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Over the past year, rare earth element (REE) prices have dropped by over 70%. The 780% increase in REE prices in 2011 – after Chinese custom agents held up rare earth exports to Japan in 2010, and through Beijing export quota cuts – proved fleeting. Prices appear to be leveling slowly, but short-term risks remain as there is more downside room for some REEs prices fall further. Although simpler, it is no longer prudent to look at REEs as one market; unique supply and demand dynamics for each REE will cause divergent pricing, as some REEs prices fall while others are soon set to rise.

Even though REEs are mined and processed together; share similar atomic structure; and occasionally have overlapping end-uses, they are distinct markets. For simplicity, this article discusses the two subgroups, heavy rare earth elements (HREE) and light (LREE).

China – through dint of geological fortune, historically weak environmental regulation and low-cost production – controls nearly all HREE and LREE production. But that is changing. By 2016, rare earth output outside China will rise tenfold from 2011 levels to nearly 60,000 tonnes, according to IMCOA, a rare earth consultancy. New projects such as Molycorp's facility in California have already started production; others are imminent (think: Lynas Corp's Malaysia processing facility). These projects may meet the overall demand for REEs outside of China, but not demand for individual REEs. The composition of REE production is critical.

These new projects produce primarily LREEs, such as cerium, lanthanum and neodymium. LREEs are more abundant, more widely used and often less costly than HREEs. For example, cerium and lanthanum, the most common REEs, make up more than 60% of the roughly 140,000+ tonne REE market; while the supply of dysprosium, a HREE key for permanent magnets, and terbium, a HREE necessary in flat panel displays, have annual production levels less than 1,200 tonnes. Lanthanum and cerium oxide also cost roughly \$20/kg, losing far more of their values from their 2011 highs near \$140/kg, compared to dysprosium and terbium, which sell at roughly \$900/kg and \$1700/kg down from 2011 highs of \$2,500/kg and \$4,200/kg.

Over the next few years, China will remain the only significant HREE source. HREE projects globally are struggling with technical or regulatory challenges that need to be overcome before production begins. However even by 2020, it remains likely that demand for some HREEs will continue to outstrip supply.

Expect the price spread between HREEs and LREEs to widen. Increased use of HREEs in growing green and high-tech applications and the consuming high-tech appetite of the expanding global middle class (set to double over the next 25 years) will put upward pressure on HREE demand and prices. However, the prices for most LREEs, especially lanthanum and cerium, will remain relatively depressed. This is not just a factor of additional LREE mining, but processing systems. To extract REEs from deposits, one

needs to remove cerium and lanthanum first. And as the world demands more neodymium or dysprosium, for permanent magnets, cerium and lanthanum will necessarily be produced in the process, pushing prices downward.

To be sure, downside risks from slowing economies in China and Europe could further dampen the entire REE market. What's more, smuggling REEs out of China, roughly 120% of official exports in 2011, adds to supply, depressing all REE prices. But one thing is clear: despite challenges – including changing Chinese leadership and a pending WTO case against Chinese export restrictions – the country will not change its policy of maximizing domestic benefits from rare earth production; however, the country's tactics may. Expect Beijing to switch from using contentious export quotas to enforcing stricter production quotas or state-owned firms will halt production as they did last year.

No doubt nascent technology will reduce the demand for many REEs, but finding effective substitutes for all REEs will continue to vex scientists. Likewise, recycling is no panacea; it is expensive and inefficient. Despite the hundreds of millions Japan has spent, Tokyo has a modest goal of meeting 10% of the country's REE needs through recycling by 2025.

While downside risks remain, expect an increase in demand and prices for HREEs in the medium term and fragmentation of the REE market as many LREEs face further headwinds.