BACKGROUND

Rare earth elements (REEs) are a group of 17 elements referred to as the lanthanide series in the periodic table of elements. REEs have specific properties that make them critical inputs to important sectors including defense, automotive, clean-tech, high-tech and aerospace. They are also used in many technologies and products Canadians depend on, including batteries, magnets, LED (light emitting diodes), medical imaging systems, global positioning systems, smart phones and other electronics. Many of the REEs are expected to be in great demand globally by the 2020s, particularly Neodymium and Praseodymium (Nd-Pr) which are used in the production of permanent magnet motors for electric vehicles.

Rare Earth Elements (REE) represent an opportunity for Canada to enter an emerging and globally strategic market. According the USGS Commodity report in 2018, Canada ranked 10th in countries with the most rare earth reserves in the world. The Technology Metal Research Group in 2015 identified 58 rare-earth mineral resources, associated with 53 advanced rare-earth projects and 49 companies, located in 35 regions within 16 countries. 19 of them are located in Canada. Considering the planned production rate from the five most advanced Canadian REE projects, Canada has an opportunity to play a leading role in supplying REE by potentially supplying over 20 percent of global demand.

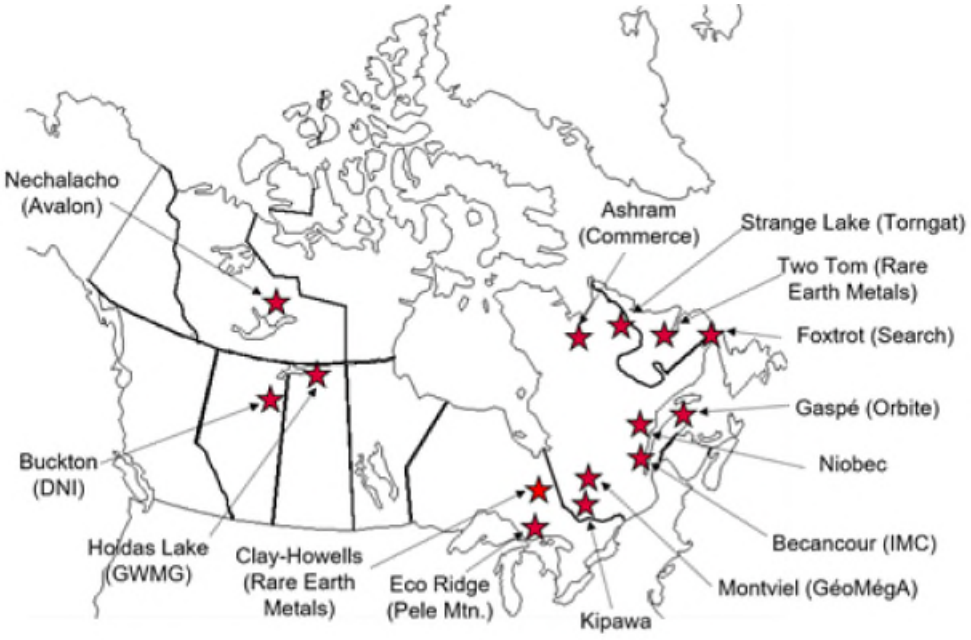


Figure 1: Map of advanced REE mineral resources in Canada

Canadian exploration companies are currently working on advanced projects that have significant concentrations of Nd-Pr. However, the metallurgical process for Canadian REE ores involves a complex sequence of beneficiation, extraction, separation, refinement, and alloying stages before they can be used in the production of permanent magnets, consumer electronics and other high value-added high-tech products. In order to get these resources to market and realize this opportunity, technological advancements are required, either through new development or by adapting existing technologies to the Canadian environment.

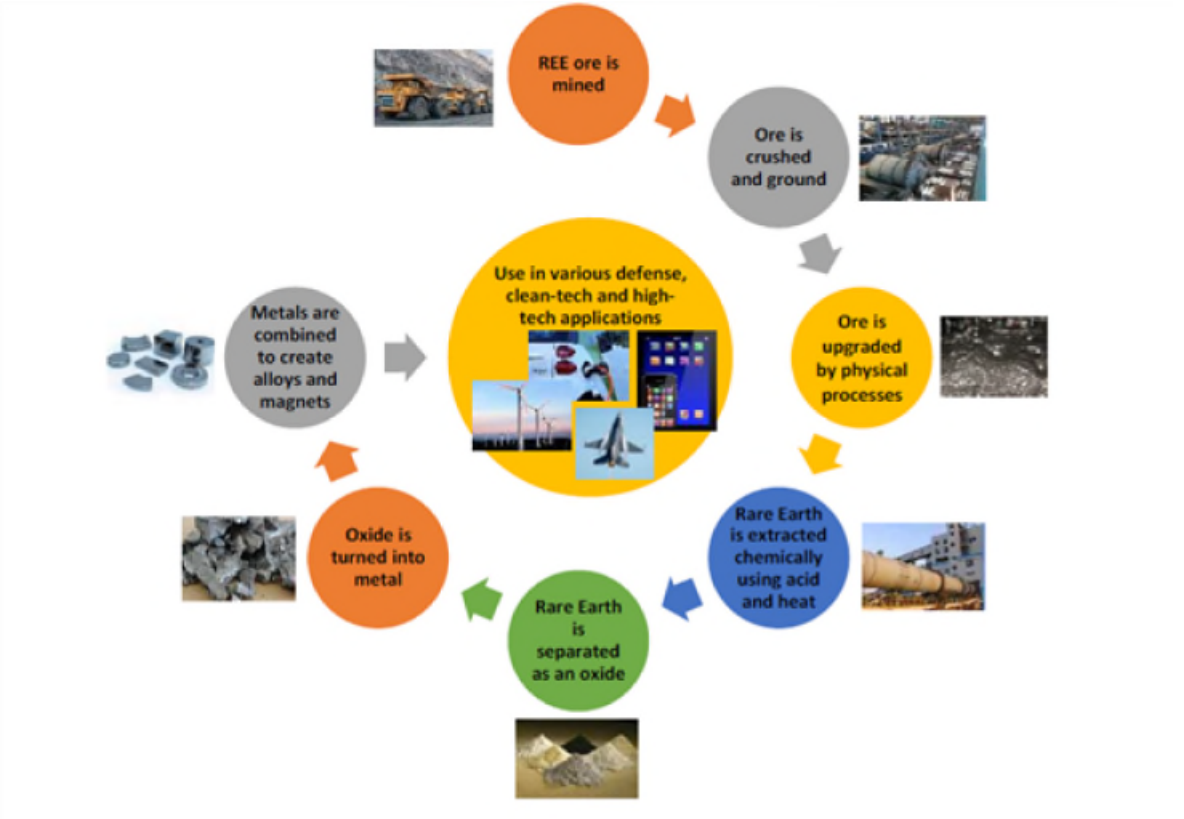
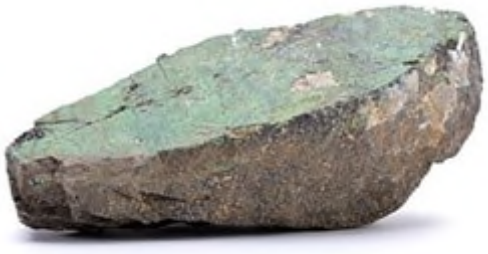


Figure 2: Schematic diagram of the metallurgical processing required to produce REE products from ore

STAKEHOLDERS



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