Mining and sustainability
Tracking progress in a rapidly changing global environment

Presentation to the 6th International Conference on Sustainable Development in the Mining industry
Monday, 1 July 2013, Milos, Greece

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Overview

1. ICMM
2. Mining’s operating environment
3. The underpinnings of applied sustainability
4. Examples: (1) EC Environmental footprint (2) mining and conflict
5. The 2003 Milos Statement
ICMM at a glance

- Direct CEO leadership, 22 member companies, 35 association members
- Over 800 sites in more than 60 countries, 1 million of 2.5 million workers, 1/3 to 1/2 of major metals
- Catalyst for improving environmental and social performance, shared value creation
ICMM vision, values, goals and structure

**ICMM Goal:** working collaboratively with others, to enhance the value creation role and long term net contribution of mining, minerals and metals industry and its products to people, the environment, and economies

**Objectives:** (1) improve performance; (2) listen; (3) communicate; (4) strengthen engagement capacity; (5) seek fair and consistent regulation; (6) represent

**Values:** care, respect, integrity, accountability, collaboration
ICMM member commitments


1. Implement ethical business practices and apply good corporate governance
2. Integrate SD in corporate decision-making
3. Uphold fundamental human rights
4. Manage risks based on sound science
5/6. Improve environment, health and safety performance continuously
7. Conserve biodiversity & contribute to integrated land use planning
8. Encourage a life cycle approach to materials management
9. Contribute to community development
10. Publicly report, independently assure and engage openly and transparently

6 Position Statements

Mining and Indigenous Peoples (2013, 2008)
Mercury Risk Management (2009)
Mining and Protected Areas (2003)
Accountability and transparency at ICMM

Robust entry criteria and process

Clear performance expectations

Reporting

Commitments Public reporting Independent assurance
Mining’s operating environment
Value of global production by metal in 2011

- Iron ore 39%
- Gold 16%
- Copper 13%
- Silver 3%
- Potash 3%
- Nickel 3%
- Phosphate rock 2%
- Zinc 2%
- PGMs 2%
- Diamonds 2%
- Others 15%


Value of global coal production more than twice that of iron ore
Global level

- Financial uncertainty
- More socially conscious consumers
- Trust in industry falling, conflict increasing
- Increasing demands for transparency
- Climate change, operational and geographic implications
- Rule-setting shift: national to sub-national
Country and local level

- Resource nationalism
- Limited understanding of benefits, costs and risks
- Not all responsibilities and accountabilities addressed
- Growing role of mining in low and middle income countries
- Ongoing concern about health and safety
Mining’s contribution: benefits, costs and risks, responsibilities and accountabilities
The nature of the industry

<table>
<thead>
<tr>
<th>category</th>
<th>approximate asset base, $USD</th>
<th>approximate numbers of companies</th>
<th>comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global giants</td>
<td>Exceeds $10 billion</td>
<td>50</td>
<td>global giants and seniors control the majority of available capital, their focus is on the industry; they have multiple operations</td>
</tr>
<tr>
<td>Seniors</td>
<td>$3 - $10 billion</td>
<td>100</td>
<td></td>
</tr>
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<td>Intermediates</td>
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<td>Juniors: small (often one mine) producers</td>
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<td>1,000</td>
<td>some growing, some shrinking; their focus is on their mine</td>
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</tbody>
</table>

Spectrum of corporate behaviour

- **Hostile Avoiders**
  - Opposers
  - Resisters
- **Rearguard**
  - Slow adapters
- **Corporate Couch Potatoes**
- **Vanguard of the Rearguard**
  - Cautious innovators
- **Leading Edge**
  - Doers

Global giants: Exceeds $10 billion
- 50 global giants and seniors control the majority of available capital, their focus is on the industry; they have multiple operations.

Seniors: $3 - $10 billion
- 100 seniors

Intermediates: $1 - $3 billion
- 350 intermediates
  - Often on their way up; their focus is on growing their reserves.

Juniors: small (often one mine) producers: $500 million - $1 billion
- 1,000 juniors
  - Some growing, some shrinking; their focus is on their mine.

Juniors: exploration: $5 - $500 million
- 2,000 juniors
  - Volatile and market dependent; they are finders, not producers and their focus is on their exploration project.

Junior juniors: Below $5 million
- 2,500 junior juniors
  - Their focus is on accessing venture capital and optimizing their stock price.
The time horizon disconnect

Mine project life cycle

- Exploration: 1-10 years or more
- Site design and construction: 1-5 years
- Operation: 2-100 years
- Final closure and decommissioning: 1-5 years
- Post-closure: A decade to perpetuity


Time horizon disconnect
- Mining investments, 30-100 year horizon
- Indigenous peoples, multi-generation
- Government, 3-5 year horizon
- Investors, quarterly results
- Communities, often immediate
- Price, constant change
2013-2014 ICMM priorities

Social and Economic Development
• Mining: Partnerships for Development; human rights; Indigenous Peoples; measuring social investment and outcomes

Environment and Climate Change
• Water; biodiversity; climate change – national policies and competitiveness; closure

Health and Safety
• Performance – eliminating fatalities; shift to risk management approach from incident management approach; sharing experiences – organizational learning

Materials Stewardship
• Sustainability profile; responsible sourcing; mercury; chemicals management

Communications
• Reputation drivers; issues profiling; relationship strategy

President’s Office
• Mining’s contribution; emerging issues, reporting and assurance – GRI; outreach (investors, mining and non-mining); Extractives Industry Transparency Initiative; Committee for Mineral Reserves International Reporting Standards (CRIRSCO)
The underpinnings of applied sustainability
Definitions

**Sustainability**
the persistence of certain necessary and desired characteristics of both people and the enveloping ecosystem (of which people are a part) over a very long time – indefinitely

Robinson et al., 1990

**Development**
to expand or realize the potentials of; bring gradually to a fuller, greater, or better state.

Daly, 1989

**Sustainable Development**
the human and, most importantly, the ACTION part of the above idea set – it covers what and how people do.

The result is not a “fixed state of harmony.” Rather, it is an ongoing process in which people take actions leading to development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland 1987, Milos Decl. 2003).

Conversely, actions that reduce the ability of future generations to meet their own needs should be minimized and if deemed essential to continue with today, at least done so with the explicit recognition of and sensitivity to future implications.
Perspectives on sustainable development

Components

- Environmental
- Social
- Cultural
- Political
- Health
- Economic
- Institutional

Results

- Human Well-being
- Ecosystem Well-being

Capitals: Natural, Built, Human, Knowledge, Institutional
Observations – applied sustainability

• is not environmental protection in another guise

• applications build from but go beyond traditional environmental, social, and economic impact approaches – but the key is “contribution” not “impact”

• is a positive concept that has as much to do with achieving wellbeing for people and ecosystems as it has to do with reducing stress or impacts (criteria and indicators need to reflect this)

• we need to design for and test against the achievement of a net positive contribution to people and ecosystems over the long term
Achieving practical results using systems ideas
(The Seven Questions to Sustainability (7QS), http://www.iisd.org/natres/mining/7qs.asp)

Assessing for Sustainability

1. **Engagement.**
   Are engagement processes in place and working effectively?

2. **People.**
   Will people's well-being be maintained or improved?

3. **Environment.**
   Is the integrity of the environment assured over the long term?

4. **Economy.**
   Is the economic viability of the project or operation assured, and will the economy of the community and beyond be better off as a result?

5. **Traditional and Non-market Activities.**
   Are traditional and non-market activities in the community and surrounding area accounted for in a way that is acceptable to the local people?

6. **Institutional Arrangements and Governance.**
   Are rules, incentives, programs and capacities in place to address project or operational consequences?

7. **Synthesis and Continuous Learning.**
   Does a full synthesis show that the net result will be positive or negative in the long term, and will there be periodic reassessments?
Development template

**Major Questions**
(Interrogative form of goal statement)

**Ideal Answers**
(Foundation of assessment criteria)

**Sub-questions**
(Interrogative form of objectives)

**Indicators**
(Qualitative and quantitative signals for tracking change)

**Metrics**
(Specific units of indicators)
Engage with Who?

- **Industry** (industry associations, other companies)
- **Support services** (financial, consultants, contractors, suppliers)
- **Government** (local, county/regional/district, state/provincial, federal, international)
- **Indigenous people and their organizations**
- **Organized labour**
- **Mining Affected Communities** (by economic, social, and/or environmental (e.g. watershed) dependency – several million people in several hundred communities)
- **Non-government organizations**
- **Academic, Learning, and R & D Support** (universities, technical schools, research centres (private/public))
Boundary Conditions 1: Project Life Cycle

1. Exploration 1-10 years
   - Suspension Termination

2. Detailed Site Investigation, Design and Estimating
   - Typically 1-5 years
   - Suspension Termination 2A

3. Construction

4. Operation
   - 2-100 years Progressive Rehabilitation
   - Temporary Closure 4A

5. Final Closure and Decommissioning
   - 1-5 years

6. Post Closure
   - In Perpetuity

Key:
- Orange: Mine Life Cycle 1960's
- Blue: Mine Life Cycle 1970s +
- Red: Mine Life Cycle 2000
Boundary Conditions 2: Mine/Minerals Life Cycle

1. EXPLORATION
2. RESERVES
3. MINING AND MILLING
4. CONCENTRATE
5. PRIMARY SMELTING AND REFINING
6. SECONDARY SMELTING AND REFINING
7. FIRST-PRODUCTS
8. MANUFACTURING
9. CONSUMER PRODUCTS
10. WHOLESALE AND RETAIL TRADE (Domestic and International)
11. END-USES
12. Recycle

Generation of Stress and Restoration - social and environmental (physical, chemical, biological)
Boundary conditions 3: ripple effect

**DIRECT OUTPUTS**
- Benefits and costs to people (all communities of interest)
- Benefits and costs to the environment (Environmental stress and restoration: chemical, physical, biological)

**DIRECT INPUTS**
- Stakeholder engagement, labour, land, water, energy, feedstocks, reagents and supplies

**INDIRECT INPUTS**
- Benefits and costs to upstream consumers, operations, communities and ecosystems because of demand for inputs

**METAL AND MINERALS INDUSTRY**

**INDIRECT OUTPUTS**
- Benefits and costs to downstream consumers, operations, communities and ecosystems because of enhanced supply of metal and mineral products

www.icmm.com
Two examples

1. The EC environmental footprint
2. Mining and conflict
The EC environmental footprint
(life cycle approach to quantifying environmental performance)

Draft COMMISSION RECOMMENDATION on the use of common methods to measure and communicate the life cycle environmental performance of products and organizations

ANNEX II : PRODUCT ENVIRONMENTAL FOOTPRINT (PEF) GUIDE
ANNEX III: ORGANISATION ENVIRONMENTAL FOOTPRINT (OEF) GUIDE

References:
Policy and methodological and development:
http://ec.europa.eu/environment/eussd/smgp/index.htm

Annexes II and III:
EC “default” environmental footprint impact categories

1. Climate change, kg CO2 equivalent
2. Ozone depletion, kg CFC-11 equivalent
3. Ecotoxicology for aquatic fresh water, Comparative Toxic Unit for ecosystems
4. Human toxicity – cancer effects, Comparative Toxic Unit for humans
5. Human toxicity – non-cancer effects, Comparative Toxic Unit for humans
6. Particulate matter/respiratory inorganics, kg PM2.5 equivalent
7. Ionising radiation – human health effects, kg U235 equivalent (to air)
8. Photochemical ozone formation, kg NMVOC equivalent
9. Acidification, mol H+ eq
10. Eutrophication – terrestrial, mol N eq
11. Eutrophication – aquatic, fresh water: kg P equivalent marine: kg N equivalent
12. Resource depletion – water, m3 water use related to local scarcity of water
13. Resource depletion – mineral, fossil, kg antimony (Sb) equivalent
14. Land transformation, Kg (deficit)
Distinguishing conflict from violence
2012 mining-related conflicts involving protests and/or the use of force

Total of 42 incidents in 26 countries
Failed states index 2012 (Fund for Peace, www.fundforpeace.org)
Alert status in 33 countries, warning status in 92
Mining’s contribution: benefits, costs and risks, responsibilities and accountabilities
Fragility and conflict situations

- Fragile states – face particularly severe developmental challenges
- On-going violence linked to past conflict
- 75% are conflict affected
- No low income fragile state has achieved a single MDG
- Why important to mining . . .
The 2003 Milos Statement

The minerals professional community . . .

• believe minerals are essential to meeting the needs of the present while contributing to a sustainable future

• will contribute to a sustainable future through the use of our scientific, technical, educational, and research skills in minerals, metals, and fuels

  Δ professional responsibility
  Δ education training and development
  Δ communication
Seeing the forest and the trees, looking over the horizon
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