Geophysical Research Abstracts
Vol. 17, EGU2015-15602, 2015
EGU General Assembly 2015

Critical thinking: assessing the risks to the future security of supply of critical metals

Gus Gunn
British Geological Survey, Keyworth, Nottingham, United Kingdom (agg@bgs.ac.uk)

Increasing world population, the spread of prosperity across the globe and the demands of new technologies have led to a revival of concerns about the availability of raw materials needed by society. Despite scare stories about resource depletion, physical exhaustion of minerals is considered to be unlikely. However, we do need to know which materials might be of concern so that we can develop strategies to secure adequate supplies and to mitigate the effects of supply disruption. This requirement has led to renewed interest in criticality, a term that is generally used to refer to metals and minerals of high economic importance that have a relatively high likelihood of supply disruption. The European Union (EU) developed a quantitative methodology for the assessment of criticality which led to the definition of 14 raw materials as critical to the EU economy (EC, 2010). This has succeeded in raising awareness of potential supply issues and in helping to prioritise requirements for new policies and supporting research. The EU has recently assessed a larger number of candidate materials of which 20 are now identified as critical to the EU (EC, 2014). These include metals such as indium, mostly used in flat-screen displays, antimony for flame retardants and cobalt for rechargeable batteries, alloys and a host of other products. Although there is no consensus on the methodology for criticality assessments and broad analyses at this scale are inevitably imperfect, they can, nevertheless, provide early warning of supply problems. However, in order to develop more rigorous and dynamic assessments of future availability detailed analysis of the whole life-cycle of individual metals to identify specific problems and develop appropriate solutions is required.

New policies, such as the Raw Materials Initiative (2008) and the European Innovation Partnership on Raw Materials (2013), have been developed by the European Commission (EC) and are aimed at securing sustainable supplies of raw materials. These have led to major new programmes of research throughout the minerals value chain, in order to improve the raw materials knowledge base, to develop best practices and promote international collaboration.

Although recycling will make an increasingly important contribution to supply, it can never meet the total requirement when demand is increasing. Therefore, new resources of primary materials, identified through geological research, will continue to be required. The availability of regional baseline datasets, comprising geological, geophysical and geochemical data, is fundamental to the identification of exploration targets. However, in order to focus exploration we also require robust mineral deposit models for the critical metals which hitherto these have been largely neglected because of their limited economic importance. For commodities such as the platinum-group metals (PGM), cobalt, niobium, indium, rare earth elements (REE) and cobalt we have some knowledge of the processes controlling their mobilisation and concentration under certain conditions although we have little understanding of the mechanisms of deposit formation elsewhere. We also need effective techniques to explore for these metals. This may involve the development of new geophysical techniques to explore on the sea-floor or beneath thick cover, or new analytical methods for the determination of these elements in exploration samples. Improved metallurgical techniques are also required for effective and energy-efficient recovery of critical metals from ores and concentrates.

References

European Commission (2010). Critical raw materials for the EU. Report of the Ad-hoc Working Group on Defining Critical Raw Materials.
European Commission (2014). Report on Critical raw materials for the EU. Report of the Ad-hoc Working Group on Defining Critical Raw Materials.