Northern Dynasty Minerals Ltd.

The Pebble Project: The Future of U.S. Mining and Metals

MESSAGE FROM THE PRESIDENT

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Copper, with its recyclability and applications for hybrid and electric cars, wind turbines, geothermal heating and other renewable energy sources is often cited as the “green” metal. While global copper demand doubles every 18 years, it is well documented that new deposits are becoming more difficult to find. But what about other metals and the important roles they will play as we endeavor to produce environmentally friendly technologies?

Molybdenum is emerging as a key player in the green movement, from helping treat pollutants created by fossil fuels and municipal waste processes to minimizing emissions generated during petroleum production. It is also used as a component in lighter weight steel that will help electric cars achieve more efficient mileage.

While molybdenum production meets current demand, refiners expect to encounter a shortfall sometime before 2015. In the West, demand has been projected to increase by about 3% annually, while in China it could increase by as much as 10% - averaging out to 4.5% globally. Although China has 30% of the world’s molybdenum resources, it likely won’t be able to keep up with demand internally. The amount of molybdenum recycled as part of new and old steel and other scrap could be as much as 30% of forecast metal supply.

Due to its unique chemical and metallurgical properties, gold also plays a role in technologies aimed at reducing pollution and energy consumption. Researchers have proven gold’s effectiveness in the capture and removal of certain pesticides from drinking water and as an active catalyst in breaking down a common and dangerous groundwater pollutant.

Trials are underway to test gold’s effectiveness in reducing emissions from industry use of coal and automotive pollution stemming from diesel engines. Gold also features prominently in green chemistry, where chemicals and processes are designed to reduce or eliminate the generation of hazardous substances.

Gold is facing a future shortfall as world gold production has been falling steadily since 2001, with producers focusing on brownfield expansions and upgrades of previously discovered deposits to identify new reserves, rather than exploration for new projects.

Rare earth (RE) elements are vital for new technologies that help deliver efficient energy and pollution reduction. While 22,500 t of REs were required for electric motors in 2006, the number is projected to rise to 45,000 t by 2013. A typical hybrid vehicle contains 20 kg of REs between the rechargeable battery pack (cerium and lanthanum), the permanent magnet motor and the regenerative breaking system (neodymium).

Rhenium, which is found at Pebble, is another rare earth with green potential. It has the ability to reduce fuel-related nitrous oxide emissions in jet planes and turbine generators, and its use as a catalyst in oil refineries results in cleaner car exhausts worldwide. Rhenium-treated alloys also improve the efficiency of turbines, assisting with greener electricity generation.

While REs are not in fact rare, as the name denotes, it is difficult to find them in economic quantities. China, the biggest consumer of REs, produces about 97% of the world supply, with 77% of production coming from just one mine. Currently there are no producers in North America, and the US must import nearly 100% of its RE requirements, which translates to a consumed product value estimated to be in excess US $1 billion annually.

Recently, a draft report by China’s Ministry of Industry and Information Technology called for a significant tightening of China’s rare earths export market in order to satisfy internal demand. This includes a total ban on foreign shipments of a number of REs and restricting others to a combined export quota of 35,000 tonnes per year – falling far short of global requirements. While the value and importance of REs have increased thanks to new technologies, it will take some years before larger scale pipeline projects based in Canada, the US, Greenland and Australia reach operational status – resulting in a potential global shortage.

As the field of green technology evolves with new innovations, methods and materials, so too will the requirements for the above listed metals, which play an essential role in green development. It will be interesting to watch over the coming years how these requirements are filled.