The U.S. rare earths saga continues...

Put simply, the US produces minimal rare earths, while China produces 70.59% (in 2018). This is important as rare earths are used as components in most electronic devices, electric vehicles, wind turbines, and the aerospace and defense industries. They are essential to our modern society, and the US depends on China’s exports.

Global rare earths production is dominated by China (in red)

![Global mine production of rare earths (in tonnes)](chart)

Known reserves of rare earths (in tonnes)

<table>
<thead>
<tr>
<th>Country</th>
<th>tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>44,000,000</td>
</tr>
<tr>
<td>Brazil</td>
<td>22,000,000</td>
</tr>
<tr>
<td>Vietnam</td>
<td>22,000,000</td>
</tr>
<tr>
<td>Russia</td>
<td>12,000,000</td>
</tr>
<tr>
<td>India</td>
<td>6,900,000</td>
</tr>
<tr>
<td>Australia</td>
<td>3,400,000</td>
</tr>
<tr>
<td>United States</td>
<td>1,400,000</td>
</tr>
<tr>
<td>Others</td>
<td>4,430,000</td>
</tr>
</tbody>
</table>

Global rare earths production is dominated by China (in red)

Source: Statista

The US’ only domestic rare earths producing mine is California’s Mountain Pass rare earths mine, owned by MP Materials. And for now, it sends its ore to China to be processed. MP Materials say they will kick-start their own processing operation by the end of 2020 and produce about 5,000 tonnes of two popular types of rare earths annually:
Neodymium (Nd) and Praseodymium (Pr). In 2008 remaining reserves (using a 5% cut-off grade) were estimated to exceed 20 million tons of ore that averages 8.9% rare-earth oxides. Another two processing operations in the US are expected to open in mid 2022.

Before we can move forward we need to review the past

Since 1985 China has steadily grown its rare earths production. While other countries shunned the dirty production of rare earths China embraced them, realizing the world’s reliance on rare earths and hence their strategic importance. By the 1990s and 2000s China’s rare earth production dominance grew to the point of today. China has ~ 40% of global rare earth deposits but produces over 70% of global production, or ~120,000 metric tons of rare earth a year. In comparison, the world’s second largest supplier, Australia, produces ~ 20,000 metric tons.

Rare earths significant events timeline

2006-10 – China imposed rare earths quota limits on production and exports, as China wanted to be sure that they had enough supply for their own technological and economic needs. The 40% reduction in quotas in 2010 caused a severe rare earths price spike to begin. It also motivated manufacturers to move to China in order to be sure to get supply.

2010 – China and Japan clashed over a territorial dispute in the East China Sea. As a result, China halted shipments of rare earths to Japan, disrupting the supply chain for major manufacturers like Toyota and Panasonic.

2010 – The U.S. Department of Energy reported a possible shortage of five rare earth elements (dysprosium, neodymium, terbium, europium and yttrium).

2010 – The Rare Earth Supply Technology and Resources Transformation Act of 2010 was passed in the USA. The
legislation’s goal was stated (p 133): “To provide for the re-establishment of a domestic rare earth materials production and supply industry in the United States and for other purposes.”

2010-11 – Rare earths prices spike as Chinese export quotas take effect. Prices quadrupled in 2010, then doubled again over a 4 month period in H1, 2011.

2012/13 – China announced new rare earth export quotas for the start of 2013; however the export quota was still significantly higher than the actual amount of rare earth exports, therefore, there was no impact. High rare earth prices also encouraged illegal mining in China further oversupplying the market.

2011-13 – New illegal supply from China and new supply from Lynas Corporation’s Mount Weld mine and others helped the market to re-balance. Rare earth prices subside.

2014-15 – In 2014 the WTO ruled against China, which led China to drop the export quotas in 2015.

2015 – US company Molycorp Inc. (owned the Mountain Pass rare earth mine in California) filed for bankruptcy in June 2015. The bankruptcy was as a result of a 2014 restructuring (a large debt burden and heavy capital expenses) and lower prices in the China-dominated market. It was subsequently purchased by its largest creditor Oaktree Capital Management and was reorganized as Neo Performance Materials.

2019 – Chinese newspapers talk of a possible China retaliation to US tariffs on Chinese goods. On May 28 The Global Times, tweeted: “Based on what I know, China is seriously considering restricting rare earth exports to the US.

2019 – The United States has again decided not to impose tariffs on rare earths and other critical minerals from China.
May 2019 – Pentagon seeks funds to boost U.S. rare-earth production as fears over China supply mount.

June 2019 – The Rare Earths Industry Association was launched in Brussels. The group has 12 founding members from nations such as the UK, Germany, France, the Netherlands, Japan and China. A key goal of the group is supporting transparency across the supply chain.

June 2019 – China rare earth prices soar on their potential role in the trade war.

Rare earth prices spiked in 2011 when China introduced export quotas

As you can see in the rare earth index chart below the index rose spectacularly from July 2010 to June 2011; then fell equally as spectacularly from mid-2012 to 2014. The large price fall devastated the industry resulting in a huge contraction in the number of rare earth miners. In mid-2019 the US-China trade war and the concern of a ‘possible’ China rare earth US export ban caused prices to jump. Any further threats of a China export ban of rare earths will no doubt send prices much higher.
Rare earth prices spiked in 2011 when China introduced export quotas — Source

The US rare earths market blows itself up

In the period between 2010 and 2019 there have been numerous calls for the US to develop its own rare earths industry. In 2010 the US Department of Energy released a report titled “Critical Materials Strategy”. Several of the rare earths were discussed. For example on page 122 of the report they state in regard to neodymium: “Limited near-term flexibility for increasing global supply, despite stockpiled supplies.... Demand for Nd-Fe-B magnets is likely to exceed producer’s ability in the short term.... Predominantly produced in China, which has instituted significant export quotas and tariffs on REEs for resource conservation and environmental regulatory reasons. New mines in Australia, Canada and the United States will provide additional supply, but are subject to strict permitting processes and environmental regulations.” The later has been a contributory factor to a lack of new supply from
these countries, and hence the problems of today where China dominates the industry.

Yet 10 years later nothing has changed. No new US rare earth mines.

The EV boom will cause a new demand surge for some rare earths

The electric vehicle (EV) boom will cause a new wave of rare earth demand especially for Neodymium (Nd) and Dysprosium (Dy), as they are commonly used components in electric vehicle motor magnets. As the EV boom takes off (especially post 2020) demand for these key rare earths will surge.

Rare earths demand set to surge 655% in a 100% EV world

If electric vehicles continue to boom then the demand surge expected for the ‘magnet rare earths’ neodymium (Nd) and praseodymium (Pr) will be huge (see chart below). Dysprosium [Dy] is also sometimes used to make permanent magnets. As a result these magnet rare earths are forecast to go into deficit as the EV boom takes off.
Rare earths demand set to surge 655% in a 100% EV world

Source: UBS

Conclusion

The brutal rare earth price falls post 2011 has significantly contracted the number of rare earth juniors. This means any recovery in pricing will be favorable to the few rare earth juniors that survived the past decade’s turmoil.

Fast forward to the current era of supply insecurity (exacerbated by the US-China trade war) and it no longer looks wise to rely on one country (China) to be your source of rare earths supply. The only other major source of supply is Australia’s Lynas Resources who are already heavily contracted and send most of their material to Japan. In fact, the US has rare earths listed as critical materials, yet have done nothing to secure supply.

China still controls the vast majority of the global rare earth industry and hence controls the supply chain critical to
producing high tech electronics, especially those using magnets. Once again China’s dominance of the sector makes the world very vulnerable to any China export ban or supply disruption.

It makes no sense for the US to be so reliant on rare earths from China. In fact, the US is very vulnerable to a China ban on rare earths as the US imports most of their rare earths from China, either directly or indirectly as end products such as magnets, electronics, or electric motors. As the era of electric vehicles takes off demand for rare earths will also explode. What will happen if China refuses to sell rare earths to the US? The US nuclear industry is currently asking the same question with regard to Russian sourced uranium.

Thanks to US Senator Lisa Murkowski and the Rare Earth Supply Technology and Resources Transformation Act of 2010, the US government did recognize the need to “provide for the re-establishment of a domestic rare earth materials production and supply industry in the United States”. But what action was taken to make this happen. US environmental and permitting rules make it very difficult to start a new rare earths mine in the US today.

With renewed rare earth supply concerns during the US-China trade war, the question remains when will the US wake up and secure supply to critical materials such as the rare earths. The breaking news discussed above gives hope that the US may have finally started some action to secure supply of critical elements such as the rare earths. Perhaps the US has woken up at last!