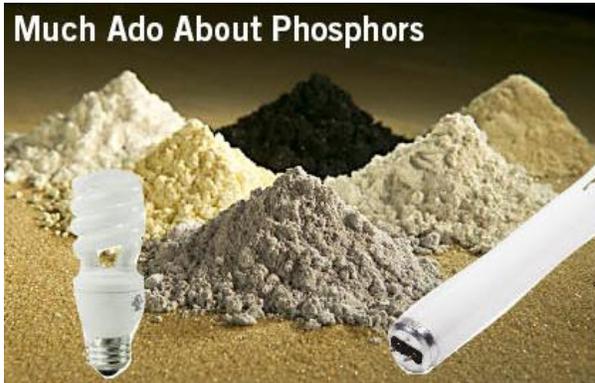


2012 EXCELLENCE IN RENEWABLE ENERGY AWARDS

Huge Price Increases Underway from Lamp Manufacturers: The impact of rare earth metals shortages

By Daniel Dobski | July 11, 2011

Much Ado About Phosphors



Brace Yourself for Record Price Increases from the Lamp Manufacturers.

As [we first reported in June](#), there is a rapid, emerging shortage of rare earth metals, a primary component used in the manufacture of fluorescent lamps - principally phosphors. Phosphors are transition metal compounds or rare earth compounds of various types. The most common uses of phosphors are

prevalent in green technologies such as batteries, magnets, computer hard drives, TV screens, smart phones, and energy-saving light sources - and fluorescent lamps.

How are phosphors used in fluorescent lamps?

There is a coating (called the phosphor) on the inner surface of the fluorescent lamps that absorbs the ultraviolet light and converts it into fluorescent light, mostly in the visible spectral region. (Any remaining ultraviolet light is absorbed in the glass tube.) The phosphor contains several substances, which are mixed in such a way that the overall emission spectrum corresponds to white light.

The geopolitical landscape:

The shortage of rare earth metals is caused by a strategic reduction in exports by China, the world's current and dominant leader in rare earth mining, presently

controlling about 97 percent of the world's supply. In October 2010, the Chinese announced plans to not only cut their production, but also to reduce exports by one-third. The specter of global shortages suddenly became critical and real.

The [World Trade Organization \(WTO\) recently declared](#) China was wrong to impose restrictions on rare earth metal exports and noted measures taken by the country in recent years have constrained supply and led to unwarranted price increases. Without outright saying that China's constraint of trade actions were illegal, they rather mildly stated that the country's "export duties were inconsistent with the commitments that China had agreed to in its Protocol of Ascension," and that "certain aspects of China's export licensing regime, applicable to several of the products at issue, restrict the export of the raw materials and so are inconsistent with WTO rules."

What happened to our domestic Supply?

Through the 1980s, the domestic source for US rare metals was processed at the Mountain Pass Mine in Southern California. The mine was discontinued in 1996 after a series of pipeline leaks and spills resulted in a \$1.4 million fine. The mine continued to operate and extract ore until it was finally shut down in 2002 due to competition from China. The US was not only self sufficient through most of the last century, it actually fulfilled the majority of the world's needs for these metals. There was little notice taken at the time as usage of these metals was low and supplies seemed assured from an undeveloped China that was content to export raw materials.

North America has abundant sources in the US mountain states and also in the Canadian Northwest Territories and the Quebec region. Numerous efforts are underway to develop those resources. [Avalon Rare Earth Minerals](#) and Great Western Minerals Group are two companies with plans to open mines in Canada. It should be noted however that some of these deposits are often mixed with radioactive thorium, presenting safety and environmental issues to mine and process.

Other sources of supply:

It has been recently reported a discovery by Japanese scientists of a vast repository of rare earth minerals, found on the floor of the Pacific Ocean that can be readily extracted. It is estimated that rare earths contained in these deposits amount to 80 to 100 billion metric tons, compared to global reserves currently confirmed by the US Geological Survey of just 110 million tons that have been found mainly in China, Russia and other former Soviet countries, and the United States. According to the [Wall Street Journal](#), the discovery is said to include minerals such as gadolinium,

lutetium, terbium and dysprosium. The minerals could multiply the known supply on land by 1,000 times. [Reuters reports](#) the deposits are located in international waters. Mining will take place "east and west of Hawaii, as well as east of Tahiti in French Polynesia". Still undetermined is the ease of mining and recovery. And let's be careful not to swap out one set of problems for a what could be a more challenging undertaking.

Significant deposits also exist in Australia, Malaysia, South Africa, Brazil, and other countries, although those deposits tend to be of the lower-grade monazite ores. Lynas Corp. and Arafura Resources Ltd. are two companies that are beginning operations in Australia -- reportedly with Chinese financial backing(!)

The trickle down effect to the lighting industry:

According to a statement from Ellis Yan, CEO of [TCP Inc.](#) "Where phosphor once represented roughly 10% to 15% of the cost of a typical CFL, it can now exceed 50% (or more in some models) of the total lamps production cost". TCP was the first lighting manufacturer to alert us of the rare earth shortage issue - before it became an issue. As we experienced with the ['ballast shortage of 2010'](#), there are forward-thinking manufacturers that choose to share information to better prepare their supply channel, and there are those who choose not to divulge any information lest they expose a possible market vulnerability.

The issue with the scarcity of phosphors is much different than what we experienced with last year's component shortage. The component shortage mainly impacted the availability of finished goods; fixtures, ballasts, and controls. Market conditions were not driving prices up like they are with today's rare earth minerals issue. This time around with lamp manufacturers clearly taking it on the chin, we should expect clear and frequent communications centered on recovering escalating phosphor costs through price increase notifications.

The TCP statement from Ellis Yan goes on to explain: "Over the past few months, an unprecedented rise in the rare earth mineral markets has sent fluorescent phosphor prices skyrocketing to levels not seen before. Fluorescent phosphor prices have increased nearly ten-fold over the past couple months. Phosphor costs continue to rise every week. Last week's phosphor price exceeded 2400 RMB/ kg., (vs. around 300RMB/ kg. in February 2011), more than an 800% increase in just five months time!!"

"Most of the other domestic CFL brands source their CFLs from various Chinese-based CFL manufacturers. Therefore, some of these companies can delay the price impact to their customers by simply pushing the burden temporarily to their lamp

suppliers. Eventually though, all manufacturers will be forced to pass along these costs, since this is an industry wide issue - there are simply no alternative sources for this phosphor. In addition, these other CFL brands may not be able to control the actual cost impact, as their suppliers may eventually be able to pass through additional costs above and beyond these material impacts."

To Mister Yan's point, we are now being faced with price increase notifications from all major lamp manufacturers. Some of these increases will come in stages but industry chatter has been reporting price increases upwards to 40 percent.

In the coming days, Connexion will be meeting with some of our other lamp manufacturers to address the supply channel issues and price ramifications. As we learn more, we'll be communicating everything in our [Industry News blog](#). . As formal price increase notifications are released they will be posted on our [Price Increases](#) page .

For supporting documentation, please visit our [Rare Earth Metals Shortages](#) page.

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