InBrief: Mining's Contribution to Sustainable Development

ICMM
International Council on Mining & Metals

InBrief

Mining's contribution to sustainable development – an overview

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June 2012

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Introduction

The extraction and processing of minerals and metals to provide goods and services essential to human society is as old as human development itself. Minerals and metals have brought huge benefits to society – they are vital commodities that serve as a foundation to society's material quality of life. In today's world, population growth, urbanization, social and economic development and even demands for a green (or low carbon) economy are all contributing to an increase in the demand for minerals and metals. However meeting that demand and achieving the benefits comes at a cost.

In many countries, mining and metals activities are effectively managed to ensure that a positive overall benefit is achieved. But in some countries, resources have been misused and squandered, fuelling conflict and political unrest. There have been disputes over land use, property rights and environmental damage, concerns about revenue transparency and corruption and a growing debate about the distribution of the benefits of mineral wealth. Tensions within communities and regions have often been the result. In the extreme, there has been conflict.

However, mining is a key contributor to economic growth and improved material quality of life. Mining's long time horizon, its need for both skilled and unskilled labour, its links to regional infrastructure and service development as well as the importance of the products that it produces, means that it can make a unique and powerful contribution to sustainable development. With responsible public and private management, the mining and metals industry can contribute to poverty alleviation across the world while maintaining ecosystem integrity.

To ensure that mining- and metals-related policy development, decision-making and on-the-ground performance is conducted to the highest standard possible, a deep understanding of mining's contribution to sustainable development is essential – not only for industry specialists, government policy makers and regulators, but also for the general public. This requires consideration of both the opportunities and benefits achieved through the extraction, processing, and use of minerals and metals, as well as an assessment of the economic, social and environmental costs and risks of doing so. Importantly, the responsibilities of all stakeholders – government, civil society, communities and companies – must be considered.

Society's expectations of the sector's performance are high and continue to increase. This manifests itself in pressures for higher standards of social and environmental performance, greater transparency, and more participation in decision-making by stakeholders that have historically played only a marginal role. Simultaneously, the nature and fairness of the distribution of the benefits and costs from mining and metals' operations is being challenged. The resource nationalism rallying cry for a greater share of the wealth extracted by the mining industry is getting louder. Clearly, the industry's operating environment is rapidly changing and the challenge for all stakeholders in the industry is to stay on top of this evolution.

Fundamentally, ICMM believes that:

1. minerals, metals and the vast array of products that result, play a critical and evolving role in society, a role that will continue far into the future
2. mining and metals activities, if well-managed, can provide lasting opportunities for economic growth and development
3. the demand for minerals and metals is growing and will continue to do so
4. mining will be needed to meet this demand, even with society achieving greater efficiencies through reduction of extraneous uses, reuse, and recycling (as enshrined, for example, in the European Union's public policy goal of dematerialization)
5. society must continue to improve the way it extracts, processes and uses metals in order to make a positive, long-term contribution to people and the environment.

The objective of this series of publications is to describe mining and metals' contribution to sustainable development. It seeks to set out some of the more important benefits, costs and risks and responsibilities relating to mining and metals in today's world, and explore how well they are defined, assigned and monitored.

This series is not intended as a definitive statement. The topic is complex and this treatment should be considered as a contributing step. The series has been initiated to spark a conversation with others inside and outside the industry as we move ahead and seek ever better solutions to challenges faced by society and the industry.

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Mining's contribution to sustainable development

ICMM has commissioned this series of publications to describe mining and metals' contribution to sustainable development. It seeks to set out some of the more important benefits, costs, risks and responsibilities related to mining and metals in today's world.

The first in the series – *Mining's contribution to sustainable development* – provides an overview of the series and introduces the concept of contribution analysis. *The role of mining in national economies* examines the contribution of mining activities in all countries with an overview of the contribution to the global economy. *Trends in the mining and metals industry* provides a forward looking discussion of trends likely to govern the evolution of the industry over the next decade.

In *Uses of minerals and metals*, a treatment of the current and future contribution of minerals- and metals-based products to sustainable development is offered. Building on this theme, *The role of minerals and metals in a low carbon economy* focuses on the materials needed for the technologies to address the climate change challenge.

The next two titles in the series focus on the contribution of mining to people and the environment. *Human rights, social development and the mining and metals industry* focuses on the role of business in contributing to the realization of human rights. Whilst *Mining and the environment* looks at how mining companies are tackling the challenge of achieving a net positive contribution from their activities.

Together these discussions are intended as a starting point for the industry and others to more fully examine the contribution of mining and metals to sustainable development, a conversation that will continue for years to come. They are intended to stimulate an exchange of ideas leading to the development of innovative ways forward. The series was launched at the Rio+20 summit in June 2012 and individual titles are being released from June–November 2012.

About ICMM

The International Council on Mining and Metals (ICMM) was formed in 2001 to catalyze improved performance and enhance the contribution of mining, minerals and metals to sustainable development. Today, it brings together 22 mining and metals companies as well as 34 national and regional mining associations and global commodity associations. ICMM's member companies employ close to one million of the 2.5 million people working in the sector worldwide. These companies have some 800 operations in over 60 countries producing 30–40% of the world's hard mineral commodities including iron ore, gold, platinum and nickel. We engage with a broad range of stakeholders – governments, international organizations, communities and indigenous peoples organizations, investors, civil society and academia – in order to build meaningful relationships. Our vision is one of leading companies working together and with others to strengthen the contribution of mining, minerals and metals to sustainable development.

About the authors

This series has been developed by ICMM with input from members, subject matter experts and representatives of organizations we work with. ICMM would like to thank them all for their contributions. Information on the authors and reviewers for each title is provided on the back cover.

The mining and metals industry

The mining and metals industry spans a complex interdependent web that includes a formal component, an informal component, and many affiliated interests – support services (such as investors, contractors and suppliers), government, Indigenous Peoples and their organizations, mining affected communities, civil society organizations, organized labour, academia and research institutions and downstream users. The industry interacts with these interests either directly and/or through multi-stakeholder initiatives such as the Extractive Industries Transparency Initiative, the Global Reporting Initiative, the IFC Performance Standards and the Voluntary Principles on Security and Human Rights.

At the core of the formal mining industry are publicly traded and state-owned companies as described in Table 1 overleaf. Together, these companies employ about 2.5 million people world-wide. About half of these are employed with the global and senior companies (and ICMM's 22 member companies come from this group). The formal mining industry operates under a legal and fiscal framework determined in each country it operates. It is linked by various national, regional and commodity-focused associations committed to representing the industry, protecting its interests and improving performance. (34 of these associations are members of ICMM.)

In contrast to the above, artisanal and small-scale mining comprises an informal component of the mining and metals industry. There is typically no legal or fiscal framework, or if there is one it is difficult to enforce, although this is slowly changing as countries or local jurisdictions address this gap. While the informal sector provides employment for some of the world's poorer people, potential instability can arise from the fact that many of these people work unsafely and illegally and may fall prey to exploitation by criminal networks and armed groups.

The World Bank estimates that today, some 15 to 20 million artisanal and small scale miners are operating in 30 countries with about 80 to 100 million people depending on such mining for their livelihood. Working conditions in artisanal mining are typically harsh. Cultural conflict, crime and corruption, health problems, gender and child labour issues, and serious environmental degradation are common. Public and private services to provide essential health care and education usually do not exist.

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Table 1: Profile of the formal mining industry

Company category	Approximate asset base	Approximate numbers of companies	Comment
Global	Exceeds US$10 billion	50	Global and senior companies which have access to the largest portion of available capital
Seniors	US$3 – US$10 billion	100	
Intermediates	US$1 – US$3 billion	350	Companies often on a growth path to become seniors
Juniors (producers)	US$500 million – US$1 billion	1,500	Companies which often have one mine
Juniors (exploration)	US$5 – US$500 million	2,500	Volatile and share market dependent; they are finders, not producers and their focus is on their exploration activities
Junior – juniors	Below US$5 million	1,500	Focus is on accessing venture capital and enhancing their stock price

Broad categories of the minerals and metals produced by the industry include:

- **ferrous and non-ferrous metals:** iron and steel, nickel, lead, zinc, copper, aluminium, tin, tungsten, molybdenum, tantalum, cobalt, bismuth, cadmium, titanium, zirconium, antimony, manganese, beryllium, chromium, germanium, vanadium, gallium, hafnium, indium, niobium, rhenium, thallium and rare earth metals
- **precious minerals and metals:** diamonds, gold, silver, platinum group metals (platinum, palladium, iridium, ruthenium, rhodium, osmium)
- **energy minerals:** coal, uranium
- **industrial minerals:** clays, silica sand, talc, salt, limestone, gypsum, pumice, potash, refractory bauxite, chromite, rutile and ilmenite (titanium), zircon, magnesite, borates, fluorspar, barites, sulphur and phosphate rock
- **building materials:** stone, sand and gravel.

The mine projects to produce this broad range of minerals and metals as well as the resulting products follow a life cycle as illustrated in figures 1 and 2.

Figure 1: The mine project life cycle

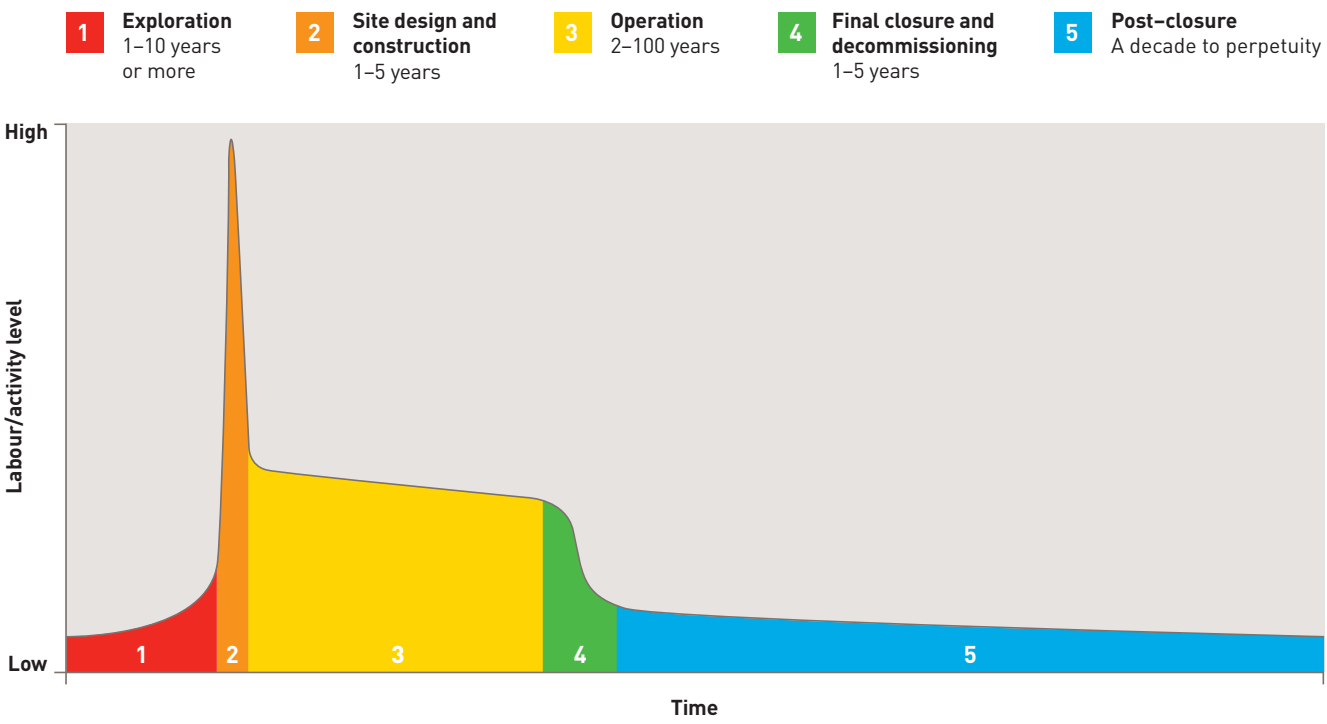
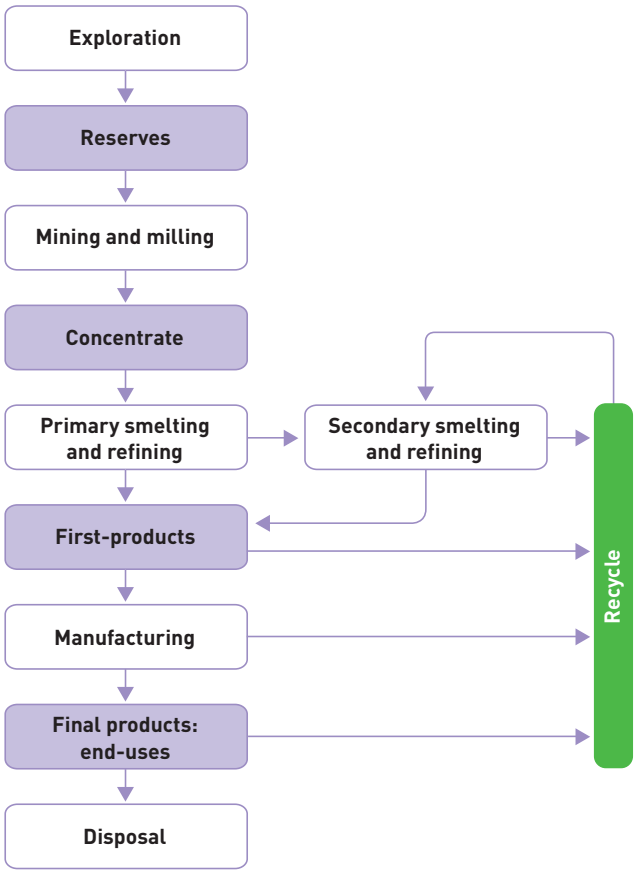


Figure 2: The mineral product life cycle



Allowing for the time required for exploration and to find an orebody to develop a mine, as well as the decades or more for construction, operation, closure and post-closure management, a 20–30 year mine can often involve five to seven generations of relationships between an industry player (more than one company will likely be involved) and the host community. Many mining operations have an even longer lifespan which further extends the multi-generational relationship with communities.

A critical feature of metals is their capacity to be recycled. While metals have been recycled for many centuries, the realization in the last few decades of the potential cost savings and reduction of environmental and social impacts achieved by recycling (linked for example to air and water emissions and reduced energy use) has led to an increased emphasis on recycling by regulators, business and consumers. This topic is described more fully in a later publication in this series, *Uses of minerals and metals*.

Mining and metal's contribution to sustainable development

At the heart of the concept of sustainable development lies the idea that any human activity, including mining, should be undertaken in such a way that the activity itself and the products produced provide a net positive long-term contribution to human and ecosystem well-being.

The focus is not on how mining can be sustainable (recognizing that any individual mining operation has a finite lifespan) but on how mining, minerals and metals can contribute to sustainable development. This is a conceptual shift away from a singular analysis and mitigation of impacts to a more comprehensive analysis that looks at the wider contribution of the industry and its products.

The focus on contribution is a tougher but fairer approach. This is so because it demands a demonstration of positive results and not just mitigation of negative impacts. Such an approach is essential if mining and metals-related activities and the resulting products are to make the sustainable development contribution demanded by society and sought by industry leaders.

Today's regulatory systems are based on environmental and social impact analyses that emerged in the 1960s and 1970s. These recognized that many negative environmental and social implications of human activity were not included in traditional economics-driven cost-benefit analyses. Accordingly, the main focus has been on identifying and mitigating the negative, with less emphasis on recognizing, assessing and acknowledging the positive. In other words, a legal mining licence to operate is granted when the negative impacts are deemed to be well-defined and the mitigating strategies are adequate, rather than because the net contribution of a given project over the long term is positive.

Beyond the legal licence, the concept of a social licence to operate has been widely accepted by the industry as an essential attribute of success. It has prompted companies to look well beyond their self interest. However in practice, the social licence too, tends to be focused on more immediate decisions and actions. A contribution perspective would push the boundaries and open opportunities for greater stability over the longer term.

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Mining's contribution to sustainable development – an overview

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Today's society is challenging the assumptions of the traditional social and environmental impact approaches. For its part, the industry has a key role to play in capturing and communicating the full value of its mining and processing activities and products. Box 1 shows a set of questions for addressing the sustainable development contribution of mining. This approach was first championed by the Mining, Minerals and Sustainable Development project in 2002, a project that undertook a far-reaching examination of industry practices and that contributed to the decision by leaders in the mining industry to form ICMM.

There can be no doubt that mining projects and the resulting mineral and metal products have a significant impact on human society and on the global ecosystem.

Mine projects are a source of livelihood and well-being for millions of people. For emerging nations they attract foreign direct investment, domestic investment, foreign earnings and government revenues. At the local level they provide an opportunity for employment, support for entrepreneurs to provide goods and services needed by mining activities and contribute to infrastructure and services in the local community.

Often located in remote areas, mining can provide a unique means for stimulating local economic activity. Throughout history, mineral discoveries have catalyzed the development of sparsely populated and remote areas. The discovery and development of mineral resources has provided an opportunity for addressing poverty reduction and helping countries in achieving the Millennium Development Goals (Table 3).

Table 3: Millennium Development Goals

Goal	Description
1	Eradicate extreme poverty and hunger
2	Achieve universal primary education
3	Promote gender equality and empower women
4	Reduce child mortality
5	Improve maternal health
6	Combat HIV/AIDS, malaria and other diseases
7	Ensure environmental sustainability
8	Develop a global partnership for development

Box 1: Seven questions to 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 new result will be positive or negative in the long term, and will there be periodic reassessments?

Source: MMSD North America, 2002.

However, local social and environmental implications are significant and can result in major socio-economic challenges. When mismanagement occurs (whether by government, company or community), the resulting impact can be adverse and severe. If a perceived or real inequitable distribution of costs, benefits, risks and responsibilities occurs, tensions can split a community, undermine a company's reputation and at worst, lead to conflict.

Importantly, while minerals and metals provide a material foundation for contemporary society, they are also a means for transforming current society into one marked by greater efficiencies, lower environmental stresses and more effective public services. Just as the businesses that produced them must be carefully managed, so too should the contribution these products can make to ensure that the benefits from their usage are realized.

Many of the complex issues facing modern mining and metals operations require collaborative involvement of multiple stakeholders. If such collaborations are to be effective, the responsibilities carried by companies, governments, communities and civil society must be clearly defined. These definitions must be accompanied by a monitoring, reporting and evaluation system that facilitates the enforcement of these responsibilities and enables stakeholders to learn from mistakes and successes.

Change and progress in the mining and metals industry

Achieving positive change in the mining and metals industry so that it can adjust to its evolving operating environment is a significant challenge for those inside and outside the sector.

In the early 1990s, concerns linked to mining activities in developing countries – particularly those characterized by high poverty - led some to suggest that mineral endowment constituted a kind of resource curse for these countries. We now know that this does not need to be the case. When managed responsibly and effectively, and in a context of good governance, mining and metals production can contribute meaningfully to an improvement in living standards, particularly in communities directly impacted by these operations.

In the late 1990s, CEOs from some of the world's leading mining companies launched an effort to reposition the industry in terms of both performance and perception. Faced with a groundswell of public criticism, it commissioned the International Institute for Environment and Development (IIED) to undertake a global review of practices and develop an agenda for strengthening the industry's contribution to sustainable development. Some 50,000 people from around the world participated in the resulting process that came to be known as the Mining, Minerals and Sustainable Development (MMSD) project. Out of that review emerged an agenda for change to strengthen the contribution of mining, minerals and metals to sustainable development. ICMM was created in 2001 to facilitate delivery of that agenda working with its members and others in pursuit of continuous performance improvement.

A decade later, what has been accomplished and which challenges remain? From an ICMM perspective, the following ten indicators highlight how the industry has changed markedly over the past decade. This list is far from comprehensive.

"When managed responsibly and effectively, and in a context of good governance, mining and metals production can contribute meaningfully to an improvement in living standards."

1. Reporting and assurance
Amongst leading companies there is now full acceptance and familiarity with annual reporting of performance against sustainable development principles using an independent third-party assured process. There has also been a steep increase in interest on the part of investors in the social and environmental performance of mining and metals companies, as well as the development of initiatives such as the Equator Principles and the IFC Performance Standards.

2. Mining and development
A clear formula for avoiding the resource curse now exists and is being followed in many parts of the world. More and more developing and emerging nations are finding that the role of mining and metals in their national economies can be a positive factor, that their dependency on mining and metals for economic strength is growing and that mining and metals can play a key role in addressing poverty reduction and other developmental issues. For their part, companies are accepting this developmental role, though the boundaries of responsibility between company, community and government remains a concern for all parties.

3. Revenue transparency
Today's support for enhanced revenue transparency, as reflected in the commitment by governments, companies, investors and civil society organizations to the Extractive Industries Transparency Initiative, did not exist a decade ago.

4. Human rights
The committed focus on human rights by mining companies has increased significantly in the last decade, and the industry is now considered to be one of the leaders though many significant challenges remain.

5. Environment
Environmental management systems with a substantive focus on performance related to critical issues such as biodiversity protection and water management are now accepted priorities of most mining companies.

6. Health and safety
Clear progress on the introduction of robust systems that emphasize a health and safety culture. Significant reductions in lost-time injury incidents year-on-year have been achieved as well as similar improvements in occupational health. The industry still faces the challenge of eliminating fatalities in work-related accidents.

7. Climate change
The mining and metals industry's committed entry into the climate change arena through engagement at the country level by both companies and national associations, regional association engagement in Europe and ICMM's championing of a generic set of principles for guiding the development of climate change-related public policy, represents a significant change. Closely linked to this is ongoing work on enhancing energy efficiencies, reducing carbon emissions contributing more effectively to local energy needs, and recognizing the role of minerals and metals in a low carbon economy.

The International Council on Mining and Metals (ICMM) was established in 2001 to improve sustainable development performance in the mining and metals industry. Today, it brings together many of the world's largest mining and metals companies as well as national and regional mining associations and global commodity associations. Our vision is one of leading companies working together and with others to strengthen the contribution of mining, minerals and metals to sustainable development.

ICMM
35/38 Portman Square
London W1H 6LR
United Kingdom

Phone: +44 (0) 20 7467 5070
Fax: +44 (0) 20 7467 5071
Email: info@icmm.com

www.icmm.com

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8. Relationship building and shared value
The industry's recognition of the importance of relationship building and the creation of shared value – for communities, companies, and governments – reflects a dramatic change to previous business approaches. The recent statement by a CEO that "the greatest insurance policy I have is community trust", reflects this recognition. Unfortunately, there are many locations where this degree of trust does not exist.

9. Full project life cycle, long time horizon
Recognition by the industry, communities, civil society and government to consider the full project life cycle – from exploration through to the long post-closure period – in a mine's design and financial analysis reflects a major evolution. The impact of this life cycle approach on a project's technical, financial, environmental and social outcomes remains to be seen. Unfortunately, the thorny issue of addressing legacy and orphaned sites is being resolved slowly in most countries.

10. Sustainability footprint and tracking responsible performance across the full life cycle
Initially driven by concerns over illicit support of factions in conflict areas ("blood diamonds"), the increased interest in tracking performance across the full product life cycle of metal and metal products, has resulted in a strong focus on life cycle assessment. The development of an integrated "sustainability footprint" would not have been considered necessary a decade ago.

The mining and metals industry as an agent of change

Mining and metals operations bring significant change – social, environmental, and economic. Change is inevitable. In raising the concept of contribution, this series of publications is explicitly recognizing the role of the industry as an agent of change. They begin to describe the design and performance criteria needed to ensure that the net result of the industry's impact is positive over the long term.

This is the challenge of sustainable development. It is the challenge faced and accepted by ICMM and its 22 member companies.

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The original draft of this note was prepared by ICMM President, Anthony Hodge. Critical reviews were offered by David Humphreys, Edward Bickham, Patricia Dillon, Steve d'Esposito, Ian Thomson and Rory Sullivan. Reviewers from ICMM members included Sven Lunsche, Melinda Buckland, Christopher Chambers and Andrew Parsons. It was edited by Hugh Leggatt and ICMM staff.

For questions, please contact info@icmm.com.

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