New Realities Facing the Mining and Metals Industry
Working within the new realities in mining

Changing global geo-political and economic conditions have resulted in a dramatic slowdown in the resources sector. An imbalance between the supply and demand of commodities is forcing mining companies to focus on short-term demands, while attempting to maintain line of sight to their long-term business objectives.

With this as context, building a sustainable enterprise is paramount for survival. Companies are focused on decreasing unit costs and improving operational efficiencies. Successful, sustainable enterprises:

- Integrate life-cycle thinking into their existing assets to optimize the overall return on investment
- Actively engage with their stakeholders to develop and sustain a social license to operate
- Take a holistic view to mine planning and consider technical and non-technical factors in making decisions
- Have an overriding commitment to Health and Safety that is effectively integrated throughout the business

ERM understands the challenges and implications companies face in this sector. Having been deeply involved in the sector for many decades, ERM has successfully assisted clients to navigate through the multiple downturns companies have experienced. As a result, we can help you develop a clear strategy and associated tactics for your operations at group, division and site levels.
Current trends we are seeing

Oversupply and weakening demand continue to drive commodity prices lower, leading to:

- Continued reduction in new capital investment and Return on Capital Employed (ROCE) as the industry’s new mantra
- Market share competition and aggressive unit cost reduction by streamlining operations and increasing productivity
- Divestment of under-performing and non-core assets to improve returns and relieve cost of debt

Risk based approach to health, safety, environmental and community (HSEC) management has shifted the focus of scarce resources to:

- Confirm that material risks have been identified, assessed, and effectively managed to acceptable levels
- Provide a material contribution to financial return through obtaining and maintaining a social license to operate and supporting increased productivity
- Continuously improve safety performance and the fight against fatalities
- The robust identification and management of catastrophic hazards, and ensuring critical controls are in place

Reassessment of closure plans in order to reduce long-term liabilities by developing innovative closure strategies and optimizing mining methods.
We continue to see major value opportunities across the lifecycle

Recent ERM research looked at 67 mining projects which showed that 46% of major capital projects missed their delivery date commitments between 2008 and 2013. The majority of these projects were delayed because of community opposition (42%), environmental concerns (35%), difficulty in obtaining permits (23%), and unfavorable commodity prices/capital shortages (35%). The delays had far reaching consequences including budget overruns, loss of trust from stakeholders, and negative shareholder sentiment.

Causes of delays to mining projects

- Social opposition: 42%
- Environmental concerns: 35%
- Permitting issues: 23%
- Land access: 6%
- Health & safety: 6%
- Extreme weather: 3%
- Commercial issues: 35%
- Revenue sharing: 8%
- Technical challenges: 3%
- No details available: 6%

World-class mining project with capital expenditure of between US$ 3–5 billion will suffer roughly US$ 20 million per week of delayed production in Net Present Value (NPV) terms.

The most frequently overlooked cost cited was the management time devoted to managing conflict, especially at senior management level.

Case Study

ERM analyzed the prevalence of delays to capital projects due to sustainability issues.

ERM partnered with Anglo American to develop the Sustainability Valuation Approach© which identifies sustainability risks across the lifecycle and estimates their financial and reputational impact so that these can be fully incorporated into options analysis and decision making.

This approach brings together team members from all disciplines to identify constraints and assist in the early stages of mine design to avoid delays and costly changes later on.

42% of large mining projects that were delayed from 2008-2012 were due to social opposition, while 35% were hindered due to environmental concerns.
In looking at mine closure, ERM research showed that mines were being required to monitor and manage water much longer than anticipated after final production representing cost escalation.

ERM survey results concluded that post closure:
- 91% of mine sites still manage water
- 51% are monitoring water
- 33% are actively treating water
- 27% are passively treating water

Less than 9% of mine sites have been successfully reclaimed and relinquished.

Case Study

By integrating closure considerations in mine planning and operations, ERM has found that the total cost of closure can be reduced and the probability of relinquishment post closure can be increased.

By integrating closure considerations into early mine planning, one study into a coal mine showed that the mine Net Present Value could increase 20 to 40% by changing the stripping and backfill methods during the mining phase.

Post-closure status of 57 mines studied

Increased net present value of mines integrating closure considerations into planning

<table>
<thead>
<tr>
<th>Mining and Rehabilitation Costs</th>
<th>Liabilities</th>
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<tbody>
<tr>
<td>Strip and place</td>
<td>Water treatment costs</td>
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<td>Compaction</td>
<td>Care and maintenance costs</td>
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<td>Reshaping</td>
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<td>Seeding and soil amelioration</td>
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-20% NPV | -45% NPV
-35% NPV |
In the context of the new realities facing the industry, how can you be sure that material risks have been effectively identified, assessed and managed to acceptable levels?

Where is your organization in terms of controlling HSEC risks?

**Level 1**
No Adequate Control

- No controls/poor control design with limited effectiveness and reliability
- Management has no real confidence that key risks are adequately addressed

**Level 2**
Limited Control

- Significant gaps in preventive controls and/or recovery measures
- Management not able to easily view effectiveness of critical controls
Most controls are designed correctly and in place.

Management has doubts about reliability of controls in preventing risks from occurring or minimizing their impacts.

- Majority of controls are designed correctly, implemented and effective.
- Management is able to track the reliability of some controls.
- Controls are well designed and appropriate for the risk, not overly reliant on the absence of human error or procedures.
- Self-assessment and robust monitoring and review program in place.
- Management believes that controls are effective and reliable at all times.
ERM and the mining and metals project lifecycle

ERM offers complete lifecycle services to the mining and metals industry, from social risk management at the concept stage to closure implementation.

Our 5,000 employees combine strategic solutions with deep technical expertise to support your business objectives.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Feasibility</th>
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<tr>
<td>• Identify community stakeholders</td>
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<td>• Build credibility with community and regulatory stakeholders</td>
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<tr>
<td>• Map potential fatal flaws and other project constraints</td>
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<tr>
<td>• Environment and social baseline studies</td>
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<td>• Human factors requirements analysis</td>
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<td>• Environmental, Social, Health Impact Assessments (ESHIAs)</td>
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<td>• Plan and implement land acquisition and resettlement programs</td>
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<td>• Sustainability master plans to improve socioeconomic performance across the lifecycle of the operation</td>
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<td>• Adaptation issues to physical risks e.g. water stress, climate change etc.</td>
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<td>• Human factors screening workshops</td>
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<td>• Worker housing strategies</td>
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<td>• Local economic participation strategies</td>
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HSEC due diligence for transaction support and public disclosure

Integration of environmental, social, health and safety considerations with life of mine plans and monitor performance

High-impact HSEC training program

Risk management strategies, catastrophic event and fatality prevention,

Closure planning and late life legacy
### Construction
- Permitting
- Design and implement detailed management plans to minimize sustainability risks and maximize opportunities
- Manage community interactions with construction workforce
- Human factors design specifications, safety critical task analysis
- Establishing safety culture, leadership and training during construction

### Operations
- Implement and monitor environmental, health and safety (EHS) management systems
- Behavioral safety programs
- Enhance productivity by improving sustainable performance
- Assurance performance to improve EHS and social performance
- Compliance management and permit renewals

### Closure
- Risk based exit strategies
- Develop sound closure goals
- Manage long term liabilities
- Help ensure sustainable transition for post closure communities
- Implement decontamination and demolition programs
- Site planning for future use

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**Health and safety considerations with life of mine plans and monitor performance**

**Aimed at building internal capacity and achieving sustainable operational excellence**

**And implementation techniques**

**Management**
About ERM

ERM is a leading global provider of environmental, health, safety, risk, social, and sustainability related consulting services. We have more than 160 offices in over 40 countries and territories employing more than 5,000 people who work on projects around the world. ERM is committed to providing a consistent, professional, and high quality service to create value for our clients. Over the past three years we have worked for more than 50 per cent of the Global Fortune 500 delivering innovative solutions for business and select government clients helping them understand and manage the sustainability challenges that the world is increasingly facing.

For over 40 years we have been working with clients around the world and in diverse industry sectors to help them understand and manage their environmental, health, safety, risk, and social impacts. The key sectors we serve include oil and gas, mining, power, manufacturing, chemical, and pharmaceutical. All face critical sustainability challenges and our clients in these and many other areas rely on our ability to assist them to operate more sustainably which has a positive impact on our planet.