



## Sustainability and the Minerals industry

John Rankin

**Short Course:** 27 Nov 2011, Fiesta Americana Condesa All Inclusive Resort, Cancun, Mexico

Minerals and rocks derived from the Earth provide many of the materials needed by society. Yet their production and consumption produces huge quantities of wastes. The Earth's resources are finite and its land and water ecosystems have finite capacities to cope with the wastes produced by human production and consumption. Annually, the per capita consumption of resources in the United States is 80 tons, consisting of 76 ton of non-renewable resources and 4 tonnes of biomass. Of this only 19 tons are used as direct inputs to processing; the rest is waste! Further waste is produced during processing of the inputs and during the use and disposal of the products made from them. How to deal with the problems caused by this unprecedented level of production, and the associated consumption of resources and disposal of the wastes, is a global challenge which will only grow as living standards in China, India, Brazil and other developing countries rise. The concept of Sustainable Development arose as an attempt to address this and other environmental and social issues.

### Who Should Attend

This course should be useful to those who wish to gain a greater appreciation of the nature of sustainability, its implications for the minerals industry and the opportunities and challenges for the industry during the transition to sustainability. The course will be of particular interest to those in industry, NGOs, research organisations, academia and government agencies with an interest in the mineral resources sector and its environmental aspects. Undergraduate and graduate students will also find much of interest.

### Course Outline

1. An introduction to sustainability
  - the environmental, social and historical context
  - definitions of sustainability; weak and strong sustainability
  - sustainability frameworks
  - a conceptual model of sustainability
2. The mineral industry's response to sustainability
  - the Global Mining Initiative and formation of the ICMM





- sustainability reporting; the Global Reporting Initiative
- industry progress in addressing sustainability challenges

### 3. Mining and processing wastes

- wastes and the materials cycle
- types and impacts of wastes; direct and indirect wastes
- solid, liquid and gaseous wastes – strategies and technology of storage and disposal
- toxicity and bioavailability
- the Basel convention and REACH

### 4. Use of energy in primary production

- concepts of direct and indirect energy, gross energy requirement, embodied energy
- values of embodied energy in production of mineral and metal commodities
- the minerals industry and global warming
- implications of declining ore grade and quality on energy consumption

### 5. Towards zero waste in primary production

- the dynamic concept of waste; the waste hierarchy
- the Cleaner Production approach
- wastes as raw materials; examples include red mud, fly ash, flotation tailings
- waste reduction through re-engineering, including examples
- principles of industrial ecology, including examples

### 6. Towards sustainability

- the concept of stewardship
- the ICMM and Five Wind models
- an integrated stewardship model

### The participants will also receive:

- CD with course material
- Certificate of completion
- A copy of the instructor's recently published articles related to sustainability and the minerals industry
- Lunch and refreshments

### Course Instructor Dr John Rankin



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John Rankin has held academic appointments at the universities of Stellenbosch (South Africa), Waterloo (Canada) and Melbourne, research positions in MINTEK (South Africa) and CSIRO (Australia), and worked for several years in the aluminium industry. He received his BSc and PhD degrees from the University of Queensland. Dr Rankin's expertise is in extractive metallurgy and the implications of Sustainable Development for mineral processing and metal production. He has published over 100 papers and seventy technical reports. He chaired the Green Processing 2002 and 2004 international conferences on the sustainable processing of minerals. He has held a number of senior positions: Professorial Research Fellow at the University of Melbourne, Director of the G. K. Williams

Cooperative Research Centre for Extractive Metallurgy, Deputy Chief and Chief Scientist, CSIRO Division of Minerals (2000 to 2008). He recently completed a book Minerals, Metals and Sustainability: Meeting Future Material Needs.

**REGISTRATION:** <https://www.flogen.com/FraySymposium/registration.php>

