverables.

In March 2021, the Chinese Government announced a record REE quota for 2021. This production quota was 27% higher than 2020, even though 2020 saw a major production slump during Covid-19. Nevertheless, fueled by the expectation of a huge global demand for EV and the introduction of ECL as a weapon of trade, China felt it was still in control of the REE market with barely 59% global share. Additionally, with its control over SOE resource heavyweights, and public and institutional investments in rare earth SOE's, the Chinese Government believed record supply would meet with record demand.



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### Where do we go from here?

From the initial price surge, at the onset of ECL, to a peak price of \$120/Kg, in mid-April, China's domination of the REE market seemed unassailable. With its apparent ability to manipulate stock market regulations for its favoured SOE's and prop up REE prices even without palpable transactions to consume its historical 2021 quota, it would seem to underline the Chinese government's optimism in its ability to defy the immutable laws of supply and demand. In its past, China has also demonstrated this ability with examples like: its sustained, double-digit national growth; a heated real estate bubble that never bursts; and record trade balances with the USA despite allegations of IP infringement.

The reality at home is more sobering. Just after Chinese New Year, this year, Chinese Minister Xiao, opined for reconciliation with the USA over the tariff war, which has clearly taken its toll on the country. In 2020, China's REE quota exports were down 23% as the rare earth producers experienced their worst production slump, historically. National headlines reported China was no longer selling "Rare Earths". They were just selling "earth" because prices had become so depressed. China needs open markets just as it needs trading partners. China needs to replace the manufacturing jobs lost to the US and European reshoring and nearshoring initiatives. China needs reconciliation.

The reality abroad is that the EV revolution is not producing record demands for REE. Outside of China, few countries are able to purchase, let alone produce, EV's in the volumes predicted in a Zero Emissions Vehicle (ZEV) mandate that the major economies have pledged to achieve in 20-25 years. At the G7 meeting, China made it clear that the ZEV mandate would not apply to China for at least another 40-50 years. Apparently, the same rules do not apply to China.

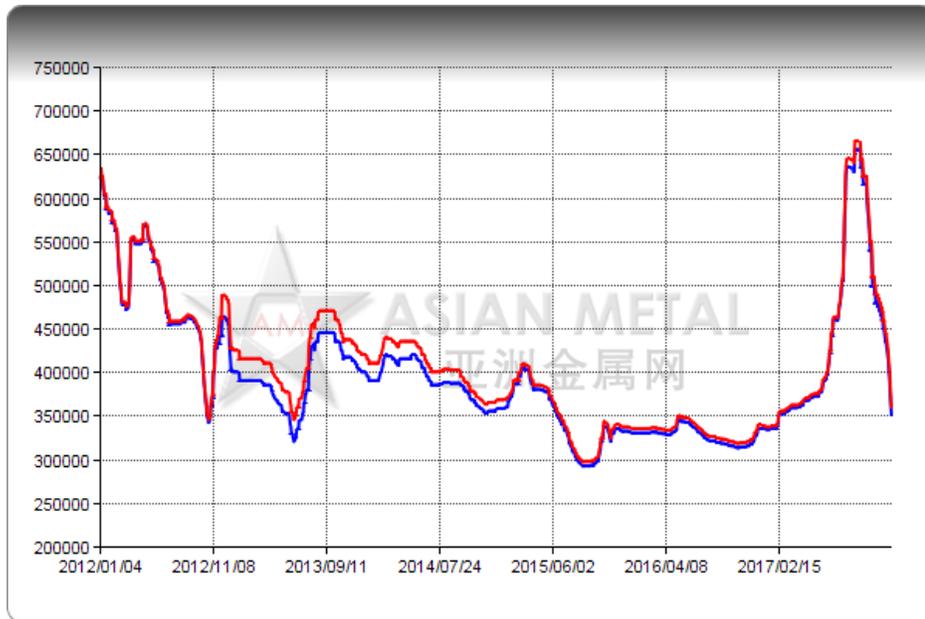
Except, when they do. The fundamentals simply do not support China's REE ambitions. With a worsening production slump, a record REE quota that cannot be fulfilled, increased global competition and a diminishing rare earth monopoly, and an ECL that will only intensify the tariff war that the Biden administration has not lifted, much to China's chagrin, the rules of supply and demand apply, in spades.



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Even at the time of writing, the REE prices dropped off their April highs (\$120/Kg) and are expected to continue to decline eventually into the \$75-80/Kg range. This decline is anticipated to materialize by the end of Q2 or start of Q3, before leveling off. Do not be surprised to witness prices ranging as low as \$60/Kg by the end of Q3 (50% off the April highs). We saw this happen before in 2017.



In the meantime, what do you do about your rare earth magnets? Buy only what you need for now, and develop your forecast and sourcing plan around a stable, reliable source. Consider multi-sourcing your materials instead of single-sourcing. Where possible, combine your components into value-added assemblies or subassemblies. As with 2011, remind yourself, that this too will pass. The laws of supply and demand always work themselves out...in spades.



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