



With the support of:



COMMITTED TO
IMPROVING THE STATE
OF THE WORLD

Mapping Mining to the Sustainable Development Goals: A Preliminary Atlas

Consultation Draft

January 2016

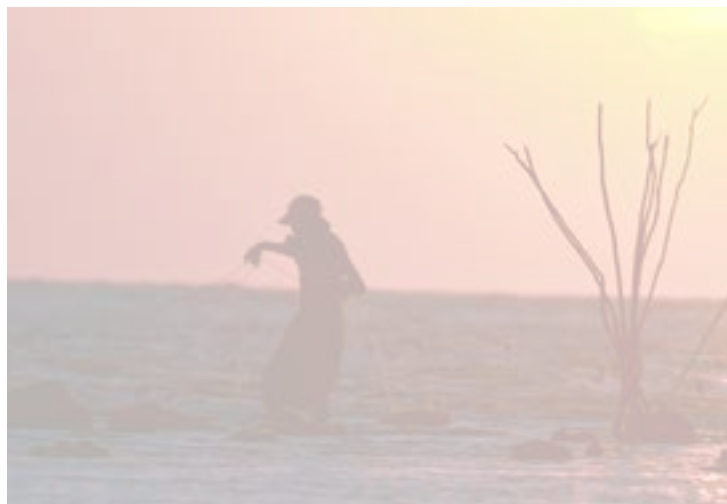


TABLE OF CONTENTS

FOREWORD.....	3
EXECUTIVE SUMMARY	4
INTRODUCTION	7
SGD1: End Poverty – End poverty in all its forms everywhere.....	14
SDG2: Zero Hunger – End hunger, achieve food security and improved nutrition and promote sustainable agriculture	18
SDG3: Good Health and Well-being – Ensure healthy lives and promote well-being for all at all ages	21
SDG4: Quality Education – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.....	25
SDG5: Gender Equality – Achieve gender equality and empower all women and girls	28
SDG6: Clean Water and Sanitation – Ensure availability and sustainable management of water and sanitation for all.....	31
SDG7: Affordable and Clean Energy – Ensure access to affordable, reliable, sustainable and modern energy for all	35
SDG8: Decent Work and Economic Growth – Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all	38
SDG9: Industry, Innovation, and Infrastructure – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	41
SDG10: Reduced Inequalities – Reduce inequality within and among countries	45
SDG11: Sustainable Cities and Communities – Make cities and settlements inclusive, safe, resilient and sustainable.....	48
SDG12: Responsible Consumption and Production – Ensure sustainable consumption and production patterns	51
SDG13: Climate Action – Take urgent action to combat climate change and its impacts	54
SDG14: Life Below Water – Conserve and sustainably use the oceans, seas and marine resources for sustainable development.....	57
SDG15: Life on Land – Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	59
SDG16: Peace, Justice, and Strong Institutions – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable and inclusive institutions at all levels	63
SDG17: Partnerships for the Goals – Strengthen the means of implementation and revitalize the global partnership for sustainable development	67
CONCLUSION	70
ACKNOWLEDGEMENTS	71
ENDNOTES.....	73

FOREWORD

The Sustainable Development Goals (SDGs) represent the world's post-2015 agenda for equitable, socially inclusive and environmentally sustainable economic development. It is our shared belief that the mining industry has an unprecedented opportunity to mobilize significant human, physical, technological and financial resources to advance the SDGs.

Mining is a global industry and is often located in remote and less-developed areas including many indigenous lands and territories. When managed appropriately, it can create jobs, spur innovation and bring investment and infrastructure at a game-changing scale over long time horizons. If managed poorly, mining can also lead to environmental degradation, displaced populations and increased conflict, among other challenges. These attributes make the industry a major potential contributor to the SDGs. At the same time, if the mining industry does not participate or if individual companies engage in activities that contradict the goals, their achievement will be hindered.

By mapping the linkages between mining and the SDGs, the aim of this Atlas is to encourage mining companies of all sizes to incorporate relevant SDGs into their business and operations, validate their current efforts and spark new ideas. Success will also require substantial and on-going partnership between governments, the private sector, communities and civil society. We hope the Atlas spurs action that will leverage the transformative power of collaboration and partnership between the mining industry and other stakeholders. Our intention is that it will be useful for:

- National governments across all relevant ministries - mining, development, finance, environment, infrastructure and others - as a catalyst to further align mining policies with national development plans and to engage more systematically with industry and local governments to leverage investment for sustainable development.
- Local governments, communities, development agencies and civil society organizations to support programmes and efforts to help unlock the mining sector's potential to contribute to a sustainable future and as a stimulus for increased inclusive dialogue and cooperation.
- Existing and future multi-stakeholder dialogue forums at the mine site level and the country level as a foundation to integrate the role of mining into the broader discussion of sustainable development and national plans to achieve the SDGs.

The Atlas is intended as an introduction to the many linkages between mining and the SDGs and complements other resources on the role of mining and the private sector in sustainable development. Many of these resources were reviewed during the development of the Atlas and are listed at the end of each chapter. The United Nation's (UN) SDG Indicators framework will be finalized in early 2016, offering opportunity to further explore how the mining sector can align its actions and reporting.

We are releasing the Atlas as a consultation draft. While extensive initial consultations have been undertaken to develop the draft, we realize that the document covers a wide range of topics and will benefit from further review and input. We therefore welcome comments and suggestions for how to strengthen the Atlas during the consultation process from January – April 2016. During this period, we will also organize a number of multi-stakeholder consultation sessions to promote dialogue and garner further inputs for the next draft.

Finally, we would like to thank all of the experts and institutions who shared their knowledge and the reviewers who provided their expertise and feedback. The core team and the reviewers are noted in the Acknowledgements section.

We look forward to everyone's input and comment!

Casper Sonesson

Policy Advisor, Extractive Industries
Bureau for Policy and Programme
Support
United Nations Development
Programme

Gillian Davidson

Head of Mining and Metals
Industries
World Economic Forum

Lisa Sachs

Director
Columbia Center on
Sustainable Investment

EXECUTIVE SUMMARY

In September 2015, the 193 United Nations (UN) member states adopted “Transforming Our World: The 2030 Agenda For Sustainable Development” which includes a set of Sustainable Development Goals (SDGs) for 2015-2030. The agenda provides a successor framework for the Millennium Declaration and the Millennium Development Goals (MDGs) that were agreed upon 15 years ago for 2000-2015. The SDGs represent the world’s comprehensive post-2015 agenda for equitable, socially inclusive and environmentally sustainable economic development. Meeting the SDGs by 2030 will require unprecedented cooperation and collaboration among governments, non-governmental organizations, development partners, the private sector and communities. Achieving the SDGs will require all sectors and stakeholders to incorporate the SDGs into their own practices and operations.

This draft Atlas maps the relationship between mining and the SDGs by using examples of current work happening in the industry and existing knowledge and resources in sustainable development. It presents a broad overview of opportunities and challenges to demonstrate the actual and potential contributions of the mining sector – from exploration through production and eventually mine closure – to the achievement of the SDGs. Mining companies, their staff, management and boards are the primary audience of the Atlas. It is also intended to advance the conversation about how mining companies working both individually and collaboratively with governments, communities, civil society and other partners can achieve the SDGs.

The Atlas has a chapter for each of the SDGs focusing on the contribution the mining industry can make to that goal and identifying opportunities for how mining companies can collaborate with other stakeholders and leverage resources to address the SDGs. Each chapter also includes case studies on which to draw in building innovative, systematic and sustained collaborative efforts.

The Atlas is based on desktop research and interviews with over 60 global experts from industry, civil society, governments, academia, international organizations and financial institutions conducted between June and August 2015. Companies will see initiatives they are already implementing or participating in, some may find new ideas to support implementation and others will discover new linkages between their existing work and the SDGs. Civil society and communities may find ideas that support new partnerships or inform useful policy reforms. National and local governments may see opportunities to link policies, regulatory activity and funding to the SDGs. The Atlas aims to facilitate three outcomes:

- *increased understanding* of how the SDGs and mining relate to one another
- *awareness-raising* of opportunities and challenges that the SDGs pose for the mining industry and its stakeholders and how they might address them
- *multi-stakeholder dialogue and collaboration* towards the achievement of the SDGs

Some preliminary conclusions that we hope to discuss further during the draft consultation process are:

- ***The mining industry has the opportunity and potential to positively contribute to all 17 of the SDGs.***

The mining industry can impact positively and negatively across the SDGs. In recent decades, the industry has made significant advances in improving how companies manage their environmental and social impacts, protect the health of their workers, achieve energy efficiencies, respect and support human rights, provide opportunities for decent employment and foster economic development. Historically, however, mining has contributed to many of the challenges that the SDGs are trying to address – environmental degradation, displacement of populations, worsening economic and social inequality, armed conflicts, gender-based violence, tax evasion and corruption, and increased risk for many health problems. Given the negative and positive impacts of mining combined with the industry’s capability to mobilize human, physical, technological and

financial resources, the Atlas demonstrates the role mining companies can play in contributing to all 17 of the SDGs.

- ***The scope and nature of mining activities create opportunities to leverage some goals in particular.***

While opportunities to positively contribute can be found across all of the goals, experts interviewed suggested that due to the nature of mining, the industry can contribute more directly to the following eight SDGs:

- **SDG 1 – End Poverty:** Mining generates significant revenues through taxes, royalties and dividends for governments to invest in economic and social development.
- **SDG 6 – Clean Water and Sanitation and SDG15 – Life on Land:** Mine development requires access to land and water presenting significant and broad landscape impacts that must be responsibly managed.
- **SDG 7 - Energy Access and Sustainability and SDG13 – Climate Action:** Mining activities are energy and emissions intensive in both the production and downstream uses of its products.
- **SDG8 – Decent Work and Economic Growth:** Mining can change the lives of local communities, offering opportunities for jobs and training, and also contributes to economic and social inequities if not appropriately managed.
- **SDG9 - Infrastructure, Innovation, and Industrialization:** Mining can help drive economic development and diversification through direct and indirect economic benefits, the development of new technologies and by spurring the construction of new infrastructure for transport, communications, water and energy.
- **SDG16 – Peace, Justice and Strong Institutions:** Mining can contribute to peaceful societies by avoiding and remedying company-community conflict, respecting human rights and the rights of indigenous peoples, and by supporting the representative decision-making of citizens and communities in extractives development.

- ***Building company-specific plans requires further work.***

The Atlas presents a number of ideas, options and case studies demonstrating how companies can contribute to the SDGs. Further work is required to adapt these concepts to individual businesses and specific programmes and to develop the metrics and indicators for measuring performance. The specific actions and opportunities for a particular company will depend on the local social, political, and economic context, the mineral resource, the phase of mining activities (exploration, development, extraction or closure), and the input received from local communities and other stakeholders through formal dialogue and engagement.

- ***Achieving sustainable development is challenging and the mining industry must ramp up its engagement, partnership, and dialogue with other industry sectors, government, civil society and local communities.***

To realize the full potential for contributing to the achievement of the goals, mining companies must continue to work to integrate changes into their core business and, along with the mining industry as a whole, bolster collaboration and partnership with government, civil society, communities and other stakeholders.

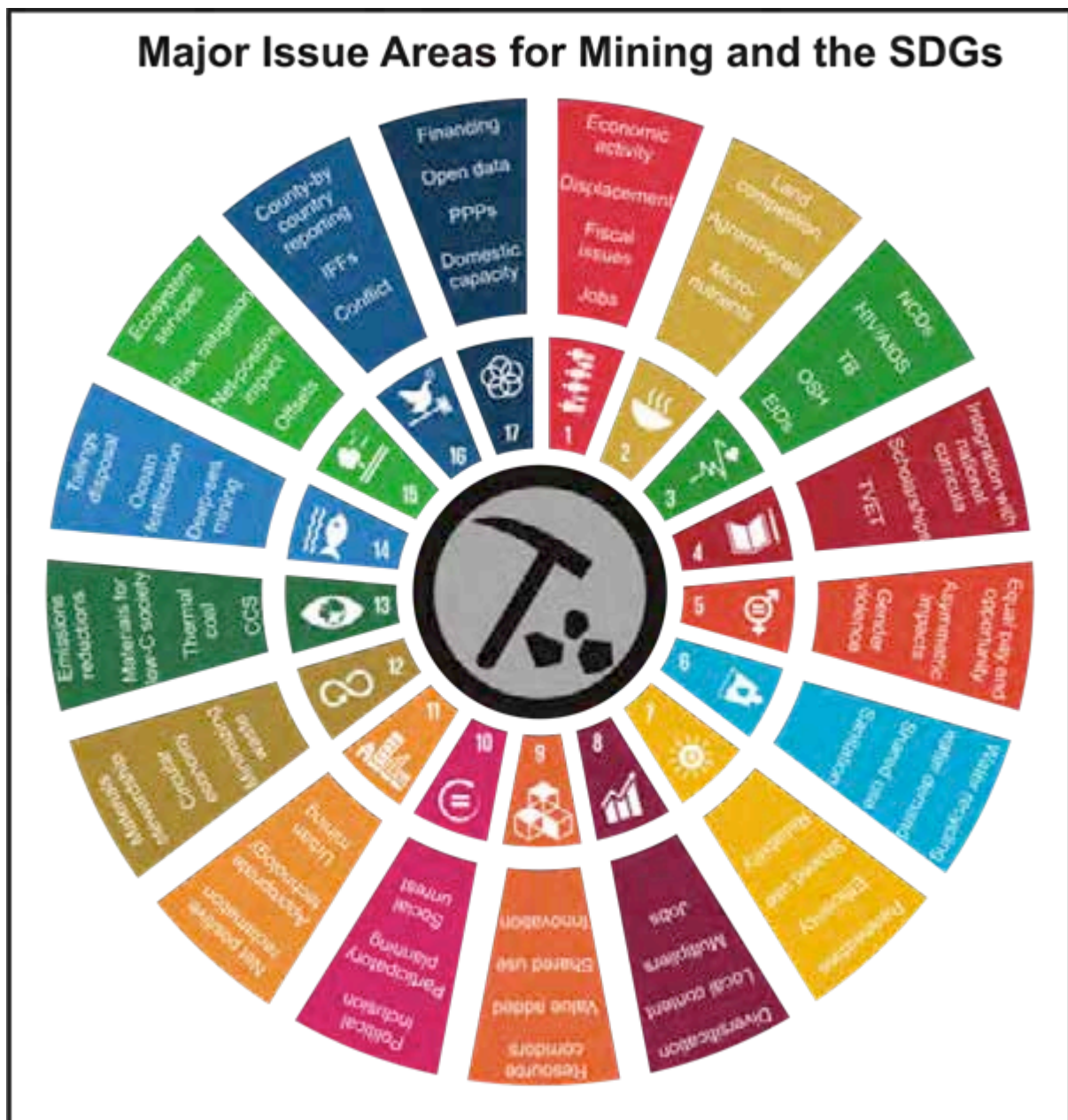


Figure 1: Major issue areas for mining and the SDGs. Abbreviations (in order): NCDs = non-communicable diseases; TB = tuberculosis; OSH = occupational health and safety; EIDs = emerging infectious diseases; TVET = technical, vocational, and educational training; CCS = carbon capture and storage; IFFs = illicit financial flows; PPPs = public-private partnerships. SDG icons adapted from <http://www.globalgoals.org/>.

This document is open for public consultation until April 8, 2016.

Comments should be submitted via the online form at:

<http://unsdsn.org/blog/news/2016/01/13/mining>.

INTRODUCTION

What are the SDGs and why are they important to mining and metals?

In September 2015, the 193 UN member states adopted “Transforming Our World: The 2030 Agenda For Sustainable Development,” which includes a set of Sustainable Development Goals (SDGs) for the period 2015-2030. The agenda is a successor framework for the Millennium Development Goals (MDGs) agreed 15 years ago for the period 2000-2015. The SDGs represent the world’s comprehensive post-2015 agenda for equitable, socially inclusive and environmentally sustainable economic development. The SDGs provide a common framework for navigating the most urgent economic, social and environmental challenges of this generation including the respective roles for all actors in our society in achieving sustainable development.

Meeting the SDGs by 2030 will require unprecedented cooperation and collaboration among governments, non-governmental organizations, development partners, the private sector and communities. Therefore, achieving the SDGs requires all stakeholders to incorporate the SDGs into their own practices and operations. Citizens will increasingly hold government, civil society, financial institutions and businesses accountable for their constructive contributions to the SDGs.

This is especially true for the mining and metals industry. Large-scale mining is a global industry, with 6,000 companies employing 2.5 million people.¹ Mining is often located in remote and less-developed areas where it can create jobs and innovation and bring investment and infrastructure at a game-changing scale over long time horizons. According to the International Council on Mining and Metals (ICMM), in many low- and middle-income countries, mining regularly comprises 60-90% of total foreign direct investment (FDI), 30-60% of total exports, up to 20% of government revenues and as much as 10% of national income.² In addition, the products of mining are essential to all aspects of life, contributing to the health, well-being and development of society. Combined with the capability to mobilize physical, technological and financial resources required for sustainable development, it is clear that mining and metals have an important role to play in the SDG agenda.

However, mining has also contributed to many of the problems that the SDGs are trying to address – for example, environmental degradation, carbon emissions, displacement of populations, worsening economic and social inequality, armed conflicts, gender-based violence, tax evasion and corruption, and increased risk for many health problems, among others. These are some of the most important global challenges of our time, and the SDGs provide a consensus-based global architecture that the mining industry can use to assess its efforts, align its actions, evaluate its partnerships, and scale up its efforts to incorporate many areas of sustainable development into its practices. Ideally, the industry can position itself as a leader within the private sector in advancing the SDGs.

How is this Atlas organized?

Each chapter of the Atlas includes the following:

- A brief **explanation of the SDG** reflecting the official UN definition followed by a summary of the contribution the mining industry can make.
- A list of **key UN-defined SDG targets** (sub-goals) that are relevant to mining, quoted verbatim. See the paragraph below for an explanation on how the targets were selected.
- Opportunities and examples of how mining companies can **integrate the SDGs into their core business**. See below for further explanation of what is meant by core business.
- Opportunities and examples of how mining companies can **collaborate** with other stakeholders and **leverage** resources to address the SDGs. See below for further explanation on how to collaborate and leverage.

- A **diagram** summarizing how the mining industry can contribute to achieving the goal incorporating both integration into the core business and collaboration with other stakeholders to leverage resources.
- **Case studies** illustrating examples of the mining sector's contribution.
- A list of **selected resources** offering further information, methodologies and tools.

The UN SDG targets relevant to mining were selected as follows. The 17 SDGs have 169 sub-goals or SDG targets, 71 of which are included in the Atlas. Targets were selected to highlight areas where mining has actual or potential impact, either through its core business or by leveraging its resources and partnerships. Some targets not included in the Atlas may be relevant to a particular mining company or a particular operating context. For example, target 12.3 (halving global per capita food waste) is not included, but may be relevant for a mine that generates substantial amounts of food waste. For this reason readers are referred to the full UN text "Transforming our World" which contains all 169 targets.³

Multi-stakeholder roles and responsibilities in implementing the SDGs

Building a sustainable world is a multi-stakeholder endeavour and this is clearly emphasized in the 2030 Agenda and in SDG17 in particular. Everyone has different roles and responsibilities that sometimes overlap or are exclusive to a particular stakeholder. There are certain key roles that each stakeholder is expected to perform and these roles are generally defined by legal, economic and cultural frameworks. Beyond this, additional responsibilities should be agreed based on dialogue and engagement to align everyone's work for maximum societal benefit. Without dialogue, these roles become blurred and sometimes companies take on responsibilities outside of their private sector role and for which they lack a legitimate mandate. The goal of multi-stakeholder efforts is to identify how greater positive impact can be created when different stakeholders collaborate, leverage and pool resources without losing clarity of each sector's fundamental responsibilities.

The primary roles of key stakeholders in relation to the SDGs are:

- **Governments** are responsible for the legislation, regulations and policies surrounding mineral extraction and all areas covered by the SDGs, including social services, public health, education, public infrastructure, economic policies and setting environmental performance standards. Governments are also responsible for aligning national mining legislation and policies with the SDGs and putting in place capable institutions to ensure harmonization and policy coherence across the different branches, agencies and levels of government involved in managing the mining industry. Governments also should enforce regulations, invest in and deliver basic services, ensure human rights are protected, put in place fiscal regimes, manage mining revenues transparently and invest these revenues in sustainable development. Effective governance of the mining industry requires a coordinated "whole of government" approach where all relevant ministries and other parts of government are engaged, not just those responsible for mining.
- **Companies** are responsible for undertaking their core business operations in a responsible manner that respects human rights, complies with government regulations, maximizes positive contributions to society, and avoids or minimizes negative impacts. Companies also pay taxes and royalties, engage in responsible policy dialogue and can collaborate to leverage resources and make social investments, ensuring that these are aligned with local development priorities.
- **Civil society** organizations are responsible for working alongside governments and companies to address gaps and ensure governments and companies are fulfilling their responsibilities to society. This may include policy advocacy work, consulting and capacity-building initiatives, partnerships to multiply the positive impact of the public and private sectors and sometimes a monitoring role promoting transparency and accountability.

- **Development partners including multilateral institutions and bilateral donors** can support in numerous ways ranging from providing project finance conditioned on adherence to sustainability standards to providing technical expertise and capacity building support to governments, communities and local enterprises. They can also contribute to sharing cross-country learning on good practices and advocating and promoting greater alignment between mining sector policies, practices, and sustainable development.

Some communities and governments may have in place, even if not always formalized, plans to address many of the challenges included in the SDGs. Mining companies will need to work through specific roles and responsibilities for each SDG with their stakeholders taking into account existing initiatives. Companies can clearly communicate what they are willing to do and what they believe is the role of others and should expect the same from the other stakeholders. There is no hard and fast rule for how these initiatives might be arranged, but typically companies should seek to avoid taking on the delivery of social services that are the responsibility of government.

Integrating the SDGs into core business

Each chapter has a section offering suggestions and ideas on how to integrate contributions to the SDGs into core business. Core business refers to the range of activities and functions required to conduct primary business activities. Every company will define their core business differently. The intent of the Atlas is to encourage companies to look first at how their business operations can be leveraged for positive impacts rather than focusing primarily on social investment or philanthropy.

Mining companies typically have standards, policies, and procedures in place to guide business performance in environmental management, health and safety, business ethics, human resources, procurement, supply chain management and community and stakeholder engagement. In many cases, the implementation of corporate policies and standards is facilitated through management systems that set actions and schedules and track progress against set goals. These are all useful tools to leverage integration of the SDGs into the business. Some typical core business processes that are mentioned in the chapters are:

- **Policies, standards and management systems** - Existing management frameworks are likely to contain commitments to company performance that are relevant to the SDGs such as ensuring a safe workplace, minimizing negative impacts on the environment and enhancing local employment and procurement. Suggestions on how to leverage common corporate processes are included in the chapters.
- **Social and environmental baselines and impact assessments** - Identifying the specific relevance of each SDG and opportunities to integrate actions into operations is helped if there is an understanding of the nature and scope of the impact of mining activities in the local context. Best practice during the design and construction phase in the extractive sector is to implement environmental, health, social and human rights baselines and impact assessments (ESIAs and HRIAs). In addition to formal impact assessments, companies can gather information to better understand their operating context and cumulative impacts throughout the mine life cycle with desktop research and specific studies, and by learning from stakeholders through dialogue and engagement. Companies can use these tools to determine approaches to integrate the SDGs.
- **Risk and opportunity assessments and planning processes** - Many companies use risk and opportunity assessment methodologies as a predictive planning tool. Risk and opportunity assessments are useful to identify potential material impacts, the probability and relevance of those impacts to the business and to develop and prioritize responses. If the relevance of the SDGs is understood in this context, companies can incorporate this data into their assessments and planning processes.

Ways to collaborate with stakeholders and leverage resources

The Collaborate and leverage section of each SDG chapter presents ways for mining companies to collaborate with stakeholders and leverage additional resources to address the goal. While companies can make significant contributions to the SDGs through their core business, many of the issues captured in the SDGs are outside of the company's direct control and expertise and can only be tackled through multi-stakeholder collaboration to leverage the resources needed to make a difference.

Collaboration can mean formal partnerships and regular multi-stakeholder roundtables, but companies also have additional cost-effective ways to leverage results such as:

- -Using the company's **convening power** to bring people and organizations together to close gaps in communication and relationships. For example, mining companies may have multiple relationships across government, industry, communities, civil society and other stakeholders. Companies can help facilitate communication and collaboration between different groups to address shared issues.
- In the course of their business, mining companies collect and analyze data that might be useful in the implementation of programmes led by government or civil society. **Sharing information and analysis** around tax and royalty payments, watersheds, landscapes, health challenges and safety statistics, for example, may be useful.
- Companies can actively contribute to initiatives targeted at the SDGs by **participating** in them. Contribution does not always have to take the form of financial contributions. Companies can contribute time, leadership and management skills.
- Companies can make financial commitments to support the implementation of a particular initiative through **social investment programs**.
- Companies can build formal **partnerships** with government and civil society. Partnerships are usually negotiated and codified through a signed agreement that contains mutual responsibilities, shared outcomes and, in some cases, agreed metrics to measure success.
- Some countries establish **trust funds** to invest mining revenues into local communities to improve public infrastructure or promote local economic development and companies sometimes participate in the management of the fund in collaboration with local communities and government. Additionally, companies may decide that the depth and breadth of their support to the SDGs and social, economic and environmental development is best served by establishing a separate **foundation**. There are many examples of the pros and cons of trust funds and foundations and how they are governed that companies might review prior to making these decisions.⁴ One of the most important learnings is that foundations and trust funds do not replace the company's responsibility to manage its social, environmental, and economic impacts through its core business.

Dialogue and engagement with communities and stakeholders

Dialogue and engagement will inform the company on how best to integrate the SDGs into its core business and underpin the opportunities to collaborate and leverage resources. Fully understanding the relationship between the business and the external context requires communication, dialogue and engagement with local communities, local and national government, civil society, development agencies and other stakeholders. Dialogue and engagement aims to build trust, share information and perspectives, and reach agreement on how to address mutually shared issues and concerns. This is a continuous and on-going process that is systematic and based on transparency and mutual respect. Many resources are available to inform how a company can build a transparent approach to engagement and relationship-building at the local, regional and national levels and some are noted in the Selected resources sections in the chapters.

Industry related aspects to consider

The contribution of an individual mining company to the SDGs will take different forms depending on the local context, the nature of the extractive activity and the mineral resource. To determine the best way forward, the opportunities and challenges in each chapter should be complemented with a review of the company's current sustainability programmes and performance, its particular industry characteristics, the development phase, the business context and the corporate framework. Specific issues to consider include:

The mineral commodity and product value chain

The mining industry extracts and processes a range of different minerals and metals that include precious metals (such as gold and platinum group metals), base metals (such as copper, zinc, and nickel), industrial minerals (such as phosphate and limestone), iron and ferro-alloys, bauxite, rare earths and energy minerals (such as coal and uranium). Each metal or mineral and its associated processing, sale and use have different economic, social and environmental benefits, constraints, impacts and risks. It also follows that different SDGs are relevant to each mineral and metal and their associated value chains to differing degrees.

The Atlas focuses on the applicability of the SDGs to the extractive segment of the value chain rather than the final use of the mineral or metal itself. Nevertheless, it can be important for mining companies to consider that in many cases, the product or service created by the use of the mineral has important relevance to particular SDGs, for example:

- Fertilizers (e.g. phosphate) and micronutrients (e.g. zinc) - **SDG2 (Zero Hunger)** - These products contribute to improved food security and nutrition and global demand is likely to increase as human populations grow.
- Thermal coal - **SDG13 (Climate Action)** - Barring large-scale deployment of carbon-capture and storage or some unforeseen technology, coal-powered electricity will continue to be one of the greatest contributors to climate change and the associated emissions need to be phased out.
- Rare earths and specialty metals (e.g. copper) - **SDG 7 (Energy Access and Sustainability)** - Many renewable energy technologies depend on rare earths and other specialty metals which will play a critical role in the low-carbon economy. Base metals like copper will be a key component for production of electric vehicles and zinc is necessary for storing renewably generated electricity.
- Aluminium - **SDG12 (Sustainable Consumption and Production)** - Aluminium is highly recyclable, but is energy-intensive to produce. More sustainable consumption will probably require increased aluminium recycling. Aluminium, as a lightweight metal, can also reduce fuel consumption when used in manufacturing transportation systems.

The mining project life cycle and the scope of operational impacts

Mineral development is a multi-stage business. Typically, there is an exploration and evaluation phase (1-10+ years), followed by a site design and construction phase (2-5 years), followed by the mining extraction phase itself (2-100 years), and then closure, decommissioning and reclamation (5-30+ years).⁵ The scope of social, environmental and economic impacts generated by mining activities will vary across each phase. All 17 SDGs are applicable to most of the phases, but some may be more relevant during certain phases than others depending on the impacts of the mining activities. Contributing to each goal may take a different form depending on the phase of the mining activity and this should be taken into account when assessing where the main opportunities for contributions are.

All SDGs, even those that initially might appear not to directly concern mining activities, are relevant for each phase. Take SDG3 for Good Health and Well-Being as an example. Managing health risks is

important at all phases in the mine life cycle. However, depending on the phase, the aspects of health most relevant to SDG3 might vary, requiring different management approaches. For example:

- Exploration phase - ensuring road safety for staff, contractors and the community.
- Design and construction phases - anticipating and collaborating with local health institutions to manage health risks related to an influx of new workers into local communities.
- Mining phase - ensuring a safe and healthy working environment and collaborating with government and civil society to ensure that employees, their families and the communities have access to healthcare and treatment for communicable and non-communicable diseases.
- Closure and decommissioning phase – ensuring the near-mine environment and waterways are free from harmful debris and/or toxins, and working with communities to ensure management and monitoring of any post-closure social and health impacts and risks.

Acknowledgement of mining and sustainable development initiatives

The information included in the Atlas reflects recommendations and learnings derived from many existing resources, initiatives, standards and good practice codes of conduct. The following early initiatives played a leading role in moving the mining industry to think about new approaches:

- *Mining, Minerals, and Sustainable Development (MMSD)* - From 2000 to 2002, the World Business Council on Sustainable Development (WBCSD) and the International Institute for Environment and Development (IIED) in partnership with a number of mining companies convened and housed MMSD, “a research project looking at how the mining and minerals sector could contribute to the global transition to sustainable development.”⁶ The MMSD study resulted in the founding of the International Council on Mining and Metals (ICMM).
- *World Bank Extractive Industries Review (EIR)* - From 2000 to 2004, the World Bank Group conducted a study on how its operations could better leverage the extractive industries for sustainable development and the fight against poverty.
- *Responsible Mineral Development Initiative (RMDI)* - the World Economic Forum began RMDI in 2010 to better understand the expectations and priorities of different stakeholders on the value and benefits of mineral development and to initiate long-term collaborative processes for stakeholder engagement.⁷

Building on the early work, a number of other important initiatives have emerged: The Extractive Industries Transparency Initiative (EITI); the International Finance Corporation (IFC) Performance Standards and Commdev.org; the Natural Resource Charter and Natural Resource Governance Institute; PDAC Guidelines e3Plus and Early Stakeholder Engagement Guide; Mining Association of Canada Towards Sustainable Mining (TSM) Initiative; the Africa Mining Vision; Voluntary Principles on Security and Human Rights; the UN Guiding Principles on Business and Human Rights; the Intergovernmental Forum (IGF) on Mining, Minerals, Metals, and Sustainable Development; the OECD Policy Dialogue on Natural Resource-based Development; and the Global Reporting Initiative (GRI) Mining and Metals Sector Supplement, among others. The Case studies and Selected resources sections of each chapter include descriptions of these and many other initiatives and information sources.

A note on artisanal and small-scale mining (ASM)

Tens of millions of people worldwide depend on ASM for their livelihoods and incomes, far more than depend on large-scale mining (LSM). Artisanal mining tends to be most common in poor areas, magnifying its developmental implications and risks. ASM generates employment and income, but it is not always safe, well-monitored, legal or regulated. ASM activities can cause substantial negative environmental, health, and social impacts and its informal nature also can make ASM an easy source of income for organized crime and armed conflicts. The implications are clear for SDG1 (End Poverty), SDG3 (Good Health and Well-Being), SDG8 (Decent Work and Economic Growth), SDG15

(Life on Land), and SDG16 (Peace and Justice; Strong Institutions). The Atlas focuses on large-scale mining, but artisanal and small-scale mining is discussed when it directly relates to LSM. The scale of ASM warrants a separate guide and review to map the opportunities on how ASM can contribute to the SDGs.

Selected resources

- Impact 2030: [Global private sector led collaboration to mobilize volunteers to advance the achievement of the SDGs](#)
- The Global Goals for Sustainable Development. [Global Goals](#)
- UN Global Compact: UN-Business Action Hub. [Global Compact](#)
- World Business Council for Sustainable Development (WBCSD): Action 2020. [WBCSD](#)
- International Council on Mining and Metals – www.icmm.com
- International Finance Corporation Sustainability Framework – [IFC Framework](#)
- International Finance Corporation 2015. [The Art and Science of Benefits Sharing](#)
- International Institute for Environment and Development (IIED) 2002. [Mining, Minerals and Sustainable Development \(MMSD\)](#)
- International Institute for Environment and Development (IIED) 2012. [MMSD + 10: Reflecting on a Decade of Mining and Sustainable Development](#)

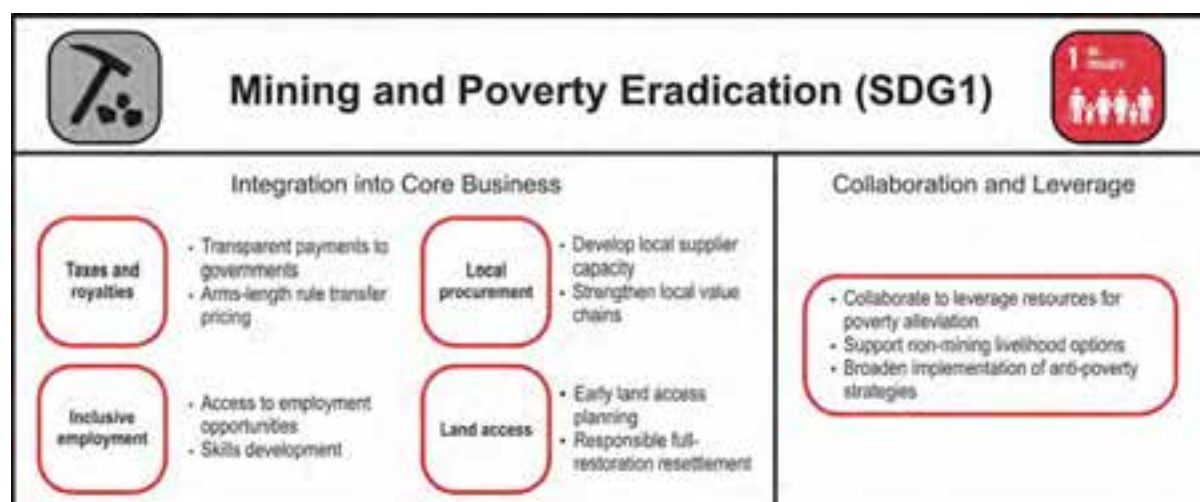
SGD1: End Poverty – End poverty in all its forms everywhere

Extreme poverty around the world has been halved since 1990, but one in five people in developing countries continue to live on less than \$1.25 a day. The challenge is to continue eradicating poverty and ensuring that those who have risen out of poverty keep rising. Ending poverty is not just about income; it is also about access to health and education, and participation in social, political and economic decision-making processes that impact sustainable livelihoods. SDG1 focuses on the concept of inclusive economic growth - that is access to the social, political and economic opportunities for the poorest and the most marginalized people.⁸

Mining contributes to eradicating poverty through tax and royalty payments that allow the development of basic public goods such as access to health, housing, education and infrastructure. Mining can also help reduce poverty through job creation, induced economic activity and the provision of basic services. Finally, to avoid the risk of exacerbating poverty, mining projects must have effective strategies to restore livelihoods that might be adversely affected by mining, including ensuring access to land and natural resources for people in mining communities.

Key UN SDG1 targets relevant for mining

- 1.1 By 2030, **eradicate extreme poverty** for all people everywhere, currently measured as people living on less than \$1.25 a day.
- 1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have **equal rights to economic resources**, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services including microfinance.
- 1.a Ensure **significant mobilization of resources** from a variety of sources in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions.



Integrate SDG1 into core business

Paying a fair and accurate share of taxes and royalties. In many resource-rich countries, revenues from mining operations comprise a large proportion of the government's budget. While paying taxes is not a sufficient condition for development (the developmental impact of tax and royalty revenues depends on transparent government policies for inclusive and strategic resource allocation), paying a fair share of taxes and royalties is essential for mining to have a developmental impact. Companies that fail to publicly declare their payments to governments, disregard "arms-length" transfer pricing rules or seek to subvert international tax laws in order to shift profits to lower-tax jurisdictions, are

undermining development by moving money – money that could be used for improving the health, education and opportunities of the poor – overseas.

Promoting inclusive employment. Mining companies can contribute to poverty reduction through direct employment created by their operations and indirect employment resulting from local and national procurement of goods and services. Companies can enhance their direct employment contribution by reviewing their current workforce recruitment approaches to ensure they reach a broad and diverse set of potential candidates. Implicit bias or corrupt practices in recruitment can exclude women, indigenous peoples and other marginalized groups or create unfair advantages in access for specific (dominant) groups. In turn, companies can create incentives for contractors and sub-contractors to have a more inclusive recruitment approach. Some companies have developed rotational job programmes that share access to short-term employment for unskilled labour across communities.

Promoting skills development. Skills development and education (see SDG4) contribute to inclusiveness by increasing the potential of marginalized groups to access employment opportunities. Companies can bolster retention of previously marginalized employees with on-the-job training or complementary programmes implemented in collaboration with technical and educational institutions. Contractors and sub-contractors can also contribute to skills development by offering apprenticeship and training programmes.

Building local, regional, and national procurement strategies. Many countries require that mining companies invest in national suppliers and build local supply chains as a strategy for leveraging skills, expertise, innovation and technologies to stimulate further indirect employment and induced economic growth. Companies operating on indigenous lands have further incentive to consider procurement arrangements with local indigenous suppliers to promote local livelihoods, contribute to community development and ultimately maintain relationships access to the resource. As with employment, companies can work with local suppliers and third party organizations to develop the local and national capacities for provision of goods and services. These programmes build supplier capacity to meet mining industry demand and standards for quality, price, health, safety and the environment. In many cases, once a supplier meets applicable standards, it can begin servicing non-mining sectors as well. Local procurement can include sourcing basic services from micro- and small entrepreneurs and foodstuffs from local farmers. (See also SDG8 – Decent Work and Economic Growth)

Planning early for land access, resettlement, and livelihood restoration. Mining requires land, both to extract the resource and to build the necessary infrastructure. In some cases, land access can be acquired through market-based transactions with minimal impact on the livelihoods of the landowners. In other instances, land access will result in the displacement and resettlement of traditional landowners, oftentimes poor communities and indigenous peoples who rely directly on the land for their livelihoods and survival. Mining companies should start land access planning early on and include affected populations in decision-making processes and identifying impacts on livelihoods. If indigenous peoples are impacted, companies must recognize their special status and take care to respect Free, prior and informed consent (FPIC). Planning can mitigate negative impacts, enhance livelihood opportunities and move away from a singular focus on financial compensation to one of livelihood restoration and improvement. Companies should ensure that all members of affected households, particularly women, are included in any process involving land access and resettlement.

Collaborate and leverage

Companies can further contribute to SDG1 through collaboration with local communities, local governments, civil society and other stakeholders to leverage resources for inclusive poverty alleviation and to strengthen traditional livelihoods. Companies can view collaborative initiatives not just as social investment opportunities, but also as a means to address systemic challenges (e.g. gaps in services and infrastructure) to the business that stem from poverty and exclusion in the operating context.

Supporting non-mining related livelihood options. Mining companies that operate in poor areas are usually under intense pressure from government and communities to provide jobs. Mining is capital intensive rather than labour intensive and there are limits to the scope of employment opportunities it generates. Companies can address local expectations and help minimize the employment pressure on their operation by helping to improve non-mining livelihood options. This can include investing in programmes to improve agricultural productivity, supporting infrastructure and services to link existing products to markets, collaborating to develop additional non-mining economic opportunities and supporting microfinance initiatives.

Implementing community development agreements (CDAs) to help broaden access to anti-poverty strategies. Communities, governments and non-profits usually have on-going approaches and programmes to combat poverty. Companies can engage with communities, government and other stakeholders to sign formal agreements to support these efforts. When these agreements emerge from a robust process of engagement between a company and the community, they help create a strong foundation for collaboration.

Case studies and initiatives

Project-by-project disclosure of payments to governments: Global. In 2015, BHP Billiton began publicly releasing information about the tax and royalty payments it makes to governments on a project-by-project basis. The Extractive Industries Transparency Initiative (EITI) also requires companies to do this, but only in EITI-compliant countries. By voluntarily deciding to do it in every country and sub-national jurisdiction where it operates, BHP Billiton has illustrated the massive scale of its fiscal contributions (\$7.3 billion in 2015). It has also demonstrated to stakeholders the company's commitment to compliance, as these numbers can be publicly verified and compared with what might be expected at each individual operation. The \$7.3 billion in tax payments in 2015 represent substantial resources at governments' disposal that can then be used for spending on social priorities including better health and education services, and infrastructure – crucial in poverty reduction.⁹



The shea butter production centre is essentially run for and by Berkinabé women (Credit: SEMAFO Foundation)

SEMAFO and shea butter producers: Burkina Faso. 600 members of the cooperative Gnogondémé of Yona in Burkina Faso keep the village's new shea butter production centre humming with activity. It all started as part of an initiative by SEMAFO, a Canadian mining company with gold production facilities in West Africa, to establish ties with local communities and generally improve the quality of life around the mines. Initially, SEMAFO was just buying raw soap from villagers, a small gesture that

sparked the idea to make soap on a more commercial basis. When it became clear the women would need plant and machinery, at the request of TFO Canada (a non-profit export promoter), the SEMAFO Foundation stepped in to finance technical know-how and construction. TFO Canada provided technical support in finding market niches and before long, the Yona cooperative had struck a deal with Karitex, a Montreal-based start-up.¹⁰

Land access and resettlement planning at La Granja. Achieving consensual land access and successful livelihoods transition requires long time frames and deep engagement between the company and the community. Rio Tinto Minera Peru's La Granja Project developed an approach that integrated and aligned the business and project schedule with a responsible approach to engagement and agreement-making on land access. The company worked with local communities to design and

implement an engagement process to discuss the possibility of land acquisition and resettlement if the project proceeded, and agree on general terms and principles that would be applied in future negotiations. During the process, community members had the opportunity to share their concerns, fears and interest in considering the possibility of resettlement. The process also yielded critical information for the company on the likelihood and potential costs of land acquisition and resettlement.¹¹

Selected resources

- International Finance Corporation (IFC) 2012. Performance standard 5: Land acquisition and involuntary resettlement. [IFC Performance Standard 5](#)
- International Council on Mining and Metals (ICMM) 2014. [The Role of Mining in National Economies, 2nd Edition](#)
- ICMM and IFC 2010. [Working Together - How Large Scale Mining can engage with Artisanal and Small-Scale Miners](#)

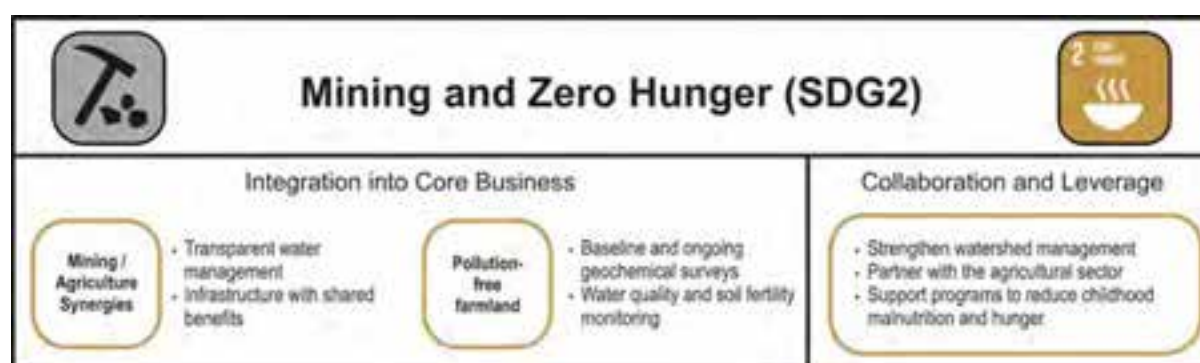
SDG2: Zero Hunger – End hunger, achieve food security and improved nutrition and promote sustainable agriculture

SDG2 seeks to end hunger while improving the sustainability of global food and agriculture systems. This means reducing negative impacts on the planet's soils, freshwater, oceans, fisheries, forests and biodiversity. SDG2 primarily addresses agricultural production and its contribution to ending hunger and eradicating poverty. Agriculture is the world's largest employer and the primary livelihood for poor rural households.¹²

Where mining companies operate in traditionally agricultural areas, the impact of mining on water, land and biodiversity resources is a concern to farmers and indigenous peoples and can therefore be a potential source of social conflict. Mining companies also frequently operate in areas with chronic malnutrition, especially among children. Companies can contribute to SDG2 by managing their impacts on natural resources and collaborating to eliminate hunger and improve agricultural production and sustainability. In addition, through the production of agrominerals (e.g. fertilizers) and micronutrients (e.g. zinc), mining can help improve global food security.

Key UN SDG2 targets relevant for mining

- 2.2 By 2030, end all forms of **malnutrition**, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age.
- 2.3 By 2030, double the agricultural productivity and incomes of **small-scale food producers**, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.
- 2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that **increase productivity** and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.
- 2.a Increase investment, including through enhanced international cooperation, in rural infrastructure, **agricultural research and extension services**, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries.



Integrate SDG2 into core business

Finding synergies where mining and agriculture operate together. Mining and agriculture operate side by side in many places. In Australia's Hunter Valley, mining and large-scale vineyards operate in the same region; in Peru, mining operates alongside small-scale subsistence farmers. Both mining and agriculture require land and water and both industries have shared interests in policies and operations that impact these resources. The dynamics, shared interests and potential conflicts with

agriculture in the local context should be evaluated. Particularly where mining exists alongside subsistence farming or small-scale food production, mining companies can consider how their operations impact on their neighbours and ways to build trust.

Transparency in water management. A mining company can help build trust in its operation by sharing information about how it manages water consumption, use and quality. Working with communities and local governments to formalize community-based or third party approaches to participatory water monitoring is a proven method for facilitating transparency. These monitoring mechanisms can be integrated into the company's formal system for health, safety and environment measurement. It is important that communities and third parties involved in monitoring share their results publicly. (See also SDG6 – Clean Water and Sanitation)

Designing infrastructure with shared benefits to agriculture. Most mining operations have infrastructure for water management including reservoirs for water storage. The design and planning of this infrastructure should consider the technical, social and political dynamics of the availability and use of hydrological resources across the watershed including demand from downstream users. Such an analysis allows companies to identify design criteria that minimize negative impacts, address public concerns and positively contribute to better watershed management that benefits agricultural and municipal users. For example, water storage infrastructure may be used to level irrigation flow during dry and wet periods, reforestation on mine lands might contribute to watershed health, or water pumped to dewater a mineral deposit before mining can be allocated to the local irrigation system.

Keeping farmland and livestock free from contamination and dust. Mining can liberate toxic materials such as heavy metals into the environment. Most mines properly dispose of this material in tailings dams and waste rock disposal areas. However, the risk that toxic materials leak into water sources remains. It is also possible that fine particles of these materials become airborne and fall to the ground in the area surrounding the mine.¹³ In both cases, the risks that people and livestock will be negatively affected increases if the surrounding land is (or could become) farmland. Mining companies can conduct baseline geochemical studies of soils and water surrounding the mine to ensure that the mine is not adding to concentrations of potentially harmful elements in the environment. In addition, companies can work with local farmers to establish health baselines for livestock to track potential impacts. Dust suppression programmes that include covers on ore stockpiles, use of dust suppressants on roads and dust monitoring by communities are fundamental to minimizing impacts on both farm and residential neighbours.

Collaborate and leverage

Companies can collaborate with neighbouring farmers, communities, government and other stakeholders to address shared challenges in hunger, malnutrition, agricultural and natural resource management. These collaborations generate opportunities and benefits for the mining sector and society and deepen a company's engagement with key stakeholders.

Participating in efforts to strengthen watershed management. Companies can join in efforts to improve watershed management. This might include supporting the development of public baselines for planning that measure the availability and quality of water resources, sharing technical information on company use of water or supporting the formalization of water rights for local communities. Companies can proactively engage with government and other stakeholders in efforts to implement cumulative impact assessments in mining basins where several mines affect the same source of water.

Partnering with the agricultural sector. Mining companies can partner with local farmers to share perspectives on policies and management approaches of mutual interest or to support strengthening of agricultural models that sustain traditional livelihoods. Companies can collaborate with small-scale farmers by funding farmer training, facilitating agricultural extension programmes or helping to source improved equipment or fertilizers for improving yields.

Supporting programmes for reducing childhood malnutrition and hunger. Malnutrition impacts brain development and children's performance in school. Eradicating malnutrition helps drive a child's skills and abilities to take on technical and employment challenges as adults. In addition, mining companies should identify how their operations might contribute to malnutrition through negative impacts on local livelihoods and collaborate with governments and communities to eliminate any ill effects.

Where malnutrition and hunger are present, governments, NGOs and funders are usually implementing programmes to combat the problem. Companies can involve their employees and their families in these programmes, use their convening power to leverage the participation of other stakeholders or make direct investments in activities in the surrounding region.

Case studies and initiatives



A local community member feeds two Brown Swiss cows in the rural town of Cuncashca, Peru (Credit: Barrick)

Farmer support and training: Peru. At Barrick's Pierina mine in Peru, the nearby community of Cuncashca had survived on subsistence farming in poverty for decades. The mining company worked with the community to develop a local business development plan to raise the people out of poverty through agriculture. The company partnered with community leaders to build a model farm for training local farmers in modern farming techniques and animal husbandry.

It also improved water management infrastructure, interbred cows for genetic improvement, installed corrals for livestock to encourage mating, built a new dairy plant and helped establish links to local markets. Between 2002 when the project started and 2007, monthly incomes rose fourfold, and childhood malnutrition decreased by 20%.¹⁴

Zinc and micronutrients: Canada and India. In 2014, Teck launched the "Zinc and Health" programme to combat zinc deficiency. This includes a \$5 million partnership with UNICEF to provide zinc and oral rehydration salts to children in India, where only 2% have access to this simple treatment for diarrhea. Every AA battery contains enough zinc to save the lives of six children. At Teck-sponsored "Zinc Saves Lives Battery Recycling Campaign" days in Canada, Teck donates the amount of zinc contained in each battery to UNICEF while also keeping the batteries out of landfills.¹⁵

Partnering to use water resources from wet mines: United States. Resolution Cooper, a joint venture between Rio Tinto and BHP Billiton operating a copper underground mine in the state of Arizona, realized that 9 billion litres of water accumulated in the old mine (closed in 1996) had to be removed before operations could start. In 2009, the company decided to build a \$20 million water treatment plant to serve both the needs of the mine and the needs of the surrounding agricultural industry. The mine worked with the New Magma Irrigation and Drainage District (NMIDD) to use the extracted treated water to irrigate cotton, alfalfa and Bermuda rye grass and avoid depleting groundwater for agricultural, municipal and industrial uses. The project includes a 44 km pipeline to transport water from the treatment facility to the agriculture fields and a storage facility that would store water for the mine operation in the future and therefore minimize the mine's water footprint.¹⁶

Selected resources

- Africa Australia Research Forum, 2013. Mining, Agriculture and Development: Bread from Stones? Proceedings of the Crawford Fund 19th Annual Conference. [Mining, Agriculture and Development: Bread from Stones? Proceedings of the Crawford Fund 19th Annual Conference](#)
- Farming First, 2015. The story of agriculture and the Sustainable Development Goals. [The Story of Agriculture and the Sustainable Development Goals](#)

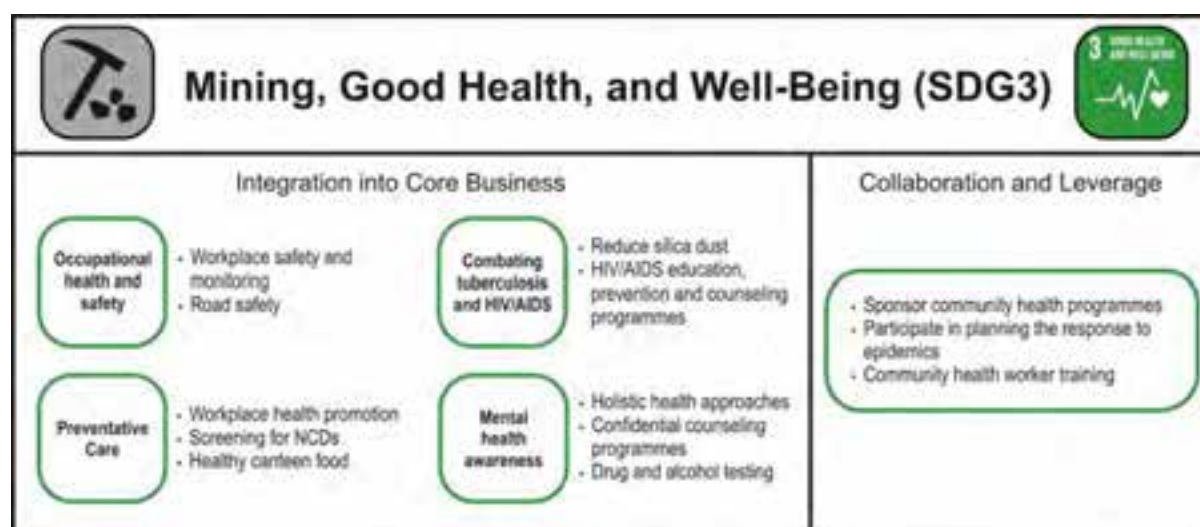
SDG3: Good Health and Well-being – Ensure healthy lives and promote well-being for all at all ages

Ensuring healthy lives and promoting well-being at all ages is essential to sustainable development. Significant strides have been made in increasing life expectancy and reducing some of the common causes of child and maternal mortality. Major progress has been made to increase access to clean water and sanitation, and therefore helping to reduce malaria, tuberculosis, polio and the spread of HIV/AIDS. However, more efforts are needed to fully eradicate a wide range of diseases and address many persistent and emerging health issues. SDG3 focuses on child health, maternal health, HIV/AIDS, malaria and other preventable and chronic diseases.¹⁷

The potential health risks associated with mining pose significant challenges for advancing SDG3. These include occupational hazards and increased risk factors for cardiovascular and respiratory diseases (e.g. particulate air pollution), tuberculosis (e.g. silica dust exposure), HIV/AIDS (e.g. unsafe sex and prostitution), mental illness, substance abuse and domestic violence (e.g. split lifestyles from fly-in/fly-out, month-on/month-off work schedules). Mining also can occur in areas that are particularly vulnerable to tropical diseases like malaria. Mining companies have substantial commitments and policies for health and safety to preemptively address risk factors. Mining companies can also collaborate with government and other stakeholders to bring health services to areas that lack them.

Key UN SDG3 targets relevant for mining

- 3.3 By 2030, end the epidemics of **AIDS, tuberculosis, malaria** and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.
- 3.4 By 2030, reduce by one-third premature mortality from non-communicable diseases through prevention and treatment and promote **mental health** and well-being.
- 3.5 Strengthen the prevention and treatment of **substance abuse**, including narcotic drug abuse and harmful use of alcohol.
- 3.6 By 2020, halve the number of global deaths and injuries from **road traffic accidents**.
- 3.d Strengthen the capacity of all countries, in particular developing countries, for **early warning**, risk reduction and management of national and global health risks.



Integrate SDG3 into core business

Improving occupational health and safety including road safety. The mining industry has made a significant commitment to ensure safe conditions for their workers and has well-developed standards and management systems for day-to-day and long-term execution of their health and safety policies. These standards typically consider chronic health impacts like silicosis along with impacts to community health such as road safety. A commitment to continuous improvement helps companies keep up with lessons learned and new improvements in mitigation. The integration of community health into the company's health and safety management systems continues to evolve and can be leveraged through the implementation of community health impact assessments.

Preventing non-communicable diseases (NCDs). Chronic NCDs (primarily heart disease, diabetes, cancer and respiratory diseases) are the number one cause of mortality today, and according to medical research, 63% of all premature deaths in 2011 were due to NCDs, with the vast majority of these in low and middle income countries.¹⁸ Working at mines may expose employees to many of the risk factors for these diseases: air pollution, silica dust, high stress levels, possible trauma, shift work and nocturnal shifts.¹⁹ Although few formal medical studies exist that track physiological changes related to these risk factors over time, a 2015 study of mining workers in Indonesia found that mine workers' metabolic indicators showed increased risk for NCDs over time.²⁰ Workplace health promotion programmes, healthy canteen food and good lifestyle hygiene are areas where mining can help to reduce the risk of NCDs.

Anticipating, mitigating, and monitoring for infectious diseases. Mining companies have a duty to ensure their employees are healthy and to ensure that their activities do not compromise the health of those who live outside the mine fence. Mining and its associated construction of infrastructure modify the environment, potentially creating new health risks. For example, extending roads into remote areas brings people into contact with more and different species and potential disease vectors. Potential negative impacts on health can be identified and mitigation measures put in place. Mitigation strategies depend on the health risks and can include separate housing and strict codes of conduct for outside workers, vaccination programs for all workers and collaborative health monitoring with local health agencies.

Combating tuberculosis (TB) and HIV/AIDS among employees. In the mining industry in southern Africa, TB is common (see case study below) and occupational hazards and socio-economic factors drive this relationship. Exposure to silica dust increases the risk of pulmonary TB, as do long periods spent in poorly ventilated underground mines. In addition, miners (who face potentially higher occupational risks daily, work 12-hour shifts for weeks at a time often far from home, and earn disposable income) are more likely to engage in unsafe sex, spread sexually transmitted diseases, and belong to the "most-at-risk" population for contracting and spreading HIV. Massive influxes of construction workers into a community during the mine development stage can also result in an increase in prostitution and spread HIV into the community. Best practice is to ensure that health, safety and environment programmes identify and eliminate potential health risks.

Fostering mental health, prevent substance abuse, and domestic violence. The Australasian Centre for Rural and Remote Mental Health estimates that annually one in three workers in the Australian mining industry will suffer from mental illness. This is because "people working in rural and remote mining and resource operations confront a wide range of challenges including FIFO (fly-in-fly-out)-induced 'split-lifestyles,' harsh climatic conditions and remoteness from family and friends for weeks at a time."^{21,22} This can lead to breakdowns in relationships and misuse of alcohol and drugs which can also make acts of violence more likely.²³ Mining companies must take these realities seriously, and also be aware that deploying aggressive drug and alcohol testing may unfortunately encourage the use of less detectable and more harmful drugs.²⁴ Companies can build programmes that take a holistic approach to employee physical, mental and emotional health.

Collaborate and leverage

Mining companies can partner with communities, government and other stakeholders to improve accessibility to health services, the quality of health care and joint approaches to monitoring and responding to health epidemics. Companies can leverage their commitment to health and safety and their internal expertise to benefit community health.

Sponsoring community health programmes. Many companies get involved in local programmes to combat infectious disease. The company's commitment to addressing health issues in operations can be extended beyond the mine into communities through social investment programmes. This is especially true in places where the standard of healthcare inside the mine is far greater than that in the surrounding community. Contributions by the mining company in the community such as helping to fund health campaigns, distributing mosquito nets or spraying anti-malarial insecticide can make a significant difference. Companies can also support improvements in health infrastructure by leveraging opportunities for shared benefits in potable water and sanitation (see SDG6 – Clean Water and Sanitation) and electricity distribution (see SDG7 – Affordable and Clean Energy).

Participating in planning the response to epidemics. Mining companies were key partners in the response to the West African Ebola epidemic. Companies can participate in response planning with government, NGOs and other stakeholders, align their internal response to the crisis with external strategies and support funding of emergency health care facilities and communications campaigns.

Case studies and initiatives



Spreading the word about Ebola, Grand Bassa County, Liberia 2014 (Credit: Roland Glay, ArcelorMittal Liberia)

Fighting Ebola: Liberia. When the Ebola epidemic hit Monrovia, Liberia, the general manager of corporate responsibility for ArcelorMittal, the world's leading steel and mining company which has iron ore and shipping operations in Liberia, phoned other London-based companies operating in the region to share information and discuss risk mitigation and disaster response strategies. Soon the Ebola Private Sector Mobilization Group (EPSMG) was born. From 11 individuals on a phone call in July 2014, it expanded to 400 people by December that year, with companies collectively leveraging their communication networks, risk protocols, equipment and expertise to respond to Ebola. At a minimum, EPSMG estimates it gave away 50,000 liters of chlorine, 4 million latex gloves and 55 vehicles. Most

importantly, it estimates it trained 50,000 employees.²⁵ In the words of the lead health specialist for Southern Africa at the World Bank, "What has become apparent through the [Ebola] crisis is the immense opportunity for collaboration between the health and mining sectors, in contexts where there are shared interests. In the case of Ebola, the crisis—and the fear of the collapse of mining operations—provided common ground for collaboration."²⁶

Combating Tuberculosis: South Africa. Five years ago, the governments of South Africa, Lesotho, Swaziland, and Mozambique partnered with the World Bank, the Stop TB Partnership and the UK government's Department for International Development (DFID) to explore new ways of addressing a century-old challenge: the high prevalence of TB within the mining industry. In countries like South Africa, TB prevalence within the mining industry is 2.5 to 3%, which is ten times the WHO threshold of a health emergency (defined at 0.25%). The initiative brought together ministries of health, labour, mines and social welfare, as well as mining companies, unions, communities and regional bodies to both improve occupational health in the mines and strengthen public health services in near-mine communities. The initiative created a harmonized cross-country treatment protocol for TB, referral and tracking systems for mineworkers with TB and a one-stop occupational health service centre. This

year, the World Bank launched a campaign to screen at least 90% of the mining workforce for TB, put 90% of all active cases on treatment and ensure that at least 90% of patients under treatment are completely cured.²⁷

Selected resources

- Chatham House, 2015. [The IDRAM Initiative: Extractive Industries Infectious Disease Risk Assessment and Management](#)
- Ebola Private Sector Mobilisation Group, 2015. [EPSMG](#)
- International Council on Mining and Metals (ICMM) 2013. [Community Health Programs in the Mining and Metals Industry](#)
- ICMM 2015. [Health and Safety Critical Control Management: Good Practice Guide](#)

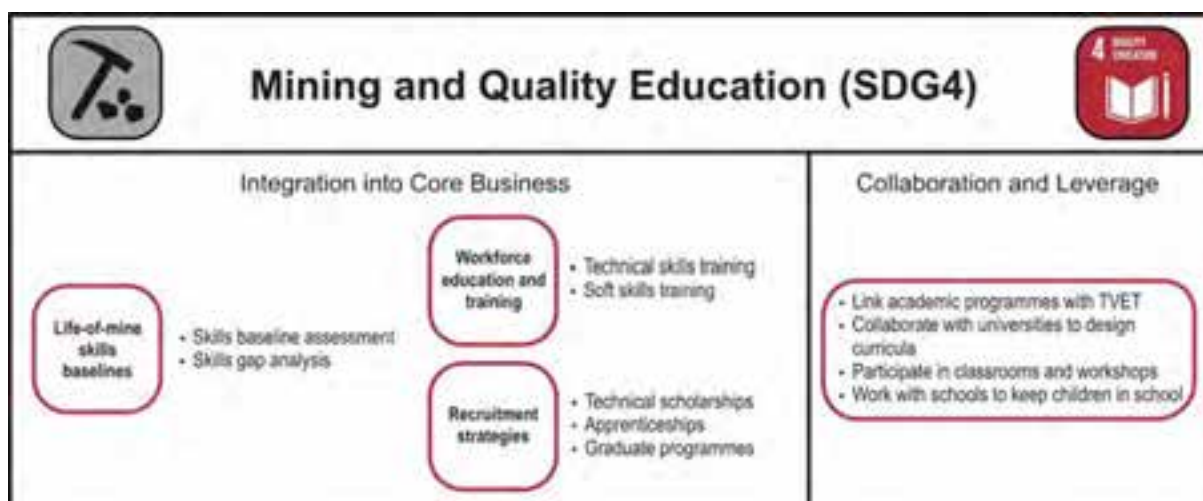
SDG4: Quality Education – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

The skills, knowledge and learning gained through education are building blocks for improving people's lives. The world has made significant advances in broadening access to education by increasing enrolment rates, especially for women and girls, and expanding availability of schools. More work is needed to strengthen equitable access to quality education that leads to improved economic opportunities for women and men.²⁸

Mining can contribute to quality education through technical, vocational and educational training programmes for the current and future mining workforce. Companies can collaborate to ensure that national curricula offer the technical training required by the mining industry. Companies can also invest in schools and teacher training and collaborate with government and communities to improve the quality and availability of educational opportunities. Particular care is warranted where skilled workers are not present in the local community. Bringing in skilled workers from other areas without investing in up-skilling local workers could marginalize community residents contribute to economic and educational inequities and negatively impact the community – company relationship.

Key UN SDG4 targets relevant for mining

- 4.1 By 2030, ensure that all girls and boys complete free, equitable and quality **primary and secondary education** leading to relevant and effective learning outcomes.
- 4.3 By 2030, ensure equal access for all women and men to affordable and quality **technical, vocational and tertiary education**, including university.
- 4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including **technical and vocational skills**, for employment, decent jobs and entrepreneurship.
- 4.b By 2020, substantially expand globally the number of **scholarships** available to developing countries for enrolment in higher education, including vocational training and information and communications technology, technical engineering and scientific programmes.
- 4.c By 2030, substantially increase the supply of qualified **teachers**, including through international cooperation for teacher training in developing countries.



Integrate SDG4 into core business

Implementing a life-of-mine skills baseline and assessment. As part of workforce planning, companies can document skills baselines in the available labour force and analyze gaps against skills requirements over the life-of-mine. In some countries, governments may already have skills assessments in place to track projected investment in mining against the skills and education of the population. Companies can use this publicly available information or gather data locally through engagement with education and technical institutions. By matching available skills to skills required in operations, companies can identify differences and build training and recruitment solutions to close the gaps.

Investing in workforce education, training, and technical programmes. Company-led training and education can build specific technical skills required for job performance in addition to other “softer” skills such as communication, decision-making and planning which are required for employees to advance in the workplace. Some governments offer tax incentives that can be used to offset training programme costs. Employee education will benefit the company by enhancing the skills needed to do the job. In turn, these skills are transferable assets the employee can take to new jobs, new companies and new sectors. Overall, if done properly, the benefits of these training programmes and partnerships accrue to communities.

Building technical scholarships and new graduate programmes into recruitment strategies. Company-supported scholarships and other incentives help shape future qualified employees, attract new employees to the company and build demand for the graduates of technical schools. Companies can also work with contractors and sub-contractors to identify positions for new technical graduates and apprentices.

Collaborate and leverage

Companies can collaborate across the mining industry and with communities and government to understand the challenges and gaps in expanding inclusive access to education and identify opportunities for company participation. Collaboration should not create dependencies on the company for delivery of education services or infringe on the responsibilities of government.

Launching local capacity technical and vocational training (TVET) programmes. Companies can collaborate with community groups, schools and universities to design appropriate curricula and link them with employment opportunities across the mining industry. TVET should be coordinated with national curricula and planning as this enables students to receive a recognized diploma for their training, as well as provide the opportunity to deploy their skills in other sectors.

Participating in a meaningful way in schools and in the classroom. Supporting and sponsoring local schools is a long tradition in the mining industry and a good way to build or improve relationships with the local population. Mining companies are often asked to sponsor sporting events, donate soccer balls and judge beauty contests. However, they can consider more substantive ways to contribute to learning in the classroom. For example, collaborating with teachers to develop workshops and curriculum in environmental management, supporting school recycling programs or providing local scholarships to enrol the poorest children. Companies can link these efforts with their own employee volunteer programmes. Participating in schools is an excellent way to build relationships locally, listen to community concerns and answer questions about mine operations.

Promoting inclusive access and help keep children in school. Primary school enrolment rates in mineral-rich economies are below the world average.²⁹ Some children depend on artisanal mining or other forms of employment that prevent them from attending school, and this is particularly common in areas where rapid economic development creates many indirect and informal employment opportunities. Mining companies can partner with local governments and civil society to keep children in school, especially by ensuring that the economic benefits and opportunities of education exceed

those of dropping out of school to be employed in the informal sector. This highlights the importance of monitoring primary and secondary school enrolment rates in emerging mining regions.

Case studies and initiatives

TVET and national education standards: Sierra Leone. In recognition that Sierra Leone would need around 600,000 jobs to accommodate its rapidly growing population, the German Development Corporation (GIZ) partnered with London Mining in 2012 to establish a TVET program, “From Mines to Minds.” The programme recognizes that “mining plays a vital role as a pioneering industry, stimulating the development of key services, manufacturing, and up- and downstream industries,” but also that only 23% of mid-level and 12% of senior-level mining staff were Sierra Leone nationals. Demand for skilled employees at both the mine and in the surrounding area also far exceeded supply. In response, the programme aimed to provide locals with the technical, financial, and organizational training required for safe and well-paying mining jobs. According to GIZ, the qualification standards developed for the programme will be translated into national-level standards in cooperation with the national TVET advisory board, with plans to replicate the programme in other districts in Sierra Leone.³⁰



Driver training (Credit: MMG)

Local skills training and study-abroad university scholarships: Laos. MMG’s Sepon mine in Laos has a localization employment plan to increasingly build up the capacity of the local workforce and gradually transition away from reliance on expatriate workers. The company provides extensive in-house training in health and safety, computer skills, site operating permits, professional development and maintenance, and English and Lao language skills. In addition, Sepon partners with local training providers in Savannakhet and Vientiane for a range of apprentice and traineeship programmes. Two students in

Australia and two students in Thailand are benefitting from the MMG LXML scholarship programme. The company is also providing additional financial support for two students undertaking tertiary studies through the AusAID Australian Development Scholarship Program and two students studying through the New Zealand ASEAN Scholarship.³¹

Selected resources

- SMI Centre for Social Responsibility in Mining, University of Queensland 2014. [The Guide to Good Practices in Indigenous Employment, Training and Enterprise Development](#)
- UNICEF 2015. [Children’s Rights and the Mining Sector, UNICE Extractive Pilot](#)
- World Bank, 2014. [Human Capital for the Oil, Gas, and Minerals Industries](#)

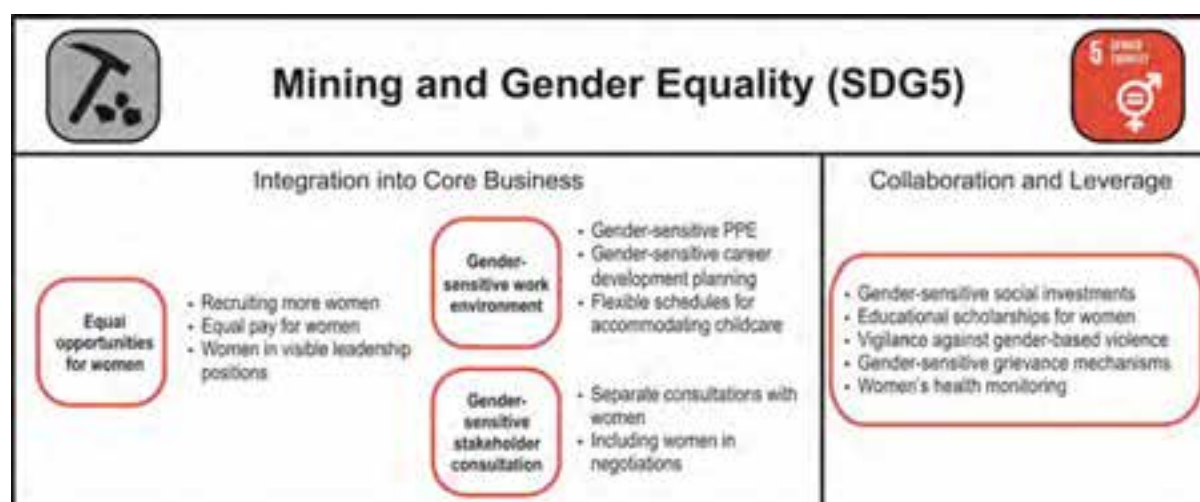
SDG5: Gender Equality – Achieve gender equality and empower all women and girls

Gender equality means equal access for women and girls to health care, education and jobs and equal participation in political and economic decision-making. Gender equality is a fundamental human right, yet significant gaps still exist in the rights of women and girls to fully participate in their communities and societies.³²

Mining companies can promote gender equality by ensuring gender parity and equal pay for equal work across all levels of the organization. Companies can also implement proactive efforts to recruit and retain female employees and make the workplace a safe place for women. In communities impacted by mining, women tend to experience fewer benefits and more negative impacts than men. This can be addressed by recognizing women's rights to resources and property, including women as stakeholders in land acquisition, resettlement and consultation processes, and building inclusive access to jobs and economic opportunities.

Key UN SDG5 targets relevant for mining

- 5.2 Eliminate all forms of **violence against all women** and girls in the public and private spheres, including trafficking and sexual and other types of exploitation.
- 5.5 Ensure women's full and effective participation and equal opportunities for **leadership** at all levels of decision-making in political, economic and public life.
- 5.a Undertake reforms to give women **equal rights to economic resources**, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources in accordance with national laws.
- 5.c Adopt and strengthen sound policies and enforceable legislation for the promotion of **gender equality** and the empowerment of all women and girls at all levels.



Integrate SDG5 into core business

Ensuring equal opportunities for women. Gender ratios in mining suggest that women are discriminated against at each stage in the employment cycle from recruitment through retention, career development and during retrenchment. In 2014, PWC's annual "Mining for Talent" report documented that only 5-10% of the global mining workforce was female, and of the top 500 listed mining companies, only seven had female CEOs.³³ Women in mining are also paid less than men. In 2014, the Australian Institute of Mining and Metallurgy (AusIMM) conducted a study of 3,000 mining workers in Australia and found that men were paid 27% more than women for the same work, and

that pay gaps were widest at higher levels of seniority.³⁴ Mining companies can adopt proactive strategies to ensure equal opportunities at each stage of the employment cycle and a proactive approach to re-balancing the gender wage gap.

Ensuring gender-sensitive work environments. Attracting and retaining women in the workforce requires taking a gender-sensitive look at the workplace to identify factors that might contribute to unequal opportunities and access. This might include establishing awareness training and grievance mechanisms to help enforce anti-harassment policies, offering more flexible shift work or child care to accommodate childcare responsibilities, offering personal protective equipment (PPE) and other equipment that fits different body sizes and types, putting in women's toilets and dressing areas and implementing formal career development planning for women. In addition, companies can work with their contractors to ensure that a gender-sensitive approach is included in their work.

Recognizing the roles and rights of women. While a limited number of women may be employed in mines and benefit from increased income and improved livelihoods, women are also often under-represented in negotiations between mining companies and communities and share disproportionately in the benefits.³⁵ Recognizing the roles and rights of women in mining impacted communities, including how women's work and decision-making contributes to family and community livelihoods, is best practice in impact assessment and community engagement. According to the IFC, "Consulting primarily with men provides only half the story. Active intervention may be required to identify issues that are important to women and to make sure they are given equal weight."³⁶ A gender-inclusive approach that is culturally appropriate is likely to be more effective in identifying negative impacts and positive opportunities that would not have been uncovered without the participation of women. Women's participation can also help identify impact mitigation measures the company can integrate into its core business.

Collaborate and leverage

Companies can apply a gender-sensitive lens to all their work with communities, government and other stakeholders to make sure that women's voices are heard and incorporated.

Collaborating to manage impacts on women in local communities. According to the African Minerals Development Centre, it is common for the impacts, benefits and risks of mining to be measured at the community level rather than at the individual level. Women tend to provide secondary services such as food and housing, and, due to the influx of migrant workers and lack of access to legal services, women near mine sites are often involved in commercial sex or are victims of sexual violence. Companies can work with women's groups, local government and civil society to build solutions.

Making gender-sensitive social investments and commitments. As a historically male-dominated industry whose activities often negatively impact women more than men, mining companies can take steps to ensure women share more of the benefits and less of the costs of mining. For example, companies can sponsor educational opportunities, scholarships and employment training specifically for women. In places where female voices are less likely to be listened to, companies can work with local leadership, anthropologists and sociologists to support opportunities for women to safely demonstrate leadership and participate equally.

Case studies and initiatives

Women in senior management: Global. In 2013, Thiess, the world's largest contract miner, began implementing its "Women in Mining" company policy. The plan is to "accelerate and sustain the flow of women into senior management positions and non-traditional roles while creating and maintaining a culture that holds high expectations for the potential of women at all levels." Among other things, the plan includes increasing the percentage of women in the company by one point annually and increasing the percentage of women in senior management roles by two points. The plan also includes parental leave programmes and regular gender pay equity reviews.³⁷

Professorship in Women in Engineering: Canada. In recognition of the need to correct gender disparities in mining and engineering, Goldcorp donated C\$500,000 to the University of British Columbia on International Women's Day in 2014 to set up the Goldcorp Professorship in Women in Engineering. Among other things, the programme will increase the female proportion of engineering faculty from 20% to 50% within five years, promote women in engineering through recruitment efforts and represent women in engineering to high school students, parents and counsellors.³⁸

“Why Gender Matters” Guide: Global. Rio Tinto and the Centre for Social Responsibility in Mining at the Sustainable Mining Institute at the University of Queensland, Australia developed a how-to guide that provides specific suggestions on gender-sensitive approaches to engaging with communities and stakeholders and finding solutions that benefit both the company and society. The guide provides a rationale for integrating gender into the business and shares relevant international protocols. Clear explanations that follow a management system approach offer specific how-to steps along with case studies.³⁹

Selected resources

- African Union / African Minerals Development Centre, 2015. [African Women in Artisanal and Small-Scale Mining](#)
- European Bank for Reconstruction and Development 2015. Strategic Gender Initiative. [Strategic Gender Initiative](#)
- GIZ 2015. Encyclopedia of Gender and Mining: Key initiatives, best practices, and actors. No hosting website. Search and download only.
- International Women in Mining, 2015. [Women in Mining](#)
- Oxfam 2009. [Women, Communities and Mining: The Gender Impacts of Mining and the Role of Gender Impact Assessment](#)
- Pricewaterhouse Coopers 2015. [Mining for Talent 2015: A review of women on boards in the mining industry 2012-2104](#)
- Rio Tinto 2009. A resource guide for integrating gender considerations into Communities work at Rio Tinto. [Why Gender Matters](#)

SDG6: Clean Water and Sanitation – Ensure availability and sustainable management of water and sanitation for all

Clean water is critical for humans and the natural world. Poor sanitation, poor hygiene and inadequate infrastructure contribute to disease and millions of deaths annually. Access to clean water and good quality sanitation services prevent disease and improve livelihoods and clean waterways sustain a healthy environment.⁴⁰

Mining is a significant user of water and can negatively impact water quality. The mining industry can contribute to adequate access to clean water and sanitation by reducing its own water footprint in quantity and quality (through water efficiency measures and recycling its water waste), increasing the local supply of water (through shared use water infrastructure), obtaining water from appropriate sources, ensuring that its operations neither compete with local water users nor pollute the water supply and sharing its water monitoring data and expertise with local governments.

Key UN SDG6 targets relevant for mining

- 6.1 By 2030, achieve universal and equitable access to safe and affordable **drinking water** for all.
- 6.2 By 2030, achieve access to adequate and equitable **sanitation and hygiene** for all and end open defecation, paying special attention to the needs of women and girls.
- 6.3 By 2030, improve **water quality** by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.
- 6.4 By 2030, substantially increase **water-use efficiency** across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity.
- 6.a By 2030, expand international cooperation and **capacity-building** support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies.
- 6.b Support and strengthen the participation of **local communities** in improving water and sanitation management.



Integrate SDG6 in core business

Conserving and recycling water. Mining requires large quantities of water, and this is a headline industry concern. The International Council on Mining and Metals (ICMM) 2014 Stakeholder Perception Study found that in every region of the world, water use and management was the number one environmental impact for the mining and metals industry to address.⁴¹ It was rated as more important than air emissions, wastewater management, land reclamation, biodiversity and greenhouse gas emissions contributing to climate change. To secure enough water for mining operations, especially in environments where mining is one of many users competing for a limited supply of water, water conservation and wastewater recycling are good for both the environment and the company bottom line. Best practice is to request water rights based on a formal water efficiency policy that determines net demand after recycling, retreating and reusing. Reduced use can be incorporated into processing design along with best practice approaches to treatment of tailings. The industry is innovating with alternative water sources, such as seawater and grey water, and with technologies such as dry tailings. Desalination plants and pumping seawater inland may be additional options, but present challenging trade-offs in cost and environmental impact.

Monitoring water quality. Mining can impact water quality and even with the best environmental standards, the risk of leakage persists. The responsibility of mining companies to ensure that their operations do not negatively impact water quality is becoming increasingly paramount for maintaining the social licence to operate. Regular monitoring of near-mine and downstream water quality can catch small problems before they become big ones. Companies can invite communities and other stakeholders to participate in water monitoring to build trust and transparency. (See also SDG2 – Zero Hunger for more discussion on water.)

Taking approaches to managing water that considers social, cultural and technical aspects. In many countries, community fears and concerns around access and quality of water are drivers of conflicts with mining companies. A holistic company approach is to consider the social, cultural, economic and environmental value of water at the catchment scale in order to identify material risks and align operational water management and engagement with communities and government. Availability of water is a critical issue especially where there are scarce water resources or in areas that are impacted by climate change. Managing water from a company perspective is not just about managing the operation's direct water impacts; it is about engaging with communities to share information about water use and offset their fears, and engaging with governments to contribute to and align with policies that govern water management. Companies can review their work plans across the operation to ensure a comprehensive approach for both addressing the impacts of the operation over the life-of-mine and addressing stakeholders' concerns about water.

Collaborate and leverage

In many mining areas, water management is a challenge and mining companies, governments, multi-lateral agencies, civil society organizations, the local community and scientific research institutions can collaborate closely on solutions. Companies can play a significant role by contributing their expertise to these efforts and integrating the knowledge into their own water management strategies.

Contributing to watershed management. Mining companies are transitioning from a strictly operational water management paradigm to a more holistic, watershed- or catchment-based approach that actively engages with and considers the priorities of other water users⁴². This reflects a science-based systems perspective that considers all the dynamics that go into understanding water – hydrological, ecological, economic, social, cultural and political. In addition, many governments are moving from a localized regulatory model to a watershed management model taking into account the cumulative impacts on the watershed. Companies can identify opportunities to contribute to the management approach in the watershed where they operate.

Sharing benefits through water infrastructure. In water-scarce environments where mining companies must construct infrastructure to bring water in from elsewhere or where mining companies

must pump groundwater to mine a deposit, partnership agreements with governments and other water users can defray costs for all parties and alleviate the need to compete for water. The industry's considerable expertise in materials processing and infrastructure upgrading could enable it to be a key contributor for bringing water purification and sanitation to underserved locations.

Supporting potable water and sanitation planning and infrastructure. The WHO estimates that 3,900 children die each day from dirty water or poor hygiene.⁴³ Companies can make a contribution in this area by becoming familiar with the local communities' and governments' approaches to potable water and sanitation, what improvements need to be made and what plans are in place. Working with stakeholders, companies can identify gaps where the company can contribute planning expertise, convening power or targeted investments. As with education and health, companies should seek to ensure that their participation supports long-term solutions to avoid dependencies and create incentives for sustainable management, operations and maintenance of infrastructure.

Case studies and initiatives

Recovering copper from wastewater: China. At Jiangxi Copper Company's Dexing mine, rainfall on low-grade stockpiles was generating acid mine drainage. The company partnered with BioTeQ Environmental Technologies to construct a water treatment plant that both treats and recovers copper from the wastewater. In its first six months of operation, the plant treated 3 billion litres of wastewater and recovered 700,000 pounds of copper. The treatment costs were completely covered by revenues from the recovered copper and the water is continually reused.

Shared use water infrastructure: Saudi Arabia. Because of Saudi Arabia's arid climate and paucity of freshwater, it is estimated that desalination capacity must double over the next 20 years in order to adequately serve the population. Ma'aden, the largest mining company in Saudi Arabia, has a \$10.8 billion joint venture with Alcoa to construct the largest vertically integrated aluminium complex in the world. Ma'aden partnered with the state-owned Saline Water Conversion Company and the Saudi Electricity Company in a joint energy and water shared use infrastructure agreement. The joint power and desalination plant produces 2400 MW of electricity and 1.025 million cubic meters of water daily, of which 1350 MW and 25,000 cubic meters, respectively, go to the project, while the rest goes to the public grid.

100% water recycling: Brazil. At Vale's Sossego metallurgical plant in Para, Brazil, 99.99% of the water used to produce copper concentrate is recycled from the tailings pond and recirculated through the processing circuit. The procedure saves 900,000 cubic meters of freshwater annually which had previously been pumped from a nearby river. This is enough water to supply a town of 25,000 for six months. The only freshwater the plant uses is potable water for drinking.

Sharing the use of a water treatment facility: Peru. Freeport-McMoran's Cerro Verde mine is an open-pit copper and molybdenum mine situated near the city of Arequipa in southern Peru. The mine is already a zero-discharge facility that recycles approximately 85% of the water used in the process but the company plans to expand and triple its production which will require an 85% increase in its water requirements. Cerro Verde is also surrounded by a region suffering from a lack of access to clean water. Untreated sewage discharge has contaminated the main source of water supply, the Rio Chili. In that context, in 2011, the mining company proposed to meet its additional water requirement through a new wastewater treatment plant with excess capacity reserved for the communities. The Regional Government of Arequipa, the national government and SEDAPAR (Servicio de Agua Potable y Alcantarillado de Arequipa S.A) came to an agreement with Freeport-McMoran that the mine would finance the engineering and construction of the wastewater treatment plant and that the plant would be operated by SEDAPAR. The construction started in 2013. Expected results include avoiding polluting discharges to the Rio Chili in order to improve agriculture productivity in the area and reduce water-related diseases. It will also be a long-term source of treated water for mining operations.⁴⁴

Selected resources

- Columbia Center on Sustainable Investment 2014. [Leveraging Mining Investments in Water Infrastructure for Broad Economic Development: Models, Opportunities and Challenges](#)
- International Council on Mining and Metals (ICMM) 2012. [Water Management in Mining: A Selection of Case Studies](#)
- International Council on Mining and Metals (ICMM) 2015. [A Practical Guide to Catchment-based Water Management for the Mining and Metals Industry](#)
- UN Global Compact, 2015. [The CEO Water Mandate](#)
- World Resources Institute 2013. [Aqueduct Water Risk Atlas](#)
- World Wildlife Fund, 2015. [The Water Risk Filter](#)

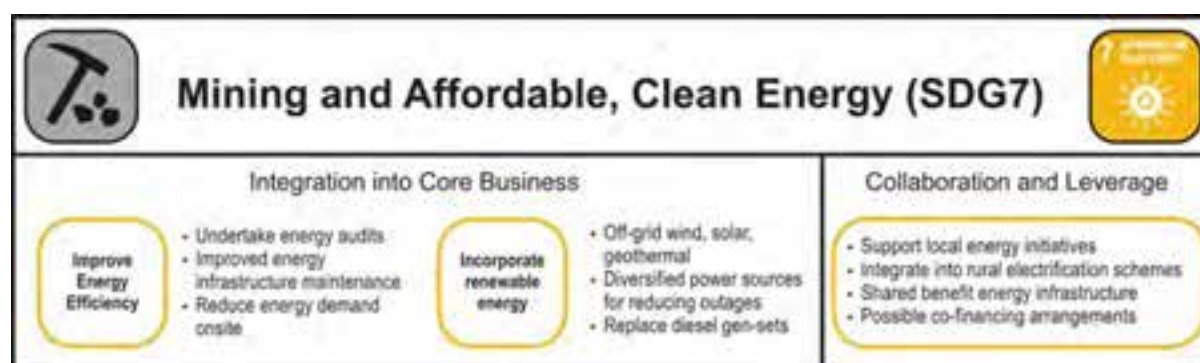
SDG7: Affordable and Clean Energy – Ensure access to affordable, reliable, sustainable and modern energy for all

One in five people lack access to electricity and three billion people use wood, charcoal or animal waste for cooking and heating. SDG7, access to energy, is a critical component of the SDGs and is also an enabler of sustainable development across many of the other goals. However, production of energy is the primary contributor to climate change (see SDG13). The challenge is improving the availability of reliable energy for those who lack access while minimizing negative impacts on the planet. Universal access, improved efficiency and an increase in renewable energy are the focus of SDG7.⁴⁵

Mining is energy-intensive. The mining industry can improve energy sustainability by accelerating the incorporation of energy efficiency measures and renewable energy into mine power supplies and partnering with utilities to increase use of renewables. While energy efficiency is a necessary focus, mining can also leverage its energy demand to extend power to undersupplied areas through partnerships that enable shared use of energy infrastructure.

Key UN SDG7 targets relevant for mining

- 7.1 By 2030, ensure universal **access** to affordable, reliable and modern energy services.
- 7.2 By 2030, increase substantially the share of **renewable energy** in the global energy mix.
- 7.3 By 2030, double the global rate of improvement in **energy efficiency**.
- 7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and **clean energy technology**.
- 7.b By 2030, expand **infrastructure** and upgrade technology for supplying modern and sustainable energy services for all in developing countries.



Integrate SDG7 into core business

Improving energy efficiency. Mining is energy-intensive, and depending on the mine, anywhere from 10% to 40% of operational costs are for energy.⁴⁶ Of these, extraction is responsible for up to 60% of energy consumption and ore concentration and milling are responsible for up to 40%. (This varies with type of mine, especially between underground and open pit mines.) Approximately 3% of all electricity used globally by the mining industry (and 45% of the energy in a typical open-pit mine) is used to reduce rock size.⁴⁷ Companies can support research and development focused on new low-energy grinding technologies. In addition, energy audits, improving energy efficiency (employee contests may yield good ideas), reduced use and improvements in equipment maintenance are all ways a company can reduce costs and energy demand.

Incorporating renewable energy. Many mines are in remote areas and not connected to national power grids. Other mines are connected to grids that may have periodic or seasonal outages due to factors such as changing water levels in hydroelectric reservoirs.⁴⁸ Diesel generators have typically met electricity demand in such scenarios. Forward-thinking mining companies are considering environmentally friendlier and potentially lower cost solutions such as off-grid or mini-grid wind, solar or geothermal energy instead of diesel. Aside from the benefit of reducing greenhouse gas emissions, these companies can benefit from reduced energy costs given that production costs of alternative energy are falling rapidly. Furthermore, these energy sources are less impacted by fuel supply bottlenecks.

Collaborate and leverage

Understanding the local context, national priorities and the roles of different stakeholders in energy production and distribution is the first step in identifying opportunities to collaborate and leverage resources to address the SDG7 targets.

Sharing benefits through energy infrastructure. Many mining operations draw power from unreliable power grids or are far from any power grids. In both situations they must supply their own power to ensure reliable access to energy for their operations. This represents an opportunity for non-electrified communities that are close to mine sites to gain access to affordable, reliable, modern energy. Through shared use energy infrastructure arrangements, access to energy can be made affordable for local communities. For instance, in a shared use arrangement, the marginal costs of supplying energy to near-mine communities through “last-mile” infrastructure are far lower than the average unit cost of constructing the “backbone” infrastructure which is typically anchored on or paid for by the mine. Questions such as who is responsible for the capital investment, operation and maintenance of this last mile infrastructure are questions to be answered in close coordination with the power utility, government and community.

Supporting local energy initiatives. Mining companies typically have deep knowledge of the energy sector as a pre-condition to developing the operation’s energy strategy. With this knowledge, companies are likely to have a good understanding of the local challenges in energy production and distribution, who lacks access and why, barriers to distribution and government-led plans in process. Companies can work with stakeholder groups to identify where the company can contribute planning expertise, convening power or targeted investments to contribute to the solutions.

Case studies and initiatives

Energy efficiency: Canada. In 2014, New Gold’s New Afton Mine in British Columbia became the first mine in North America to receive ISO 50001 energy management system certification. As part of the programme, employees attend training workshops on energy efficiency in operations. One major outcome of the programme was the miner-initiated idea to shut down conveyor belts during shift changes, saving approximately C\$12,500 per month in energy costs. Expected energy usage reductions are 9 GWh annually.⁴⁹

Energy efficiency: Global. In 2008, Barrick published a position statement on climate change that included commitments to improved energy efficiency as well as reductions in greenhouse gas emissions. Since at that time electricity accounted for 38% of Barrick’s total energy usage, of which 55% was used for grinding (generating 1.7 million tons per year of greenhouse gas emissions), all adding up to C\$300 million, Barrick had significant incentives to find ways of improving its comminution processes. Following a global review of its grinding operations, Barrick developed a strategy for sampling and modelling grinding circuits at each site to determine the energy efficiency of different stages and components of the process. From there, it could craft solutions for the unique circumstances of each of its mines. A review of four Barrick mines showed that some had net energy improvements over 20%, and that 43,000 tons per year of CO₂ emissions had been averted.⁵⁰

Geothermal power: Papua New Guinea. Newcrest's Lihir mine in Papua New Guinea is in an active geothermal area where underground water in the rocks regularly reaches temperatures up to 200°C. In early stages of the mine, this presented considerable technical challenges, and water was used to cool the rocks during drilling and mining. However, in 2003, Newcrest built a geothermal power plant, which captures steam and uses it to drive turbines for electricity generation. By 2006, geothermal power was fulfilling 75% of the mine's power demand, at a cost of \$0.01 per kWh compared to \$0.12 per kWh for heavy fuel oil, saving the mine an estimated \$40 million annually.⁵¹

Wind power: Canada. Glencore's Raglan mine in northern Canada is replacing its diesel fuel with wind power. Energy is the mine's second largest budget item because the mine is so remote and cannot be connected to the hydroelectric grid or natural gas network. In its first four months of operation, the first wind turbine saved almost 1800 kg of CO₂ emissions; over the 20-year life of the turbine it is expected to save C\$40 million in fuel costs.⁵²

Selected resources

- Columbia Center on Sustainable Investment 2012. [Leveraging the Mining Industry's Energy Demand to Improve Host Countries' Power Infrastructure](#)
- Coalition for Eco-Efficient Comminution 2015. [CEEC The Future](#)
- Energy and Mines 2015. [Energy and Mines](#)
- Ernst & Young 2014. [Renewables in Mining: Futuristic or Realistic?](#)

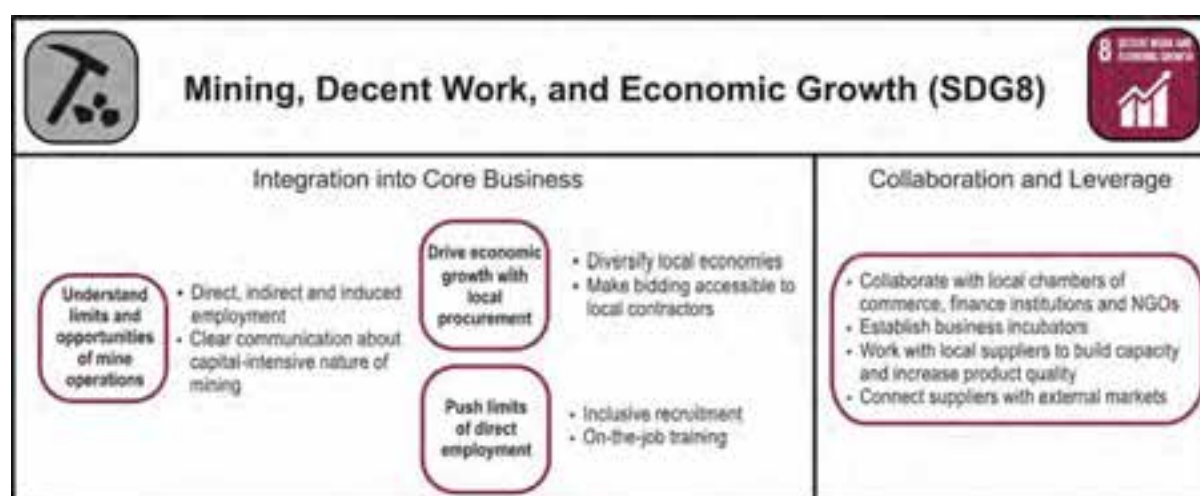
SDG8: Decent Work and Economic Growth – Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all

SDG8 seeks to create the conditions needed for sustainable and inclusive economic growth and job creation. Public and private sector policies that drive investment require a fresh look with a view to increasing productivity, diversifying markets and opportunities and improving creativity and innovation. Combined with a focus on eliminating child labour and protecting labour rights, SDG8 seeks to promote economic growth with opportunities and decent work for all.⁵³

Despite public expectations, the direct employment generated by large-scale mining can be limited. However, it does have potential for large economic multipliers through local procurement. Mining companies, in partnership with other stakeholders, can help to build approaches to promote competitive domestic enterprises for increasing local content and supply capacity, which also helps drive more sustainable, long-term, diversified economic growth. Economic growth due to mining can sometimes be so powerful that it boosts GDP by several percentage points. However, such growth usually depends on high commodity prices which are cyclical by nature, and growth might not be inclusive if there are no government redistribution mechanisms or efforts to encourage linkages to the broader economy.

Key UN SDG8 targets relevant for mining

- 8.2 Achieve higher levels of economic productivity through **diversification**, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors.
- 8.3 Promote development-oriented policies that support productive activities, decent **job creation, entrepreneurship, creativity and innovation**, and encourage the **formalization** and growth of micro-, small- and medium-sized enterprises, including through access to financial services.
- 8.7 Take immediate and effective measures to secure the prohibition and elimination of the worst forms of child labour, eradicate forced labour and, by 2025, **end child labour** in all its forms.
- 8.8 Protect **labour rights** and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants and those in precarious employment.
- 8.10 Strengthen the capacity of **domestic financial institutions** to encourage and expand access to banking, insurance and financial services for all.



Integrate SDG8 into core business

Understanding the limits and opportunities of mining's economic impacts. Mines generate direct employment, but the number of jobs directly created is often small relative to the size of the capital investment. Mining companies and their investments have other economic impacts that are often far larger and can make potentially considerable contributions to local and national economies. There are three types of economic impacts – direct, indirect and induced. Direct impacts are goods and services purchased by the mine. Indirect impacts are goods and services purchased by suppliers of the mine to meet the demands of the mining operation. Induced impacts are goods and services purchased at the household level by mine employees.⁵⁴ According to ICMM, one employee at a company may correspond to three or four employees elsewhere in the economy, as the labour supply rises to meet local demand introduced because of the mine. Mining companies can review and document the different ways they contribute to economic growth and this baseline can serve as the blueprint for identifying opportunities to leverage more inclusive and sustainable growth.⁵⁵

Driving economic growth with local procurement and supplier development strategies. When mining companies make efforts to procure inputs locally, the local economic benefits from mining are maximized. Mining companies can build a comprehensive approach to procure from local suppliers and build supplier capacity. Local procurement policies and targets set internal incentives; local supply baselines matched with company demand allow for identification of present and future local procurement opportunities; and re-scoping of contracts or staged approaches to execution of capital projects can make bidding more accessible to local contractors. These are just a few of the ways that a company can formally integrate a commitment to local suppliers into their business.

Expanding the inclusiveness of direct employment. The direct employment offered at mines typically requires skill levels that might be unavailable in local populations. See SDG1 – End Poverty, SDG4 – Education and SDG5 – Gender Equality for suggestions on how to expand the opportunities for access to direct employment through more inclusive recruitment, education, training and work with contractors and sub-contractors. Most importantly, communicate early and often with local communities so they are aware of the scope of opportunities and limits that mining activities can (or cannot) generate.

Implementing impact-benefit / community agreements. In some countries such as Canada and Australia, the use of formal agreements with communities, especially indigenous peoples, is standard practice. Agreements are legally binding documents where the company and the community set out mutual commitments. Agreements typically cover community access to employment, procurement and training opportunities in exchange for company access to land and water resources. Agreements can also cover joint monitoring of operational impacts. Agreements are based on good faith, inclusive and participatory consultations with the local population and, in the case of indigenous peoples, should respect the principles of free, prior and informed consent (FPIC).

Collaborate and leverage

Mining companies operating in developing economies are under increased pressure to advance the development of local, regional and national procurement as a means to broaden economic growth and diversification. Building an approach that aligns with local and national expectations requires company commitment and extensive collaboration between government, local communities and mining companies.

Collaborating to build a sector-wide, regional or national approach. Achieving the benefits of local content requires shared goals and strategies across sectors. Governments lead in creating the enabling environment for business by promulgating consistent, realistic and enforceable policies and laws, and contractual local content requirements. Companies are responsible for complying with legal frameworks by integrating work into the business and collaborating across the mining industry. Community groups, technical schools and civil society are key enablers of local content by contributing to skills-building and entrepreneurship.

Establishing business incubators and small business support centres. Business incubators are a good tool for building local capacity, entrepreneurship and skills. In environments where there is no local production, or it is not of sufficient quality to be used by the mine, companies can target social investments to build local supplier capacity. Such business incubation programmes can improve the local skill base and educate prospective suppliers about opportunities for working with the company.

Case studies and initiatives

Small-business incubation: Chile, Global. The World Class Suppliers Programme, launched by BHP Billiton in 2009 and joined by Codelco in 2011, helps suppliers acquire skills for creating and implementing new technologies in the mining industry. The suppliers provide solutions for the challenges faced by the mining company, acquire the intellectual property and finance the research. BHP Billiton provides technical, managerial and financial support, offers the mining operations as testing grounds for the new technologies and assists in accessing international markets. By 2013, the programme had 43 innovation projects with 36 suppliers, 5,000 employees and combined sales of \$400 million. BHP Billiton has invested around \$50 million in the programme and savings from the innovations are estimated at \$121 million.⁵⁶ One supplier, Prodinsa, developed new steel cables for BHP Billiton that extended their shelf life by 40% and began exporting them to BHP Billiton mines in other countries.⁵⁷

Local procurement: Kyrgyzstan. Kumtor Gold Company (owned by Centerra) is the largest foreign investor in Kyrgyzstan and contributes 12% to the country's GDP. It employs 3000 people, 97% of whom are Kyrgyz nationals. The company has partnered with EBRD and GIZ to devise the Local Business Initiative. It features a procurement programme that favours small local suppliers, adapts payment schedules to their needs and pays more for goods in the short term, enabling local businesses to purchase equipment so that they become more cost-competitive in the long term.⁵⁸

Selected resources

- Engineers without Borders, Mining Shared Value 2013. [Local Procurement and Public Reporting Trends Across the Global Mining Industry](#)
- FSG / Shared Value Initiative 2015. [Extracting with Purpose: Creating Shared Value in the Oil and Gas and Mining Sectors' Companies and Communities](#)
- International Council on Mining and Metals (ICMM) 2014. [The Role of Mining in National Economies, 2nd Edition](#)
- International Council on Mining and Metals (ICMM) 2011: [Mining Partnerships for Development Toolkit](#)
- World Bank 2014. [Diversified Development: Making the most of natural resources in Eurasia](#)
- World Bank 2015. [A Practical Guide to Increasing Mining Local Procurement in West Africa](#)

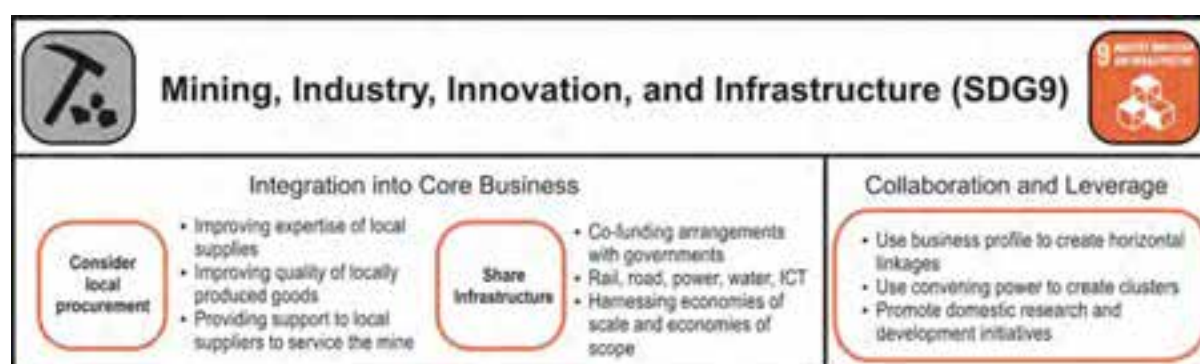
SDG9: Industry, Innovation, and Infrastructure – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Transport, water, energy and information and communication technology (ICT) infrastructure are necessary for sustainable development. These basic services are critical for vibrant and resilient societies, robust and well-functioning health and educational systems, and agricultural and economic productivity. In many developing countries, roads, railways, ports, sanitation facilities, communication networks and electricity grids remain out of reach for many citizens. Expanding access to basic infrastructure is key to enhancing innovation and productivity, helping to create opportunities in other sectors of the economy, which in turn is necessary for diversification and sustainable industrialization.⁵⁹

Mining also requires all these forms of infrastructure. Shared use infrastructure, especially in countries with a large infrastructure financing gap, represents a significant opportunity for mining to expand access to critical services. Given that distinct geological characteristics require specialized mining techniques, mining companies can also contribute to in-country innovation through research and development programmes and through their procurement practices.

Key UN SDG9 targets relevant for mining

- 9.1 Develop quality, reliable, **sustainable and resilient infrastructure**, including regional and transborder infrastructure, to support economic development and human well-being.
- 9.3 Increase the access of **small-scale industrial** and other enterprises to **financial services**, including affordable credit, and their integration into value chains and markets.
- 9.5 Enhance scientific research, **upgrade the technological capabilities** of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people.
- 9.b Support **domestic technology development**, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, **industrial diversification** and **value addition** to commodities.
- 9.c Significantly increase access **to information and communications technology** and strive to provide universal and affordable access to the internet in least developed countries by 2020.



Integrate SDG9 into core business

Supporting local procurement and skill development. Mining companies can play an active role in promoting the domestic industry. The same practices that can be used to reduce poverty (see SDG 1) and induce employment and generate economic growth (SDG8) can also drive industrialization. Procuring goods domestically can help to improve the quality of goods and the expertise of suppliers. In many developing, resource rich countries, domestic companies may lack some of the expertise to produce the required quality of goods and services. In such circumstances, there is a need for

financial, technical and/or technological support programmes for domestic companies that have the potential to become suppliers. Apart from broadening the industrial base by increasing the number of suppliers, the acquired expertise will also help these suppliers to offer their goods and services to other sectors domestically or abroad, thereby contributing to economic diversification and sustainable industrialization. For example, South African high tech capabilities in coal washing which were developed to serve the South African mining industry were adapted and now serve spiral washing in tar sands projects in Canada.

Considering shared infrastructure solutions. Often, because of the remoteness of mining operations and insufficient pre-existing local demand, mining companies build infrastructure. While traditional infrastructure solutions have often been designed to only serve the mining project, shared use infrastructure, in which companies and governments share funding responsibilities and/or usage rights, is gaining popularity. Apart from improving infrastructure access to surrounding regions and potentially unlocking economic opportunities that were previously not viable, economies of scale and scope can be achieved when this infrastructure is shared. Economies of scale can be attractive because one infrastructure investment with a larger capacity is oftentimes less expensive than investing in two separate infrastructure projects (one 400MW power plant, for example, is likely to cost less than two 200MW power plants). Similarly, economies of scope can exploit synergies and reduce costs because one type of infrastructure investment can be shared with another type of infrastructure investment (when building pipeline infrastructure, for example, fibre optics cabling can be deployed at a reduced cost, given that up to 80% of costs are associated with civil works). Companies can consider such shared use arrangements and coordinate with governments, other companies and financial institutions to assess opportunities for shared use infrastructure solutions during the planning stage. These types of shared solutions should be discussed and identified as part of national and local dialogue processes.

Collaborate and leverage

Mining companies can collaborate with government, local communities and other stakeholders in lending their support for economic policies that aim to create spillovers from innovations made in mining to other sectors. Companies can also prioritize expanded access to technology and infrastructure.

Utilizing the business profile to encourage the creation of horizontal linkages. While mining companies have a business interest in supporting skills and innovations that feed back into the mining process, there is less of an incentive for them to support spillovers into other sectors. However, they can take a proactive approach to prioritizing these horizontal linkages by collaborating with government and other sectors to promote and reward first mover companies that invest in research and development to adapt mining technologies to other sectors. This collaboration could also lead to the creation of training institutes for advanced skill building that would focus on the transfer of capabilities from one sector to the other.

Using convening power to create clusters. Industry clusters can be engines of growth as they enable the dissemination of knowledge, reduce transaction costs, help with the acquisition of best practices, increase competitiveness and promote innovative collaborations. Industrial clusters can also enable industry-university collaboration. For instance, in Trinidad and Tobago the Centre for Energy Enterprise Development was established in 2004 to “increase local participation in value-added energy projects, facilitate the expansion in depth and scope of the local energy industry, develop business skills in the small and medium enterprises, encourage innovation and foster new thinking, helping entrepreneurs to capture supply chain niches.”⁶⁰ Clusters can also integrate non-mining industries that have synergies with the mining industry, as well as technological institutes to encourage the formation of horizontal linkages. Mining companies can use their convening power to help governments form clusters and participate in them.

Promoting domestic research and development initiatives. While most of the conversation about industrialization and mining is focused on value addition of commodities, historical experience has shown that innovation, not necessarily value addition, drives industrialization. Given that the geological characteristics of countries are unique, some adaptation of existing production techniques is often required. Mining companies can create research centers and/or liaise with national universities to explore innovative ways to improve mining processes, which can benefit the industry, while spurring local innovation.

Case studies and initiatives

SME financing and mentoring: South Africa. Anglo American founded its Zimele (“to stand on one’s own feet”) programme in 1989 “to help previously disadvantaged South Africans with funding and support to build their own successful small to medium enterprise (SME).”⁶¹ Through its six funds, the programme provides mentorship and financial support to budding entrepreneurs in a variety of different fields, and has supported 1,885 companies employing over 38,000 people in the last 15 years alone.

Coupled pipeline and ICT infrastructure: Peru. Compania Minera Antamina constructed a 304 km pipeline to transport copper and zinc concentrate slurry from mine to port. The company also built a fibre optic cable next to the pipeline to monitor it for leaks or disturbances. The cable has enabled Telefonica del Peru, the local telecommunications utility, to better serve the area with mobile and internet coverage at a much lower cost than would have been incurred if the mining company’s cable had not been used.⁶²

Shared use rail and port infrastructure: Mozambique. The Nacala Logistics Corridor will connect the Moatize Coal mine in northern Mozambique by rail to the deep-water port at Nacala. The agreement for the \$4.4 billion project, signed by joint venture partners Vale and Mitsui in December 2014, will upgrade existing railway tracks and construct new ones for handling current and future cargo load, estimated at 22 million tons annually. Of this, 18 tons are for coal transport and four are for general cargo and shared use, including from extensive agricultural development in the region that will be made possible through new access to export markets. The railway also passes through landlocked Malawi, connecting it more directly to overseas export markets.⁶³



A diamond sorter in Botswana (Credit: De Beers)

Adding value to diamonds: Botswana. In 2011, as part of a new 10-year sales agreement between De Beers and the Botswana government, it was agreed that De Beers’ London-based rough diamond sales activity (including professionals, skills, equipment and technology) would relocate to Gaborone, Botswana, the country where it mines most of its diamonds. The move was part of a negotiated agreement between the two parties regarding the sales and distribution of the

diamonds mined by Debswana (the 50:50 mining joint venture between De Beers and the government) and represented part of a broader effort by Botswana to

leverage its raw materials for economic growth. The Botswana government also offered other diamond businesses tax incentives and free land in a diamond industrial park to help spur growth in diamond cutting and processing.⁶⁴ The relocation was completed at the end of 2013 and, by the end of 2014, the value of rough diamonds traded in Botswana was \$6 billion (from under \$1 billion annually before the relocation).

Selected resources

- African Union / African Minerals Development Centre 2011. [Exploiting natural resources for financing infrastructure development: Policy options for Africa](#)

- Columbia Center on Sustainable Investment (CCSI) 2012. [Leveraging Extractive Industry Infrastructure Investments for Broad Economic Development: Regulatory, Commercial and Operational Models for Railways and Ports](#)
- CCSI 2014. [A Framework for Shared Use of Mining-related Infrastructure](#)
- CCSI 2014. [Leveraging Mining Demand for Internet and Telecommunications Infrastructure for Broad Economic Development: Models, Opportunities and Challenges](#)
- United Nations Industrial Development Organization (UNIDO) 2012. [Promoting Industrial Diversification in Resource Intensive Economies: The Experiences of Sub-Saharan Africa and Central Asia Regions](#)
- World Bank 2014. [Resource Financed Infrastructure: A discussion on a new form of infrastructure financing](#)
- World Bank 2015. [The Power of the Mine: A transformative opportunity for sub-Saharan Africa](#)

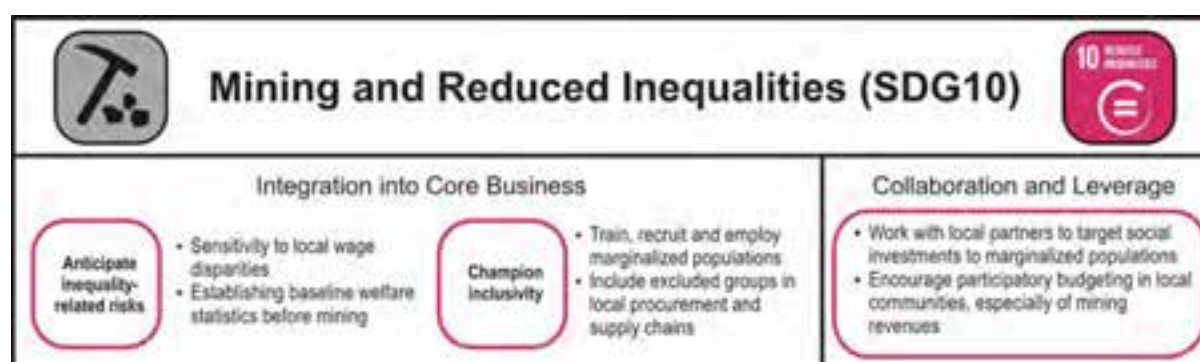
SDG10: Reduced Inequalities – Reduce inequality within and among countries

Despite significant reductions in poverty in many countries, poverty still persists and inequalities are growing, particularly in least developed countries, landlocked nations and small island states. Disparities remain in developed countries as well, with some populations still lacking access to basic infrastructure and economic opportunities despite significant improvements in the country overall. Taking an inclusive approach to expand economic opportunities and include marginalized peoples is fundamental to breaking down these disparities.⁶⁵

Many mining dependent nations struggle with economic inequality. Much research exists examining the relationship between mining activities, poverty, income equality and government reinvestment of mining revenues, among other factors. Economic inequality creates social inequality, sometimes leading to social unrest and erosion of the mining company's social licence to operate. While governments are primarily responsible for reducing inequality through policies and redistributive mechanisms, mining can play an active role by promoting inclusion in direct employment, leveraging direct, indirect, and induced economic benefits through local procurement, supporting livelihood diversification, and collaborating with government and communities to support transparent public consultations and expand access to basic services and infrastructure.

Key UN SDG10 targets relevant for mining

- 10.1 By 2030, progressively achieve and sustain **income growth of the bottom 40 per cent** of the population at a rate higher than the national average.
- 10.2 By 2030, empower and promote the **social, economic and political inclusion** of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status.



Integrate SDG10 into core business

Understanding how mining activities may exacerbate inequality. In some countries, mining wages and salaries are higher than other industries. In particular, mining companies operating in traditionally agricultural regions can increase inequality as farming wages are typically lower or communities are based on subsistence practices rather than cash economies. Building local employment and training programmes can help, but mine operations usually cannot employ everyone and access to high wages is limited. At the same time, living expenses in the region are likely to increase due to increased demand for products and services resulting from the influx of workers, businesses and cash. Those without access to mining wages can become poorer relative to the cost of living and conflict between different groups may emerge. These dynamics can be anticipated through social and economic baselines and impact assessments that help define measures companies can take to mitigate effects.

Anticipating and preventing the risks of conflict to communities and the company related to inequality. The cost to mining companies of ignoring structural inequalities in the local economy and the potential cost of conflict to both the company and communities should not be underestimated.

Social unrest has been documented to follow increasing income inequality in resource-rich countries and conflicts can result.^{66,67,68} Mining companies can evaluate how their activities might exacerbate conflict in order to proactively address underlying issues through their core business or in collaboration with other stakeholders. Participatory and inclusive consultation practices about the role and impacts of the mining operation are fundamental to the process of sharing information, responding to concerns and questions, and agreeing on how the company and community will collaborate. These processes help prevent conflict and can contribute to economic, social and political inclusion. (See also SDG16 – Peace, Justice and Strong Institutions.)

Championing inclusivity widely across operational activities. Mining companies alone will not eliminate the wider wage differential in regions where mining occurs, but they can expand how local communities access and benefit from the mine's economic development. Companies can ensure that recruitment and employment strategies reach marginalized populations including women and young people (SDG1 & SDG5); invest in local procurement and business incubators to widen economic opportunities, especially for poorer, excluded segments of the population (SDG1 – End Poverty & SDG8 – Decent Work and Economic Growth); invest in technical skill building with their workforce and the community of future employees (SDG4 – Quality Education); and collaborate with government to promote reinvestment of mining revenues back into local communities and across the region. Companies can also be transparent and communicate early, often and honestly about how the operation will evolve and how the company will manage the increases and decreases in available jobs and contracts.

Collaborate and leverage

While companies can play a significant role by identifying and mitigating their contribution to inequality, a long-term solution to disparities requires collaboration with government and communities.

Targeting diverse groups with social investments. Companies can incorporate inequality as a factor in decisions about where and how to make social investments. For example, in situations where there are economically or politically marginalized groups, mining companies could carefully and judiciously use social investments (in schools, health, basic infrastructure or otherwise) to support improvements. These investments should result from close consultation and dialogue with the community to identify how the company can contribute to community needs and assets, respecting their culture, traditional livelihoods and customs. (See also SDG1 – End Poverty, SDG3 – Good Health and SDG4 – Quality Education)

Encouraging participatory budgeting. Companies can encourage the involvement of communities in the budgetary planning of mining-related revenues allocated to the local level. According to the Institute for Human Rights and Business (IHRB), this “approach to budgeting helps strengthen the links between extractive revenue income and expenditure, both through an inclusive and participatory process around budget development and review, as well as a more explicit focus on budgeting to meet state obligations to protect and fulfill human rights – such as for education, health, social protection and justice systems.”⁶⁹ While mining companies themselves do not plan the end uses for the taxes they pay, the participatory budgeting approach is one that reduces inequality and fosters social cohesion. Mining companies, as significant taxpayers, can contribute to this social good by actively encouraging it.

Case studies and initiatives

Tracking inequality with household surveys: Laos. At its Sepon mine in Lao PDR, MMG conducts a household survey of the 34 surrounding villages every two years in order to understand and track changes in near-mine communities. The surveys include quantitative information on population, income and food sources, and qualitative information related to public opinion about life in the area and the mining operations. The survey results to date illustrate promising trends. Despite a doubling of the population in villages closest to the mine from 2001 to 2011, annual per capita income multiplied sixfold, and the Gini coefficient (an inequality index) was cut in half.⁷⁰ By focusing on

training local labour, as well as on local procurement, MMG's operations have spurred growth and lowered inequality. According to ICMM, "Equality is culturally an extremely important concept in the Lao PDR," and the reduced inequality is one factor that makes MMG "a welcome addition to the community."⁷¹

Mentoring and job-readiness programs for Aboriginals: Australia. In 2012 Thiess partnered with Reconciliation Australia to form the Thiess Reconciliation Action Plan (RAP). The plan provides greater opportunities within the company for indigenous Australians. It includes a 20-week pre-employment mentoring and homestay programme for indigenous people over 17 years old, an undergraduate internship programme, engineering-focused career expos focusing on indigenous recruitment and a 12-month "Women in Hard Hats" programme that trains indigenous women to be machine operators.⁷²

Selected resources

- World Bank 2013. [Poverty, Inequality, and the Local Natural Resource Curse](#)
- International Council on Mining and Metals 2007. [ICMM Resource Endowment initiative](#)
- McKinsey 2013. [Reversing the Curse: Maximizing the Potential of Resource Driven Economies](#)
- Peruvian Economic Association 2015. [The Local Impact of Mining on Poverty and Inequality: Evidence from the Commodity Boom in Peru](#)
- International Association for Impact Assessment 2015. [Social Impact Assessments: Guidance for assessing and managing the social impacts of projects](#)

SDG11: Sustainable Cities and Communities – Make cities and settlements inclusive, safe, resilient and sustainable

Half of the global population today lives in cities. By 2030, 60% of humanity will make cities their home. Cities are hubs of innovation, creativity, business, arts, science and many other issues that help advance human development. The challenge is creating urban areas that offer inclusive opportunities for prosperity without straining natural resources and land use.⁷³

Mining companies can contribute to sustainable cities and communities by supporting development of relevant local infrastructure, involving all stakeholders in land use and settlement planning and reclaiming mined land into parks and green spaces where appropriate. Mining landfills to reduce waste and reuse of materials and technologies are also potential contributions. Mine-related in-migration, while expanding the local labour supply and economic activity, may also create gaps in job opportunities for existing residents, strain public services and exacerbate unplanned urban growth.

Key UN SDG11 targets relevant for mining

- 11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for **participatory, integrated and sustainable human settlement planning** and management in all countries.
- 11.4 Strengthen efforts to protect and safeguard the world's **cultural and natural heritage**.
- 11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other **waste management**.
- 11.7 By 2030, provide universal access to safe, inclusive and accessible, **green and public spaces**, in particular for women and children, older persons and persons with disabilities.
- 11.c Support least developed countries, including through financial and technical assistance, in building sustainable and resilient **buildings utilizing local materials**.



Integrate SDG11 into core business

Planning land use for life-of-mine. Mining companies can adopt life-of-mine planning when developing strategies for land use and infrastructure development. This includes considering post-closure land use in closure planning strategies, and aligning any footprint expansion with anticipated community use. It also includes considering ways to minimize the mine's footprint and building operational approaches to reduce the cost and impact of closure into early project design. Post-closure planning will become increasingly important near urban areas, where large informal settlements can spring up near mine dumps, tailings ponds, unstable land and radon emissions as a result of growing pressure for land.^{74,75}

Developing cultural heritage management plans. Mining is an activity that requires access to land. Land has many meanings and importance far beyond its economic value as a source of metals and minerals. Indigenous peoples, local communities, governments and other stakeholder groups have

strong cultural, historical and local ties to land that may be designated for mining activities. Governments generally establish regulatory frameworks to govern the management and protection of archaeological and cultural assets and best practice in the mining industry includes identification of cultural and historical assets through baseline assessments and engagement with indigenous peoples and local communities, starting with the exploration phase and throughout the life of mine. Solutions to eliminate and manage the impact of mining activities on both tangible and intangible assets can be incorporated into the company's formal approach to community engagement and environmental management.

Anticipating and mitigating the negative impacts of urban development. Mine developments, especially new ones, can lead to a rapid influx of new residents into local communities and, if unplanned, can generate uncontrolled urban development and strain on public infrastructure and resources. Mining companies can anticipate the impacts of their workforce plans on local population growth and identify mitigation strategies that can be built into company policies for workforce housing, company-provided transportation, and collaborative efforts with local governments and communities.

Mining waste. Commodity prices change over time, and high prices can turn waste into ore. In such situations, mining companies may mine tailings. Another way of mining waste may also become economic: urban mining. This involves recovering valuable materials from landfills and up-cycling former waste back into the supply chain. As cities grow, they will produce more waste. Materials engineers are increasingly beginning to see secondary resources in megacities as potentially attractive opportunities for large-scale production of raw materials. They also see opportunities for using waste energy from recycling plants to provide heating, cooling, and electricity to cities.⁷⁶ Opportunities to apply materials processing and metallurgical capabilities can be assessed in this expanding field.

Collaborate and leverage

Managing urban growth and planning is the responsibility of local governments, but mining companies can collaborate to share information about operational plans and jointly address gaps in public infrastructure and services that might be needed for growing populations.

Broadly sharing workforce and operations planning. Mining companies typically plan the size of their workforce in line with planned production. This planning is done a few months to years ahead of time. Companies can collaborate with local communities to broadly estimate how many additional jobs will be created by each direct job and the resulting impact on population growth. This information can be used to assess the availability of local services and infrastructure and put plans in place to address the gaps. Where more than one mining company is operating in the area, companies can encourage local government to lead urban planning that takes into account future growth across the region.

Collaborating in local and regional planning and contribute to the development of green spaces. Companies can actively participate in regional and local planning initiatives. In addition to sharing information on company operations that will impact growth, companies can leverage investment in basic infrastructure, contribute to development of housing and help develop green spaces. Open pit mines have been transformed into parks, green spaces and even hotels. Underground mines can actually create new "land," and stories of repurposing them post-closure are becoming increasingly common. Community and local government participation should be built into any planning process that considers public use of former mining lands.

Case studies and initiatives

Landfill mining: Belgium. The Remo Milieubeheer landfill in Belgium has been growing since the 1970s, but now Group Machiels plans to mine it in a process called Enhanced Landfill Mining.⁷⁷ Over a 20-year period, it will excavate the entire area, now filled with 16.5 million tons of household and industrial waste. Approximately 45% of the material will be recycled; the rest will be heated to high temperatures using plasma technology and transformed into clean-burning natural gas.⁷⁸ The

company's expertise is in waste management, but this project illustrates transferability of technical expertise between industries in a way that could reveal opportunities for mining companies as well.

Appropriate technology in community-building: Liberia. Mining can support sustainable development by lending expertise in the mining and processing of local materials for building projects using appropriate technology. For example, as part of a resettlement programme for a gold mine in Liberia, the mining company brought in brick-making machines and trained 300 people in brick-making, carpentry and other construction skills for building a village, including houses, a school and a clinic.⁷⁹



The Eden Project in Cornwall, UK (Credit: The Eden Project)

Transforming mines into parks, resorts, and data centres: Global. The Eden Project in Cornwall, UK is a spectacular example of a repurposed mine. Until 1995, the land was mined for clay. Today, the old pit has been transformed into an eco-tourism destination and educational charity with beautiful gardens showcasing some of the world's rarest plants, sustainability training programmes for educators and students, and on-site modules for an MSc programme in sustainability.

It is currently investigating the feasibility for an enhanced geothermal system that would power the site and 4000 nearby households.⁸⁰ Eden

has also led a number of mining industry initiatives on closure planning. In addition to Eden, many other reclaimed mines have been transformed into amazing spaces, including: the world's largest underground bike park (former limestone mine, USA), subterranean theme park (former salt mines, Romania), underground data centre (former limestone mine, USA), asthma therapy spas (former salt mine, Ukraine), physics laboratory (former gold mine, USA), museum (former zinc mine, Norway) and cathedral (former salt mine, Poland) among others.^{81,82}

Selected resources

- International Finance Corporation (IFC) 2012. [IFC Performance Standard 8: Cultural Heritage](#)
- United Nations Environment Programme 2013. [Identifying potential overlap between extractive industries \(mining, oil and gas\) and natural World Heritage sites](#)
- Urban Mining 2015. [UrbanMining.org](#)

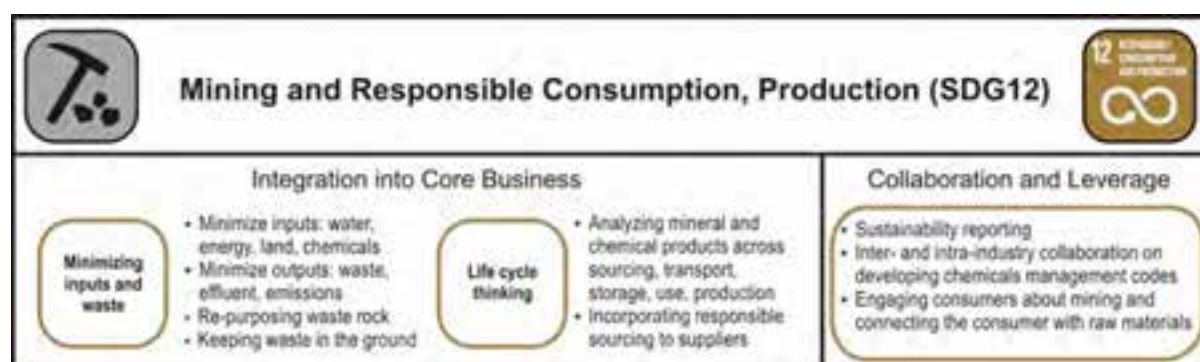
SDG12: Responsible Consumption and Production – Ensure sustainable consumption and production patterns

The UN estimates that one third of all food produced annually – equivalent to 1.3 billion tons worth around \$1 trillion – ends up rotting in waste bins or spoiling during the harvest and transport process to market. The UN also estimates that if everyone around the world used energy efficient light bulbs, we would save \$120 billion annually. These are two of the many opportunities for improving sustainable consumption and production. In sum, it means “doing more and better with less” across the world’s production and consumption supply chains.⁸³

The mining process produces useful materials for society that are in products we use every day. Mining also generates waste, much of it unusable. Waste volumes are likely to increase as high quality mineral deposits are exhausted and increasingly lower grade, lower quality ore is mined. In spite of these challenges, mining can contribute to more sustainable production by undertaking responsible “materials stewardship” across the value chain.⁸⁴ Companies can collaborate with governments and across the supply chain to support a circular economy to minimize inputs to waste from the mining process and to increase reuse, recycling and repurposing of raw materials and products to improve sustainable consumption. Metal and mineral resource recovery, recycling and reuse is labour intensive and presents opportunities for industrial innovation and job creation.

Key UN SDG12 targets relevant for mining

- 12.2 By 2030, achieve the sustainable management and **efficient use of natural resources**.
- 12.4 By 2020, achieve the environmentally sound **management of chemicals and all wastes throughout their life cycle** in accordance with agreed international frameworks and significantly reduce their release to air, water and soil.
- 12.5 By 2030, substantially **reduce waste generation** through prevention, reduction, recycling and reuse.
- 12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to **integrate sustainability information into their reporting cycle**.



Integrate SDG12 into core business

Minimizing mine inputs and waste. Sustainable mining entails minimizing inputs of water, energy, land, chemicals and other materials, as well as outputs of waste, effluent and emissions. Mining companies already have clear economic incentives to minimize inputs and are working on efficient blasting, new fuels for mobile fleets, reduced energy for processing and recycled process water. Managing outputs, particularly rock waste, requires new approaches that extract more value from less rock, leave more waste in the ground, and find creative uses for remaining waste and overburden. In the future, the social licence to operate will be given to companies that can demonstrate maximum efficiency and minimum impact and hence the most value for all involved from the mine to the

products. Increased recycling of materials in the value chain and from final products will enhance the connection between producer, materials and products, allowing easier life-cycle sustainability analysis for customers.

Implementing environmentally sound management of chemicals and all wastes throughout their life cycle. Mining companies can continue to strengthen their efforts to improve responsible management and minimize risks associated with chemicals they produce or use by working across the value chain and with other stakeholders. Some in the mining industry have recognized that many metals and minerals are classified and regulated as hazardous chemicals and that responsible management of these mined products throughout the life cycle (sourcing, transport, storage, use and production), including managing occupational health and environmental risks, is a key aspect of responsible materials management.⁸⁵

Moving away from extraction-only. Progressive depletion of easily extractable resource deposits will drive prices upwards and catalyze innovation in new technologies for extraction of less accessible deposits, while encouraging recycling and/or substitution using different materials. The latter two options reflect business opportunities for mining companies to integrate down the supply chain and become materials companies or conversely for technology companies reliant on specific materials to move up the value chain to secure supply. There is already significant and growing recycling of base metals, but more needs to be done with regards to minor metals, which have recently seen significant growth in demand. Much of the mining industry is focused on extracting more value from existing operations rather than building new ones, but as long as there is population and prosperity growth, we will need new mines along with more recycling. While the timing of these changes is difficult to predict, the resultant structural changes in resource supply may be considerable.

Implementing responsible sourcing. Mining companies can integrate environmental and social considerations and requirements into their procurement processes. Establishing criteria in addition to quality and cost helps drive improved performance at the production end of the value chain. The mining industry has a practice of incorporating safety and community engagement requirements into contracts with direct suppliers and contractors. This practice can be extended across the value chain and across the inputs and services purchased by the company.

Collaborate and leverage

Sustainable production and consumption requires collaboration between producer and end user across the supply chain to identify efficiencies, improve sustainable consumption and provide end users with information about the origin of the raw materials and products they use.

Collaborating to establish codes of conduct and sourcing principles. The Responsible Jewellery Council's Code of Practices Certification and the International Cyanide Management Code are examples of industry collaboration to establish codes of best practice across the mining value chain. Conflict minerals sourcing criteria is a responsible sourcing approach that directly impacts the business of mining.

Case studies and initiatives

Zero-waste mining: Canada. The Canada Mining Innovation Council has launched a programme called "Towards Zero Waste" that has support from major mining companies. The programme is a collaboration between industry, universities and government. Its goal is to move to net zero waste from mining and minerals processing in the next 10 to 20 years, through a combination of more efficiently defining new ore discoveries, improved *in situ* mining techniques that minimize waste, closed-system processing that reduces water and energy waste and refining tailings into a benign and saleable product.⁸⁶

Explosives-free rock breaking: Canada. One method for reducing waste rock and impact on the land that is currently being researched is explosives-free rock breaking (EFRB), such as using electricity to heat and mechanically weaken a vein for in-situ recovery. According to Natural

Resources Canada, “possible breakthroughs in this technology have garnered serious interest by mining companies, who have already funded a number of large-scale EFRB projects. There are strategic drivers within the industry, such as an operational shift from open pit to underground mining, faster accessibility to ore bodies and reduction in development costs.”⁸⁷

Selected resources

- Accenture 2014. [The UN Global Compact - Accenture CEO Study on Sustainability Industry Insight: Mining & Metals](#)
- Aluminum Stewardship Initiative 2015. [AS Initiative](#)
- Global Reporting Initiative 2013. [G4 Sector Disclosures: Mining and Metals](#)
- International Council on Mining and Metals 2015. [Demonstrating Value: A guide to responsible sourcing](#)
- International Finance Corporation 2012. [IFC Performance Standard 3: Resource Efficiency and Pollution Prevention](#)
- Mining Association of Canada 2015. [Towards Sustainable Mining \(TSM\) Initiative](#)
- Sustainable Accounting Standards Board 2014. [Mining and Metals Research Brief](#)
- World Economic Forum 2014. [Scoping Paper: Mining and Metals in a Sustainable World](#)

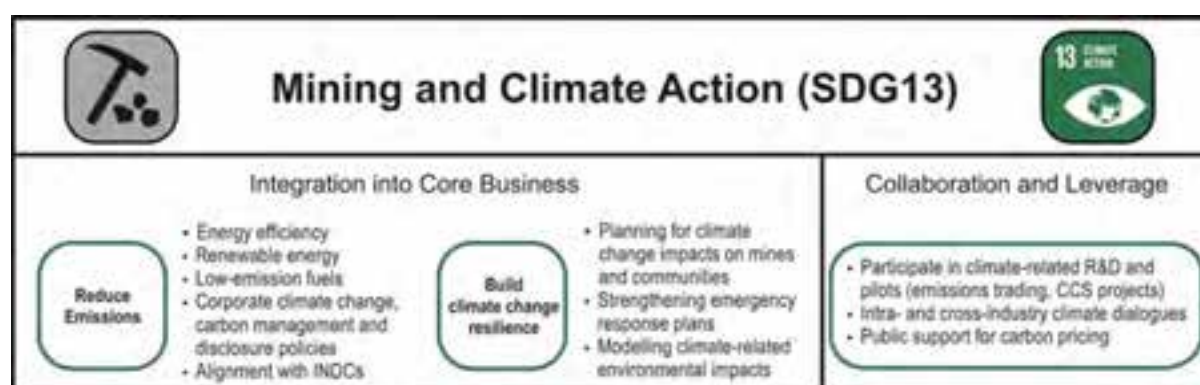
SDG13: Climate Action – Take urgent action to combat climate change and its impacts

In the coming decades, climate change is set to disrupt national economies and adversely affect people's livelihoods through changing weather patterns, rising sea levels, and more extreme weather events. Greenhouse gas emissions are also projected to rise. Limiting global warming, mitigating further impacts and promoting solutions for adaptation and resilience are everyone's responsibility from government to the private sector to the individual. The landmark 2015 Paris Agreement signed by 200 countries sets a global framework for stemming greenhouse gas emissions and adaptation to the effects of climate change. The impacts of climate change touch on nearly all the SDGs, but the relationship between SDG13 and SDG7 - Affordable and Clean Energy is fundamental.⁸⁸

Mining companies can contribute to addressing climate change by reducing their carbon footprint and by engaging in dialogue with stakeholders to enhance adaptive capacities and integrate climate change measures into policies and strategies. Barring large-scale commercial viability of emission-reducing technologies such as carbon capture and storage (CCS) or geo-engineering, or a carbon price that accurately accounts for negative environmental impacts of emissions, coal-powered electricity will continue to be one of the greatest contributors to climate change and the associated emissions need to be phased out. To move away from coal will necessitate not only the development and adoption of new technologies, but also support to countries heavily dependent on coal to enable the transition to cleaner technologies, energy sources and alternative employment opportunities. Finally, mining can adapt to climate change by ensuring its surrounding communities (and its own operations) are resilient to more extreme weather events.

Key UN SDG13 targets relevant for mining

- 13.1 Strengthen **resilience and adaptive capacity** to climate-related hazards and natural disasters.
- 13.3 Improve education, awareness-raising and human and institutional **capacity on climate change mitigation, adaptation, impact reduction and early warning**.
- 13.b Promote mechanisms for raising capacity for effective **climate change-related planning and management** in least developed countries, including marginalized communities.



Integrate SDG13 into core business

Adopting a corporate policy to address climate change. Climate change threatens to undermine all other efforts for sustainable development. If climate change is not successfully tackled, it will not be possible to achieve sustainable development. Yet despite global agreement based on extensive scientific research that the probability of catastrophic warming, sea level rise, droughts and floods will dramatically increase if global temperatures exceed 2°C over pre-industrial levels,⁸⁹ many mining companies have yet to acknowledge that climate change is a reality. As recently as 2013, CSIRO in

Australia conducted a study showing that only 39% of mining companies in Australia believed the climate was changing.⁹⁰ At a minimum, companies can use available data to assess potential impacts and risks to the business. Ideally, companies will conduct a comprehensive review of the scientific research, engage in internal dialogue and publicly establish the company's position and commitments to mitigation and adaptation. Such a review can include scenario planning to inform views on climate and energy risks, identifying and implementing cost effective energy efficiency opportunities, establishing internal governance structures and processes to clarify accountabilities for energy management and including climate change on the board agenda.

Reducing, measuring and reporting emissions. Emissions reductions should be a core component of any corporate policy for mining companies. Emissions reduction is challenging because mines, by design, extend further from the surface, requiring ever-increasing transit distances for equipment and trucks, and therefore increasing amounts of energy. Therefore, reducing emissions in mines will require increased use of renewable energy, significantly cleaner fuel sources or efficiency gains realized through increasing mechanization – ideally all three. Reducing emissions also requires measuring and reporting both direct and indirect product emissions. Companies can support the deployment of low emission technologies to reduce operational emissions and improve productivity.

Aligning company strategies with national efforts and sharing the company's policy on climate change. Under the UN Framework Convention on Climate Change and the Paris Agreement, national governments have committed to implement climate actions at home. These commitments are called the Intended Nationally Determined Contributions (INDCs) and will be the foundation for building a climate resilient future. Companies can engage with government and other stakeholders to align their corporate climate change strategies with the applicable INDCs. Once established, companies can share how they will support the national effort. Contributing to the discussion and sharing information and analysis to spur innovation are fundamental to addressing climate challenges. Coal companies can make a substantial contribution by acknowledging the challenge of emissions and choosing to collaborate to establish industry efforts to accelerate low emissions coal technologies and transition to lower emissions and eventually a net zero emissions energy mix.

Building climate change resilience. Companies can use climate projects to inform the design and placement of operations and associated infrastructure. Identification of potential climate impacts on operations and local communities – whether in terms of drought, floods, weather as well as changes in economic livelihoods – can help to strengthen adaptation approaches and emergency response plans. According to Australia's CSIRO Climate Flagship, "A range of climate change effects – drought, conflict over water use, heat waves and intense rainfall – will adversely affect mining operations as well as other industry sectors, communities and the surrounding environment."⁹¹

Collaborate and leverage

Participating in climate-related R&D and pilots. Mining companies can develop and participate in experimental pilot programmes to reduce emissions, most importantly in the field of CCS. Fossil fuels (including coal) will only be part of the low carbon future if CCS becomes a reality.⁹² While only one large-scale commercially viable CCS project has been implemented (see story below), some in the power industry say it is only a matter of time before CCS will be implemented on a global scale. Company investment and participation in research to make CCS more viable – especially by coal mining companies – is a benefit to the company, to the industry and to society as a whole.

Supporting global carbon pricing. A global price on carbon would internalize the true social and environmental cost of burning coal, and make cleaner renewable energy sources much more cost-competitive in comparison. Some of the largest mining companies in the world have made public their support for a price on carbon. For example, the World Bank reports that Vale and Anglo American are participating in a trial for a national emissions trading scheme (ETS).⁹³ It must be global, however, to guard against simply shifting emissions to jurisdictions with lower carbon prices or weaker enforcement.

Case studies & initiatives

Creating bioethanol from steelmaking waste gases: Belgium. In July 2015, ArcelorMittal, the world's largest steel and mining company, partnered with LanzaTech, a carbon recycling company, and Primetals Technologies, a leading technology and service provider to the iron and steel industry, to build Europe's first commercial-scale production facility to create bioethanol from the waste gases produced during the steelmaking process. It is estimated that the bioethanol will emit 80% less greenhouse gases than conventional fossil fuels.⁹⁴

Carbon Management and Disclosure Policies: Global. Gold Fields has found that instituting corporate carbon management and disclosure policies at their South African and Ghanaian operations has saved them millions of dollars annually. Participating in the Carbon Disclosure Project (CDP) has driven energy efficiency measures within the company and has opened up opportunities for Gold Fields to attract "ESG-focused investors." The company has incorporated CDP procedures into its life-of-mine planning, and now requires that any new project source at least 20% of its energy from renewable sources.⁹⁵



The SaskPower CCS project has captured more than 500,000 tonnes of CO₂ since it launched in October 2014 (Credit: Sask Power)

Carbon capture and storage: Canada. In October 2014, SaskPower's Boundary Dam coal-fired power plant became the first commercially viable large-scale CCS operation in the world. The C\$1.25 billion project retrofitted the coal-fired power station to inject emissions back into the ground for enhanced oil recovery in nearby oil-fields. Approximately 90% of the emissions are trapped through this process.⁹⁶ While this CCS project is commercially viable only because of enhanced oil recovery, the net reduction of emissions is significant. A global carbon price that internalizes all costs of burning fossil fuels would quickly and drastically improve CCS viability.

Carbon price advocacy: Global. In June 2015, BHP Billiton followed six large European oil and gas companies (BP, Shell, Statoil, Total, BG Group and ENI) in actively supporting a global price on carbon.⁹⁷ BHP Billiton's website states "There should be a price on carbon, implemented in a way that addresses competitiveness concerns and achieves lowest cost emissions reductions."⁹⁸

Selected resources

- Carbon Disclosure Project 2015. CDP.net
- European Commission Joint Research Centre 2011. [Critical Metals in Strategic Energy Technologies](#)
- Greenhouse Gas Protocol 2015. GHGProtocol.org
- International Council on Mining and Metals 2012. [The Role of Minerals and Metals in a Low Carbon Economy](#)
- International Council on Mining and Metals 2015: [ICMM Climate Change Statement](#)
- International Council on Mining and Metals 2011: [ICMM Principles for Climate Change Policy Design](#)
- World Resources Institute 2015. [CAIT Climate Data Explorer](#)
- United Nations Global Compact 2015. [Climate and Energy Business Partnership Hub](#)
- United Nations Climate Change Conference and Agreement 2015. [COP21](#)

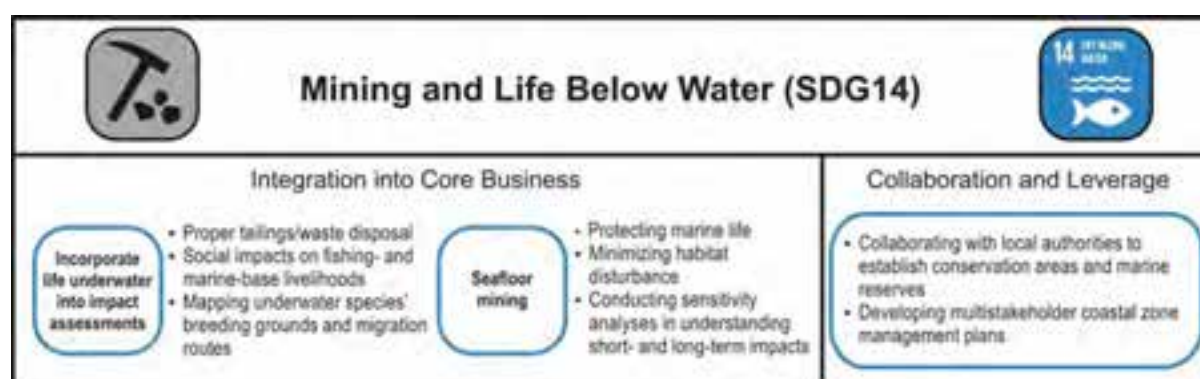
SDG14: Life Below Water – Conserve and sustainably use the oceans, seas and marine resources for sustainable development

The world's oceans are home to a rich diversity of plant and animal life and a source of food and marine resources that drive economies. Climate change and pollution are changing ocean dynamics – their temperature, chemistry, currents and life. SDG14 is about reducing negative impacts on the world's oceans and protecting fragile marine ecosystems.⁹⁹

Mining impacts the ocean in a number of ways: use of the oceans for shipping products, subsea shallow mining, submarine tailings, riverine tailings and the new frontier of deep-sea mining, to name a few. Mining companies can contribute to ocean sustainability by identifying marine-related impacts and mitigation strategies, understanding the dependence of local communities on marine resources and contributing to the protection and conservation of the oceans and seas.

Key UN SDG14 targets relevant for mining

- 14.1 By 2025, prevent and significantly **reduce marine pollution** of all kinds, in particular **from land-based activities**, including marine debris and nutrient pollution.
- 14.2 By 2020, sustainably manage and **protect marine and coastal ecosystems** to avoid significant adverse impacts, strengthen their resilience, and achieve healthy and productive oceans.
- 14.7 By 2030, **increase the economic benefits** to small island developing states and least developed countries from sustainable use of marine resources, including **fisheries, aquaculture and tourism**.



Integrate SDG14 into core business

Incorporating “downstream” and marine impacts into assessments. Company environmental impact assessments should consider effects on life underwater and the connectivity of ecosystems from watershed to ocean floor. Tailings disposal – whether terrestrial or marine – represents a major mining-related challenge for life below water and the life that depends on water and marine environments. In theory, submerging mine tailings underwater prevents them from oxidizing and turning into sulfuric acid. In practice, acid mine drainage can leak into and contaminate water supplies or tailings dams may collapse; in both cases entire underwater ecosystems, and all life that depends on them, are polluted and potentially rendered uninhabitable.¹⁰⁰ While submarine tailings burial reduces the possibility of acid drainage, it also introduces the risk that high concentrations of dissolved metals could harm underwater ecosystems that many, including humans, may rely on for food. The importance of elevated environmental precautions for mine waste disposal, especially near water bodies, cannot be understated.

Identifying social impacts and relationships to marine resources. Company impact assessments should recognize the rights and livelihoods of communities who depend on marine resources and

include them in consultation and social impact management planning. Assessments can not only consider the direct impacts of company infrastructure on marine-based livelihoods, but also the indirect impacts and expectations that may arise. For example, in some places, traditional fishing livelihoods are under pressure as fish stocks decline or move farther off shore. Nearby company operations may not directly impact these communities or their marine resources, but companies may be subject to high expectations from communities to contribute to their livelihood transition by providing access to jobs and social investment programmes.

Mining the seafloor. As terrestrial mineral resources decline in grade, deep-sea mining is becoming potentially attractive. Metal concentrations in some seafloor deposits may represent substantially better sources for mineral extraction from a material and energy-efficiency perspective. However, the potential environmental impacts of deep-sea mining are still being investigated, and include the risk of releasing increased quantities of toxic materials into the ocean, as well as the agitation of sediment, which itself can adversely affect marine organisms if not properly managed. This is a critical consideration, especially for governments of small island developing states which depend on marine life for much of their food supply, but who also see vast economic opportunity in deep-sea mining.¹⁰¹

Collaborate and leverage

Companies can collaborate with government, local communities and other stakeholders to research, protect and discuss balanced use of marine resources.

Establishing marine conservation areas and contributing to research and planning. Mining companies operating near coastlines and large bodies of water can take a practical approach to maintaining underwater biodiversity by collaborating with government and communities to set aside conservation areas and marine reserves. Companies with activities near fisheries, fish migration routes or fish breeding grounds can make contributions to ensure that these areas remain protected. Companies operating in coastal areas can work with other stakeholders to develop integrated coastal zone management plans and support ecosystem monitoring and assessment capacity.

Case studies and initiatives

Subsea tailings disposal: Turkey. At Inmet's Cayeli Bakir underground copper-zinc mine in Turkey, the company backfills half the mine tailings underground and discharges the other half into the anoxic zone at the bottom of the nearby Black Sea. The discharge is done in accordance with Turkish regulations, and a comprehensive third-party scientific monitoring programme is in place to ensure that the tailings do not negatively impact life in the sea. The area is known to produce about half of Turkish sea fish and a quarter of Turkish shell fish. Because there is no oxygen at this depth, tailings do not oxidize, and therefore do not produce acid. Long-term monitoring shows no change in water quality resulting from tailings discharge.¹⁰²

Protecting coral reefs at an LNG terminal: Yemen. In order to protect a coral reef at its liquid natural gas processing and shipping terminal in the Gulf of Aden, Yemen LNG partnered with the International Union for the Conservation of Nature (IUCN) and environmental NGO Earthmind to conduct the first large-scale coral transplantation in the world.¹⁰³ Before clearing a path for the terminal infrastructure, the group conducted baseline studies around the reef. It then transported nearly 1500 coral colonies 600 to 800 meters away where they would not be disturbed. Large silt curtains were used to protect the corals from sediment, and dive teams vacuumed the remaining sediment off the corals after the terminal construction was finished. Today, Yemen LNG manages the site as a marine exclusion zone and verified conservation area, protecting it from fishing and preserving the delicate marine ecosystem^{104,105}.

Selected resources

- Woods Hole Oceanographic Institution 2009. [The Promise and Perils of Seafloor Mining](#)
- World Economic Forum 2016. [Toward Transparency and Best Practices in Deep Seabed Mining](#)

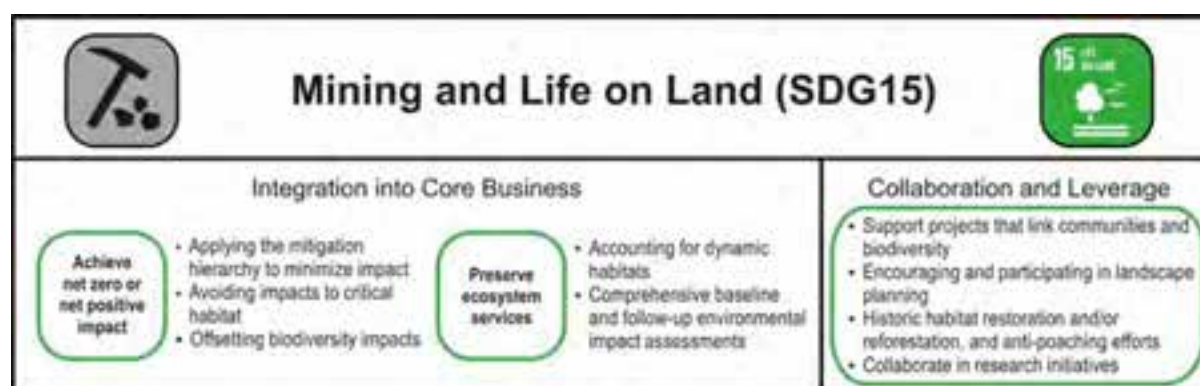
SDG15: Life on Land – Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Deforestation, desertification and biodiversity loss are threatening life on land. People depend on terrestrial ecosystems – forests, savannahs, deserts, wetlands and others – for food, water, shelter, medicine, income and their livelihoods. Terrestrial ecosystems are also critical for conservation of threatened species and their habitats and for carbon storage and sequestration. Global efforts to restore, protect and better manage valuable ecosystems need to improve.¹⁰⁶

Mining and its associated infrastructure can disrupt both the ecosystems that provide valuable services to society and the biodiversity on which these ecosystems depend. The mining sector is also a major manager of land as mining leases are usually larger than the directly impacted footprint of mining activities. As a land manager, mining companies have an important role to play in biodiversity and conservation management. The mitigation hierarchy of avoid, minimize, restore, enhance and offset, provides a framework for mining and other companies to assess and determine measures to protect ecosystems and biodiversity.¹⁰⁷¹⁰⁸ Examples of activities mining companies can undertake include projects designed to avoid or minimize adverse impacts, species at risk surveys during exploration, conservation programmes, protection of threatened or endangered species, elimination of invasive species, restoration of displaced or disrupted ecosystems, and the use of biodiversity offsets to address residual impacts.

Key UN SDG15 targets relevant for mining

- 15.1 By 2020, ensure the **conservation, restoration and sustainable use** of freshwater ecosystems and their services, in particular **forests, wetlands, mountains and drylands**.
- 15.5 Take urgent and significant action to reduce the degradation of natural habitats, **halt the loss of biodiversity** and, by 2020, protect and **prevent the extinction of threatened species**.
- 15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of **invasive alien species** on land and water ecosystems and control or eradicate the priority species.
- 15.c Enhance global support for efforts to **combat poaching and trafficking** of protected species, including by increasing the capacity of local communities to pursue sustainable livelihoods.



Integrate SDG15 into core business

Avoid impacts to critical habitat and work towards no net loss and net gain. Mining activities and the operations of associated infrastructure occurs in forests, wetlands, mountains, drylands, rivers, deserts, oceans and the Arctic, and affect habitats and ecosystems in all of them. Surface or open pit mining can result in forest clearing and habitat destruction, underground mines can have

tailings storage and ore processing facilities that create surface impacts and associated infrastructure and waste streams can negatively impact life on land. No mine has zero surface footprint and the first step in the biodiversity mitigation hierarchy is to avoid impacting critical habitats. Some biodiversity loss is irreplaceable and companies should be willing to forego mining in the most sensitive areas such as Natural World Heritage Sites. Companies must also account for the dynamic nature of habitats – migratory species or downstream wetlands may be just as affected by mining activities as near-mine habitats. By applying the mitigation hierarchy, companies, working with key stakeholders, can better manage their impacts and have a workable approach to identifying and undertaking actions to protect and conserve biodiversity and ecosystem services. The mitigation hierarchy can be used as a framework for no net loss or net gain conservation goals¹⁰⁹ with offsets being an important component. Some regulatory or other performance standards (e.g. IFC PS6¹¹⁰) may impose certain obligations on project proponents for no net loss, net gain or offsets. At minimum, mining companies can undertake mitigation efforts intended to achieve net zero or no net loss as a means of contributing to the SDG15 targets. A greater positive contribution to the SDG15 targets might be feasible if companies undertake efforts aimed at having a net positive impact or net gain.

Implementing biodiversity offsets. The mitigation hierarchy helps identify measures to prevent (avoid) and minimize impacts, restore impacted features, enhance existing biodiversity and understand cumulative impacts. Biodiversity offsets can be used to ensure that any significant residual loss of biodiversity or ecosystem services (ES) at or around the project site can be more than made up for by deliberately conserving and preserving biodiversity or ES elsewhere. Utilizing standards and guidelines, such as those found in the Selected resources section below, as well as collaborating with expert conservation organizations and communities are critical elements for getting it right.

Preserving ecosystem services. Ecosystems are worth protecting in their own right, but also provide valuable services to humanity. They are dynamic environments in which everything, including humans, is interdependent, and they are more than the sum of their parts. Altering one element beyond its natural threshold can produce significant and potentially undesirable knock-on effects. A comprehensive environmental baseline assessment must consider not only the static presence of different species, but also the dynamic nature of ecosystems as a whole and the services that they generate. Companies can implement assessments to better understand the nature of the operation's impacts on ecosystems services and identify mitigations.

Collaborate and leverage

Companies can collaborate with governments, NGOs, communities and academia to protect and promote biodiversity and other terrestrial resources through habitat restoration, reforestation projects and ecosystem-related research.

Supporting projects that link communities and biodiversity. In many mining areas, local communities depend on biodiversity resources for their livelihoods. Companies can support programmes that enhance the sustainability of these linkages and improve ways to measure, assess and report on biodiversity gains or losses. This might include community-based nurseries to grow plants for company reclamation or reforestation projects, collaborating with local authorities to combat illegal poaching and supporting livelihood transition programmes for poachers, or working with local communities and government to monitor illegal trade in animal products. In some cases, increased employment opportunities related to mining can help to relieve economic stresses that encourage poaching. Companies can participate in regional and national dialogues related to biodiversity protection.

Encouraging and participating landscape-scale planning (LSP). LSP can help guide sustainable development and reduce biodiversity impacts by identifying critical habitat and ecosystem services for maintaining healthy landscapes, opportunities for shared infrastructure that has lower impact and guiding biodiversity offset investments to the highest priority areas/actions in the landscape.

Companies can support LSP by facilitating cooperation among multiple partners in a region, including the sharing of data, models and plans as appropriate. Through working with local and regional stakeholders, opportunities for integrated resource corridors and shared infrastructure can be identified to minimize environmental and social impacts, reduce project-community conflicts and costs and improve overall development outcomes. Environmental and social impact assessments can also be grounded in landscape-scale plans, to improve assessment of cumulative impacts and dependencies, meet performance standards and support strategic mitigation actions including offsets.

Seeking opportunities to enhance net positive impact. Companies can help restore habitats that were compromised before mining ever took place. Companies can also support the development of new protected areas or the improved management of existing protected areas. In some cases, company controlled land that was formerly used for agriculture could be reforested to restore local species and increase forest cover. Determining the best approach to enhancing net positive impact can be supported by collaboration with other companies operating in a single area to identify the cumulative impacts on biodiversity.

Collaborating in research initiatives. In areas with critically important ecosystems, governments, communities, universities, NGOs and others may have on-going research programmes. Companies can identify the on-going work in their region and collaborate to strengthen or expand the research approach. Research projects may yield information and results that will benefit the company's own environmental planning. Companies can also share their own baseline, assessment and monitoring data.

Case studies and initiatives

Sector-wide biodiversity guidelines: South Africa. UNDP helped develop the Mining and Biodiversity Guideline through a three-year multi-stakeholder process convened through the South African Mining and Biodiversity Forum with participation of the Chamber of Mines of South Africa and its members, several government departments and NGOs. The guideline provides a single reference point for industry and regulators to ensure that biodiversity issues are consistently integrated into the decision-making for mining projects. It was launched in 2013 with approval of ministers from mineral and environment departments and adoption by the Chamber of Mines of South Africa and its 69 member companies.¹¹¹



Protecting biodiversity in Chile (Credit: Matias Pinto/The Nature Conservancy)

Protecting biodiversity: Australia, Chile. In 2011, Conservation International (CI) and BHP Billiton launched a five-year alliance in which CI advises BHP on its biodiversity strategy and BHP funds and carries out conservation work. At its Five Rivers Conservation Project in Tasmania, CI and BHP are restoring forests and the habitat of the Tasmanian Devil within the Tasmanian World Heritage Area at a cost of AU\$13.4 million.¹¹² At its Valdivian Coastal Reserve in Chile, which is one of the World Wildlife Fund's 'Global 200,' BHP has ensured permanent conservation of 50,000 hectares of temperate rainforest, and is supporting the largest restoration of native

forest ever conducted in Chile, which involves removing 3,500 hectares of non-native eucalypts and planting more than 2.5 million native trees.¹¹³

Biodiversity offsets: Madagascar. Rio Tinto's subsidiary QIT Madagascar Minerals operates three ilmenite mines, associated road infrastructure and a deepwater port as part of a 60+ year integrated mining project. Rio Tinto invested in a large team of biodiversity experts to completely survey the biodiversity value of the area. The project required clearing 1,217 ha of forest which had both intrinsic biodiversity value (because it contained some endemic and threatened species) as well as service biodiversity value (because villagers depended on reeds for their livelihoods). As a biodiversity offset,

the company defined four offset sites, put forests with endemic and threatened species into conservation and established reed plantations with higher biomass harvest than the natural habitat. Overall, the project resulted in a net gain of 5,095 ha of quality forest.¹¹⁴

Restoring bighorn sheep habitats: United States. Bighorn sheep populations in the US state of Nebraska began declining in the late 1800s due to habitat loss, unregulated hunting and disease. Nebraska Fish and Wildlife started efforts to rebuild the population in the 1970s. In 2012, Teck, whose reclaimed Luscar Pit in the Rocky Mountains of Alberta provides excellent year-round habitat for bighorn sheep, collaborated with Nebraska Fish and Wildlife and Alberta Sustainable Resource Development to transfer sheep from Alberta to Nebraska for repopulating the Nebraskan herds. So far 41 sheep have been exported from Alberta's population, which numbers 950.¹¹⁵

Selected resources

- Convention on Biological Diversity 2015. [CBD.int](https://www.cbd.int)
- Cross Sector Biodiversity Initiative 2015. [A Cross Sector Guide for Implementing the Mitigation Hierarchy](#)
- Earthmind 2015. [Verified Conservation Areas](#)
- International Finance Corporation 2012. [IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources](#)
- International Council on Mining and Metals 2006. [Good Practice Guidance for Mining and Biodiversity](#)
- International Council on Mining and Metals 2010. [Mining and Biodiversity: A collection of case studies](#)
- South Africa Department of Environmental Affairs 2013. [Mining and Biodiversity Guideline: Mainstreaming biodiversity in the mining sector](#)

SDG16: Peace, Justice, and Strong Institutions – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable and inclusive institutions at all levels

Corruption, human rights abuses, bribery, tax evasion and conflict threaten inclusive and peaceful sustainable development. SDG16 is about building more effective access to justice and institutions that contribute to transparent rule of law and protection of human rights. Securing peace also means reducing violence and conflict, protecting children, reducing corruption, and broadening the opportunities for people to participate in government.¹¹⁶

Mining companies can help strengthen accountable and transparent institutions by actively combating mining-related illicit financial flows through disclosure and reporting. Mining can also contribute to peaceful societies by remedying company-community conflict, providing access to information, respecting human rights, supporting representative decision-making and carefully managing their security approaches to ensure they decrease rather than increase the likelihood of conflict.

Key UN SDG16 targets relevant for mining

- 16.1 Significantly reduce all forms of **violence** and related death rates everywhere.
- 16.3 Promote the **rule of law** at the international and national levels and ensure **equal access** to justice for all.
- 16.4 By 2030, significantly reduce **illicit financial and arms flows**, strengthen the recovery and return of stolen assets and combat all forms of organized crime.
- 16.5 Substantially reduce **corruption and bribery** in all their forms.
- 16.7 Ensure responsive, inclusive, participatory and representative decision making at all levels.
- 16.10 Ensure **public access to information** and protect fundamental freedoms, in accordance with national legislation and international agreements.



Integrate SDG16 into core business

Preventing company-community conflict. The 2014 study, "Cost of Company-Community Conflict in the Extractive Sector," estimated that the cost to a world class (\$3-5 billion) mining project of one week of lost productivity due to temporary shutdowns or delay is \$20 million.¹¹⁷ The magnitude of the costs highlights the importance for companies to anticipate the scope of their social, environmental and economic impacts, and to understand how these may spark conflict. Consistent and on-going engagement with local communities and other stakeholders, as well as formal complaints and grievance mechanisms, are the foundation for responding early to concerns, listening to questions and sharing information. In addition, companies can implement conflict assessments (including as

part of their ESIA) that consider the links between social change, expectations and the risk of conflict.

Implementing human rights impact assessments. Companies have a responsibility to support and protect human rights as defined in the UN Universal Declaration of Human Rights. In 2011, the UN issued the “Guiding Principles on Business and Human Rights” to clarify the roles of business and government in upholding and protecting human rights. Human Rights Impact Assessments (HRIAs) are becoming standard practice across the mining sector. They help companies identify their responsibilities relevant to human rights across the scope of their operations and solutions to enhance and improve their performance. HRIAs can also be complemented with an assessment to determine the company’s conformance to the Voluntary Principles for Security and Human Rights which provide guidelines for managing physical security, the use of firearms, and security contractors to prevent escalation of conflicts.

Respecting free, prior and informed consent (FPIC) and the special status of Indigenous Peoples. Oxfam defines FPIC as “the principle that indigenous peoples and local communities must be adequately informed about projects that affect their lands in a timely manner, free of coercion and manipulation, and should be given the opportunity to approve or reject a project prior to the commencement of all activities.”¹¹⁸ ICMM defines FPIC “as a process based on good faith negotiation, through which Indigenous Peoples can give or withhold their consent to a project.”¹¹⁹ Indigenous Peoples have unique cultural and spiritual ties to their ancestral lands and special rights articulated in the UN Declaration on the Rights of Indigenous Peoples.¹²⁰ Companies must recognize the special status of Indigenous Peoples and take special care to respect FPIC if mining activities impact indigenous lands and communities.

Participating in conflict-free minerals certification schemes. Illegal small-scale mining can fuel illicit financial flows (IFFs), which can in turn fund armed conflict. Legislation, including Section 1502 of the Dodd Frank Act in the United States and the EU Accounting and Transparency Directives in Europe, require companies to verify that their raw materials are not sourced from conflict zones. The international community, in partnership with companies and civil society, has devised various schemes to certify minerals and metals – these include, among others, the Kimberley Process Certification Scheme for diamonds and the Conflict-Free Tin Initiative. The power of these initiatives depends on the extent of their adoption. Mining companies have a role to play by implementing supply chain reviews for conflict mineral use.

Collaborate and leverage

Peace and transparency requires a multi-stakeholder approach. There are a number of initiatives underway that focus broadly on transparency.

Spearheading transparency. The ongoing work of the Extractive Industries Transparency Initiative (EITI), Publish What You Pay (PWYP), and major efforts from NGOs such as Oxfam, Transparency International, Global Witness and the Natural Resource Governance Institute (NRGI) are highlighting the importance of financial reporting for mining. Transparency International’s 2012 report analyzing the corporate reporting for the 105 largest multinationals found that the best-performing sector was the extractive industries. Mining companies occupied the second, third and fourth spots, and six of the top ten; no other industry sector came close. However, while mining performed well in anti-corruption programmes and organizational structure, its performance in the third category (country-by-country reporting), though favourable compared to ratings of multinationals in other sectors, was still poor. A new report in 2014 showed that country-by-country reporting was still holding the mining industry back.¹²¹ Companies can consider making their contracts and project financial information – including costing of services and intercompany payments – public. These efforts contribute to the country’s development by preventing illicit financial flows and deterring extortion.

Promote the rule of law. Companies can promote the rule of law and good governance in the countries and communities where they work by respecting and complying with existing legal

frameworks and collaborating with government. Governments need to have good laws, institutions and processes in place to ensure accountability, stability, equality and access to justice for all. This ultimately leads to respect for human rights and the environment and stability for business, knowing that all rights are respected and protected. The UN Global Compact has developed a guide for how business can promote the rule of law through core business, public policy engagement and collective action.¹²²

Case studies and initiatives

Country-wide mining CSR guidelines: China. The Chinese Chamber of Commerce of Metals, Minerals, and Chemicals Importers and Exporters (CCC MC) released its “Guidelines for Social Responsibility in Outbound Mining Operations” in 2014. CCC MC is one of the largest Chinese industry associations in this field with more than 6,000 member companies covering metals, minerals, oil and oil products, chemicals, hardware, construction materials and ceramic sanitary ware. The guidelines contain standards for labour, environmental protection, supply chain due diligence, community engagement and human rights, based on internationally recognized standards, and have been prepared in cooperation with various international organizations including GIZ, the OECD, UNDP, World Bank, WWF and Global Witness.¹²³ Implementation of the guidelines will be voluntary, but CCC MC is seeking to support Chinese mining enterprises with a range of measures from awareness-raising to capacity development, and with monitoring and evaluation of their social responsibility performance. The guidelines represent a commitment of industry leaders in China in line with government policy to improve the social responsibility of Chinese enterprises abroad.



Newmont's complaints and grievances registers help the company to address stakeholder concerns in a timely and effective manner to avoid conflict and build trust (Credit: Newmont)

Human rights assessments: Ghana. As part of its impact assessments at its Ahafo mine in Ghana, Newmont conducted extensive stakeholder consultation and mapped potential human rights concerns. According to ICMM, these included the effects of the potential loss of agricultural land on communities' livelihoods, the displacement and resettlement of homes, the potential for spread of infectious diseases, and the differential impacts on vulnerable people. Newmont now uses Fund for Peace's Conflict Assessment Systems Tool to identify human rights risks.¹²⁴

Selected resources

- Business for Social Responsibility 2013. Conducting and effective Human Rights Impact Assessment. [Conducting an Effective Human Rights Assessment](#)
- Global Witness 2015. [Oil, Gas and Mining](#)
- Extractive Industries Transparency Initiative (EITI) 2015. [Progress Report 2015](#)
- International Council on Mining and Metals 2010. [Good Practice Guide: Indigenous Peoples and Mining](#)
- International Council on Mining and Metals 2012. [Human Rights in the Mining and Metals Industry](#)
- Initiative for Responsible Mining Assurance (IRMA) 2015. [ResponsibleMining.net](#)
- Natural Resource Governance Institute 2013. [Resource Governance Index](#)
- Natural Resource Governance Institute 2014. [Natural Resource Charter - 2nd Edition](#)
- Oxfam 2015. [Community Consent Index](#)
- Publish What you Pay (PWYP) 2015. [PWYP.org](#)
- Shift Project 2015. Business and Human Rights. [ShiftProject.org](#)
- UN Office of the High Commissioner on Human Rights 2011. [Guiding Principles on Business and Human Rights](#)
- UN Declaration on the Rights of Indigenous Peoples 2008. [UNDRIP](#)

SDG17: Partnerships for the Goals – Strengthen the means of implementation and revitalize the global partnership for sustainable development

Advancing the sustainable development agenda requires substantial and on-going partnerships between governments, the private sector and civil society. The UN is calling for urgent and immediate action to mobilize the transformative power of private resources to deliver on sustainable development objectives. Long-term investments by the private and public sectors are needed in critical areas such as sustainable energy, infrastructure, transport and information and communications technologies. The public sector will need to set clear parameters for this investment and provide the monitoring frameworks, regulations and incentive structures needed to leverage sustainable outcomes.¹²⁵

According to the World Bank, implementing the SDGs will require trillions of dollars.¹²⁶ Sustainable development will not depend on social investment or corporate responsibility writ large, but on existing business activities and markets being better aligned with sustainable development objectives and on new markets developing where sustainable development is the core business. Whether through paying a reasonable and fair share of the taxes they owe in the jurisdictions where they operate, deploying environmentally sound technologies in their operations, employing people and inducing broader economic activity or in partnering with governments in shared infrastructure arrangements or public-private partnerships (PPPs), mining companies have a role to play. As demonstrated in the case studies and resources noted throughout the Atlas, the mining industry, with its extensive global footprint, sometimes in the most remote and poorest regions, has significant experience partnering with community, regional, national and international actors.

Key UN SDG17 targets relevant for mining

- 17.1 Strengthen **domestic resource mobilization**, including through international support to developing countries, to improve domestic **capacity for tax and other revenue collection**.
- 17.7 Promote the **development, transfer, dissemination and diffusion of environmentally sound technologies** to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed.
- 17.15 **Respect each country's policy space** and leadership to establish and implement policies for poverty eradication and sustainable development.
- 17.17 Encourage and promote effective **public, public-private and civil society partnerships** building on the experience and resourcing strategies of partnerships.
- 17.18 By 2020, enhance capacity-building support to developing countries, to increase significantly the availability of **high-quality, timely and reliable data disaggregated** by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other relevant characteristics.



Integrate SDG17 into core business

Transparently mobilizing resources. SDG1 (No Poverty) and SDG16 (Peace, Justice and Strong Institutions) highlight company responsibilities to pay their fair share of taxes and promote transparency in the flow of mining revenues between the private sector and states. Companies can take a step further and proactively collaborate with governments to improve institutional capabilities to track, collect and administer taxes and other mining revenues. Companies can support existing initiatives, contribute to training, share employee expertise or promote the sharing of lessons learned through programme replication and communication. Understanding the challenges in resource mobilization in host countries is the first step along with identifying existing programmes and partners.

Transferring innovative and environmentally sound technologies. SDG9 (Industry, Innovation, and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG13 (Climate Action) present opportunities for the mining industry to collaborate and innovate around new technologies for improving production efficiency, reducing emissions and lowering the energy and overall environmental footprint. When allocating investments and resources to innovation and technology development, companies can consider not only just the benefits to the business, but also how the programmes can be structured to share beneficial technologies with other sectors and society in general. Partnerships with other companies, academia and public institutions are the recommended mechanism for facilitating this transfer of knowledge and technology. Partnerships can be mission-based or take the form of joint ventures.

Sharing geo-data. One unique way mining companies can support capacity building is by sharing unused scientific data with governments. As development banks fund acquisition of geological data to simultaneously incentivize exploration and put governments on more equal technical footing in resource contract negotiations, mining companies have an opportunity to contribute information they have collected, but for which they have little use. The International Mining for Development Centre (IM4DC) states that “for many African countries, the extent of geo-data transferal from industry to government is variable and company geo-data is largely missing from the geological infrastructure. When a company ceases activity on a permit, if the datasets they have acquired during exploration are not transferred to the government custodians of geoscientific data, this represents a missed opportunity for growing the national archive.”¹²⁷ The cost of transferring unused exploration data to governments is low, and willingness to transfer can facilitate an attitude of trust and partnership. Companies can also collaborate with government to build the systems and institutions required to receive and manage the geo-data.

Collaborate and leverage

Each of the previous SDG chapters present a number of examples of current and potential opportunities for encouraging and promoting effective public, public-private and civil society partnerships. Below are some approaches and tactics that companies can use to engage at the local, regional, national and international levels to identify opportunities, spur action and leverage resources to achieve the SDGs.

- **Participate in dialogues.** Participate in structured dialogues at country level with governments, civil society and development partners on the role of the mining industry in national sustainable development strategies.
- **Strengthen coordination between initiatives.** Identify and build mechanisms to strengthen coordination, synergies, and collaboration between global, regional, and local level initiatives that focus on mining and sustainable development. This might include adapting global expertise and tools to local realities to support local action.
- **Incorporate SDGs into policies.** Collaborate to provide common industry perspectives to governments and policy makers on how to incorporate the SDGs into mining regulations, policies and frameworks including recommendations for improvements.

- **Apply the SDG indicators.** Come together with government and other stakeholders to determine how to apply the forthcoming SDG indicator framework to the mining industry.
- **Advocate for improved coordination and response.** The role of the mining industry in organizing and advocating for the response to the West African Ebola crisis is an excellent example of how companies can leverage resources. (See SDG3 – Good Health and Well-Being case studies section.)

Case studies and initiatives

Malaria development impact bond (DIB): Mozambique. Mozambique's former health minister called malaria the single largest health problem facing the country. In some areas of the country, 90% of children under five are infected.¹²⁸ Dalberg Global Development Advisors partnered with Anglo American, restaurant chain Nando's, The Coca Cola Foundation and the Ministry of Health of Mozambique to do something about it. They set up the Mozambique Malaria Performance Bond, a DIB in which socially minded investors provide the up-front capital for covering 90% of the population with long-lasting insecticidal nets (LLINs) and 85% with indoor residual spraying (IRS) and are paid for their performance. If the programme reduces malaria incidence by at least 30% after three years, the programme administrators (including Anglo American, which stands to benefit greatly from a workforce less impacted by malaria) repay investor capital plus 5% interest; if not, investors receive 50% of their initial investment back, with no further commitments to the programme.¹²⁹ This type of DIB, while in initial phases, harnesses private sector incentives, accountability and efficiency to target a major health problem.

The Billion Dollar Map: Africa. In 2014, after investing over \$200 million in acquisition of high-quality geological data in Africa over the preceding ten years, the World Bank announced its plan to build a "Billion Dollar Map," a series of comprehensive, high-quality geological maps that will incentivize mining investment in Africa and provide governments, companies and investors with more accurate information for decision-making. According to the World Bank, who is partnering with the Australian Mineral Industry Research Association, Centre for Exploration Targeting at the University of Western Australia and the International Mining for Development Centre to gather the geo-data to assemble the map, "the potential investment that publicly available geo-data could mobilize for many countries in Africa would far exceed revenue they now receive in development assistance. Under sound, transparent, and accountable management, this investment can lead to local job creation, along with revenues to government that translate into programs in health and education, among others, that help reduce poverty and boost shared prosperity."^{130, 131}

The Extractive Industries Transparency Initiative. The EITI is a successful example of multi-stakeholder collaboration. It is a global standard for the governance of a country's oil, gas and mineral resources. The standard is implemented by governments in collaboration with companies and civil society. Countries implementing EITI disclose information on tax payments, licenses, contracts, production and other key elements around resource extraction. Publicly available information improves the debate about the management of and use of a country's natural resources. 49 countries currently implement EITI, representing \$1.7 trillion in government revenues disclosed.¹³²

Selected resources

- Devonshire Initiative 2015. DevonshireInitiative.org
- International Monetary Fund and World Bank 2015. [From Billions to Trillions: Transforming Development Finance](#)
- United Nations Global Compact 2015. [Business Partnership Resources](#)
- World Economic Forum 2015. [Responsible Mineral Development Initiative \(RMDI\)](#)

CONCLUSION

Many companies in the mining industry are already doing much of the work shared in the Atlas. There is a wealth of knowledge, thought and action already underway across the industry that can be leveraged to support the achievement of the Sustainable Development Goals. The SDGs offer opportunities for companies not only to focus inward on their own operations and metrics, but also outward, by participating in ongoing discussion with industry and its stakeholders on contributing to sustainable development. Currently, the UN and national governments are designing country-level dialogues on how to move the SDG agenda forward with the mining, oil and gas sectors. These efforts will offer opportunities for companies to share work already underway and identify new opportunities for collaboration and innovation. Dialogue across sectors will ensure that best practices are shared and the potential contribution of the mining industry fully leveraged for sustainable development.

ACKNOWLEDGEMENTS

The following people are thanked for their instrumental roles in bringing this work to fruition. In addition, the core project team extends its thanks to the 60+ experts who participated in interviews and reviewed earlier versions of the report.

Core Atlas team

Brandon Lewis, Lead Author, Mining and Metals Research Fellow, World Economic Forum, Switzerland

Sharon Flynn, Contributing Author, Industry Fellow, Centre for Social Responsibility in Mining, Sustainable Mining Institute, University of Queensland & Principal, Artara Consulting, United States

Gillian Davidson, Lead Sponsor and Editor, Head of Mining and Metals Industry, World Economic Forum, Switzerland

Lisa Sachs, Lead Sponsor and Editor, Director, Columbia Center on Sustainable Investment, United States

Casper Sonesson, Lead Sponsor and Editor, Deputy Director, Private Sector, United Nations Development Programme, United States

Nicolas Maennling, Reviewer and Contributor Senior Economics and Policy Researcher, Columbia Center on Sustainable Investment, United States

Perrine Toledano, Reviewer and Contributor, Head of Extractive Industries, Columbia Center on Sustainable Investment, United States

Sofi Halling, Reviewer and Contributor, Policy Analyst, Extractive Industries, United Nations Development Programme, United States

Lauren Barredo, Reviewer and Contributor, Manager, Sustainable Development Solutions Network, United States

Ben Peachey, Editor, Communications Specialist, Ecotonic, United Kingdom

Special contributors and reviewers

Charles Akong, Economic Affairs Officer, African Minerals Development Centre / United Nations Economic Commission for Africa, Ethiopia

John Atherton, Director, Materials Stewardship, International Council on Mining and Metals, United Kingdom

Britt Banks, Executive Director, Getches-Wilkinson Center for Natural Resources, Energy and the Environment, University of Colorado Law School, United States

Ana Elizabeth Bastida, Senior Lecturer, Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee, United Kingdom / Universidad Catolica de Cuyo, San Juan, Argentina

Morten Blomqvist, Senior Policy Advisor, IBIS, Denmark

Andrew M. Cheatle, Executive Director, Prospectors & Developers Association of Canada (PDAC), Canada

Aidan Davy, Deputy President, International Council on Mining and Metals, United Kingdom

Stephen D'Esposito, President, RESOLVE, United States

James Ensor, Group Social Policy Lead, BHP Billiton, Australia

Daniel Franks, Chief Technical Advisor & Programme Manager, ACP-EU Development Minerals Programme, United Nations Development Programme, Belgium

Ross Hamilton, Director, Environment and Climate Change, International Council on Mining and Metals, United Kingdom

Mark Holmes, Manager, Health and Safety, International Council on Mining and Metals, United Kingdom

Andrew Hudson, Head, Water and Ocean Governance Programme, Bureau for Policy and Programme Support, United Nations Development Programme, United States

Laurence Klein, Programme Specialist Indigenous Participation, Governance and Peacebuilding, United Nations Development Programme, United States

Alan Knight, General Manager of Corporate Responsibility, ArcelorMittal, United Kingdom

Linda Krueger, Senior Advisor, Global Lands, The Nature Conservancy, United States

Huguette Labelle, Former Chair Transparency International 2005-2014, Canada

Bernice Lee, Director, Climate Change and Resources Initiative, World Economic Forum, Switzerland

Kristian Lempa, Senior Advisor and Team Leader, Resources and Development / GIZ, Germany

Julia Mensah, Consultant, Governance for Extractive Industries, World Bank, United States

Bruce McKenney, Director, Development by Design, The Nature Conservancy, United States

Marcio Senne de Moraes, External Affairs Director, Vale, Switzerland

Jane Nelson, Director, Corporate Social Responsibility Initiative, Harvard Kennedy School, United States

Marcelle Shoop, Principal, MfSA Consulting, United States

Michael Solomon, Chairman, Mineral Economics Committee, South African Institute of Mining and Metallurgy, South Africa

Ros Taplin, Research Director, Australian Centre for Sustainable Mining Practices, Australia

John F.H. Thompson, Wold Professor, Cornell University and PetraScience Consultants, United States

Francesca Viliani, Public Health Director, International SOS, Denmark

ENDNOTES

- ¹ <http://www.icmm.com/document/8264>
- ² <http://www.icmm.com/document/8264>
- ³ <https://sustainabledevelopment.un.org/post2015/transformingourworld>
- ⁴ <http://commdev.org/establishing-foundations-to-deliver-community-investment/>
- ⁵ <https://www.icmm.com/document/3716>
- ⁶ <http://www.iied.org/mining-minerals-sustainable-development-mmsd>
- ⁷ <http://www.weforum.org/projects/responsible-mineral-development-initiative>
- ⁸ <http://www.un.org/sustainabledevelopment/poverty/>
- ⁹ <http://www.bhpbilliton.com/~media/12d7d9572f1042a4b6cdb0bd7abe5c09.ashx>
- ¹⁰ http://www.tfocanada.ca/docs.php?page=5_5&chapid=12
- ¹¹ <https://www.csr.uq.edu.au/publications/land-access-resettlement-planning-at-la-granja>
- ¹² <http://www.un.org/sustainabledevelopment/hunger/>
- ¹³ <http://www.sciencedirect.com/science/article/pii/S0375674214000119>
- ¹⁴ <http://barrickbeyondborders.com/people/2008/10/from-subsistence-farming-to-agribusiness-the-cuncashca-story/>
- ¹⁵ <http://www.zincsavestives.com/>
- ¹⁶ <http://ccsi.columbia.edu/files/2014/05/CCSI-Policy-Paper-Leveraging-Mining-Related-Water-Infrastructure-for-Development-March-20141.pdf>
- ¹⁷ <http://www.un.org/sustainabledevelopment/health/>
- ¹⁸ <http://www.ncbi.nlm.nih.gov/pubmed/26231573>
- ¹⁹ <http://www.ncbi.nlm.nih.gov/pubmed/26231573>
- ²⁰ <http://www.ncbi.nlm.nih.gov/pubmed/26231573>
- ²¹ <http://www.acrrmh.com.au/assets/Uploads/This-Place-...-Brochure.pdf>
- ²² http://www.health.harvard.edu/newsletter_article/mental-illness-and-violence
- ²³ ²³ <http://www.acrrmh.com.au/assets/Uploads/This-Place-...-Brochure.pdf>
- ²⁴ <http://www.miningaustralia.com.au/Features/Healthy-mining-minds>
- ²⁵ <https://www.epsmg.com/media/6220/epsmg-being-clever-by-being-simple-final-june-2015.pdf>
- ²⁶ <http://blogs.worldbank.org/health/better-health-mines-and-mining-communities-shared-responsibility>
- ²⁷ <http://www.worldbank.org/en/news/feature/2014/03/24/southern-africa-tackles-tuberculosis-in-the-mining-industry>
- ²⁸ <http://www.un.org/sustainabledevelopment/education/>
- ²⁹ <http://www.extractivedialogue.com/wp-content/uploads/2014/12/extractiveEconomies.pdf>
- ³⁰ <http://www.giz.de/expertise/downloads/giz2013-en-ppsi-sierra-leone-london-mining.pdf>
- ³¹ <http://www.mmg.com/en/Careers/Vocational-pathways/Indigenous-and-host-communities-employment-and-training.aspx>
- ³² <http://www.un.org/sustainabledevelopment/gender-equality/>
- ³³ <http://www.pwc.co.uk/mining/publications/mining-for-talent-2014.jhtml>
- ³⁴ <http://www.abc.net.au/news/2014-11-28/research-shows-growing-gender-pay-gap-in-mining/5925148>
- ³⁵ <http://policy-practice.oxfam.org.uk/publications/women-communities-and-mining-the-gender-impacts-of-mining-and-the-role-of-gende-293093>
- ³⁶ http://www.ifc.org/wps/wcm/connect/5a4e740048855591b724f76a6515bb18/PartOne_StakeholderConsultation.pdf?MOD=AJPERES
- ³⁷ https://www.thiess.com/files/files/Mining_HR_Women%20in%20Mining_v11.pdf
- ³⁸ <http://www.justmeans.com/blog/the-changing-face-of-engineering>
- ³⁹ http://www.riotinto.com/documents/ReportsPublications/Rio_Tinto_gender_guide.pdf
- ⁴⁰ <http://www.un.org/sustainabledevelopment/water-and-sanitation/>
- ⁴¹ <http://www.icmm.com/document/8615>
- ⁴² <http://www.icmm.com/publications/water-management-guide>
- ⁴³ http://www.unwater.org/downloads/Water_facts_and_trends.pdf
- ⁴⁴ ⁴⁴ <http://ccsi.columbia.edu/files/2014/05/CCSI-Policy-Paper-Leveraging-Mining-Related-Water-Infrastructure-for-Development-March-20141.pdf>
- ⁴⁵ <http://www.un.org/sustainabledevelopment/energy/>
- ⁴⁶ http://www.schneider-electric.com/solutions/za/en/med/166195567/application/pdf/2165_production_energy_optimization_in_mining_world.pdf
- ⁴⁷ <https://www.nrcan.gc.ca/mining-materials/green-mining/8218>
- ⁴⁸ <http://www.miningweekly.com/article/canadas-first-quantum-minerals-to-lay-off-1-480-workers-in-zambia-2015-08-03>

- ⁴⁹ http://www.cleanenergyministerial.org/Portals/2/pdfs/GSEP_EMWG_New-Gold_case-study.pdf
- ⁵⁰ <http://www.ceecthefuture.org/wp-content/uploads/2013/01/Improving-Energy-Efficiency-in-Barrick-Grinding-Circuits3.pdf?dl=1>
- ⁵¹ <http://www.theage.com.au/news/business/lihir-gold-turns-green-as-it-bubbles-up/2007/04/09/1175971018447.html>
- ⁵² http://www.glencore.com/assets/sustainability/doc/sd_reports/2014-Sustainability-Report-regional-material-issues.pdf
- ⁵³ <http://www.un.org/sustainabledevelopment/economic-growth/>
- ⁵⁴ <https://www.pwc.com/gx/en/mining/school-of-mines/2012/pwc-realizing-the-value-of-your-project-economic-impact-analysis.pdf>
- ⁵⁵ <https://www.icmm.com/document/4440>
- ⁵⁶ <https://sharedvalue.org/groups/bhp-billiton-and-codelco-foster-innovation-supply-chain>
- ⁵⁷ <http://www.bhpbilliton.com/~media/bhp/documents/investors/reports/2014/bhpbillitonourcontribution2014.pdf>
- ⁵⁸ <http://www.ewb.ca/sites/default/files/ewb-msv-kumtor-gold-local-procurement-case-study-jan2015-ENG.pdf>
- ⁵⁹ <http://www.un.org/sustainabledevelopment/infrastructure-industrialization/>
- ⁶⁰ http://unctad.xiii.org/en/SessionDocument/suc2012d1_en.pdf
- ⁶¹ <http://southafrica.angloamerican.com/our-difference/zimele-enterprise-development.aspx>
- ⁶² <http://ccsi.columbia.edu/files/2014/05/CCI-Policy-Paper-Leveraging-Mining-Related-ICT-Infrastructure-for-Development-June-20141.pdf>
- ⁶³ http://ccsi.columbia.edu/files/2014/05/Case-Study_Mozambique-March-2014.pdf
- ⁶⁴ <http://venturesafrica.com/diamonds-are-botswanas-best-friend/>
- ⁶⁵ <http://www.un.org/sustainabledevelopment/inequality/>
- ⁶⁶ http://www.hks.harvard.edu/m-rcbg/CSRI/research/Costs%20of%20Conflict_Davis%20%20Franks.pdf
- ⁶⁷ <http://ftp.iza.org/dp7226.pdf>
- ⁶⁸ http://www.economist.com/news/americas/21600682-economic-success-cannot-indefinitely-co-exist-political-weakness-perus-italian-job?fsrc=scn/tw_ec/peru_s_italian_job
- ⁶⁹ <http://www.extractivedialogue.com/wp-content/uploads/2014/12/PromotingHumanRights.pdf>
- ⁷⁰ <http://www.icmm.com/document/8264>
- ⁷¹ <https://www.icmm.com/document/1841>
- ⁷² <https://www.thiess.com/news/2011/thiess-women-in-hard-hats-wins-award>
- ⁷³ <http://www.un.org/sustainabledevelopment/cities/>
- ⁷⁴ http://www.citiesalliance.org/sites/citiesalliance.org/files/su-up-close_0.pdf
- ⁷⁵ http://www.citiesalliance.org/sites/citiesalliance.org/files/su-up-close_0.pdf
- ⁷⁶ <https://www.kth.se/social/upload/4ea9a52cf27654531a000026/Brunner%202011.pdf>
- ⁷⁷ <http://www.elfm.eu/en/CTCConcept.aspx>
- ⁷⁸ <http://www.triplepundit.com/2011/09/belgian-company-leads-landfill-mining/>
- ⁷⁹ <http://www.ft.com/intl/cms/s/0/a91f0448-ffbe-11e4-bc30-00144feabdc0.html#axzz3i89P8GoZ>
- ⁸⁰ <http://www.edenproject.com/eden-story>
- ⁸¹ <http://weburbanist.com/2015/02/11/rocky-ruins-reclaimed-mining-facilities-transformed/>
- ⁸² <http://www.miningfacts.org/environment/what-happens-to-mine-sites-after-a-mine-is-closed/>
- ⁸³ <http://www.un.org/sustainabledevelopment/sustainable-consumption-production/>
- ⁸⁴ “Maximising Value, Guidance on Implementing Materials Stewardship in the Minerals and Metals Value Chain,” ICMM 2010
- ⁸⁵ See, ICMM publications, “*Minerals and Metals Management 2020*”; and “*Minerals and Metals Management 2020 Status report 2015*.”
- ⁸⁶ http://www.parl.gc.ca/Content/HOC/Committee/412/FINA/WebDoc/WD6615327/412_FINA_PBC2014_Briefs%5CCanadaMiningInnovationCouncil-e.pdf
- ⁸⁷ <http://www.nrcan.gc.ca/mining-materials/extraction-innovation/8177>
- ⁸⁸ <http://www.un.org/sustainabledevelopment/climate-change-2/>
- ⁸⁹ http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf
- ⁹⁰ <http://theconversation.com/mining-companies-are-underprepared-for-climate-change-13091>
- ⁹¹ <http://theconversation.com/mining-companies-are-underprepared-for-climate-change-13091>
- ⁹² <http://www.iea.org/newsroomandevents/pressreleases/2014/october/iea-hails-historic-launch-of-carbon-capture-and-storage-project.html>
- ⁹³ <http://blogs.worldbank.org/climatechange/testing-carbon-pricing-brazil-20-companies-join-innovative-simulation>
- ⁹⁴ <http://m.corporate.arcelormittal.com/news-and-media/news/2015/july/13-07-2015>
- ⁹⁵ <https://www.cdp.net/en-US/WhatWeDo/Pages/case-study-gold-fields.aspx>
- ⁹⁶ <http://www.mining.com/canada-launches-1-25bn-large-scale-carbon-capture-and-storage-plant-35547/>
- ⁹⁷ <http://www.bloombergvew.com/articles/2015-06-01/even-big-oil-wants-a-carbon-tax>

⁹⁸ <http://www.bhpbilliton.com/society/climate-change>

⁹⁹ <http://www.un.org/sustainabledevelopment/oceans/>

¹⁰⁰ <http://technology.infomine.com/enviromine/ard/case%20studies/britannia.htm>

¹⁰¹ <http://unchronicle.un.org/article/sustainable-exploitation-ocean-s-minerals-and-resources/>

¹⁰² <http://www.imo.org/en/OurWork/Environment/LCLP/minetailings/Documents/Mine%20Tailings%20Marine%20and%20Riverine%20Disposal%20Final%20for%20Web.pdf>

¹⁰³ <http://www.total.com/sites/default/files/atoms/file/total-milieu-marin-vgb-04>

¹⁰⁴ <http://www.forbes.com/sites/francisvorhies/2014/11/14/whats-a-gas-company-from-yemen-doing-at-a-parks-congress-in-australia/>

¹⁰⁵ <http://v-c-a.org/areas/ye/balhaf>

¹⁰⁶ <http://www.un.org/sustainabledevelopment/biodiversity>

¹⁰⁷ Cross-Sector Biodiversity Initiative (CSBI) has published a helpful “Cross-Sector Guide for Implementing the Mitigation Hierarchy”, October 2015.

¹⁰⁸ See for example: http://bbop.forest-trends.org/pages/mitigation_hierarchy

¹⁰⁹ Id. at 8.

¹¹⁰ IFC PS6 imposes a ‘net gain’ for ‘Critical Habitat’ and, where feasible, ‘no net loss’ for ‘Natural Habitat’.

¹¹¹ <http://bgis.sanbi.org/Mining/project.asp>

¹¹² <http://www.conservation.org/partners/Pages/bhp-billiton.aspx>

¹¹³ <http://www.bhpbilliton.com/society/communitynews/Valdivian-Coastal-Reserve>

¹¹⁴ http://www.riotinto.com/documents/ReportsPublications/MDG_Biodiversityoffsets.pdf

¹¹⁵ <http://www.teck.com/news/stories/2013/sheep-sharing--teck-transplants-bighorn-sheep-across-north-america>

¹¹⁶ <http://www.un.org/sustainabledevelopment/peace-justice>

¹¹⁷ http://www.hks.harvard.edu/m-rcbg/CSRI/research/Costs%20of%20Conflict_Davis%20%20Franks.pdf

¹¹⁸ https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/bp207-community-consent-index-230715-en.pdf

¹¹⁹ <http://commdev.org/wp-content/uploads/2015/06/ICMM-Indigenous-Peoples-and-Mining-Position-Statement.pdf>

¹²⁰ http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf

¹²¹ http://www.transparency.org/whatwedo/publication/transparency_in_corporate_reporting_assessing_worlds_largest_companies_2014

¹²² <https://www.unglobalcompact.org/library/1341>

¹²³ <https://www.globalwitness.org/archive/new-chinese-guidelines-offer-mineral-companies-chance-reduce-conflict-corruption-risks-and-0/>

¹²⁴ <http://www.icmm.com/document/3308>

¹²⁵ <http://www.un.org/sustainabledevelopment/globalpartnerships/>

¹²⁶ <http://www.imf.org/external/pubs/ft/survey/so/2015/new041915a.htm>

¹²⁷ http://im4dc.org/wp-content/uploads/2015/04/Harris_Miller_IM4DC_CompanyGeodata_Completed-Report.pdf

¹²⁸ <http://www.zdnet.com/article/social-impact-bonds-gear-up-for-mozambique/>

¹²⁹ <https://www.devex.com/impact/partnerships/goodbye-malaria-mozambique-malaria-performance-bond-362>

¹³⁰ http://im4dc.org/wp-content/uploads/2015/04/Harris_Miller_IM4DC_CompanyGeodata_Completed-Report.pdf

¹³¹ <http://im4dc.org/world-bank-launches-billion-dollar-map/>

¹³² <https://eiti.org/>



COMMITTED TO
IMPROVING THE STATE
OF THE WORLD

The World Economic Forum, committed to improving the state of the world, is the International Organization for Public-Private Cooperation.

The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas.

World Economic Forum
91–93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel.: +41 (0) 22 869 1212
Fax: +41 (0) 22 786 2744

contact@weforum.org
www.weforum.org