

# Exploring Sustainability in Mining

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There is no getting away from the fact that mining and the extraction of mineral resources from the earth and underneath the world's oceans, is in no way sustainable. However, there are areas in which the industry can be improved and work to a more sustainable model and it is these areas which Vicky Kenrick at Allen & York International Sustainability Recruitment Consultancy will explore in the following article.



Vicky Kenrick

Improvements can be made across; Energy usage, water management, compliance with social and environmental impact assessment legislation and increased investment in the research and development of new and innovative ways to 'clean' the raw materials and reduce harmful emissions.

## EIA and Social Assessment

The mining industry has a crucial role to play in the responsible development of the world's natural resources; however at the same time mining can have a substantial and direct social, environmental and economic impact on the surrounding communities.

As demand for the world's mineral resources continues to grow, exploration and mining activities are expanding into areas of critical habitat. Degradation of these areas can result in the loss of threatened or endangered species, as well as ecosystems vital to the provision of services such as food production and freshwater availability. There is clearly an urgent requirement for the mining industry to become more sustainable.

"If companies do not pay attention to external signals, and do not practice sustainable mining, there can be number of negative consequences".

Tom Delfgauw, retired Vice President for Sustainable Development at the Royal Dutch/Shell Group

The sustainability of the mining industry, particularly the local environmental impact of mines, has been a hot topic for many years and mining companies have worked hard to address these issues.

However, failure by mining companies to manage local environmental and community relations effectively can cause serious disruption, ranging from temporary shutdowns to project delays and loss of licenses; ultimately resulting in an unsustainable mining industry. This, along with the growing awareness of sustainability in mining, has led to an increased demand for EIA and SIA professionals working within the mining industry. Not only do EIA licences need to be granted for the mining project to proceed; demonstrating the move to more sustainable mining, but also the EIA processes provide a valuable opportunity for the local community to participate in decisions about mines, and their involvement at the planning stages are also beneficial in the prevention of issues further down the line. By evaluating each stage of the mining process in terms of its environmental and social impact; mining companies are more informed to be able to move towards more sustainable and socially responsible mining practice.

Each phase of mining has an environmental and social impact on the local community; from clearing of vegetation at the exploratory stage to the construction of access roads surrounding ecologically sensitive areas and the creation of the mining pit. Allen & York specialise in sourcing EIA and SIA professionals specifically to manage the project delivery. A good ESIA professional will ensure that the potential health risks of mining; such as the hazardous chemicals in waste and water, do not affect the local environment or community and consequently move the mining company in the direction of a less polluting and more environmentally friendly strategy.

SIA professionals may have to manage the resettlement of communities during a period in which they feel particularly vulnerable. Maintaining good relationships with local authorities and enabling local communities to play a role in the decision making process can ensure that the views of the local community are taken onboard and not infringed. Managing the communities demands on land, water as well as waste infrastructures are also important aspects' involved in SIA management and again steer mining projects towards a more socially responsible agenda.

The social impact of mining is complex, although mining can create jobs, roads and infrastructure in

undeveloped communities, it can cause considerable disruption. Assessing the treatment of communities is therefore an important part of making the mining industry more sustainable.

## Energy Efficiency

Among the most pressing environmental concerns for stakeholders associated with the mining industry are energy efficiency and water usage.

An exciting sustainable development that will improve energy efficiency in the mining industry is being implemented by Rio Tinto, who are developing the Mine of the Future™, a robotic mine at the iron ore mine in Pilbara, Australia which will rely more on remote controlled equipment and energy efficient solutions. A continual transition to more efficient mining is also taking place in South Africa, where as recently as March 2012, mining companies are looking at solar or wind power to substitute grid power for parts of powering operations and floodlights. Some companies have also become directly involved in electricity generation. Rio Tinto, for example, has its own hydropower generating facilities with combined generating capacity of over 3,500MW for energy usage at their mines. Furthermore, a new joint mining venture in South Africa aims to provide the foundation for a shallow and low-cost platinum mining complex. The mine hopes to make use of the "Kell Process", which uses only one-fifth of the energy used in conventional platinum smelting.

It is clear that a number of mining companies are working on the development of low emission technologies for the industry - either directly, or through funding for research.

Given growing public concern about water resources, the minerals industry has an urgent need to demonstrate, and be recognised for, responsible and sustainable water management. Furthermore, by being seen as effectively managing water usage, this will help the industry maintain its social licence to operate and continue to grow.

Reliable access to water, its management and disposal is critical for mining and processing sites. The sustainability reports of the major mining companies frequently address the issue of water; in the majority of reports there is an exploration into excess water produced in mines and how it could be used for agriculture or for generating electricity, instead of being wasted.

In addition, changes in laws, technologies and attitudes have begun to address some of the most immediate threats posed by mineral development, to the water system. Water-pollution problems which can often be caused by mining include; acid mine drainage, metal contamination and increased sediment levels in streams. There is a call for mining companies to manage their water usage more sustainably, so water pollution does not occur as often. A number of preventable accidents that have occurred recently include massive sediment loading into fish-bearing streams, the building of roads with acid generating waste rock, non-compliance with waste handling plans, and repeated violations of water quality standards.

To avoid these accidents, mining corporations need to ensure the best pollution prevention strategies are employed in cases where the risks can be managed. Another question that should be raised is to whether there is a need to recognise that in some places mining should not be allowed to proceed because the identified risks to other resources, such as water, are too great. In the right place - and with conscientious companies, new technologies and good planning - many of the potential impacts are avoidable. In fact, it has also been argued that most water pollution that is caused by mining arises from negligence not necessity. Therefore, having the right water professionals working within mining companies can ensure mining pollution does not occur. At Allen & York we're recruiting for water professionals within the mining industry, all with the responsibilities to make the water processes in mining more sustainable, such roles include Senior Hydrogeologist; which is both a technical and senior level role that will provide client and project management assistance to the business.

Mining is involved in a diverse range of energy intensive processes such as excavation, mine operation, material transfer, mineral preparation and separation. Good news is that mining companies are taking steps towards carrying out these activities more sustainably; with energy efficiency being a key focus for them - they continue to seek to reduce the emissions of toxic substances such as carbon, nitrogen and sulphur dioxides, generated in smelting and combustion processes, and to reduce air pollution.

## Clean Coal and New Innovations

The coal-mining industry in particular has come under scrutiny recently, as society and politicians show a continued concern about CO<sub>2</sub> emissions and global warming.

It is clear that the biggest problem in coal mining is the large amounts of CO<sub>2</sub> emitted. According to the United States Environmental Protection Agency (EPA) coal contributes 31% of CO<sub>2</sub> emissions - the largest of any source.

Happily, coal mining is also an industry that is investing significantly in environmental processes and research into 'clean coal technologies';

**"I firmly believe that this new approach is a global imperative, not only for sustainable mining but also for sustainable development, in general"** Susan Shabangu, Minister of Mineral Resources, South Africa.

Clean coal has a number of variations, but each one of them involve stripping the CO<sub>2</sub> out of the coal, either before or after it is burned and then capturing it. It is then either utilized for industrial

purposes or for enhanced oil recovery, or else it is pressurised into a liquid form where it can be injected underground and where it supposedly will stay indefinitely in a process called carbon sequestration. The overall process is called carbon capture and storage (CCS).

The least destructive form of clean coal is underground coal gasification (UCG). This is where the coal is left in the ground and converted to gas by chemical means and then sucked up to the surface where it is burned.

China has positively embraced the concept of moving towards cleaner coal technologies to lessen problems with greenhouse gases and reduce the release of sulphur and nitrogen oxide, which are the main contributors to acid rain.

China is developing promising new coal processing innovations that make best use of resources, not just environmentally but commercially; capturing the heat and the chemicals that are emitted. As a dominant coal supplier and coal producer it is good to see that China are recognising the need for change and it's likely the continent could begin to lead the world in clean coal technologies.

## Bio Diversity

Minimizing the impacts of mining practices on biodiversity is also a major challenge facing mining companies today in their quest to become more sustainable. Frequently, when mining companies create new mines, they strip the land of all plant life, destroying animal habitats and threatening the region's biodiversity. Companies are therefore challenged to avoid harmful impacts on all lands they own, including the unnecessary disturbance and removal of habitats.

In 2010, the UN declared a 'Decade of Biodiversity'; highlighting the requirement for the conservation of biodiversity in mining and its relationship with a more sustainable mining industry through 2010-2020 and beyond. Post 2010, a case study of the De Beers Marine mine in South Africa demonstrated their move towards a more sustainable extraction process, having realised their environmental and social responsibilities.

Mining activities at the De Beers Marine mine in South Africa altered the nature of the seabed landscape; where the communities that live in the effected soft sediment areas were destroyed during the mining processes. To counteract this and preserve the seabed's; De Beers invested in independent scientific assessments of mining operations on this particular West coast of South Africa; of which the results demonstrated that natural recovery of the unconsolidated sediment habitats occurs over time. The understanding of the seabed environment and its biological communities around Southern Africa was improved by involvement in research of marine science. Combined with the company's collaboration with the World Wildlife Fund and the South African National Biodiversity Institute in the planning phase and the recruitment of Conservation Planners; De Beers altered their mining processes to ensure the natural recovery of sediment habitats occurred.

## Collaboration is Key

The mining and minerals industry has always been on the receiving end of environmental campaigns but it appears the industry itself is embarking on a campaign for a more sustainable mining industry. Not only through all of the technical innovations and developments in mine processing outlined above; but also with the recruitment of environmental and sustainable professionals to move the industry towards a more permanently sustainable model.

The two-year Mining, Minerals and Sustainable Development (MMSD) project, completed earlier this year, is certain to go a long way towards developments in more environmentally friendly mining.

The project was assessing the global mining and minerals sector in terms of transition to sustainable development, identifying how the services provided throughout the minerals supply chain can be delivered in ways that support sustainable development, proposing key elements for improving the minerals system and building platforms for ongoing communication and networking among all in the industry.

The conclusion of the project was that sustainable development in the minerals sector can be achieved through increased understanding of the principles of sustainable development, creating the right organisational-level policies and management systems, collaborating with others with common interests and increasing the ability to work towards sustainable development at the local, national and global levels.

It suggests factors for improvement including; incorporating sustainable development into the curriculum for minerals professionals and educating employees, government officials, civil society and labour organisations and increasing the number of sustainability and environmental professionals within the mining industry.

## In Summary

Mining is a challenging environment for the sustainability professional, but one in which there are opportunities to make a huge difference in terms of impact to the planet.

Sustainability in mining seems to be on the rise in terms of awareness and actions by mining companies and supporting governments and associations.

It is clear that companies are incorporating sustainable development into mine operations as well as corporate policy. With a growing number of sustainability job opportunities across the mining industry, primarily across; energy, environmental management and water management

Allen & York specialise in recruiting sustainability professionals within the mining and minerals industry; supporting the growth towards a more sustainable mining industry.

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