

Challenges and Implications for the Mining Industry for Future Resources Extraction

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Epochs of human civilization are marked by the sources of materials used at the periods, namely: Stone Age, Bronze Age, Iron Age and Silicon Age. The materials used at these eras were mined and can be linked to the development of mining for the benefit of society. The same epochs are indications of advances in Materials Science and Engineering. We are now in the Smart or Intelligent Materials age. One of the key drivers of the Smart Materials era is sustainable development. To achieve sustainable development, the G8 countries agreed on the 3R Initiative at the Sea Island Summit in June 2004 that was launched at the Ministerial Conference in Tokyo in 2005. The 3Rs concept for sustainable development refers to Reduce, Reuse and Recycle and it is now extended to 4Rs to include "Recover". There is potential to further extend the 4Rs concept to 5Rs to include Reprocess. Achieving the objectives of 5Rs within the Sustainable Development Goals of the United Nations involves a critical look at how renewable energy and Smart or Intelligent materials are developed. A critical source of Smart materials and renewable energy resources is mining. Unfortunately, mining is now considered intolerable and antagonistic to sustainable development in the context of environmental friendliness and its contribution to fossil fuel use consequences. Intelligent mining ensures sustainable resource recovery and processing and will make critical materials availability for Smart materials and renewable energy development. Regrettably, mining currently faces aggressive challenges with a bleak future in accomplishing these objectives.

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