

# Harnessing the power of mining for a sustainable future

## ABSTRACT

This is the first of a series of three articles which aim to create a change in mindset, attitudes and motivations towards mining that recognizes its true value to our modern-day society—one that enhances the environment and human wellbeing, while at the same time creates tremendous value for consumers and industry alike. It is time to collaborate to create a richer and more ethically compelling narrative of mining as a driver for a sustainable society.

The goal of this first article is to advance the argument why mining is vital for a sustainable society. The second article shall discuss what role all stakeholders can play. The third article will present case-studies of government actions, corporate social responsibility and technological innovations which have contributed toward harnessing this potential. The authors welcome comments and suggestions for this and the two upcoming articles.

## INTRODUCTION

Minerals and metals have played an important role in the development of humankind, from prehistoric times to the modern era. Life as we know it would be impossible without minerals and metals. As the global population grows, the demand for copper, coal, iron ore and other commodities will continue to rise. Yet, there is hardly any other sector which has created as much discourse or controversy. Mining is viewed as environmentally and socio-economically destructive. Such perceptions portray mining as dirty, destructive and sunset.

But the mineral industry is both modern and technologically advanced, and includes many examples of responsible governance and sustainable development in both the developed and developing world. Models for benefit-sharing do exist, as do examples of environmental sensitivity. However, progress has been slow and incongruent. The discourse needs to move away from whether mining is good or bad, and move towards how to harness the technologies and collaborative models to guide future mineral development in a positive direction, embracing sustainability as a new engine for growth where we all benefit from mining's vast potential.

## 1. MINING AND MINERALS IN MODERN SOCIETY

It is impossible to imagine a world without mining. Since the beginning of time, man has mined minerals for its very existence. Thousands of years ago, the hunter, farmer, explorer and artisan relied on the use of rocks and minerals as tools and utensils for their sustenance. Today, everything from light bulbs, televisions and cars to pencils, toothpaste, makeup, and fruit juice are all made of mined minerals. If you can see it, touch it, taste it, smell it, or hear it, it is created from our natural resources.

The mining industry is modern, dynamic, innovative and technologically advanced. It is one of the largest investors in, and users of, state-of-the-art technology. This includes GPS surveying, airborne technologies and down-hole seismic imaging technologies that allow exploration companies to locate new deposits not otherwise discoverable with traditional methods. Environmental technologies reduce energy consumption and the emission of greenhouse gas during smelting and refining, the most energy-intensive aspects of the industry. Information technology efficiently manages data from several sources and reduces the time and cost associated with managing and interpreting data. Communications technology has increased efficiency by, for example, using robots in the refining process, thereby eliminating the need for humans to enter dangerous work areas, and in turn increasing productivity.

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Not only is the mining industry creating technologies for its own advancement, it is also furthering our own modern-day innovations. The Northern Centre for Advanced Technologies located in Greater Sudbury has been, for the last 10 years, using its knowledge of mining technology to explore the final frontier. The not-for-profit organization has been working with National Aeronautics and Space Administration to develop drilling units and other equipment to allow for subsurface space exploration. These processes will be essential for future space exploration or even human settlements on the moon.

Mining also serves as one of the greatest economic drivers of our time. The global mining industry drives more than 45 per cent of the world's GDP, either on a direct basis or through the use of products that facilitate other industries. In Canada, a single mine that produces 6.7 million ounces of gold generates \$3.2 billion in revenues, \$1.9 billion in expenditures that support other industries, \$400 million in wages, \$660 million in corporate mining taxes, \$23.8 million in local taxes, \$1.5 million in direct donations to local charities, and employs 250 people. The Canadian mining industry is also the largest private employer of Aboriginal Canadians. And if mining is necessary to drive economic growth in the developed world, it is even more heavily relied upon in the developing world. Mining is vital to opening up frontier areas and provides economic development opportunities in remote communities.



For all its positive advancements, progress has been slow and industry has operated for too long without a true understanding of its overall impact on the world. Without proper regulation and enforcement, governments around the world have also helped perpetuate the negative impacts. As a result, the mining sector continues to be faced with negative perceptions and historical legacy issues which hinder positive and sustainable growth.

## 2. MINING AND ITS IMPACTS ON PEOPLE AND THE ENVIRONMENT

The mining sector is an intensive user of energy, water and land, and a significant generator of emissions and environmental waste which can cause significant harm to people and the environment. Inadequate mining, and social and living conditions, increasingly attract attention. Such adverse impacts on broader communities (including displacement and relocation), the environment, wildlife, and crops have yet to be effectively addressed. Meanwhile, labour disputes, civil unrest and illegal strikes are on the rise worldwide as more assertive communities in the developing and developed world seek to be recognized as true stakeholders. Intertwined with these risks are historical legacy issues, such as abandoned mines around the globe, which perpetuate health and safety risks and the negative stigma surrounding mining.

The majority of the health problems in mining regions are caused by unchecked pollution and high levels of toxicity. The soil, water bodies, air and environment are polluted due to constant release of chemical wastes, dust generated by blasting and excavation, and the dumping of mine wastes and over-burden in the surrounding lands and rivers. People living nearby are constantly exposed and consequently develop respiratory illnesses, skin disease, and a deteriorating functionality of their organs. Women may be more likely affected due to their domestic household role, yet these unhygienic conditions affect children the most; more than one million children are doing poisonous work on the margins of the mining industry.

Environmental impacts of mining are another area of significant concern. Mining is site-specific activity and the land is of

no use to mining companies in the pre- and post-mining periods. Removal of vegetation, water scarcity, and contaminated soil, water and dust in the atmosphere from mining disrupts the growth of entire ecosystems. With increasing awareness about the damaging effects of pollution in our soil, air and in our oceans, these have become critical issues for the global community. If not addressed correctly, these impacts will be permanent and irreversible. Abandoned mines only perpetuate these negative environmental impacts and reinforce the negative stigma associated with mining. Overcoming these effects is vital to the sustainable development of the mining industry.

## 3. WHAT DOES SUSTAINABLE DEVELOPMENT LOOK LIKE?

According to the United Nations, sustainable development seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future. Far from requiring the cessation of economic growth, it recognizes that the problems of poverty and environmental degradation cannot be solved unless we have a new era of growth. It has been argued that economic development, reduction of poverty, and conservation of resources are equally essential pillars to sustainable development.

A number of international guidelines have emerged to help companies shape their

Corporate Social Responsibility (“CSR”) practices. CSR is defined by the Government of Canada as the voluntary activities undertaken by a company to operate in an economic, social and environmentally sustainable manner. CSR has traditionally been reactive and associated with corporate charity and philanthropy—a means to build a good brand-image and cooperation from local community interests. The United Nations Guiding Principles on Business and Human Rights moved us beyond this idea, however. Governments have now affirmed that all businesses have a direct responsibility for their impacts on the environment and for preventing human rights violations, whilst ensuring that adequate remedies are available when abuses occur. The OECD, European Union, International Standards Organisation and others have now also aligned with the UN principles.

We are seeing companies taking a more integrated approach to their CSR programs, considering the social and environmental consequences of their business activities. For example, Vale’s \$2-billion Clean AER (Atmospheric Emissions Reduction) will reduce sulphur dioxide emissions at Vale’s Copper Cliff smelter in Sudbury by 70 per cent and dust and metal emissions by 35 to 40 per cent. The project will also create an estimated eight million person-hours of employment and \$400 million a year of construction value. And Goldcorp has taken



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an active role in creating partnerships with the Aboriginal and Indigenous Peoples. On August 16, 2013, Goldcorp signed a Collaboration Agreement with Ontario's Lac Seul First Nation that considers everything from future exploration activities on the Red Lake site to training and employment opportunities (which will require 1,280 workers) for Lac Seul members and upcoming financial contributions from Goldcorp for community initiatives.

Sustainable companies are recognizing that by combining resources, labour and innovation, wealth can be greatly expanded. It is not a zero-sum game. CSR is becoming a proactive value-creation tool to innovate within business, develop human capital, enhance energy-efficiency and develop shared values with customers and the society at large.

#### 4. THE WAY FORWARD: PROPOSALS FOR A SUSTAINABLE FUTURE IN MINING

Responsible development of mineral resources integrates stakeholder engagement, community development, environmental best practices, responsible resource use, respect for human rights, and provides fair labour conditions and health and safety standards for its workers. It helps parties express their interests and concerns in a constructive and proactive way and identify areas of mutual benefit viewing the community and environment as key stakeholders. The result is the prevention or resolution of conflicts and ultimately the economic and social development of a region in an environmentally responsible manner.

Truly sustainable development includes a positive net return in all four areas: (1) **Poverty reduction:** creates employment, develops infrastructure, builds local community capacity; (2) **Environmental:** carbon positive, energy positive, water positive, materials positive, waste positive, and restorative to ecosystems; (3) **Social:** fair share of taxes, labour rights and safe working conditions, fair employee remuneration, family-friendly benefits, engaged employees, local workers, purchasers and investments, products and services build social capital; (4) **Economic/Financial:** financially sustainable, ethical business practices, transparent/engaged stakeholders, sustainable business model, policies and systems, sustainable value chain/life-cycle accountability.

To make progress with these elements of sustainable development, institutional cooperation among key stakeholders including government, the mining industry and its associated organizations, and academic and educational institutions is vital. Institutional cooperation is defined as the ability of organizations to work proactively, cooperatively and collaboratively. Institutional cooperation is crucial for the simple reason that it is beyond the sphere of authority, capacity or control of any one entity. Neither the government, nor the private sector, alone, can achieve goals relating to sustainable development.

When governments, civil society, mining companies and local communities get together, great things can be done. In Ontario, partnership between Barrick Gold Corporation and the Municipality of Greenstone played a key role in rehabilitating a highway corridor after 32 years of mine operations. Today, a Heritage Interpretive Centre and an 18-hole golf course stand as attractive tourism and income generator for the community. Similarly, following nearly eight decades of mine and smelter operation, cattails and reed grass now

cover over 95 per cent of 170 hectares of active marshland around the Falconbridge smelter. Canada geese, black ducks, great blue herons, red-winged blackbirds, killdeer, muskrats and moose can now be seen at the marsh.

At the exploration level, we have seen several companies enter into "interim" benefit agreements with affected Aboriginal groups respecting early-stage mineral exploration. These agreements have been of modest scope and not nearly as expansive as impact benefit agreements commonly associated with larger projects. Fostering strong relationships with communities is a long-term process. Laying the groundwork early on, through exploration-stage consultation or interim benefit agreements, may give exploration companies more success in gaining support for the project and developing a project that is sustainable over the long term.

Furthermore, by collaborating with all affected stakeholders, greater value is created for the consumer. We are seeing examples of end-users such as electronic companies and jewellers take proactive action to collaborate with local communities, industry and government to create conflict-free supply-chains in regions suffering from years of war, such as the Congo. These programs not only directly reduce profits to fund illicit wars, they also attempt to address environmental devastation and create employment and better working conditions for the thousands of artisanal miners working in extreme conditions on the fringes of society. In return, a viable product is developed that can be readily traced and sold to the consumers who are demanding safe minerals in the products they purchase. The end cost to the company is significantly lower than each company undertaking its own intensive due diligence plan to uncover the sources of their supply chain.

Yet there is a scarcity of tested models and frameworks which have been consistently successful to bring all stakeholders together to achieve sustainable development objectives. We propose that each mining jurisdiction establish a "Multi-Stakeholder Collaborative Council" with membership from all sectors mandated to advance sustainable mining. Having such a council will serve as a catalyst for establishing direction, priorities, dialogues and a legal framework to promote the development of cross-functional synergies and cooperation. With this, there needs to be incentive and economic drivers from the government to support innovation within the mining industry. New technologies are needed that create cost-effective and environmentally safe methods for extraction and operation.

At the international level, we propose that the international community engaged in sustainable and responsible development with the affected governments of the mining jurisdictions pool together financial resources and human capital to set up a "Global Mineral Resource Development Fund" to address three key areas: (1) the rehabilitation of abandoned mines; (2) conversion of artisanal mining into legal mining; and (3) investment in the development of breakthrough technologies to conserve and manage resources such as water, energy, and land in a more environmentally, socially and economically responsible manner.

Several successful natural resource-based collaborative groups have emerged around the world. They have leveraged their resource endowment into a knowledge advantage that can multiply the economic benefit of the resource and create high-tech, knowledge-econ-



omy niches. For example, Finland's mining sector accounted for 85 million in exports in 2008; the country has also developed a strong mining technology industry which accounted for 1.5 billion worth of exports in 2008 and employed almost 40 per cent more people than the core mining industry. The Finns have managed to transform their relatively modest resource advantage into a strong knowledge advantage.

The Canadian Government has recently amalgamated the Canadian International Development Agency with the Department of Foreign Affairs and International Trade. The newly restructured department is expected to create a larger role for the resource sector in foreign affairs and development policies. Resource extraction is a key tenant of the Canadian economy. According to Natural Resources Canada, the total value of Canadian mineral exports in 2012 was \$92.4 billion, or more than 20 per cent of Canada's total exports. Furthermore, Canadian miners explore and operate in 4,300 projects around the world. Sustainability and responsibility are increasingly the credentials required to operate in this global arena. Its future success is dependent on being as transparent as possible, which means establishing consistent and strong consequences for corporate behaviour abroad, including environmental damage, strengthening the role of the ombudsman and institutions in the countries where Canadian companies work. We have seen recent cases where Canadian mining companies have been held responsible for human rights abuses and degradation of the lands and waters where they are active in countries such as Eritrea, Greece, Papua New Guinea, Guatemala, and the Congo.

Glenn Sigurdson, chair of the Responsible Minerals Sector Initiative at SFU's Beede School of Business, states, "The discussion must go beyond economic questions, as important as they are, and become more inclusive. Everyone involved in the process—from environmentalists to miners, local governments to community groups—must understand that each has a vital self-interest in understanding what is going to work for the other side. For the miners, it's an opportunity to tackle some of the toughest challenges facing the industry."

## 5. CONCLUSION

Development of mineral resources has been identified as a key driver of global economic growth, with the potential to transform economies and societies, including some of the world's poorest nations. Mining is vital to our society and is here to stay. The discourse needs to move toward conversations about how to harness mining's true value.

The challenges facing the mining sector necessitate significant paradigm shifts from a reactive to a proactive approach, from traditional governance methods to collaborative public engagement processes, changes in attitudes and behaviours, and a willingness to address historical legacy and environmental damage issues, the deployment of breakthrough technologies, and above all, cooperation and collaboration among all major stakeholders for a shared vision and commitment to mining in a sustained manner until sustainability is embraced and integrated. Achieving sustainable development will require concerted collaboration and a commitment to a balanced approach that views risks as opportunities for growth and prosperity for all. We have only "scratched the surface" of mining's vast potential.

*The authors have been influenced by a number of organizations' work on sustainable development in mining and by their own experiences working with diverse stakeholders in the mining and mineral sector. The views expressed here, however, are solely the authors' and should not be attributed to any of their firms, clients, or respective associates. The material and information provided are for general information purposes and should not be relied on as legal or business advice or as a legal opinion. The authors make no claims, promises nor guarantees about the accuracy, completeness, currency, or adequacy of any information linked or referred to.*

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