Columbia Center on Sustainable Investment
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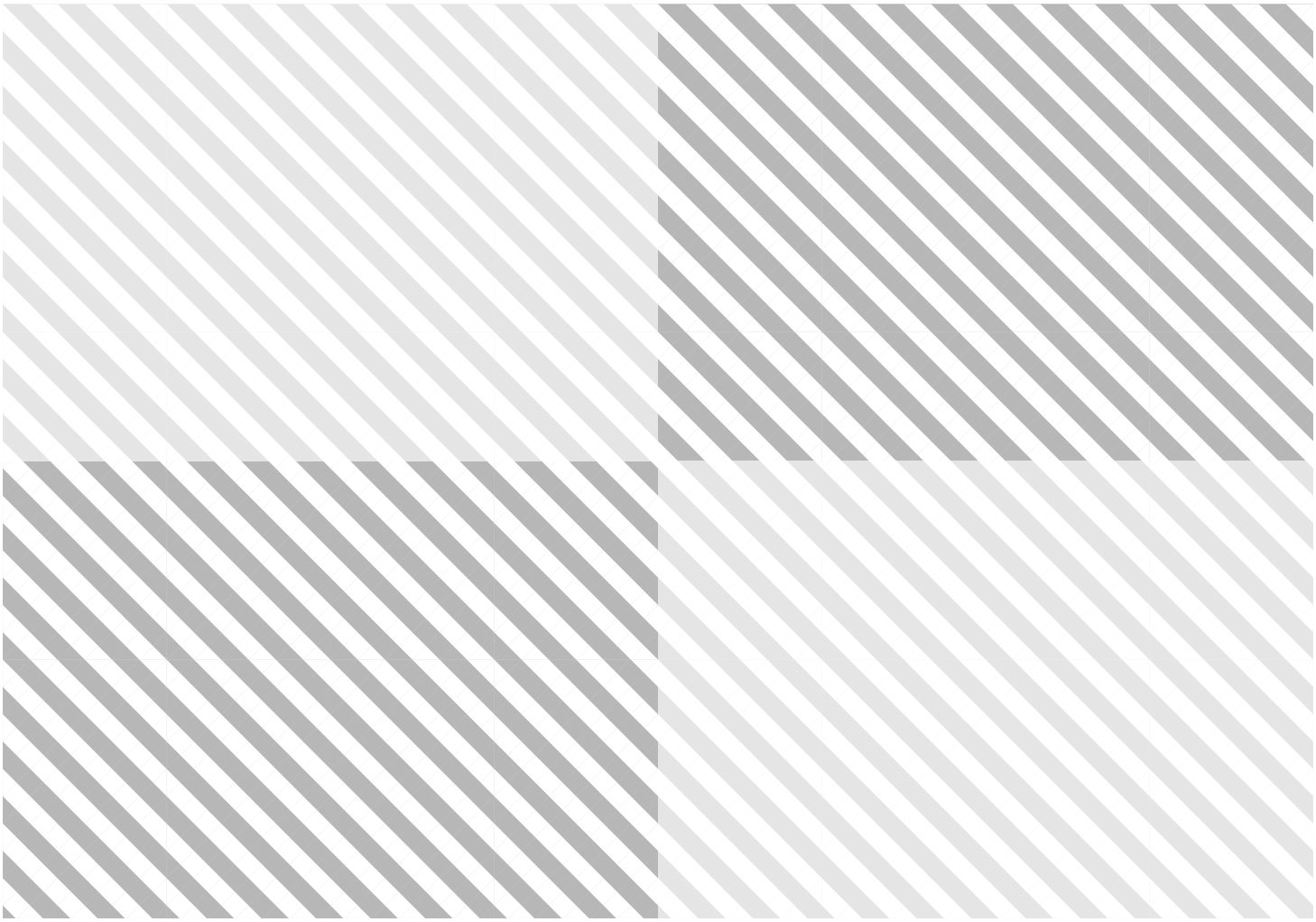
White Paper

Mapping Mining to the Sustainable Development Goals: An Atlas

July 2016



About the Columbia Center on Sustainable Investment

The Columbia Center on Sustainable Investment (CCSI), a joint center of Columbia Law School and the Earth Institute at Columbia University, is the only university-based applied research center and forum dedicated to the study, practice, and discussion of sustainable international investment worldwide. Its mission is to develop practical approaches for governments, investors, communities, and other stakeholders to maximize the benefits of international investment for sustainable development.

About the UNDP

UNDP partners with people at all levels of society to help build nations that can withstand crisis, and drive and sustain the kind of growth that improves the quality of life for everyone. On the ground in more than 170 countries and territories, we offer global perspective and local insight to help empower lives and build resilient nations.

About the UN Sustainable Development Solutions Network

UN Secretary-General Ban Ki-moon launched the UN Sustainable Development Solutions Network (SDSN) to mobilize global scientific and technological expertise and to promote practical problem solving for sustainable development, including the design and implementation of the Sustainable Development Goals (SDGs). Following their adoption, the SDSN is now committed to supporting the implementation of the SDGs at local, national, and global scales. The SDSN aims to accelerate joint learning and help to overcome the compartmentalization of technical and policy work by promoting integrated approaches to the interconnected economic, social, and environmental challenges confronting the world. The SDSN works closely with United Nations agencies, multilateral financing institutions, governments, the private sector, and civil society.

About the World Economic Forum

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.

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Foreword

The 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) represent the world's plan of action for social inclusion, environmental sustainability and 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, ecologically sensitive and less-developed areas that include 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. Yet, if managed poorly, mining can also lead to environmental degradation, displaced populations, inequality and increased conflict, among other challenges.

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 ongoing partnership between governments, the private sector, communities and civil society, and we hope the Atlas spurs action that will leverage the transformative power of collaboration and partnership between the mining industry and other stakeholders. In addition to mining companies, our intention is that the Atlas 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 multistakeholder 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.
- Universities and learning institutions – as a
- Source of ideas and opportunities to convene and coordinate education, research and professional development that address mining and 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 indicator framework offers further opportunity to explore how the mining sector can align its actions and reporting.

We have incorporated comments received during the public consultation period from January to April 2016 into this final version of the Atlas. The response was overwhelmingly positive and we thank everyone who participated. Several consultation events were organized during this period, and they are listed in the "Acknowledgements" section. We reviewed every suggestion and have included as many as possible.

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.

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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 covered the period from 2000-2015. The SDGs represent the world's comprehensive plan of action for social inclusion, environmental sustainability and 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 Atlas maps the relationship between mining and the SDGs by using examples of good practice in the industry and existing knowledge and resources in sustainable development that if replicated or scaled up could make useful contributions to the SDGs. It presents a broad overview of opportunities and challenges to demonstrate the actual and potential contributions of the mining sector to the achievement of the SDGs – from exploration through production and eventually mine closure. Mining companies, their staff, management and boards are the primary audience for the Atlas. The Atlas 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
– *Multistakeholder dialogue and collaboration* towards the achievement of the SDGs

Some overall conclusions that can stimulate further debate and research include:

- ***The mining industry has the opportunity and potential to positively contribute to all 17 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. Many of the minerals produced by mining are also essential building blocks to technologies, infrastructure, energy and agriculture. 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.

- ***While the mining industry is diverse, the scope and nature of typical mining activities highlight some common opportunities to leverage and contribute to the SDGs.***

Opportunities for mining companies to positively contribute are found across all of the goals and individual companies will need to do the analysis to understand how their business can make an impact. A company's specific actions and opportunities 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.

If companies are looking for a place to start, the goals of social inclusion, environmental sustainability and economic development highlight some SDGs that might be opportunities for many mining companies:

Environmental Sustainability:
Companies typically impact land, water, the climate and the flora, fauna and people that depend on these resources:
– **SDG6 – 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.
– **SDG7 – 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.

Social Inclusion:
Mining can significantly impact local communities, bringing economic opportunities, yet also challenges to livelihoods, rights and resources:
– **SDG1 – End Poverty, SDG5 – Gender Equality** and **SDG10 – Reduced Inequalities**: Mining generates significant revenues through taxes, royalties and dividends for governments to invest in economic and social development, in addition to opportunities for jobs and business locally. Mining companies can take an inclusive approach by working with communities to understand their positive and negative impacts and to identify and expand opportunities for marginalized groups.
– **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.

Economic Development:
Mining can have a local, regional and national impact on economic development and growth that can be leveraged to build new infrastructure, new technologies and workforce opportunities.
– **SDG8 – Decent Work and Economic Growth**: Mining can change the lives of local communities, offering opportunities for jobs and training, and professional development.
– **SDG9 – Infrastructure, Innovation and Industrialization** and **SDG12 – Responsible Consumption and Production**: Mining can help drive economic development and diversification through direct and indirect economic benefits and by spurring the construction of new infrastructure for transport, communications, water and energy. Mining also provides materials critical for renewable technologies and the opportunity for companies to collaborate across the supply chain to minimize waste, and to reuse and recycle.

- ***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: Mining and the 17 SDGs. A selection of most major issue areas where mining may have an impact (positive or negative) on each of the 17 goals. Readers are referred to the individual chapters and diagrams for each goal for a detailed and more comprehensive discussion. Icons adapted from http://www.globalgoals.org/. Abbreviations: EIDs = emerging infectious diseases; OSH = occupational safety and health; TVET = technical, vocational, and educational training; CCS = carbon capture and storage; IFFs = illicit financial flows; FPIC = free, prior, and informed consent; PPPs = public-private partnerships.

Adapted from Global Goals (www.globalgoals.org)

Mining and Poverty Eradication (SDG1)

Integration into Core Business

Pay taxes and royalties
- Publicly disclose details of payments to governments
- Use arms-length rule transfer pricing

Leverage local procurement
- Develop local supplier capacity
- Strengthen local value chains

Champion Inclusive employment
- Facilitate equitable access to employment opportunities
- Offer training and apprenticeship programs

Preserve land access
- Begin land access planning early in projects
- Fully restore resettled communities

Collaboration and Leverage

- Collaborate to leverage resources for poverty alleviation
- Support non-mining livelihood options
- Broaden implementation of anti-poverty strategies via CDAs

Mining and Zero Hunger (SDG2)

Integration into Core Business

Explore synergies with agriculture
- Manage water resources transparently
- Minimize land take
- Share infrastructure benefits with agricultural community

Keep farmland pollution-free
- Conduct baseline and ongoing geochemical surveys
- Monitor water quality and soil fertility regularly

Collaboration and Leverage

- Strengthen watershed management
- Partner with the agricultural sector
- Support programs to reduce childhood malnutrition and hunger

Mining, Good Health, and Well-Being (SDG3)

Integration into Core Business

Champion occupational health and safety
- Promote workplace health
- Establish rigorous workplace health and safety monitoring and reporting
- Focus on road safety

Combat Tuberculosis and HIV/AIDS
- Reduce silica dust
- Run HIV/AIDS education, prevention and counseling programmes

Offer and encourage preventative care
- Screen for NCDs
- Provide healthy canteen food options and good hygiene protocols
- Prevent toxic emissions to the environment

Increase mental health awareness
- Approach health holistically
- Set up confidential counseling programs
- Regularly test for drug and alcohol use and abuse

Collaboration and Leverage

- Support community health programmes
- Participate in response to and recovery from epidemics
- Train community health workers
- Recognize and strengthen traditional medicinal practices

Mining and Quality Education (SDG4)

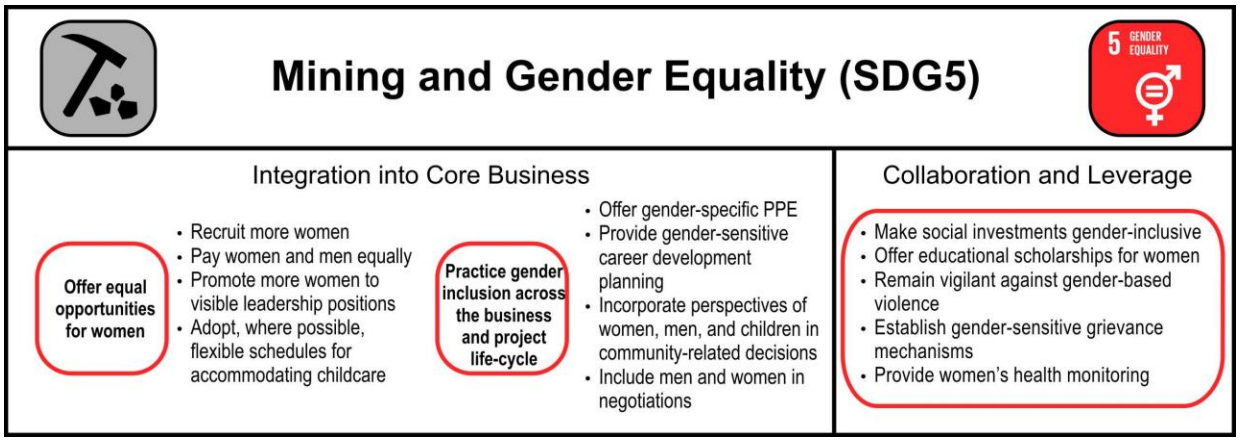
Integration into Core Business

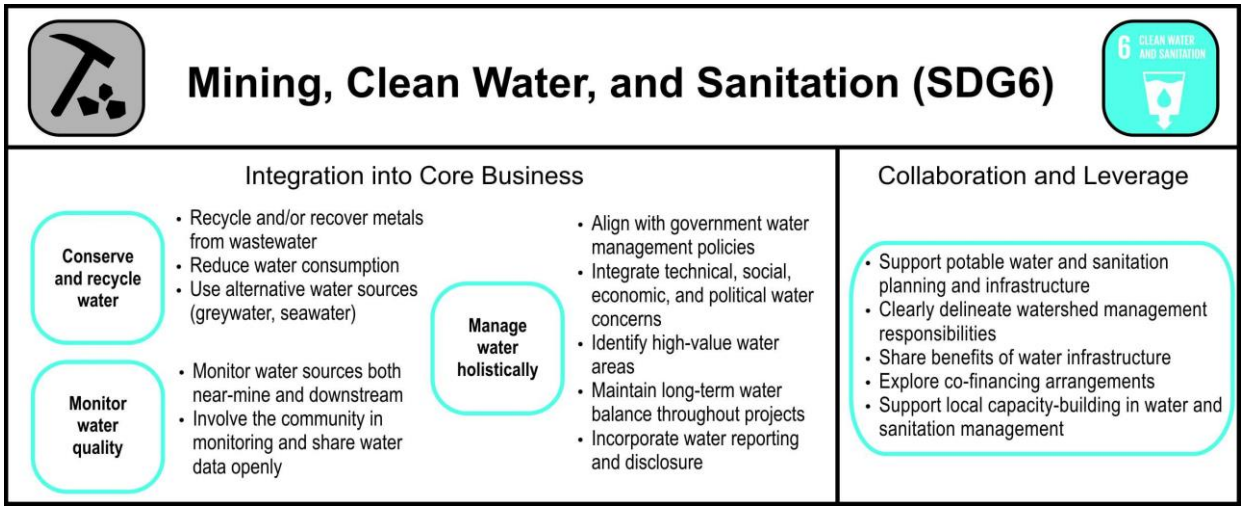
Assess and upgrade the local skills base
- Routinize skills baseline assessments and gap analyses
- Sponsor apprenticeships, scholarships, and graduate programmes

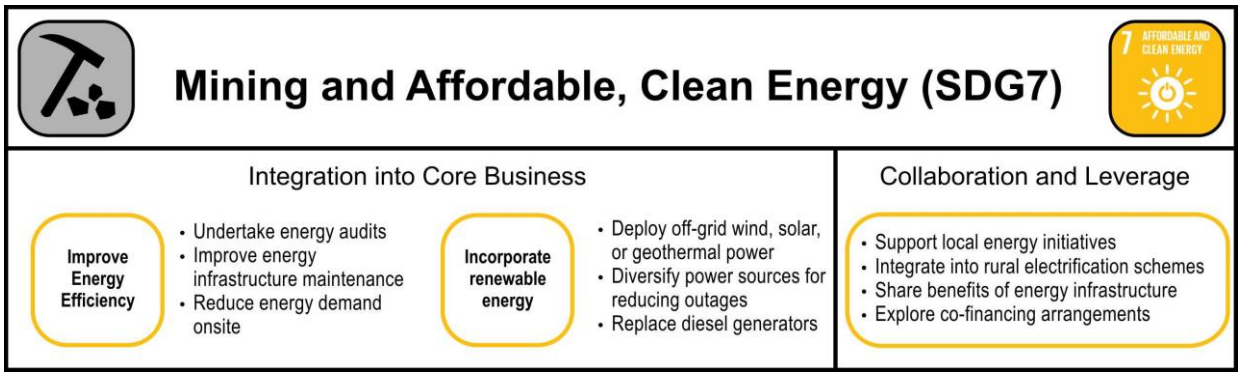
Train and educate the workforce
- Train workforce in technical and management skills
- Ensure training opportunities are made available to employees at all levels and across all backgrounds

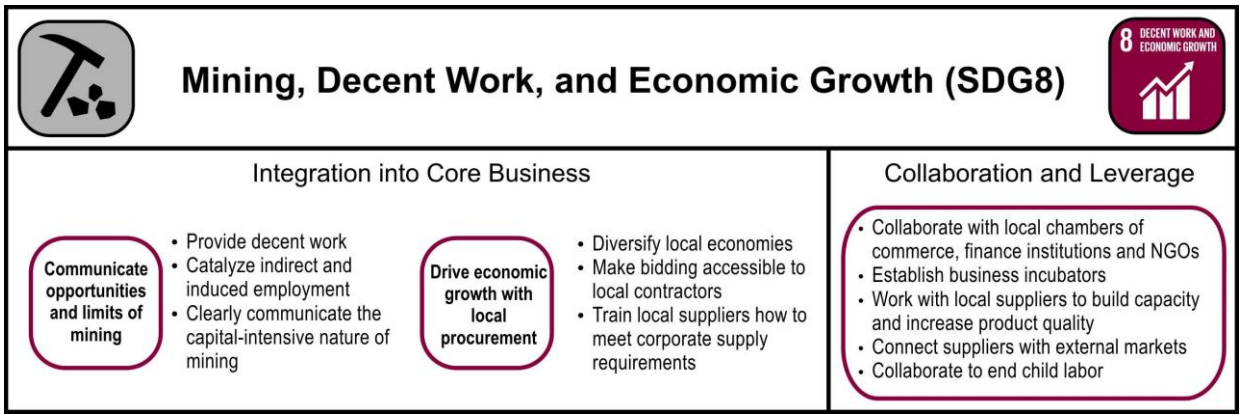
Collaboration and Leverage

- Link academic programmes with TVET
- Collaborate with universities to design curricula
- Participate in classrooms and workshops
- Work with schools to keep children in school
- Train for sustainable livelihood opportunities beyond mining


Mining and Gender Equality (SDG5)
5 GENDER EQUALITY
Integration into Core Business
Offer equal opportunities for women
• Recruit more women
• Pay women and men equally
• Promote more women to visible leadership positions
• Adopt, where possible, flexible schedules for accommodating childcare
Practice gender inclusion across the business and project life-cycle
• Offer gender-specific PPE
• Provide gender-sensitive career development planning
• Incorporate perspectives of women, men, and children in community-related decisions
• Include men and women in negotiations
Collaboration and Leverage
• Make social investments gender-inclusive
• Offer educational scholarships for women
• Remain vigilant against gender-based violence
• Establish gender-sensitive grievance mechanisms
• Provide women's health monitoring


Mining, Clean Water, and Sanitation (SDG6)
6 CLEAN WATER AND SANITATION
Integration into Core Business
Conserve and recycle water
• Recycle and/or recover metals from wastewater
• Reduce water consumption
• Use alternative water sources (greywater, seawater)
Monitor water quality
• Monitor water sources both near-mine and downstream
• Involve the community in monitoring and share water data openly
Manage water holistically
• Align with government water management policies
• Integrate technical, social, economic, and political water concerns
• Identify high-value water areas
• Maintain long-term water balance throughout projects
• Incorporate water reporting and disclosure
Collaboration and Leverage
• Support potable water and sanitation planning and infrastructure
• Clearly delineate watershed management responsibilities
• Share benefits of water infrastructure
• Explore co-financing arrangements
• Support local capacity-building in water and sanitation management


Mining and Affordable, Clean Energy (SDG7)
7 AFFORDABLE AND CLEAN ENERGY
Integration into Core Business
Improve Energy Efficiency
• Undertake energy audits
• Improve energy infrastructure maintenance
• Reduce energy demand onsite
Incorporate renewable energy
• Deploy off-grid wind, solar, or geothermal power
• Diversify power sources for reducing outages
• Replace diesel generators
Collaboration and Leverage
• Support local energy initiatives
• Integrate into rural electrification schemes
• Share benefits of energy infrastructure
• Explore co-financing arrangements


Mining, Decent Work, and Economic Growth (SDG8)
8 DECENT WORK AND ECONOMIC GROWTH
Integration into Core Business
Communicate opportunities and limits of mining
• Provide decent work
• Catalyze indirect and induced employment
• Clearly communicate the capital-intensive nature of mining
Drive economic growth with local procurement
• Diversify local economies
• Make bidding accessible to local contractors
• Train local suppliers how to meet corporate supply requirements
Collaboration and Leverage
• Collaborate with local chambers of commerce, finance institutions and NGOs
• Establish business incubators
• Work with local suppliers to build capacity and increase product quality
• Connect suppliers with external markets
• Collaborate to end child labor

Mining, Industry, Innovation, and Infrastructure (SDG9)

Integration into Core Business

Support local procurement

- Upgrade expertise of local suppliers
- Improve quality of locally produced goods
- Provide support to local suppliers to service the mine

Share Infrastructure

- Explore co-funding arrangements with governments
- Share rail, road, power, water, ICT infrastructure
- Harness economies of scale and economies of scope

Collaboration and Leverage

- Use business profile to create horizontal linkages
- Use convening power to create clusters
- Promote domestic research and development initiatives

Mining and Reduced Inequalities (SDG10)

Integration into Core Business

Anticipate inequality-related risks

- Be sensitive to local wage disparities
- Establish baseline welfare statistics before mining

Champion inclusivity

- Train, recruit and employ marginalized populations
- Include excluded groups in local procurement and supply chains

Collaboration and Leverage

- Work with local partners to target social investments to marginalized populations
- Encourage participatory budgeting in local communities, especially of mining revenues

Mining and Sustainable Cities, Communities (SDG11)

Integration into Core Business

Mine unconventional deposits

- Re-mine tailings
- Mine urban waste (urban mining)
- Pair metals recycling and waste energy reclamation

Plan land use carefully

- Plan land use with the life-of-mine in mind
- Reclaim mines into parks
- Develop cultural heritage management plans
- Anticipate unplanned urbanization

Collaboration and Leverage

- Share workforce requirements and planned operations early so local authorities can assess adequacy of local services
- Collaborate with local authorities to develop green space, including decommissioned mines

Mining and Responsible Consumption, Production (SDG12)

Integration into Core Business

Minimize resource use and waste

- Minimize use of water, energy, land, chemicals
- Minimize production of waste, effluent, emissions
- Re-purpose waste rock

Incorporate life cycle thinking

- Analyze mineral and chemical products across sourcing, transport, storage, use, production
- Extend responsible sourcing to suppliers

Collaboration and Leverage

- Collaborate inter- and intra-industry to develop and report against materials management codes
- Engage consumers about mining and connect the consumer with raw materials

Mining and Climate Action (SDG13)

Integration into Core Business

Reduce Emissions

- Improve energy efficiency
- Use renewable energy
- Use low-emission fuels
- Align with INDCs
- Measure and report direct, indirect, and product-related emissions

Build climate change resilience

- Plan for climate change impacts on mines and communities
- Strengthen emergency response plans
- Model climate-related environmental impacts

Recognize climate change in planning and Investment

- Use scenario planning to inform views on climate and energy risks and opportunities
- Use climate projections in design and placement of operations and infrastructure
- Adopt corporate climate change, carbon management and disclosure policies
- Use shadow carbon prices to inform portfolio evaluation and investment decisions
- Include climate change on the board agenda

Collaboration and Leverage

- Participate in climate-related R&D and pilots (emissions trading, CCS projects)
- Engage in intra- and cross-industry climate dialogues
- Publicly support carbon pricing

Mining and Life Below Water (SDG14)

Integration into Core Business

Incorporate life under water into impact assessments

- Properly dispose of tailings/waste
- Assess social and environmental impacts on fishing- and marine-base livelihoods
- Map breeding grounds and migration routes of underwater species

Approach seafloor mining cautiously

- Protect marine life
- Minimize habitat disturbance
- Conduct sensitivity analyses in understanding short- and long-term impacts

Collaboration and Leverage

- Collaborate with local authorities to establish conservation areas and marine reserves
- Develop multistakeholder coastal zone management plans

Mining and Life on Land (SDG15)

Integration into Core Business

Achieve net positive or no net loss impact

- Apply mitigation hierarchy to minimize impact
- Avoid impacts to critical habitat
- Offset biodiversity impacts

Preserve ecosystem services

- Recognize dynamic nature of habitats
- Conduct comprehensive baseline and follow-up environmental impact assessments

Collaboration and Leverage

- Support projects that link communities and biodiversity
- Encourage and participate in landscape level planning
- Restore historic habitats and engage in reforestation and anti-poaching efforts
- Collaborate in research initiatives

Mining, Peace, Justice and Strong Institutions (SDG16)

Integration into Core Business

Prevent and preempt conflict

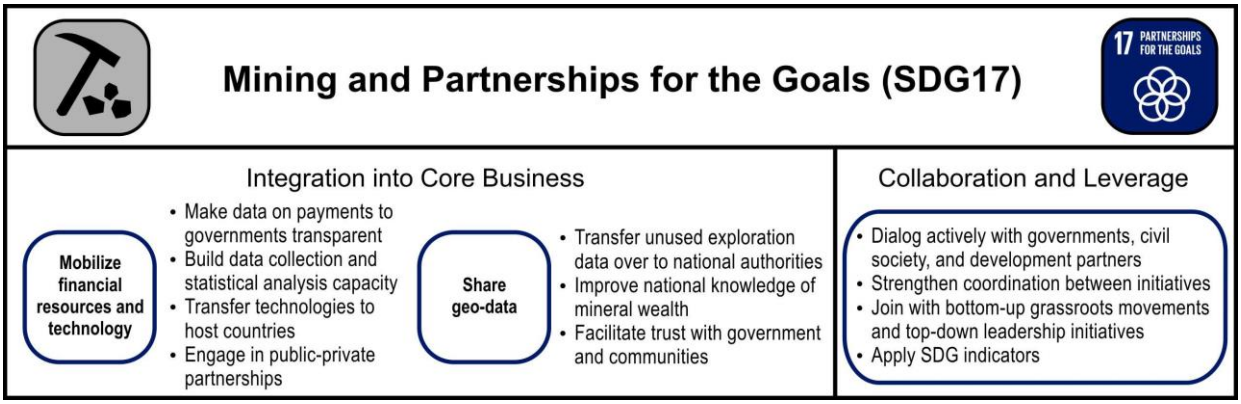
- Listen and respond early to stakeholder concerns
- Establish formal and accessible complaint and grievance mechanisms
- Participate in conflict-free mineral certification schemes

Respect indigenous rights and FPIC

- Implement human rights impact assessments
- Extend high standards to security contractors
- Incorporate both regulatory requirements and local community objectives and sentiments into decisions

Collaboration and Leverage

- Publicly report project-related payments country-by-country and project-by-project
- Conduct transfer pricing of intra-company transactions via arms-length rule
- Facilitate peaceful working environment and good community relationships
- Promote the rule of law


Mining and Partnerships for the Goals (SDG17)
17 PARTNERSHIPS FOR THE GOALS
Integration into Core Business
Mobilize financial resources and technology
• Make data on payments to governments transparent
• Build data collection and statistical analysis capacity
• Transfer technologies to host countries
• Engage in public-private partnerships
Share geo-data
• Transfer unused exploration data over to national authorities
• Improve national knowledge of mineral wealth
• Facilitate trust with government and communities
Collaboration and Leverage
• Dialog actively with governments, civil society, and development partners
• Strengthen coordination between initiatives
• Join with bottom-up grassroots movements and top-down leadership initiatives
• Apply SDG indicators

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 2015-2030. The 2030 Agenda is a successor framework for the Millennium Development Goals (MDGs) that covered the period from 2000-2015. The SDGs represent the world's comprehensive plan of action 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.

The SDGs are underpinned by three key principles that have implications for how to address and achieve the goals. The first is the *integrated and indivisible* nature of the goals, recognizing the linkages between the economic, social and environmental dimensions of the agenda. This implies managing trade-offs and maximizing synergies across the goals. The second principle is *universality*, which means that the goals are relevant to all countries and all societal actors. It is not an agenda for developing countries only, nor for governments alone. A final principle is about ensuring that *no one is left behind*. The goals and targets should be met for all peoples and segments of society, including the most vulnerable.

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 that can be leveraged 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.

Targeted and well-planned actions to contribute to the SDGs should also be good for business. Benefits to business may include concrete cost-savings (e.g. energy, local procurement, water recycling, reducing conflict, etc.), better company alignment with national policies and regulations relevant for the mining sector, improved relations with communities and stakeholders, and support to building an overall better business environment. Aligning with the SDGs can also give mining companies a common language to communicate sustainability performance and impact.

How is the 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. It is advisable that each company does its own review of the SDGs to identify the most relevant targets for its business. For this reason readers are referred to the full UN text "Transforming our world" which contains all 169 targets.[3]

Multistakeholder roles and responsibilities in implementing the SDGs

Building a sustainable world is a multistakeholder 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 multistakeholder 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 economic, social, cultural and environmental 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 plans in place, even if not always formalized, 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. The delivery and management of social services is outside the role of the mining industry and mining companies can risk creating unsustainable dependencies of communities and government on the business.

Integrating the SDGs into core business

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. 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.) Companies can also leverage how they use technology and innovate across business and operational processes to contribute to the SDGs. The Atlas highlights different examples of companies using technology innovation to improve their business and increase their positive contribution.

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 the 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. Companies can use these assessments to evaluate the relevance of the SDGs to their business from the perspective of first "doing no harm" and second contributing to local development. Once formally identified, companies can incorporate these opportunities to positively impact the SDGs 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 multistakeholder collaboration to leverage the resources needed to make a difference.

Collaboration can mean formal partnerships and regular multistakeholder roundtables, but companies also have additional cost-effective ways to leverage results. These include:

- The company can use its **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 analyse data that might be useful in the implementation of programmes led by government or civil society. **Sharing information, data 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. Involvement 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 programmes**.

- 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 ongoing 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 ferroalloys, 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 may be 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 metals – **SDG7 (Energy Access and Sustainability) –** Many renewable energy technologies depend on rare earths and other metals that will play a critical role in the low-carbon economy. Base metals like copper will be a key component for the 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 multistage 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 the 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.
- *Extractive Industries Transparency Initiative (EITI)* – Founded in 2003, EITI is a global standard to promote open and accountable management of natural resource. Countries implementing the EITI disclose information on tax payments, licences, contracts, production and other key elements around resource extraction. EITI is now implemented in 51 countries via in-country coalitions of government, companies and civil society.

Building on the early work, a number of other important initiatives have emerged: 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; the 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 Organisation for Economic Co-operation and Development (OECD) Policy Dialogue on Natural Resource-based Development; and the Global Reporting Initiative (GRI) Mining and Metals Sector Supplement, among others. In addition, the World Economic Forum began the Responsible Mineral Development Initiative (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] The "Case studies" and "Selected resources" sections of each chapter include descriptions of these and many other initiatives and information sources.

A note on mineral exploration companies

Exploration stage companies (also referred to as Junior Miners) are often the first point of contact between communities and the minerals industry. Exploration companies are typically funded with equity financing and lack revenues from the production of minerals. Consequently, shareholders and management are under pressure to ensure that raising capital is spent "on the ground", to make mine discovery. Societal acceptance and community engagement is now an essential part of the process. Given the pivotal role exploration companies play in the mining value chain for many projects, the Atlas includes case studies highlighting the important sustainable development contributions these companies can make.

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

- Global Goals for Sustainable Development. Global Goals
- Impact 2030. Global private sector led collaboration to mobilize volunteers to advance the achievement of the SDGs
- International Council on Mining and Metals. www.icmm.com
- International Finance Corporation, 2015. The Art and Science of Benefits Sharing
- International Finance Corporation Sustainability Framework. IFC Framework
- 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
- UN Global Compact: UN-Business Action Hub. Global Compact
- World Business Council for Sustainable Development (WBCSD): Action 2020. WBCSD

SDG1:

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]

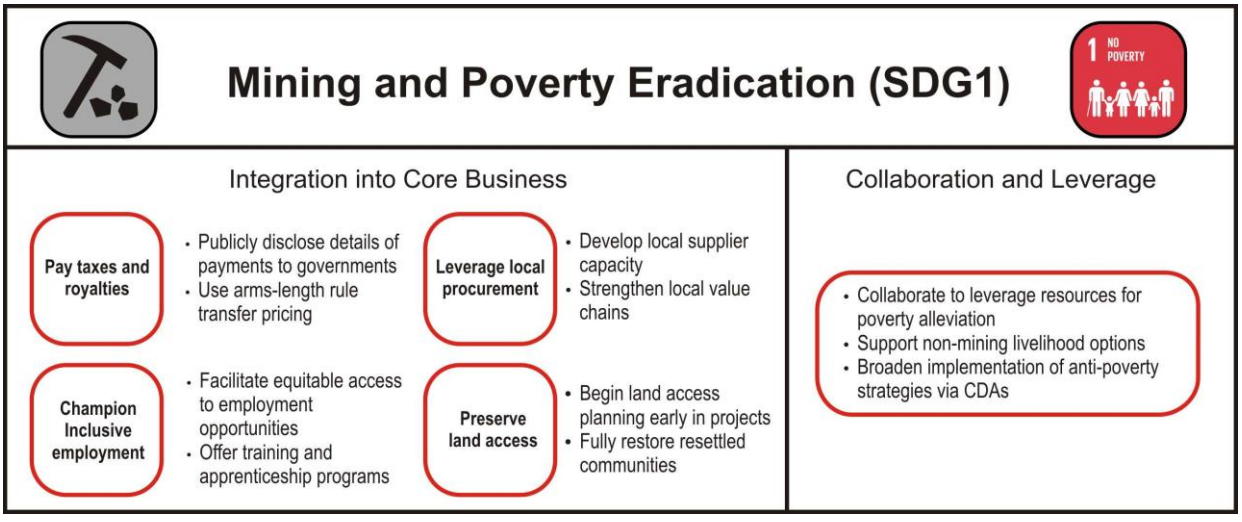
Mining contributes to eradicating poverty through tax and royalty payments that allow the development of basic public goods, such as access to health, housing, education and infrastructure. Mining can also help reduce poverty through job creation, induced economic activity and the provision of basic services. Finally, to avoid the risk of exacerbating poverty, mining operations 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. Companies should especially consider their impact on children, who are often overlooked, yet can be particularly vulnerable physically and economically.

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 the **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 "arm's-length" transfer pricing rules or seek to subvert international tax laws in order to shift profits to lower-tax jurisdictions may be undermining development by reducing payments to governments that could be used for improving the health, education and other social services and infrastructure.

Promoting inclusive employment.
Mining companies can contribute to poverty reduction through direct employment created by their operations and indirect employment resulting from the 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 subcontractors 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 the retention of previously marginalized employees with on-the-job training or complementary programmes implemented in collaboration with technical and educational institutions. Contractors and subcontractors can also contribute to skills development by offering apprenticeship and training programmes. Companies can target programmes to youth and young adults to promote educational benefits and their eventual employability.

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 and 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 the 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, including women and children, in decision-making processes and identify impacts on livelihoods. If indigenous peoples are impacted, companies must recognize their special status and take care to respect free, prior and informed consent. 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 ongoing 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. Companies and communities can work together to set up transparent monitoring of the commitments made in CDAs.

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 implementing countries. By voluntarily deciding to do it in every country and subnational 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

SEMAFO and shea butter producers: Burkina Faso.
Six-hundred members of the Gnogondémé of Yona cooperative 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: Peru.
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

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

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.

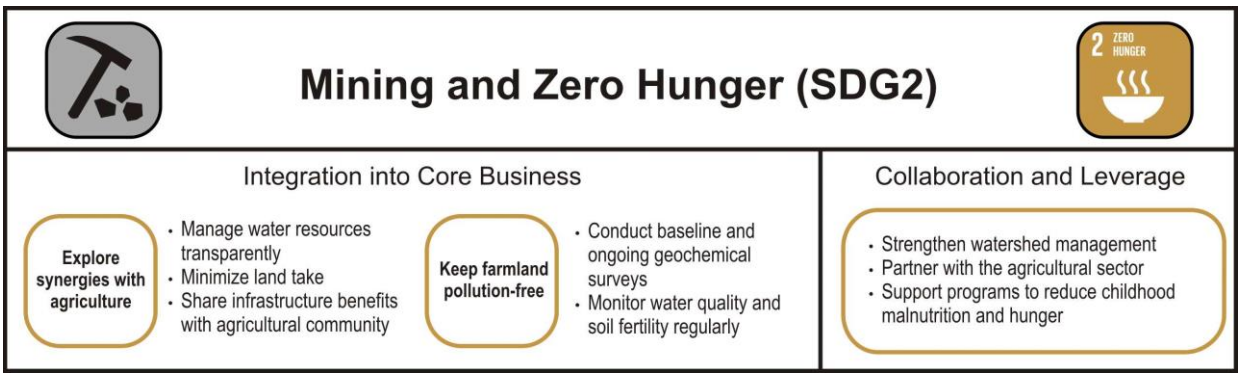
Key UN SDG2 targets relevant for mining

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 should consider how their operations impact on their neighbours' livelihoods and identify ways to build trust and avoid or minimize negative impacts.

Ensuring 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 with a view to ensure access to water for sustainable and productive agriculture systems. 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 the 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. By procuring locally grown food, mining companies can also help increase incomes for small-scale farmers. Companies and industry groups can also share their geological science and expertise to assist agricultural ministries and local farmers to address soil quality.[14]

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, non-governmental organizations (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

Providing 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 diarrhoea. 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]

A local community member feeds two Brown Swiss cows in the rural town of Cuncashca, Peru

Supporting and training farmers: 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%.[16]

Applying geological expertise to increase crop yields: Ethiopia.
Companies and geological surveys can partner with the agricultural sector by applying their geological expertise to help agricultural ministries and local farmers address soil quality in the most effective and efficient manner possible. For example, the Finnish Geological Survey (GTK) worked with farmers in Ethiopia to examine the soil and determined that the soil was very acidic. Instead of using costly (and ineffective) fertilizers, they were able to apply lime to the soil and significantly increase crop yields.[17] While in this case the information and technical assistance provider was a geological survey, the geochemical sampling that all mining companies conduct regularly could also be deployed to help understand soil characteristics for the benefit of the surrounding agricultural community.

Partnering to use water resources from wet mines: United States.
Resolution Copper, a joint venture between Rio Tinto and BHP Billiton operating a copper underground mine in the US 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 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.[18]

Selected resources

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

SDG3:

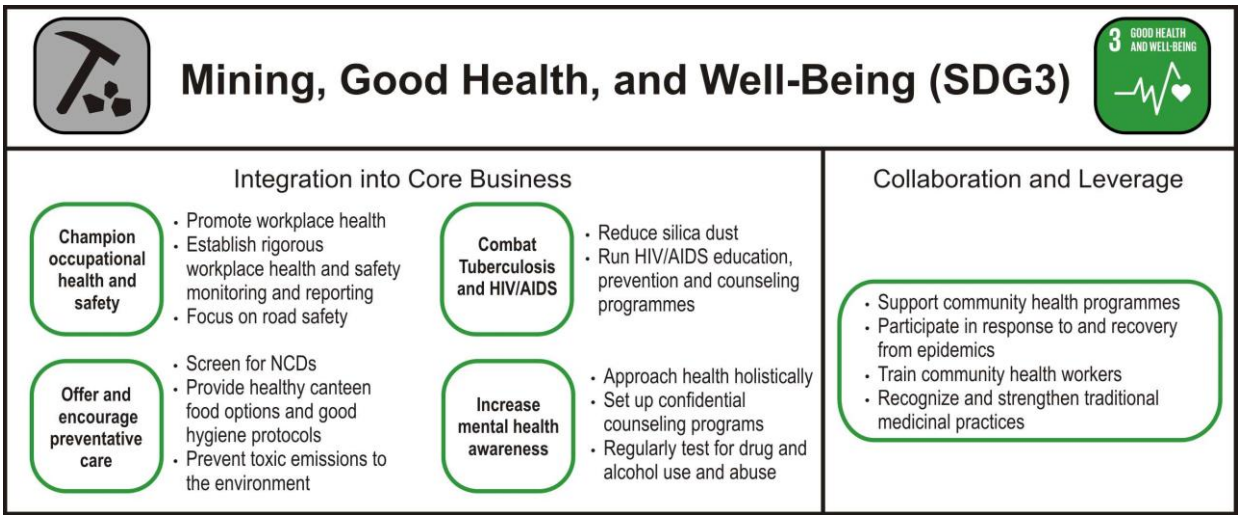
Good Health and Well-Being – Ensure healthy lives and promote well-being for all at all ages

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, 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.[19]

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, and the mine-related in-migration of labour can also pose health risks, especially to children and women, exposing them to sexual exploitation, violence, pregnancy, drugs and alcohol abuse. Mining companies have substantial commitments and policies for health and safety to pre-emptively 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, waterborne 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 the 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 in low-and middle-income countries. 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. 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 mineworkers' 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 protect the health and safety of employees 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 programmes 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 and work 12-hour shifts for weeks at a time often far from home) 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 with negative consequences for women and children. Best practice is to ensure that health, safety and environment programmes identify and eliminate potential health risks.

Fostering mental health, preventing 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 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 that considers impacts on the family.

Preventing emission of toxic substances to the surrounding environment.
The mining industry can also pose a health risk to communities through the emission of contaminants, such as heavy metals and chemicals, to the surrounding environment. These contaminants can be taken up by humans through direct contact or through digestion of contaminated water and food sources. Sources of environmental pollution include direct process emissions (effluent and gases), storm water runoff and seepage from waste deposits, among others. Companies must understand the scope of potential emissions and risks to land, water and people and adopt the appropriate management plans and mitigation measures.

Collaborate and leverage

Mining companies can partner with communities, government and other stakeholders to improve accessibility to health services, the quality of healthcare 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.

Collaborating to strengthen health services.
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 SDG7 – Affordable and Clean Energy).

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

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 healthcare facilities and communications campaigns.

Recognizing and collaborating to strengthen traditional practices.
The World Health Organization (WHO) defines traditional medicine as "the health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral based medicines, spiritual therapies, manual techniques and exercises, to treat, diagnose and prevent illnesses or maintain well-being". WHO notes that in Africa, Asia and Latin America, traditional medicine is a fundamental approach to meet some primary healthcare needs.[25] In Africa, up to 80% of the population uses traditional medicine for primary healthcare. Companies can link their work on biodiversity and ecosystems to help strengthen the use and knowledge of medicinal plants or promote the incorporation of effective traditional health practices into local, public health approaches.

Case studies and initiatives

Improving worker health and reducing lost time by improving food hygiene: Dominican Republic.
Unigold Inc., at its Neita project in the Dominican Republic, upgraded sanitation and hygiene at its exploration camp kitchen with minimal expense. Prior to 2012, the camp kitchen was run by local cooks – three women from the village – who had no formal training in canteen demands or associated hygiene issues. Realizing an opportunity, Unigold Inc. constructed a purpose-built kitchen using local resources, and during the tourist off-season hired a professionally trained chef (one week every six weeks) to train the local cooks in kitchen safety, hygiene best practices, and incorporating new variety into the menu using local produce. The result was improved camp morale, reduced lost work days due to hygiene-related issues, and improved skills that benefited the broader community.[26]

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 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 litres of chlorine, 4 million latex gloves and 55 vehicles. Most importantly, it estimates it trained 50,000 employees.[27] 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."[28]

Combating tuberculosis and HIV: 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 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 2.5-3%, which is 10 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. The World Bank has since launched a campaign to screen at least 90% of the

mining workforce for TB, put at least 90% of all active cases on treatment, and ensure that at least 90% of patients under treatment are completely cured.[29] Mining companies have played an active role, as well. For example, Anglo American started offering free HIV treatment to its workforce in 2001 and subsequently expanded this service to its employees' dependents; the company can see a reduction in incidence and mortality of TB in its workforce. As the focus on improving worker and community health expands into broader health systems strengthening, Anglo American has made the health information system it uses for its own business available for use in public facilities.

Selected resources

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

SDG4:

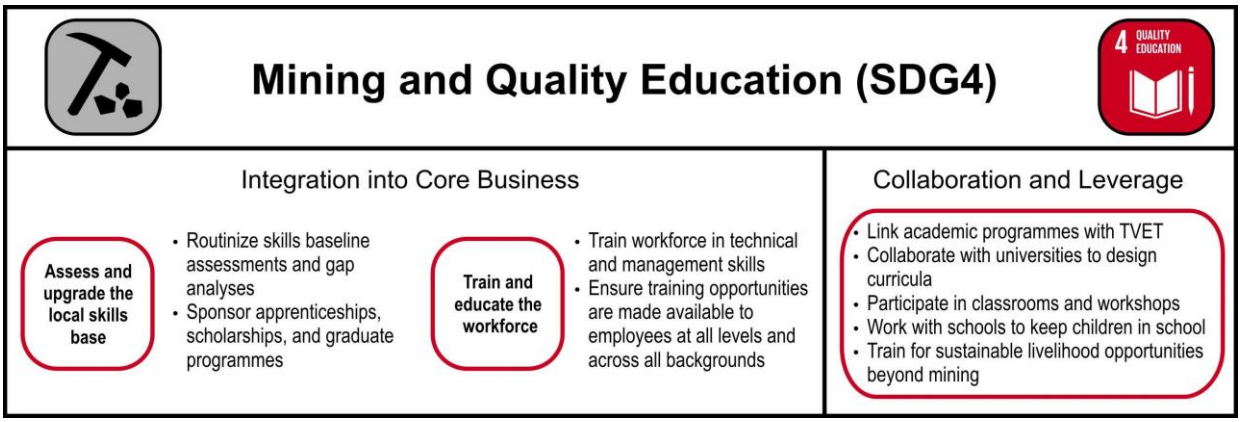
Quality Education – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

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 the availability of schools. More work is needed to strengthen equitable access to quality education that leads to improved economic opportunities for women and men.[30]

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 upskilling 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 analyse 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 subcontractors 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 curricula in environmental management, supporting school recycling programmes 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 helping to keep children in school.
Primary school enrolment rates in mineral-rich economies are below the world average.[31] 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 programme called 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.[32]

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 Savvannakhet 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 for two students studying through the New Zealand ASEAN Scholarship.[33]

Transdisciplinary post-graduate degree programme for mining professionals: South Africa.
The University of Cape Town, in collaboration with the University of Zambia and the United Nations University, has developed an inter-institutional and transdisciplinary Master of Philosophy degree programme specializing in sustainable mineral resource development that highlights the critical challenges of sustainable development in the context of mining and minerals processing in Africa. The programme is open to graduate professionals from across a spectrum of disciplines, including geologists, engineers, planners, strategists, lawyers, regulators, health professionals, safety specialists, environmental officers, economists and social scientists, who seek a broader understanding of what is involved in sustainable mineral resource development in order to promote its application in the most meaningful way. One of the criteria applied when selecting students for the programme is to assemble cohorts with a diversity of backgrounds, to provide opportunities for students to learn from one another's disciplines and experiences as well as from the course material. The first three cohorts of students (41 in total) hail from four southern African countries (Malawi, South Africa, Zambia and Zimbabwe), as well as Australia and Japan, and range in age from 21 to 51. These students represent government, academia, the mining industry, consulting firms, as well as the business and economic sectors, and have their first degrees in a range of disciplines, including: engineering sciences, natural sciences, social sciences, law and economics.[34]

Selected resources

- International Geological Congress (IGC), 2016. Social Responsibility for Geoscience Education
- 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
- University of Cape Town, 2016. MPhil in Sustainable Mineral Resources Management
- World Bank, 2014. Human Capital for the Oil, Gas and Minerals Industries

SDG5:

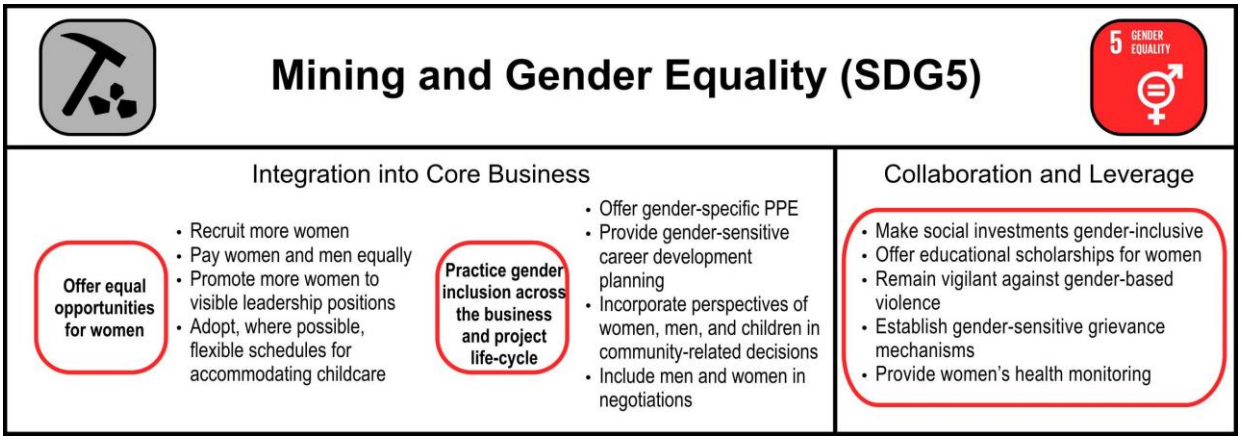
Gender Equality – Achieve gender equality and empower all women and girls

Gender equality means equal access for women and girls to healthcare, 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.[35]

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, PricewaterhouseCoopers' 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.[36] Women in mining are also paid less than men. In 2014, the Australian Institute of Mining and Metallurgy 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.[37] Mining companies can adopt proactive strategies to ensure equal opportunities at each stage of the employment cycle and a proactive approach to rebalancing 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 childcare to accommodate childcare responsibilities, offering personal protective equipment 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.[38] 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."[39] 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.[40]

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.[41]

"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.[42]

Partnership to Prevent Gender-Based Violence: Global.
In April 2012, Barrick Gold Corporation (Barrick) and White Ribbon (WR) formed a partnership to prevent gender-based violence (GBV) and promote the positive role that men have as part of the solution to ending violence against women. For the past four years, Barrick and WR have worked together at mine sites and in host communities in three locations – Lumwana, Zambia; north-eastern Nevada, United States; and Porgera, Papua New Guinea. The first phase of the partnership was an extensive one-year needs assessment in each country that included workshops, focus groups, consultations and interviews with a variety of stakeholders at the national, regional and local levels working to address issues around gender equality and GBV. This allowed WR to develop three unique GBV prevention strategies that addressed the cultural context, capacity and best practices in each location. This was a critical step required to establish important local relationships, and to build awareness and the buy-in with Barrick employees needed to successfully implement the project's second three-year phase at each site.[43]

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SDG6:

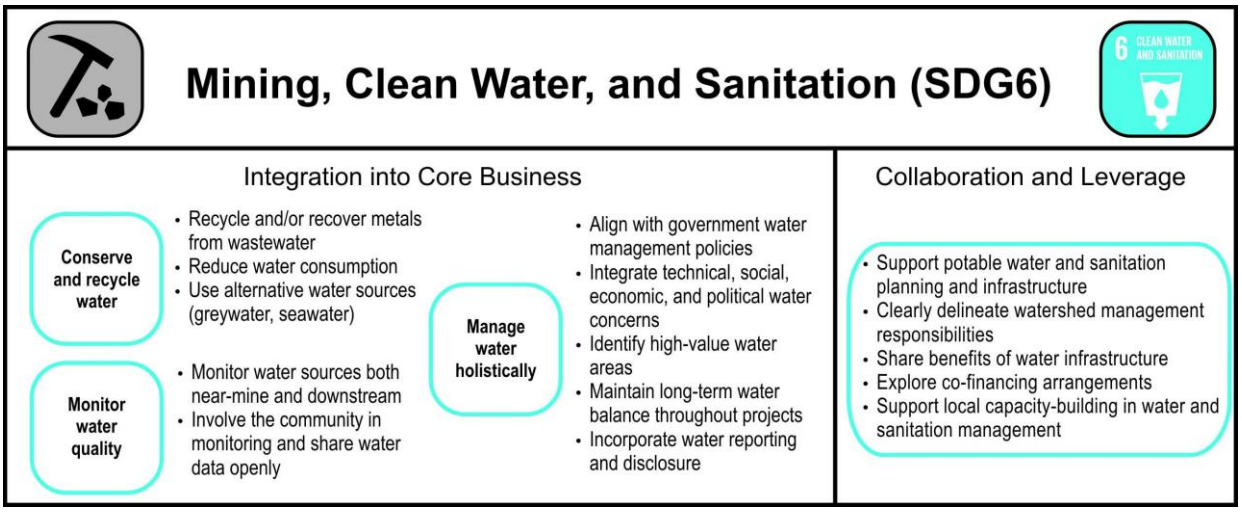
Clean Water and Sanitation – Ensure the availability and sustainable management of water and sanitation for all

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.[44]

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 don't displace local water users or 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 the 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; 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.[45] 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 and that is based on a long-term evaluation of operational usage across the full scope of activities. 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 and reporting on water use.
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 and reporting 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 and companies can also report publicly on their water consumption and uses (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 understand high value water assets by considering the full scope of social, cultural, economic and environmental values at the catchment scale to identify material risks and align operational water management and engagement with communities and government. The 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, multilateral 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 users.[46] 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. Children are particularly vulnerable to water shortage and water pollution. The WHO estimates that 3,900 children die each day from dirty water or poor hygiene.[47] 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 and operations, and the 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.[48]

Shared use water infrastructure: Saudi Arabia.
Because of Saudi Arabia's arid climate and the paucity of freshwater, it is estimated that desalination capacity must double over the next 20 years 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 2,400 MW of electricity and 1.025 million cubic meters of water daily, of which 1,350 MW and 25,000 cubic meters, respectively, go to the project, while the rest goes to the public grid.[49]

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 that 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.[50]

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) 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.[51]

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SDG7:

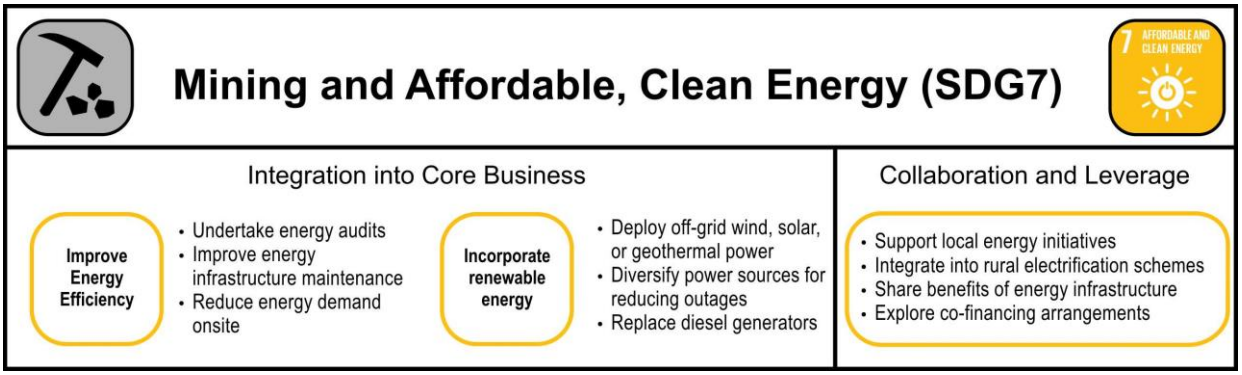
Affordable and Clean Energy – Ensure access to affordable, reliable, sustainable and modern energy for all

One in five people lack access to electricity and 3 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, the 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.[52]

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 the 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 the 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 10-40% of operational costs are for energy.[53] 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 the 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.[54] Companies can support research and development focused on new low energy grinding technologies. In addition, energy audits, improved 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.[55] 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 the 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 that 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 must 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 precondition 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

Sunshine for Mines: Global.
Sunshine for Mines, an initiative of Rocky Mountain Institute and Carbon War Room, works directly with the global metals and mining industry to enhance the competitiveness and profitability of industry-leading companies by accelerating the adoption of cost-effective renewables. Their goal is to rapidly accelerate the installation of on-site renewable energy capacity – especially solar photovoltaic technologies – integrated into the power systems of on- and off-grid mines around the world. The first project, a 40 MW power plant, is under way in collaboration with Gold Fields in South Africa. Given the extent of deep level mining in South Africa, electricity supply and costs serve as key challenges to the South African gold operations. In this context, multiple solar and bioenergy projects are planned to reduce the costs and increase the reliability of mine electricity.[56, 57]

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.[58]

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.[59]

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 1,800 kg of CO_2 emissions; over the 20-year life of the turbine it is expected to save C$40 million in fuel costs.[60]

Energy efficiency: Global.
In 2008, Barrick published a position statement on climate change that included commitments to improve energy efficiency as well as reduce 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 of over 20%, and that 43,000 tons per year of CO_2 emissions had been averted.[61]

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SDG8:

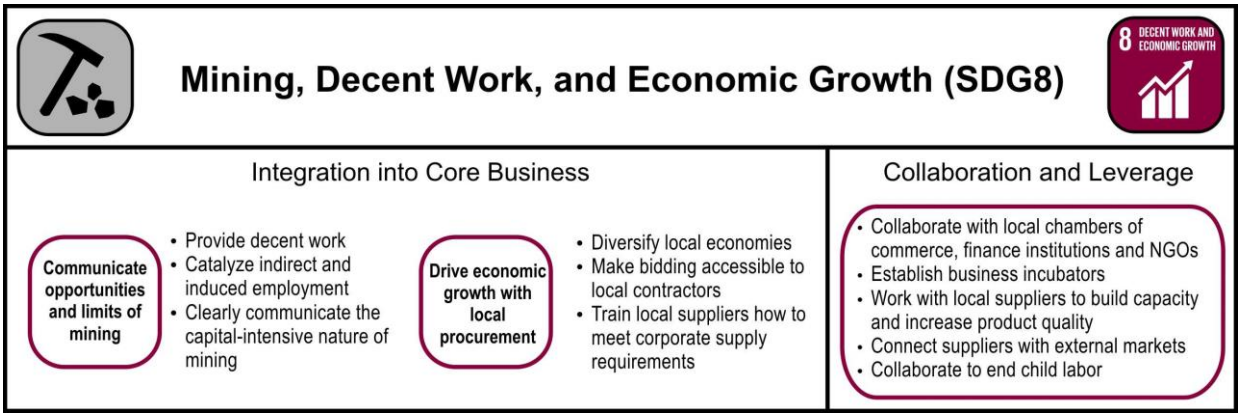
Decent Work and Economic Growth – Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all

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.[62]

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
8.6	By 2020, substantially reduce the proportion of youth not in employment, education or training
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
8.9	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. In addition, modernization and technology development can lead to big improvements in economic savings and environmental savings, but also reductions in labour force needs. 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.[63] 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; this baseline can serve as the blueprint for identifying opportunities to leverage more inclusive and sustainable growth.[64]

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 the identification of present and future local procurement opportunities; and the re-scoping of contracts or staged approaches to the 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 subcontractors that broadens the diversity of the workforce, including men, women, youth, local people, indigenous peoples and other marginalized groups.) Most important is to 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 the 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. Companies and communities can collaborate on the transparent monitoring of commitments made in agreements.

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.[65] 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.[66]

Generating local jobs during the exploration phase: Dominican Republic.
Unigold Inc., at its Neita Project near Restauracion in the Dominican Republic, illustrates how exploration phase work can be leveraged to create local employment. Prior to 2012, diamond drilling at the project was undertaken with expatriate supervision and operators, with labour being supplied from the local community. During 2012 and 2013, the company, along with NorthStar Drilling (a Canadian drilling company) and with the support of IFC financing, trained local staff in the operation of hydraulic diamond drills, as well as supply and purchasing requirements, so they could became fully locally supervised by 2014. The 2014 drilling campaign was completed with drilling efficiencies comparable to those of the expatriate counterparts and with no injuries – a first for the company and local staff. Complementing the drive to have local drill crews operating the diamond drilling rigs, the company further developed local capacity in an area of 90% unemployment by working with local wood mills and carpenters to build core trays locally (for core storage). These handcrafted trays replaced those in plastic that were previously imported from Quebec, Canada.[67]

Local artisans provide Unigold's core storage needs in the Dominican Republic (Credit: Kevin Palmer Photography, Unigold Inc.)

Partnerships to improve working conditions and livelihoods for artisanal miners: Tanzania.
In 2014, the World Bank, the Government of Tanzania, AngloGold Ashanti and African Barrick Gold partnered with the Geita Region Miners Association to improve the livelihoods and working conditions of about 500 local small-scale and artisanal miners. The partnership entails financial and technical contributions to the artisanal miners, particularly training in areas of mining, geology, metallurgy, health and safety issues, bookkeeping and accounting, and also includes work to eliminate child labour and the use of mercury. While the partnership is in an early stage, it illustrates the promising ways in which large mining companies and small-scale miners can effectively work together, as well as how multiple large mining companies can partner with governments and each other to create social as well as financial value.[68]

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SDG9:

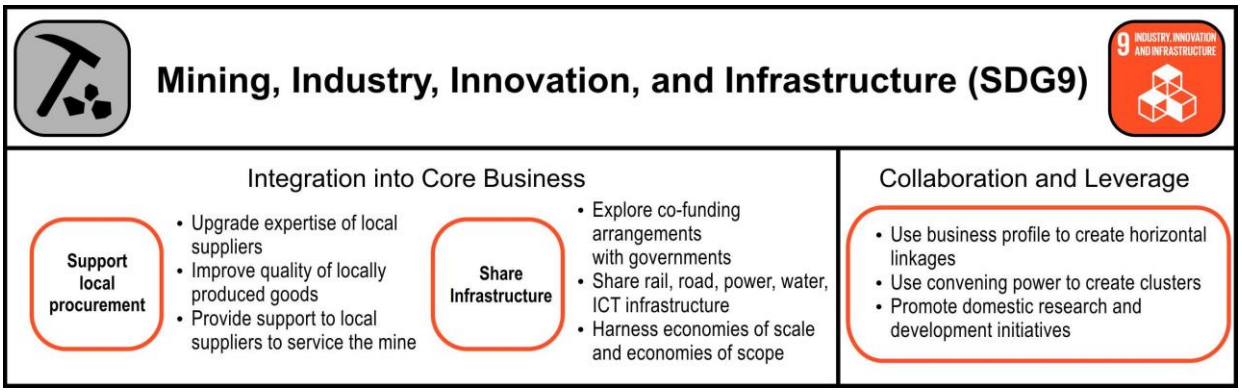
Industry, Innovation and Infrastructure – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

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.[69]

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 SDG1) 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 400 MW power plant, for example, is likely to cost less than two 200 MW 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."[70] 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 centres 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-sized enterprise (SME)." Through its six funds, the programme provides mentorship and financial support to budding entrepreneurs in a variety of different fields, and has supported 2,200 companies employing over 46,630 people in the last 15 years alone. [71]

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.[72]

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 to handle current and future cargo load, estimated at 22 million tons annually. Of this, 18 million 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.[73]

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, in 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 one of the largest transfers of economic activity from the northern to the southern hemisphere. 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). The transfer of De Beers' Global Sightholder Sales to Gaborone has created a strong platform for the southern African diamond producing region to grow its role as a leading international diamond centre, and has created a ripple effect of additional economic opportunities for local businesses as demand grows for accommodation, catering, office facilities, transport, security and leisure facilities.[74]

Selected resources

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SDG10:

Reduced Inequalities – Reduce inequality within and among countries

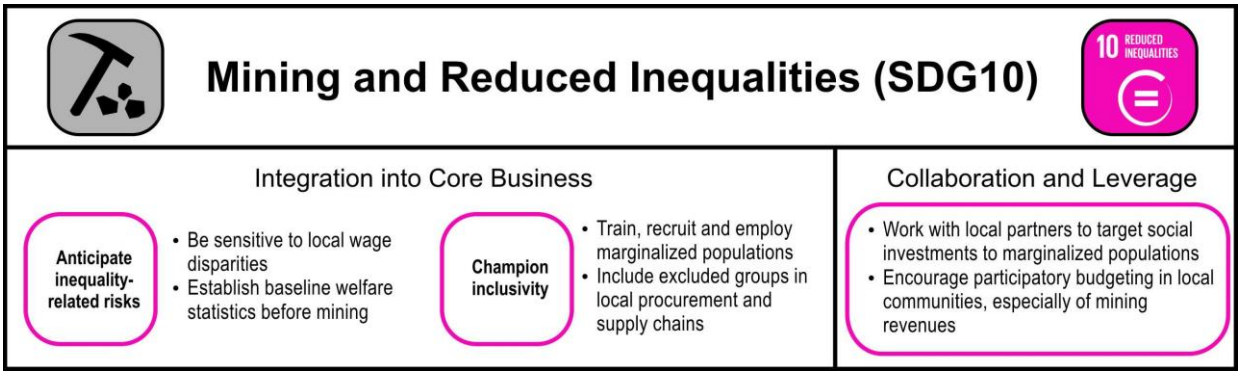
Despite significant reductions in poverty in many countries, poverty still persists and inequalities are growing, particularly in least developed countries, landlocked nations and small island states. Disparities remain in developed countries as well, with some populations still lacking access to basic 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.[75]

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%** 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.[76,77,78] 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 and SDG5); invest in local procurement and business incubators to widen economic opportunities, especially for poorer, excluded segments of the population (SDG1 – End Poverty and 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 and government to identify how the company can contribute to community needs and assets, respecting their culture, traditional livelihoods and customs. Consultation should include the most vulnerable and "hidden" groups, such as a women and children (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, 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 fulfil human rights – such as for education, health, social protection and justice systems".[79] 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 Laos, MMG conducts a household survey of the 34 surrounding villages every two years 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.[80] 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 Laos," and the reduced inequality is one factor that makes MMG "a welcome addition to the community".[81]

Mentoring and job-readiness programmes for Aboriginals: Australia.
In 2012 Thiess partnered with Reconciliation Australia to form the Thiess Reconciliation Action Plan. 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 of age, 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.[82]

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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.[83]

Mining companies can contribute to sustainable cities and communities by supporting the development of relevant local infrastructure, involving all stakeholders in land use and settlement planning, implementing cultural heritage plans, and reclaiming mined land into parks and green spaces where appropriate. Mining landfills to reduce waste and the 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.[84]

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 upcycling 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 the 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.[85] 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 contributing 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 the 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.[86] 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.[87] 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.

Leveraging geology and mining for preserving cultural heritage and promoting tourism: Greece.
The onset of the Greek crisis in 2011 resulted in a sharp decline in the number of tourists on the Greek island of Milos. In 2012, Imerys (formerly S&B) took on the challenge to create a branded product to promote tourism, building on Milos' comparative advantage: its unique geology. Miloterranean Geo Experience was launched as a Milos Mining Museum initiative, sponsored by the company. With seven routes around the island (for walking, cycling and driving) showcasing the variety of geological features and the island's mining history, as well as a group of geologists, mining engineers, foresters, cartographers, historians and other specialists contributing their expertise, Miloterranean "caters to the inquisitive traveller's desire to discover the multifaceted beauty of the Greek islands Milos' and Kimolos' landscape and volcanic origin".[88,89] With its online interactive maps guiding travellers around waypoints, minerals and geological phenomena, Miloterranean's innovative approach to combining mining, natural history and tourism is an example of how mining companies can promote cultural heritage and community development.

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 its New Liberty gold mine in Liberia, Aureus Mining 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.[90]

Transforming mines into parks, resorts and data centres: Global.
The Eden Project in Cornwall, United Kingdom, 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 ecotourism 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 a Master of Science programme in sustainability. It is currently investigating the feasibility of an enhanced geothermal system that would power the site and 4,000 nearby households.[91] 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.[92,93]

Selected resources

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- UNESCO Sustainable Development Goals for Culture. UNESCO
- 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, $120 billion would be saved 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.[94]

The mining process produces useful materials for society that are in products used 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.[95] 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 the reuse, recycling and repurposing of raw materials and products to improve sustainable consumption. Metal and mineral resource recovery, recycling and reuse are labour intensive and present opportunities for industrial innovation and job creation. Finally, mining companies can strengthen their public reporting efforts by continually reviewing and improving the information included in their sustainability reports.

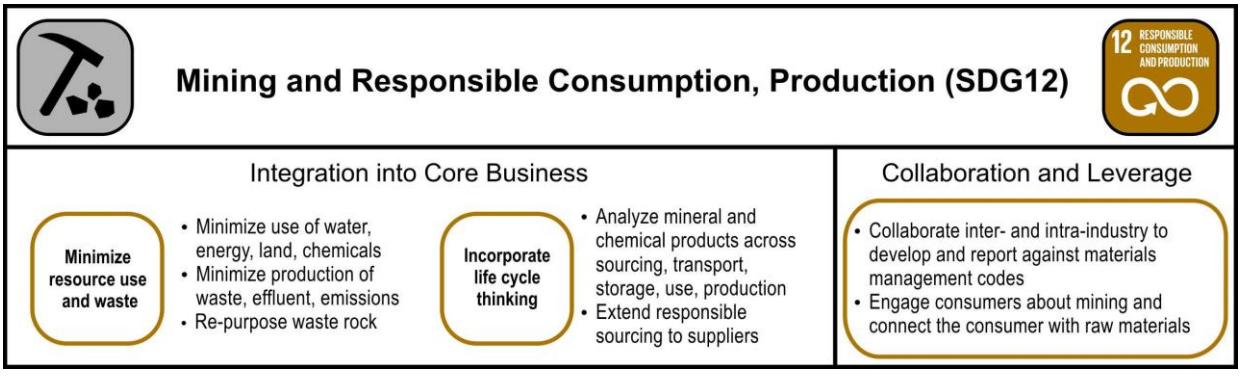
Key UN SDG12 targets relevant for mining

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 the 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 the 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.[96] Companies can work with experts and partners to ensure that waste management strategies eliminate risk to local communities.

Moving away from extraction only.
The progressive depletion of easily extractable resource deposits will drive prices upwards and catalyse innovation in new technologies for the 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. The recycling of base metals is already significant and growing, but more needs to be done with regard to minor metals, which have recently seen important 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 the population and prosperity grow, new mines along with more recycling will be needed. 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, improving *in situ* mining techniques that minimize waste, implementing closed-system processing that reduces water and energy waste and refining tailings into a benign and saleable product.[97]

Transforming waste into resources: European Union, United States.
In 2014, more than 40% of Imerys' 318,000 tons of industrial waste was recycled. Almost all (99%) of this waste is non-hazardous. The European facilities have set the standard since the EU directive on mining waste management in 2011 – 15 material recycling and waste reduction projects were entered for the 2014 Sustainable Development Challenge.[98] In its US operations, a Carbonates site took the initiative of transforming 800,000 tons of Hi-Cal sand into a marketable product for asphalt shingle makers. The project recycled materials recovered from customers' furnaces – including steel, cement and glass works – that were previously treated as industrial waste.[99]

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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.[100]

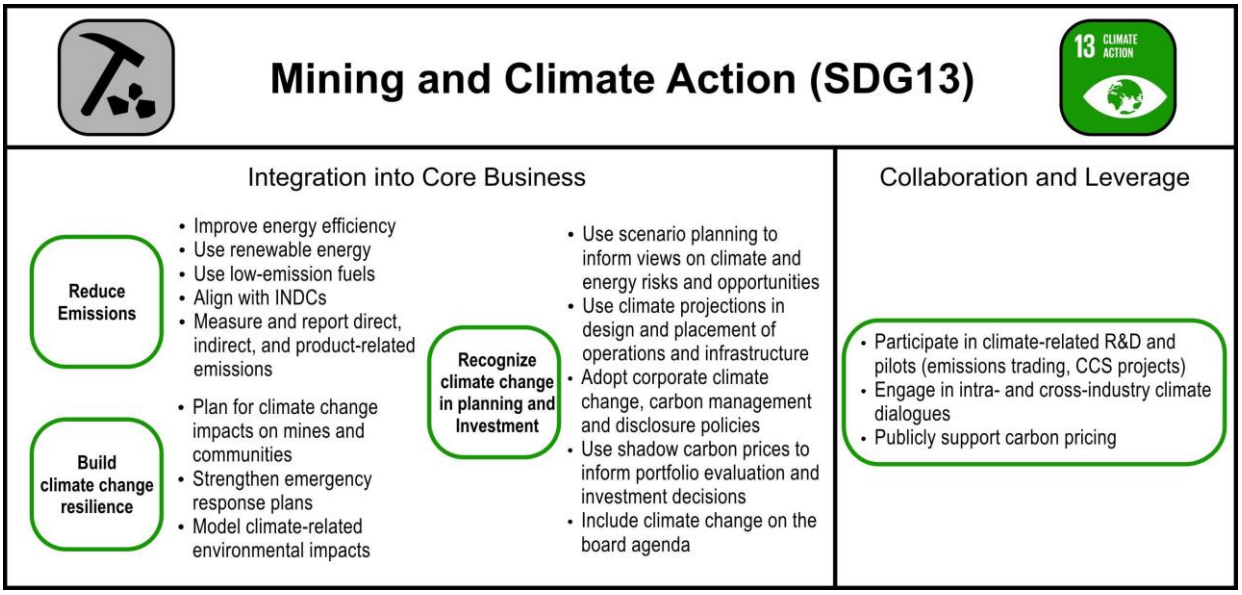
Mining companies can contribute to addressing climate change by reducing their carbon footprint and by engaging in dialogue with stakeholders to enhance adaptive capacities and integrate climate change measures into policies and strategies. Barring large-scale commercial viability of emission-reducing technologies such as carbon capture and storage (CCS) or geo-engineering, or a carbon price that accurately accounts for the 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 the physical impacts of 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 the 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,[101] many mining companies have yet to acknowledge that climate change is a reality. As recently as 2013, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia conducted a study showing that only 39% of mining companies in Australia believed the climate is changing.[102] 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 and publicly establish the company's position and commitments to mitigation and adaptation. Such a review can include performing 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. Consequently, 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, indirect and product-related emissions. Companies can support the development and 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 and support the establishment of governance structures to ensure accountabilities are clear. Once established, companies can share how they will support the national effort. Contributing to the discussion and sharing information and analyses 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 emission coal technologies and transition to lower emissions and eventually a net zero emissions energy mix.

Building climate change resilience.
Many mining operations are experiencing the physical impacts of climate today with climate projections expected to exacerbate local operating conditions into the future. Companies can use climate projections to inform the design and placement of operations and associated infrastructure. Scenario planning to identify 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."[103]

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.[104] While only one large-scale commercially viable CCS project has been implemented (see the 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.[105] As a first step to a global carbon price, there must be an approach to link different carbon pricing schemes and markets to guard against simply shifting emissions to jurisdictions with lower carbon prices or weaker enforcement.

Case studies and 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 waste gases produced during the steelmaking process. It is estimated that the bioethanol will emit 80% less greenhouse gases than conventional fossil fuels.[106]

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.[107] The greater use of renewables creates power price and supply stability and has the added benefit of reducing the company's carbon footprint. As such Gold Fields has announced an on-site 40 MW photovoltaic solar plant at the South Deep mine in South Africa, and is developing a gas plant at the Granny Smith Gold Mine in Australia to replace the diesel power station.[108]

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 oilfields. Approximately 90% of the emissions are trapped through this process.[109] 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.

Increasing climate resilience of mines and communities: Peru.
Rio Tinto Minera Peru, working with ICMM, implemented a pilot programme to assess threats and opportunities related to climate change that could affect communities living near its La Granja project, as well as its own operations. Using a methodology called CRiSTAL (Community-based Risk Screening Tool – Adaptation and Livelihoods) developed by the International Institute for Sustainable Development, as well as CARE International's Climate Vulnerability and Capacity Analysis, the pilot identified key climate risks: drought, cold snaps, floods and landslides. The information enabled Rio Tinto and local communities to better understand climate change impacts and improve their resilience to them.[110]

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.[111] By October 2015, all ICMM member companies publicly supported a price on carbon. 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."[112]

Selected resources

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- European Commission Joint Research Centre, 2011. Critical Metals in Strategic Energy Technologies
- Greenhouse Gas Protocol, 2015. GHGProtocol.org
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- 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
- United Nations Climate Change Conference and Agreement, 2015. COP21
- United Nations Global Compact, 2015. Climate and Energy Business Partnership Hub
- World Resources Institute, 2015. CAIT Climate Data Explorer

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.[113]

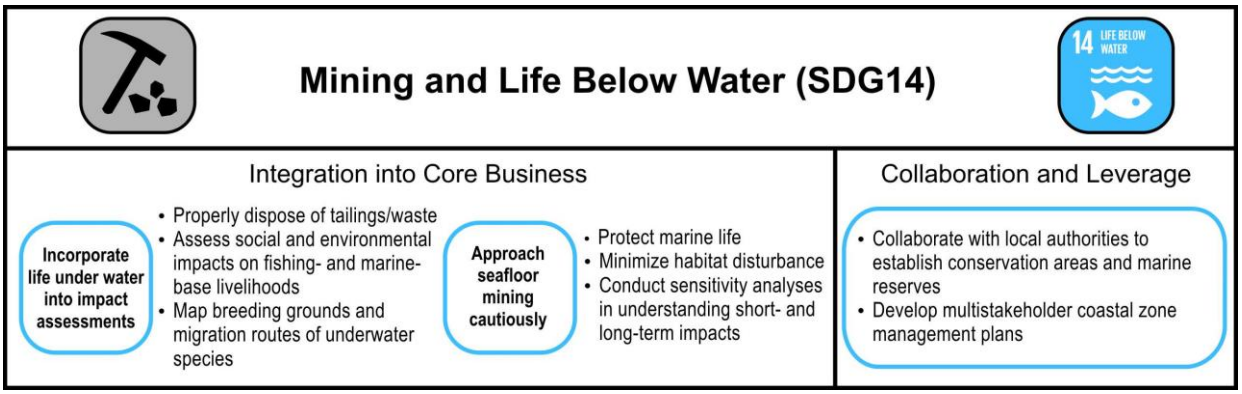
Mining impacts the ocean in a number of ways: use of the oceans for shipping products, subsea shallow mining, submarine tailings, riverine tailings and the new frontier of deep-sea mining, to name a few. Mining companies can contribute to ocean sustainability by identifying marine-related impacts and 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 environmental 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. Submerging mine tailings underwater prevents sulphide minerals (if present) from oxidizing and creating sulphuric acid. In the event that sulphidic tailings are exposed to oxidizing conditions, acid rock drainage may result and potentially leak into and contaminate water supplies. Tailings dams may also collapse. In both cases, entire underwater ecosystems, and all life that depends on them, may be polluted and potentially rendered uninhabitable.[114] 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 that depend on marine life for much of their food supply, but who also see potential economic opportunity in deep-sea mining.[115]

Collaborate and leverage

Companies can collaborate with government, local communities and other stakeholders to research, protect and discuss the 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 First Quantum Minerals' Cayeli 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.[116]

Protecting coral reefs at a liquid natural gas terminal: Yemen.
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 and environmental NGO Earthmind to conduct the first large-scale coral transplantation in the world.[117] Before clearing a path for the terminal infrastructure, the group conducted baseline studies around the reef. It then transported nearly 1,500 coral colonies 600-800 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.[118, 119]

Selected resources

- Conservation International, 2016. Climate Solution: Blue Carbon
- Woods Hole Oceanographic Institution, 2009. The Promise and Perils of Seafloor Mining
- World Economic Forum, 2016. Toward Transparency and Best Practices for Deep Seabed Mining

SDG15:

Life on Land – Protect, restore and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, 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 the 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.[120]

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.[121,122] 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.

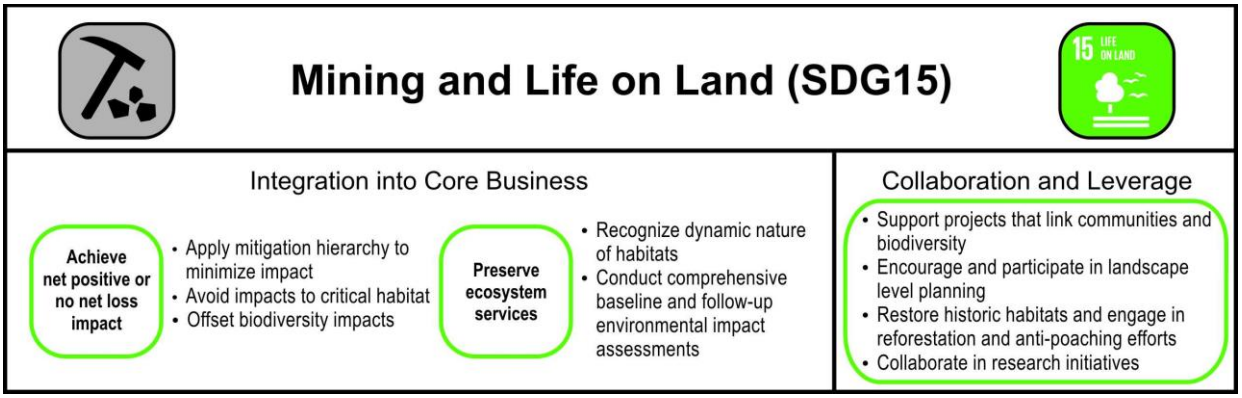
Key UN SDG15 targets relevant for mining

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

Avoiding impacts to critical habitat and working 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 goals[123] with offsets being an important component. Some regulatory or other performance standards (e.g. IFC PS6[124]) 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 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 at or around the project site can be made up for by deliberately conserving and preserving biodiversity or ecosystem services 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 ecosystem 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 in 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 the 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 ongoing research programmes. Companies can identify the ongoing 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.
The United Nations Development Programme (UNDP) helped develop the Mining and Biodiversity Guideline through a three-year multistakeholder 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 the approval of ministers from mineral and environment departments and adopted by the Chamber of Mines of South Africa and its 69 member companies.[125]

Protecting biodiversity: Australia, Chile.
In 2011, Conservation International (CI) and BHP Billiton launched a five-year Alliance to support the companies' commitment to deliver enduring benefits to biodiversity, ecosystems and other environmental resources. The Five Rivers Conservation Project, a partnership between BHP Billiton, the Tasmanian Land Conservancy and CI, covers 11,000 hectares within the Tasmanian World Heritage Area, home to the iconic Tasmanian devil. BHP Billiton has committed A$13.4 million to the long-term protection of this landscape. In Chile, CI and BHP Billiton are partnering with The Nature Conservancy to support the Valdivian Coastal Reserve, an area of rich biodiversity and one of the world's last temperate rainforests, including a forest of ancient alerce trees. BHP Billiton's $20 million commitment is contributing to ensuring the conservation and ongoing management of the reserve.[126]

Biodiversity offsets: Madagascar.
Rio Tinto's subsidiary QIT Madagascar Minerals operates three ilmenite mines, associated road infrastructure and a deep-water 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 hectares 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 hectares of quality forest.[127]

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 to repopulate the Nebraskan herds. So far 41 sheep have been exported from Alberta's population, which numbers 950.[128]

Selected resources

- Conservation International, 2016. Ecosystems based Adaptation
- Convention on Biological Diversity, 2016. CBD.int
- Cross Sector Biodiversity Initiative, 2015. A Cross Sector Guide for Implementing the Mitigation Hierarchy
- IAIA Biodiversity in impact assessment, 2005. IAIA Biodiversity
- ICMM, Good Practices for the Collection of Baseline Data, 2015. ICMM Baseline Data
- 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
- International Finance Corporation, 2012. IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- South Africa Department of Environmental Affairs, 2013. Mining and Biodiversity Guideline: Mainstreaming biodiversity in the mining sector
- WBCSD Eco4Biz: Tools for managing impacts biodiversity, 2013. Eco4Biz

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 the 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.[129]

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. Companies can commit to transparency across the scope of their activities that impact society, from transparency in mining revenues and payments to transparency in commitments made to local communities.

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

16.6 Develop effective, accountable and transparent institutions at all levels

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.[130] 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 ongoing 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 environmental and social impact assessments) 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 and the use of firearms and for training security contractors to prevent the 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".[131] ICMM defines FPIC as "a process based on good faith negotiation, through which indigenous peoples can give or withhold their consent to a project".[132] 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.[133] Companies must recognize the special status of indigenous peoples and take care to respect FPIC if mining activities impact indigenous lands and communities.

Participating in conflict-free mineral certification schemes.
Illegal small-scale mining can fuel illicit financial flows, 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 multistakeholder approach. A number of initiatives focus broadly on transparency.

Spearheading transparency.
The ongoing work of the Extractive Industries Transparency Initiative, Publish What You Pay, and major efforts from NGOs, such as Oxfam, Transparency International, Global Witness and the Natural Resource Governance Institute, are highlighting the importance of financial reporting for mining. Transparency International's 2012 publication analysing the corporate reporting of 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 10; 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 the 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.[134] 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.

Promoting 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.[135]

Case studies and initiatives

Country-wide mining CSR and due-diligence guidelines: China.
The China Chamber of Commerce of Metals, Minerals and Chemicals Importers and Exporters (CCCMC) released "Guidelines for Social Responsibility in Outbound Mining Operations" in 2014, followed by "Due Diligence Guidelines for Responsible Mineral Supply Chains" in 2015. CCCMC 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 two sets of guidelines contain standards for labour, environmental protection, supply chain due diligence, community engagement and human rights, based on internationally recognized standards, and were prepared in cooperation with various international organizations, including GIZ, OECD, UNDP, World Bank, World Wildlife Fund and Global Witness.[136, 137, 138] Implementation of the guidelines will be voluntary, but CCCMC 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.

Capacity-building: Southern Africa.
Anglo American has formed a partnership with the Development Bank of Southern Africa (DBSA) to build the capacity of 11 local municipalities in its mining and labour sending areas in South Africa.[139] The project aims to transfer skills to municipal officials to implement investment planning processes; enhance the operations and maintenance of municipal infrastructure; build technical capacity to implement poverty alleviation projects within selected municipalities; support the implementation of systems and controls to improve revenue generation, reduce electricity and water distribution losses; and, more generally, improve policy coordination. Implementation started in 2014 and will be completed at the end of 2016. The structured partnership with government at the local, provincial and national levels ensures the coordination of efforts. Partners include the Treasury, South African Local Government Association and the Departments of Cooperative Governance and Traditional Affairs. The project budget for the three-year period is $8.3 million. Additional funding has also been provided by the Investment Climate Facility for Africa, a donor-backed capacity-building fund. DBSA and Anglo American have designed a robust monitoring and verification process that will inform the areas of focus for each of the municipalities in the following years. Results and progress in the programme are currently presented every quarter.

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 the 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.[140]

Incorporating children's rights indicators into risk assessments: Global.
Working with UNICEF's global pilot project on the extractive sector, Barrick Gold has begun integrating children's rights indicators into its risk assessments. It does this through a child vulnerability matrix, which maps out the risks children could face at different stages of childhood, such as dehydration, malnutrition, exposure to environmental toxins, or the lack of access to quality education or adequate housing. The inclusion of children's rights in the assessment process at Barrick's Lagunas Norte project enabled a much more sophisticated understanding of the mine's socio-economic impact. On the one hand, the assessment improved the understanding of negative impacts, such as malnutrition, on the other, it also captured the previously unrecognized value to the community of Barrick actively encouraging children to stay in school rather than drop out to engage in illegal mining.[141]

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- Shift Project 2015, Business and Human Rights, 2015. ShiftProject.org
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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 ongoing 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.[142]

According to the World Bank, implementing the SDGs will require trillions of dollars.[143] 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, 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

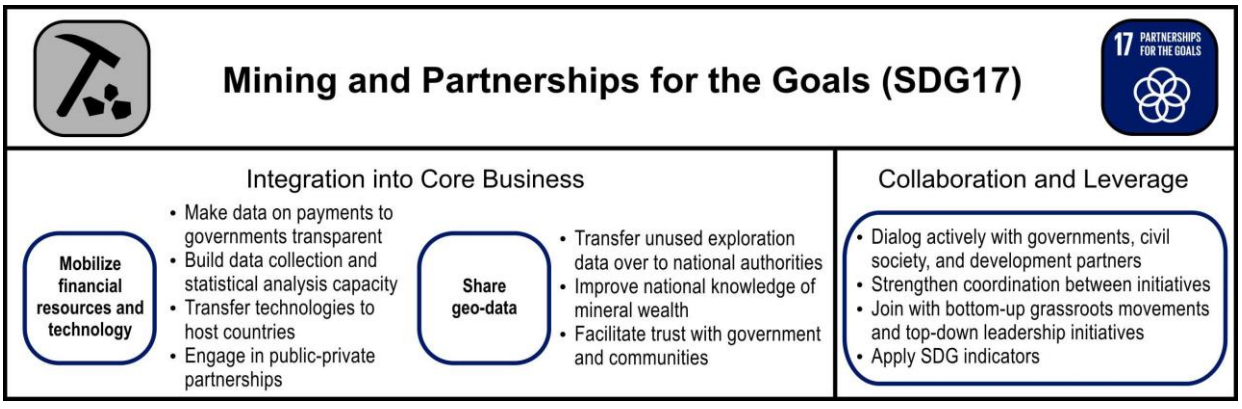
17.1 Strengthen **domestic resource mobilization**, including through international support to developing countries, to improve domestic **capacity for tax and other revenue collection**

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), SDG12 (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 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 geodata.
One unique way mining companies can support capacity building is by sharing unused scientific data with governments and society in general via publication or open data formats. As development banks fund the acquisition of geological data to simultaneously incentivize exploration and put governments on a 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 states that, "For many African countries, the extent of geodata transferal from industry to government is variable and company geodata 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."[144] 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 geodata.

Collaborate and leverage

Each of the previous SDG chapters presents 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 the 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 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.** Use the role of the mining industry in organizing and advocating for the response to the West African Ebola crisis as an example of how companies can leverage resources (see SDG3 – Good Health and Well-Being section)

Case studies and initiatives

The Extractive Industries Transparency Initiative (EITI): Global.
EITI is a successful example of multistakeholder 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, licences, 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. Currently, 51 countries implement EITI, representing $1.8 trillion in government revenues disclosed.[145]

Expanding transparency past financial metrics and across the full value chain: Global.

A number of global initiatives are under way to expand the notion of transparency beyond financial terms, to include social and environmental issues. For example, the World Bank and the United Nations Environment Programme have teamed up in the development of an open data platform for the extractives sector called MAP-X.[146, 147] MAP-X has the capability to provide open access to all of the financial data contained within national EITI reports plus the ability to analyse and visualize this data over time, together with a range of other social and environmental parameters. MAP-X will also provide stakeholders tools for participatory monitoring of benefit sharing agreements and grievance redress mechanisms at the site level.

The African Minerals Geoscience Initiative (AMGI): Global.
AMGI – which originated from the Africa Mining Vision 2050 adopted by the African heads of state in 2011 and was endorsed in 2015 by the African Union Commission (AUC) – aims to provide African governments with better information about their countries' mineral assets in order to strengthen their negotiating position, facilitate better deals for local economies and ensure the sustainable development of their natural resources.[148] AMGI will support improving capacity, both human capital and technological, within African national institutions to collect, collate, verify and reinterpret geodata that has already been produced, assess gaps and define priorities for the generation of new geological data. AMGI will develop a common scientific protocol and technological platform among all participating countries, which will serve both as a repository and as a tool for the treatment of the data. The AMGI multi-donor trust fund, managed by the World Bank, will pool resources and financing for start-up and country-focused implementation. At the regional level, AMGI will be managed through a Secretariat hosted by the African Minerals Development Centre, reporting to a multistakeholder board chaired by the AUC. AMGI will primarily focus on data and technology, but will also support capacity building, the improvement of governance of data and the deepening of transparency.

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Conclusion

Many companies in the mining industry are already doing much of the work shared in the Atlas. A wealth of knowledge, thought and action is already under way 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 their work and identify new opportunities for collaboration and innovation. Dialogue across sectors will ensure that best practices are shared and that the potential contribution of the mining industry is fully leveraged for sustainable development.

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